



**New Zealand
School Property Agency**

Fire Safety Design Requirements for Schools (July 2008)

Requirements for boards of trustees, project managers, and design consultants

About this resource

This resource was originally published by the Ministry of Education in July 2008 and includes addendums published in July 2017 and June 2018. It has been transitioned to New Zealand School Property Agency (NZSPA) branding.

References within the original document and addendums have been retained as published. NZSPA intends to review and update the detailed content of this resource separately.

Includes the following addendums

1. Adoption of the Enclosing Rectangle Method (ERM) for the calculation of separation distances between buildings on a Ministry of Education school site (July 2017); and
2. Amendments to the requirements for sprinklers, compartmentation and fire alarm systems (June 2018)

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Addendum to Fire and Safety Design Requirements for Schools (2008)

Adoption of the Enclosing Rectangle Method (ERM) for the calculation of separation distances between buildings on Ministry school site (July 2017)

Purpose

1. This addendum outlines the adoption by the Ministry of Education (the Ministry) of the Enclosing Rectangle Method (ERM) for the calculation of separation distances between buildings on an Ministry school site. The changes pertain primarily to section 2.8: Fire and smoke separation for property protection, paragraph 6 of this document ***Fire and safety design requirements for schools (2008)***.

Background

2. With more than 30,000 buildings on school sites, ensuring that there are safe separation distances between buildings to mitigate the risk of fire spread, is a key risk mitigation strategy for the Ministry. With such a large portfolio of assets, spread across 2,100 schools, flexibility is required to address the wide variety of site specific circumstances that may be encountered. The 2008 fire policy's minimum mandatory separation distances of 6m or 10m apart, for single and two storey buildings, respectively, while being robust, clear and simple, has not always provided sufficient flexibility to address some situations.
3. The Ministry has sought to address this issue by shifting to a more performance based approach for the calculation of separation distances between its own buildings. This provides additional flexibility, whilst still achieving the Ministry's overall property protection objectives.
4. Under the Building Act (2004) and Building Code (BC), separation distances are addressed primarily in the context of proximity to a boundary and the potential impacts on 'other' people's property. The BC provides a range of Acceptable Solutions by which compliance for protecting 'other' people's property can be achieved.
5. The Enclosing Rectangle Method (ERM) forms the basis of those acceptable solutions and verification methodology for calculating safe separation distances to the relevant boundary based on the percentage of unprotected area. The approach is set out

under the Commentary for Building Code Clauses C1–C6 and Verification Method C/VM2 (“Commentary for C/VM2”). Safe separation distances are set out in tabulated form in Appendix A: Tables A2.1–A3.2. These are available from the Building Performance website: www.building.govt.nz/assets/Uploads/building-code-compliance/c-protection-from-fire/asvm/cvm2-protection-from-fire-amendment-2-commentary.pdf.

6. From a property protection perspective, the BC does not specify requirements for separation distances between a property owner’s ‘own’ buildings (except for emergency vehicle/fire appliance access requirements). The Ministry, however, is concerned with mitigating horizontal fire spread between its ‘own’ buildings, in order to manage the risk and costs of fire damage.
7. In seeking to provide greater flexibility, the Ministry was mindful that any method should be widely accepted and familiar to users of the fire policy. The Ministry has therefore decided to adopt the ERM, used under the BC for calculating safe separation distances in respect of ‘other’ people’s property, and apply the method to calculating safe separation distances between its ‘own’ buildings. Designers will therefore be able to select from a range of solutions based on which approach offers the best fit for the specific circumstances.
8. It should be understood that, in respect of calculating separation distances between its ‘own’ buildings, the Ministry is only adopting the enclosing rectangle calculation ‘method’. The Ministry is not adopting all of the fire compliance requirements that apply under the BC in respect of protection to ‘other’ property.
9. In order to reflect the additional flexibility provided under the ERM, the Ministry has also made modifications to the mandatory 60/60/60 Fire Resistance Ratings (FRR) for external walls requirement under the 2008 fire policy.

The policy changes

10. The following replaces Section 2.8: Fire and smoke separation for property protection of the 2008 fire policy, paragraph 6:
 - The mandatory requirement for buildings on a Ministry school site to be a minimum of 6m (single storey) or 10m (two storey) apart has been removed.
 - Where buildings or fire compartments are unprotected and are more than 1m apart:

a) Methods for calculating separation distances

Separation distances can be calculated by selecting from the range of acceptable solutions or verification methods under the BC as follows:

- i. using the Enclosing Rectangle Method (ERM) tables as set out in the Commentary for Building Code Clauses C1–C6 and Verification Method C/VM2 (“Commentary for C/VM2”), Appendix A: Methodology for Horizontal Fire Spread, Tables A2.1-A3.2 (“Appendix A: Tables A2.1-A3.2”); or
- ii. using the previous acceptable solution tables in C/AS4: Appendix Table C3: Permitted unprotected areas in unsprinklered buildings Method 4: Enclosing Rectangles (C/AS4); or
- iii. the applicable calculation provided in the Commentary for C/VM2, Appendix A: Methodology for Horizontal Fire Spread (Tabular Data), sections:
 - A3.0: Method 2; or
 - A4.0: Method 3; or
 - A5.0: Method 4; or
- iv. the BRANZ Technical Report 13: Method for determining safe separation distances between buildings in the event of fire; or
- v. specific design modelling to demonstrate compliance with *clause 3.6* of the BC.

Calculation methods iii, iv and v should be used where the building scenario is not addressed in the tabulated minimum distances expressed in *Appendix A: Tables A2.1 - A3.2 or C/AS4* or where a more specific outcome is sought.

b) Building structures and supplementary elements

The following must also be taken into consideration when calculating separation distances:

- building eaves (maximum outside line);
- canopies (attached and non attached);
- decking (combustible material construction only);
- walkways (open, enclosed and ducted); and
- shade or other attached elements or structures.

In addition, access for emergency vehicles and fire appliances to all school buildings must be provided as set out in clauses 5.3 and 5.4 of the BC.

c) Maximum separation distances

The Ministry recognises that there may be instances where the outcome from using an acceptable solution or verification method, described in paragraph 10 (a) i-v above,

may lead to separation distances greater than 6m (single storey) and 10m (two storey) being required. In such cases the responsible Designated Financial Authority (DFA) may consider limiting the required separation distances to 6m and 10m for single and two storey buildings respectively.

d) Fire resistance ratings

The fire policy is also amended to remove the mandatory minimum FRR of 60/60/60 on external walls to accommodate the flexibility provided under the ERM. Where required, the level of fire protection on external walls shall be calculated based on the 'burnout' formula as per Verification Method C/VM2, Part 2: Paragraph 2.4.4". Mandatory FRR of 60/60/60 will still apply where applicable under clauses 1-5 under Section 2.8 Fire and smoke separations for property protection or as set out under Section 2.9 Fire and smoke separation for BC requirements.

Commentary

11. To aid interpretation, the following should be read in conjunction with the above policy changes:
 - a. The recommended policy changes are designed to create greater flexibility for calculating separation distances between the Ministry's own buildings by applying the range of acceptable solutions and verification methods available under the BC.
 - b. The policy applies to all new buildings or any alteration to an existing building that impacts on the separation distance requirements (see section 2.1 of the 2008 fire policy).
 - c. The policy is to be applied between buildings on a Ministry school site, regardless of the ownership of the buildings.
 - d. The calculation of separation distances using the ERM is only required to be applied to the 'imposed' risk or new building.
 - e. The Ministry policy under the ERM assumes a 1m notional boundary from the 'imposed' risk (new building) taking into consideration the components set out in paragraph 10 (b) above. Where there is more than one new building, separation distances and any requirement to apply a FRR system, will equally apply to any new buildings both in respect of each other, and in respect to any existing buildings.
 - f. Where the proposed separation distance is outside the 1m notional boundary, then a one-way FRR approach, from the inside of the new building is required. There is no requirement to apply the calculation to existing buildings in these circumstances.

- g. Fire protection between buildings may also be achieved by either fire rating the exposed external wall of the new building to the required level using a Ministry accepted fire rated system, or an external fire rated barrier, designed and constructed to an equivalent level of fire rating, to shield between the buildings.
- h. Separations distances should be calculated using the ERM if an existing building is internally sprinklered and the imposed building is not protected.
- i. Separation distances are not required to be calculated provided buildings are at least 1m apart and the following protections are proposed:
 - the imposed building(s) and the existing building(s) are both sprinklered internally; or
 - either of the existing or imposed building(s) is/are to be externally sprinklered; or
 - the critical incident face(s) of the external wall(s) of the imposed or existing building(s) are treated to an adequate fire protection level using an approved fire rated system; or
 - an external fire rated barrier designed and constructed to an adequate level of fire protection is in place between the critical incident faces of the opposing buildings.
- j. Where buildings or fire separations are less than 1m apart:
 - the structural stability design performance of primary building elements must meet clauses 3.6 and 3.7 of the BC and withstand burnout.
 - •no unprotected areas are permitted in a wall; and
 - Where penetrations are required, they should be less than 0.1m² and fire protected equal to or greater than the calculated FRR.
- k. Where an external wall is within 1m of the notional boundary, then a two-way fire rated approach is required.
- l. Where a two-way FRR is required, it shall be calculated using the 'burnout' formula as set out in C/VM2, Part 2: Paragraph 2.4.4.
- m. The Ministry acknowledges that instances may arise where the use of tabulated tables under C/AS4 or the Commentary for C/VM2 may yield more conservative outcomes than the previous mandatory 6m (single storey) and 10m (two storey) minimum separation distances policy. In such cases, consult your fire engineer, who may undertake the more detailed step by step approach using Verification Method C/VM2 or other permissible approaches outlined above. Where more conservative approaches are adopted, the Ministry would expect to see an evaluation of the value options considered.

- n. To meet the Ministry's requirements, an FRR of 60/60/60 may still be the outcome under the 'burnout' formula.
- o. In respect of building height calculation, the Ministry's approach, under the ERM, is the same as under the BC.
- p. The Ministry's definition of a fire cell adopts a 'one building envelope' principle. It is not acceptable to aggregate separate building envelopes and equate them as one fire cell.
- q. When using Appendix A: Tables A2.1-A3.2, interpolation of the percentage of unprotected area of a wall is not permitted.

Addendum to Fire and Safety Design Requirements for Schools (2008)

Amendments to the requirements for sprinklers, compartmentation, and fire alarm systems (June 2018)

Purpose

12. The Ministry of Education has made some changes to the *Fire and Safety Design Requirements for Schools (2008)* ('fire policy') document pertaining to the requirements for sprinklers, compartmentation, and fire alarm systems. This Addendum sets out those changes.
1. The Addendum should be read in conjunction with the fire policy (2008) document and where indicated, substitute the wording with that set out in this Addendum.

Scope

2. The changes relate primarily to the following sections of the fire policy (2008):
 - 2.2: Active fire alarm systems;
 - 2.4: Use of sprinklers;
 - 2.5: Choosing the correct alarm type;
 - 2.7: Use of smoke detectors;
 - 2.8: Fire and smoke separations for property protection: and
 - 2.9: Fire and smoke separation for Building Code requirements.

Background

3. The changes form part of a staged review of the Ministry's fire policy, which last underwent a full review in 2008.
4. In July 2017, changes to the fire policy were set out in an Addendum in respect of the calculation of separation distances between Ministry school buildings by adopting the Enclosing Rectangle Method (ERM), including removal of the minimum Fire Resistance Rating (FRR) of 60/60/60. The shift to the performance-based ERM replaced the previous approach of mandatory minimum separation distances.

The policy changes

5. Throughout the document

Replace NZFS with FENZ.

6. Section A, 2.2 Active fire alarm system

Remove the textbox.

Delete the text “or the Ministry's School Fire Alarm Specification (MOE SFA1)”

7. Section A, 2.4 Use of sprinklers, 1 Sprinklers in new schools

Replace the text with the following:

“A sprinkler protection system shall be provided in new buildings under any of the following circumstances:

1. The school has an existing sprinkler system where the capacity of the infrastructure can support such an extension.
2. Where a building has a gross floor area above 2,400m¹.
3. Where the building is multi-level with an escape height¹ being greater than 10m, regardless of the size and shape of the building.

Sprinklers are recommended in school buildings where the practice of having sleepovers in school is likely to be a key part of the school culture or curricula.”

9. Section A, 2.4 Use of sprinklers, 2 Sprinklers in existing schools

Replace the text with the following:

“A sprinkler protection system shall be provided in existing buildings under any of the following circumstances:

1. Where the completed building will have a total floor area greater than 2400m² after extension or substantial alteration to the building.
2. Where the alteration will increase the escape height of the building from under 10m to over 10m, regardless of the size and shape of the building.
3. The school has an existing sprinkler system that has sufficient capacity to support a substantial alteration or redevelopment of existing buildings.”

¹ Escape height is as per defined in the Building Code Handbook, which is the height between the floor level in the firecell being considered and the floor level of the required final exit which is the greatest vertical distance above or below that firecell.

10. Section A, 2.4 Use of sprinklers, 3 Sprinklers in special needs schools and special needs units

Replace the text with the following:

“When a special needs school or special needs unit is being built or substantially altered, a sprinkler system is to be installed to NZS 4541 ‘Automatic fire sprinkler systems’, unless all of the following requirements are met:

1. The unit is always situated on the ground floor of a building.
2. Any difference in height between ground floor and the level of final exit is less than 2m, and the exit route does not consist of steps or stairs.
3. More than one escape route is provided from the unit;
4. The open path travel distance direct to the outside is not greater than 20m.
5. Irrespective of other compartmentation requirements for the building, the unit forms its own fire cell with a two-way Fire Resistance Rating (FRR) of (60)/60/60.
6. The school can demonstrate compliance at all times with the Fire Safety and Evacuation of Buildings Regulations 2006, the 2008 amendments, FENZ Act 2017 and FENZ Evacuation Regulations in evacuating people with disabilities who require assistance to reach an external place of safety.”

11. Section A, 2.4 Use of sprinklers, 4 Sprinkler in residential units at schools

Remove the text in this section.

12. Section A, 2.4 Use of sprinklers, 6 Sprinkler system compliance

Replace all “Appendix D of Acceptable Solution C/AS1” to “Appendix B of Acceptable Solutions C/AS2-C/AS7”.

13. Section A, 2.5 Choosing the correct alarm type

Replace the text with the following:

“The selection of the fire alarm system shall be in compliance with the Building Code requirements, with the following additional requirements:

1. The minimum fire alarm system type shall be a Type 4 (i.e. an automatic fire alarm system activated by smoke detectors and manual call points). In areas that are prone to false alarms for smoke detectors, heat detectors can be used instead of smoke detectors, and a Type 3 system with supplementary smoke detectors is allowed. This fire alarm system requirement is not applicable to ancillary buildings and outbuildings-except boiler rooms, plant rooms, or buildings that are vital for the operation of the school.

2. In all new building or existing building being substantially altered or redeveloped which provide permanent sleeping accommodation, a minimum Type 5 fire alarm system shall be provided.
3. Direct FENZ connection is mandatory in all cases.
4. The fire alarm systems must be:
 - site wide integrated with a single point of access for monitoring and control;
 - analogue addressable;
 - of spare capacity to accommodate predicated growth (20% spare board capacity for expansion); and
 - integrated into a mimic alarm panel located at an appropriate place for ease of access by FENZ emergency response personnel upon arrival at site.”

14. Section A, 2.6 240 Volt Alarm Systems

Remove the text “or MOE SFA1”.

15. Section A, 2.7 Use of smoke detectors.

Remove the paragraph.

16. Section A, 2.8 Fire and smoke separations for property protection

Replace the text after the textbox with the following:

“Except where sprinklered, all buildings shall be sub-divided to create fire cells comprising a maximum of 800m² in area. However, there is relaxation of the requirement for assembly halls and gyms.

Unsprinklered assembly halls and gyms are allowed to have a maximum area greater than 800m² if fire separations will disrupt the intended use of the building. Adequate fire separations shall be provided to align with change in activity boundaries (such as between hall and administration) or where acoustic separations are to be installed.

The fire separations are to extend from floor slab to the underside of roofing or to the underside of any floor construction above.

Unless sprinkler protected, designated satellite or special needs units must form their own fire cell with two-way FRR of (60)/60/60 irrespective of other compartmentation within the building.”

17. Section A, 2.9 Fire and smoke separation for Building Code requirements

After the textbox replace the text with the following.

“Provide a smoke control door at the base of any stair leading up from ground to upper level to ensure smoke separation. Fit with magnetic hold open devices as above”

18. Section B, Q2 Are there extra requirements for special needs students?

Replace the text with the following.

“Special needs schools and units require specific consideration. Refer to Section A, paragraph 2.4 Paragraph 3 for specific advice in regard to the use of sprinklers”.

19. Section B, Q5 What about dormitories and wharehousi?

Replace the text with the following.

“Sprinklers are recommended in buildings containing dormitories and wharehousi.

In wharehousi with cooking facilities, an adequate hooded extract system should be provided in the cooking area to prevent false alarms.”

20. Section B, Q6 Should our buildings be sprinklered?

Replace the text with the following.

“Sprinklers are required in situations set out in paragraph 2.4 of Section A.”

21. Section B, Q12 How do we contact the FENZ in an emergency if the fire alarm is not automatically connected to them?

Replace the text with the following.

“It is required that all new fire alarm systems in the school buildings be automatically connected to FENZ. However, there will be existing buildings that do not have direct connection to FENZ.

The staff, students, and security personnel shall be aware that it is necessary to immediately telephone FENZ on 111 if an alarm operates. Access to a telephone must be available at all times to enable a 111 call to be made. This telephone should not be in a locked office.”

Acknowledgements

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¹ Escape height is as per defined in the Building Code Handbook, which is the height between the floor level in the fire cell being considered and the floor level of the required final exit which is the greatest vertical distance above or below that fire cell.

Section A: Building design and evacuation

1. Introduction

The Ministry of Education, working with the New Zealand Fire Service (NZFS), has developed these ***Fire Safety and Design Requirements for Schools***.

1.1 Purpose of these Requirements

The purpose of this document is to provide boards of trustees (boards) with information on fire protection for schools. It informs about the mandatory requirements and also provides best practice guidance on design requirements for boards and also for architects and professional engineers employed by the board to design new buildings or do alterations. In Section C there is a link to the Ministry's standard specifications for fire alarms. There is also information about evacuation schemes. Some of the material in this document is of a technical nature. In addition, there are legal requirements of which most consultants with experience in building projects on school sites should be familiar. While you should be able to rely on the expertise of specialised consultants to interpret the more technical aspects of fire safety design into a building project, someone on your board should take the time to become familiar with the broad requirements outlined. To help you apply the legal requirements and the specifications, you will find **Section B: Frequently asked questions**, very useful.

1.2 An introduction to the legal requirements

The legislation relevant to fire safety is:

- Building Act 2004
- New Zealand Building Code
- Fire Service Act 1975
- Fire Safety and Evacuation of Buildings Regulations 2006.

The *Building Act 2004* and the *New Zealand Building Code* (the '*Building Code*') provide for ***building design*** whether it is for a new building or an alteration.

The *Building Code*'s Acceptable Solution C/AS1 has been drawn on in this document. However, *Acceptable Solutions* are not the only way of meeting the requirements of the *Building Code*. You should be aware of ***all*** the relevant legal requirements. To help you with this a full description of the legal requirements arising from the Acts and Regulations is set out in Section D.

The Fire Service Act 1975 and the Fire Safety and Evacuation of Buildings Regulations 2006 establish **requirements for evacuation**.

New Zealand Standards sit under the Acts and Regulations. They provide specifications for products, processes, services, or performance and although they are not generally mandatory, they provide detailed means of achieving a performance requirement, in this case, fire safe buildings. Therefore the Standards referred to in this document are mandatory if indicated as being so.

1.3 Responsibilities of boards of trustees

You are required to promote fire safety as a part of your management responsibilities of the school. The occurrence of fire, particularly arson, is a traumatic event in the life of a school as well as being costly and time consuming for those involved. You should approach fire safety on the basis of **managing the risks** by developing good fire safety practices, which are incorporated into the everyday management of your school. You will be able to achieve this by complying with at least the minimum requirements of:

- the relevant legislation
- the Ministry's building protection measures as set out in these is document, and
- evacuation arrangements for your school.

By complying with these measures, your school will continue to be a safe place for staff and students. To further help you with this the NZFS website gives information on enhancing fire safety in schools, best advice on arson prevention, best practice in relation to evacuation and reference to expert advice and contacts (www.fire.org.nz).

1.4 Understanding the rationale behind management of fire safety

Why is it so important to have good fire protection and evacuation management at schools?

1. The most obvious reason is for the protection of people using school buildings. As managers of school property, you have an obligation to meet the legal requirements of the *Building Act 2004* and the *Fire Safety and Evacuation of Buildings Regulations 2006* to **protect people**, including NZFS personnel.
2. In addition, it is recognised that schools are special places because of the high numbers of young people using them. This is why additional **property protection** guidelines have been provided, to help protect the high capital investment in schools and reduce the risk of loss through arson.

1.5 A further note about achieving compliance

It should be noted that the main purpose of the *Building Act 2004* and the *Building Code*, in relation to fire protection, is to provide a safe environment for people using the buildings and to protect **other** people's property. There is no provision in the *Building Act 2004* or the *Building Code* requiring property owners to protect their **own** property. This is not an omission in the Act. Parliament has deemed it the building owner's decision as to what measures they should take to protect their own property. Given the importance and nature of school buildings, additional fire protection measures have been adopted by the Ministry to protect crown property, ie. school buildings, from fire. These additional measures are included as **requirements** in this document. Note that Acceptable Solution C/AS1 provides only one way of complying with the *Building Code* and is not mandatory. Presentation of an alternative solution to your local Building Consent Authority (BCA) - usually the local city or district council, may require the assistance of a qualified fire engineer. In conclusion, by complying with the requirements in this document, compliance with the *Building Act 2004* and the *Building Code* will normally be achieved. Compliance with the *Fire Safety and Evacuation of Buildings Regulations 2006*

2. New building and building alterations requirements

2.1 Preparation of 'briefs' for building projects

For any new school building project, or alteration of an existing school building, you should have a comprehensive **brief** on fire issues prepared before the design and construction stage. The recommendations in this document should form part of the brief, along with the specific design requirements of the particular project. Satisfying the requirements of the *Building Code* will satisfy the provisions of the *Fire Safety and Evacuation Regulations 2006* (as they relate to any warning devices required for procedures developed under the Regulations).

In preparation of the brief, you should consider the following:

- You should make contact with the NZFS at an early design stage. Note however that only the BCA has the authority to approve building design by issuing a building consent. The NZFS is able to provide advice to the BCA but is unable to require any action that is more stringent than that set out in the *Building Code*.
- Refer Q1, **Section B: Frequently asked questions** for a check list of information to be obtained, considered or discussed with design professionals in preparing a design brief, including topics for discussion with the NZFS.
- This document does not cover the requirements of the *Hazardous Substances and New Organisms Act 1996* in respect of dangerous goods stores; use of flammable gases; fume cupboard design and specification etc. in science laboratories. Nor does it cover occupational safety and health. Refer to the Ministry's website for advice on these topics (www.minedu.govt.nz).
- Any school facility used for sleeping must be equipped with an automatic fire alarm system with smoke detectors and manual call points. Any building which does not have such a system fitted **must not** be used for sleeping (classrooms and assembly halls without such a system must not be used for overnight use).

The following paragraphs, 2.2 to 2.11 include all the fire design features you should consider in your brief.

2.2 Active fire alarm systems

Manual call points and evacuation alarms are to be fitted in all schools where staff and pupils total 100 or more.

The sound pattern of the alarm should ideally, but not necessarily, be the same throughout the school (but should be consistent throughout any particular building). The sound pattern and alarm system will normally be in accordance with the fire alarm standard NZS 4512 'Fire Detection and Alarm Systems in Buildings', or the Ministry's **School Fire Alarm Specification** (MOE SFA1, which you can access in Section C). However, it should be noted that in certain schools other types of alarm systems have been used as Alternative Solutions to the *Building Code*, including the continuous ringing of the classroom change bells. Such Alternative Solutions will continue to be acceptable subject to approval by the BCA. Fire alarms in schools should:

1. Provide a recognisable evacuation signal throughout the whole school.
2. Be linked to a fixed fire detection system where available.
3. Have an evacuation signal that can be heard throughout the whole school (or, in the case of large schools, in parts of the school as agreed after discussion with the NZFS). Note that in any technology workroom where students may be wearing hearing protection there should also be visual signals to alert those students.
4. Result in total evacuation of the school, unless otherwise agreed with the NZFS.

New fire alarm systems may also incorporate class-change facilities and/or public address functions without compromising their compliance with NZS 4512.

It is recommended that you have a portable loudhailer available so that you can communicate with people evacuated outside buildings at the designated assembly points and in the event of power failure.

2.3 Types of alarm

There are typically four ways of detecting fire and sounding the alarm.

1. The simplest is by people smelling, hearing or seeing smoke or fire and giving warning by breaking the glass and operating the switch of a manual call point that is part of a manual alarm system.
2. **Sprinkler systems** in New Zealand are generally extremely reliable, with the first sprinkler typically operating about three to four minutes after the onset of flames. Sprinklers act individually as they reach about 68°C. They do not all activate at once. A single sprinkler is

usually all that is needed to put out a fire in the case of about three quarters of all sprinkler-suppressed fires.

3. **Heat detectors** are simple and generally reliable. They will be set off when the detector senses a preset temperature. NZS 4512 does not specify what that temperature should be but it does note that the detector should be set to activate at a point which is at least 15°C above the ambient temperature of the room it is fitted in. Therefore, a 57°C detector located in a classroom could possibly be sufficient but one located in a roof space would probably have to be of a higher rating, possibly 77°C. Typically, a heat detector will take between two and a half and three and a half minutes to activate after the fire starts depending on the severity and nature of the fire.
4. **Smoke detectors** will operate generally within 60 seconds of the fire starting and may activate before this, during the smouldering phase of a fire. However, they can require more maintenance than heat detectors, are subject to more frequent replacement due to breakdown or malfunction, and, if poorly selected or located, can create a higher incidence of false alarms than other detection systems. Various types of smoke detectors exist for detection of smoke either at a particular point or, by using a light or laser beam which can detect smoke when it obscures the beam.

2.4 Use of sprinklers

The installation of sprinkler systems to minimise property damage in the event of fire is required in some school buildings and encouraged in all others. Sprinklers systems can be a cost effective choice as they may reduce the need for other fire protection measures in some circumstances.

1. Sprinklers in new schools

- Fire protection sprinklers are required in all new schools.

2. Sprinklers in existing schools

- Fire protection sprinklers are required in:
 - any building extension where the completed building will have a total floor area of greater than 1000 square metres²
 - any extension to a school where the rest of a school is already sprinklered.

² The cost of installing sprinklers into a small extension, eg 10 sqm, may not be justified. In these situations the extended areas must be subject to a separate fire cell.

Note: Where a relocatable is brought onto the site to handle roll growth, it may not be practicable to add pipework for sprinklers to the relocatable building. This may be because of the following reasons:

- cost,
- the building may be removed at a later date, and
- the pipework may not be compatible with the system at the next school.

You should discuss this with your local Ministry office if you find your school in this situation.

3. Sprinklers in special needs schools and special needs units

When a special needs school or special needs unit is being built or substantially altered, a sprinkler system is to be installed to NZS 4541:2007 'Automatic fire sprinkler systems'.

The Building Code states that automatic fire suppression systems (sprinklers) shall be installed where people would otherwise be unlikely to reach a safe place due to disability and must comply with the *Building Code*. Compliance with the *Building Code* is provided by NZS 4541. The decision as to whether a building will be 'substantially altered' is one for the board. As a guide, installation of a new window may not be considered 'substantially altered' while an extension of floor space or major internal reorganisation may be considered 'substantially altered'. The Ministry believes that special needs schools and units should be protected by sprinkler systems.

The decision whether or not to call a building project a 'substantial alteration' should be seen as an opportunity to install sprinklers rather than an excuse not to install sprinklers in a special needs school or unit.

4. Sprinklers in residential units at schools

If a residential unit is being built or substantially altered, it is a requirement that the *Building Code* and NZS 4515:2003 'Fire sprinkler systems for residential occupancies' or NZS 4541 be followed in relation to sprinkler systems.

5. Sprinkler design against arson

NZS 4541 is written to allow reasonable levels of reliability for most fire situations. It does not include protection against exterior arson attack. To provide for this the sprinkler design brief should be extended to consider providing protection under canopies, verandas and accessible areas under wooden floors. Similarly, allowance for potential multiple fire starts or use of accelerants should be considered.

6. Sprinkler system compliance

New sprinkler systems or systems that are substantially altered are to comply with NZS 4541 as modified by Appendix D of Acceptable Solution C/AS1.

NZS 4541 includes the provision of hand-held fire fighting equipment (hose reels and/or extinguishers) and the use of external sprinklers where there are buildings without sprinklers, or other significant fire loads, within 10 metres of the building fitted with a sprinkler system.

NZS 4541 was written partially with property protection in mind. The *Building Code* has the stated objectives of life safety and protection of neighbouring property only. The *Building Code* specifically states that compliance with the *Building Code* does not require some clauses of NZS 4541 to be complied with, and lists those clauses in Appendix D of Acceptable Solution C/AS1. This is known as 'Appendix D compliance' and is acceptable for school sprinkler installations.

7. Fire Extinguishers and Fire Hose reels

Under NZ Building Code Acceptable Solutions C/AS1 it is not necessary to provide either fire hose reels or fire extinguishers. However, fire extinguishers may be a requirement of the sprinkler standard NZS 4541 or the Fire Safety and Evacuation of Buildings Regulations 2006 in some situations. The voluntary provision of multi-purpose dry powder extinguishers (for combined fire classes A, B and E), especially in technology classrooms or science laboratories is recommended. Fume cupboards may be fitted with a single manually operated sprinkler (this will require specific design covering alarm interaction, control, locking and electrical safety). The provision of fire fighting equipment should be discussed with the NZFS. Note that such equipment should only be used when it is safe to do so.

2.5 Choosing the correct alarm type

In choosing the appropriate alarm type for a particular school, any likely future growth should be taken into account so that the likelihood of having to upgrade an alarm system in the future is minimised. The occupancy numbers given below are derived from the Acceptable Solution C/AS1 and so if there is a reasonable possibility that the building or school occupancy could grow past these figures in the future then serious consideration should be given to installing the alarm type to suit the higher numbers. Upgrading an alarm in the future is most probably going to be more expensive than carrying out the work now.

Also, when a new system is installed it is recommended that any other existing, stand-alone alarm systems are integrated into one system for the school. This will allow an overall

evacuation policy to be included and also minimise on-going monitoring costs where alarms are monitored by the NZFS.

1. For any building with sprinklers, also provide a manual fire alarm system throughout the complex, incorporating manual call points to NZS 4512 specification. Buildings with sprinkler systems are required to have a connection to the NZFS. Buildings containing sleeping accommodation may also require smoke detection subject to discussion with and the agreement of the local NZFS and/or BCA where appropriate.
2. For unsprinklered classroom blocks of up to 250 occupants (about 7 classrooms) and no more than two floors, provide a manual fire alarm system throughout the complex, incorporating manual call points to NZS 4512 specification or alternatively a Ministry approved alarm specification MOE SFA1. Note that a direct connection to the NZFS is not normally required provided that there is a telephone freely available at all times for 111 calls.
3. For unsprinklered classroom blocks of between 250 and 500 occupants (about 8 to 14 classrooms) and no more than two floors, provide an automatic fire alarm system with heat detectors and manual call points to NZS 4512 specification or alternatively Ministry-approved alarm specification MOE SFA1. Note that a direct connection to the NZFS is not normally required provided that there is a telephone freely available at all times for 111 calls.
4. For unsprinklered classroom blocks of over 500 occupants (about 14 classrooms) and no more than two floors, provide an automatic fire alarm system with smoke detectors and manual call points to NZS 4512 specification or alternatively Ministry-approved alarm specification MOE SFA1. Note that a direct connection to the NZFS is subject to discussion with and the agreement of the local NZFS and/or BCA where appropriate.
5. For unsprinklered buildings containing assembly halls holding up to 250 people provide a manual fire alarm system incorporating manual call points to NZS 4512 or MOE SFA1 specification. Note that a direct connection to the NZFS is not normally required provided that a telephone is freely available at all times for 111 calls.
6. For unsprinklered buildings containing assembly halls holding between 251 and 500 people provided an automatic fire alarm system with heat detectors and manual call points to NZS 4512 or MOE SFA1 specification. Note that a direct connection to the NZFS is not normally required provided that a telephone is freely available at all times for 111 calls.
7. For unsprinklered buildings containing assembly halls holding between 501 and 1000 people provide an automatic fire alarm system with smoke detectors and manual call points to NZS 4512 or MOE SFA1 specification. Note that a direct connection to the

NZFS is subject to discussion with and the agreement of the local NZFS and/or BCA where appropriate.

8. Buildings containing assembly halls holding over 1000 people must be designed specifically. The Acceptable Solutions to the Building Code suggest sprinklers for occupancies over 1000, but a specific design using smoke detectors alone will often be sufficient to protect life. Note also that buildings of this size are subject to the ministry's property protection policy, which requires sprinklers for buildings over 1000 square metres. Sprinkler systems will always be directly connected to the NZFS.
9. Classroom blocks more than two storeys high require specific design to meet Building Code compliance.
10. Buildings used for sleeping (dormitories, wharehau and, sometimes, school halls and classrooms) are to be covered by design specific for this type of use but will require an automatic smoke detection system with manual call points throughout the building. Note that a direct connection to the NZFS is subject to discussion with and the agreement of the local NZFS and/or BCA where appropriate. Note also that classrooms or other areas without smoke detectors must not be used for casual overnight use for events like the World Vision Forty Hour Famine.

Dividing a building into several fire cells by the use of fire-rated walls and doors may allow the use of lower alarm systems.

For example, a classroom block that houses over 250 people would require a heat detection system (refer 3, above), but if it were subdivided into firecells where each has less than 250 people, only a manual system is required. Where a building falls into more than one category (eg. a classroom block attached to an assembly hall), and it is not subdivided by fire-rated separations, the total building population should be used to determine the appropriate alarm type. In some limited circumstances and with the agreement of the NZFS classroom change bells may be used as alarm sounders under certain conditions as provided in MOE SFA1.

2.6 240 Volt Alarm Systems

The use of 240 volt fire alarm systems is being phased out and these are being replaced by low voltage systems that comply with NZS 4512 or MOE SFA1. The appropriate system is to be selected as in paragraph 2.5, above.

2.7 Use of smoke detectors

The use of smoke detectors is discussed in Section C. It should be noted that there are only three reasons for installing smoke detectors.

1. Where people are sleeping, to awaken and warn them.
2. Crowd use where earlier warning may be required to give extra time for escape.
3. Property protection, where earlier warning will enable more rapid action by occupants or the NZFS to suppress the fire. Note that if smoke detectors are expected to provide any property protection, then they should be connected to the NZFS directly (bearing in mind the potential for false alarms as discussed below).
Alternatively, if the output from the smoke detection system is transmitted to the security system then the security company must be instructed to call the NZFS immediately on alarm notification outside school hours.

Refer Q7 **Section B: Frequently asked questions** for further detail.

Where smoke detectors are chosen for property protection reasons in a particular location, spot detection (see NZS 4512, paragraph 401.6) or local beam type may be useful. Smoke detectors must always be part of the fire alarm system, with output then going to the security system if desired, rather than smoke detection directly providing input to the security system. This avoids confusion between the optional security system and the statutory fire alarm system.

Smoke detectors must always be on the fire alarm circuit, but output may be taken to alert the security system that a smoke detector has activated. The fire alarm system must always be the lead system ie. output may be taken from the fire alarm system to alert the security system, but not vice versa.

2.8 Fire and smoke separations for property protection

The section has been updated. Refer to the Addendum - Adoption of the Enclosing Rectangle Method (ERM) for the calculation of separation distances between buildings on a Ministry school site (July 2017) incorporated at the beginning of this document or available from <https://www.schoolproperty.govt.nz/day-to-day-management/fire-safety-for-schools>

Refer to **Q20 Section B Frequently Asked Questions** for an explanation of ‘fire cells’ and ‘fire resistance rating’. Where a single storey building is sprinklered, and within the maximum Ministry specified fire cell area, no fire resistance rating between corridors and classrooms is needed.

1. Buildings with two or more storeys will require specific fire compartment design in accordance with the *Building Code* (see 2.9 below). However, significant design advantages will be gained by the incorporation of sprinkler systems.
2. (a) Except where sprinklered, all teaching blocks shall be sub-divided ~~by one hour fire resistance rated partitions (60/60/60 or -/60/60 as appropriate)~~ to create fire cells comprising a maximum of three classrooms plus associated corridor space. This will generally result in a maximum fire cell size of about 270sqm in area, with fire separations at intervals generally not exceeding 20m. The fire separations are to extend from floor slab to the underside of roofing (refer Acceptable Solution C/AS1 Fig. 6.4), or to the underside of any floor construction above. Refer below for fire resistance ratings for upper floors.
(b) Technically, to complete the separation, fire doors to -/60/30Sm (one hour fire door with smoke seals, noting that insulation rating for doors need never exceed 30 minutes) should be placed in corridors on the line of the fire separation described above. However, where construction is such that a fire resistance rating of 30/30/30 will be created between corridors and classrooms (with minimum -/30/30Sm doors into classrooms), it is permissible for such fire doors in corridors to be at 40m maximum centres, in the line of a fire separation.
(c) Note that artwork, furniture and equipment (fire load) in corridors must be kept to a minimum for this concession to apply. Standard metal lockers are acceptable.
3. ~~Where teaching blocks abut other specialised buildings, such as administration and office facilities, then similar design rules as above will apply with generally minimum 60/60/60 with -/60/30Sm closures to ensure protection of school property.~~
4. ~~Stand alone gymnasium and assembly hall buildings need not be subdivided except to provide minimum 60/60/60 separation, with fire doors to -/60/30Sm between two adjacent assembly and/or gymnasium spaces, or where they abut teaching or administration blocks.~~
5. ~~Where both buildings (or fire compartments) are of single storey construction, separation between buildings shall be not less than 6m. Where either (or both) of the buildings is two storied then building separation shall be 10m. Separation is to be measured from the maximum point of eaves overhang. Where sprinklers are installed in opposing buildings or at least one of the facing external walls is fire rated these separation distances need not apply.~~

2.9 Fire and smoke separation for *Building Code* requirements

The section has been updated. Refer to the Addendum - Adoption of the Enclosing Rectangle Method (ERM) for the calculation of separation distances between buildings on a Ministry school site (July 2017) incorporated at the beginning of this document or available from <https://www.schoolproperty.govt.nz/day-to-day-management/fire-safety-for-schools>

Part of this section has been updated. Refer to the Addendum - Adoption of the Enclosing Rectangle Method (ERM) for the calculation of separation distances between buildings on a Ministry school site (July 2017) incorporated at the beginning of this document or available here.

To meet *Building Code* requirements:

- Provide a minimum fire resistance in accordance with C/AS4 Amendment 4 Property Protection rating. ~~rating of 60/60/60 to support upper floors (up to three floors) of multi-storey classroom blocks.~~
- ~~• No fire resistance rating is required for exterior walls of school buildings where two storied buildings are more than 10m from the relevant boundary, or single level buildings are more than 6m from the relevant boundary of other property (excluding roads, railway property and public spaces), subject to specific design.~~
- Provide smoke control in corridors at maximum 40m centres using smoke control doors to -/-Sm i.e. no fire rating required, but must be smoke sealed. All such doors should be fitted with magnetic hold open devices to release on local smoke detection. This will normally be over-ridden by the more specific property protection measures as above for -/60/30Sm fire doors. The magnetic hold-open devices must be retained.
- Provide a smoke control door at the base of any stair leading up from ground to upper level to ensure smoke separation. Fit with magnetic hold open devices as above.
- Effectiveness of fire and smoke separations including smoke stop doors and magnetic hold open devices should be checked annually, or more frequently if building work or sub-trade work has been done.
- Note: Post-fire Structural Stability requirements are required to be designed by a Chartered Professional Structural Engineer and meet to NZBC C1 - C6 Protection from Fire, C/VM2, and B1/VM1. ~~Support may be provided either by self-cantilevering of walls, by support using non-fire resistance rated structure in any fire cell not~~

experiencing the fire, or by other fire resistance rated structure within the fire cell experiencing the fire. To be checked by a chartered professional engineer (structural).

2.10 Means of escape

- Doorways on escape routes:
 - For rooms with up to 20 occupants provide a minimum of one 810mm width inward or outward opening door.
 - For rooms with more than 20 occupants (other than as specified below), doorways must open outwards.
- For rooms with a high stud height, such as classrooms or staff rooms, there are specific design concessions that have been established as an Alternative Solution. These concessions are as a result of specific design on the basis of factors such as limited fire load and good ventilation, together with extra stud height giving additional smoke reservoir capacity, as follows:
 - For classrooms or staff rooms with a ceiling height of a minimum of 3m and a floor area of up to 100m² (design occupancy of approximately between 20 and 50 persons), provide a minimum of one 810mm width outward opening door or two 810mm width inward opening doors.
 - For classrooms or staff rooms with a ceiling height of a minimum of 3m and a floor area of between 100m² and up to 220m² (design occupancy of approximately between 51 and 110 persons), provide a minimum of two 810mm outward opening doors and/or undertake either Acceptable Solution assessment or specific design.
- Escape route lengths and widths should comply with Tables 3.2 and 3.3 of Acceptable Solution C/AS1. Note the particular importance of maintaining escape route widths from assembly halls and gymnasiums, generally at 7mm per person after discounting the widest door in the case of an unsprinklered building, except where a specific Alternative Solution design has been undertaken. This applies particularly during theatrical performances or sports events in the course of which temporary rearrangement of furniture or seating must not reduce escape capacity.
- Corridors immediately outside classrooms must provide a choice of direction for escape to a final exit unless classrooms themselves have a direct second escape route to the exterior of the building or a specific alternative design is developed. Provide smoke control doors in corridors as above.
- Stairways in multi-storey blocks (up to three floors) are to be constructed as safe paths with perimeter rated 60/60/60, and with closures at entry points rated - /60/30Sm. Doorways at the base of such stairs must always lead directly to the

exterior of the building unless specific design of the escape route is undertaken or a safe path with perimeter rated 60/60/60 runs from the base of the stair to the final exit.

- It is important that a single escape route from a classroom should be '*free of obstruction in the direction of escape*' under clause C2.3.3(b) of the *Building Code*. Where there is a possibility that escape will be difficult, for example due to the presence of stock in a chemical store room, then consider providing a second way out or providing specific design.
- In new buildings, balconies in assembly halls should not extend over more than 20% of the ground floor area and should not contain more than 100 people. Two escape routes must be provided, or if only a single escape route is available, limit balcony occupancy to 50 people.
- Doors and door hardware are to comply with Acceptable Solution C/AS1:3.17. In particular, locking devices are to be clearly visible and designed for keyless opening to allow the door to open from the inside in the normal manner. An electro-mechanical type must automatically switch to unlocked fail-safe condition in the event of alarm activation or power failure caused by fire, or use a fail-safe break glass button release.
- Provide signs to exits as required by Acceptable Solution F8/AS1 'Signs', throughout buildings.
- Emergency lighting is to be installed in egress routes and stairways in all new and re-furnished buildings as well as in gymnasias and assembly halls to comply with Acceptable Solution F6/AS1.

Note that in designing assembly halls or gymnasias, the implications of NZS 9232 'Model Bylaw for Precautions against Fire and Panic in Cinemas, Theatres and Places of Assembly' may need to be considered. This is not part of the *Building Code*. Recent research on human behaviour in fire shows that panic is unusual where there is a programme of regular education and trial evacuations.

2.11 Surface finishes and spread of fire

To ensure that the building occupants are not endangered by fast spreading fires due to combustible surfaces in buildings, both the speed of flame spread and the amount of smoke generated from burning surfaces must be controlled as required by the *Building Code*. You can achieve this by specifying a **spread of flame index** (SFI) and a **smoke developed index** (SDI), both of which are established by laboratory tests.

Note that for sprinklered buildings, the relevant restrictions below apply only to ceilings, and not to walls and floors, unless the construction uses foamed plastic panels.

- Walls and ceilings of exit ways:

- SFI to be zero
- SDI to be not greater than 3.
- Walls and ceilings of passageways, corridors and stairways not being part of an exit way:
 - SFI to be not greater than 7
 - SDI to be not greater than 5.
- Walls and ceilings of classrooms and assembly halls:
 - SFI to be not greater than 2
 - SDI to be not greater than 5 (but refer to the concession below for certain cases).
- Walls and ceilings generally (but refer to the concession below for certain cases):
 - Either SFI to be not greater than 5 and SDI to be not greater than 10, **or**
 - SFI to be not greater than 9 and SDI to be not greater than 8.
- **Concession** for walls and ceilings of fire cells with less than 250 occupants where the fire cell is at ground level and is served by at least two exit ways or final exits:
 - For surfaces 1.2m or more above floor level: SFI to be not greater than 7 and SDI not greater than 5.
 - For surfaces less than 1.2m above floor level: SFI to be not greater than 8 and SDI not greater than 6.
- Flooring:
 - No requirement except in corridors and stairways where the flooring should be non-combustible or have a low radius of effects of ignition. The test for this is known as the ‘hot nut test’, found in British Standard BS 4790.
- Suspended flexible fabrics:
 - All suspended flexible fabrics are to have a **flammability index** (FI) not exceeding 12. Note this is particularly important for curtains and for assembly hall productions involving stage scenes with hung scenery or curtains as part of scene setting.
- Exterior surface finish control is generally not required but exterior surface finishes within 1.0m of a relevant boundary should be limited to a peak heat release rate of 100kW/m² except for finishes less than 1.0mm thick applied directly to non-combustible substrate. Note that certain restrictions may also apply for buildings higher than two storeys.
- Translucent plastic sheeting used for roofing and walls is a flammable material and its use is restricted. Refer to the Ministry’s *Design Standard Guidelines* on the Ministry’s website (Section 6 of the Property Management Handbook).

- Avoid the use of foamed plastic building materials such as polyurethanes and polystyrene, unless they meet with Acceptable Solution C/AS1:6.20.11 – 6.20.13 inclusive.
- Any penetrations through fire separation walls and floors (for example, holes for plumbing and electrical services) should be sealed with fire stopping compound.

2.12 Firefighting

In the event of a fire, the first concern of occupants is to get out safely. However, in some instances being able to handle a small fire quickly, if it is safe to do so, can prevent a major conflagration and subsequent danger to occupants. In all other cases, the following firefighting requirements apply.

- When upgrading or planning new buildings ensure access for NZFS vehicles. Where this is not possible, alternative arrangements are to be agreed with the NZFS.
- NZFS vehicle standing areas are to be provided at no more than 18m from any part of the building to be protected. This distance may be increased to 75m where the building is sprinklered.
- Design details for fire engine access should be discussed with the NZFS especially with regard to axle loads on pavements, pavement width and the shape of vehicle standing areas.
- The maximum hose run to the most distant point of buildings from the vehicle access position should not be more than 75m. This may be increased to 150m when the building to be protected is sprinklered.
- The NZFS may require the provision of hydrants within the school grounds. Water pressure and flow for such hydrants must comply with SNZ PAS 4509:2003 'New Zealand Fire Service Fire Fighting Water Supplies Code of Practice'. Agreement has been reached with the NZFS that hydrants will not be required within school grounds where all buildings to be protected are sprinklered.
- Near the fire alarm control panel, which in turn should be near the point where a fire engine would enter the school grounds, provide a map or plan of the school on a suitably durable material showing classroom locations, classroom numbers and NZFS access routes (where necessary taking into account axle loads as above). Note that this map may be extended to provide guidance for other school users provided that the details for NZFS access are also present and able to be read from the driver's door of the fire engine. Discuss this with the NZFS.
- There is no requirement to provide fire hose reels. Note however that the NZFS may require provision of portable **multi-purpose dry-powder fire extinguishers** (for

combined fire classes A, B and E) under regulation 10 of the *Fire Safety and Evacuation Regulations 2006*. A policy document for the provision of extinguishers is under development with the NZFS. Discuss the provision of appropriate portable fire extinguishers, including training in their use, with the NZFS.

3. Evacuation schemes

3.1 Development of evacuation schemes

All schools must have an evacuation **procedure**. Schools of 100 students or more, or with more than 10 staff, or where there is sleeping provision such as in special schools or where the school hall will accommodate more than 100 persons, require an evacuation **scheme** approved by the NZFS. An evacuation ‘procedure’ is a less formal process than an evacuation ‘scheme’.

The approval of draft **evacuation schemes** is done by the National Commander of the NZFS (regulation 13 of the *Fire Safety and Evacuation Regulations 2006*). Boards have the responsibility for the development of the scheme and the NZFS will assist you in this process. To develop and receive approval for an evacuation scheme, make contact with the local Fire Service Safety Officer (FSO) who can help you with the development, staff training and operation of the actual evacuation procedures. The NZFS can provide you with a fire safety manual to help you plan your own scheme. An evacuation scheme template is available on the NZFS website (www3.fire.org.nz).

The contents of a draft evacuation scheme, as set out in regulation 14(2) of the *Fire Safety and Evacuation Regulations 2006*, should include:

1. Procedures for safe, expeditious and efficient evacuation.
2. Appointment and training of wardens.
3. Management of escape routes.
4. Special provision for avoidance of panic.
5. Identification of wardens.
6. Display of notices explaining procedures.
7. Holding of trial evacuations.
8. Assembly points and evacuation points.
9. Special provision for evacuation of people with disabilities.

10. Proposed evacuation points and time to be taken to evacuate to, between and from those points to a predetermined assembly point or assembly points.
11. Training of staff of institutions of care.
12. Special provision for the evacuation of persons in lawful detention.

3.2 Evacuation scheme implementation

When advising on an evacuation scheme, comment may be made by the FSO on the active systems at the school such as smoke or heat detectors, manual alarms or emergency lighting. You can be confident that you will achieve the ‘protection of people’ requirements of the *Building Code* if you meet the recommendations in this document. And by complying with the design solutions in this Section, you should normally be able to ensure compliance with the requirements of the *Fire Safety and Evacuation Regulations 2006*.

Any request by the NZFS for an upgrade in active or passive systems should be referred to the Ministry’s ‘Warrant of Fitness’ contractor (currently Argest Technical Services Ltd) for comment.

3.3 Comment on evacuation scheme requirements

Evacuation schemes are generally a matter of preparation and practice. They require significant research and development and must take into account the specific layout and activities in each school. Training, awareness and frequent practice are essential components of each scheme. They also require regular review and update.

As mentioned earlier, schools are responsible for developing and implementing evacuation schemes. You need to take care that your scheme meets the requirements of regulation 14(2)(a) of the *Fire Safety and Evacuation of Buildings Regulations 2006* (procedures for safe, expeditious and efficient evacuation). Procedures should not require warning devices in excess of those required by the *Building Code*. Section C covers alarm function and design.

3.4 Fire evacuation drills

You are legally required to carry out fire evacuation drills in accordance with the school’s approved evacuation scheme.

4. Conclusion

4.1 Developing good practices

Schools are **not** inherently dangerous places in terms of life safety and fire. There has not been a single fatality recorded in a school fire during school hours, as far as can be established, in the whole history of fire record-keeping in New Zealand. However, when a fire does happen, it is a traumatic event in the life of a school, particularly when it is the result of arson, as well as being costly and time consuming for those involved.

Schools are encouraged to adopt a fire safe approach to the management of their school and to develop emergency management plans to cover the event of fire or other emergency. Following the measures outlined in this document and preparing an evacuation scheme approved by the NZFS will ensure that your school will continue to be a safe place for staff and students.

Remember that good housekeeping is critical in preventing arson. You can discourage arsonists by keeping material from rubbish bins or other potential fuel sources well away from school buildings.

4.2 Next sections

There are three further sections to this document:

1. Section B: 'Frequently asked questions' which covers some of the material already discussed in section A but goes into more detail in some cases.
2. Section C: 'Fire alarms' which discusses the various alarm systems and links you to the Ministry's School Fire Alarm Specification: MOE SFA1.
3. Section D: 'Legal background and requirements' which goes into a lot more detail about what is in the legislation

Section B: Frequently asked questions

Q1 What factors should be taken into account when briefing design professionals (architects and professional engineers)?

- Building use:
 - Intended usage
 - Number of occupants
 - Types of occupants – adults, children, disabled
 - Sleeping use – sleepover/permanent accommodation
 - After hours use (night/weekend/holiday), school or public
 - Hazardous substance storage or use (laboratories, technology rooms)
- Building design:
 - Is this joined to another building?
 - Is there a pedestrian link to other buildings?
 - Are lifts or other disabled access systems required?
 - Vehicle access and parking
 - Location of the building relative to site boundaries and other buildings
- Building services:
 - Heating and ventilation systems
 - Type and location of plant such as generators and boilers
 - Utilities or services required such as power, gas, water, phone, local area computer network
 - Intercom system and linking to existing system
- Fire services:
 - NZFS vehicle (heavy truck) access/axle loading
 - Fire fighting water supplies (reticulated or static)
 - Hand-held firefighting appliances
 - Interfacing to existing fire alarm system
 - Fire alarm or sprinkler requirements (covered in this document)
 - Evacuation scheme requirements (covered in this document)

Q2 Are there extra requirements for special needs students?

Special needs schools and units require specific fire design. Refer to Section A, paragraph 2.4 for specific advice in regard to the use of sprinklers.

When considering the fire design for special needs students, the following questions may be useful:

1. Check ability to perceive (hear the alarm, and see, hear or smell fire).
2. Check ability to understand (cognition, recognition of fire danger or meaning of an alarm).
3. Check decision-making capability (choice of direction, helping others attempting to put out fire if safe).
4. Check mobility (ability to escape from the fire rapidly and effectively).

Supervisors need to be aware of the students' disabilities when creating the evacuation procedures. There may be a requirement, for example, that when the alarm sounds, additional staff move to the special needs centres to help with the evacuation. Discuss with the NZFS.

Q3 How can we prevent arson?

The NZFS web site will provide advice on this (www3.fire.org.nz). Good housekeeping will assist. Ensure that rubbish skips and litter bins are kept well away from buildings, and rubbish is not allowed to accumulate around building edges. Consider using security patrols, spot smoke detectors and exterior lighting. Note that beam type smoke detectors can be imaginatively used as an arson detection measure. Refer to paragraph 2.7 of Section A for smoke detection philosophy and systems.

Q4 Should we be providing fire hose reels or extinguishers or both?

Under Acceptable Solutions C/AS1 it is not necessary to provide either fire hose reels or fire extinguishers. However, fire extinguishers may be a requirement of the sprinkler standard NZS 4541 or the *Fire Safety and Evacuation of Buildings Regulations 2006* in some situations. The voluntary provision of **multi-purpose dry powder extinguishers** (for combined fire classes A, B and E), especially in technology classrooms or science laboratories is recommended. Fume cupboards may be fitted with a single manually operated sprinkler (this will require specific design covering alarm interaction, control, locking and electrical safety). The provision of firefighting equipment should be discussed with the NZFS. Note that such equipment should only be used when it is safe to do so. A more detailed policy on extinguishers and hose reels is under development in conjunction with the NZFS.

Q5 What about dormitories and wharehenui?

It is Ministry policy that any classroom, hall or specifically designed wharehenui that is to be used for sleeping, must be equipped with an automatic smoke detection system and manual call points. Any space not equipped with an automatic detection system must not be used for sleeping. Dormitory or sleeping uses associated with the school should be subject to specific design, in each case, using either Acceptable Solution C/AS1 or a fire-engineered specific design. Areas used for sleeping should be equipped with emergency lighting. In wharehenui with cooking facilities, an adequate hooded extract system should be provided in the cooking area to prevent false alarms.

Q6 Should our buildings be sprinklered?

Sprinklers are required in all new schools, new buildings greater than 1000sqm and in extensions to schools where the rest of a school is already sprinklered (see paragraph 2.4 of Section A). Sprinklers are also required in special needs schools, special needs units and in all new residential buildings. The use of sprinklers is encouraged to minimise property damage. Sprinklers can be a cost effective choice in some circumstances through reducing the need for other fire protection measures.

You should seriously consider the use of sprinklers when upgrading buildings. Note that sprinkler heads activate one at a time when they reach the required temperature, not all at once. About 75% of fires are controlled by a **single sprinkler head**, with 96% of fires being typically controlled by four sprinkler heads or fewer. Note also that the use of sprinklers limits the potential for loss of teaching materials and accumulated notes (which in a non-sprinklered building, as a matter of prudence, should be duplicated by off-site, back-up copies where possible).

Sprinkler designers should be asked specifically to consider arson. In particular they may be able to adjust or improve the sprinkler design if they are asked to consider the use of accelerants by arsonists, the possibility of multiple start points for fire and exterior ignition for example by deliberately placing rubbish bins under canopies and verandahs. Adding these factors to the design brief should significantly enhance performance. Sprinkler designers should be asked to provide costings with and without these additional 'arson protection features' which would not normally be included in a design undertaken to NZS 4541:2003 in the standard manner.

Q7 Should our school be equipped with smoke detectors?

Paragraph 2.7 of Section A sets out the basis and requirement for using smoke detectors. There are only three reasons for providing smoke detectors in schools under either the *Building Code* or Ministry requirements. These are as follows:

- **Purpose 1: Sleeping uses.** In this case the purpose of the smoke detector is to sound an alarm to awaken people who are sleeping. The extent of the area in which the alarm is to sound should be decided when you talk with the NZFS in preparation of your evacuation scheme.
- **Purpose 2: Crowd use.** This is required where the number of occupants is sufficiently large that additional time may be needed to evacuate everyone. Smoke detectors should be provided in the main occupied space, and also more importantly in immediately adjacent unoccupied spaces. As for Purpose 1, the extent of the area in which the alarm is to sound would be decided when you talk with the NZFS in preparation of your evacuation scheme.
- **Purpose 3: Property protection.** Smoke detection outside of school hours can be used to limit property damage where the smoke detector sets off an alarm. It may also send a signal to a security company to visit and check the school. If property protection is the intended purpose, the system should be connected to NZFS or alternatively output should be taken from the fire alarm system, which is the lead system, and sent to the security monitoring company. The security monitoring company must be briefed that for property protection purposes, they should immediately telephone 111 on receipt of an alarm signal outside school hours.

Under the *Building Code*, only the first and second purposes will arise. Boards may, however, choose to install smoke detectors for Purpose 3, namely property protection.

In summary, the following management principles emerge:

- Installation of smoke detectors must follow either NZS 4512 or specific aspects of MOESFA1, with the exception that isolated smoke detection is permissible for property protection purposes at any point.
- Smoke detector output must always go to the fire alarm system first even if the smoke detectors are provided for property protection purposes as part of a security system.
- No smoke detectors are to be fitted only to the security system. To activate the security system a signal will be taken from the fire alarm system, which shall always be the lead system to the security system.
- Always keep in mind the ease with which smoke detectors may produce a false alarm, which could mean costly, unwarranted callouts to the NZFS. Avoid situations where

even a small number of false alarms can reduce or eliminate the credibility of the alarm system.

- Heat detectors do not have the same false alarm problems as smoke detectors.
- Where smoke detectors are used in conjunction with sprinklers, the smoke detector only needs to sound in the immediate fire cell. (Where school property is sprinklered, installation is to be in accordance with paragraph 3 of Section C. Activation of a sprinkler will always automatically call the NZFS.)

Q8 Can preparing an evacuation scheme cause us to have to make changes to school buildings?

The short answer is 'No'. Under normal circumstances, changes to the physical design and layout of buildings will not arise out of evacuation schemes under the Fire Safety and Evacuation of Building Regulations 2006. The architectural design of the school, including escape route lengths and widths, is controlled by the Building Act and Building Code. When a building is altered or upgraded, it is possible that further changes to the design could be required by the BCA as a condition of a building consent, but these can only be required when 'reasonably practicable' (section 47 of the Building Act). Refer to Section D for a summary of the legal position. Refer any request by the NZFS that you upgrade your fire alarm activation systems to the Ministry's Warrant of Fitness contractor (currently Argest Technical Services Ltd) for comment.

Q9 Can we use the same sounder for class change, evacuation and intruder alarms?

Schools are uniquely provided with regularly used sounder systems in the form of classroom change bells or sounders, with the occupants uniquely trained to leave the building relatively quickly on hearing such bells or sounders.

On this basis, the NZFS will accept the school bell classroom change system being used as an evacuation alarm by continuous ringing. This is relatively simple and can avoid major alarm upgrade costs where different sounds exist in different areas of the school. This is an 'Alternative Solution' under the Building Code and requires specific approval of the BCA and NZFS.

However, where an alarm system is required to comply fully with NZS 4512, the use of class change bells will not be acceptable.

Intruder alarms must be on a separate circuit with a different sounder.

Smoke detectors will always be on the fire alarm circuit, but output may be taken to alert the security system that a smoke detector has activated. The fire alarm system must always be the lead system ie. output may be taken from the fire alarm system to alert the security system, but not vice versa.

Section C provides further information on fire alarm requirements.

Q10 Does the entire school need to be evacuated when any fire alarm sounds?

For a small school total evacuation will be required. For larger schools the NZFS may prefer that only the part of the school that is affected be evacuated. Discuss with the NZFS during preparation of the evacuation scheme.

Q11 Should activation of the fire alarm provide direct connection to the NZFS?

Direct connection of automatic or manual fire alarm systems to the NZFS is required for sprinklered buildings. Where fire cells are occupied by more than 500 people the question of direct connection should be discussed with the NZFS. Provision of any other permanent connection to the NZFS would be the choice for the board.

Q12 How do we contact the NZFS in an emergency if the fire alarm is not automatically connected to them?

Normally only sprinklered buildings will be automatically connected to the NZFS. Staff, students, and security personnel should therefore be aware that it is necessary to immediately telephone the NZFS on 111 if an alarm operates. Access to a telephone must be available at all times to enable a 111 call to be made. This telephone should not be in a locked office.

Q13 How often should we hold fire drills?

It is a legal requirement that fire evacuation drills be carried out in accordance with the school's approved evacuation scheme.

Q14 Does it matter how many alarm monitoring panels there are around the school?

It is recommended that there be one central control panel to monitor the whole school complex. When building extensions and new buildings are constructed their security and fire alarms should be wired back to their respective central control panels.

Q15 Can we hold fireworks displays on the school site?

Fireworks and firework displays are **not permitted** on school sites. Pyrotechnics can be used for stage effects and theatrical productions provided certain conditions are followed. Refer to the Ministry policy on fireworks and pyrotechnics (www.schoolproperty.govt.nz).

Q16 Are there any special provisions for holding stage performances or student dances on the school site?

Fire safety measures for school functions such as stage performances, dances and discos must be discussed with the local FSO of the NZFS well before the event (www3.fire.org.nz). If performances, discos or dances are to be held in a hall fitted with smoke detection, caution needs to be exercised if there are any plans to use theatrical smoke generators. The use of theatrical smoke, which may activate alarm systems, should be discussed with the NZFS. Seating rearrangements must not close off or lengthen escape routes. Be careful with potential ignition sources and loose hanging fabrics.

Q17 Can our security system and fire alarm system be combined?

The fire alarm system must always be the lead system. Output may be taken from the fire alarm system to activate the security system but not vice versa.

Intruder security systems and fire alarm systems should not be combined unless approved as an Alternative Solution by the BCA under the *Building Code*.

However, the signal from fire alarm activation outside school hours may be connected to an offsite security contractor who should be instructed to immediately contact the NZFS. This is a matter of choice for boards. Refer to Q7 above.

Note that if smoke detectors are required under any of the design factors listed above then they must not be attached directly to the security system but must be installed as part of the fire alarm system, with the fire alarm system then providing a signal to the security system if desired.

Q18 Will fire alarm systems trigger a building warrant of fitness requirement?

Any automatic alarm system that includes fire protection devices (eg. smoke alarms and heat detectors etc) requires a Compliance Schedule to be issued by the BCA. This will specify the inspection, maintenance and reporting procedures to be followed when the systems are inspected by an independently qualified person as specified under sections 100 to 107 of the *Building Act 2004*. Section 108 explains how a building warrant of fitness is to be prepared by the school and displayed to show building compliance.

Intruder alarm systems with no fire protection devices do not require a Compliance Schedule or have to meet warrant of fitness requirements.

Q19 When do the requirements of the Building Act 2004 need to be considered?

A full evaluation of legal requirements is given in Section D. However, in simplified terms, consideration of Building Act requirements and a possible upgrade under the Building Code need only be made in the following cases:

1. New buildings.
2. Alterations to buildings.
3. Change of use of buildings (this is unlikely to apply to schools, but could be possible in a conversion, for example, to dormitories etc).
4. Subdivision (will not generally apply to schools).
5. Buildings deemed to be dangerous as set out in section 121 of the Building Act 2004 where: “in the event of fire, injury or death to any persons in the building or to persons another property is likely because of fire hazard or the occupancy of the building”. It is difficult to imagine a situation in which this could apply to a well designed and managed school unless, perhaps, unauthorised alterations or changes of use had occurred - perhaps inadvertent removal of escape routes or inadvertent creation of danger in other spaces by conversion, for example, of a classroom to a laboratory.

Note that for alterations or changes of use, an upgrade is only required by the Act to a standard that is ‘*as nearly as is reasonably practicable*’ (sections 112(1) and 115). In other words, a degree of common sense will prevail in older schools where a full upgrade would be too expensive in terms of the degree of risk when balanced against the cost, time, trouble or other ‘sacrifice’ necessary to eliminate the risk. Individual cases would need to be discussed with the BCA but normally a BCA should not require a large increase in budget for a small degree of improvement.

Q20 What is meant by the terms ‘firecell’ and ‘fire resistance rating’?

Firecell: Any space enclosed by a combination of fire separations, external walls, roofs and floors.

Fire resistance rating: Time of resistance to standard fire resistance tests comprising three numbers, for example, 60/60/60 for load bearing wall, -/60/30Sm for a fire door (closure), giving time in minutes respectively for:

1. Stability (time to collapse of a beam, column, load bearing wall etc.).

2. Integrity (time for flame penetration, eg. of a wall).
3. Insulation (time for which excessive heat build up on the far side of the element must be prevented).

The postscript 'Sm' is added to elements where smoke seals are required. For example (as above) a one hour fire door with smoke stopping capability would read -/60/30Sm.

Q21 Is it permissible to use portable heaters in schools?

There is an inherent risk in the use of portable heaters. The use of portable heaters is **not permitted** in schools except in emergency situations when the school's main heating system fails.

Q22 How do we assess the design occupancy for halls?

There are two factors that affect, or are affected by, the design occupancy of a school hall, namely the width of the escape doors and the activity involved.

1. Door widths

The Acceptable Solution to the *Building Code* requires door widths of 7mm per person after discounting the widest door, except in sprinklered buildings. This assumes that a fire cuts off escape via the widest door, except in sprinklered buildings.

2. Activity

The Acceptable Solution in the *Building Code* provides a different estimate of design occupancy depending on the activity to be undertaken. For example if the figure for loose seating (1.3 persons a square metre) is used, a much lower design occupancy figure will be obtained than would be obtained by considering use as a dance floor (1.7 persons a square metre), a stadium or grandstand (1.8 persons a square metre) or simply as standing space (2.6 persons a square metre).

On balance, use of the Acceptable Solution values will give a safe design, subject to accurate occupancy assessment. However, if there is a particular reason for reducing the number of ways out, or setting capacity more accurately then this may be justified by specific design. For example the Acceptable Solutions do not take account of the typical smoke reservoir volume available above head height within a hall, which can give additional time for escape. A preliminary example study indicated that with accurate occupancy count, the required width per person, after discounting the widest door (in unsprinklered buildings with a minimum stud height of 4m) may be reduced to 5.25mm per person. This figure should only be used in conjunction with a specific design prepared by a qualified fire engineer.

Q23 How can we avoid false alarms?

False alarms can be reduced by careful placement of detectors, the use of heat detectors where possible instead of smoke detectors and intelligent design by the fire alarm installation company.

Where the fire alarm is connected to the NZFS for property protection purposes, false alarms can be costly (up to \$1,000 call-out charge). Schools should discuss with the alarm company, at the time of design and installation, where the liability for false alarm charges caused by poor design of the system would fall.

Q24 Do we have to follow NZFS instructions relating to building design or alarm equipment, or pay them for such advice?

Only a BCA has the power to approve building design by issuing a building consent. However, where specific fire engineering design is used by the designer, the BCA must provide a copy of the application for building consent to the NZFS Commission under section 46 of the *Building Act 2004*. The NZFS then has 10 working days to provide a memorandum setting out comment on means of escape issues and the needs of fire fighters. The BCA will take this advice into account when considering building consent conditions. In the event of any issues with the NZFS over building design or alarm equipment the advice of Ministry's Warrant of Fitness contractor (currently Argest Technical Services Ltd) should be sought.

Q25 Do school halls under 1000 occupancy need to be directly connected to the NZFS?

Buildings containing assembly halls holding up to 500 people must be provided with a manual fire alarm system incorporating manual call points to NZS 4512 or MOE SFA1 specification. They do not normally require a direct connection to the NZFS provided a telephone is installed and available at all times for 111 calls to be made. Buildings containing assembly halls holding between 501 and 1000 people must be provided with an automatic fire alarm system with smoke detectors and manual call points to NZS 4512 or MOE SFA1 specification. A direct connection to the NZFS is subject to discussion with and the agreement of the NZFS and/or BCA where appropriate. Buildings containing assembly halls holding over 1000 people require specific design of the fire alarm system which often includes a sprinkler system. Direct connection to the NZFS will then be a requirement. The NZFS does not normally require direct connection of alarm systems provided a telephone is installed and available at all times for 111 calls to be made. However, for speed in response to an activation of an alarm the NZFS may recommend direct connection. Discussion on direct connection should consider maintaining credibility in the performance of the fire alarm system. False alarms are often caused by sensitive smoke detectors and the NZFS may be supportive of non-connection where an alarm system is subject to frequent false alarms.

Q26 Do schools require the approval of the BCA to remove fire hose reels?

Fire hose reels are included on school's compliance schedules. Removing a fire hose reel constitutes an 'Alteration' under section 112(1) the *Building Act 2004* and therefore requires a building consent from the local BCA. There is no requirement to provide fire hose reels under the *Building Act*. However, extinguishers may be required to comply with the sprinkler standard or the NZFS may require provision of portable **multi-purpose dry-powder fire extinguishers** (for combined fire classes A, B and E) under regulation 10 of the *Fire Safety and Evacuation Regulations 2006*. A policy document for the provision of extinguishers is under development with the NZFS. Discuss the provision of appropriate portable fire extinguishers, including training in their use, with the NZFS.

Section C: Fire alarms

1. Introduction

Alarm systems are an integral part of all school evacuation schemes. Evacuation schemes may be prepared within a particular school for individual buildings, groups of individual buildings, or interconnected buildings. For the orderly running of the school and for minimising the impact on the NZFS, alarm activation resulting in evacuation should only be done in the parts of the school where necessary to **protect people**.

Where buildings are interconnected so that the fire alarms operate simultaneously, you should be able to isolate any one building for maintenance of the alarm without affecting the normal operation of alarms in the remaining buildings.

Direct connection of automatic or manual fire alarm systems to the NZFS is not normally a requirement of the *Building Code* except for sprinklered buildings or buildings with an occupancy of over 500 people. Provision of any other permanent connection to the NZFS would be the choice of your board.

1.1 Ministry's fire alarm specifications

The Ministry's 'Specification for School Fire Alarm' (MOE SFA1) provides technical guidance on alarm design.

2. Alarm systems – application

Section A discusses the type of alarm required on the basis of building geometry and activities within each building. The points below provide guidance specific to particular alarm types.

1. Manual call points fitted inside classrooms should, when activated, cause the total evacuation of the school or, subject to discussion with the NZFS, evacuation only of the block in which the manual alarm is situated.
2. Heat or smoke detectors within classrooms should activate total evacuation of the school, or, with NZFS approval, evacuation of the block within which the heat or smoke detector is situated.
3. Note that where accepted by the BCA and NZFS, it is permissible for the evacuation signal to be the continuous activation of the class change bells or sounders, either for total evacuation of the school or evacuation of the block in which the manual call

point, heat detector or smoke detector has been activated. However if full compliance with the current NZS 4512 is required then the use of the class change bells is not adequate.

4. For manual alarm systems and any automatic heat or smoke detection in corridors, where these may be set off by pupils during school hours, it is permissible for the alarm signal to be sent to the school office (prior to activation of sounders and subject to discussions with the NZFS) for investigation prior to full evacuation **only in the following situations:**
 - where there is no fire load (ie. nothing which can burn) in the corridors, and
 - adjacent classrooms are smoke separated or fire separated from the corridor (standard solid core classroom doors with vision panel are acceptable under this provision).
5. Where security systems and security personnel are used for property protection, it is permissible for the fire alarm signal from a manual call point, heat detector, smoke detector or sprinkler to be signalled directly to the security company. Note however that the security infra-red detectors and wiring must be kept separate from the fire alarm system within the school buildings unless an Alternative Solution through specific design has been approved by the BCA for the alarm system. **The fire alarm system must always be the lead signal system** and may generate an output signal to be received by the security system, but not vice versa. Smoke detectors, heat detectors and manual call points must activate the fire alarm, which in turn may signal the security system. Smoke detectors in particular must not be directly connected to the security system or in any way by-pass the fire alarm system.
6. The fire alarm system will not normally call the NZFS directly, except where the building is sprinklered, although there can be a case for connecting manual call points or heat detectors. Poorly designed smoke detection can create unwanted alarms leading to loss of credibility in the system and potential false alarm charges.
7. Manual call points and heat or smoke detectors in corridors without fire load as in point (4) above may, after school hours, be electronically switched to activate the alarm sounders throughout the buildings and alert the security company if desired.
8. Although desirable, it is not mandatory for the same sounder tone to operate throughout the school provided that everyone is trained under the evacuation scheme to understand the meaning of the sound. It is, however required that the sounder tone is consistent within any given building. Siren and bell sounds have been modified over the years, but there is no compelling reason under the *Building Act 2004* to upgrade older systems which are in good working order simply because the sounds are different. Nevertheless, section 112 of the *Building Act 2004* requires consideration

of the effect of a minor change on the whole building, taking into account that changes must be 'reasonably practicable' (refer **Q19. Section B**).

9. Smoke detectors, even if installed for security purposes, must initially be part of the fire alarm system. Note that under NZS 4512, paragraph 401.8, spot detection is permissible. Localised spot smoke detection not complying in full with NZS 4512 is permissible under MOE SFA1 in parts of school property which may be likely to suffer arson. The full requirements of NZS 4512 set out for life safety purposes need not be followed in locating spot detectors (since life safety issues will have been dealt with by other means), but all other aspects such as standards of wiring and circuit design must be followed.
10. Where smoke detectors are specifically positioned for **property** protection then well-meaning advice from inspectors or other semi-professionals to extend the system on the grounds of life safety must be resisted. Contact the Ministry's Building Warrant of Fitness contractor for advice should such situations arise.
11. Note that it is important that while ensuring people and property are protected, the way people want to run the school should not be controlled by the requirements of the alarm system. This document will allow you to achieve this while maintaining a degree of flexibility.
12. During school hours, the output from the fire alarm system to the security system may be turned off by the use of a keypad system. This is clearly the norm, since otherwise normal activity in the school will activate the security alarm.
13. Two keypads should be provided, mounted side by side to firstly disable the off-site security system during school hours and secondly to convert the output from non-secure areas, as in point (4) above, to office warning only. Alternatively, the two functions could be programmed into the same keypad provided that the fire alarm system remains as the lead system.
14. Note that the purpose of being able to disable input devices is to enhance credibility and prevent disruption. The fire alarm, smoke detectors, heat detectors and manual call points within classrooms, gymnasias, assembly halls and other secure areas where a teacher may be expected to be present should not be disabled during school hours but immediately signal an alarm throughout the school or relevant portions of the school as set out above.

3. Sprinkler systems

Sprinkler systems, whether required by the Section A, or whether voluntarily chosen by your board, shall comply with the requirements of NZS 4541 as modified under Appendix D of Acceptable Solution C/AS1.

4. Heat detection and smoke detection systems

Unless an Alternative Solution specific design has been approved for the alarm system, heat detection and smoke detection systems shall comply with the requirements of Acceptable Solution F7/AS1 'Warning Systems', and the standards referred to there, except that the sounders may be modified to allow use of the class change system subject to NZFS and BCA approval, while spot smoke detection or beam smoke detectors may be added in specific locations for property protection purposes. Refer to Section A, paragraph 2.7.

5. Manual call point systems

Manual call points must be carefully positioned to ensure that they are readily visible at all times and not liable to malicious activation because they are hidden. Manual call points should not be placed on the exterior of buildings. For all manual call point systems, whether stand-alone or integrated with sprinkler, smoke detector or sprinkler systems, refer to MOE SFA1.

Section D: Legal background and requirements

1. Introduction

The recommendations and requirements in this document will normally enable you to comply with all the legal requirements in respect of fire protection for your school. This section has been included to give a fuller explanation of the legislation for those who are interested and to expand on the philosophy of fire protection, which is mentioned in the earlier sections.

There are two main Acts of Parliament and an Amendment Act to be taken into account when considering fire protection in schools. These are:

1. The Building Act 2004 as amended by the Building Amendment Act 2005.
2. The Regulations created under section 400 of the Building Act 2004 are called the 'Building Code'.
3. The Fire Service Act 1975 and the Fire Safety and Evacuation of Buildings Regulations 2006.

1.1 Building Act 2004 and the Building Code

In essence, the *Building Act 2004* and *Building Code* deal with construction and design issues. The *Building Code* contains 35 clauses, of which four relate to fire. The objectives of *Building Code* clauses C1, C2, C3 and C4 may be summarised into four broad categories.

1. Safeguarding people from injury or illness when evacuating a building during fire.
2. Facilitating and providing protection to NZFS personnel during rescue or firefighting operations.
3. Protection of other peoples' property from the direct effects of fire or from structural instability caused by fire.
4. Safeguarding the environment from adverse effects of fire where relevant.

Note that the Acceptable Solutions to the *Building Code* are issued as C/AS1 by the Department of Building and Housing, and form the basis of many of the requirements of this document.

There is no requirement under the Building Code for owners to protect their own property for their own benefit. The Building Code leaves the onus of owner's property protection decisions up to the owner of the building. In their endeavours to minimise costs, building owners and designers sometimes overlook this important issue. These Fire Safety and Design Requirements, therefore, indicate the Ministry's policy on the levels of property protection that schools are required to meet to protect school and government property.

1.2 Fire Service Act 1975 and Fire Safety and Evacuation of Buildings Regulations 2006

The Fire Service Act 1975 and the Fire Safety and Evacuation of Buildings Regulations 2006 are not concerned with design issues, but focus on operational aspects, including the development of procedures for the 'Safe expeditious and efficient evacuation of occupants ... in the event of fire emergency requiring evacuation'.

1.3 Understanding the objectives of the legislation

The purpose of the legislation is often not clear to owners and occupiers of buildings. This can lead to confusion on occasions. Because fire tends to be an emotive topic, it is relatively easy to imagine that a high level of danger exists where in fact there is limited risk. Naturally, people will experience emotions at the thought of schools burning down, however there are no recorded deaths or even significant injuries from fires in school hours. It is important to be aware of section 18 of the *Building Act 2004*, which states that building work is not required to achieve performance criteria additional to or more restrictive than the *Building Code* unless required by another Act of Parliament. The detailed wording of section 18 is given below. It is recommended therefore that a very clear 'brief' is prepared when dealing with any agency or commercial operator wishing to provide advice on fire protection in schools so that you don't find yourself buying systems that are over and above what is required for good fire protection at your school.

2. Building Act 2004 requirements in more detail

Certain sections of the *Building Act 2004* (as amended by the *Building Amendment Act 2005*) are particularly important as a basis for actions by either the Ministry or by outside agencies in considering fire issues. These are highlighted below.

2.1 Sections 17 and 18

Section 17: All building work must comply with building code:

All building work must comply with the building code to the extent required by this Act, whether or not a building consent is required in respect of that building work.

Section 18: Building work not required to achieve performance criteria additional to or more restrictive than building code:

1. A person who carries out any building work is not required by this Act to -
 - a. achieve performance criteria that are additional to, or more restrictive than, the performance criteria prescribed in the building code in relation to that building work; or
 - b. take any action in respect of that building work if it complies with the building code.
2. Subsection (1) is subject to any express provision to the contrary in any Act.

Comment: As discussed in paragraph 1.3, it is relatively easy for an enthusiastic advisor (whether Government or private) to request performance criteria that are in fact in excess of *Building Act* or *Building Code* requirements. This is best dealt with in the brief, following the recommendations contained in this document.

2.2 Other sections of the *Building Act 2004* affecting fire design

Other sections of the Act which may trigger a building upgrade for fire protection are as follows:

1. Alterations to buildings.

Section 112: Alterations to existing buildings:

1. A building consent authority must not grant a building consent for the alteration of an existing building, or part of an existing building, unless the building consent authority is satisfied that, after the alteration, the building will -
 - a. (a) comply, as nearly as is reasonably practicable with the provisions of the building code that relate to -
 - i. means of escape from fire; and
 - ii. access and facilities for persons with disabilities (if this is a requirement in terms of section 118); and
 - b. continue to comply with the other provisions of the building code to at least the same extent as before the alteration.
2. Despite subsection (1), a territorial authority may, by written notice to the owner of a building, allow the alteration of an existing building, or part of an existing building, without the building complying with provisions of the building code specified by the territorial authority if the territorial authority is satisfied that, -
 - a. if the building were required to comply with the relevant provisions of the building code, the alteration would not take place; and
 - b. the alteration will result in improvements to attributes of the building that relate to -
 - i. means of escape from fire; or
 - ii. access and facilities for persons with disabilities; and
 - c. the improvements referred to in paragraph (b) outweigh any detriment that is likely to arise as a result of the building not complying with the relevant provisions of the building code.

Comment: Section 112 will often apply to school buildings. It simply means that you need to comply with the *Building Code* when doing alterations at your school. Compliance with the requirements in this document will achieve that.

2. Change of use of buildings

Section 115: Code compliance requirements: change of use:

An owner of a building must not change the use of the building, -

- a. in a case where the change involves the incorporation in the building of 1 or more household units where household units did not exist before, unless the territorial authority gives the owner written notice that the territorial authority is satisfied, on reasonable grounds, that the building, in its new use, will comply, as nearly as is reasonably practicable, with the building code in all respects; and
- b. in any other case, unless the territorial authority gives the owner written notice that the territorial authority is satisfied, on reasonable grounds, that the building, in its new use, will –
 - i. comply, as nearly as is reasonably practicable with every provision of the building code that relates to either or both of the following matters:
 - a. means of escape from fire, protection of other property, sanitary facilities, structural performance, and fire-rating performance:
 - b. access and facilities for persons with disabilities (if this is a requirement under section 118); and
 - ii. continue to comply with the other provisions of the building code to at least the same extent as before the change of use.

Comment: Section 115 will rarely apply to purpose-built school buildings, but could be possible in the event of conversion for example to dormitories etc. If you do have to change the use of any of your buildings, you need to consider the fire protection provisions of the *Building Code*.

3. Sub-division

Section 116A: Code compliance requirements: subdivision:

A territorial authority must not issue a certificate under section 224(f) of the Resource Management Act 1991 for the purpose of giving effect to a subdivision affecting a building or part of a building unless satisfied, on reasonable grounds, that the building –

- a. will comply as nearly as is reasonably practicable, with every provision of the building code that relates to one or more of the following matters:
 - i. means of escape from fire:
 - ii. access and facilities for persons with disabilities (if this is a requirement under section 118):
 - iii. protection of other property; and
- b. will continue to comply with the other provisions of the building code to at least the same extent as it did before the application for a subdivision was made.

Comment: Section 116A (sub-division) will rarely, if ever, apply to school buildings.

4. Buildings deemed to be dangerous (not safe) or insanitary (not sanitary)

Section 116B states as follows:

Section 116B: Offence to use building for use for which it is not safe or not sanitary, or if it has inadequate means of escape from fire:

1. No person may
 - a. use a building, or knowingly permit another person to use a building, for a use for which the building is not safe or not sanitary; or
 - b. use a building, or knowingly permit another person to use a building, that has inadequate means of escape from fire.
2. A person who fails to comply with subsection (1) commits an offence.
3. A person who commits an offence under this section is liable to a fine not exceeding \$100,000 and, in the case of a continuing offence, to a further fine not exceeding \$10,000 for every day or part of a day during which the offence has continued.

Section 121: Meaning of Dangerous Building:

1. A building is dangerous for the purposes of this Act if, -
 - a. in the ordinary course of events (excluding the occurrence of an earthquake), the building is likely to cause –
 - i. injury or death (whether by collapse or otherwise) to any persons in it or to persons on other property; or
 - ii. (damage to other property; or
 - b. in the event of fire, injury or death to any persons in the building or to persons on other property is likely because of fire hazard or the occupancy of the building.
2. For the purpose of determining whether a building is dangerous in terms of subsection (1) (b), a territorial authority –
 - a. may seek advice from members of the New Zealand Fire Service who have been notified to the territorial authority by the Fire Service National Commander as being competent to give advice; and
 - b. (b) if the advice is sought, must have due regard to the advice.

Comment: It is difficult to imagine a situation in which this could apply to a well designed and managed school unless, perhaps, unauthorised alterations or changes of use had occurred

such as inadvertent removal of escape routes or inadvertent creation of danger in other spaces by conversion perhaps of a classroom to a laboratory. There are however clear implications for boards from section 116B(1)(b).

5. Earthquake prone and insanitary buildings

The meaning of ‘earthquake prone’ is given in section 121 while the meaning of ‘insanitary’ is given in section 123 of the *Building Act 2004*. Both of these issues are outside the scope of this document.

2.3 Summary of the impact of Building Act 2004 requirements

In terms of fire therefore, consideration of building requirements will mainly be necessary for new buildings, and alterations. Note also that schools will often be subject to Compliance Schedule and Warrant of Fitness requirements respectively under sections 100 to 107 and section 108 of the *Building Act 2004*. Consideration of these requirements is outside the scope of this document, and reference to the Ministry's web site will provide further guidance.

3. Fire Service Act 1975 requirements in more detail

The *Fire Service Act* provides for evacuation schemes:

Section 92(3) (a): *To provide schemes to the satisfaction of the Commissioner for the expeditious and efficient evacuation of persons from the buildings and the prevention of panic among them in the event of the buildings being endangered by fire, and*

Section 92(3) (b): *To make such reasonable provision as may be necessary (having regard to all the circumstances of the case) for the testing of the schemes - and requiring the Commission to ensure that regulations made under this paragraph are complied with.* When the *Building Act 2004* was passed, the *Fire Service Act 1975* was amended by adjusting definitions and descriptions of relationships to refer to the *Building Act 2004* and the “Chief Executive of the Department of State responsible for the administration of the *Building Act 2004*” as appropriate, all as set out in Schedule 4 to the *Building Act 2004*. Such changes are included in the next section.

3.1 Approval of Codes of Practice

Section 21(5) and (6) gives a process for approval of codes of practice. The important point to note is that no code of practice shall be approved if it requires buildings to have compliance specifications higher than those in the *Building Act* or *Building Code*.

Section 21(5): *Where a code of practice or standard is submitted pursuant to subsection (4) of this Section for the Minister's approval, the Minister may approve that code of practice or standard.*

Section 21(6): Notwithstanding the provisions of subsection (5) of this Section, the Minister shall not approve any code of practice or standard, under that subsection, in relation to building matters if that code or standard purports to have the effect of requiring any building to achieve performance criteria additional to or more restrictive than those specified in the Building Act 2004 or in the building code.

3.2 Evacuation schemes for public safety

Section 21A introduces the need for evacuation schemes in places where members of the public assemble. This includes schools. Section 21(6) limits this to the extent that no scheme will be approved that requires fire protection over and above the requirements of the *Building Act* or *Building Code*.

The full text of section 21A is:

21A. Evacuation schemes for public safety-

1. Subject to subsection (3) of this section, where any building is used as a place
 - a. Where 100 or more people are able to be present for different purposes or activities; or
 - b. Where facilities for employment are provided for more than 10 people (whether self-employed or employed by 1 or more employers); or
 - c. Where accommodation is provided for more than 5 people whether on an overnight, short-term, or long-term basis (other than 3 or less household units); or
 - d. Which is used for any 2 or more of the purposes provided for in this subsection and the building is not sprinkler-protected, or, in the opinion of the National Commander, has an automatic sprinkler system that is inadequate to meet the nature of the fire hazard, the National Commander may require the owner of that building to make provision for a scheme which provides for evacuation from the scene of a fire to place of safety outside the building.
2. Notwithstanding the provisions of subsection (1) of this section but subject to subsection(3)of this section, where any building or part thereof is used as a place-

- a. Where 100 or more people can gather or assemble together in a common venue or place of assembly, whether for a commercial, social, cultural, religious, or any other purpose whatsoever; or
 - b. Which is used in whole or in part for the storage or processing of hazardous substances; or
 - c. In which early childcare facilities are provided (other than in a household unit); or
 - d. In which specialised nursing, medical, or geriatric care is provided (other than in a household unit); or
 - e. In which specialised care is provided for people with disabilities (other than in a household unit); or
 - f. For the accommodation of people in lawful detention; or
 - g. For any 2 or more of the purposes provided for in this subsection
- the National Commander may require the owner of that building to make provision for a scheme which-
- h. In the case of a building which is sprinkler-protected, provides for evacuation from the scene of a fire to some other place of safety (whether within or outside the building):
 - i. In the case of a building which is not sprinkler-protected, provides for evacuation from the scene of a fire to a place of safety outside the building.
3. For the purposes of subsections (1) and (2) of this section, the National Commander's requirements shall be as prescribed in regulations made under this Act, which regulations shall specify, with respect to sprinkler-protected buildings and non-sprinkler-protected buildings, such evacuation times and procedures as are necessary for safeguarding persons who are lawful occupants of the building or who are otherwise lawfully entitled to be in the building (whether as visitors or otherwise) including, in the case of buildings to which section 25 of the Disabled Persons Community Welfare Act 1975 or section 118 of the Building Act 2004 applies, the evacuation of persons with disabilities.
 4. (For the purposes of subsection (3) of this section, the requirements for such evacuation times and procedures as are necessary for safeguarding persons shall, in the case of the regulations, also be deemed to include, with respect to any sprinkler-protected building, the criteria that shall be applied by the National Commander in determining whether evacuation from the scene of a fire shall be to some other place within or outside the building.
 5. Where any owner fails, within the time required by the regulations, to prepare a scheme to the National Commander's requirements or otherwise refuses to prepare a

scheme, or where a scheme that was previously approved becomes inoperative because of the failure of the owner to ensure the requirements of the scheme are fully maintained, the National Commander, on giving not less than 10 days' written notice of his or her intention to do so to the owner of the building, may apply to the District Court for an order under subsection (6) of this section.

6. If, after giving the National Commander and the owner of the building an opportunity to be heard, the District Court is satisfied that the owner of a building has failed to comply with subsection (5) of this section, the District Court may make an order requiring that the building be closed until the requirement for a scheme to be prepared or for a scheme to become operative, as the case may be, has been met.
7. Where any building does not require a scheme in terms of subsection (1) or subsection (2) of this section but the owner considers that a scheme should nevertheless be approved, the owner shall notify the National Commander; and the provisions of this section, other than subsections (5) and (6), shall apply accordingly.
8. Where any scheme is approved for the purposes of this section it shall be a requirement of that scheme that-
 - a. The appointment of building wardens and floor wardens be reviewed at intervals of not more than 6 months; and
 - b. The duties of building wardens and floor wardens should be provided for in the scheme; and
 - c. There be trial evacuations at prescribed intervals; and
 - d. The means of escape from fire shall be monitored by the owner and properly maintained; and
 - e. Special provision is made for the avoidance of panic on the part of members of the public who are lawfully in the building at the time the building is required to be evacuated; and
 - f. Special provision is made for-
 - i. Young children, the elderly, the sick, and persons with disabilities, where the building or part of it is for their care; and
 - ii. Those in lawful detention, where the building or part of it is for their detention
9. *The National Commander may grant waivers from the requirement of any building to which subsections (1) and (2) of this section applies where, in the opinion of the National Commander, there are already other provisions which will ensure the safety of people within the building.*

10. Where any building for which a scheme is approved is altered or there is a change of use, the National Commander shall review the requirements for the scheme, and the provisions of subsections (1) to (9) of this section shall apply with the necessary modifications.
11. For the purposes of subsection (1) (a) and subsection (2) (a) of this section, the question of whether a building can be categorised as coming within the scope of those provisions shall be determined in the light of the use to which the building is put, and the provisions of the building code, in terms of the Building Act 2004.
12. (12) For the purposes of this section any evacuation scheme approved pursuant to the Fire Safety (Evacuation of Buildings) Regulations 1970 and which is still an operative scheme shall be deemed to be a scheme approved under this section.'

A discussion of each of these subsections follows.

Subsections 1, 2 and 3

The effect of section 21A(1) as it applies to schools is that an evacuation scheme is required where there are 100 or more people present, more than 10 people are employed or there are more than 5 people in accommodation units. The National Commander *“may require the owner of that building to make provision for a scheme which provides for evacuation from the scene of a fire to a place of safety outside the building”*.

Section 21A(2) provides that where a building is sprinkler protected, evacuation is to occur to a place of safety *“whether within or outside the building”* (staged evacuation). In the case of a building not being sprinkler protected then evacuation must be to a place of safety outside the building. Section 21A(2) applies to school buildings primarily where there is an assembly of more than 100 persons in a common venue, or there are hazardous substances such as in a school laboratory.

Under section 21A(3) any scheme required to be put in place must provide for the safe evacuation of people *“who are lawful occupants of the building”*, including persons with disabilities.

Subsections 4, 5, 6 and 7

Under section 21A(4) the National Commander of the NZFS is given power to determine whether evacuation in a sprinkler-protected building is to be within or outside the building. Sections 21A(5) and (6) are concerned with failures of owners to prepare a scheme. This can be referred to the District Court and continued refusal can result in the building being closed. Under section 21A(7), if an owner who does not require an evacuation scheme decides to provide one voluntarily, the scheme must still meet the requirements for schemes in section 21A.

Subsections 8 to 12

Under section 21A(8) the individual items required within a scheme are set out, namely:

1. Appointment of building wardens or floor wardens.
2. Duties of building wardens or floor wardens.
3. Requirement for trial evacuations at prescribed intervals.
4. Monitoring and maintenance of means of escape by the owner.
5. Special provision to be made for the avoidance of panic.
6. Special provisions for young people and people with disabilities.

Under section 21A(9) the National Commander has power to waive the need for an evacuation scheme where there are already other provisions to ensure safety.

Under section 21A(10) if you alter any building or change its use, you will have to review the evacuation scheme for that building and seek new approval of the scheme.

Under section 21A (11) the question of whether a building can be categorised as being **for purposes of assembly** under subsections (1)(a) or (2)(a) is to be decided in the light of the use to which the building is put.

Subsection (12) allows operative schemes, approved under the former *Fire Safety (Evacuation of Buildings) Regulations 1970*, to continue.

3.3 Evacuation schemes versus evacuation procedures

An evacuation ‘procedure’ is a less formal process than an evacuation ‘scheme’. Part 1 of the *Fire Safety and Evacuation of Buildings Regulations 2006* requires schools to have an evacuation **procedure** including fire exit routes, fire alarm signals, and fire fighting equipment for use by building occupants where premises are used for educational purposes.

However, under section 21A of the *Fire Service Act*, schools with 100 or more occupants will require an evacuation **scheme**. Section 21(6) limits this to the extent that there is no requirement to exceed the requirements of the *Building Code*.

3.4 Contents of an evacuation scheme

The contents required in a draft evacuation scheme are set out in regulation 14(2) as follows:

1. Procedures for safe, expeditious and efficient evacuation.
2. Appointment and training of wardens.
3. Management of escape routes.

4. Avoidance of panic.
5. Identification of wardens.
6. Display of notices explaining procedures.
7. Holding of trial evacuations.
8. Assembly points and evacuation points.
9. Evacuation of people with disabilities.
10. Proposed evacuation points and time to be taken to evacuate to, between and from those points to a predetermined assembly point or assembly points.
11. Training of staff of institutions of care.
12. Special provision for the evacuation of persons in lawful detention.

The maintenance and amendment of draft evacuation schemes is the responsibility of the National Commander of the NZFS – see regulations 17, 18 and 19.

Note that in designing assembly halls or gymnasia, the implications of NZS 9232 ‘Model Bylaw for Precautions against Fire and Panic in Cinemas, Theatres and Places of Assembly’ may need to be considered. This is not part of the *Building Code*.

4. Summary - relationship between Building Act 2004 and the Fire Service Act 1975

When the above legal requirements are viewed as a whole, the following points become clear:

1. The primary legal control is the *Building Act 2004* as amended by the *Building Amendment Act 2005*. At no point is there any comment in either section 21A of the *Fire Service Act 1975* or the *Fire Safety and Evacuation of Buildings Regulations 2006* which would indicate a reversal of this hierarchy.
2. There is no requirement under any of the legislation discussed above for owners of buildings to provide protection for their **own** property. The owner must therefore make a decision regarding the level of protection required to protect the property and contents from fire. Compliance with the *Building Code* will not necessarily provide any such protection.

In summary:

- The requirements of the *Building Code* represent the basis of the legal requirements.

- Any interpretation of the *Fire Safety and Evacuation of Buildings Regulations 2006* should not produce requirements in excess of those required by the *Building Code*.
- There is no requirement under law for an owner to protect their own property for their own purposes. The owners must make decisions regarding levels of protection to their own buildings and their contents.
- In the case of state schools these Fire Safety and Design Requirements require schools to protect school property

