

Determination 2008/96

Whether proposed building work complies with the fire safety requirements of the Building Code in a multi-sport complex at 20 Wayland Street, Gore

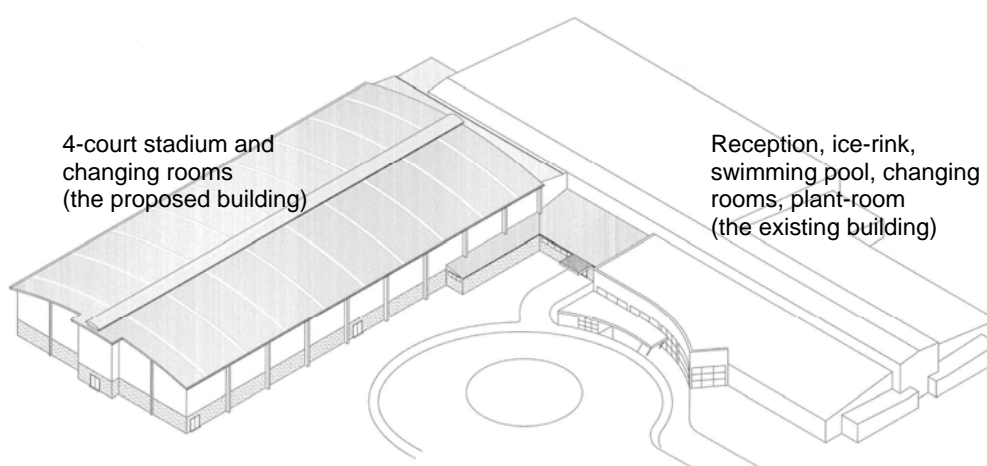


Figure 1: Isometric view of the multi-sport complex

1. The matters to be determined

- 1.1 This is a determination under Part 3 Subpart 1 of the Building Act 2004¹ (“the Act”) made under due authorisation by me, John Gardiner, Manager Determinations, Department of Building and Housing (“the Department”), for and on behalf of the Chief Executive of that Department. The applicant is the Gore District Council (“the authority”) carrying out its duties as a territorial authority or building consent authority, acting through an agent, MWH NZ Ltd (“the agent”), and another party is the owner, Gore Multisport Centre Charitable Trust (“the owner”).
- 1.2 I note also that the New Zealand Fire Service, having been provided with a copy of the building consent for the proposed building work under section 46 of the Act, is a party under section 176(g) of the Act. The owner’s fire consultant, ASBIC Consultants (“the owner’s fire consultant”) has been included as a person with an interest in the matter, along with the company contracted to construct the building, Calder Developments, (the contractor).

¹ The Building Act 2004 is available from the Department’s website at www.dbh.govt.nz.

- 1.3 This determination arises from a disagreement between the authority and the owner as to whether the fire design of the proposed building complies with Clauses C2, C3, C4, F6 and F7 of the Building Code² (Schedule 1, Building Regulations 1992).
- 1.4 Consequently the matter for determination, under section 177(a), is whether the fire safety design provisions for the proposed building comply with Clauses C2, C3, C4, F6 and F7 of the Building Code.
- 1.5 In making my decision, I have considered the submissions of the parties, the report of the expert commissioned by the Department to advise on this dispute (“the expert”), and the other evidence in this matter.
- 1.6 In this determination, unless otherwise stated, references to sections are to sections of the Act and references to clauses are to clauses of the Building Code.

2. The building work

- 2.1 The proposed building, which is now largely complete, is one part of a multi-sports complex. The proposed building contains a four-court stadium and changing rooms. It is located at right angles and attached to an existing building which is part of the same complex. The existing building contains a reception foyer, changing facilities, an ice-rink, a swimming pool, and a plantroom. The complex is shown in Figure 1.
- 2.2 The four-court stadium is approximately 75 metres long and 39 metres wide. It is built of reinforced concrete foundations, concrete encased columns and a convex steel trussed roof. The convex roof is clad with profiled long-run metal sheet. The walls are constructed of precast concrete panels from ground level to a height of 3 metres and of horizontally fixed profiled metal sheet fixed to steel studs above those panels, taking the walls to a height of approximately 8.7 metres. There will be tiered seating at one end of the building.
- 2.3 There are specifically designed fire-rated walls between the proposed and existing parts of the complex.

3. Sequence of events

- 3.1 A consent application for the proposed building was lodged with the authority in January 2006, but in the following month the applicant was advised that the application was suspended pending the supply of further information.
- 3.2 It appears that at least some of the required information was supplied and in March 2007 the authority gave approval for the top soil to be stripped and for site work to commence.
- 3.3 Further plans were lodged and some progress on the building was made throughout mid-2007. Although building consent was not issued, on 9 July 2007 the authority gave permission for work to commence on “the shell and foundations only”.
- 3.4 The authority became concerned when the construction progress on site overtook progress with the necessary fire design and documentation, and issued a notice to fix on 10 September 2007. It appears that work stopped on site after the notice was issued.

² The Building Code is available from the Department’s website at www.dbh.govt.nz.

3.5 On 18 December 2007 a building consent for the proposed building was issued in respect of:

4 Court Stadium and Changing Rooms

The consent was issued subject to a number of conditions and endorsements. Work re-commenced on site early in January 2008.

3.6 On 18 July 2008 the Department received an application for determination from the agent.

4. The submissions

4.1 In a covering letter to the Department dated 16 July 2008, the authority provided a brief history of events and explained the level of public awareness of the project because of its proximity to the already completed parts of the complex.

4.2 The authority forwarded copies of:

- the building consent application dated 17 January 2006
- the building consent dated 18 December 2007
- a building consent timeline
- fire design reports and peer reviews
- the New Zealand Fire Service Design Review Unit (“DRU”) report dated 15 January 2008.
- a file of correspondence
- some site photographs
- the set of drawings submitted to the authority by the owner.

4.3 Copies of the documents from the applicants and other evidence were provided to the other parties. No party made a submission in response to the information that was provided.

4.4 A draft determination was sent to the parties for comment on 22 August 2008 to enable them to make submissions and correct any errors of fact before the determination was finalised.

4.5 On 5 September 2008, the owner’s fire consultant said it accepted the draft determination. It had been discussing matters with the developers who were “in the process of gathering the required information to present to the Council to enable Consent to be issued”. The consultant also noted that what I had referred to in the draft as “some aspects of the fire design” that did not appear to have been peer reviewed, had been accurately identified by the Department’s expert.

4.6 In a submission dated 3 September 2008 the owner expressed confusion over the reasons for the determination and the path it had taken. The owner’s submission is summarised as follows:

- The authority had issued a building consent subject to conditions which the owner believed could be satisfactorily resolved without the need for a determination.

- The issue, from the owner's point of view, was the peer review fee for the fire engineers report which it considered did not "seem fair and reasonable in relation to other professional fees charged and the original fee estimate".

I do not believe the matter of the professional fees charged for the peer review is a matter I can determine under the provisions of the Act, refer paragraph 7.2.

4.7 In a letter to the Department dated 5 September 2008 the agent accepted the draft determination subject to the correction of some typographical errors and non-contentious amendments. The latter is summarised as follows:

- The building consent has been issued but with a number of conditions which relate to the fire design aspects of the building consent.
- At the time of writing some components of the proposed building had been constructed.

I have amended the determination accordingly. In addition the agent agreed with the determination with respect to the disparity between the likely occupancy numbers and that allowed for in the fire safety design. The agent considered it would be better practice to design for the likely use.

4.8 The contractor responded to the draft determination in a submission to the Department dated 4 September 2008. The contractor's submission echoed some of the same matters raised by the owner, being the resolution of outstanding issues, and the fees peer review work. In addition the contractor:

- noted that issue "D" of the fire report issued by the owner's fire consultant had not yet been peer reviewed
- made specific comment on the fire design and suggested these matters could be resolved
- concluded that it would provide updated plans for approval.

4.9 On 26 September 2008 the New Zealand Fire Service responded to the draft determination saying it supported the reasoning outlined in the draft and agreed with the decision.

5. The expert's report

5.1 As mentioned in paragraph 1.5, I engaged an expert, who is member of the New Zealand Institution of Professional Engineers and a Chartered Professional Engineer with particular expertise in fire engineering, to provide me with an assessment of the fire design with regard to its compliance with the fire clauses in the Building Code.

5.2 The expert was provided with a complete copy of the information submitted to me in support of the application for determination.

5.3 The expert commented on the scope of the fire engineering design, noting that the design has focused on the new building work only, and disregards the existing buildings. The expert concluded that:

The two existing buildings, pool and ice rink, must be reviewed to ensure they are compliant with the NZ Building Code as required by s112 of [the Act].

- 5.4 Commenting on the process to date with respect to the fire engineering aspects of the consent application, the expert said that some of the responses received from the owner's fire engineer had not been peer reviewed, but should have been.

Occupancy numbers

- 5.5 Discussing the occupancy of the proposed building, the expert noted that there appears to be lack of clarity about the numbers of occupants for which the fire engineering design should cater. The original design appeared to have been based on 2000 people, but other numbers such as 660 and 1000 have appeared in the latest fire report dated October 2007. The expert concluded:

The actual proposed occupant type and load needs to be clarified with the Building Consent applicant and owner of the proposed building. The proposed building is clearly capable of a capacity of 2000 people and this is what it should be designed for. Even if the occupancy is limited to FHC1 (Fire Hazard Category 1), 1000 people it is possible that the management of the proposed building may not realise the importance of these limitations and could easily allow either more people or more hazardous events to take place.

Designing the proposed building to the number of people that the toilets allow for is not acceptable. Not designing for 'one off events' is also not acceptable if these 'one off' events are already thought about or planned in the future for this proposed building.

How any of the limitations will be enforced also needs to be clarified as it will be difficult to ensure that both the occupant load and type will be policed by the management or staff of the proposed building.

Ultimately, the proposed building should be designed for any likely use by using the occupant densities in C/AS1 and special "one off" events should be included as these "one off" events could occur with some degree of regularity.

Fire safety precautions

- 5.6 The expert discussed the fire safety precautions necessary for the proposed building, and concluded that:

The fire engineering designs require the system to be compliant to NZS 4512:2003. The actual layout of the smoke detection system is not something that [the owner's fire consultant] and [the authority's fire consultants] need to be particularly concerned with as the design has been specified in the fire report to be compliant with NZS4512:2003. Note that no specification for this system has been seen as part of this report and one should be submitted to the Council as part of the Building Consent documentation.

The fire protection contractor will be required to submit drawings showing the layout of the detection system. When installed, the Type 4 system should be inspected by Fire Protection Inspection Systems (FPIS) to ensure it is compliant with NZS4512:2003.

The location of the emergency lighting needs to be clarified and drawings submitted as part of Building consent by the electrical engineer. Emergency lighting is required throughout the proposed building in compliance with clause F6.

A marked up drawing showing the [New Zealand Fire Service] access point and hose run distance needs to be submitted to confirm if a Type 18 hydrant is required or not.

Means of escape

- 5.7 The expert observed that the means of escape analysis is one of the main points of contention in the fire engineering design, peer review and the DRU commentary. After discussion of the various matters affecting the means of escape, the expert concluded that:

The existing buildings (pool, ice rink and foyer) need to be reviewed as per s112 of [the Act] to ensure their means of escape complies with the NZ Building Code.

Clarification is required of the number of escape routes actually in the proposed building, the circulation routes only and the number of escape routes used in the RSET (Required Safe Egress Time) analysis.

The tiered seating and aisle requirements need to be reviewed and the seating altered to comply with the requirements of C/AS1 or an engineered alternative solution.

Door swings need to be altered from the changing rooms and vision panels added to the double swinging lobby doors. The door schedule needs to be updated carefully and co-ordinated with the floor plans.

The new modelling and egress analysis provided by [the owner's fire consultant] in their letter dated 30 May 2008 should be reviewed by an expert user of FDS (Fire Design Simulation) with good experience in crowd egress analysis.

Spread of fire

- 5.8 In considering the design against spread of fire the expert noted that the proposed building is one fire-cell and is to be fire separated from the existing buildings with a 45 minute fire rating. The detail at the top of the wall is altered between the July 2007 drawings and the October 2007 drawings. Originally the drawings show this as a light timber framed fire rated wall and in later drawings it is a concrete wall. Presumably the later drawings show the correct construction and the wall is to be built with concrete. After discussion of the features of the design that will affect the spread of fire, the expert concluded that:

The fire report needs to be corrected to state that a 45 minute fire rating is required for the tiered seating as shown on the drawing [C4].

The spaces beneath the tiered seating need to be separated into firecells and fire rated to a 45 minute fire rating.

[The owner's fire consultant] need to make comment or alter the design regarding the 5000sq metres area limitation. This could be as simple as calculating the S Rating of the proposed building and fire rating the existing buildings from this new building to the S Rating instead of the 45 minute F Rating. It's possible that once calculated the S Rating may only be around 45 minutes meaning this becomes a non-issue.

The doors into the plantroom need to be clarified as to whether they are fire rated, if it is single or double door. The door schedule needs to be updated carefully and co-ordinated with the floor plans.

Surface finish details . . . need to be provided for the internal surfaces in the building.

Conclusion

- 5.9 The expert's report concluded that the fire designs by the owner's fire consultant as they currently exist do not comply with the Building Code. The matters to be remedied are described in some detail in paragraphs 5.3 to 5.8 inclusive. The expert concluded by saying the more significant matters of non-compliance were:

- The existing buildings need to be reviewed to determine how they will comply with the Means of Escape provisions of the NZ Building Code as required by s112 of [the Act].
- The actual proposed occupancy of the proposed building needs to be clarified . . . Designing the building to the number of people that the toilets allow for is not acceptable. Not designing for "one off" events is also not acceptable if these "one off" events are already thought about or planned for the future use of this

building. The building must be designed for any likely use and if there are to be limitations then how these limitations are to be enforced needs to be detailed.

- Details of the fire safety precautions should be submitted for Building Consent, in particular emergency lighting locations and drawings, fire hydrant/hose run details and fire protection specification for the alarms.
- Clarification and drawing updates are required for the tiered seating, door swings and door schedule.
- The new modelling and egress analysis by [the owner's fire consultant] in their letter dated 30 May 2008 should be reviewed by an expert user of FDS (fire design simulation) with good experience in crowd egress analysis such as [a named firm of fire and safety consultants].
- The tiered seating fire rating needs to be altered in the fire report and drawings to allow for a 45 minute fire rating and fire rating the spaces beneath the seating into firecells.
- Surface finish details . . . to be provided for the internal surfaces in the building.

5.10 Copies of the expert's report were provided to the parties on 31 July 2008 so that they would have the opportunity to comment on the report if they wished.

5.11 A firm of fire consultants that had been engaged as a sub-consultant to the agent wrote to the Department on 5 August 2008 and commented on the expert's report. In summary the submission said:

- It agreed with the expert's conclusion that the building must be designed for any possible use. It was better practice to do so than to design effective restrictions on occupancies.
- The fire engineering design submitted by the owner's fire consultant makes some assumptions on detector activation times. NZS 4512:2003 specifies maximum detector spacings giving the designer latitude to install them at lesser spacings. The designer can either determine the detection time for a layout compliant with NZS 4512 or design a detector layout to provide a desired detection time. In the case of the fire engineering design for the subject building the designer needed to achieve a desired detection time for the particular fire safety design. Thus the [owner's fire consultant], the [authority's fire consultant] and any other reviewer needs to be concerned with the detection design.

6. The legislation

6.1 I have set out, in Appendix 1, the relevant sections of the Act and clauses of the Building Code.

7. Discussion

7.1 Compliance with the building code

7.1.1 As I understand it, the fire design of the proposed building is one which is intended to comply with C/AS1 being the relevant Compliance Document. Compliance with C/AS1 is one way, but not the only way of complying with the requirements of the Building Code. That is to say, the building can be designed to comply with the Building Code by way of what is known as an alternative solution, a solution that does not comply with C/AS1 but does comply with the Building Code.

- 7.1.2 The expert's report raises doubts as to whether the fire design for the proposed building has taken account of all the factors that a compliant design should consider.
- 7.1.3 The report also raises doubts as to whether the application for a building consent is completely and accurately documented so that, for example, the door schedule and the consent drawings are consistent and unambiguous.
- 7.1.4 It is evident to me that the expert has evaluated the fire design of the building by comparing the various aspects of the design with the requirements of the Compliance Document C/AS1 (see for example the final clause in paragraph 5.5). I have taken a similar approach as I have seen no evidence that an alternative solution proposal was originally made.
- 7.1.5 I conclude that, based on the submissions I have received and taking note of the expert's report, compliance with the relevant clauses of the Building Code has not yet been established, but might well be able to be established with a more complete design that takes account of the deficiencies identified in the expert's report.
- 7.1.6 It is evident from the expert's report that the authority has not received sufficient information on which it could issue the building consent.

7.2 Professional fees

- 7.2.1 The matter of the quantum of the professional fees charged to the owner by the authority for peer review services (refer paragraph 4.6) is not a matter that can be determined under section 177 of the Act.
- 7.2.2 Nonetheless, I was initially prepared to make some comment on that issue in order to assist the parties. However, on reflection, I concluded that since I had been provided with only limited and unverified information as to the scope and process of the peer review, and the commercial conditions applying to it, I am unable to assist the parties by making any comment.

8. The decision

- 8.1 In accordance with section 188 of the Building Act 2004, I determine that the fire safety design provisions for the proposed building do not comply with Clauses C2, C3, C4, F6 and F7 of the Building Code.

Signed for and on behalf of the Chief Executive of the Department of Building and Housing on 10 October 2008.

John Gardiner
Manager Determinations

APPENDIX 1 (refer paragraph 6.1)

1 Relevant sections of the Act

1.1 The relevant sections of the Act include:

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) 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 Relevant sections of the Building Code

2.1 The relevant clauses of the Building Code with respect to fire safety include:

Clause C2 – Means of escape

PERFORMANCE

- C2.3.1 The number of open paths available to each person escaping to an exitway or final exit shall be appropriate to:
- (a) The travel distance.
 - (b) The number of occupants,
 - (c) The fire hazard, and
 - (d) The fire safety systems installed in the firecell.
- C2.3.2 The number of exitways or final exits available to each person shall be appropriate to:
- (a) The open path travel distance,
 - (b) The building height,
 - (c) The number of occupants,
 - (d) The fire hazard, and
 - (e) The fire safety systems installed in the building.
- C2.3.3 Escape routes shall be:
- (a) Of adequate size for the number of occupants,
 - (b) Free of obstruction in the direction of escape,
 - (c) Of length appropriate to the mobility of the people using them,
 - (d) Resistant to the spread of fire as required by Clause C3 “Spread of Fire”,
 - (e) Easy to find as required by Clause F8 “Signs”,
 - (f) Provided with systems for visibility during failure of the main lighting, as required by Clause F6 “Visibility in Escape Routes”, and
 - (g) Easy and safe to use as required by Clause D1.3.3 “Access Routes”.

Clause C3 – Spread of fire

PERFORMANCE

- C3.3.1 Interior surface finishes on walls, floors, ceilings and suspended building elements, shall resist the spread of fire and limit the generation of toxic gases, smoke and heat, to a degree appropriate to:
- (a) The travel distance,
 - (b) The number of occupants,
 - (c) The fire hazard, and
 - (d) The active fire safety systems installed in the building.
- C3.3.2 Fire separations shall be provided within buildings to avoid the spread of fire and smoke to:
- (a) Other firecells,
 - (b) Spaces intended for sleeping, and
 - (c) Household units within the same building or adjacent buildings..
 - (d) Other property.
- C3.3.3 Fire separations shall:
- (a) Where openings occur, be provided with fire resisting closures to maintain the integrity of the fire separations for an adequate time, and
 - (b) Where penetrations occur, maintain the fire resistance rating of the fire separation.
- C3.3.4 Concealed spaces and cavities within buildings shall be sealed and subdivided where necessary to inhibit the unseen spread of fire and smoke.
- C3.3.5 External walls and roofs shall have resistance to the spread of fire, appropriate to the fire load within the building and to the proximity of other household units, other residential units and other property.
- C3.3.6 Automatic fire suppression systems shall be installed where people would otherwise be:
- (a) Unlikely to reach a safe place in adequate time because of the number of storeys in the building,
 - (b) Required to remain within the building without proceeding directly to a final exit, or where the evacuation time is excessive,
 - (c) Unlikely to reach a safe place due to confinement under institutional care because of mental or physical disability, illness or legal detention, and the evacuation time is excessive, or
 - (d) At high risk due to the fire load and fire hazard within the building.
- C3.3.7 Air conditioning and mechanical ventilation systems shall be constructed to
- Where an automatic smoke control system is installed, it shall be constructed to:
- (a) Avoid the spread of fire and smoke between firecells, and
 - (b) Protect escape routes from smoke until the occupants have reached a safe place.
- C3.3.9 The fire safety systems installed shall facilitate the specific needs of fire service personnel to:
- (a) Carry out rescue operations, and
 - (b) Control the spread of fire.

C3.3.10 Environmental protection systems shall ensure a low probability of hazardous substances being released to:

- (a) Soils, vegetation or natural waters,
- (b) The atmosphere, and
- (c) Sewers or public drains.

Clause C4 – Structural stability during fire

PERFORMANCE

C4.3.1 Structural elements of buildings shall have fire resistance appropriate to the function of the elements, the fire load, the fire intensity, the fire hazard, the height of the buildings and the fire control facilities external to and within them.

C4.3.2 Structural elements shall have a fire resistance of no less than that of any element to which they provide support within the same firecell.

C4.3.3 Collapse of elements having lesser fire resistance shall not cause the consequential collapse of elements required to have a higher fire resistance.

2.2 Cited in the fire safety clauses above, and relevant to this building, are the following clauses in the Building Code:

Clause D1 – Access routes

PERFORMANCE

D1.3.1 Access routes shall enable people to:

- (a) Safely and easily approach the main entrance of buildings from the apron or construction edge of a building,
- (b) Enter buildings,
- (c) Move into spaces within buildings by such means as corridors, doors, stairs, ramps and lifts,
- (d) Manoeuvre and park cars, and
- (e) Manoeuvre and park delivery vehicles required to use the loading space

D1.3.2 At least one access route shall have features to enable people with disabilities to:

D1.3.3 Access routes shall:

- (a) Have adequate activity space,
- (b) Be free from dangerous obstructions and from any projections likely to cause an obstruction
- (c) Have a safe cross fall, and safe slope in the direction of travel,
- (d) Have adequate slip-resistant walking surfaces under all conditions of normal use,
- (e) Include stairs to allow access to upper floors irrespective of whether an escalator or lift has been provided,
- (f) Have stair treads, and ladder treads or rungs which:
 - (i) Provide adequate footing, and
 - (ii) Have uniform rise within each flight and for consecutive flights
- (g) Have stair treads with a leading edge that can be easily seen, which prevent children falling through or becoming held fast between treads, where open risers are used,
- (h) Have stair treads which prevent children falling through or becoming held fast between treads, where open risers are used,

- (i) Not contain isolated steps,
- (j) Have smooth, reachable and graspable handrails to provide support and to assist with movement along a stair or ladder,
- (k) Have handrails of adequate strength and rigidity as required by Clause B1 "Structure",
- (l) Have landings of appropriate dimensions and at appropriate intervals along a stair or ramp to prevent undue fatigue,
- (m) Have landings of appropriate dimensions where a door opens from or onto a stair, ramp or ladder so that the door does not create a hazard, and
- (n) Have any automatically controlled doors constructed to avoid the risk of people becoming caught or being struck by moving parts.

Clause F6 – Visibility in escape routes

PERFORMANCE

- F6.3.1 Specified features in escape routes must, when the systems for visibility are at their design level, be reasonably visible.
- F6.3.2 The systems for visibility must operate to the following percentages of their design levels within the following times after failure of the main lighting:
- (a) 80% in 0.5 seconds in locations (examples of which are given by performance F6.3.3) where there is a high risk of injury due to delay in operation of the systems for visibility; and
 - (b) 10% in 0.5 seconds, and 80% in 30 seconds, in stairs and in locations that are unfamiliar to users; and
 - (c) 10% in 20 seconds, and 80% in 60 seconds, in all other locations.
- F6.3.3 Examples of locations (referred to in performance F6.3.2(a)) where there is a high risk of injury due to delay in operation of the systems for visibility include:
- (a) areas where dangerous machinery is installed:
 - (b) areas where hazardous processes take place:
 - (c) clinical areas of hospitals
 - (d) prisons and other buildings in which people are detained.:
 - (e) any part of an escape route designed for use at any time by more than 250 people.
- F6.3.4 The systems for visibility must operate continuously in buildings or parts of buildings in the following risk groups for the following periods after failure of the main lighting:
- (a) risk group A, until restoration of the main lighting system:
 - (b) risk group B, 90 minutes:
 - (c) risk group C, 30 minutes.
- F6.3.5 Despite performance F6.3.4, if a building or part of a building falls into both risk group A and risk group B, the systems for visibility must operate for whichever is the longer of the periods specified in performance F6.3.4(a) and (b).
- F6.3.6 Signs to indicate escape routes must be provided as required by Clause F8 "Signs".

Clause F7 - Warning systems

PERFORMANCE

- F7.3.1 A means of warning must alert people to the emergency in adequate time for them to reach a safe place.
- F7.3.2 Appropriate means of detection and warning for fire must be provided within each household unit.
- F7.3.3 Appropriate means of warning for fire and other emergencies must be provided in buildings as necessary to satisfy the other performance requirements of this code.