Designers' guide to firefighting operations

Introduction

F5-01 GD

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Status of this document

This document is issued by Fire and Emergency New Zealand.

Recommendations for change

The document, its content and specific processes are not to be altered except through Fire and Emergency New Zealand document management processes.

Requests or recommendations for changes to this material should be sent to National Manager Response Capability.

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Foreword

He tīmatanga kōrero

The publishing of this Designers' Guide represents a progressive step forward in terms of how Fire and Emergency New Zealand wants to engage with others. We see this guide as an opportunity to share across the building industry a better understanding of how we do our work and what is required to undertake our emergency response work safely and effectively. We hope that the clarification, and transparency around our processes, will help industry provide buildings with a high level of safety to protect both occupants and our firefighters.

In line with the intent of section 10 of the Fire and Emergency New Zealand Act 2017, we have a role in reducing the incidence of unwanted fire and the associated risk to life and property. These are shared sector outcomes and we can all strive through appropriate building design and standards, to ensure social, economic and environmental impacts from emergencies are minimised.

This Designers' Guide is Fire and Emergency's guidance to industry that may be applied when designing and developing new buildings, wherever they are in New Zealand. We believe applying the recommendations will help to ensure buildings of the future support safe and effective emergency response to fire.

I strongly recommend the consideration and if appropriate the application of the information within the 14 chapters of the guide and early engagement with Fire and Emergency where any issues are encountered.

Kerry Gregory
National Commander – Deputy Chief Executive, Service Delivery

1. Why we developed this guide

Overview

We have prepared this guide to better help you understand how and why we operate.

We aim to reduce the risk to both firefighters and building occupants through encouraging appropriate building design which allows us to safely deliver our statutory function of providing fire prevention, reduction and suppression services.

The guide covers many of the common issues we encounter in our emergency operations, and addresses questions that stakeholders often ask. It also contains recommendations and suggested approaches that you may want to adopt.

We have designed this document as a first point of reference. Where necessary, you can seek further advice or clarity by contacting designers.guide@fireandemergency.nz

Standard approach

For those in the industry, it is important to understand that while we try to standardise our approach to the advice we provide, in certain circumstances we may provide different information.

This is because we need to take in to account a number of factors such as location, topography, water supplies, the nearest Fire and Emergency station, and whether it is a career or volunteer station, among other considerations.

Ability to act quickly

Delays allow fires to spread rapidly.

Building design affects how quickly and effectively we can do our job. During a fire, time is critical and problems such as the following can create unnecessary delays:

- Challenging access to the building or parts of the building
- Challenging access to water supplies (in and outside the building)
- Confusing alarm information (alarm panel location and confusing displays)
- Ineffective communication systems
- Inaccessible valves/controls
- Evacuation difficulties.

Factors affecting our operations

We work at all hours, in any weather conditions, and in unfamiliar environments. Our work environment is mentally and physically challenging.

We must make decisions based on limited information about the situation. For example, we may not know what is on fire, how much is burning, whether the building contains any hazardous substances, where the fire is spreading to, and where the building occupants are. These factors make the firefighting environment dynamic.

Considering how your building design will affect firefighting will help reduce the impacts of fire.

2. Application

Who this guide is for

This guide is for anyone involved with the built environment: from designers of fire protection systems and building owners to site supervisors and contractors.

Designers understand how the New Zealand Building Code (Building Code) and Standards apply to building design and fire protection systems. This document is to provide further assistance with understanding how building features affect our operations during a fire and encourages designers to view our personnel as users of their buildings, and in particular a building's features and fire protection systems. A system is of little use if we cannot easily locate or operate it.

Purpose

This guide:

- gives an overview of:
  - how we conduct our operations
  - what features a building needs to have so that we can do this safely.
- explains how we interface with the building's systems and facilities – this is to give some context for designing and installing what we need
- discusses how different building features affect firefighting operations
- helps to bridge the gap between building designers, fire engineers, contractors and Fire and Emergency
- is a guidance document that can be read alongside the regulatory requirements.

  Note: This guide does not replace mandatory regulatory requirements.
- explains why we need certain features, so designers understand the reasons why what we are asking for is important.

What we need from building design

We must be able to fight fires and effect rescues with the minimum chance of delays or injuries possible. Our personnel and our emergency vehicles must be able to safely:

1. get into the area
2. use the building systems to understand what is happening and to carry out our operations
3. get out.

To do all of these things, we need buildings that are designed to:

- keep occupants safe during an emergency
- let emergency responders get in quickly and easily
- allow firefighters to work as quickly and safely as possible
- help businesses continue operating and recover quickly.

How this guide will help you design buildings that assist with firefighting operations

This guide:

- explains how to design buildings and fire protection systems that make it easier for us to do our jobs safely and efficiently, which protects building occupants and allows business continuity
- explains how to incorporate design features and systems into existing building requirements
- sets out the minimum fire safety features for buildings
- reflects our standard operating procedures.

Many of these design features recommended in this guide may also help us respond to other types of emergencies.

As emergencies can be unpredictable, the building design should also take into consideration what happens if any systems fail and the contingencies for these.

Status

Read this guide alongside the:

- mandatory requirements of the Building Code
- requirements of New Zealand Standards (Standards) associated with fire protection systems
- Building Act 2004.

The guide **does not** replace any part of the Building Code or Standards or other mandatory building requirements.

Different chapters are relevant to different aspects of the Building Code. However, the scope of the guide goes further so we can address some of the issues we encounter that the Building Code does not capture.

Seek our advice

If you are involved with building design, we recommend you follow the advice in the guide. If you have any questions, contact us at designers.guide@fireandemergency.nz

For many projects, we must be involved in the building's design process. This could include:

- fire engineering brief (FEB) process, if C/VM2/alternative/performance-based design is implemented
- design review
- inspecting the fire and emergency facilities
- approving some features of the building or site (including to get building consent granted).

We recommend you contact us early in the design process, when any design changes will be easier and less costly.

The Firefighting facilities checklist

To make consultation easier, we have developed the Firefighting facilities checklist (FFFC).

We encourage you to complete the FFFC, as it is designed to provide us with the information we need.

https://fireandemergency.nz/assets/Documents/Business-and-Landlords/F5-SC-Firefighting-Facilities-Checklist.pdf

3. Scope

We have developed this guide as a series of individual chapters. You can read each chapter as a stand-alone document. Where applicable, we have provided relevant cross-references to other chapters.

Chapter synopses

- **F5-02 GD FFO Emergency vehicle access**
  Explains some of our vehicles' dimensions and capabilities and our access requirements.
- **F5-03 GD FFO Radio communications**
  Describes our communication systems, how we communicate at incidents and how building design can make this easier.
- **F5-04 GD FFO Fire alarm panels**
  Covers suitable locations for fire alarm panels, the information they should display and how we use any features provided.
- **F5-05 GD FFO Building hydrant systems**
  Outlines our needs for these critical firefighting systems, including where to put them and how to access them.
- **F5-06 GD FFO Sprinkler systems**
  Outlines the advantages of sprinklers, how we interface with them, and how associated equipment should be accessed.
- **F5-07 GD FFO Stairs in buildings**
  Discusses our design requirements for stairs, including how we use them, why we protect them and factors that can make them hard to use.
- **F5-08 GD FFO Lifts**
  Explains some general principles of lift use, how we use them for firefighting and how they can impact on the spread of fire by-products.
- **F5-09 GD FFO Fire Control Centres**
  Covers Fire Control Centre (FCC) location, construction, and the functionality and features we need them to have.
- **F5-10 GD FFO Evacuation and rescues**
  Describes how building design should complement evacuation planning, building design limitations and how/why we will carry out a rescue.
- **F5-11 GD FFO Water supplies**
  Explains how we use the Firefighting water supplies code of practice during our operations.
- **F5-12 GD FFO Construction, refurbishment and demolition sites**
  Covers the challenges we experience working on these sites and how developers and contractors can help mitigate risks.
- **F5-13 GD FFO Multi-tiered vehicle stacking buildings**
  Provides an overview of these unique systems and the challenges they present to us, and how your design can help us overcome some of these challenges.
- **F5-14 GD FFO Firefighting shafts in taller buildings**
  This chapter explains to designers the limitations of standard solutions for lifts and stairs in taller buildings and recommends an approach.

4. Related information

4.1. Legislation

- Fire and Emergency New Zealand Act 2017
- Building Act 2004
- New Zealand Building Code (Building Regulations 1992 > New Zealand Building Code > C Protection from fire)
- Health and Safety at Work Act 2015

4.2. Standards

- SNZ PAS 4509:2008 Firefighting water supplies code of practice
- NZS 4510:2008 Fire hydrant systems for buildings
- NZS 4512:2021 Fire detection and alarm systems in buildings
- NZS 4541:2020 Automatic fire sprinkler systems

Note: The legislation and Standards referred to in this guide (including the above links) are relevant at the time that this document was published. Note however that the legislation/links may have been updated since this document was published.)

Document information

Owner	National Manager Response Capability
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Review period	Every three years

Record of amendments

Date	Brief description of amendment
May 2025	Updated definitions: Address point, Attendance point, Hardstanding area. Review period changed to three years.
December 2021	Format update and SME content review
March 2018	Initial version

5. Appendix A – Definitions

The following definitions apply throughout this guide. Defined terms used throughout this document are consistent with the Building Act 2004, Building Code and Acceptable Solutions C/AS2.

Address point	This point is part of the data set administered by Toitū Te Whenua | Land Information New Zealand (LINZ). It is the address (point) where the building is, or will be, located. The address point can be either a singular or a range of individual points as described on the LINZ data set.
Aerial device	Encompasses all the types of Fire and Emergency aerial components (turntable ladder, elevating platforms, elevating monitors, baskets, cages and booms).
Aerial vehicle	A specialised emergency vehicle that has an aerial device that hydraulically rises to suppress fire and/or effect rescue as well as support other operations.
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).
Appliance	An emergency vehicle that provides capability to Fire and Emergency's mandated functions.
Attendance point	The hardstanding area where the first attending Fire and Emergency vehicle will stop and set up. There is usually only one attendance point located at the building's primary entry point. The attendance point should comply with clause 6.2.1 of C/AS2, and must comply with Clause C5.3 of the Building Code. This will give access to within 20m of: ○ indications of fire location ○ controls for fire safety systems ○ inlets for fire sprinkler or hydrant systems. The attendance point is the initial tasking and safety briefing point for crews before they deploy to any other access point. It must have facilities that give firefighters clear information, in compliance with Building Code C5.7. For unusually large or complicated building layouts, a second (or more) attendance point may be appropriate. This must be discussed and agreed with Fire and Emergency Operations. For a full description of the attendance point, refer to F5-02 GD FFO Emergency vehicle access.
Breathing apparatus (BA)	This is a device firefighters wear to provide breathable air in an atmosphere that is immediately dangerous to life or health. Also known as self-contained breathing apparatus (SCBA) or compressed air breathing apparatus (CABA).
Building hydrant system (BHS)	Fixed water main pipe system, normally already charged with water and supplemented by Fire and Emergency pumps. This should not be confused with an in-ground hydrant connected to the town mains. **Note:** In New Zealand these are called fire hydrant systems, as defined in NZS 4510:2008 Fire hydrant systems for buildings.

Canopy	Projecting hood supported on brackets, corbels or columns over a door, window or niche.
Car park	Space or spaces within a building used for parking motor vehicles including private household units.
Car-stacking facility	Place where cars are stacked above one another inside a building. Can be one or several floors. A car-stacking facility can also be found outdoors.
Car-stacking parking building	A car park building with a multi-tiered vehicle stacking device or system.
Carriageway	The driveable portion of a road (which may or may not include a sealed top surface layer).
Chimney effect	Also known as the 'stack effect'. It is the movement of air into and out of buildings resulting from air buoyancy. Buoyancy occurs due to a difference in indoor-to-outdoor air density resulting from temperature and moisture differences. The result is either a positive or negative buoyancy force. The greater the thermal difference and the height of the structure, the greater the buoyancy force.
Collapse zone	The collapse zone is an area around the building measured as 1.5 times the height of the structure. This is the area which would be considered dangerous in the event of an outward failure of a facade element. For the purposes of this document, the term 'collapse zone' only applies to pre-cast concrete panel (tilt-slab) and unreinforced masonry type construction. Use a pragmatic approach where practicable when designing, and when in doubt, consult Fire and Emergency.
Communications Centre (ComCen)	Fire and Emergency New Zealand Communications hub, which manages 111 emergency calls, the dispatch of Fire and Emergency resources and all radio messages sent via land mobile radio (LMR) from an incident. The three centres are in Auckland, Wellington and Christchurch.
Counterflow	Counterflow can occur on the stairs during the evacuation from buildings when the downward flow of evacuating occupants passes the upward flow of firefighters heading to the fire floor.
Fire and Emergency vehicular access	Vehicular access provided to Fire and Emergency vehicles should be consistent with Acceptable Solution C/AS2 Part 6 (relating to firefighting). Buildings must be provided with access that allows appliances to reach a position that makes it convenient for firefighters to get into the building and access the inlets to fire sprinkler systems or building fire hydrant systems, where these are installed. Occupants of risk group SI are more likely to require rescue by Fire and Emergency. An additional recommendation for this risk group is to allow access for the larger size of aerial vehicles to get as close to buildings as possible with space to 'jack' the vehicle. If a building has a large footprint (which is most likely to occur for a single-storey building such as a warehouse) and is not protected with fire sprinkler systems, access to two sides of the building is required. This gives Fire and Emergency the

	ability to access the building in a number of places and means that their travel within the building is minimised to reach any fire source. In addition, for the health and safety of our personnel, this access: • should not involve a canopy, or other part of a structure to drive or park under • should be located outside a horizontal collapse zone requirement of 1.5 times the height of a portal frame building • should be within 135 metres of a firefighting water supply. Where access meets these recommendations above, and is acceptable to Fire and Emergency, the 75 m hose run may be measured from this hard-standing point.
Fire control centre (FCC)	The principal location where the status of a fire detection system, an alarm system, and a communications and control system are displayed, and from which all systems can be manually controlled. Some industry standards and publications refer to the fire control centre as 'central control station', 'emergency command centre', 'fire service centre' or 'fire control room' (although different standards exist among these).
Fire engineering brief (FEB)	A formal process outlined in the International Fire Engineering Guidelines for all stakeholders to define and agree on the basis and scope of work for fire engineering analysis.
Fire floor	The floor of the building on which the fire is reported by automatic systems or observed/reported by occupants or other persons. The fire floor may change with new information and the initial reports by occupants may be inaccurate, if the observation is of the effects of fire (e.g. smoke spread), rather than the fire itself.
Fire resistance rating (FRR)	Building Code clause C regarding protection from fire defines FRR as: [t]he term used to describe the minimum fire resistance of primary and secondary elements as determined in the standard test for fire resistance, or in accordance with specific calculation method verified by experimental data from standard fire resistance tests. It comprises three numbers giving the time in minutes for which each of the criteria stability, integrity and insulation are satisfied, and is presented always in this order.
Fire sector	An area of the building that includes the fire floor and anywhere immediately at risk of fire. These areas may be extended above and/or below the fire floor according to the nature of the incident, the circumstances, the building and the progress of the fire.
Firecell	Building Code clause C regarding protection from fire defines firecell as: Any space, including a group of contiguous spaces on the same or different levels within a building, which is enclosed by any combination of fire separations, external walls, roofs, and floors.
Firefighter access point	The place where firefighters gain access to a building. This must comply with the New Zealand Building Code Clause C5.6: Buildings must be designed and constructed in a manner that will allow firefighters, taking into account the firefighters' personal protective equipment and standard training, to: (a) reach the floor of fire origin,

	(b) search the general area of fire origin, and (c) protect their means of egress.
Firefighting lift	A lift or elevator designed for use by firefighters during an emergency, fitted with systems to provide additional resilience to support emergency operations. A full description of firefighting lift features can be found in F5-08 GD FFO Lifts.
Forward control point (FCP)	A safe position inside the building from which to carry out firefighting operations. This is usually one to two floors below the lowest floor of the building that is affected by smoke and/or fire. The location becomes the last point to assemble personnel awaiting deployment. If the extent of the fire is unknown, or the fire develops and extends vertically, it creates a situation where the boundaries between zones become dynamic.

Hard-standing area (for Fire and Emergency vehicles)	A hard (roading) surface capable of withstanding the fully laden weight of a fire appliance from which fire operations for a structure are conducted. A hardstanding must be big enough for the fire appliance to enter, exit and manoeuvre and for firefighters to move around it to connect hose and safely access equipment. In most cases, the hardstanding will be the main road if the structure is close to it.
	To be operationally useful, hardstanding must be within 135 metres of a firefighting water supply.
	Additionally, for the health and safety of our personnel, hardstanding areas:
	• must not be located under a canopy, or other part of the structure on fire.
	• must not be located close to significant hazards such as dangerous goods, gas cylinders or similar.
	• must have a path of retreat for the appliance and crew if the incident deteriorates.
	• must be located outside the hazard zone of the firecell on fire. This hazard zone will include consideration of the following:
	  ○ a horizontal collapse zone requirement of 1.5 times the height of external walls of the firecell on fire
	  ○ radiant heat from flame projection or external walls exposing the pump operator and appliance
	  ○ the impact of the fire safety features within the building (for example, sprinklers).
	A full description of the hardstanding area can be found in F5-02 GD FFO Emergency vehicle access.

Incident ground communication (IGC) radio	Handheld two-way radios firefighters use to communicate with one another when working at an incident. Personnel using these cannot communicate with other handheld radios that are set on different channels or with Fire and Emergency ComCen's handheld radios.
Jacks	External outriggers and jacks fitted to aerial vehicles that extend to stabilise the vehicle when its centre of gravity shifts during the operation of the aerial device.
Land mobile radio (LMR)	A land mobile radio network that allows the ComCens to activate the station alert system to dispatch resources and to communicate with Fire and Emergency vehicles.

Lift	A moving compartment (also known as the lift car) housed in a shaft for raising and lowering people or things to different levels in a building. For the purposes of this document, the terms 'lift' and 'elevator' are interchangeable.
Mimic panel	See 'Zone index'.
Multi-tiered vehicle-stacking device/system	A mechanical device/system that stores vehicles either above or below others in a stacking arrangement. The process of stacking can be done manually; however, most large car-stacking facilities are automated. A full description of car stackers can be found in F5-13 GD FFO Multi-tiered vehicle stacking buildings.
Overhang	The portion of a vehicle's body that extends forwards past the front wheels or backwards past the rear wheels. It relates to body swing, which is when a set of wheels when turning acts as a pivot point and the bodywork swings past that point. The longer the overhang, the greater the body swing.
UHF	Ultra-High Frequency, F Band, 470–494 MHz
VHF	Very-High Frequency, ESA Band, 75–79 MHz
Wayfinding	Encompasses all of the ways in which people orientate themselves in physical space and navigate from place to place.
Zone index	A combination of diagrams, symbols, and text forming part of an indicating unit to identify the location of, and general access to, individual zones. **Note:** A zone index is often called a 'mimic panel'.