NSW FIRE BRIGADES

GUIDELINES FOR EMERGENCY VEHICLE ACCESS

POLICY NO. 4

PREVENT PREPARE PROTECT

VERSION 02

Published by:

Structural Fire Safety Unit
New South Wales Fire Brigades
Amarina Avenue
Greenacre NSW 2190

Telephone: (02) 9742 7400
Facsimile: (02) 9742 7483
Email: firesafety.NSWFB@fire.nsw.gov.au

Version	Date	Reviewed by:	Authorised by:
01	17 JUL 2007	MSFSU	DRM
01.01	25 JUN 2008	A/MSFSU	A/MSFU
02	27 OCT 2010	MSFSU	MSFSU

CONTENTS

1 Scope

This document details NSW Fire Brigades (NSWFB) requirements for emergency vehicle access, including general access to a specific site or premises, and access around buildings or structures within a site (allotment).

2 Application

This document should be used as a reference by developers and planners to ensure NSWFB emergency vehicles can adequately access sites, buildings and structures in the event of an emergency (e.g. fire, explosion).

Note: *Emergency vehicle access may be specifically required by the Building Code of Australia.*

During an emergency, the NSWFB is most efficient and effective when there is suitable provision for rapid and unhindered response by its emergency vehicles. Poor or inadequate access can result in a delayed NSWFB response, with the obvious delay to intervention having a direct impact on the life safety of occupants and the protection of property.

Note: *Due to the nature of the functions required to be performed, NSWFB emergency vehicles are generally larger and heavier than those used by other emergency services.*

The provision of emergency vehicle access is considered relevant for all development and planning. Site managers should ensure adequate emergency vehicle access is provided.

Existing sites and facilities should maximise compliance with the requirements of this document (e.g. ensuring carriageways are not obstructed by parked vehicles).

This document is 'informative' and does not replace any statutory requirement. These guidelines are intended to inform regulatory authorities when considering the provision of emergency vehicle access.

3 Definitions

The following definitions apply in this document;

(a) **Aerial appliance** — a specialised emergency vehicle which has an aerial apparatus which elevates to height for suppression and/or rescue.

(b) **Allowable Bearing Pressure** — the calculated pressure required to counter compression forces exerted by dead loads (i.e. the minimum strength required to maintain stability under a weight load).

(c) **Appliance** — an emergency vehicle which provides fire fighting, rescue or HazMat capability.

(d) **Carriageway** — any construction specifically designed to be traversed by vehicular traffic (may or may not include a sealed top surface layer).

(e) **Stabilisers** — fitted to aerial appliances to provide stability when the vehicle's centre of gravity shifts during the operation of the aerial apparatus.

(f) **Vehicle hardstand area** — as area of carriageway designated for use by an emergency vehicle (e.g. at a booster assembly).

4 NSWFB Appliances

4.1 Types of NSWFB Appliances

The NSWFB fleet consists of many different types of vehicles which are designed to perform specific functions at an emergency incident. Such vehicles are collectively known within fire service agencies as 'appliances'.

The vast majority of NSWFB appliances comprise a specially built body fitted on a two (2) axle heavy vehicle chassis. Depending on the function of each vehicle, various levels of fire fighting, rescue or HazMat capability are provided by way of equipment carried (see Figure 1 below).

Note: *The core function of general appliances is fire fighting, however some are dedicated to providing only rescue or HazMat capability.*

Figure 1 Examples of General NSWFB Appliances

While specifications vary between general appliances, the maximum parameters (i.e. worst case scenario) for this group of vehicles is as follows:

Gross Vehicle Mass	15 000kg
Maximum Overall Length	10.1m
Maximum Overall Width	2.5m

Some NSWFB appliances perform specialised functions in the event of an emergency. An aerial appliance has a specially built apparatus which elevates, telescopes and/or articulates to height for fire suppression of a large premises, or to rescue trapped occupants in multi-storey buildings.

Note: *The functions of an aerial appliance requires that it is able to get relatively close to the building or structure that it needs to attend.*

Aerial appliances are larger and heavier than general appliances, and may be on either a two (2), three (3) or even four (4) axle heavy vehicle chassis (see Figure 2 below).

Figure 2 Examples of NSWFB Aerial Appliances

Aerial appliances are strategically located for optimum response to areas with greater fire risks (e.g. mid-rise building, high rise buildings, heavy industry areas). Most aerial appliances are located in the greater metropolitan region and some large regional cities.

While specifications vary between aerial appliances, the maximum parameters (i.e. worst case scenario) for this group of vehicles is as follows:

Gross Vehicle Mass	27 500kg
Maximum Overall Length	12.4m
Maximum Overall Width	2.5m (6.0m when stabilisers are deployed)

4.2 Appliance Type Coverage

All sites, buildings and structures across the whole state of NSW should ensure general NSWFB appliances are given adequate access in the event of an emergency.

When applicable, developers and planners must also ensure that adequate access is provided for aerial appliances. The location of the site must be within the coverage area of an aerial appliance, and the buildings or structures likely to require an aerial appliance during an emergency.

Note: *The entire greater metropolitan region of Sydney, Newcastle and Wollongong, and some large regional cities (e.g. Albury), has aerial appliance coverage.*

To determine whether aerial appliance access is necessary for a given site, contact the NSWFB Structural Fire Safety Unit in writing at:

Manager Structural Fire Safety Unit
Private Locked Bag 12
Greenacre NSW 2190

5 Access Requirements

5.1 Carriageway Widths

Carriageways should be wide enough to allow appliances to easily negotiate them and provide sufficient room to allow vehicle crews to work with fire fighting equipment around the vehicle.

Note: *During an emergency, appliances will park along the carriageway in the most tactically advantageous position.*

Along straight carriageway sections, a minimum width of 4m should be provided for general appliance access, and a minimum width of 6m for aerial appliance access (see Figure 3 below).

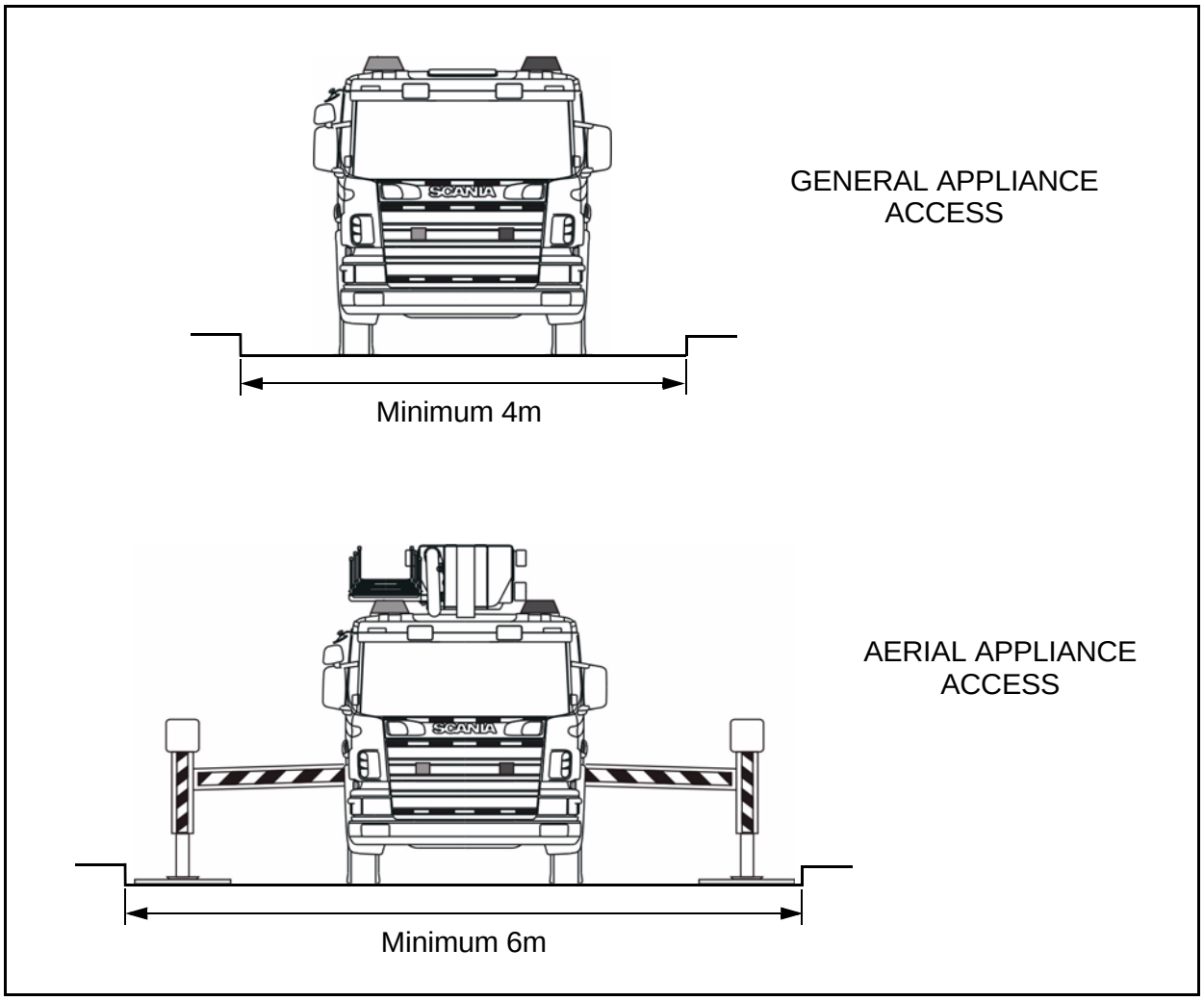

Figure 3 Minimum Carriageway Widths — Straight Sections

Note: *Aerial appliances require additional width to fully extend their stabilisers. Where a continuous clearance of 6m cannot be provided, consideration should be given to allocating designated areas for aerial appliance operation.*

Along curved carriageway sections, a minimum inner radius of 6.3m and outer radius of 11.3m should be provided for general appliance access, and a minimum inner radius of 7.3m and outer radius of 14.6m for aerial appliance access (see Figure 3 on page 4).

The distance between inner and outer turning arcs must allow for expected vehicle body swing. The minimum distance between the inner and outer arcs should not be less than 5.0m for general appliances and 7.3m for aerial appliances (see Figure 4 on page 5).

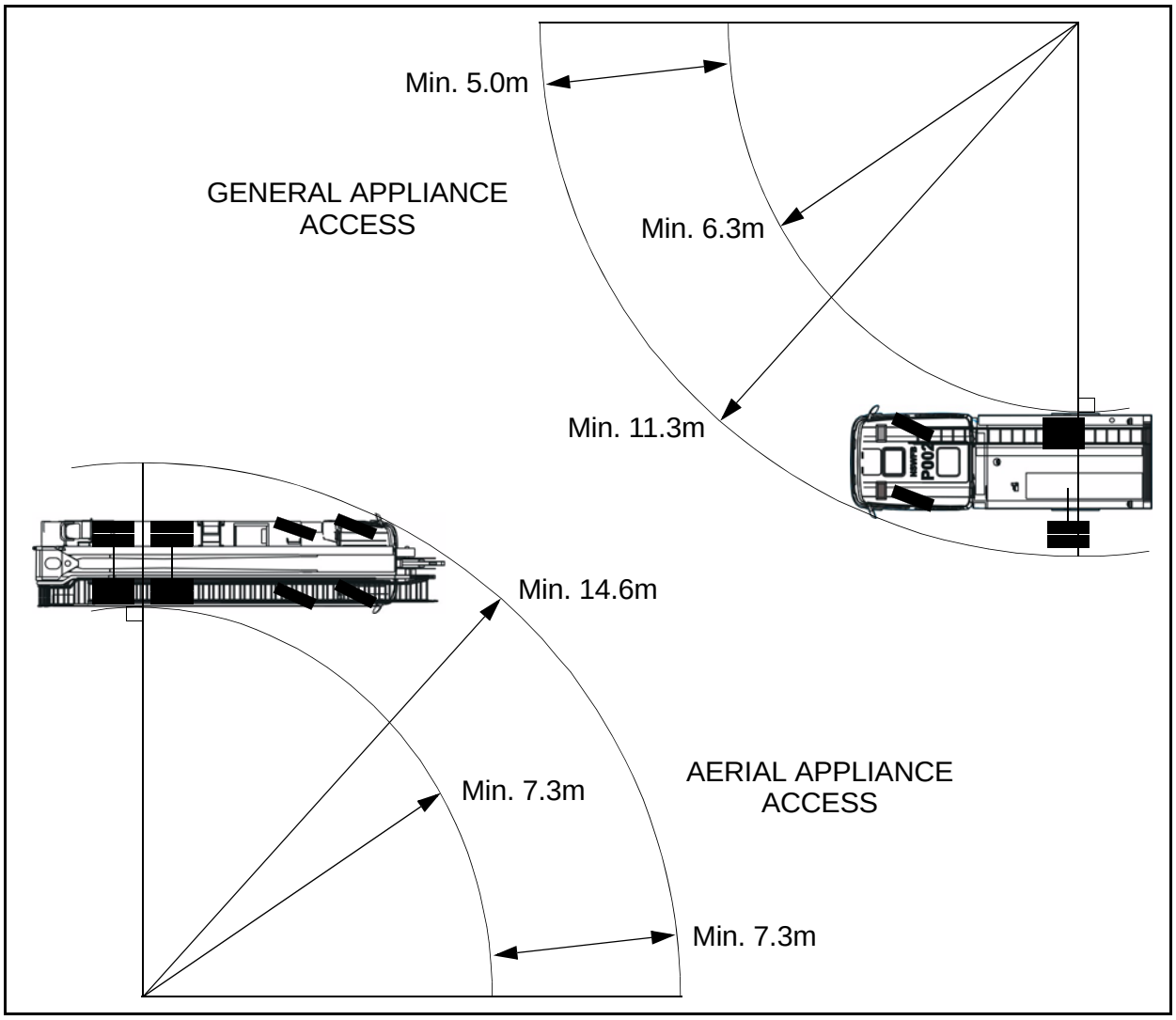

Figure 4 Minimum Carriageway Widths — Curved Sections

Note: *The radius dimensions given are for wall to wall clearance where body overhangs travel a wider arc than the wheel tracks (vehicle turning circle).*

5.2 Turning Areas

Any carriageway not leading directly to an exit (i.e. dead end) should be provided with a turn around area which prevents the need to perform multi-point turns.

The minimum turning radius of turn around areas should be no less than 11.3m for general appliances, and 14.6m for aerial appliances (refer to Figure 4 above).

5.3 Ensuring Clear Access

Site managers should ensure carriageways are not fully or partially obstructed in a manner which prevents unhindered access by appliances, at any time.

Note: *Carriageways can be obstructed by parked vehicles, shipping containers, pallets, stored goods, industrial bins etc.*

Perimeter security points (e.g. sliding/swinging gates, boom gates, bollards, vehicle security barriers) must not unnecessarily impede appliances from gaining access. A minimum width of 3.2m should be provided at security points to allow appliances passage without the need for manoeuvring.

5.4 Kerb Dimensions

All kerbs constructed along the edges of a carriageway should be no higher than 250mm and should be free of vertical obstructions at least 300mm back from the kerb face to allow clearance for front and rear body overhang.

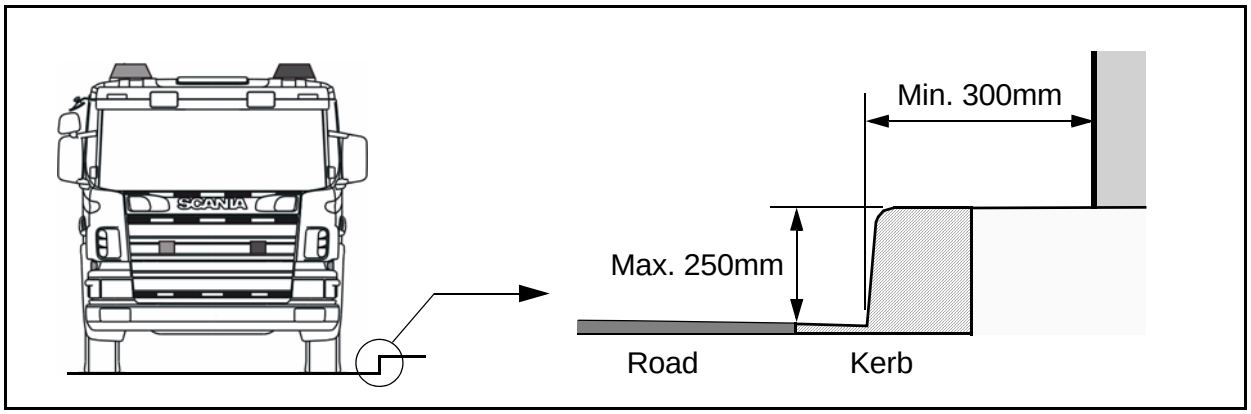

Figure 5 Carriageway Kerb Clearance Dimensions

5.5 Building and Structure Clearance Height

An unobstructed clearance height of 4.5m should be maintained above all access ways including clearance from building construction, archways, gateways/doorways and overhanging structures (e.g. ducts, pipes, sprinklers, walkways, signs, beams).

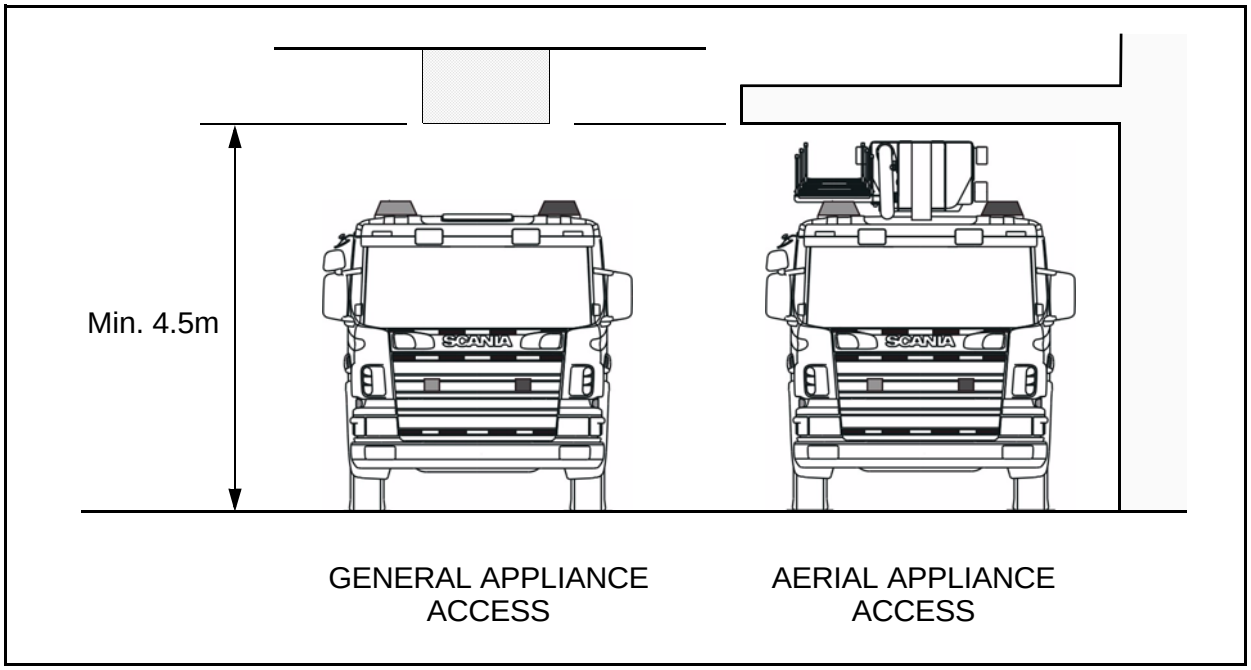

Figure 6 Building and Structure Clearance Heights

5.6 Gradients (e.g. Access Ramps)

The NSWFB prefers a ramp gradient of 1:8 or less. The maximum negotiable ramp gradient is 1:6 (see Figure 7 on page 7).

Access ramps which follow a curved or circular profile in plan view should have a maximum gradient no greater than 1:10 (measured along the centre line).

Note: *The chassis of an appliance will twist and flex when negotiating the ramp, thus a lower gradient is necessary.*

Ramps should not hinder vehicle response and should provide entry/exit clearances for appliances.

Access ramps should have a smooth transition between the main ramp gradient and entry/exit gradients. A minimum 4.0m long 1:15 transition grade is preferred for both ramp approach and departure (see Figure 7 below).

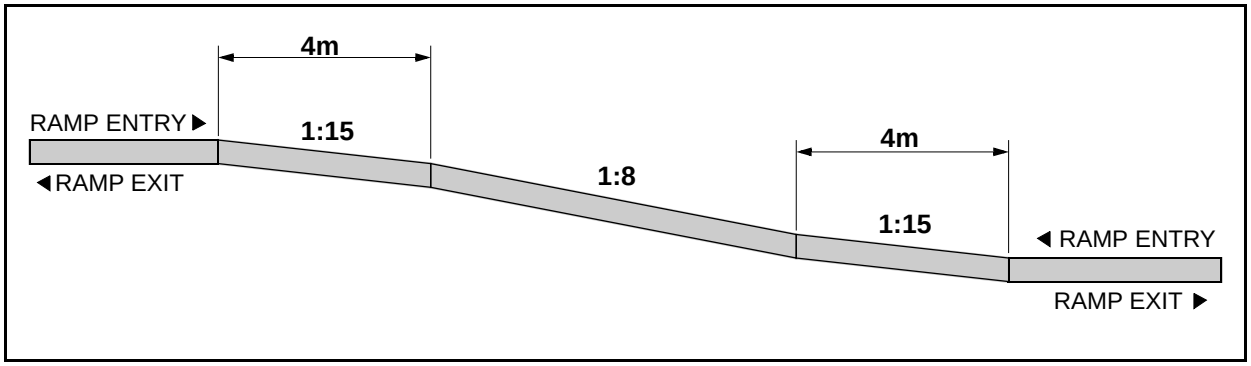

Figure 7 Maximum Access Ramp Gradients

When a change of gradient includes a recessed threshold such as a gutter (e.g. for storm water drainage), consideration must be given to reduced approach and departure clearance (see Figure 8 below).

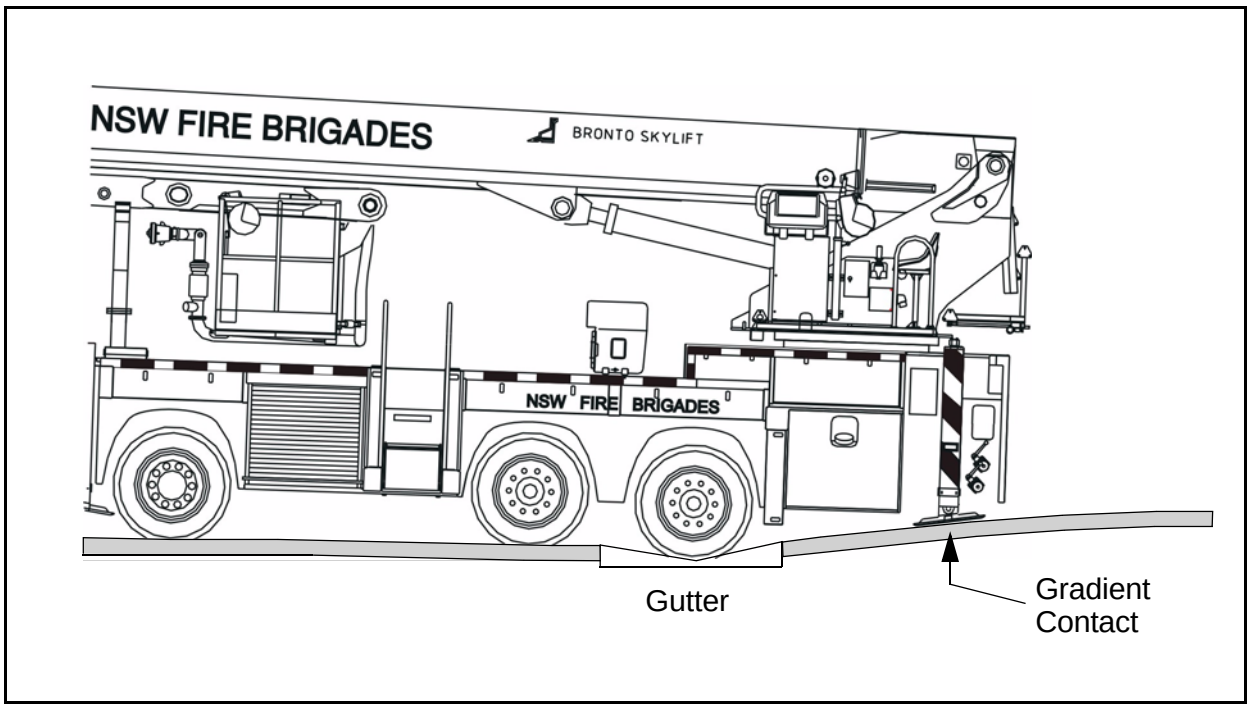

Figure 8 Reduced Gradient Clearance Owing to Gutter

Note: *As wheels recede into a gutter, the effective under-body clearance height at both front and rear overhanging sections are reduced due to the body slanting downwards. This problem is exacerbated when the gutter depth is greater and/or when the overhang length is greater.*

6 Appliance Weights (Loads)

6.1 Static Loads of Appliances

Carriageways must maintain structural adequacy and integrity when under load from a fire appliance, with particular attention given to those supported, elevated or reinforced by structural members (e.g. suspended floors, ramps, wharfs, aprons etc.).

The point loads of appliances (exerted through wheels) used to determine forces acting through load bearing structural members are provided in Figure 9 below.

Note: *Distances between wheels, both longitudinal and lateral, may need consideration when calculating point loads for wheels.*

The hardness of the carriageway surface must withstand the static pressure exerted by tyres of an appliance which is not greater than 850kPa pressure.

Note: *These localised pressures are represented as black squares in the 'point load - wheels' diagram of Figure 9 below).*

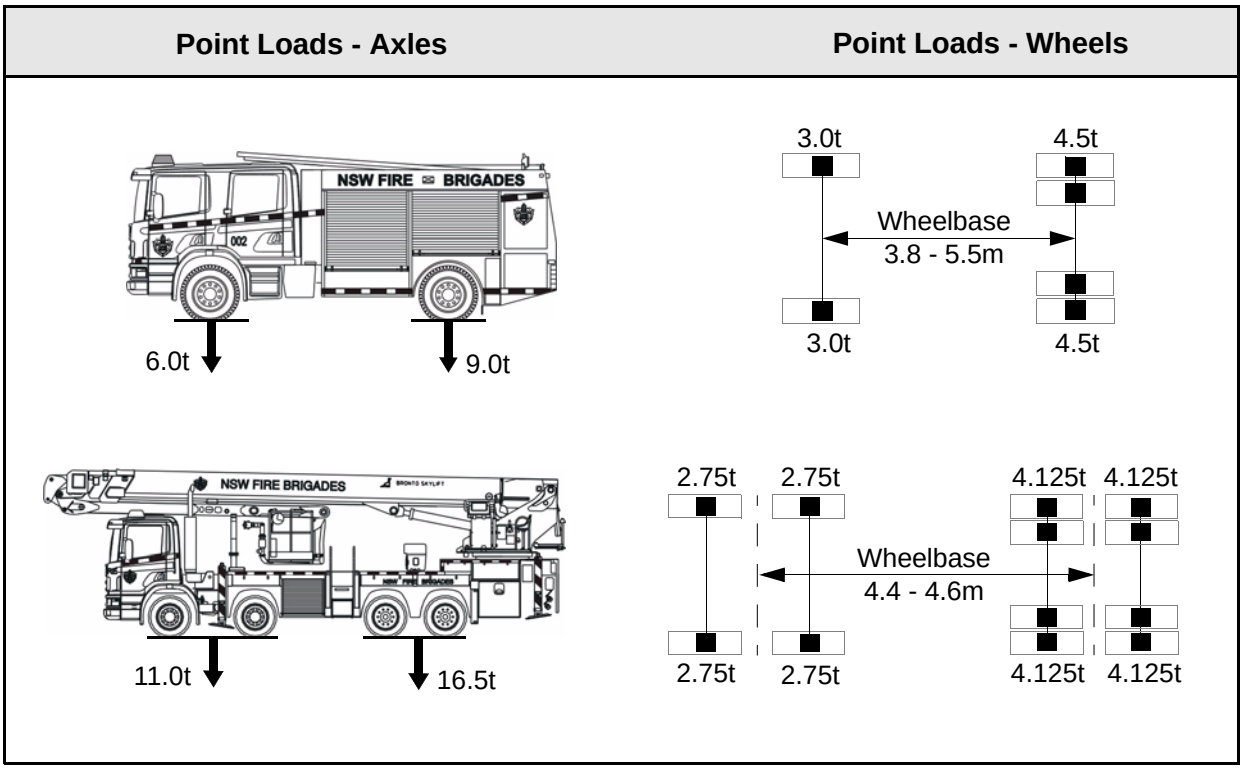

Figure 9 Static Loads of Appliances

6.2 Dynamic Loads (on Aerial Appliances)

Aerial appliances are fitted with stabilizers which prevent the vehicle from overbalancing when the aerial apparatus is operating. Aerial appliances will either have two (2) stabilisers at the rear only, or two front (2) and two (2) rear stabilisers (see Figure 10 below).

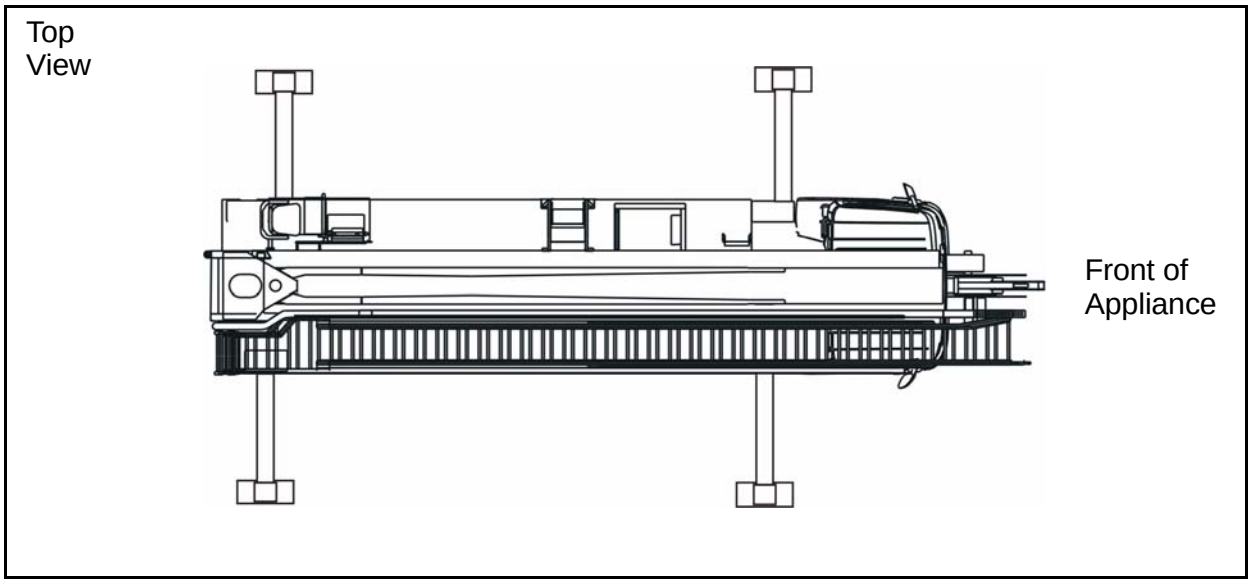

Figure 10 General Stabiliser Arrangement on Aerials

Dynamic forces exerted through the stabilisers are caused by changing weight distribution and other forces such as torsion moment forces which are created by the extension and rotation of the aerial apparatus.

Note: *The ever changing distribution of weight can cause up to 60% of the total vehicle weight to bear on a single stabiliser.*

The following data is provided from NSWFB Code of Practice *OS-FS-97/01 Stabiliser Pad Pressures, Bronto Skylift F37HDT*:

Maximum mass through a single stabiliser	16 500kg	(i.e. 16.5 tonne)
Maximum force load through a stabiliser	161 865N	
Maximum pressure exerted by a stabiliser	1.177MPa	(≅120t/m2)

Note: *The maximum pressure is calculated by the maximum force over the area of the stabiliser pad, which measures 550mm by 250mm.*

The maximum exerted pressure above should be considered when calculating the minimum Allowable Bearing Pressure (ABP) for the carriageway or hardstand area.

7 References

Australian Building Codes Board, *Building Code of Australia 2007 Volume 1. Part C2.4 Requirement for open spaces and vehicular access*, CanPrint Communications, 2007, Fyshwick ACT, Australia

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

NSW FIRE BRIGADES

STRUCTURAL FIRE SAFETY UNIT

Postal Address:
Locked Bag 12
Greenacre, NSW, 2190

Location:
Amarina Avenue,
Greenacre, NSW, 2190

Ph: (02) 9742 7400
Fax: (02) 9742 7486
Email: Firesafety.NSWFB@fire.nsw.gov.au

PREVENT PREPARE PROTECT

www.fire.nsw.gov.au