Designers' guide to firefighting operations

Evacuations and rescues

F5-10 GD

FIRE EMERGENCY NEW ZEALAND

WHAKARATONGA IWI

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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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1. Context

Scope

We need you to plan to fully evacuate your building. It is the building owner's responsibility to make a plan to ensure that everybody gets out. However, where something unforeseen has occurred with the evacuation, you may need our help to get people out.

This guide helps you understand when we expect to get involved in evacuations, how we assist, and how good design and management process can help our work.

Who this chapter is for

This chapter is for building owners, designers and other building practitioners and contractors. It provides guidance from Fire and Emergency's perspective on evacuation and rescues from buildings.

What is not included in this chapter

This chapter gives building industry stakeholders an overview of aspects of our operations that relate to them. However, it is not an exhaustive guide to our operations, nor does it replace any statutory requirements. We recommend you read it alongside other chapters in the guide.

Legislative framework

We aim to reduce the risk to both firefighters and building occupants through encouraging appropriate building design which allows us to achieve our statutory objective (under the Fire and Emergency New Zealand Act 2017) to reduce the incidence of unwanted fire and the associated risk to life and property. Our functions include responding to and suppressing fires and attending to other types of emergencies that may occur in a building.

Read this guide alongside the:

- mandatory requirements of the New Zealand Building Code (Building Code);
- requirements of New Zealand Standards (Standards); and
- Building Act 2004.

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

The Building Code Fire Safety – C Protection from fire, clauses C1 – C6 defines Building Code performance requirements of the Building Act 2004. C5 is the performance requirement on Access and safety for firefighting operations.

2. Definitions

The following definitions apply for the purposes of this chapter. 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 dataset administered by Land Information New Zealand, (LINZ). It is the address (point) where the building is commonly known to be located. It can be either a single point or a range of individual points as described on the LINZ data set.
Aerial device	Encompasses all of 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.
Appliance	An emergency vehicle that provides capability to Fire and Emergency's mandated functions.
Attendance point	It is the place where the first attending Fire and Emergency pumping vehicle will stop and set up. There is only one attendance point, usually at the building's primary entry point. Firefighters may be deployed to other firefighter access points from here. A full description of the attendance point can be found in F5-02 GD FFO Emergency vehicle access.
Breathing apparatus (BA)	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	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.
Canopy	Projecting hood supported on brackets, corbels or columns over a door, window or niche.
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 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: The 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. (Refer to the NZBC C Protection from fire for the full definition) https://www.building.govt.nz/building-code-compliance/c-protection-from-fire/c-clauses-c1-c6/
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.
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 within 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 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 demarcation of the zones becomes dynamic.
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.
Wayfinding	Encompasses all of the ways in which people orientate themselves in physical space and navigate from place to place.

3. Our operations

3.1. Designing and planning for evacuation of your building

Your obligations

The Building Code requires that you design and maintain your building so that occupants can get out safely.

The Fire and Emergency Act 2017, and Fire and Emergency New Zealand (Fire Safety, Evacuation Procedures, and Evacuation Schemes) Regulations 2018 require that, for all relevant buildings, you develop and maintain a plan on how you will get people out of the building safely. This documented plan is called an 'evacuation procedure'. For specific building occupancy types (see Appendix A for a detailed list), you need a more formalised procedure, called an 'evacuation scheme', and Fire and Emergency need to approve this.

It is important that the assumptions of an actual evacuation, assumptions in the building design, and the assumptions of the evacuation plan align.

Our role during an evacuation

The role of firefighters during an evacuation should be very limited. We can only reliably become involved when something has gone wrong with the evacuation, or when something unexpected happens as the incident unfolds, e.g. the fire spreads faster than expected, or it become clear that the alarm activation has been a false alarm.

It is important that your evacuation plan does not need firefighters to intervene to get everyone out of your building.

Evacuation is a time-critical activity. It needs to start as soon as occupants become aware of a fire. Your evacuation will be delayed if you rely on us to manage your evacuation for the following reasons:

- We may not always be immediately aware of a fire at your building (if your fire alarm is not connected to Fire and Emergency).
- We need time to travel to your building and may not always be able to send a response from your nearest fire station due to other emergencies.
- Once we get there, we need to very quickly understand your evacuation strategy and building design.
- We may not have enough firefighters or specialised equipment immediately available to manage the evacuation.

With the right planning, most building occupants can safely get out of your building without our help.

Planning for an emergency

The first part of this chapter focuses on how you can develop a plan to get everyone safely out of your building without help from firefighters.

It is important that the evacuation plan is:

- achievable (noting the fire design and occupant abilities)
- resilient (allowing for the plan to be flexible as assumptions change about the building and the occupants over time).

We recommend that you refer to the information in this part of the chapter when designing your evacuation plan.

The second part covers:

- how and when we get involved in evacuations

- how fire search and rescue works
- what you can do to speed up these efforts
- design considerations that we recommend you incorporate into your building design where possible.

4. Challenges

4.1. Occupant factors for evacuation plan design

Evacuation plan

In developing your evacuation plan, you need to consider both the building design and the occupants. While the Building Code sets out requirements for how your building design (including evacuation routes) should perform, there is no equivalent detailed requirement or guidance for evacuation plans.

Below we have noted some of the main occupant factors we recommend you consider in the design of your evacuation plan. For each factor, we provide our observations and suggest an approach. However, other approaches are available and may be more suitable for your building; this is for you to decide.

Delays in starting evacuation

Starting an evacuation as soon as possible gives you the best chance of getting everyone out safely.

However, building occupants may not always start evacuating as soon as the alarm starts. People often do other things, e.g. finish a task, search for others, or gather belongings, before they move towards the escape route.

While not desirable, a short delay may not make the outcome worse. However, the longer the delay, the riskier it becomes for occupants to stay where they are. Common reasons for unreasonably long delays in starting evacuation include:

- occupants not knowing what to do
- occupants getting confusing messages
- language barriers where voice alarm systems are used
- alarm failing to alert occupants due to:
  - alarm fault
  - occupant impairment
- occupants fighting the fire.

When occupants delay their evacuation, firefighters may have to change tactics to search and rescue for people who would otherwise have been capable of safely escaping without our help. This consumes personnel that we could have used to fight the fire.

You can minimise delays in starting evacuations by:

- providing frequent training to occupants that is consistent in delivering the appropriate message for your building
- setting clear expectations of occupants of their behaviour and role in an emergency
- supporting occupants with additional needs, e.g. with personalised alerting equipment.

Occupant expectations

Occupants can have different expectations about what might happen during a fire. For this reason, it's important for firefighters and occupants to clearly understand their roles and responsibilities.

To manage occupant expectations, evacuation plan training should include the following:

- Encouraging a high level of personal and social responsibility among occupants. Occupants need to know that they must evacuate the building when they hear the fire alarm, and not to wait for instructions from firefighters.
- Making occupants aware that they can't rely on firefighters rescuing them and that this is a last resort.

  They also need to understand that rescue via aerial vehicles from upper floors, balconies and roofs is rare and often impossible.
- For occupants who cannot reasonably be expected to evacuate without some assistance, make a personalised plan so that the person knows how they will get out (for details, see the section below, 'Designing evacuation for occupants who need help').

Evacuation plan training that includes the above will give occupants realistic expectations on what firefighters can (and can't do) during an evacuation. We find that occupants with realistic expectations are less likely to need rescue.

Fatigue

Like firefighters, occupants can become fatigued during emergencies, particularly if they are expected to travel long distances or to help others during an evacuation.

Fatigued occupants will gradually slow down throughout the evacuation and eventually may not be able to complete the evacuation without some assistance. International studies show that during evacuations, occupants tend to behave helpfully and respectfully (e.g. waiting with slower occupants) rather than selfishly (e.g. leaving others behind). This means that the slower fatigued occupants can significantly impact the evacuation as people slow down to keep pace with them and help each other.

Once the occupant flow in the escape route slows, the routes can become congested. This is dangerous for both occupants and firefighters as it makes it difficult for anyone to get into the protected space. This results in:

- delayed firefighting as firefighters cannot get into the building along the protected route
- an increased risk of occupants being exposed to fire, which increases the number of people who need firefighter assistance
- more smoke getting into the stair, which endangers the occupants already in the stair and compromises the access route for firefighting (refer to F5-07 GD FFO Stairs in buildings, F5-08 GD FFO Lifts and F5-14 GD FFO Firefighting shafts in taller buildings for further guidance).

To avoid these types of issues, we need your evacuation plan to be realistic about occupant abilities.

Where occupants are expected to travel long distances, the building design should take this in to account by:

- considering slower walking speeds in the evacuation assessment
- including extra floor area in protected escape routes for occupants to rest

- considering the use of lifts for evacuation in multi-storey buildings (see F5-08 GD FFO Lifts).

Expected lift response to a fire alarm activation

Standard building lifts are not usually used for evacuation. When the fire alarm activates, the lift call buttons on each floor should automatically disable, and lift cars should automatically return to the main access lift lobby with the doors open.

If there is a fire, this prevents passengers from becoming trapped in the lift, or exposed to heat and smoke, and allows us to quickly confirm that lifts are unoccupied (through observing the open doors at the designated lobby).

4.2. Designing evacuation plans for occupants who need assistance

Occupants who need assistance

In every building, some occupants will need assistance to evacuate. They include:

- people with mobility impairments
- young children and infants
- people needing care or under detention
- people with health issues who can't travel long distances without help.

It is important to ensure that your evacuation plan identifies occupants who need assistance and includes a way to get these occupants to safety.

You are more likely to evacuate your building without our help if you:

- consider the needs of the building occupants during your evacuation planning
- give appropriate, timely help to occupants who need it.

Providing assistance

Your evacuation plan needs to identify:

- who needs assistance (consider both long-term impairments, e.g. paraplegia, and short-term impairments, e.g. fractured limbs)
- what equipment they'll need, e.g. evacuation chairs or stretchers
- who and how many people (if any) will help those who need it
- when the help is needed (for the whole escape route or just part of the escape route)

The plan should consider the abilities of the person requiring assistance. The person may be able (and may want) to complete parts of the evacuation without help.

It is important to be realistic about what the number of available assistants can achieve. They may need back-up assistance teams for long distances (horizontal or vertical), or if the assistants will fatigue quickly, e.g. when carrying heavy loads.

Designing an escape route for occupants needing assistance to escape

Your building design should allow for people who need help to evacuate as this will make developing your evacuation plan easier.

Building design should allow the person needing assistance to help themselves as much as possible. This creates resilience in the plan, so that if the person helping them isn't immediately available, occupants can (within reason) still do something to protect themselves. For example, occupants who can't use stairs should be able to move to another location on the same floor where they can wait safely for help to escape as per your evacuation plan.

Building design can do this in several ways, including:

- dividing floors into firecells so that occupants can always move horizontally to another firecell on the same floor not affected by the fire
- providing floor area in fire-separated sterile escape routes where occupants can safely and comfortably wait to evacuate without delaying the evacuation of more able occupants
- providing a system of fire separations and a sprinkler system to allow occupants to move to another part of the building and stay in this space indefinitely.

For the first two options, you need to ensure that you have a plan for how the occupants in this space will get to the final exit; this plan should not rely on firefighter intervention.

Using lifts for evacuations

Typically, lifts are not suitable for evacuation. However specifically designed evacuation lifts are becoming more common in multi-storey buildings overseas. We support using this approach in your building.

However, it is important to ensure that your evacuation lift has been designed to a recognised standard to demonstrate that it is safe to use during a fire.

It is also important to have a plan for how to use the lift. This will include rules on:

- who can operate the lift
- which occupants should and shouldn't use the lift
- how long occupants should wait for a lift before seeking another evacuation option.

You may also have a lift in your building suitable for firefighters to use. While this lift may also be suitable for evacuation, it is important to remember that the primary purpose of the firefighting lift is firefighting. If the lift is being used for evacuation, this will delay our firefighting activities.

Making occupants aware of design features for evacuation

Occupants requiring assistance will only use building features intended to help them if they know about them.

We recommend that as part of your regular evacuation training, you work with both helpers and people needing help to:

- ensure occupants needing assistance know what to do in the event of an evacuation
- identify and agree where the person needing assistance should go, e.g. the stairwell, a neighbouring firecell, lift lobby, etc. – this may vary depending on where the occupant is when the evacuation begins
- identify any specialist equipment required, arrange for it to be provided, and let occupants know where to find it and how to use it
- identify helpers and agree on their responsibilities
- identify any training needs, e.g. heavy lifting, equipment use, communication

This should be part of an ongoing commitment to ensure that your evacuation plan is relevant for the current occupants, aligned with the building design and management, and generally remains feasible.

4.3. How we get involved in evacuations

Only when necessary

Remember: we only get involved in an evacuation when something has gone wrong, or when something unexpected happens as the incident unfolds.

Below are some specific examples of what we do when we have to get involved in evacuations.

Systems failure

If the fire alarm fails to activate, only partially activates, or there is a fault in the equipment, alarm or sequence, occupants may not know that they need to evacuate when we arrive at the incident.

We may be able address this by triggering an all-out evacuation if the equipment is operational.

If not, we may need to physically tell occupants that they need to evacuate. This can mean that we knock on doors and tell occupants to leave immediately. This is especially time-consuming in apartment blocks where there are many separate households over several floors.

A further challenge is that occupants don't expect to be told to leave when the alarm isn't sounding, and can be reluctant to leave, even when firefighters tell them to. This can delay the evacuation further.

To prevent this from happening, ensure that alarm equipment is:

- installed and programmed as per the assumptions of the fire design and the evacuation plan
- installed and maintained to the relevant standards.

This makes it more likely that the systems will operate as expected during a fire.

Stopping the evacuation

Sometimes we stop the evacuation sequence. This may be because:

- we have confirmed a false alarm activation, e.g. a malicious activation of a manual call point
- we have established the cause of the alarm and there is no fire, e.g. accidental activation of smoke detector by dust/steam, cooking, etc.
- we have established the cause of the alarm and the fire is extinguished; e.g. small kitchen fire extinguished by firefighters
- it was a system fault, e.g. the system has reported an activation where there was no trigger

We understand that evacuating a building is stressful for occupants and challenging for business continuity, so it's important that when we decide to stop the evacuation, we can do it quickly. We need you to put your alarm panel in a suitable location to make this as easy as possible.

Altering the evacuation sequence

If something goes wrong during the evacuation sequence, we may take control of the evacuation and reprioritise the sequence.

However, we prefer not to do this because we understand that the building has been designed to suit a specific evacuation strategy. If we trigger a simultaneous evacuation when a delayed or staged evacuation sequence is already under way, this may cause crowding or crush conditions at the exits or along escape routes. It may also result in unnecessary evacuation of spaces containing vulnerable occupants, e.g. hospital patients or secure areas of a building.

For these reasons, we only alter the evacuation sequence when we have given it serious consideration and there is an immediate need.

The extent to which we can control the evacuation depends on the complexity of the fire alarm system. If the system is an EWIS (Emergency Warning and Intercommunication System), we can deliver voice messages and control the

evacuation tones in each evacuation zone (refer to F5-04 GD FFO Fire alarm panels for further information).

If there's no EWIS, taking control of the evacuation means triggering a simultaneous evacuation throughout the building.

Search and rescue

'Search and rescue' means finding and helping people who may be in danger and is our primary involvement in removing occupants from buildings. We only carry out search and rescue when something has gone wrong with your evacuation.

There are no set rules about how we prioritise search and rescue and firefighting operations. It depends on the fire (location, spread, speed of development) and the occupants (location, number, condition).

We use an approach called 'dynamic risk assessment' to make decisions. This means that we are always revising our priorities based on the latest information available.

4.4. Occupants who need to be rescued

Occupants who need rescuing

We may need to rescue people because they're:

- injured or incapacitated
- lost in the building
- trapped by the fire, or failed building elements, e.g. collapsed construction
- not getting the help they need (for occupants unable to self-evacuate).

Once we know who needs rescuing, we will allocate resources in line with our operational priorities. You can help us by providing as much specific information as possible, including:

- how many people may need to be rescued
- where they are, or were last seen, and how that space is affected by the fire
- what condition they're in
- if there is a means to communicate with them
- the fastest way to reach them.

Occupants who are unaccounted for

The building warden arrangements should include a robust method for indicating which of the building areas have been cleared (i.e. fully evacuated).

We need you to tell us if anyone hasn't escaped. You may hear us use the term 'unaccounted for'. Occupants unaccounted for are people believed to have been in the building at the time of the alarm activation but cannot be found in assembly area or the vicinity of the building.

Sometimes, occupants are unaccounted for because they couldn't evacuate, and will therefore require rescue. However, this is not always the case. Occupants can also become unaccounted for when they:

- are reported missing despite not having been present in the building at the time of the incident
- leave the building and/or the site during the evacuation without reporting to the assembly area or notifying others.

If we are unable to confirm that occupants are safe, we will assume the worst and initiate search and rescue. This could lead us to search for occupants who aren't in the

building or don't need rescuing. This takes up resources that could be used for other priorities and puts firefighters at unnecessary risk.

To stop this from happening, evacuation training should:

- encourage a high level of personal responsibility so occupants don't leave the scene without letting others know
- encourage people to identify occupants who are unaccounted for if they suspect that someone may need our help.

Details we need on unaccounted-for occupants

To assist our rescue efforts, it is helpful to know:

- where the person was last seen, e.g. floor and general area
- any reason the person may have become unaccounted for, e.g. was injured, separated from the group in smoke, etc.
- any other information that may help us locate the person, e.g. if the person is familiar with the building, what would be their familiar paths around the building.

Witnesses are good sources of information, so it's useful to train all building occupants to make a mental note of this type of information so that it can be relayed to firefighters if necessary.

If there is a designated fire warden, they will most often relay this information to us. This is the most efficient way to relay information as it avoids repetition and speeds up the process. It is important to train fire wardens to effectively gather and communicate critical information.

4.5. Equipment limitations

Personal equipment limitations

The following equipment limitations affect the amount of time we can safely spend on search and rescue, and how effectively we can search:

- When we are searching spaces where there is any smoke, we wear our breathing apparatus. The air cylinders on our breathing apparatus contain limited air and we must be able to return to a safe location before we run out of air.
- Smoke significantly impacts the light and our ability to see – this means that even with daylight or torches, we still struggle to see in smoky conditions.
- While we have thermal image cameras to assist in low-visibility conditions, these are not carried onboard every vehicle and may not be available in the early stages of an incident.
- Our protective clothing is not a complete heat shield. We still need to take care to avoid too much heat exposure. This limits how close we can get to a fire, and how long we can spend in hot environments.

Note that subdividing the building into firecells will limit the size of the area to be searched.

Aerial equipment limitations

Some of our emergency vehicles have longer ladders or other aerial devices that help us reach up the outside of the building. This equipment has some limitations that mean we cannot use it in all situations:

- There is a maximum reach.
- Aerial vehicles need access and space to set up (stabilisers which extend out).
- These take time to set up.

For further information, see F5-02 GD FFO Emergency vehicles access.

For these reasons, you can't rely on us rescuing occupants using aerial vehicles. Instead, you should ensure that the building is designed to allow us to carry out internal rescues (see F5-07 GD FFO Stairs in buildings, F5-08 GD FFO Lifts and F5-14 GD FFO Firefighting shafts in taller buildings for further detail).

Resource limitations

We have a predetermined response that dictates the resources we send to different types of emergencies. We are able to mobilise additional resources, but this takes time. This means that we have limited resources available initially.

During the initial stages of an incident, we will prioritise activities based on the resources we have at the scene. This is another reason why it is important that your evacuation plan doesn't rely on our assistance.

4.6. Building design limitations

Congestion inside the building

The building design can limit how efficiently we work. Buildings in New Zealand must be designed for occupants to get out, and there is limited allowance for firefighters to get into the building at the same time.

Firefighters wear bulky protective clothing and breathing apparatus, and carry equipment, e.g. hoses, tools, etc., so we take up more space than the average occupant.

This makes it especially challenging to move against the flow of occupants. This is called counterflow, and can occur in any area of the building, but is most likely to occur on stairs, in corridors and at exit doors (further information can be found in F5-07 GD FFO Stairs in buildings).

Figure 1 – Standard firefighter PPE and equipment load for building fires

Counterflow is worse when several teams of firefighters enter a building during the evacuation.

The design needs to allow for occupants to leave the building and for firefighters to go into the building simultaneously.

Congestion outside the building

Congestion can also occur outside the building around the last exit on the escape route as occupants tend to congregate in this area. Occupants need to disperse quickly from this area to keep the evacuation moving and to create space for firefighters.

You can minimise congestion around exits by:

- locating evacuation assembly points (if provided) away from the exit
- training building occupants to move away from the exit
- designing evacuation routes that don't cross over spaces that firefighters are expected to occupy.

Figure 2 – Highlights situations where congestion can occur

For further information about these factors, see F5-04 GD FFO Fire alarm panels, F5-05 GD FFO Building hydrant systems and F5-06 GD FFO Automatic sprinkler systems.

Exit from and access to upper floors

Exit from and access to upper floors is impacted by:

- stair width
- number of occupants using the stairs
- availability of firefighting lifts to access upper floors.

When firefighters must share stairs with evacuating occupants, this delays our operations by causing congestion, counterflow and fatigue.

You can fix this by providing firefighting lifts, designated stairs for firefighting access and wider stairs. It's important to include these in early stages of the design, because it's very difficult to add them once the design has been finalised or in existing buildings.

See F5-07 GD FFO Stairs in buildings and F5-08 GD FFO Lifts for a more detailed discussion.

Building security

Firefighters can find themselves behind locked doors, especially in stairwells and between tenancies in buildings with multiple tenants.

This can slow down our operations as we either need to find another way out or, if possible, force a door open. This takes time and effort that could be spent on search activities, etc.

This situation is less likely to occur in a building where the fire alarm and security systems are interfaced to allow some doors to unlock when the fire alarm activates. You can also prevent it by providing door security override buttons or a master key (see also F5-04 GD FFO Fire alarm panels for details on how this can be arranged).

For more information on suitable access provisions, see F5-02 GD FFO Emergency vehicles access and F5-07 GD FFO Stairs in buildings.

Unprotected escape routes

We can't share our protective equipment with building occupants. This means that during a rescue, we're protected from heat and smoke, but occupants aren't.

Escape routes designed to protect occupants from fire and smoke allow us to quickly move occupants to a safer location, such as fire-separated stairs, corridors or even a fire-separated part of a floor.

This is another benefit of subdividing the building into firecells, as discussed earlier.

5. Recommendations

5.1. Evacuation planning

Evacuation plan	• Prepare an evacuation plan (procedure) for your building. • If required, develop an approved evacuation scheme (see **Appendix A**) under the Fire and Emergency New Zealand (Fire Safety, Evacuation Procedures, and Evacuation Schemes) Regulations 2018. For more information refer to: https://onlineservices.fire.org.nz/ • Your evacuation plan should align with the building design.
Occupant factors for evacuation plan design	• Ensure that your evacuation starts as soon as possible – consider providing specialised alerting equipment for occupants who may not immediately recognise prompts to evacuate. • Ensure occupants are familiar with the evacuation plan and have realistic expectations about what will happen/what they should do during an evacuation. • Allow contingencies in your evacuation plan for occupants who could fatigue during the evacuation – this will limit congestion on evacuation routes.
Designing evacuation plans for occupants who require assistance	• Put in place a process to identify people who may need help to evacuate and review the outcomes of the process regularly. • Identify people who need assistance in your evacuation plan and detail what you'll need to get them to safety. • Your building design should suit its occupants' abilities, including what they will need to evacuate safely. If you provide an evacuation lift, plan how it will be used.

5.2. Fire and Emergency involvement in evacuations

Safety and alarm systems	• Maintain your fire safety systems properly so that system failures don't delay the start of the evacuation. • Put the fire alarm panel (and EWIS if applicable) where we can find it quickly and take control of the evacuation if necessary.
Search and rescue operations	• To make our search and rescue efforts more efficient, give us reliable information on occupants who may need our help. • Train building occupants to report to a fire warden (or similar) before they leave the scene – this will limit the risk of them being mistakenly reported as unaccounted persons.
Equipment limitations	• Remember that firefighter's equipment has limitations and that our exposure times are limited for our safety. • Always plan to evacuate your building entirely via internal escape routes – physical constraints around your building or resource constraints may prevent us from using our aerial vehicles to rescue people from outside the building.
Building design limitations	• When designing horizontal and vertical escape routes, consider widening escape routes so firefighters can move into the building while occupants move out. • Minimise the risk of congestion around firefighter access points by: ○ funnelling evacuations away from the building

    - designing escape routes so that occupants don't have to move through spaces firefighters will occupy, e.g. around the alarm panel or sprinkler and building hydrant system inlets.

- In multi-storey buildings, provide a specially designed firefighting lift that goes to upper floors.
- Give firefighters a way of overriding your security system so we don't get stuck behind secure doors.
- Subdivide the building into firecells to minimise firefighters' exposure to flames, smoke and heat – large open spaces are challenging to navigate as there is no relief from fire exposure.

6. Related information

6.1. Designers' guide to firefighting operations

- F5 01 GD FFO Introduction
- F5-02 GD FFO Emergency vehicles access
- F5-03 GD FFO Radio communications
- F5-04 GD FFO Fire alarm panels
- F5-05 GD FFO Building hydrant systems
- F5-06 GD FFO Automatic sprinkler systems
- F5-07 GD FFO Stairs in buildings
- F5-08 GD FFO Lifts
- F5-09 GD FFO Fire Control Centres
- F5-10 GD FFO Evacuation and rescues
- F5-11 GD FFO Water supplies
- F5-12 GD FFO Construction, refurbishment and demolition sites
- F5-13 GD FFO Multi-tiered vehicle stacking buildings
- F5-14 GD FFO Firefighting shafts in taller buildings

6.2. Legislation

Fire and Emergency New Zealand Act 2017

Building Act 2004

Building Regulations 1992 > NZ building code > Fire safety

Fire and Emergency New Zealand (Fire Safety, Evacuation Procedures, and Evacuation Schemes) Regulations 2018

6.3. Standards

- AS 1670.4:2015 Fire detection, warning, control and intercom systems – System design, installation and commissioning. Part 4: Emergency warning and intercom systems
- AS 4428.4:2016 Fire detection, warning, control and intercom systems – Control and indicating equipment, Part 4: Intercommunication systems for emergency purposes
- NZS 4512:2021 Fire detection and alarm systems in buildings

6.4. References

- Fire and Emergency New Zealand Online Services Evacuation schemes
- Fire and Emergency New Zealand > Business and landlords > Evacuation schemes
- C/AS2 Acceptable Solutions
- Fire and Emergency manual - M1 TM Command and control technical manual: Section 3 Risk assessment, strategy and tactics; Section 4 Exercising command and control, (2007)
- Ministry of Business Innovation and Employment, New Zealand Building Code Handbook, 3rd edition (2014)
- Fire and Rescue Manual: Volume 2: 'Fire Service Operations – Incident Command', 3rd edition (2008) The Stationery Office, London. ISBN: 978-0-11-341321-8

(NB: 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 the publishing of this document.)

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January 2022	Format update and SME content review
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7. Appendix A – Buildings that require an approved Evacuation Scheme

Source: Fire and Emergency New Zealand Act 2017 Subpart 4 – Evacuation schemes Section 75 (1)

Section 75 Relevant building defined for purposes of sections 76-79

(1) In sections 76-79, relevant building means a building or part of a building used for 1 or more of the following purposes:

(a) The gathering together, for any purpose, of 100 or more persons

(b) providing employment facilities for 10 or more persons*

(c) providing accommodation for 6 or more persons (other than in 3 or fewer household units) *

(d) a place where hazardous substances are present in quantities exceeding the prescribed minimum amounts, whatever the purpose for which the building is used

(e) providing early childhood education and care centre (other than in a household unit)

(f) providing nursing, medical or geriatric care (other than in a household unit)

(g) providing specialised care for people with disabilities (other than in a household unit)

(h) providing accommodation for persons under lawful detention (not being persons serving a sentence of to home detention or community detention, or serving a sentence of imprisonment on home detention, or on parole subject to residential restrictions imposed under section 15 of the Parole Act 2002)

(i) any other prescribed purpose.

*In some situations where only (b) or (c) applies, if the building has an automatic sprinkler system an approved evacuation scheme may not be required. The building owner must notify Fire and Emergency New Zealand of this in writing