Fire safety guideline

Access for fire brigade vehicles and firefighters

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Contents

1 Purpose

The purpose of this document is to provide safe, efficient and effective access for *fire brigade vehicles* (i.e. a *fire appliance*) to any *premises* and allow firefighters to rapidly intervene when fire or other *emergency incident* occurs.

2 Scope

This guideline details the requirements of Fire and Rescue NSW (FRNSW) for:

a) identifying areas within NSW that are protected by the diverse types of *fire appliances* used by *fire brigades* within NSW

b) providing access for *fire brigade vehicles* to any *premises* using public roads

c) providing access for *fire brigade vehicles* to any building, structure or site using a privately-owned road system

d) providing *hardstand* areas that are suitable for firefighting operations

e) roads and structures to support the weights and loads of *fire appliances*

f) consideration of operational limitations when planning *fire brigade vehicles* access for any proposed development

g) *fire brigade vehicle* access on land that is designated as bush fire prone land, and

h) planning and implementing local area traffic management.

When this guideline is followed, the *fire brigade* will be able to undertake their statutory duty and function to protect and save life and property during an emergency in the speediest and most efficient manner.

3 Application

This guideline applies to any land subdivision, proposed development, change of building use, or building construction that is intended to meet the *National Construction Code* (*NCC*[1]), and which is located within NSW.

Note: Performance requirement CP9 of the *NCC* requires *fire brigade vehicle* access be provided to the degree necessary (this guideline) to facilitate *fire brigade* intervention.

This guideline is intended to be used by owners, developers, designers, engineers, urban planners, regulatory and consent authorities when planning, assessing or determining any application pertaining to any applicable land or *premises*.

Access for *fire brigade vehicles* and firefighters is relevant to all *premises* and is to be commensurate to the potential level of risk; it should be considered even when not specifically identified by any planning instrument, regulation or Act.

Note: The relevant consent authority can impose conditions on development or issue orders when provision for access is inadequate.

[1] *National Construction Code 2019, Building Code of Australia Volume One*

Developers, designers, engineers and planners are to ensure that adequate access is given to an *aerial appliance* when appropriate to the development (e.g. multiple-storeys and located within the coverage area of an *aerial appliance*).

This guideline has been developed in the public interest and is intended to be used by any consent authority considering any proposed development (refer to *Section 4.15(1)(e)* of the *Environmental Planning and Assessment Act 1979*).

Note: Under *Section 4.17* of the *EP&A Act*, the consent authority may impose requirements from this guideline (in part or full) as a condition on the development consent.

This guideline is to be used for any land or development within NSW as deemed applicable by the consent authority. Access requirements are generally consistent across all emergency services, but reference should be made to other guidelines where appropriate (e.g. NSW Rural Fire Service (RFS) *Planning for Bush Fire Protection* in bush fire prone land).

4 Definitions

The following definitions apply in this guideline:

aerial appliance — means a specialised type of *fire appliance* fitted with an *aerial apparatus* which elevates to given heights to provide fire suppression and rescue capabilities.

aerial apparatus — means a purpose-built device which can elevate, extend, articulate and slew within a field of operations to provide operational functions at elevated height (e.g. water stream, cage rescue, stairway rescue, observation, gear lift, water supply, work platform).

alternative solution (or performance solution) – means a method of complying with the *NCC* performance requirements other than by a 'deemed-to-satisfy' solution.

carriageway – means any public road, *private road*, shared traffic zone, laneway, access way or the like, whether having a sealed surface layer or not, that is intended for the carriage of vehicles. A carriageway may comprise one or more vehicle lanes.

complex development – means any development comprising one or more buildings or structures of higher than normal risk (e.g. infrastructure, podiums, precincts and shared zone or a *major facility*).

designated building entry point (DBEP) – means the entry point into a building providing firefighter access when fire or other *emergency incident* occurs.

Note: Typically, the *DBEP* will be the main building entrance. The *DBEP* is identified when the building has a fire detection, warning, control and intercom system installed.

designated site entry point (DSEP) – means the entry point into a site that provides access to emergency vehicle when fire or other *emergency incident* occurs.

effective height – means the same as in the *National Construction Code*.

emergency incident – means any abnormal and dangerous situation that has caused, or threatens to cause, harm persons, property or the environment, and requires a response by an emergency service to manage back to safe and normal condition.

fire appliance – means any vehicle that forms part of the equipment of a *fire brigade* and that is equipped with an audible warning device and flashing lights.

fire brigade – means a statutory authority constituted under an Act of Parliament having as one of its functions, protect life and property from fire and other emergencies.

fire brigade vehicle – means any *fire appliance* being used by firefighters from a *fire brigade*.

fire brigade station – means a state government operated premises which is a station for a *fire brigade* (i.e. FRNSW fire brigade station or NSW RFS fire brigade station).

fire district – means an area which the *Fire and Rescue NSW Act 1989* applies in relation to fires and contributions of costs.

Note: Fire districts are constituted by the Governor under *Section 5* of the *Fire and Rescue NSW Act 1989* by order published in the NSW Gazette.

hardstand – means an apron or section of *carriageway* specifically designated for use by a stationary *fire appliance* (e.g. for a *fire appliance* at the fire hydrant booster assembly).

local area traffic management (LATM) – means the analysis of traffic characteristics and the implementation of *traffic control devices* within a local area.

national construction code (NCC) – means the *National Construction Code (NCC) 2019, Building Code of Australia Volume One*, as amended.

major facility – means any large building or complex of related buildings on any given site and having multiple designated site or building entry points for emergency response. Any facility having a network of *private roads* providing building access may be considered major.

premises – means any building, facility or site (land).

private road – means a *carriageway* located within the boundary of privately-owned *premises* and not under the care and management of a council or public authority.

rural fire district – means an area which the *Rural Fires Act 1997* applies in relation to the area of the responsible local authority or authorities (e.g. Councils).

Note: Rural fire districts are constituted under *Section 6* of the *Rural Fires Act 1997* and published in the NSW Gazette.

stabiliser – means a hydraulic operated stabilising jack fitted to an *aerial appliance* to provide stability when the vehicle's centre of gravity shifts during operation of the *aerial apparatus*.

suction-connection outlet – means a connection outlet for suction hose that draws water from a static water supply (e.g. tank, reservoir, dam, lake, river).

traffic control device – means any sign, signal, pavement markings or other installation placed or erected by an authority having jurisdiction, for the purpose of regulating, warning or guiding road users.

turning circle radius – means the minimum arc radius that provides wall-to-wall clearance of a fire appliance turning at full steering lock (e.g. to negotiate corners or turnaround areas).

wheelbase – means the distance between the centre-point of the front steer axle (or group) and rear drive axle (or group).

5 Background

Under *Section 5A* of the *Fire and Rescue NSW Act 1989* and *Section 9* of the *Rural Fires Act 1997, fire brigades* in NSW have the duty to protect persons from injury or death and property from damage from fires and other emergencies. A fundamental factor to achieving this is the ability of firefighters to respond and undertake intervention activities as quickly as possible.

During an emergency, firefighters require efficient and effective access for a rapid and unhindered response. Poor or inadequate access to any *premises* will result in delays to response and intervention and may directly impact on the life safety of occupants.

Access to a given *premises* is primarily provided by a public road network in accordance with *Austroads Guide to Road Design*. On the given *premises*, vehicular access around buildings and structures may be provided by way of *private roads*.

Planners and designers sometimes only consider local traffic (i.e. minor vehicles) and typically exclude the carriage of heavy vehicles. *Fire brigade vehicles* are larger and heavier types of vehicles that may require access to any given *premises* at any time, without notice.

Note: When designing for local traffic, access for *fire appliances* should not be prohibited.

Owners of existing *premises* must ensure *fire brigade vehicle* access provisions are maintained at all times (e.g. access is not obstructed by parked vehicles or stored goods).

6 Fire appliances

6.1 Types of fire appliance

6.1.1 Both FRNSW and NSW RFS have several types of *fire appliances*, each specifically designed to perform a different range of functions at any given emergency.

6.1.2 Most general *fire appliances* comprise a purpose-built body fitted on a two axle truck chassis. Depending on the primary function, various levels of firefighting, rescue and hazardous materials equipment will be carried (see Figure 1).

Note: While the core function of a ‘general’ *fire appliance* is firefighting, some may provide only rescue or hazardous materials capability.

Figure 1 General fire appliances: tanker, pumper and rescue (from l to r)

6.1.3 FRNSW operates a fleet of *fire appliances* that are fitted with an *aerial apparatus* that elevates, rotates and extends to a given height to access an emergency in a building or structure. In this guideline, an *aerial appliance* is a ‘specialist’ fire appliance.

Note: An *aerial appliance* is commonly, even though incorrectly, referred to as a ‘cherry picker’ by the media and public.

6.1.4 Both FRNSW and NSW RFS operate specialist *fire appliances* to undertake specific functions at a given incident. These *fire appliances* are larger and heavier and may be on either a two, three or four axle truck chassis (see Figure 2).

Note: Specialist fire appliances are strategically located across NSW to protect key assets and community places as required.

Figure 2 Specialist fire appliances: bulk water, command and aerial appliance (from l to r)

6.1.5 Both FRNSW and NSW RFS operate articulated heavy vehicles (e.g. prime mover with trailer) which are excluded from the scope of this guideline.

6.2 Overall parameters for design

6.2.1 While specifications vary between *fire appliances*, for the purpose of design overall parameters are broadly categorised into two distinct *fire appliance* types as follows:

General fire appliance	
Gross vehicle mass	15 000 kg
Overall length	10.0 m
Overall width (incl. mirrors)	3.0 m
Body width (excl. mirrors)	2.5 m
Overall height	3.7 m

Specialist fire appliance	
Gross vehicle mass	29 300 kg
Overall length	12.5 m
Overall width (incl. mirrors)	3.0 m
Body width (excl. mirrors)	2.5 m
Overall height	4.3 m

Table 1 Overall parameters of fire appliances

Note: A medium rigid (MR) licence or higher is required for a general *fire appliance*, while a heavy rigid (HR) licence is required for a specialist *fire appliance*.

6.3 Coverage area by types of fire appliance

6.3.1 A general *fire appliance* will offer fire protection to any *premises* located within a *fire district* or *rural fire district*; *fire brigade vehicle* access commensurate to parameters given for ‘general’ *fire appliance* is to be provided for all *premises* in NSW.

Note: The fire may be attended by FRNSW, NSW RFS or both (e.g. mutual aid) and may also be supported by other emergency vehicles.

6.3.2 Any *complex development* may be attended by a specialist *fire appliance*; *fire brigade vehicle* access commensurate to parameters given for ‘specialist’ *fire appliance* is to be provided as appropriate to the risk.

Note: A non-fire emergency may require attendance of a specialist *fire appliance* (e.g. for rescue, aerial access or hazardous materials incident).

6.3.3 Any building having an *effective height* greater than 9 m (e.g. more than three storeys above ground) and located within the coverage area of an *aerial appliance* should be provided with *fire brigade vehicle* access commensurate to the parameters given for 'specialist' *fire appliance* as appropriate to the risk (refer to section 10.4).

Note: The portable extension ladder carried on a fire appliance can only reach 10 m high. An *aerial appliance* can provide a means of emergency escape in any building that only has a single required exit.

6.3.4 *Aerial appliances* are strategically located within *fire districts* for optimum response in areas of greatest fire risk, and cover the greater metropolitan regions of Sydney, Newcastle and Wollongong, and the regional cities of Albury and Wagga Wagga.

Note: FRNSW can be consulted to identify when development is located within the coverage area of an *aerial appliance* and 'specialist' access applies.

6.3.5 Clause E1.3 of the *NCC* requires a fire hydrant system (e.g. *AS 2419.1–2005*) be provided only when a *fire brigade station* is no more than 50 km away and is equipped to utilise the fire hydrant. The fire hydrant system is only required when the *fire brigade station* has a *fire appliance* not less than shown in Table 2.

Note: The *fire appliance* must have appropriate personnel available (i.e. crew cabin) and carry self-contained breathing apparatus. Refer to Appendix A for typical pump performance of *fire appliances*.

No. of hydrants required to flow simultaneously	Min. system design flow rate	Operating pressure	Available fire brigade station	Type of fire appliance available (as stationed within 50 km)
1	10 L/s (600 L/min.)	900 kPa	FRNSW	Any Pumper or Tanker
			NSW RFS	Any Category 1, 3, 10 or 11
2	10 L/s (1,200 L/min.)	1,000 kPa	FRNSW	Any Pumper or Tanker
			NSW RFS	Any Category 10 or 11
3	10 L/s (1,800 L/min.)	1,000 kPa	FRNSW	Any Class 2, 3 or Aerial pumper
			NSW RFS	Any Category 10 or 11
4	10 L/s (2,400 L/min.)	1,000 kPa	FRNSW	Any Class 2, 3 or Aerial pumper
			NSW RFS	None (FRNSW mutual aid only)
5 or more	≥50 L/s (≥3,000 L/min.)	1,000 kPa	FRNSW	Two or more pumpers
			NSW RFS	None (FRNSW mutual aid only)

Table 2 Types of fire appliance suitable to operate a fire hydrant system

7 Vehicle access requirements

7.1 Carriageway width

7.1.1 A *carriageway* is to be wide enough to allow easy negotiating by the *fire appliance* and provide room around the vehicle to allow firefighters to exit and work with equipment.

Note: During an *emergency incident*, the *fire appliance* will be positioned (i.e. parked) in the most tactically advantageous position.

7.1.2 Along any straight *carriageway* section, the minimum width is 4.5 m for general *fire appliance* access, or 6 m for specialist *fire appliance* access (see Figure 3).

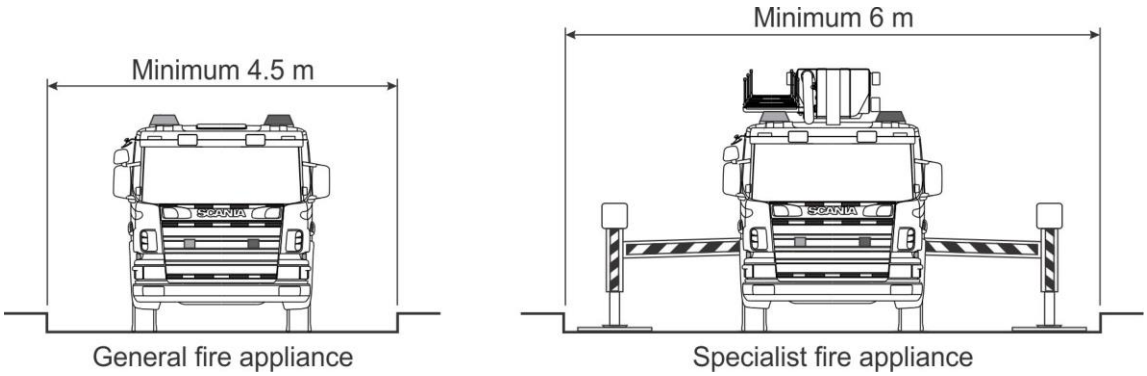


Figure 3 Minimum carriageway width (straight section)

Note: An *aerial appliance* requires additional width to extend *stabilisers* and operate. A designated *aerial appliance hardstand* area may be considered if continuous minimum width clearance cannot be achieved (see Figure 13).

7.1.3 When the *carriageway* is curved, including a corner around a building or structure, consideration is to be given to the *turning circle radius* and the minimum wall to wall clearances from both inner and outer body sections (including overhangs).

7.1.4 The minimum *turning circle radius* of any curved *carriageway* section is to be 6.5 m (inner) and 11.5 m (outer) for general *fire appliance* access, or 7.5 m (inner) and 14.6 m (outer) for specialist *fire appliance* access (see Figure 4).

Note: These turning circles provide wall to wall clearance from the vehicle body and overhangs. They are not the turning circles for the vehicle's wheel tracks.

7.1.5 The distance between inner and outer *turning circle radius* is to provide body swing clearance (i.e. vehicle swept path), and not be less than 5 m for general *fire appliance* access and 7.5 m for specialist *fire appliance* access (see Figure 4).

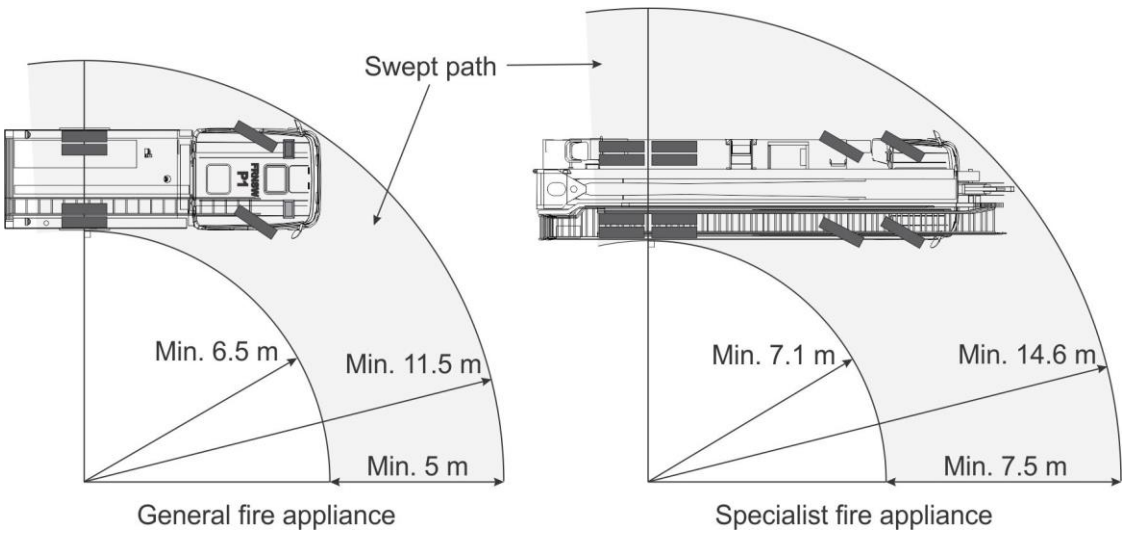


Figure 4 Minimum turning circle radius (curved section)

7.1.6 Body swing on turn entry and exit is to be considered, particularly when going around a building (see Figure 5). The pivot is tangential to the centre of the drive axle/s.

Note: The body swing arc changes with forward travel to full steering lock and back and arc created by the front opposite corner needs to clear any obstructions.

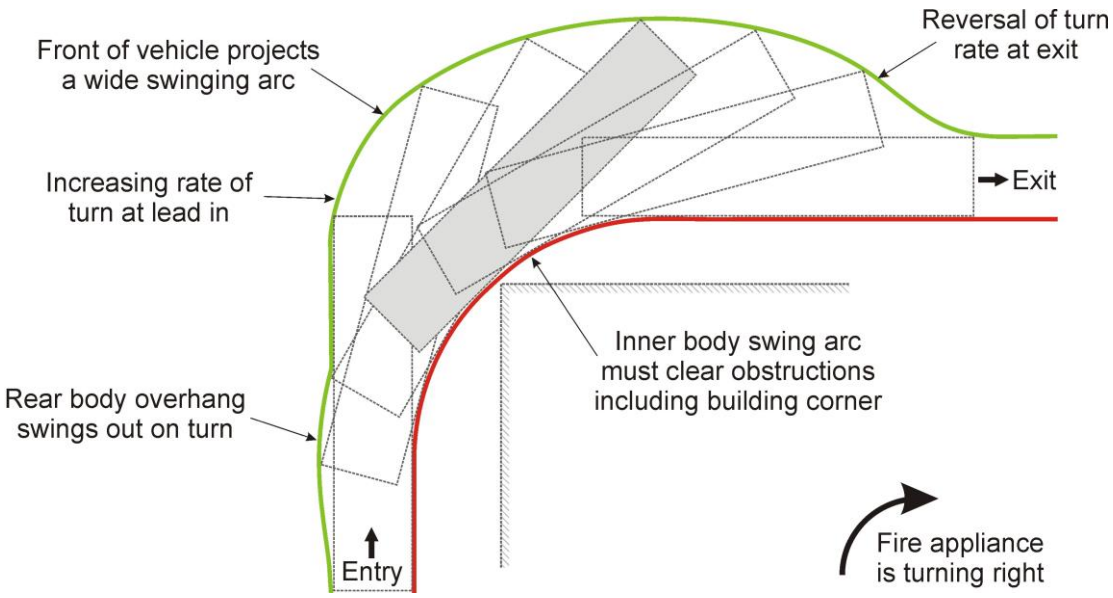


Figure 5 Typical body swing on entry and exit of turn

7.1.7 The design vehicle from *AS 2890.2:2018 Parking facilities Off-street commercial vehicle facilities* should be used for swept path analysis, with 'medium rigid vehicle' used for a general *fire appliance* and 'heavy rigid vehicle' for specialist *fire appliance*.

Note: The front overhang of some *aerial appliances* results in an increased swept circle diameter of 29.2 m instead of 27.8 m for the design heavy rigid vehicle.

7.2 Turnaround area

7.2.1 Any carriageway that extends longer than 120 m from an intersection and does not lead directly to an exit or connecting *carriageway* (i.e. dead end) is to have a suitable turnaround area so that a *fire appliance* does not need to reverse out (see Figure 6).

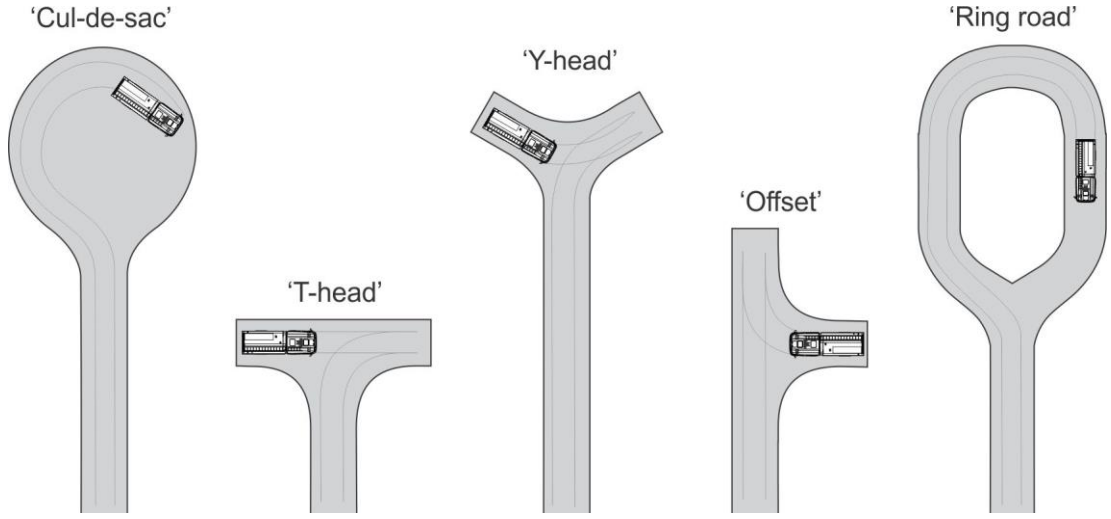


Figure 6 Examples of typical turnaround area configurations

7.2.2 The turnaround area must allow for body swing bias to the front of the *fire appliance*. If a multiple-point turn is required due to space restriction, the turning area is to be large enough to not require more than three points of turn (see Figure 7).

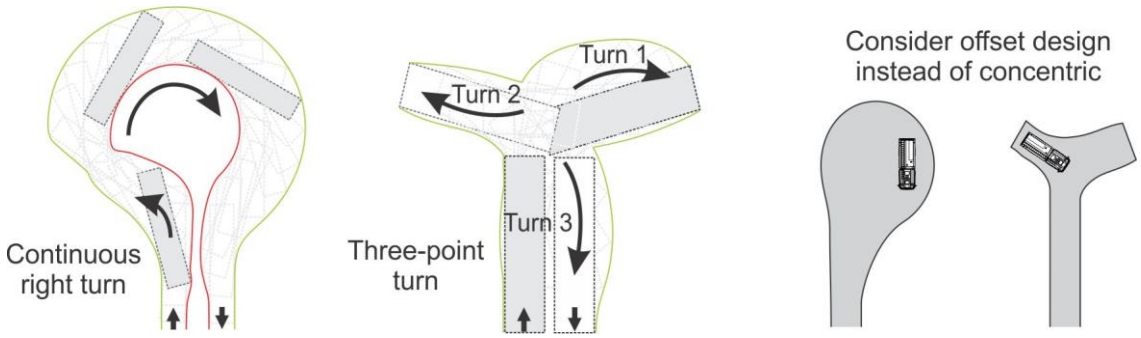


Figure 7 Turnaround body swing; continuous (left) or multiple point (right)

7.3 Constricted access (i.e. pinch point)

7.3.1 Constricted access is any narrow pinch point around an immovable object (e.g. building, structure, bridge, bollard, pylon, gate, vehicle barrier, *traffic control device*, utility pole, drain, fence, tree etc.) that provides less than 4.5 m width.

Note: A pinch point has insufficient width for firefighters to exit the *fire appliance* and work with equipment. A *fire appliance* is not able to stop at any pinch point.

7.3.2 The carriageway is not to have any constricted access providing less than 3.2 m width (see Figure 8).

Note: A *fire appliance* is unable to negotiate past a pinch point less than 3.2 m wide.

7.3.3 Any constricted access along a straight *carriageway* section is not to be longer than 50 m (see Figure 8).

Note: A 50 m long pinch point allows two lengths of fire hose.

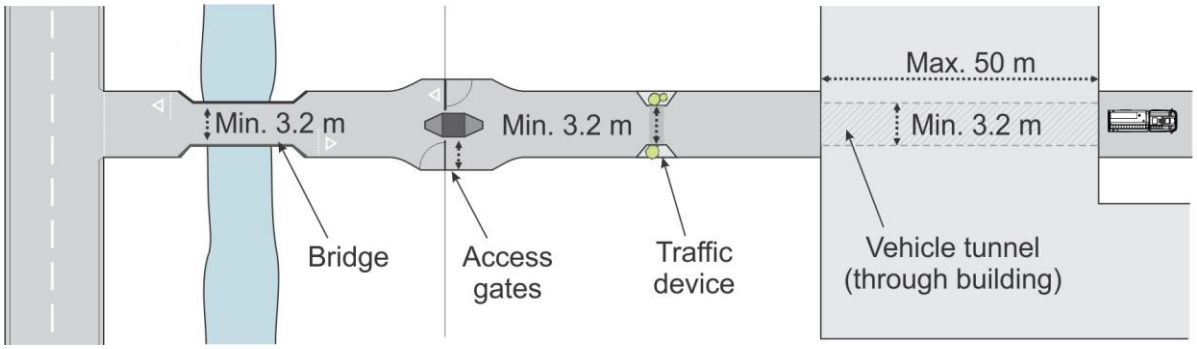


Figure 8 Examples of constricted access (typical pinch points)

7.3.4 Site managers are to ensure *fire brigade vehicle* access is not blocked by non-permanent obstructions including by parked vehicles, freight containers, pallets, stored goods, stored waste, bins, temporary structures etc.

7.4 Underbody clearance

7.4.1 All raised kerbs along the edge of a *carriageway* are to be no higher than 200 mm and be free of vertical obstructions at least 300 mm back from the kerb face, to allow clearance from and body overhang when turning (see Figure 9).

7.4.2 Kerbs in the centre of a *carriageway* (e.g. splitter islands and median strips) should be no higher than 200 mm and no wider than 500 mm, and be free of obstruction along their length, to allow the *fire appliance* to drive over the kerb (see Figure 9).

Note: A *fire appliance* responding to an *emergency incident* may need to manoeuvre onto opposing traffic lanes to get past stationary built up traffic.

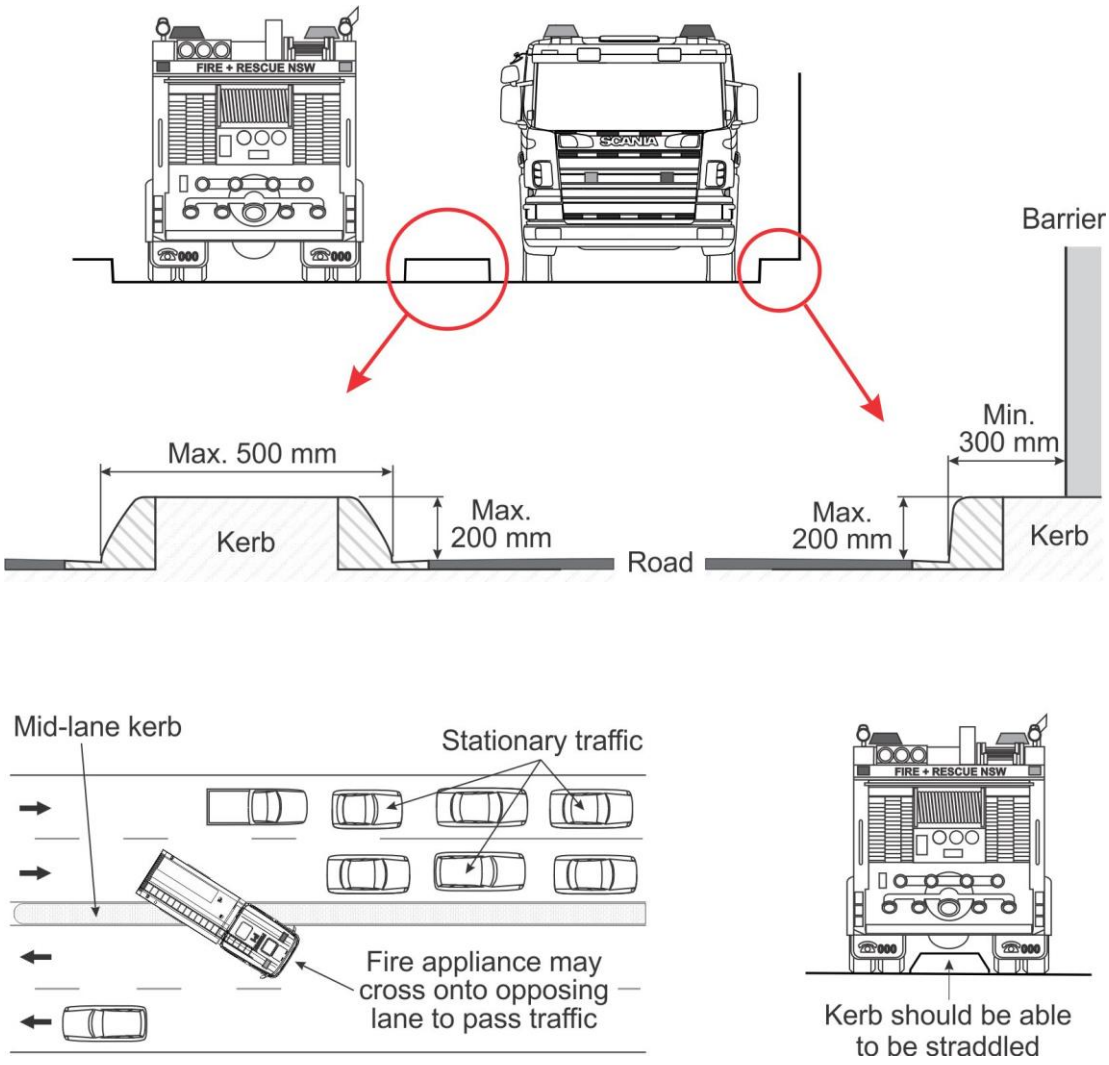


Figure 9 Kerb clearance dimensions

7.4.3 *Traffic control devices* that have integrated kerbs to slow traffic (e.g. speed hump, chicane slow point, small roundabout) are to have low profile mountable kerbing with 40 mm bull nose edge to allow easy negotiation by a *fire appliance*.

7.5 Overhead clearance

7.5.1 The *carriageway* is to have a minimum overhead clearance height of 4 m for general *fire appliance* access or 4.5 m for specialist *fire appliance* access (see Figure 10).

Note: The maximum vehicle height under the *Road Transport (Vehicle Registration) Regulation 2017* is 4.3 m. *AS 2890.2:2018 Parking facilities, Part 2: Off-street commercial vehicle facilities* prescribes a clearance height of 4.5 m.

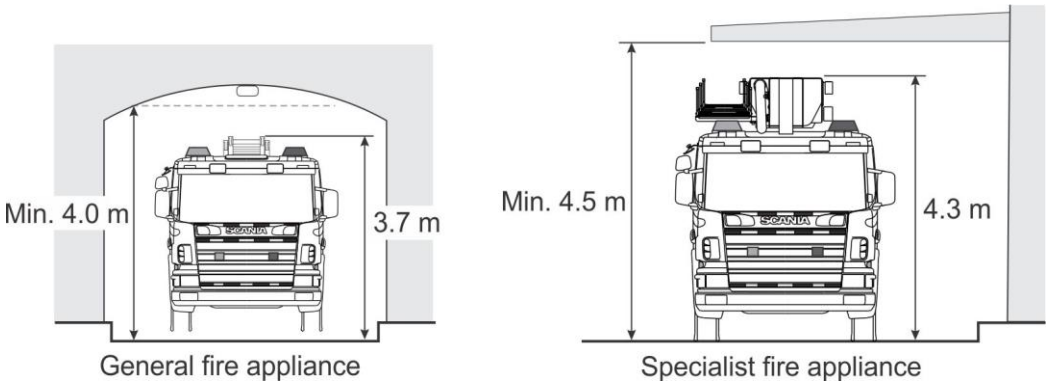


Figure 10 Minimum clearance height

7.5.2 Overhead clearance is to be free of any obstructions including building element (e.g. ceiling, beam, truss) bridge, archway, tunnel, walkway, barrier and any ceiling or overhanging fixtures such as lights, signs, poles, pipes, ducts, sprinkler heads etc.

7.5.3 Any restricted height clearance due to unavoidable overhead obstacle (e.g. low bridge) is to be clearly signed and indicate the actual maximum height clearance.

7.6 Grades and ramps

7.6.1 The grade of a *carriageway* or ramp is to be no steeper than 1:6 (16.6%).

Note: A grade of 1:8 (12.5%) or less is preferred for easier access. *AS 2890.2:2018* prescribes a maximum roadway/ramp grade of 1:6.5 (15.4%).

7.6.2 If the *carriageway* or ramp follows a curved or circular path, the maximum grade is to be no greater than 1:8 (12.5%) as measured along the centre line.

Note: The vehicle's chassis and body will twist and flex when negotiating a circular path, increasing with vehicles that have a longer *wheelbase*.

7.6.3 Ramps are to have transition grades between entry and exit which have a maximum rate of change of 1:16 (6.25%) for every 7 m of travel (see Figure 11 below).

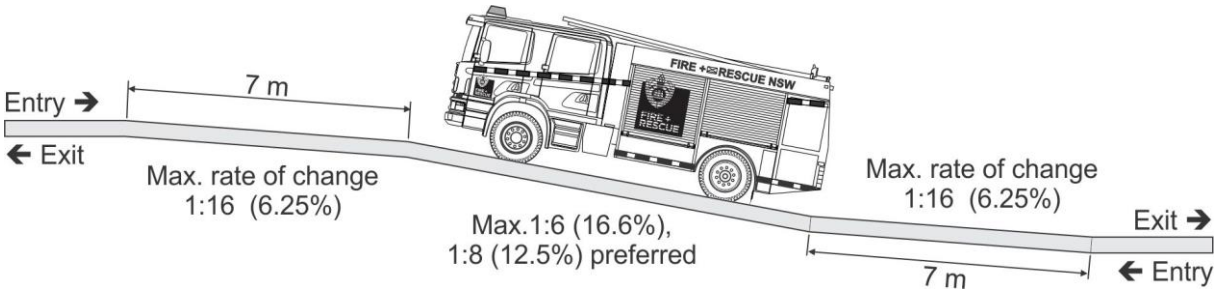


Figure 11 Maximum gradients of access ramps

7.6.4 Ramps that do not have a transition grade of at least 7 m are to have an approach and departure angle not exceeding 8° to ensure front and rear body overhang of a *fire appliance* does not contact the ground when negotiating the gradient change.

7.6.5 If any gradient change incorporates a recessed threshold (e.g. gutter or drain at site entrance driveway), the design should consider any reduced entry and exit clearance for the *fire appliance* (see Figure 12).

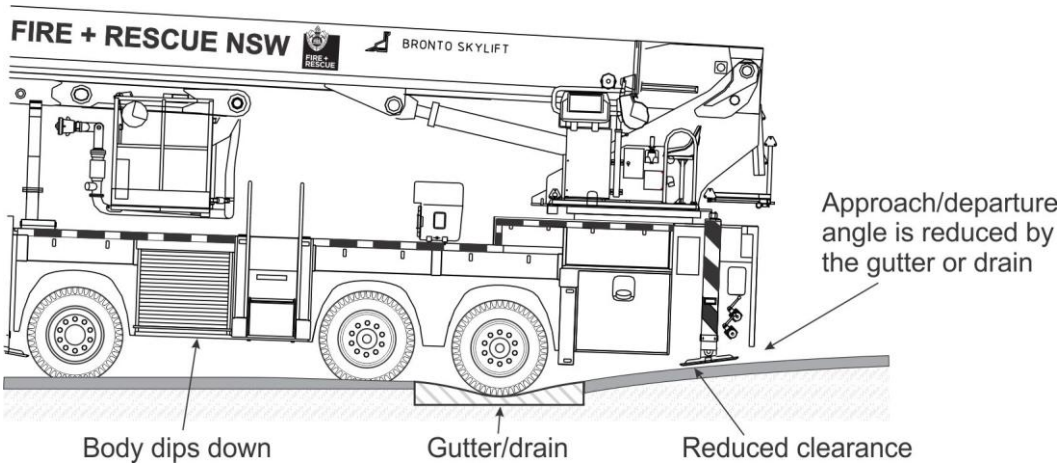


Figure 12 Reduced gradient clearance from recessed gutter

Note: Wheels will recede into any gutter or drain and reduce the effective approach and departure angle. Clearance is impacted most on *fire appliances* having long front and rear overhanging body sections (e.g. specialist *fire appliance*).

7.7 Security points and barriers

7.7.1 Gates, barriers and bollards installed to inhibit vehicle access for security purposes are to be either removeable, retractable or foldable so that a *fire appliance* can gain access to the site during an *emergency incident*, including access after-hours.

Note: A bypass should be provided for any weighbridge, vehicle station, loading bay or the like, if likely to be obstructed by a vehicle during normal operations.

7.7.2 Any vehicle access gate that is required to be locked, including any alternate vehicle access gate, should be secured with a non-hardened metal chain and lock (e.g. galvanised mild steel).

Note: Firefighters may need to force entry through the vehicle access gate using standard bolt cutters on the chain or lock.

7.7.3 All locks fitted to vehicle access gates and security devices are to be keyed alike, and a copy of the key deposited with the two nearest FRNSW *fire brigade stations* or kept with the site security if 24/7 security is provided for the site.

Note: *Premises* keys can be deposited directly with the local FRNSW *fire brigade stations* (see clause 10.5.5).

7.7.4 Any electrically operated vehicle access gate or security device should incorporate either mechanical override, fail-safe open mode, or activation by site security so that fire appliances can access the site in the event of fire.

8 Hardstand area

8.1 Design requirements

8.1.1 Designated *hardstand* areas are to provide a safe working space for firefighters to exit the vehicle and move around the fire appliance to remove and use equipment, including connecting fire hoses to the *fire appliance* (see Figure 13).

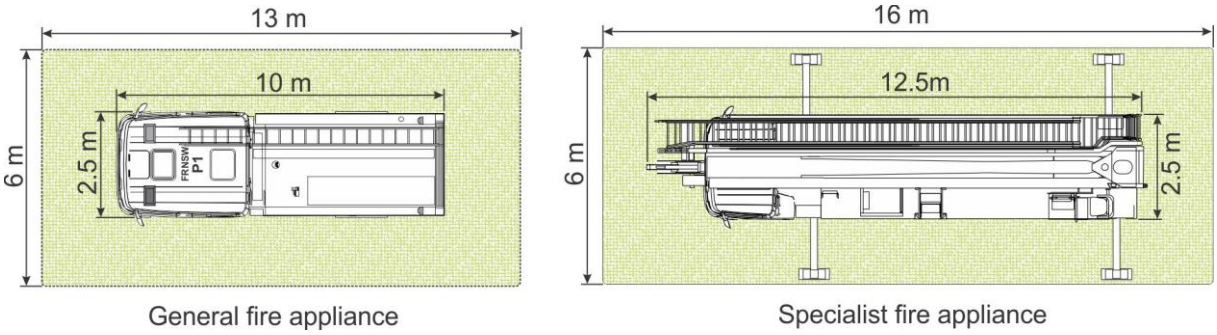


Figure 13 Minimum working space for hardstand area

8.1.2 The designated *hardstand* area is to be flat and level all weather surface which is clear of any obstructions that could be hazardous during operations (e.g. bollard, railing, fencing, sign, kerb, gutter, fixed structure, parked vehicle, storage, rubbish).

8.1.3 The designated *hardstand* area is to provide easy manoeuvring for the *fire appliance* to be positioned onto the *hardstand* from the *carriageway*.

8.1.4 Any section of *carriageway* may be used as a designated *hardstand* area only when the passing traffic flow will not be blocked by the positioned *fire appliance*.

Note: A minimum clearance of 3.5 m should be provided. A turnaround area may be used as a hardstand only when another fire appliance can safely turn around.

8.1.5 Any *hardstand* serving a *suction-connection outlet* is to have a working space which extends a minimum of 18 m from the point of connection to allow semi-rigid suction hose to be connected to the rear of the *fire appliance* (see Figure 14).

Note: *Fire appliances* typically use three x 2.4 m or two x 3.6 m long suction hoses (i.e. combined length of 7.2 m). Some FRNSW 'aerial pumpers' have a mid-mounted pump where the suction hose is connected to the side of the vehicle.

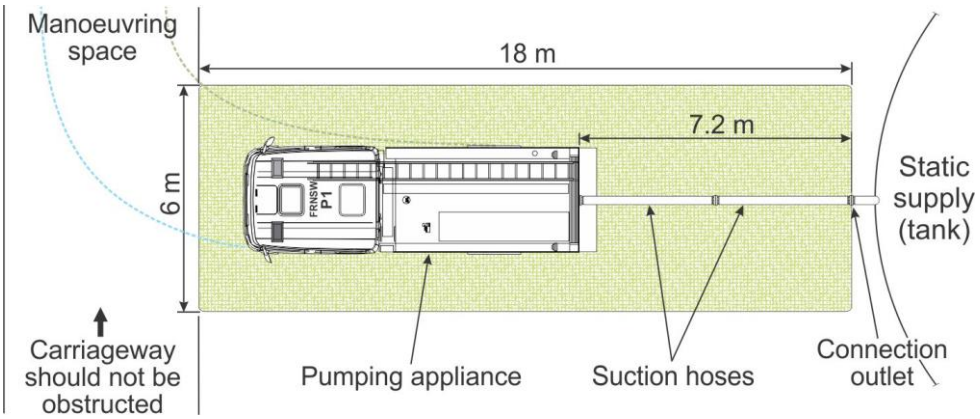


Figure 14 Hardstand area serving a suction-connection outlet

8.1.6 Any designated *hardstand* area serving a pumping *fire appliance* for firefighting operations (e.g. pumper using a feed fire hydrant) is to have appropriate guttering and drainage to remove any continuous water discharge from the *fire appliance*.

8.2 Hardstand locations

8.2.1 A *hardstand* is to be provided as required by *AS 2419.1—2005 Fire hydrant installations – System design, installation and commissioning*, and as otherwise nominated by the relevant authority having jurisdiction, including:

- within 20 m of any feed fire hydrant
- within 8 m of any fire hydrant booster assembly
- within 50 m of an external attack fire hydrant
- within 20 m of the access door to any external fire pumproom
- in front of any *suction-connection outlet* (e.g. tank, river, lake, dam, sea).

Note: The location must also consider other required factors such as firefighter access to the building and maximum hose coverage requirements.

8.2.2 Any *hardstand* area serving a *suction-connection outlet* is to be positioned at an angle not greater than 45º from the outlet's longitudinal direction (see Figure 15).

Note: Suction hoses are semi-rigid and only allow slight bending, therefore the *fire appliance* must be positioned relative to the connection outlet. The working space must be kept unobstructed at all times.

8.2.3 If multiple *fire appliances* are required to connect to *suction-connection outlets*, the *hardstand* areas should allow each *fire appliance* to operate independently without encroaching onto the other's working space (see Figure 15).

Note: *Suction-connection outlets* are not be located within 5 m of each other.

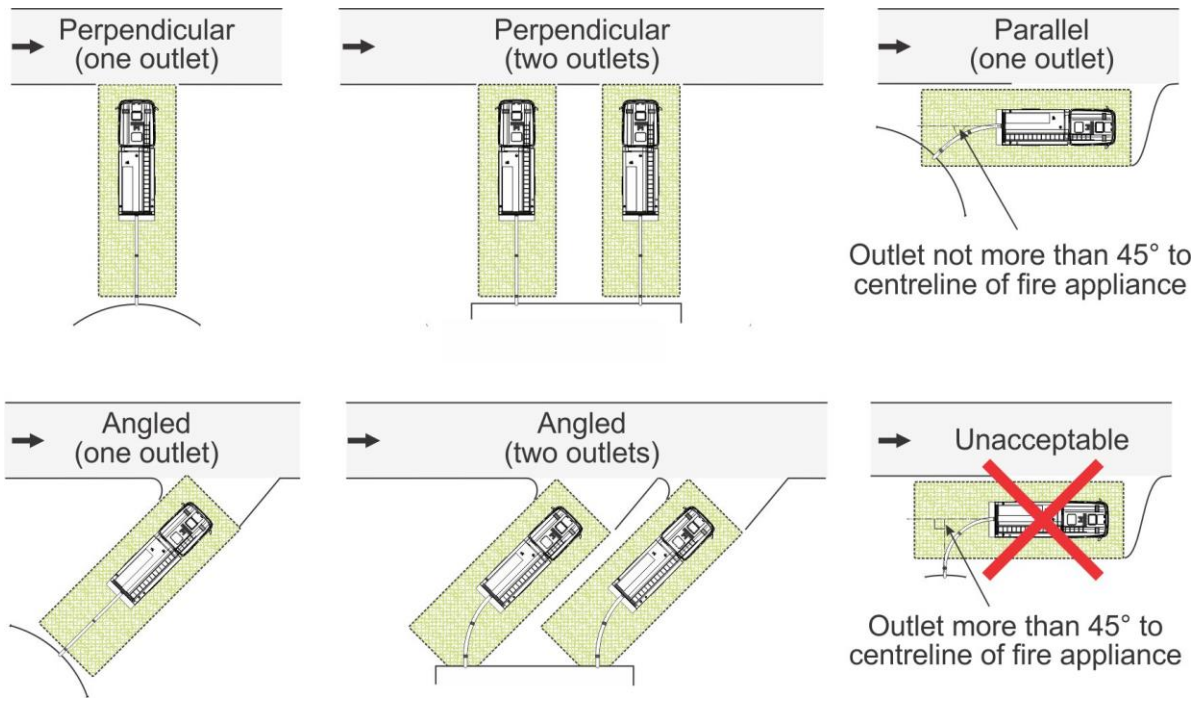


Figure 15 Example of orientation of hardstand area for suction-connection outlets

9 Weights and loads

9.1 Design requirements

9.1.1 All *carriageways* and *hardstand* areas are to be suitably formed and constructed having an all-weather sealed surface capable of supporting the *fire appliance*.

Note: Refer to the *Austroads Guide to Road Design* for best practice *carriageway* design and construction.

9.1.2 All *carriageways* and *hardstand* areas are required to maintain structural adequacy under load from a *fire appliance*, including when supported, elevated or reinforced by structural members (e.g. bridge, ramp, apron, suspended floor, wharf etc.).

Note: Load limited bridges unable to support a *fire appliance* should be avoided, particularly when alternate routes involve much longer distances.

9.2 Weight (static load)

9.2.1 The maximum weight of a general *fire appliance* is 15 tonnes, and 28 tonnes for a specialist *fire appliance*. The static load should be used when determining forces acting through load bearing structures and surfaces (see Figure 16).

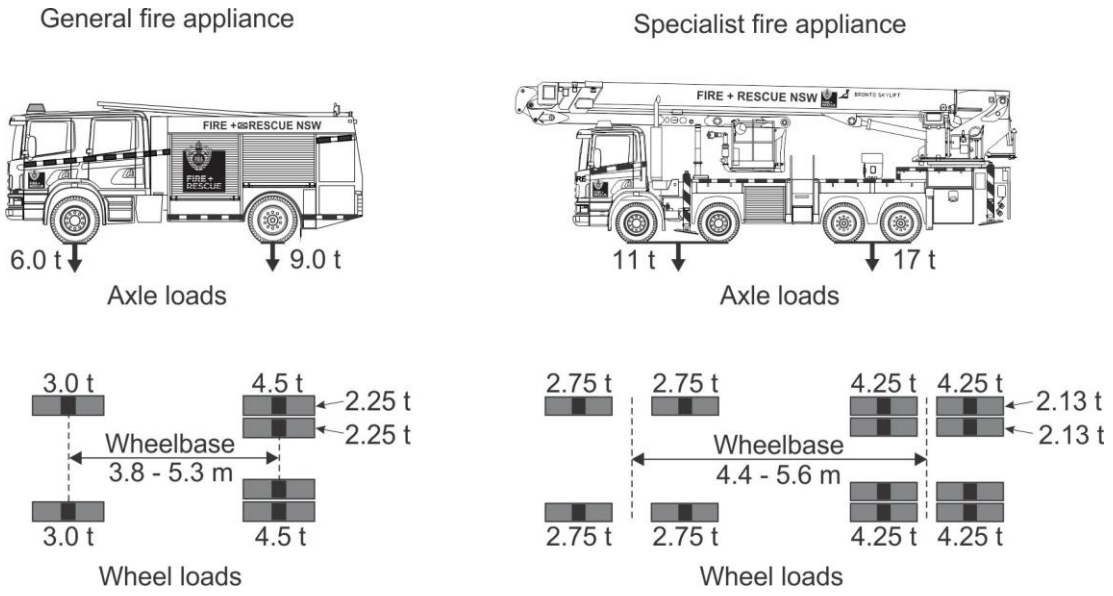


Figure 16 Static loads from fire appliances

9.2.2 The *Bronto Skylift F44 RLX aerial appliance* is the heaviest *fire appliance* in the FRNSW fleet and exceeds legal mass limits (i.e. operates by special permit).

9.2.3 The surface of any *carriageway* and *hardstand* area is to have enough binding and hardness to withstand point loads exerted thought each tyre (i.e. tyre pressure contact point as represented by black squares in Figure 16).

Note: Tyres are typically inflated around 850 kPa pressure. If the *carriageway* or *hardstand* has insufficient surface integrity, the point load will result in localised damage to the road surface (i.e. cracking of surface layer).

9.3 Dynamic load (of an aerial appliance)

9.3.1 An *aerial appliance* is fitted with hydraulically actuated *stabilisers* to support the vehicle when the *aerial apparatus* is operating and will either have two stabilisers at both the front and rear or just two *stabilisers* at the rear only (see Figure 17).

Note: *Stabilisers* extend out and lift the *fire appliance* to provide a stable operating base and prevent overbalancing. If any *stabiliser* cannot be fully extended the field of operations of the *aerial apparatus* will be restricted accordingly.

9.3.2 Movement of the *aerial apparatus* results in changing weight distribution and dynamic forces being exerted through the *stabilisers* (e.g. momentum from rotation, torsion from elevation/extension, weight from rescued persons, water stream reaction).

9.3.3 A bearing plate is positioned under each *stabiliser* to increase ground contact surface area and lower the pressure exerted on the ground. A *stabiliser* will only be deployed without a bearing plate when it is opposite to the intended working side.

Note: The lower pressure assists maintain surface integrity and minimises the likelihood of the *stabiliser* being pushed through the ground surface.

9.3.4 Bearing plates do not reduce the point load from each *stabiliser*. Designers need to consider the foundation and structural support under the *carriageway* surface, particularly when supported, elevated or reinforced by structural members (e.g. bridges, ramps, aprons, suspended floors, wharfs etc.).

Note: Consideration should be given to relocating or reinforcing underground services that may be damaged from high point loads (see Figure 17).

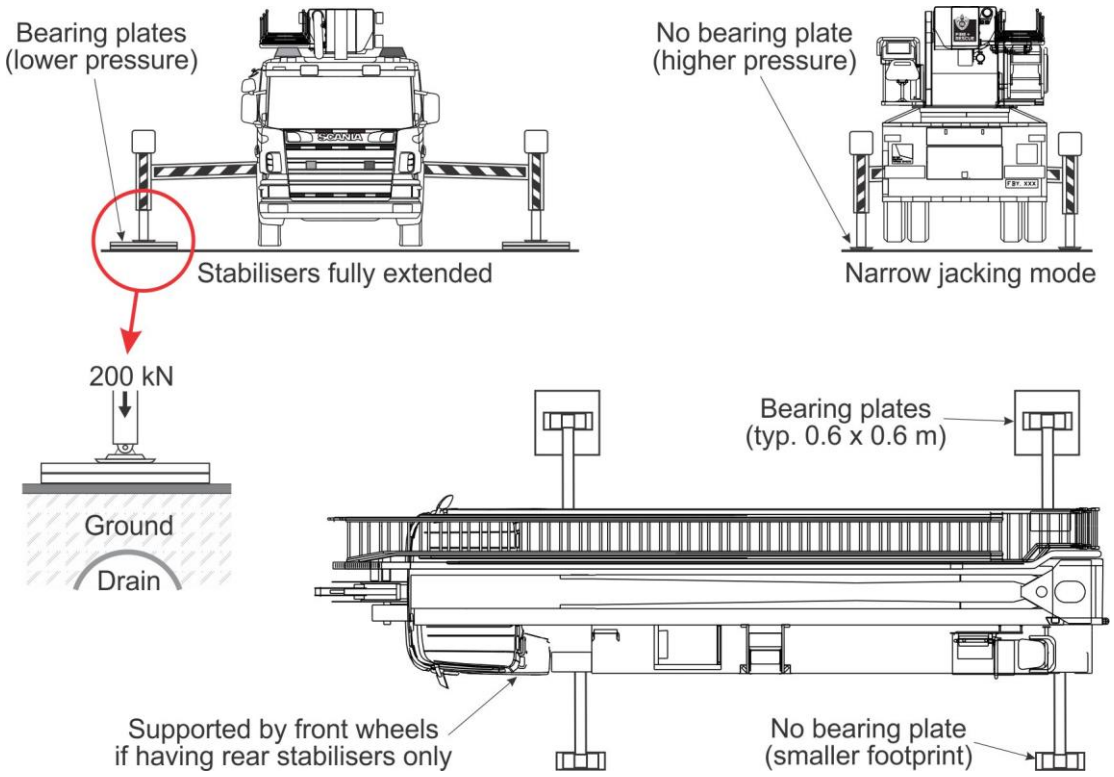


Figure 17 Typical operation of stabilisers and bearing plates

9.3.5 When the *Bronto Skylift F44 RLX* *aerial appliance* has a fully loaded cage (500 kg) at maximum extension and worst-case rotation angle (I.e. over a rear *stabiliser*), the maximum load exerted though a single *stabiliser* is shown in Table 3 (see Figure 18).

Maximum load through single stabiliser	
Force	200 kN
Mass	20,400 kg
Percentage of vehicle mass	70% of gross
Footplate pressure	11 kg/cm² (1080 kPa)
Bearing plate pressure	2.8 kg/cm² (275 kPa)

Table 3 Maximum dynamic loads of an aerial appliance

Note: Dynamic loads should be considered when determining forces acting through load bearing surfaces and structures, particularly when being supported, elevated or reinforced by structural members.

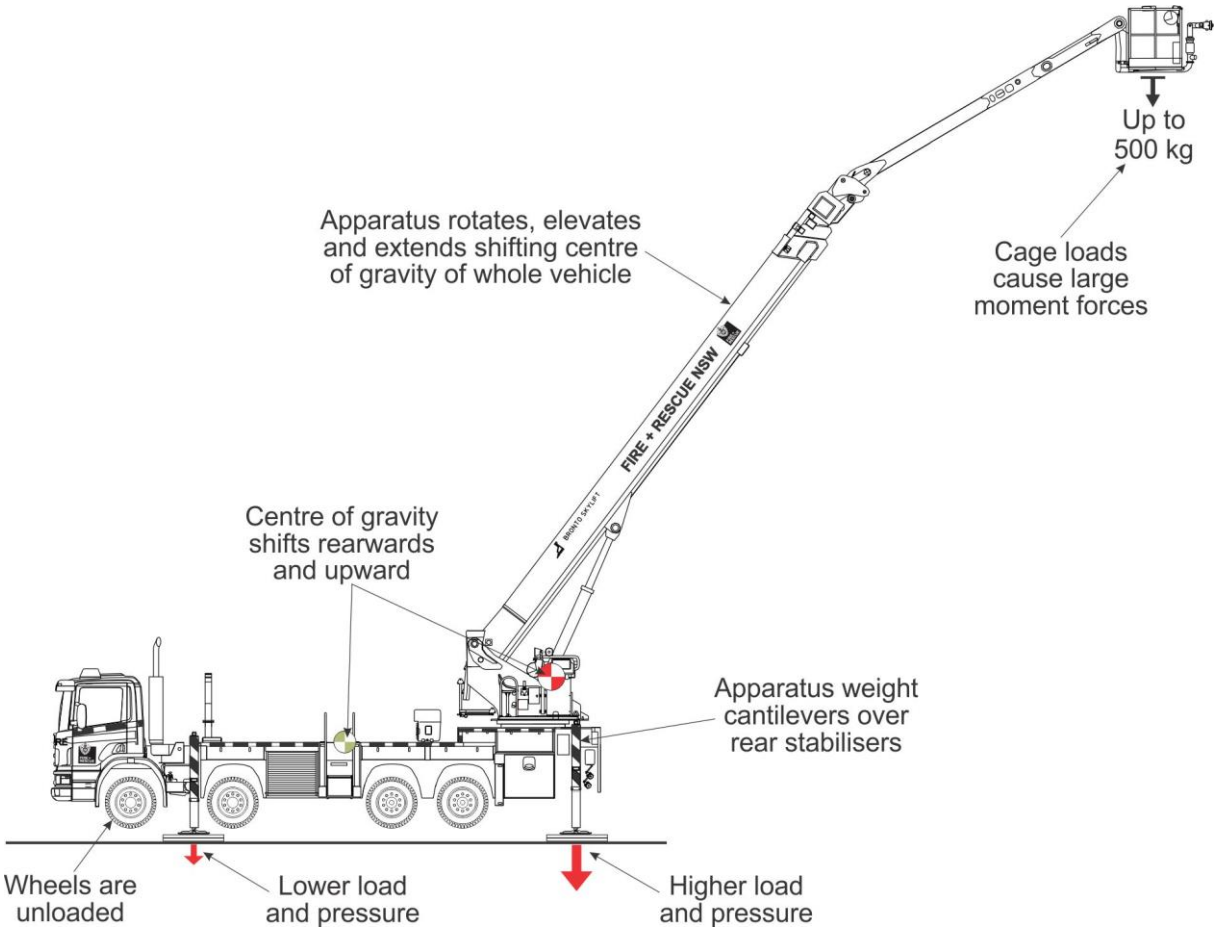


Figure 18 Dynamic loads exerted during aerial appliance operation

10 Considerations for development

10.1 NCC requirements

10.1.1 Performance requirement CP9 of the *NCC* states:

*Access must be provided to and around a building, to the degree necessary, for fire brigade **vehicles** and **personnel** to facilitate fire brigade intervention appropriate to –*
a) the function or use of the building; and
b) the fire load; and
c) the potential fire intensity; and
d) the fire hazard; and
e) any active fire safety systems installed in the building; and
f) the size of any fire compartment.

10.1.2 *Fire brigade vehicle* access is critical to *fire brigade* intervention. Performance requirement CP9 is to be considered in any performance-based design (i.e. *alternative solution*) where *fire brigade* intervention is to be verified.

Note: When identifying relevant performance requirements under clause A2.2(3)(b) of the *NCC*, CP1, CP2, CP9, DP5, EP1.3, EP1.5, EP1.6, EP2.2 and GP4.4 all require verification of *fire brigade* intervention and/or firefighting operations.

10.1.3 Except for Clause C2.3 of the *NCC*, there are no deemed-to-satisfy provisions directly applicable to the provision of *fire brigade vehicle* access to comply with performance requirement CP9.

Note: The *NCC* deemed-to-satisfy provisions deal with general firefighter access.

10.1.4 Design and planning of development should holistically consider *fire brigade vehicle* access for any type of major *emergency incident* (e.g. fire, explosion, accident, gas leak, hazardous material, structural damage or collapse, bomb threat, terrorism etc.).

Note: A major *emergency incident* will require a multiple alarm response; good *fire brigade vehicle* access will assist *fire brigades* and other emergency services to manage the incident and treat casualties.

10.2 Large isolated building

10.2.1 Clause C2.3 of the *NCC* allows the size of a fire compartment in a building to exceed that specified in Table C2.2 when the building is provided with perimeter vehicular access complying with Clause C2.4(b) of the *NCC*.

10.2.2 Clause C2.4(b) of the *NCC* requires the vehicular access to:

- provide continuous forward direction vehicular access around the building
- have a minimum unobstructed width of 6 m, with no part being more than 18 m from the building
- provide reasonable pedestrian access to the building
- have a load bearing capacity and unobstructed height suitable to permit the operation and passage of *fire brigade vehicles*, and
- be wholly within the allotment, except when a complying public road is used.

10.2.3 Any external panel walls must be designed to minimise the likelihood of external collapse onto the vehicular access *carriageway*, with emphasis on Clause 3(g) of Specification C1.11 of the *NCC*.

10.2.4 The unobstructed width of a *carriageway* may be less than 6 m only when:

a) the development is in an area where a specialist *fire appliance* is unlikely to attend (i.e. outside of major metropolitan areas)

b) the unobstructed width is not less than 4.5 m and the external wall adjacent the *carriageway* is a fire wall having a suitable fire resistance level (see Figure 19)

c) a performance-based design (i.e. *alternative solution*) has been undertaken and agreed to by FRNSW

d) openings in the fire wall are passenger doors only and suitably protected to maintain the required fire rating.

Note: A carriageway having a reduced unobstructed width will impact on *fire brigade* intervention, accessibility and safety.

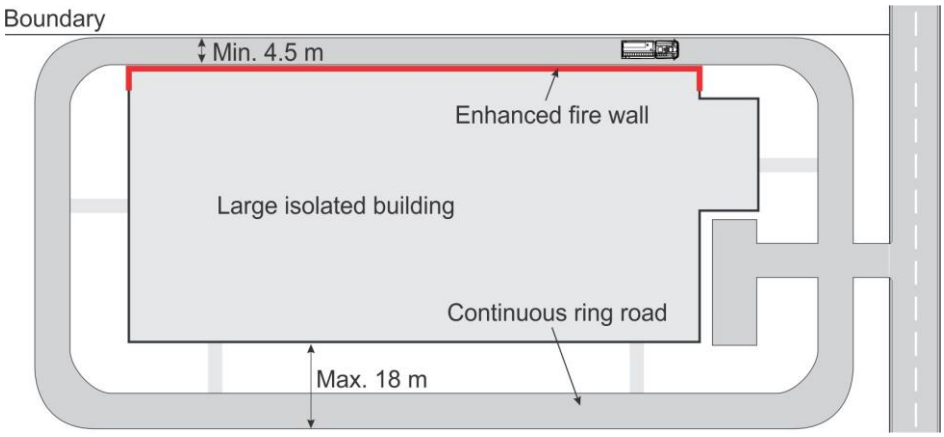


Figure 19 Large isolated building with reduced carriageway width

10.2.5 If the building is protected by an automatic fire sprinkler system, any awning over the *carriageway* is to also be protected by sprinkler system (see Figure 20).

Note: The sprinkler system is to be appropriate to the hazard and minimum clearance is to be maintained under the awning for *fire appliance* access.

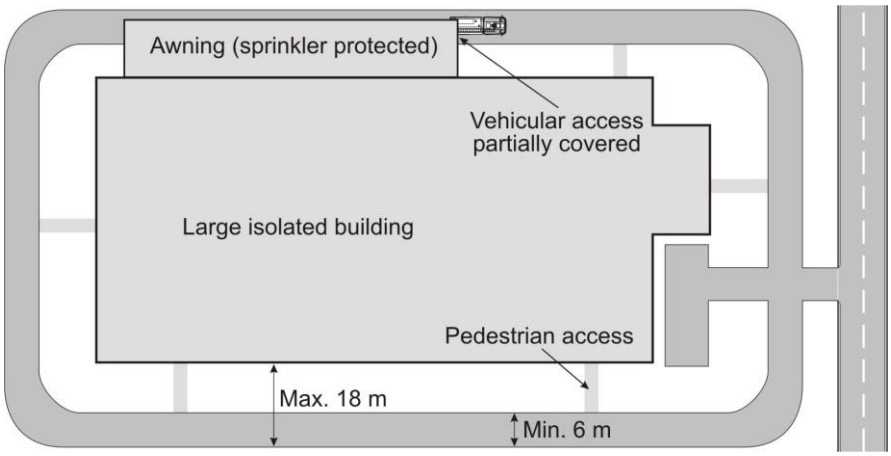


Figure 20 Large isolated building with awning over carriageway

10.2.6 If continuous forward travel around the building is not possible, a performance-based design (i.e. *alternative solution*) should be undertaken and agreed to by FRNSW.

10.3 Complex development

10.3.1 Development typically has a building adjacent to a public road providing easy access; modern development may be complex in design and require firefighters to negotiate a complicated route through the premises to undertake *fire brigade* intervention.

10.3.2 *Complex development* may involve several buildings which may be united (e.g. podium), clustered (e.g. urban precinct), or be a *major facility*. Such development is likely to have higher than normal occupation levels and/or risks.

10.3.3 *Complex development* may not require any specific *fire brigade vehicle* access other than to a designated entry point. However, this can have a significant adverse impact on operations during any *emergency incident*, including:

- increased *fire brigade* intervention times
- congestion of emergency vehicles and personnel at the designated entry
- not being able to position an *aerial appliance* within its field of operations
- confusion and delay from complicated routes through building, facility or site
- the need to carry equipment over greater distance to/from *fire appliances*
- greater dispersal of evacuees at multiple building evacuation points
- the need to move casualties over more distance to triage areas or ambulances

Note: A holistic assessment of *fire brigade vehicle* access for possible or likely major emergencies should be considered during the design phase, including provision of accessible *private roads* and *hardstand* areas as appropriate.

10.4 Buildings under 25 m effective height

10.4.1 Performance requirement CP9 of the *NCC* requires access be provided for *fire brigade vehicles* to facilitate *fire brigade* intervention. The *Guide to NCC Volume One* also states 'access for the *fire brigade* must be appropriate to their needs and the type of vehicles and equipment to be used'.

10.4.2 In regard to the 25 m *effective height*, Clause D1.2(b)(i) of the *Guide to NCC Volume One* states that 25 m is 'the effective operating height of *fire brigade* ladders and other firefighting and rescue equipment'.

Note: The *Guide to NCC Volume One* further identifies the role of the *fire brigade* 'to undertake external rescue or firefighting from ladders' in clauses D1.2(d)(i), D1.8 and E1.8(a), performance requirement EP1.4, and Table E1.5.

10.4.3 All buildings should have suitable 'provision for escape' from each storey, such as multiple required exits (e.g. building over 25 m) or a single required exit with an alternate means of emergency escape (e.g. fire brigade ladders).

Note: During *fire brigade* intervention, a portable extension ladder can only reach up to 10 m and an *aerial appliance* up to 25 m (see Figure 21).

10.4.4 Any non-sprinklered building more than three storeys above ground, and having a single stairway serving each storey (i.e. under 25 m building), should demonstrate that an *aerial appliance* can be positioned to provide means of emergency escape.

Note: If an *aerial appliance* cannot be suitably positioned to provide means of emergency escape, an *alternative solution* should be sought to demonstrate compliance with performance requirement CP9 of the *NCC*.

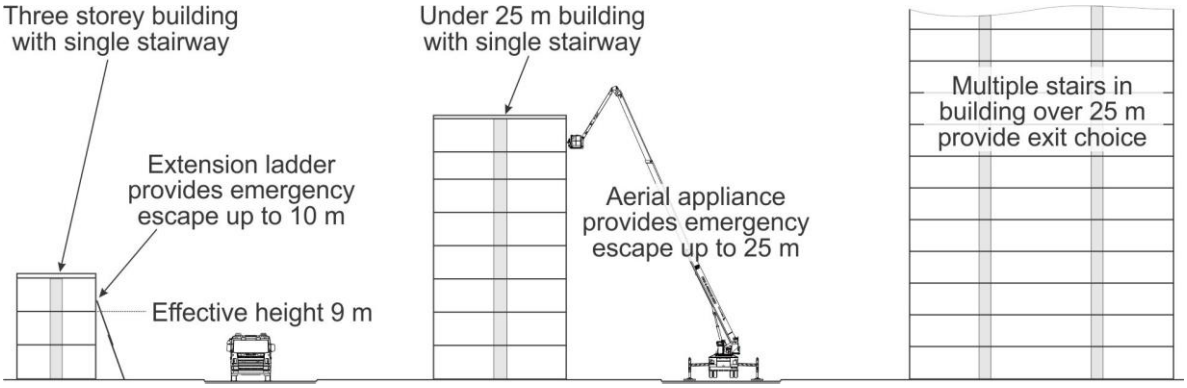


Figure 21 Using fire brigade ladders to provide emergency escape

10.4.5 An *aerial appliance* has a limited field of operations that requires it to be positioned adjacent to and near the building; any part of a building that is set back from the *carriageway* may be outside the reach of the *aerial appliance* (see Figure 22).

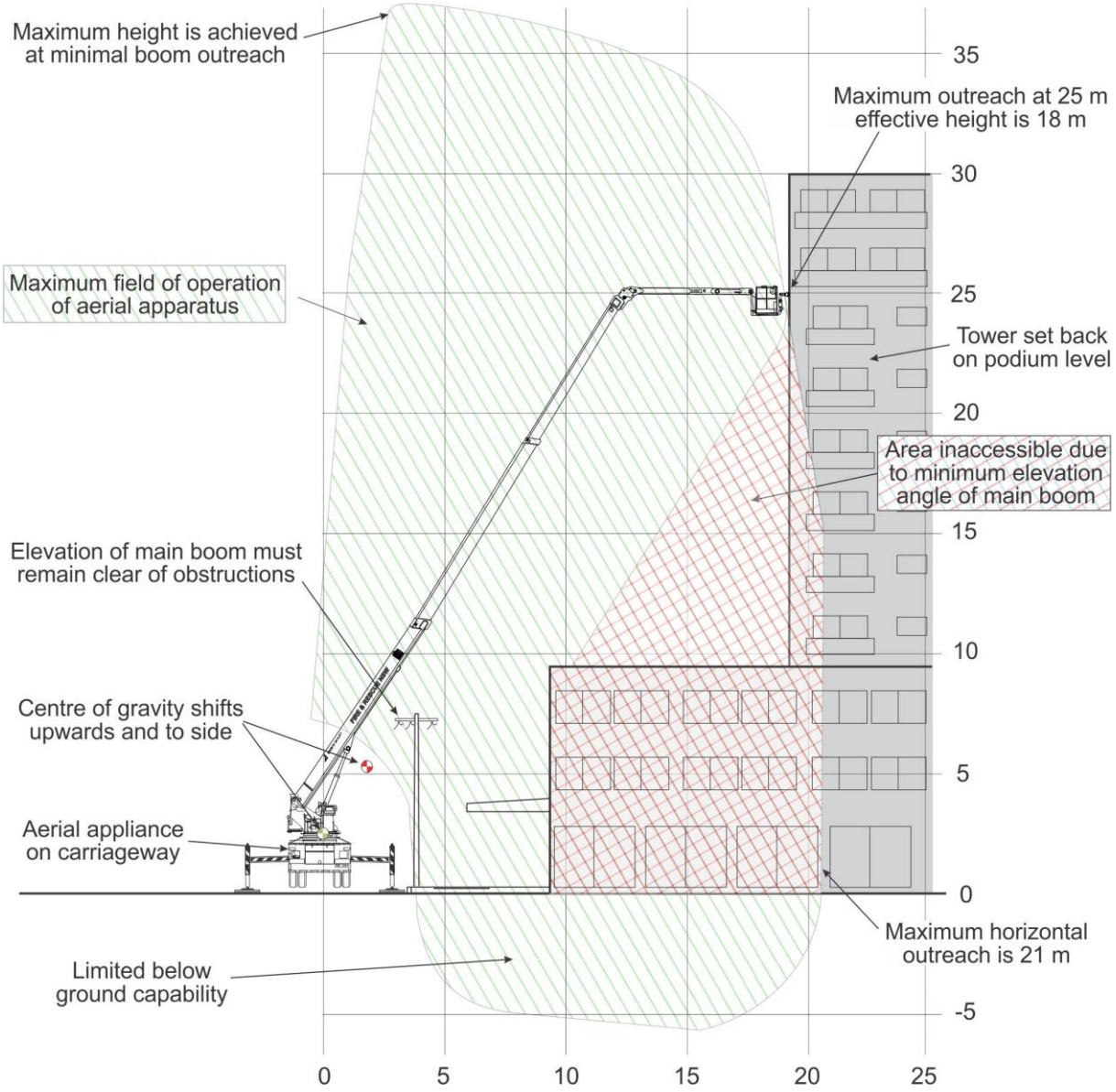


Figure 22 Typical field of operations of an aerial appliance

10.5 Building access

10.5.1 Buildings with a monitored automatic fire alarm system are to provide firefighters access into the *DBEP* and to the fire control centre (e.g. if located within a room off the main entrance) including after-hours.

Note: Any delay in gaining access during an *emergency incident* may be life critical.

10.5.2 When building access through an emergency exit door is necessary in an emergency (e.g. to enter a fire isolated stairway to access upper storeys), the emergency exit door is to be openable from the outside using either a key, fob or security passcode.

10.5.3 Doors to essential services and systems including pump room, sprinkler control valve room, fire control room, facility emergency control centre etc. are to be kept unlocked or accessible using either a key, fob or security passcode.

10.5.4 If the building has an emergency lift, a copy of the fire service lift key is to be kept at the fire control centre and clearly identified.

10.5.5 A copy of all *premises* keys, fire service lift keys, electronic access fob or security passcode should be deposited with the two nearest FRNSW *fire brigade stations*.

Note: Keys are kept in a wire sealed bag within a locked cabinet until needed during notification of alarm. The owner may apply their own seal if they wish.

10.5.6 When multiple *premises* keys are being kept or deposited, individual keys are to be readily identifiable (e.g. engraved, numbered or colour coded).

10.6 Signage and wayfinding

10.6.1 Clear signage should be provided at the *DSEP* to direct *fire brigade vehicles* around the site (e.g. buildings, structures, roadways, access points, fire safety systems, *hardstand* areas, assembly areas, storage areas, hazardous chemicals etc.).

10.6.2 Clear signage should be provided at the *DBEP* to direct emergency service personnel around the building (e.g. access/egress points, emergency lifts, refuge areas, fire safety systems, control rooms, utilities and services etc.).

10.6.3 A block plan located at the fire control centre is to clearly indicate how and where firefighters are to access different areas of the building including upper storeys, especially when exiting the *DBEP* to enter via an emergency exit.

10.6.4 When multiple exits discharge at a common point, each exit door should have signage identifying the area/floors the exit will provide access to (see Figure 23).

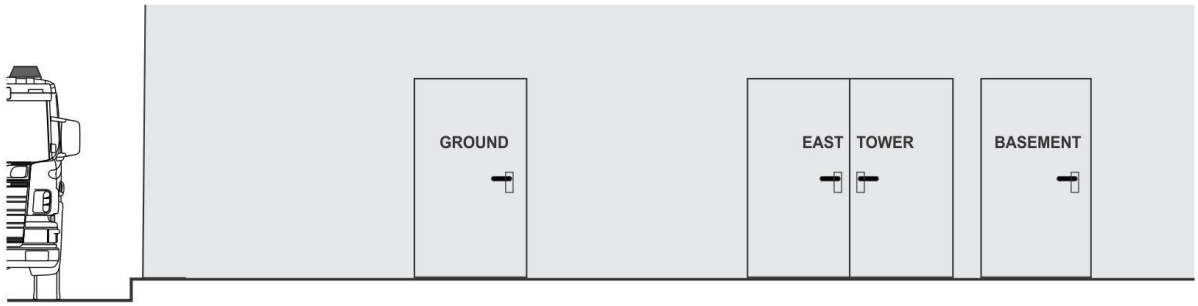


Figure 23 Example of exit door signage to assist firefighters

10.6.5 All buildings, towers, areas and floors are to be adequately labelled to assist with wayfinding, including corresponding identification provided on the safety side of emergency exit doors (e.g. 'East Tower – Level 3' sign being in the lift lobby as well as on the reverse side of all emergency exit doors on the same storey).

Note: Firefighters ascending fire stairs must be able to readily identify their actual location (e.g. floor level).

10.6.6 Signage is to be permanently affixed, weather resistant if external, high contrasting (e.g. black on white), clearly visible and readable at the expected viewing distance.

Note: Font height of signage is to be not less than 10 mm per metre of viewing distance as per *AS 1319–1994 Safety signs for the occupational environment*.

10.7 Other operational issues

10.7.1 The scale of response by *fire brigades* and other emergency services is proportional to the nature of the emergency. A major *emergency incident* will require a multiple alarm response by multiple combat and support agencies.

10.7.2 Any *complex development* having multiple site access points to deal with an *emergency incident* is to have all *DSEPs* clearly identified with signage to ensure it does not get obstructed (e.g. 'Emergency vehicle access – do not block').

10.7.3 Additional *fire brigade vehicles* may be responded to provide extra personnel for the *emergency incident*. These vehicles will likely be staged at an assembly area nearby.

Note: *Fire appliances* generally have a crew of four to six firefighters. At a large fire, many *fire appliances* will respond to provide additional firefighters.

10.7.4 An *aerial appliance* will be positioned in the most operationally advantageous position having clear overhead working space to safely operate within its field of operation.

10.7.5 When fire occurs in a building not having a fire-resisting roof, the risk of roof collapse may require firefighters to not enter the building and fight the fire externally.

10.7.6 When fire occurs in a building not having Type C construction, the risk of wall collapse may require firefighters to fight the fire defensively outside collapse zones.

Note: When external walls are tilt-slab panels, the collapse zone is 1.5 time the height of the wall. *Fire appliances* will be strategically positioned at corners.

10.7.7 When significant firefighting operations is being undertaken *carriageways* and *hardstand* areas may be partly or fully obstructed by fire hose running between *fire appliances*, water sources and buildings.

Note: If fire hose is required to cross the carriageway (e.g. to access a street fire hydrant), passing road traffic may be stopped for safety reasons

10.7.8 Development comprising multiple privately-owned dwellings, where not all dwellings have direct frontage onto a public road, is to have *fire brigade vehicle* access as outlined within *Firefighting access and water for minor residential development*.

11 Bush fire prone land

11.1 The NSW RFS *Planning for Bush Fire Protection – A guide for councils, planners, fire authorities and developers* (PBP) applies to all development on 'bush fire prone land' within NSW.

Note: Bush fire prone land is mapped by each respective council under *section 146* of the *Environmental Planning and Assessment Act 1979*.

11.2 As all general *fire appliances* have comparable specifications, complying with the requirements of this guideline will ensure PBP requirements are also satisfied.

11.3 Suitable *fire brigade vehicle* access is to be provided to within 4 m of a static water supply if no reticulated water supply is available (e.g. 10,000 L tank).

11.4 Perimeter roads on a bush fire interface are to provide not less than 8 m clear width (i.e. exclusive of parking) so that firefighters can safely operate when heavy smoke reduces visibility across the road.

11.5 Access roads are to allow traffic to pass by having passing bays at least 20 m long by 2 m wide provided every 200 m if the *carriageway* does not allow traffic to freely pass (see Figure 24).

Figure 24 Example of passing bays on road in bush fire prone land

12 Local area traffic management (LATM)

12.1 Design requirements

12.1.1 *LATM* is the installation of *traffic control devices* to purposely modify speed, volume and composition of traffic in a local area. LATM devices will slow or restrict all traffic including *fire appliances* that are responding with speed to an *emergency incident*.

12.1.2 Traffic engineers and planners should consider the effects of *LATM* on *fire brigade* response. *LATM* should be implemented strategically to achieve optimum balance of managing traffic without detrimentally delaying response times.

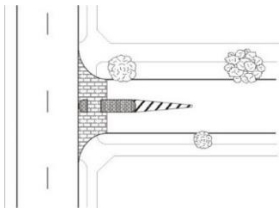
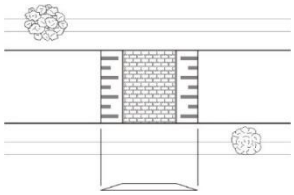
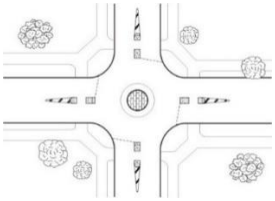
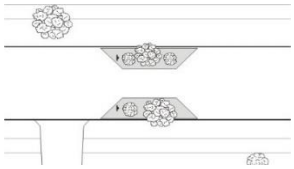
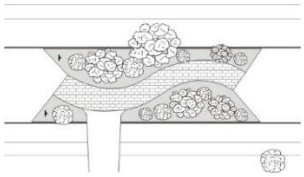
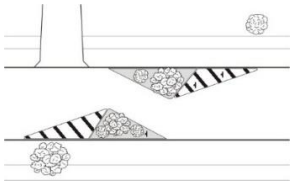
12.1.3 *LATM* impact on both public and *private roads*. Roads that prohibit heavy vehicles (i.e. trucks) still need to be accessible by *fire brigade vehicles*, including by a specialist *fire appliance*, that is responding to an *emergency incident*.

Note: Improper *LATM* design may delay or terminate the response of a *fire appliance* and potentially result in loss of life and/or property.

12.2 LATM devices

12.2.1 *LATM* devices are to comply with *AS 1742.13 Manual of uniform traffic control devices - Local area traffic management*.

12.2.2 *Fire brigades* prefer *LATM* device that are easily negotiated by a *fire appliance*. The impact on *fire appliance* access by each *LATM* device is provided in Table 3 below.

LATM device	Impact to fire appliance access
Perimeter treatment 	• Street entry is at very low speed as extra caution is required. • The treatment should not reduce entry/departure angles. • Any island should allow negotiation by turning fire appliances. • Any island should not exceed kerb clearance dimensions. • Non-mountable islands may impede fire appliance response. • Traffic bank up may occur on street exit, impeding response. • Landscaping should not restrict visibility at intersection.
Road hump 	• Actual design will greatly impact on negotiating speed. • Flat top hump (shown) preferred over Watts profile hump. • Shallow entrance/exit allow better negotiating and reduce delays. • Short humps require slow negotiating and results in delays. • Humps will strain vehicle suspension and increase wear and tear. • Should be installed strategically; significant delays to response times will result if many are installed locally.
Roundabout 	• Design should allow negotiation by turning fire appliances. • Roundabout should not exceed kerb clearance dimensions. • Approach islands should not exceed kerb clearance dimensions. • Non-mountable roundabouts and/or approach islands may impede fire appliance response. • Traffic bank up may occur if through traffic is constant. • Landscaping should not restrict visibility at intersection.
Single-lane slow point 	• Minimum width of 3.2 m required. Width of 4.0 m preferred to allow easier and speedier negotiating by fire appliance. • Conflict with opposing traffic may occur if road is dual direction. • Should not be used with another *LATM* device (e.g. road hump) • Landscaping should not adversely restrict visibility past device.
Driveway link 	• Design should allow easy negotiation and constant line of sight. • Negotiation speed very slow because of manoeuvring required. • If negotiation is not possible for a specialist appliance an alternative route is needed significantly delaying response times. • Surfaces must be suitable for loads from fire appliances. • Conflicts with opposing traffic may occur. • Landscaping should not adversely restrict visibility past device.
Single-lane angled slow point 	• Design should allow easy manoeuvring on approach and exit, especially for a specialist fire appliance. • Any kerbs should not exceed kerb clearance dimensions. • Should be installed strategically; significant delays to response times will result if many are installed locally. • Access may be restricted by improperly parked vehicles. • Conflicts with opposing traffic may occur. • Landscaping should not adversely restrict visibility past device.

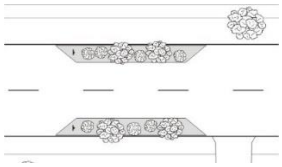
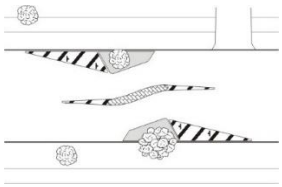
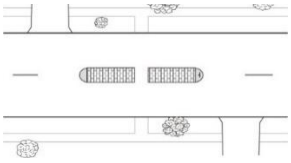
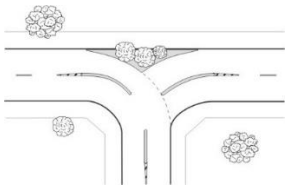
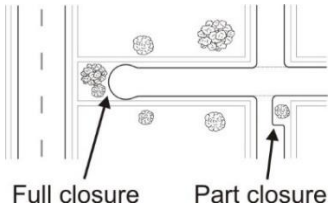
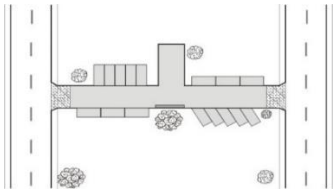
LATM device	Impact to fire appliance access
Two-lane slow point 	• Preferred method of speed reduction (i.e. over road humps). • Should not be used with another *LATM* device (e.g. mid-block island, road hump). • Landscaping should not adversely restrict visibility past device.
Two-lane angled slow point 	• Design should allow easy manoeuvring on approach and exit, especially for a specialist fire appliance. • Kerbs or islands should not exceed kerb clearance dimensions. • Non-mountable islands may impede fire appliance response. • Should be installed strategically; significant delays to response times will result if many are installed locally. • Access may be restricted by improperly parked vehicles. • Landscaping should not adversely restrict visibility past device.
Mid-block island 	• Preferred method of speed reduction (i.e. over road humps). • Island is generally used for pedestrian refuge. • Any island should not exceed kerb clearance dimensions. • Non-mountable islands may impede fire appliance response. • Landscaping should not restrict visibility; pedestrians require unobstructed view of traffic and vice-versa.
Modified intersection 	• Design should allow easy manoeuvring through intersection • Intersection priority can be confusing when responding emergency vehicles are encountered. • Any island should allow negotiation by turning fire appliances. • Any island should not exceed kerb clearance dimensions. • Non-mountable islands may impede fire appliance response. • Traffic bank up may occur, impeding response. • Landscaping should not restrict visibility at intersection.
Road closure 	• Diverts traffic onto adjacent roads which may increase congestion and result in delays to response times. • Detour and alternative route required when full road closure. • Suitable turnaround area for fire appliance should be provided if full road closure is used. • Minimum width of 3.2 m required if part road closure is used. • Landscaping should not restrict visibility at intersection when part road closure is used.
Shared zone 	• Careful design required to ensure negotiation by fire appliances. • Negotiation speed very slow due to conflicts with pedestrians, traffic and parked vehicles being encountered. • Access may be restricted by improperly parked vehicles. • Surfaces must be suitable for loads from fire appliances. • Generally avoided unless *emergency incident* is in shared zone. • Local traffic bank up may occur, impeding response.

Table 4 Impact of LATM on fire appliance access and response

13 References

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NSW Rural Fire Service, *Planning for bush fire protection – A guide for councils, planners, fire authorities and developers*, 2017, Lidcombe NSW, Australia.

Standards Association of Australia, *AS 2419.1–2005 Fire hydrant installations. Part 1: System design, installation and commissioning*, Standards Australia, 2005, Sydney NSW, Australia.

Standards Association of Australia, *AS 1319–1994 (R2018) Safety signs for the occupational environment*, Standards Australia, 1994, Sydney NSW, Australia.

Standards Association of Australia, *AS 1742.13–2009 Manual of uniform traffic control devices - Local area traffic management*, Standards Australia, 2009, Sydney NSW, Australia.

Standards Association of Australia, *AS 2890.2:2018 Parking facilities, Part 2: Off-street commercial vehicle facilities*, Standards Australia, 2018, Sydney NSW, Australia.

Appendix A – Pump performance of fire appliances

A1 General

Most *fire appliances* are fitted with a fire pump that have varying pumping capacity depending on the type of pump, installation, connections and efficiency (i.e. condition) of the fire pump. When boosting a fire hydrant and/or sprinkler system, the highest capacity pump available at the scene will be typically be used.

A standard urban *fire appliance* has a maximum of four 65 mm inlets and outlets, so fire brigade booster inlets are grouped into a maximum of four per *fire appliance*. Under *AS 2419.1–2005*, fire brigade booster inlets are calculated to flow at 10 L/sec per inlet.

Note: If the required fire hydrant and/or sprinkler system performance exceeds 40 L/sec, then a second *fire appliance* will be required to boost the additional inlets.

A standard urban *fire appliance* also has a single large bore suction inlet to take water from a static water source (e.g. on-site storage tank). A *suction-connection outlet* is required for each *fire appliance* required to boost the system.

Under *AS 2419.1–2005*, if more than eight fire brigade booster inlets are required for the system (i.e. exceeds 80 L/sec), then a separate fire brigade booster assembly and third *fire appliance* is required.

A standard urban *fire appliance*, being an FRNSW Class 3 pumper, is capable of delivering 50 L/sec through four fire hydrant booster inlets. A performance-based design (i.e. *alternative solution*) may be sought to increase the flow rate per booster inlet to 12.5 L/sec.

Note: If the required fire hydrant and/or sprinkler system performance is 50 L/sec (normally five booster inlets), an alternative solution can remove the need for the fifth booster inlet, second *fire appliance* and second *suction-connection outlet*.

A performance-based design (may also be sought for increased flow rate per booster inlet (at 12.5 L/sec) to remove the need for a separate fire brigade booster assembly.

Note: If the required fire hydrant and/or sprinkler system performance is 100 L/sec (i.e. ten booster inlets), an alternative solution can remove the need for a third *fire appliance*, third *suction-connection outlet* and second fire brigade booster assembly.

Any performance-based design proposing an alternative solution as discussed in this Appendix should be referred to FRNSW for consultation.

A2 FRNSW fire appliances

Class 1 Tanker
- Min. 1,500 L/min at 1,000 kPa
- Min. 2,200 L water
- Two 65 mm outlets
- Two 65 mm inlets
- One 100 mm inlet (at rear)
- 4x4 crew-cab chassis

Maximum hydrant design
- 20 L/sec (1,200 L/min)
- 2 inlet/outlet design
- One large bore *suction-connection* (using a 150-100 mm Storz reducer)

Note: Light tankers used for hazard reduction role are excepted.

Class 2 Pumper
- Min. 2,900 L/min at 1,000 kPa
- Min. 2,000 L water
- Four 65 mm outlets
- Four 65 mm inlets
- One 125 mm inlet (at rear)
- 4x2 crew-cab chassis

Maximum hydrant design
- 40 L/sec (2,400 l/min)
- 4 inlet/outlet design
- One large bore *suction-connection* (using a 150-125 mm Storz reducer)

Class 3 Pumper
- Min. 3,500 L/min at 1,000 kPa
- Min. 1,800 L water
- Four 65 mm outlets
- Four 65 mm inlets
- One 150 mm inlet (at rear)
- 4x2 crew-cab chassis

Maximum hydrant design
- 40 L/sec (2400 l/min)
- 4 inlet/outlet design
- One large bore *suction-connection*
- Up to 50 L/sec possible (via *alternative solution* of 12.5 L/sec per inlet/outlet)

Aerial Pumper
- Min. 5,000 L/min at 1,000 kPa
- or 2,500 L/min at 2,000 kPa
- 2,000 L water
- Four 65 mm outlets
- Four 65 mm inlets
- 150 mm inlets (side or rear)
- 6x4 crew-cab chassis

Maximum hydrant design
- 40 L/sec (2400 l/min)
- 4 inlet/outlet design
- One large bore *suction-connection*
- Up to 50 L/sec possible (via *alternative solution* of 12.5 L/sec per inlet/outlet)

A3 NSW RFS fire appliances

Category 1 or 3

- Min. 1,100 L/min at 1,000 kPa
- 3,500 L water
- One 65 mm outlet, and
- two 38 mm outlets
- One 75 mm inlet (at rear)
- 4x4 crew-cab chassis (Cat 1)
- 4x2 crew-cab chassis (Cat 3)

Maximum hydrant design

- 10 L/sec (600 L/min)
- 1 inlet/outlet design
- One small bore *suction-connection* (using a 75-65 mm Storz reducer)

Category 10

- Min. 2,100 L/min at 1,000 kPa
- 1,800 L - 2,400 L water
- Two 65 mm outlets, and one 38 mm outlet
- Two 65 mm inlets
- One 100 mm inlet (at rear)
- 4x2 crew-cab chassis

Maximum hydrant design

- 20 L/sec (1,200 L/min)
- 2 inlet/outlet design
- One large bore *suction-connection* (using a 150-100 mm Storz reducer)

Category 11

- Min. 2,000 L/min at 1,000 kPa
- 1,800 L water
- Two 65 mm outlets, and one 38 mm outlet
- Two 65 mm inlets
- One 100 mm inlet (at rear)
- 4x4 crew-cab chassis

Maximum hydrant design

- 20 L/sec (1,200 L/min)
- 2 inlet/outlet design
- One large bore *suction-connection* (using a 150-100 mm Storz reducer)

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