DESIGN STANDARDS
for
URBAN INFRASTRUCTURE

15 PLAYGROUNDS AND PLAYGROUND EQUIPMENT

URBAN SERVICES

15 PLAYGROUNDS AND PLAYGROUND EQUIPMENT

15.1 Introduction

These guidelines have been prepared to provide information and guidance on the design requirements and safety standards for playground facilities on land owned by ACT government and managed by Canberra Urban Parks and Places. The playgrounds generally occur in open space areas and for convenience, the term open space playgrounds has been used in these guidelines to include all the playgrounds managed by Canberra Urban Parks and Places.

This guideline outline general information and safety requirements that are in addition to the requirements of the relevant Australian Standards for application in open space playground installations in the ACT, and do not replace the Australian Standards.

This guideline is not to be used in isolation, but read in conjunction with Australian Standards AS 1657, AS 1924.1, AS 1924.2, AS/NZS 4422 and AS/NZS 4486. Where there are irregularities between the documents, the option with the safest outcome is to be adopted as required on a site-specific basis.

Variations from or additions to the Australian Standards within this guideline are the result of:

- accounting for environmental conditions specific to the ACT region
- ACT planning requirements for the allocation and location of playgrounds
- planning for age appropriate play equipment in ACT open space
- using accumulated knowledge to target high-risk accident and injury types that occur within children's playgrounds that are not currently addressed in detail by the Australian Standards.

The design and construction inspections of open space playgrounds must be undertaken by qualified professionals in the fields of landscape architecture or playground design. ACT Government approval of any open space playground facility is required prior to commencement of construction.

Due consideration should been given to providing an appropriate balance between physical challenge and safety requirements and the pattern of use children apply to their play. Heights and dimensioning must carefully consider both the size of intended users and the likelihood of the equipment being used in non-supervised situations

Design and construction specifications must ensure that robustness, durability and longevity are also considered.

15.2 Related codes of practice and guidelines

15.2.1 Legislation

Disability Discrimination Act 1992 (Cwlth)

15.2.2 Industry standards

AS 1182 Size Coding Scheme for Infants' and Children's Clothing – Underwear and Outerwear, Standards Australia.

AS 1657 Fixed Platforms, Walkways, Stairways and Ladders - Design, Construction and Installation, Standards Australia.

AS 1924.1 Playground Equipment for Parks, Schools and Domestic Use. Part 1: General Requirements, Standards Australia.

AS 1924.2 Playground Equipment for Parks, Schools and Domestic Use. Part 2: Design and Construction - Safety Aspects, Standards Australia.

AS 1926.1 Swimming Pool Safety. Part 1: Fencing for Swimming Pools, Standards Australia.

AS 3600 Concrete Structures, Standards Australia.

AS/NZS 4422 Playground Surfacing Specification Requirements and Test Method, Standards Australia.

AS/NZS 4486 Playgrounds and Play Equipment. Part 1: Development, Installation, Inspection, Maintenance and Operation, Standards Australia.

15.2.3 Policy and guidelines

ACT Crime Prevention and Urban Design Resource Manual, Planning and Land Management, ACT Department of Urban Services, Canberra, 2000.

Proposed Policies for Residential Development in the ACT Incorporating ACTCode, Department of Urban Services, Canberra, 2000.

15.3 Legal obligations

Play equipment and playground designers should familiarise themselves with the paper 'Legal Liability for Playground Design and Management' in *Play Without Pain*. Of particular interest is the opinion that designers are responsible for their designs and the relevant safety issues.

The *Disability Discrimination Act 1992* makes it unlawful to discriminate on the grounds of disability in providing access to or use of premises that the public can enter or use. Public facilities must be designed to be accessible to people with disabilities.

15.4 Philosophy of play and playgrounds

A child's entitlement to play should be recognised and reflected in the range of experiences made available to them within their sphere of mobility. Due to the child's limited concentration span, the aim of the play might not be achieved but the inquisitiveness to carry out play is established. Play must *not* be dictated but developed to promote children's self-concept, self-esteem and autonomy. When designing an outdoor play environment, designers should aim to provide a variety of play, stimulation and challenges and some flexibility in play opportunities to maximise the child's development. Where appropriate, a playground and equipment should be accessible to all persons (ie people with disabilities).

15.4.1 Variety of play opportunities

Children's play is generally characterised by:

- a short span of concentration
- the need to make decisions involving personal risk
- informal competitiveness within their peer groups.

Playgrounds should provide both a balance and variety of recreation opportunities to suit the physical, social and intellectual play needs of the children for whom the playground has been designed.

15.4.2 Physical play

Of all the play needs, physical play needs are generally the ones best satisfied in a playground. Sliding, swinging, climbing, spinning, bouncing and balancing can all be catered for through the provision of appropriate play equipment. Other physical play needs such as throwing, hitting, kicking, pushing and jumping can also be provided for at public playgrounds through thoughtful planning and the provision of both hard surfaces and grassed open spaces for ball and other game activities.

Paths or open paved areas are useful for riding wheeled toys, skateboards and tricycles. If these specific use activities are to be catered for, it is important that some separation from major pedestrian paths is provided to avoid conflict between user groups and passers-by. The provision of such play opportunities will also promote and encourage desirable social and intellectual play.

15.4.3 Social play

Social play needs may be met through the provision of play items, which, through their design or location in relation to each other, promote social interaction and companionship. In addition to play equipment, the landscape can be designed to create areas conducive to social play through the provision of seating, shelters and the creation of spaces of varying size defined by mounding or tree planting.

While ‘waiting one’s turn’ is a valuable part of social play, it is not a reason for providing too few play opportunities in playgrounds.

The provision of equipment and facilities that encourage ‘comfortable’ competition with others on an informal basis through instructed play is highly desirable.

15.4.4 Challenge

One of the more subtle skills of good playground design is to ensure that playgrounds are interesting and challenging while still meeting community expectations and legal requirements for safety. This is particularly relevant when designing for older children.

Children are seldom concerned with the subtlety of design that is aimed at creating relevant equipment to a specific age group. If play equipment is provided for the public, children presume that it is there for their use and pleasure. In the process of using the equipment children may discover that it is not entirely to their personal liking, they may desist from using part or all of the equipment. However, it is essential that the design of a playground offers challenge that includes an appropriate balance between safety and risk for the appropriate age group.

Children in general, and young children in particular, should feel comfortable and secure when using public play equipment. The form of challenge and the degree of risk incorporated in designs must acknowledge these facts through the provision of safety features that are appropriate to all age groups.

15.4.5 Play activity circuits

The concept of providing play activity circuits where the various pieces of equipment in a playground are sequentially located to promote a child’s progressive use from one play item or event to the next is desirable. In planning this progression of play activity, it is

important that careful consideration be given to the creation of circulation routes within the playground in a manner to avoid possible conflicts occurring between users. It is recognised that regardless of the best pre-planned design intentions, children will still invent their own games using various circuits of equipment. It is therefore important that the designer's influence in this matter should be subtle, sensitive and have flexibility to encourage a range of circuit options.

The form of equipment and facilities provided in a playground should be arranged so that their design and function offer opportunities for the personal satisfaction, achievement and development of children in terms of:

- the span of the child's interest in particular activities
- the gradual and maturing ability of the child to respond to challenge and make decisions which involve some element of perceived risk to them personally
- the freedom for imaginative and creative individual play and group games with companions.

15.4.6 The relationship of playground design to user age groups

Playground designers should realise and recognise that the physical abilities of children, their vision and mental concentration are different from those of adults and vary within and between age groups.

This guideline identifies the following three age groups:

- 0–9 years
- 10–14 years
- 15+ years.

The scope of physical, social and intellectual needs that can be satisfied in the playground environment varies considerably between age groups and can, to a degree, be catered for through a design emphasis on an age group. In particular, it is important that play equipment intended for use by the 0–9 age group should be scaled to suit the physical capabilities of that particular group.

However, the equipment intended primarily for use by the older age groups must not be designed to preclude use by the younger age groups. A graduated scale of activities should be incorporated in the design of equipment structures and activities for the older age groups to still enable safe use of the equipment by younger children.

The following diagrams provide body dimensions by age and should be referred to in the design of playgrounds. Appropriately proportioned play equipment or play items are an important factor in ensuring safe play. A brief outline of the play needs of the respective age groups is provided.

15.4.6.1 0-9 years

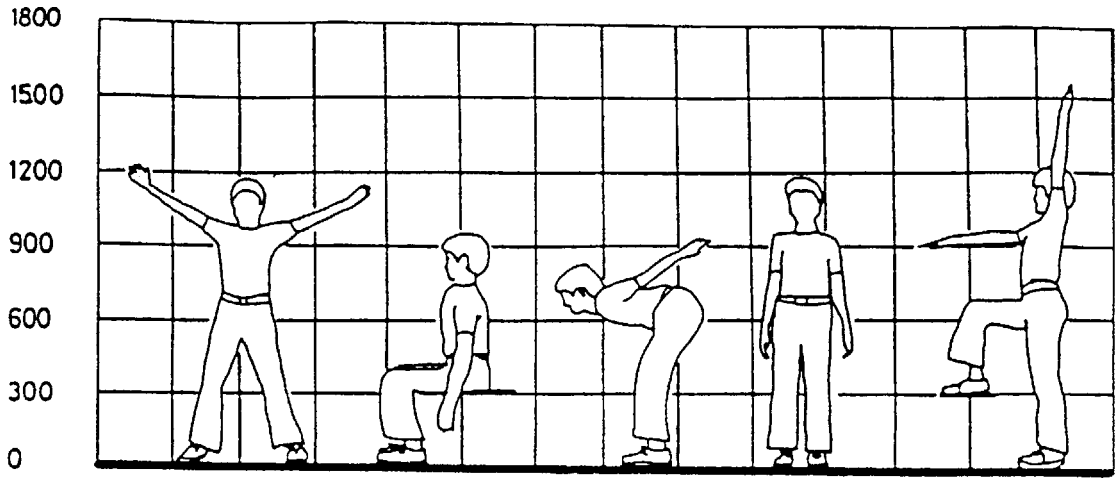
The 1–4 year old age group has a restricted sphere of mobility both in and around the home and neighbourhood environment. The child would normally have full time supervision from an adult.

At two years of age, the child can walk upright and can run, but usually prefers to walk. Co-operative play is rare at this stage, and if groups of two or three form, they do not stay

together for long. The two-year-old can be easily intimidated by the more active and older age groups.

Three- and four-year-olds are more active, they enjoy creative activities and playing with small toys. Their social play needs are beginning to develop and they enjoy making new friends. Interactive play in groups of two or three is common.

Whilst being prone to tiring easily, the play activities of this age group can be very active and include running, jumping, climbing, riding, balancing, exploring, swinging, sliding, interacting, crawling, racing, chasing, rocking, imagining and pretending.



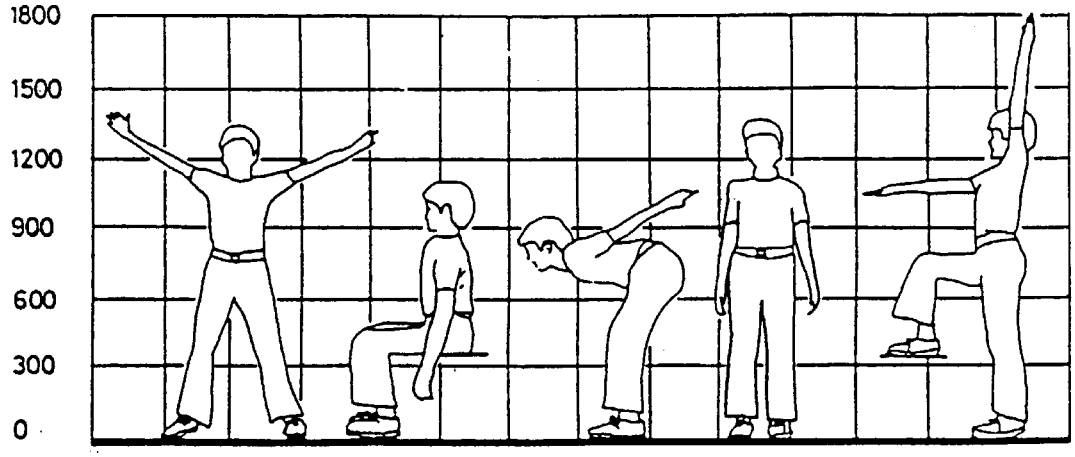
Body dimensions for 6 year old

The sphere of mobility of the 5–9 year olds expands to the larger neighbourhood including the school environment. Supervision in public places by an accompanying adult or responsible sibling still exists.

Five- and six-year-olds enjoy active games and can be boisterous; they can climb with confidence and are more sociable in groups of two to five children. These groups have shifting membership and the ‘rules’ of games are not fixed. Hide-outs and small enclosures are popular for social interaction and imaginative play experiences.

Seven- and eight-year olds are generally less boisterous in their play activities and are prepared to repeat their performance of activities to learn and master skills. Stamina for activity increases and they are prepared to be a spectator as well as a performer. Game rules are generally fixed and group play lasts for long periods.

Nine-year-olds are beginning to become more independent, and become competitive in their play activities.



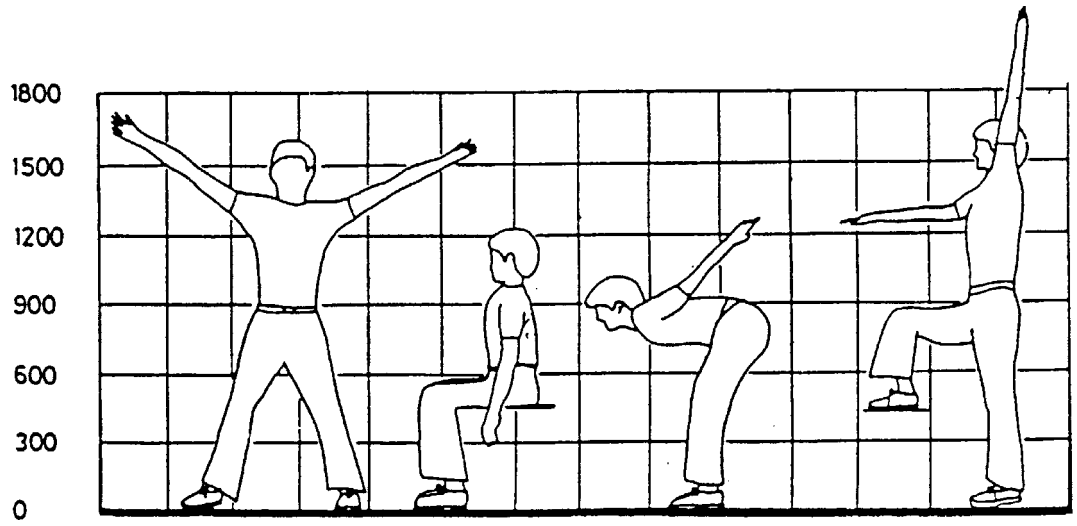
Body dimensions for 9 year old

15.4.6.2 10-14 years

The 10–14 year old age group has a sphere of mobility that extends beyond the home, the neighbourhood and the school environment. Their activity generally includes the company of peers. Their play activities include bike riding, ball games and skateboarding. The pursuit of more challenging physical feats in order to test their physical and intellectual skills, as well as satisfying their need for social interaction, becomes an important focus in their development.

Ten- and eleven-year-olds test their motor abilities to their limit as they work and play hard to master skills. This group has a strong interest in competitive activities. The child is more socially stable, more independent and generally prefers friends to parents.

Individual differences become more pronounced in children over 12 years and the play characteristics of teenagers are difficult to describe. Young teenagers prefer not to be identified with smaller children and seek their own identity, both as a group and individually. Play equipment needs to offer a challenge in proportion with their physical abilities, strength, sophistication and daring. The ‘image and style’ of play equipment is important to this group.



Body dimensions for 12 year old

15.4.6.3 15+ years

While the 15–19 age group are not encouraged to participate at the local or central playground level, consideration should be given to providing facilities for their use at district playgrounds. This age group is generally highly mobile and seeks involvement in a wide range of formal and informal sports either as competitors or as spectators; social involvement is a high priority.

15.5 Planning open space playgrounds

Proposed Policies for Residential Development in the ACT Incorporating ACTCode provides guidelines for the provision of various types of parks and open space. Many of these areas will contain playgrounds. Playgrounds cater for small to large numbers of children using the playground intensively for short periods of time.

Children aged three to 12 years are usually the predominant user group of play equipment areas in neighbourhood parks, with the youngest children enjoying the lower, easily accessed equipment and slides and the older children enjoying the challenge of equipment designed for overhead/upper body development.

In neighbourhood and district parks, it is ideal to develop play equipment areas for each age group. Whilst a play equipment area can provide individual items that are suitable for particular age groups, it is desirable to provide separation between them. Budgetary constraints often mean that separate softfall areas are not possible. Carefully considered 'grouping' of play events that are most popular and suited (in terms of physical dimensioning and degree of challenge) to each age group into particular 'zones' of the softfall area is a way of achieving this strategy within a single designated softfall area.

15.5.1 Local neighbourhood playgrounds

Local neighbourhood playgrounds are generally provided in residential areas within a 400 metre radius of 95 per cent of all residences and preferably adjacent to pedestrian paths. Although all age groups are likely to use these playgrounds, the target age group is 0–9 years. This age group is likely to be accompanied by adult guardians.

A minimum of seven activities should be provided but less may be acceptable where a playground is being replaced and there is a general oversupply of equipment in the neighbourhood. Popular play items such as double swing sets, a slide and one or two spring animals or a spring see saw should generally be included. Additional activities may consist of an angled or vertical slide pole, scramble net, horizontal ladder, stepped decks, steering wheel panel or shop front. High risk play equipment such as flying foxes and skateboard ramps are generally not considered suitable for these playgrounds.

For height of equipment in local playgrounds refer to section 15.8.1.

Basic park furniture such as seats (see Design Standard 19 Park and Street Furniture and Barbecues) together with tree planting and landscaping (see Design Standard 22 Soft Landscape Design) should be provided.

15.5.2 Central neighbourhood playgrounds

Central neighbourhood playgrounds are generally provided in residential areas within a one kilometre radius of 95 per cent of all residences and preferably adjacent to cycle facilities. They are often located near a recreation facility, sporting complex, park or suburban shopping centre. Although all age groups are likely to use these playgrounds, the target age group is 10–14 years.

Central neighbourhood playgrounds should provide a more diverse, physically challenging and greater quantity of play equipment than local neighbourhood playgrounds catering for the number of children likely to use the equipment. Equipment should include free standing items and platforms with play items suitable for the 10–14 age group. Some play equipment should also be provided for the 0–9 age group.

For height of equipment in central neighbourhood playgrounds, refer to section 15.8.1.

Additional play opportunities might include some irrigated grass surrounding the play area, small paved areas that are installed with basketball hoops or tennis practice walls for informal ball games, and concrete paths, mounds or ramps suitable for skateboarding and other forms of wheeled play.

A diverse range of park facilities, tree planting and landscaping are considered essential in encouraging an increased length of stay and providing for the passive recreation needs of adults and children. Barbecue facilities and a drinking fountain (see Design Standard 19 Park and Street Furniture and Barbecues) may also be desirable depending on individual locations and the surrounding activities and land uses.

15.5.3 District playgrounds

District playgrounds, located in district parks or playing fields, provide facilities for a number of suburban areas. District playgrounds should be sited within walking distance of toilets, car parks and picnic areas. They should cater for all age groups and are likely to be particularly used by families. They should provide the greatest range of play opportunities and the highest element of challenge of all the park types.

District playgrounds are designed to have a theme and distinct character. They usually include adventure playground elements and skateboarding facilities. Equipment suited to use by a particular age group may be grouped and separated from equipment suited to another age group.

While the 0–9 age group should be provided with equipment suitable for their physical capabilities, the teenage group should be given special consideration in the design of district playgrounds because they seek specific qualities in their play activities which should only be provided at the district playground level. Children and teenagers with physical and/or mental disability should also be given consideration in the design of play equipment.

For height of equipment in district playgrounds, refer to section 15.8.1.

District playgrounds should cater for group or family visits of up to a day in duration and should provide facilities such as barbecues, shelters, toilets, car parks, trees and landscaped areas.

15.6 Siting, layout and design of play equipment areas

15.6.1 General

In planning and designing a playground, thoughtful consideration should be given to the overall setting, site specific elements of the intended play space and the degree of challenge the equipment will provide the targeted age groups of users.

The siting of a play equipment area should make use of landscape features to provide adequate shade and shelter from wind for the children and create visual harmony with the surrounding area without compromise to safety.

15.6.2 Sun/shade protection, other climatic factors and trees

Weather factors such as prevailing winds and the location of the sun, particularly on summer afternoons should be accounted for in the design process. Trees near the defined play equipment area can provide summer shade and protection from the prevailing winds.

It is important that the design and siting of an open space playground should wherever possible provide shade cover to the users. This may either be in the form of shade provided by existing tree canopies, or a shade structure associated with the play structure (see Design Standard 19 Street and Park Furniture and Barbecues).

The posts of shade structures are not to be located within fall zones of play equipment.

Extreme care must be exercised when excavation works are planned within the root zone of existing trees near the play equipment area. The depth and extent to which an existing tree specimen will tolerate disturbance from excavation, is dependent on the age and species of the tree in question. Any work occurring within the tree root zone must be assessed and approved by the Department of Urban Services or their nominated representative prior to commencement of work. See also the requirements for tree protection in Design Standard 22 Soft Landscape Design.

Extreme care must also be exercised to avoid locating play equipment areas under tree species that are renowned for dropping branches. Tree surgery by a qualified tree surgeon may be required to remove branches overhanging the playground. Any work occurring within the tree canopy must be assessed and approved by the Department of Urban Services or their nominated representative prior to commencement of work.

If no trees exist in the immediate area, a planting program should be undertaken to provide future shade and wind protection. See Design Standard 23 Plant Species for Urban Landscape Projects for appropriate species for planting near playgrounds.

All trees proposed to be planted within 8 metres of a defined play equipment area should be specified as advanced stock with a minimum trunk diameter of 40 mm at 1.2 metres above ground level. Trees should be installed with tree guards or sturdy stakes to provide protection from vandalism or the wear and tear damage that is associated with a play environment (see Design Standard 19 Street and Park Furniture and Barbecues for more information about tree guards).

15.6.3 Landform

It is generally preferred that play equipment be sited in areas of flat to gently sloping, open land. The area needs to accommodate a reasonably large, open space suitable for play equipment structures and their necessary safety clearances areas and to avoid the introduction of unnecessary level changes to a play space. Changes of ground level in

spaces where boisterous running and play activities are likely can create undesirable trip and fall risk areas. Flat sites generally have lower construction costs.

15.6.4 Relationship with surrounding land use

The functional relationship between the playground facility and other use areas of the open space should be considered. This could involve siting the playground facility close to other facilities such as ballgame courts to assist in effective and efficient supervision. Parents carers or older siblings often use facilities because they are near playgrounds. To enable formalised and casual supervision of the play equipment area by parents or carers, it is important that clear views area are not obstructed by landscape features such as low limbed trees, shrubs and hedges, fences and awkward level changes. Seating areas with good sightlines to children's play areas should be provided for adults supervising children's play.

The location of playground areas where there is natural surveillance, such as busy pedestrian pathways, or where there are views from surrounding streets helps to improve safety and reduce incidence of vandalism. The *ACT Crime Prevention and Urban Design Resource Manual* contains further information relevant to safety in open space playgrounds.

15.6.5 Play equipment siting setback requirements

Play equipment in open space playgrounds shall have the following setbacks:

- 10 metres from the edge of a building or major structure
- 20 metres from adjoining residential property lines, the edge of any local road or car park pavement area (some existing playgrounds may be closer)
- 30 metres from distributor road pavements (where existing playgrounds are closer a playground safety fence meeting Australian Standard AS 1926.1 for pool fences is required)
- 20 metres from hazards such stormwater drains, bike tracks and playing fields.

15.6.6 Existing site services

An important consideration in the design of a playground area is its integration with existing or proposed infrastructure such as underground services, irrigation systems, major paths or other established outdoor activity areas. Detailed adjustment of the playground's softfall area to avoid services and align it in sympathy with existing irrigation lines helps to minimise both the degree to which services will require modification and the final construction costs of the playground.

Playgrounds are not to be sited within reservations for overhead powerlines. Consult with ActewAGL to obtain details of reservations.

15.6.7 Areas adjacent to the playground

For grassed areas adjacent to the playground, allow a minimum 2.4 metre clearance between the playground edge and trees trunks or other obstructions to enable mower access. To encourage natural surveillance avoid planting shrubs near playgrounds, trees and groundcovers are preferred. Refer to *ACT Crime Prevention and Urban Design Resource Manual* for more information.

Nearby paths and hard pavement areas should be free of hazardous trip points and be easily maintained.

Where possible, access paths should be incorporated into the playground design to prevent excessive wear of surrounding grass areas. Isolated and narrow strips of grass less than 3 metres wide should not be located adjacent to the play equipment or heavy-use areas.

Seats should be installed on a hard surface to reduce maintenance.

15.7 Safety clearance zones, impact absorbing materials and drainage

15.7.1 Fall zone dimensions, safety clearances and impact attenuation

Safety clearance, fall zones and impact absorption materials must conform to AS/NZS 4422 in addition to the following requirements by Canberra Urban Parks and Places. It should be noted that sculptures intended for play and climbing are required to be treated as play equipment.

- Play items with a free fall height up to and including 400 mm shall be positioned within areas of well-maintained grass cover or within the softfall area.
- All play equipment whether fixed or moveable which has a height (that is, the platform or other standing area) exceeding 400 mm must be surrounded by a well-constructed, drained and appropriately sized softfall area of impact absorbing material. (This transgression from 500 mm as per the Australian Standard to 400 mm is in response to the predominantly clay soil type of the ACT.
- Play equipment items should be installed in a dedicated area and have the required safety clearance zone. The safety clearance zone incorporates the fall zone and a circulation space where children can safely move between the various activities while the equipment is in use.
- The finished softfall surface of the play equipment area is to have a maximum fall in any direction of 2 per cent.
- Play equipment must have a clearance zone of an approved impact-absorbing surface. The clearance zone incorporates both a potential fall distance and a circulation space where children can safely move between the various activities while the equipment is in use.

The following clearances between and around items of play equipment are over and above the requirements of AS/NZS 4422, and are required by CUPP :

Equipment	Clearance required from outer edge of an item to another item or to the softfall edge
Swings in open space installed with softfall edges raised above ground level or adjacent to slopes greater than 1 in 5	Clearance from the pivot point in the directions of the movement of the swing shall be the length of the arc (from the pivot point to the seat) plus 3.0 metres to the raised edge.
Open space play facilities with a platform height restriction of 2.5 metres.	minimum 2.5 metres, and a ground distance increase of 0.5 metre for every 0.5 metre increase in height above 1.8 metres

The clearances listed above for swings and slides should not intrude into any major circulation paths existing within the designated play area.

15.7.2 Impact absorbing surface materials

The impact absorbing surface material must comply with Australian /New Zealand Standard AS/NZS 4422 and be approved by Canberra Urban Parks and Places.

In selecting appropriate impact absorbing surfaces or softfall material and construction methods for a play equipment installation, the whole-of-life or long-term cost should be carefully considered. This includes consideration of the asset holder's resources for initial cost outlay in purchasing and installing the softfall, and funding availability to undertake maintenance programs that are appropriate to the upkeep needs of each material type.

The impact absorbing surfaces that are currently preferred by Canberra Urban Parks and Places are approved pine bark materials or approved synthetic softfall surfaces. As new materials emerge on the market, Canberra Urban Parks and Places' preferences for material may change. The selection of a preferred material is based on maintenance, durability and safety issues. Sand and other loose particles are not recommended as softfall materials since they are more prone to becoming contaminated, being swallowed or being messy on clothing. For future open space playground projects check with Canberra Urban Parks and Places for their preferences.

Consideration should be given to the installation of synthetic surfacing under part or all of the play equipment. Synthetic surfaces are easy to maintain and provide easy access to the various play items for wheelchairs and children with impaired walking.

As the synthetic surfacing materials as a rule involve a greater initial cost, care should be taken in selecting the product and construction method that will provide the longest resistance to deterioration and compaction.

Ponding of water adjoining or within the play areas is not permitted.

15.7.3 Pine bark softfall

The minimum installation standard for pine bark softfall in play areas is a 300 mm depth of 25 mm diameter graded pine bark free of wood slivers and other extraneous material.

The soil type in the ACT region is predominantly clay. Due to the poor permeability of clay soils the playground designer needs to take care to ensure adequate drainage of the playground area is provided.

In playground installations where the pine bark softfall material is set flush to surrounding ground surfaces, the play area must be excavated to a minimum depth of 400 mm and installed with a sub-soil drainage system that is drained to the stormwater system. Where this cannot be achieved due to the absence or difficulties in reaching a suitable connection point, a soakage pit at least 20 metres from the play surface and of a minimum size of 2 cubic metres may be acceptable. All sub-soil drains must have a minimum fall of 1 in 100 along their alignment.

Often small budgets do not allow for the substantial excavation and drainage works that are associated with in-ground play equipment areas. The most appropriate option to meeting a limited budget whilst still meeting minimum softfall safety requirements is to place a contained softfall area on top of the existing ground level (on sites with an existing maximum 2 per cent fall) or by cutting a slightly graded platform into a sloped site. With this method a 300 mm depth of graded pine bark softfall can be installed which drains (no sand layer is required). Raising the softfall level above the existing ground level allows the water to drain through the softfall depth, out across the graded base (a minimum 2 per cent grade must be incorporated into the initial site grading works) and through either weep

holes in one of the raised edging walls, or in the case of raised timber edging, drain beneath the lowest timber section of the edging. To avoid problems of ponding or erosion, the drainage from the weep holes should not be concentrated to one point, but should be spread over a large area of ground. In locations where the playground is in a low area installation of a sump or sub-soil drain along the lowest edge of the raised softfall area is recommended to avoid the creation of boggy spots.

It is important to ensure that overland flow is deflected away from softfall areas. This is a particular concern for pine bark installations. Where the catchment directs stormwater flows towards the play area, swales, mounding or some other technique to shed runoff away from the major play areas should be employed.

In some cases a new above ground softfall area is placed directly in the location of the existing softfall area. In such cases the existing softfall should be either be removed and replaced with compacted fill or the existing drainage should be checked to ensure that it is functioning so it can be used. Any new play equipment post lengths proposed to be installed into re-used softfall areas will need to be lengthened to ensure that footings are installed into compacted subgrades.

The most cost efficient edging materials for the construction of raised softfall areas are of sleeper or log construction. Treated pine timbers are preferred on the basis of ready supply and conservation of native forest timbers. In selecting treated pine sleeper products, it is important to ensure that the timber is rated as H4 Class. Sleepers selected for this application must be of less than 25 per cent heartwood and free of protrusions, knots and twists. Capping timbers should be of prime quality to reduce cracking and splintering. To deter and minimise the possibility of excessive warping, cracking or splintering occurring, it is important to treat the capping timbers with an approved oil or protective coating product. Exposed timber edges should be chamfered and all surfaces rendered free of splinters.

Brick wall edging may also be considered but it is more expensive than treated pine. Care must be taken in the design of edging that such structures do not pose a safety hazard, that is, a difficult step up, or a small trip step. Exposed edges should be rounded or chamfered.

Pine bark softfall effectiveness in providing an acceptable level of impact absorption to falls is very much dependent on the manner in which it is maintained after its initial installation. It is important that regular checks on the condition (level of particle breakdown and compaction) and depth (thickness of softfall material laying spread on top of the sub-base material) are undertaken. The pine bark material should receive regular raking to reduce compaction of the loose particles, remove any undesirable materials or objects that may become mixed with the loose particles and ensure that softfall levels are spread evenly over the designated play equipment and safety clearance area. Topping-up of the softfall area with fresh pine bark should also be undertaken regularly to ensure the 300 mm minimum depth is maintained. In selecting pine bark as an appropriate softfall material, it is important that the designer and playground asset holder recognise its need for a regular maintenance regime.

15.7.4 Synthetic softfall surfacing

Synthetic surfaces have the advantage of remaining in place under intensive scuffing and wear. Synthetic surfaces are easy to maintain and provide easy access to the various play items for wheelchairs and children with impaired walking.

Surfaces that provide suitable impact absorbing properties for play equipment with a maximum fall height of 1.8 metres (maximum accessible standing height 1.5m) include:

- a granulated rubber surface backed with a rubber, polyurethane or similar impact absorbing layer that is a minimum of 40 mm thick (similar to Olymprene).
- sand filled synthetic grass topcoat surface (synthetic grass pile minimum thickness 12 mm, similar to Ampol Mod Grass), with a minimum 30 mm sub-layer depth of either granulated rubber or polyurethane sheeting on a rubber matting 12 mm thick on a sand base or similar.

In applications where the fall height of play equipment is restricted to a maximum of 1.0 metres, the synthetic grass pile is to be minimum thickness of 12mm (similar to Ampol Mod Grass) and laid over a rubber matting 20mm thick or a sand or similar.

Synthetic softfall areas are generally designed to be flush with the surrounding ground levels. Drainage of these areas primarily relies on surface water deflection by adjoining swales and drains, and soakage movement along the prepared sub-base to finally disperse into the surrounding ground. Installation of sub-soil drains around the periphery of the softfall area may need to be considered.

15.8 General guidelines for equipment

15.8.1 Height of equipment and fall heights

All play equipment must conform to the maximum fall heights identified in Australian Standard AS 1924.2 and safety clearance zones identified in Australian Standard AS/NZS 4422.

To further reduce the incidence of serious injury from falling from play equipment there are further height restrictions for open space playgrounds in the ACT. The maximum height of equipment and maximum fall heights relate to the use and location hierarchy of playgrounds.

CUPP have set maximum heights for accessible standing heights, (these are the heights of surfaces designed for foot access), and maximum play equipment heights, which refers to the overall height of the equipment. All heights are from ground surface.

Playground Classification	Maximum accessible standing height	Maximum play equipment height
Local playground	1.5 metres – to enable adult guardians to assist young children when necessary.	*1.8 metres
Central playground	1.8 metres.	*2.5 metres
District playground	2.5 metres for accessible standing surface with external exit. Accessible standing surfaces above 2.5 metres are allowed as long as the structure does not have any external exit above 2.5 metres.	6 metres

*Swing frames are exceptions to the maximum play equipment heights at local and central playgrounds. Refer to 15.9.2 Swings, for minimum and maximum swing frame heights

The provision of equipment in excess of the specified heights for local and central playgrounds may be considered where it can be demonstrated that the design, construction and materials to be used address safety issues above and beyond the standard types of equipment. Proposed equipment and heights must comply with the relevant Australian Standards.

15.8.2 Height between platforms/decks

The maximum height variation permitted between platforms/decks when the level change is accessed by steps and handrails or a ladder within public open space should not be greater than 600 mm.

Height changes between platforms/decks without a safety panel or the assistance of either a step and handrail or ladder within public open space should not be greater than 400 mm.

The use of infill panels to fill the height gap between platforms is desirable especially where infants (0-4 age group) are accessing high decks.

15.8.3 Designing playgrounds specifically for younger age groups

Within open space playgrounds there is the opportunity to provide playgrounds specifically designed for younger age groups under 3 years. These are special playgrounds in selected locations such as near hospitals, baby clinics or shops, or part of the play equipment offered at district playgrounds. They help to attract family groups and encourage casual surveillance of the playgrounds.

The following is a guide for playgrounds most suitable for specific age groups.

15.8.3.1 Children up to 18 months

Raised platform items are not recommended unless the platform is fully enclosed and there are no fall points.

Slides and swings are not recommended.

15.8.3.2 Children 18 months to 3 years

Platform items should not be greater than 1 metre high.

The maximum height between platforms when the level change is accessed by steps and handrails or a ladder should be no greater than 400 mm.

The maximum height between platforms without a safety panel or assistance of steps or a ladder should be no greater than 400 mm.

15.8.4 Hazards to be avoided in designing playgrounds.

In planning an outdoor environment for children at all levels, from the general layout to designing specific pieces of equipment, potential hazards such as excessive height, poor softfall, entrapment areas, pinch and crush points, protrusions and sharp areas or dangerous surfaces must be taken into consideration and eliminated.

15.8.4.1 Non-slip surfaces

All accessible surfaces in the playground, including decks and platforms of fixed equipment, should be durable non-slip. The effect of weather on surfaces should be considered. For example, does it get slippery in damp conditions; will it support the growth of moss? In the ACT, as in other high altitude areas, the issue of ice forming on surfaces in the colder months must be considered. Surfaces need to drain well and not pond water.

15.8.4.2 Entrapment

Entrapment occurs when parts of the body are able to enter a space in the equipment but are then unable to be extricated.

The issue of entrapment is a difficult one because of the number of variables that operate. The following are some general principles.

- Inverted angles are more likely to entrap a head than upright angles.
- Horizontal openings are more likely to entrap than vertical openings
- Openings where children could lose their footing are more likely to entrap and injure than openings where footing can be maintained and the weight of the body supported by the legs rather than the head and neck.
- Openings in equipment (particularly wood) that originally would not entrap could change in configuration due to bending warping or loose installation.

The following is a guide to avoiding entrapment.

- To avoid finger entrapment accessible spaces and holes must not be between 6 mm and 25 mm.
- To avoid hand, foot or limb entrapment accessible spaces and holes should not be between 35 mm to 70 mm.
- To avoid head entrapment the equipment shall be designed to comply with requirement in AS 1924.2.

15.8.4.3 Crush or pinch points

Crush or pinch points usually occur in situations where there are moving parts (such as monorail tracks and swings) or where one part of the equipment touches another part of equipment or the ground when in motion (such as the scramble nets and clatter bridges).

The detailed design of play items should make every effort to ensure that no crush or pinch points are accessible to children using the equipment.

15.8.4.4 Protrusions and sharp edges

It is critical that no protrusions or sharp edges that are likely to cut, puncture or catch on clothing are present on play equipment items. To ensure this, all bolts or other fastenings must be set flush to adjoining surfaces or covered over with smooth plugs that are not readily removable. All welds and edges to decks, slides and play items are to be rendered smooth. No sharp edges or burrs should be found around any deck drainage holes or spaces.

15.8.4.5 Inappropriate use of equipment

Children do not always use equipment in the way that adults intended. Often, as they feel the need for new challenges, they will think of 'unthinkable' ways to play on apparatus.

This is one reason why designers and builders of play environments need to think past the intended use of play features to minimise risks from unintended use.

For example, while a swing set is designed for children to sit on and swing, if the frame is not carefully designed, it could also offer an interesting climbing challenge, and if it is sited just under the branch of a tree, a further challenge.

15.8.5 Materials used in construction of play equipment

All materials used for the construction of play equipment shall comply with Australian Standard AS 1924.1. In addition, Canberra Urban Parks and Places require the following for playgrounds in open spaces.

- Materials shall not be abrasive.
- Materials should not allow the generation of static electricity in normal use.
- CCA pressure treated timbers are preferable to other applied preservatives. At least two thirds of the cross-section should be penetrated by preservative.
- Use of nails is not permitted on any play structure.
- Metal supporting members must be embedded in concrete.
- Thin sheet metal must be avoided.
- Ends of pipes should be closed to avoid finger entrapment.
- All joints and welds shall be ground smooth and be free from pits and bumps.
- All metal fittings and fixings shall be heavy duty galvanised.
- Steel shall be galvanised or similarly protected against rust and joints should be regalvanised by hot-dipping or alternatively by a cold-zinc rich process.
- All bolts must be firmly secured to posts. In the event of incorrect drilling the items must be replaced.
- Fibreglass products must have a minimum gel coat thickness of 3 mm.
- All rope items require consistent maintenance checks to ensure that wear and tear has not affected the ropes' strength and load capacity.

- Steel ropes should be covered by a fabric that is integrated with the rope and have a minimum 12 mm diameter to allow for a reasonable grip by users.
- Chain links should be fully closed and of a dimension to avoid finger entrapment.

15.8.6 Joints and connections

Raised bolt-heads are to be countersunk, or alternatively, cuphead bolts are to be used. Nails are not permitted as they are prone to pushing out of their cavity and creating sharp protrusions.

Protruding threads should be sawn off and filed flush with the nut. Where feasible nuts are to be countersunk to finish below the surface of the member bolted.

No sharp or rough edges should be left in a position that may present a hazard or safety risk to a user.

Timber should all be fixed with threaded fasteners. The bolt-heads should be flush or below the surface of the members secured.

Hammerlock shackles are the preferred fasteners for most chain items and should be used in place of split links and 'S' hooks. However, 'S' hooks may be permitted where approval by Canberra Urban Parks and Places has been given and only if they are welded to close the gap and sharp protrusions and catch points have been eliminated.

15.8.7 Posts and footings

All playground equipment or other play features requiring permanent locations must be secured by stable concrete footings.

The size of footings will vary with different pieces of equipment. As required by Australian/New Zealand Standard AS/NZS 4486.1, the manufacturer is to provide installation information requirements.

The installer of the equipment shall ensure that the tops of footings are a minimum of 400 mm below the finished softfall level, that they are chamfered at 45 degrees and have no sharp protrusions.

Concrete curing times and strengths should comply with the Australian Standard AS 3600 for 20 MPa after 28 days. Concrete must be allowed to dry before stress is placed on the structure and footing.

15.8.8 Decks and platforms

Decks and platforms are important components in ensuring a child's safe access, use and exit from a play equipment activity. The size and inter-relationship of platforms to one another within a play equipment structure is important in creating a safe and flowing play circuit. Platforms function as access, transitional movement, resting, waiting, and observation and exit areas.

Decks and platforms must be free draining and have a non-slip surface.

Decks and platforms must be horizontal.

Size requirements for platforms are dependent upon their intended use. The minimum deck size shall be not less than 1000 mm x 1000 mm.

15.8.9 Safety panels

Safety panels provide visual and safety features to a play equipment structure.

To minimise the potential of fall from a platform, infill panelling must be used on any platform area in public open space playgrounds that exceeds a height of:

- 500 mm for playgrounds designed for children up to 5 years
- 600 mm for playgrounds designed for children over 5 years.

Safety panels need to be installed internally where a cluster of abutting decks results in a fall height greater than 500 mm in open space equipment designed for children over 5 years old. However, in situations where a ladder with grab rails or steps with handrails are provided, the height becomes a maximum of 600 mm.

To ensure child safety, infill panels should be designed to have horizontal bar members that will give the child a foothold to climb over the panel. Panel fixtures must be constructed to avoid gaps or holes where finger entrapment could occur.

Panels may be:

- vertical bars spaced 70–80 mm apart
- diagonal bars (not less than 30 degrees from the vertical and at 70–80 mm spacing)
- solid infill (only in situations where supervision/surveillance is not obstructed)
- play items such as tic-tac-toe (vertical bar configuration) clock faces, steering wheels (solid), and shopfronts (suitable for ground level installations only) and picture panels.

Powder-coated, vertical barred, metal safety panels are the preferred products for open space playgrounds. Selected plastic items may be accepted where they provide additional play experiences that cannot be cost effectively manufactured in metal, for example, tic-tac-toe and abacus items.

Infill/safety panels with plastic bubbles are not favoured because of the high risk of vandalism.

15.8.10 Grab rails

Grab rails must be installed to all external entry and exit points of play items onto deck areas that are above the height of 500 mm from the finished ground level. Grab rails are intended to provide comfort and safety to users when accessing or exiting platform areas.

Grab rails must be of dimension and located to discourage use as a ladder or climbing structure. A configuration where the base of the grab rail item is secured to the associated platform, thereby providing no foothold for climbing is favoured. Extended ‘D’ loop items may be given support in selected locations such as when associated with banister slides.

Grab rail diameters should be of dimension suited to children’s handhold and should range from 19 to 38 mm.

15.9 Equipment items suitable for open space playgrounds

New innovative play equipment is encouraged for use in open space playgrounds. For safety reasons all play equipment items require approval from Canberra Urban Parks and Places for use in open space. These should be reviewed with CUPP officers for approval at preliminary design.

The following items are considered suitable for open space playgrounds. The arrangement of the play equipment items requires an understanding of how the equipment will be used and the age of the children using the equipment. As playgrounds receive varying amounts of responsible adult supervision, the play equipment should be selected to be as robust as possible. Easily damaged or finely detailed items should be avoided where possible to reduce possible over-use, damage and vandalism.

15.9.1 Slides

It is recognised that slides are amongst the most popular attractions at playgrounds. ACT playground design policy encourages the installation of at least one straight slide in every local playground site. Stainless steel slides are preferred. Whilst posing a greater initial financial outlay, stainless steel slides are far more durable and easily maintained than plastic slides. It is important that all stainless steel slide beds are manufactured from a single sheet; no joins are permitted along the chute.

Plastic slides may be considered and approved as a secondary slide that provides a different play experience from that offered by the straight stainless steel slide. Approved configurations included curved, wave and spiral.

Double width slides may be considered for approval in open space playgrounds if they are manufactured with a central divider.

Roller slides are not permitted.

Slides must have a horizontal run out section to slow the user down to walking pace or slower at their exit from the slide. The run out bed surface should be 300 mm above the finished softfall surface.

To avoid the likelihood of children running down the slide chute, it is desirable to install a horizontal bar across the entry to the slide to encourage children into a sitting position before becoming set in motion. The bar should ideally be square in section or designed to avoid children using it as a turning bar.

Slides attached to decks less than 1200 mm x 1200 mm in size requires a sit-down section to be provided at the top of the slide. This sit-down section should be defined by a non-climbable enclosure to reduce the potential for falls. The manufacture and connection of the safety enclosure feature to the associated deck and slide should avoid the possibility of entrapment.

Slides that do not require an entry sit-down section (that is their decks are 1200 mm x 1200 mm or greater) should have an appropriate safety railing installed between the sides of the slide and the adjacent uprights/posts. This railing should be devoid of entrapment and climbing points.

Slides with an entry and exit height of greater than 1000 mm must be manufactured to have a side depth of 100 mm to the slide bed. All slides must also be designed to have a horizontal run-out section at their exit.

To prevent the possibility of burns occurring from skin contact with hot surfaces, slides should be located to the south between southeast and southwest. Stainless steel slides are of particular concern and should be located facing south as much as possible.

Fibreglass slides are approved by Canberra Urban Parks and Places on a site by site basis and must have a minimum gel coat thickness of 3 mm.

15.9.2 Swings

Swings provide a dynamic play experience within the otherwise static play items regularly found in playgrounds. It is recommended that a double swing set be installed in all open space playgrounds with sufficient space to maintain setback clearances.

The height of open space swing installations should not be less than 2.4 metres or greater than 2.7 metres. Swing items must be secured to the frame by close-linked chains and hammerlock-shackle fastenings. 'S' or split link fastenings are not permitted.

Where swings are provided, there should be more than one swing and one of the seats of the swings should be a toddler seat.

15.9.3 Access ladders and stairways

Safety stairs or stairways are the safest and most secure method of accessing a platform or play item for young children.

Stairways may be used to gain access to platforms and play items that do not exceed 1500 mm in height. Access to items above this height must have an intermediate platform or landing.

Stairways should have an incline of between 15 and 45 degrees. Stair treads must be evenly spaced and infill panel to risers is preferred. Stair risers should not be less than 100 mm and not greater than 220 mm. Tread widths should be not less than 225 mm and not greater than 350 mm. Treads should have a non-slip surface.

Rung ladders should have an angle of incline between 65 and 90 degrees.

Where these ladders and stairways exceed a vertical height of 500 mm, hand supports or handrails must be incorporated into the design.

15.9.4 Scramble and scaling walls

Chain, moulded plastic, timber, metal, rope, or other forms of scramble walls may be used as an alternative means of access to platform decks. Scrabble and scaling walls are only permitted for use on decks below the height of 1.5 metres.

Grid structured scramble walls should be provided with safe hand-gripping that is a minimum diameter of 19 mm and maximum of 38 mm.

The apertures of the scramble wall structure should be either less than 110 mm or between 230 and 300 mm. The distance between the stepping surfaces should be a minimum of 175 mm and maximum of 300 mm. All grid dimensions must avoid head and finger entrapment. Grid intersections should be fixed or have restricted movement to avoid crush and pinch points. It is desirable for chain net climbers to be coated in PVC.

Scramble and scaling walls should be securely anchored at ground level and attached to the platform in such a manner as to avoid tripping. Metal anchors should be installed to be flush with the finished level of the softfall surfacing.

Flexible scramble walls should be provided with a means of tensioning the net structure to avoid it sagging beyond design function. Grab rails are to be placed on both sides of the platform entry point to assist children either leaving or gaining access to the platform.

Scaling walls should have the handgrip chain attached above the platform to a rail (or similar) at a height to allow the user to access the deck with their feet. Chain is not to be attached at deck height.

15.9.5 Tunnels

Tunnels can be either set to the ground or elevated.

Tunnels with a length of more than 1000 mm should have a minimum opening of 500 mm.

Crawl-tunnels should be of a dimension to encourage slow, controlled movement through the structure; children should have to crawl or crouch and not be able to run through them.

The tunnel's design and construction material should minimise the risk of head injury occurring to children entering and exiting the tunnel. Fabricated metal or plastic tunnels are approved for use in the ACT. Durable padding material must be fixed to the circumference of concrete pipe ends to prevent head injuries.

For tunnels set to the ground the height dimension from the top of a tunnel structure to ground level should not exceed 1500 mm. The pipe must be fixed in place and be one of the following:

- fully surrounded by softfall
- with a mound built over the top and softfall at each end
- with a mound built over the top and safety panel across the top and sides of each pipe end.

If surrounded by softfall, the pipe and adjoining area must be well drained to prevent ponding.

Where a tunnel is raised, its location and entry/exit point design within the play area should incorporate appropriate safety panels to prevent children gaining access to the top of the structure.

15.9.6 Bridges and ramps

Bridges may have a rigid or flexible walking surface. The walking surface should be slip resistant and provide a secure foothold for all users.

Bridges with flexible walking surfaces should not be more than 1600 mm from ground level.

Timber decking is permitted for use in bridge structures; selected timber should be 'A' grade seasoned hardwood. The decking boards are to drain well and must be secured by bolt and nut fastenings only. Nails as fixing items are *not* permitted. Consideration should also be given to applying an approved protective sealant to decking timbers to prevent the possibility of splitting or splintering occurring.

Bridges should be attached to a platform or adjoining surface in such a manner as to avoid tripping, entrapment and crush points.

Arched bridges may become slippery after frost and are not permitted,

Flexible deck bridges should be designed to allow re-tensioning when required. Decking surfaces should be constructed with spaces, gaps and holes of less than 5 mm or greater than 25 mm but less than 35 mm between decking boards to avoid finger and limb entrapment.

Bridges and ramps up to 1.2m in height should have handrails and where they exceed 1.2 metres they are to have infill panel safety rails.

15.9.7 Angled slide poles

Angled parallel slide or banister slides should not be installed at a platform height greater than 1500 mm. The internal spacing or gap between the two sloping poles should be between 320 mm and 380 mm. Variation within this span dimension should be determined on the basis of the predominant user age group of play area.

Parallel slide pole diameters should be in the range of 40 to 45 mm. No spacers or bracing bars designed to assist in stability or installation of the poles are permitted above the approved softfall layer.

The spaces created between the parallel poles and the adjoining grab rails and structural posts must not pose head and limb entrapment zones, where a child may become trapped and suspended above ground level.

15.9.8 Vertical slide poles

The maximum take-off deck height for a vertical slide pole installed in open space playgrounds is 1800 mm. The maximum pole diameter is 42 mm.

To instil confidence, provide balance and ensure safety of users, a grab rail or rails are required to provide hand support at the take-off edge of the standing platform.

15.9.9 Climbing arches and hoop climbers

Climbing arches and hoop climbers give more adventurous children an opportunity to start upper body development exercises. Designers should consider the appropriate dimensions of the item and the entry/exit height from decks.

Concave arch climbers are preferred over convex arch climbers. The convex shape is difficult for children to negotiate as there is often a lack of hand support in the item and there is potential for children to fall between the upper most rails and the deck surface.

Hoop climbers can be installed in angled, horizontal and vertical directions. Selection of hoop climbers that feature large coils where children can climb over and through is favoured over items that operate as rung ladders. All hoop climbers should be designed to provide comfortable stepping intervals for children using the equipment to enter or exit from decks. Spacing for the step intervals should be between 230 mm and 300 mm. The configurations and dimensions of the hoops and their relationship to supporting members must be free of possible head or torso entrapment risks.

All vertical hoop climbers should be designed with an appropriately angled post connection feature that discourages the opportunity for users to ‘perch on’ or gain access to the top of the supporting member. The pole length above the upper-most coil should also be of a dimension that discourages access.

The maximum height above ground level for an arch or angled hoop climber should not be higher than 1500 mm from ground level. Vertical hoop climbers may be attached to

1800 mm high decks. Horizontal hoop climber items that span between two equal height decks should be installed at a restricted height of 1200 mm.

15.9.10 Horizontal ladders and roman rings

Horizontal ladders and roman rings are used primarily to develop and increase upper body strength and co-ordination skills. They may be inappropriate and even harmful for young children with immature muscular-skeletal development. They are more appropriate for children over 5 years than for young children.

Horizontal ladders and roman rings are very popular with the 8 to 12 years age group and are recommended for installation in open space playground facilities. In designing or selecting horizontal ladders and roman rings it is important to ensure that appropriate heights, vertical travel distances and handgrip dimensions are considered and matched to the intended major user group.

Suspended between two supporting structures, the handgrip feature/rung of a horizontal ladder or roman rings must not exceed 1600 mm above the step-off level, nor have a travelling distance greater than 3500 mm. The recommended fall height from the handgrip area of a horizontal ladder or roman rings should be around 2060 mm. The design must encourage children's hand access only. Foot access to the top of the structure should be avoided by omitting horizontal bars from the top half of the vertical supporting frame.

The rung spacing between each bar of the ladders and climbers must be within the range of 250 to 400 mm. The diameters of rung bars must provide an easy hand-gripping dimension for children (19–38 mm diameter).

15.9.11 Monorail and track rides

Monorail and track riders are used primarily to develop and increase upper body strength and co-ordination skills. They may be inappropriate and even harmful for young children with immature muscular-skeletal development. They are more appropriate for children over 5 years than for young children.

Track ride structures should be sited within the designated soft-fall play area so as to avoid the potential for collision with other users or passers-by. Start-off and landing platforms at each end are preferred as they reduce the dislodgment of soft fall from this critical fall area. The platforms must be of the same height at both ends of the travel bar and not elevated more than 350 mm above the ground level. In playgrounds for children aged 6 to 9 years platforms should have a 1000 mm minimum width and 1000 mm minimum length. Track ride structures designed for use by children aged over 10 years can be increased in length (in the direction of travel) to 1200 mm. It is ideal for track rides to be either free standing or grouped with other overhead, upper body developing items.

The slide rail of the track-ride should be between 1800 to 2200 mm above ground level. Rail heights should be set by determining the age and requirements of the predominant users.

Glide-trolleys may be designed as either an internal or external apparatus and attached to a rigid, horizontal bar. To enable children to reach the opposite end of the structure under their own momentum and avoid being stranded between landings, the glide rail length should not exceed 4000 mm. The hand supports of the glide trolley should be designed to have a comfortable shape and dimension to allow a grip for both hands. The grip bar diameter should be 19 to 25 mm in diameter. A plastic or PVC coating over the handgrip is desirable.

15.9.12 Balance beams

Balance beams assist in developing balance and co-ordination skills. Usually located away from the more boisterous play-structure items, balance beams offer quieter play opportunities to individuals or smaller groups of children. Separation from the main play structures avoid creating areas of congestion.

Balance beams may be fixed or moving items. Fall heights from the bars must not exceed 400 mm.

15.9.13 Spring animals

Spring animals are rocking apparatus with more than one fulcrum. Spring animals are popular with infants (0-4 yrs) and 5-6 year olds. Local playgrounds should include one or more spring animal to provide activity for the younger age group. It is preferable to position the spring animal close to a seat for ease of parental supervision and interaction. Avoid position where to access the item, children are likely to run across other active area ie. swings.

15.9.14 Turning and turnover bars

Turning bars are intended to allow children to turn around the bar at waist height. Bar heights should not be greater than 1200 mm. In situations where junior children predominantly use the play equipment, the bar height should be restricted to 800 to 1000 mm above ground level.

15.10 Items not suitable for open space playgrounds

Playground equipment causing one or a number of severe injuries or with a record of high accident frequency needs to be assessed as to its suitability both in the current location and in playgrounds generally. The following is a list of items found not suitable for playgrounds:

- jungle gyms (metal pipe climbing structures)
- maypoles
- boat and plank swings
- rocks with sharp edges
- glass or any other material that can easily shatter or break
- materials and objects that may cause children to choke
- treated pine poles or play equipment structures.

Non-draining surfaces, basins or hollows are not permitted within playground areas unless specifically approved as a water feature. Specifically designed water-play features with free-draining or controlled drainage outlets maybe considered in special circumstances.

15.11 Fitness Equipment

As with play equipment, it is important that fitness tracks or circuits and their associated equipment are designed by qualified designers to ensure that due consideration is given to providing a appropriate balance between both the physical challenge and safety requirements. Heights and dimensions of the fitness stations must be carefully chosen to

suit both the size of intended users and the likelihood of the equipment being used by other age groups in non-supervised situations.

Design and construction specifications must ensure that robustness, durability and longevity of circuit items are also considered. Fitness track equipment must also be designed to be devoid of entrapment areas and sharp or abrasive surfaces.

All fitness track items exceeding 400 mm in height must have softfall provided. Safety clearances and softfall depths must comply with the requirements discussed in 15.7.

The maximum possible fall height from a piece of fitness track equipment should not be greater than 1.5 metres above finished softfall level.

15.12 Further reading

Play without Pain, Root J., Child Accident Prevention Foundation, 1983.

Early Childhood Playgrounds: Planning an Outside Learning Environment, Walsh P., Martin Educational, Albert Park, Victoria, 1988.