Determination 2005/109

Single means of escape from a high-rise apartment building

1 THE MATTER TO BE DETERMINED AND THE PARTIES TO THE DETERMINATION

1.1 This is a determination of a dispute referred to the Chief Executive of the Department of Building and Housing ("the Chief Executive") under section 17 of the Building Act 1991 ("the Act") as amended by section 424 of the Building Act 2004.

1.2 The applicant was the Fire Service. The other parties were the owner and the territorial authority.

1.3 I take the view that the matter for determination is whether a new apartment building with a single means of escape from fire complies with clauses C2 and C3 of the building code (the First Schedule to the Building Regulations 1992) as required by section 7(1) of the Act. In making this determination, I have not considered any other requirements of the building code.

2 THE BUILDING

2.1 General

2.1.1 The building has 18 levels. Level 1, the ground floor, contains an entrance lobby, spaces for various services, and a loading bay. Level 2 contains three apartments, an office, and a plant room. Levels 3 to 18 each contain six apartments. The vertical cross-section of the building is shown in Fig 1 and the 3 different floor plans are shown in Fig 2. These drawings are schematic and are included to provide information of the overall form of the building. They are not intended to reflect construction details.

2.1.2 The apartments, of approximately 27 m^2 floor area, are either bed sitting rooms or single-bedroom dwellings. The main door of each apartment opens into the stairway, and at the other end of the apartment a sliding door and windows open onto a small external balcony. There are two lifts serving the upper floors. There is an open shaft ("the stairway") from the ground floor to the roof that contains intermediate floors at each upper level with a single stair between floors. The building's escape height is 48 m. The internal atrium and stairway space is pressurized by 3 fans mounted in the roof space and one fan mounted at ground level. The apartments, stairway and levels 1 and 2 service areas are sprinklered.

2.1.3 In the event of smoke in one of the apartments, a smoke detector within the apartment will activate to alert the occupant to a potential danger starts and a smoke vent in the form of a "drop window" in the external face of the apartment will open.

If the occupant leaves the apartment and activates a manual call point, or if smoke enters the atrium from the apartment and activates a second smoke detector outside the apartment door, the pressurisation system will activate.

2.1.4 The Fire Service is advised when the pressurisation system or the sprinkler system is activated. The residents are alerted to an alarm condition by an automatic voice communication system "with features to be agreed with Fire Service". A typical automatic message for apartments not on the fire floor or the floor above would be: "There is a fire alert in the building, you may remain in your apartment until the alarm sounds on your floor." Later messages would be transmitted manually by the Fire Service.

2.2 Fire safety features necessary to comply with the acceptable solution

2.2.1 The relevant provision of the acceptable solution C/AS1 amount to a means of complying with the performance requirements of clauses C2 and C3 of the building code. In comparing an alternative solution with the acceptable solution it is useful to bear in mind the objectives of those clauses, which are:

Clause C2—MEANS OF ESCAPE

OBJECTIVE

C2.1 The objective of this provision is to:

(a) Safeguard people from injury or illness from a fire while escaping to a safe place, and

(b) Facilitate fire rescue operations.

Clause C3—SPREAD OF FIRE

OBJECTIVE

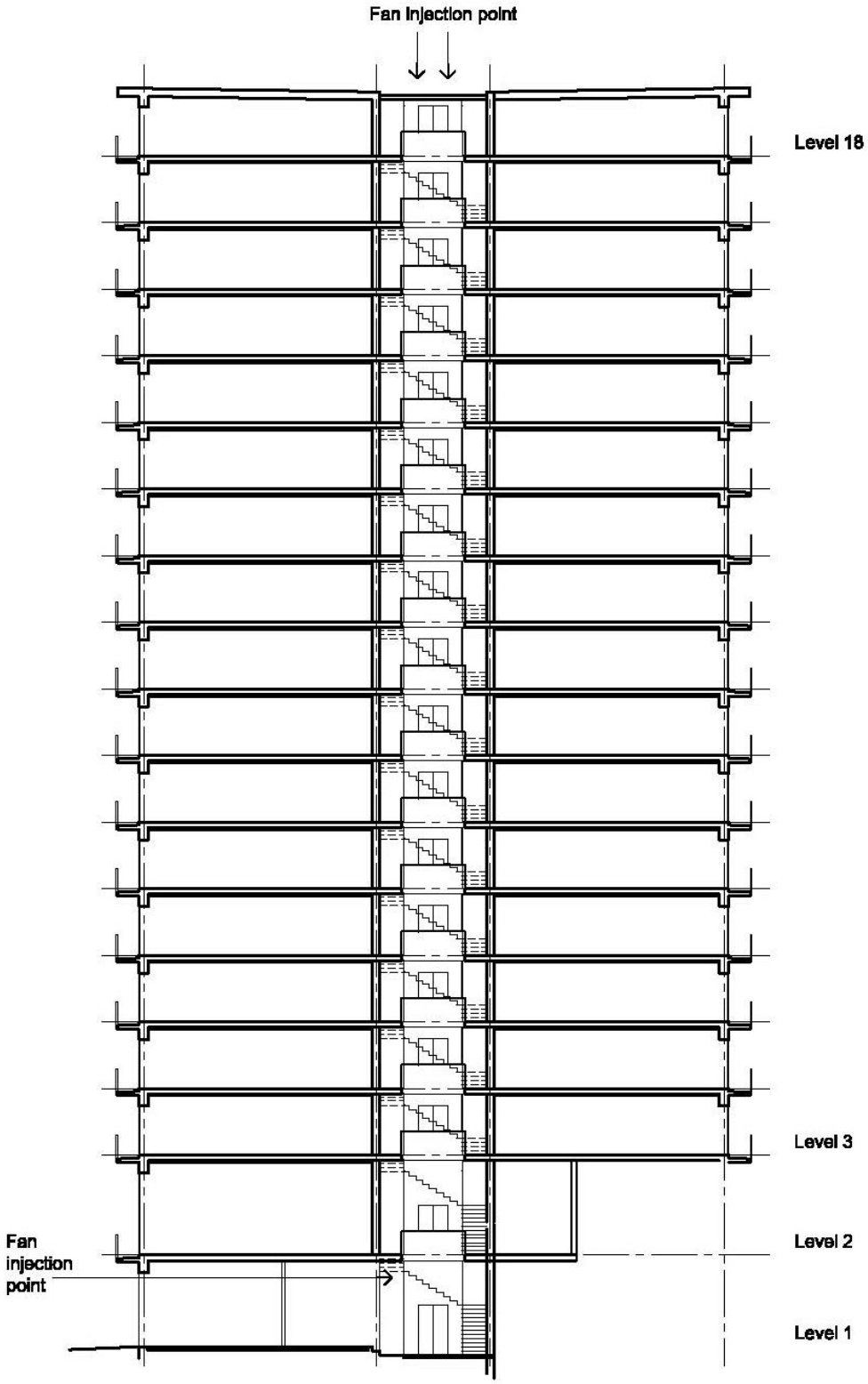
C3.1 The objective of this provision is to:

(a) Safeguard people from injury or illness when evacuating a building during fire.

(b) Provide protection to fire service personnel during fire fighting operations.

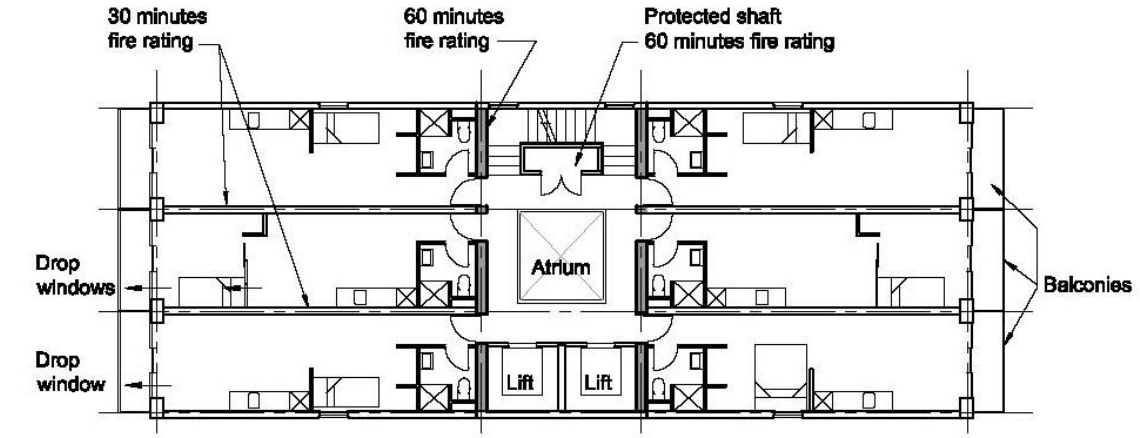
(c) Protect adjacent household units, other residential units, and other property from the effects of fire.

(d) Safeguard the environment from adverse effects of fire.

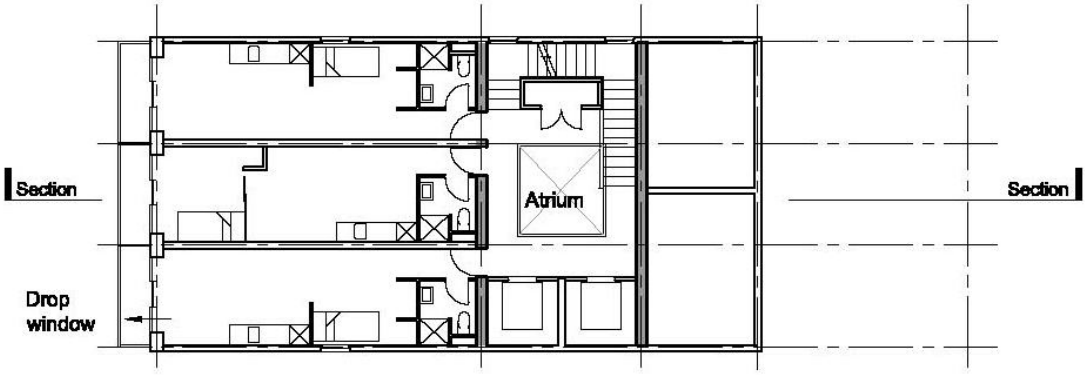


LONG SECTION OF BUILDING SHOWING ATRIUM

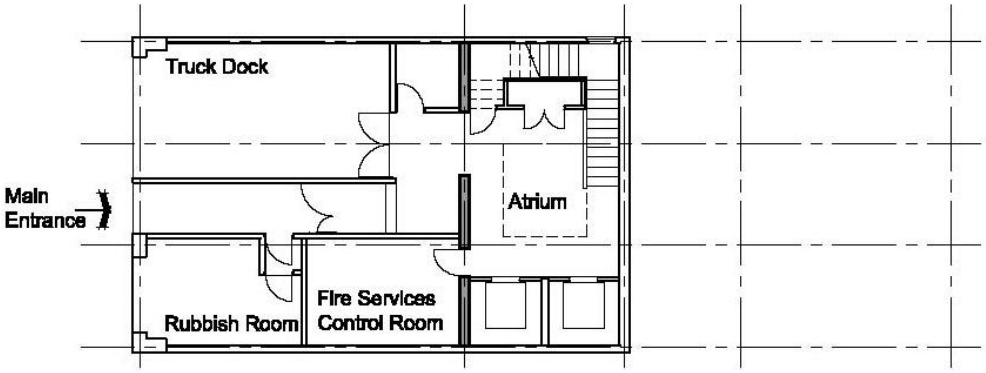
Fig. 1



INDICATIVE FLOOR LAYOUTS — LEVELS 3-18



LEVEL 2



GROUND FLOOR — LEVEL 1

Fig. 2

2.2.2 In order to comply with the acceptable solution C/AS1, a sprinklered multi-unit residential dwelling (Purpose Group SR) having an escape height of 48 m (18 floors) and containing the same apartments and rooms as the proposed building (199 occupants) would be required to have the following significant fire safety features:

- Automatic fire sprinkler system with smoke detectors and manual call points (allowing local notification of smoke detector activation in apartments);
- Two separate means of escape separated by fire rated construction;
- Intermediate floors (the atrium contains intermediate floors) with a smoke control system subject to specific fire engineering design;
- Firecell rating to be no less than F30;
- Fire separations of the safe path to be 30/30/30 (reduced from 60/60/60 due to provision of sprinklers);
- Lifts to be within a protected shaft;
- Exit doors from apartments are required to open directly onto a horizontal safe path, a pressurised vertical safe path or a final exit; and
- A horizontal protected path at each floor level other than the top floor shall precede the vertical safe path. The protected path and vertical safe path shall be separated by fire doors.

2.3 Fire safety features proposed as an alternative solution

2.3.1 The proposed building therefore differs from one complying with C/AS1 in that:

(a) It has a single escape route instead of the two required for a sprinklered building with an escape height exceeding 25 m.

(b) The automatic fire sprinkler system is enhanced by:

(i) Dual street main water supply,

(ii) Fast response heads on apartment levels, and

(iii) "Type 2 Fire Service" connection (a manual fire alarm system that is connected to NZ Fire Service receiving equipment)

(c) The fire rated construction between apartments and between each apartment and the atrium, and the walls surrounding the services duct at the centre of the stairway all have a fire rating of 60/60/60 instead of the 30/30/30 rating required by C/AS1.

(d) A staged evacuation scheme that involves a voice communication system (type 8 of C/AS1)

2.3.2 The building includes various other fire safety features that are not discussed in this determination. I am satisfied that each such feature is not relevant to the determination.

2.3.3 I assume that the building is intended to comply with C/AS1 in respect of fire safety features that are not mentioned in the fire report.

2.4 The building consent

2.4.1 The application for building consent was accompanied by:

(a) an analysis of the proposed building for compliance with the fire safety provision of the building code ("the fire report") prepared by a firm of consulting engineers ("the fire designer"),

(b) a report on the escape route pressurisation system ("the mechanical report") prepared by a consulting building services engineer ("the mechanical designer"),

(c) a peer review of the pressurisation system by an independent building services engineer, and

(d) a review of those documents prepared for the territorial authority by a firm of consulting engineers ("the territorial authority's consultant").

together with correspondence between the territorial authority, the fire designer, and the mechanical designer at the building consent stage.

2.4.2 The detail provided with the building consent application was in the nature of a performance specification and design philosophy, rather than a detailed design. The contractors responsible for the building work concerned were required to carry out detailed design on the fire safety system, and on completion, to demonstrate that the system met the performance criteria set out in the building consent. I have not been presented with any information relating to the actual performance of the fire safety system as built. In the ordinary course of events, the territorial authority would be expected to receive and examine such information before issuing the code compliance certificate.

2.4.3 The territorial authority issued the building consent on 10 February 2004.

2.4.4 The Fire Service applied for this determination on 9 June 2004. I understand that by that date the building was nearing completion.

2.5 The completed building

2.5.1 The building has since been completed but no code compliance certificate has been issued. Unit title holders have taken possession and at least two units have been made available for short term occupancy. The availability of short term accommodation is advertised on the front of the building. The building is advertised on the Internet as a "hotel".

2.5.2 I offer no opinion as to whether an offence was committed in terms of section 80(1)(a) of the Act in that building work was done after the building consent was suspended by the operation of section 17(4) of the Building Act 1991. That is a matter for the territorial authority.

2.5.3 As to the use of the building as a hotel as distinct from a multi-unit dwelling, see 5.2 and 6.4 below.

3 THE ORIGINAL SUBMISSIONS AND REPORTS AND THE FIRST DRAFT DETERMINATION

3.1 The submissions

3.1.1 As mentioned in 2.4 above, the building consent had been granted on the basis of the fire report, which had been reviewed by the territorial authority's consultant. The original submissions for this determination consisted of the documents listed in 2.4 above together with reports from the Fire Service and responses by the fire designer, together with legal submissions from the owner and from the Fire Service.

3.1.2 Subsequently, the owner submitted a quantitative risk assessment ("the risk assessment report") prepared by another fire engineer ("the risk assessor").

3.1.3 I obtained independent reports on the submitted documents from three fire engineers and an expert in environmental safety and risk management (Experts A, B, C, and D)

3.1.4 Drafts of those reports were copied to the parties for their comments. The final reports, taking account of the parties' comments, were also copied to the parties.

3.1.5 I record that the Department of Building and Housing has asked its Fire Advisory Panel to report and provide appropriate advice on fire safety issues and emerging trends within the industry. Several of the fire engineers who have contributed to this determination are members of that panel. Deliberations by the panel are still on-going but indications are that they consider single means of escape a priority for a review of compliance documents (the Fire Safety Approved Document and in particular the acceptable solution C/AS1). If such a proposal emerges, it will be subject to the public consultation procedures required under section 29 of the Building Act 2004 (previously section 49 of the Act).

3.2 The first draft determination

3.2.1 Having taken careful account of the parties' initial submissions as well as their subsequent cross submissions and the independent experts' reports, I prepared a draft determination ("the first draft"). The first draft included detailed discussions of the relevant documents. It is not necessary to repeat those discussions in this second draft, suffice it to say that the first draft said:

> "14.1.1 I conclude that I do not have reasonable grounds on which I can be satisfied that the provisions of clauses C2 and C3 the building code would be met if the proposed building were properly completed in accordance with the plans and specifications submitted with the application for determination.

"14.1.2 That is not to say that a similar building with a single means of escape from fire could never comply with clauses C2 and C3. However, demonstrating that compliance would require significantly more justification than I have been presented with in this case . . ."

3.2.2 In other words, I concluded that the information supplied with the application for building consent was inadequate, that the territorial authority should not have issued the building consent, and that the additional information contained in the risk assessment report still did not enable me to be satisfied on reasonable grounds that the building complied with the building code.

4 RESPONSES TO THE FIRST DRAFT

4.1 Responses to the first draft

4.1.1 I sent the first draft to the parties on the understanding that if any of them did not accept it then it would be necessary to hold a formal hearing.

4.1.2 The owner submitted:

(a) A second risk assessment report ("the second risk assessment") by the risk assessor.

(b) A review of the second risk assessment ("the assessment review") by yet another firm of fire engineers ("the assessment reviewer") who had not previously been involved.

Those documents are described and discussed in 5.3 below.

4.1.3 I sent the second risk assessment and the assessment review to Experts A, B, and D, and sent their responses to the parties.

4.1.4 The Fire Service and the territorial authority each made submissions on the second risk assessment, the assessment review, and the experts' reports.

4.1.5 The owner made submissions on the experts' responses.

4.1.6 This is not a treatise on fire engineering or on the law, and accordingly its accounts of the second risk assessment, the assessment review, and the corresponding experts' reports and further submissions from the parties does not purport to do more than indicate the nature of the technical points at issue and cannot do justice to the carefully presented documents themselves. Various matters that were mentioned in the submissions and reports are not discussed below because I concluded, after full consideration of all the circumstances, that those matters did not affect my decision.

4.1.7 As the parties did not accept the first draft, I held a formal hearing at which the parties could speak and call evidence.

5 THE HEARING

5.1 General

5.1.2 Each of the parties (the Fire Service, the owner, and the territorial authority) was represented by legal counsel.

5.1.3 Also present were officers of the Fire Service, an officer of the owner, the risk assessor, the peer reviewer, officers of the territorial authority, the territorial authority's consultant Experts B and D, and officers of the Department.

5.1.4 As to matters of law, each counsel made legal submissions.

5.1.5 As to matters of building technology, the hearing was concerned almost entirely with the second risk assessment, the peer review, and the comments on those documents made by Experts A, B and D. As to those matters, the hearing became in effect a technical discussion between experts. New material was generated and tabled in the course of that discussion, particularly as to the probabilities mentioned in 5.3.6 below. Further written comment on that new material was received after the hearing and circulated to the parties.

5.2 Legal submissions and my responses

5.2.1 Legal submissions on behalf of the Fire Service recognised that the delay in issuing the determination could have adverse financial effects on the owner.

5.2.2 The Fire Service emphasised its general concern about high rise buildings with only a single vertical means of escape, but accepted the passage in the first draft in which I said:

> "13.3.1 The Fire Service said that the building was typical of a number of recent or proposed apartment buildings and requested that I 'make appropriate general statements in my determination to assist developers and territorial authorities that are dealing with these buildings'.
>
> "13.3.2 In Determination 2004/65 the Authority said:
>
> > "'6.1.1 The Authority takes the view that as a matter of law this determination is binding only on the parties and only in respect of the building concerned.
> >
> > "'6.1.2 Nevertheless, the Authority recognises that people considering other buildings will frequently use a determination for guidance. The Authority therefore tends to set out its reasoning in more detail than may be strictly necessary for the particular case, in the hope that the reasoning, as distinct from the conclusions, will be of use as an example of the process of arriving at a decision in a different case involving comparable circumstances.'
>
> "13.3.3 I take the same view in this case, but also note that this building and particularly its floor layout are not common. Any broader interpretation of the conclusions of this determination must acknowledge that fact."

5.2.3 In this instance, I recognise that people considering other similar buildings could well consult this determination for guidance. Accordingly, I emphasise that this determination is concerned with a unique building and is made in unique circumstances. Any interpretation of this determination must recognise those facts.

5.2.4 Legal submissions on behalf of the owner included that the Fire Service "had not discharged the evidential threshold" and that by virtue of certain communications between the Fire Service and the other parties the Fire Service must be taken to have elected to abandon its application for a determination.

5.2.5 I do not agree with those submissions. As I said in the first draft, I have acted on the application and left such questions of law to be resolved in the Courts if necessary.

5.2.6 It was submitted for the owner that the current use of the building as a hotel, as distinct from a multi-unit dwelling, applied to only a few apartments and was a matter for the territorial authority and irrelevant to the determination. See 6.4 below.

5.2.7 It was also submitted that the owner had "done nothing wrong" but had obtained professional advice before applying for a building consent, had constructed the building in accordance with a building consent, had obtained additional technical advice when requested for the purposes of the determination, and had acted in good faith throughout the process. A determination that the building consent should be withdrawn would have very significant consequences for the owner.

5.2.8 I recognise the validity of those submissions, which I have taken into account as described in 6.2.10 below.

5.2.9 Counsel for the owner also said in effect that the building had now been the subject of numerous experts' reports and "the process had gone almost to exhaustion". It was time to recognise that there was a general consensus amongst the experts that the building complied with the building code.

5.2.10 I note that Expert D did not share in that consensus and that Expert B appeared to have recognised the validity of Expert D's approach.

5.2.11 Counsel for the territorial authority made similar comments to the effect that I should accept that there was a consensus of experts and determine accordingly. As to Expert D, counsel said:

> "If you subject any building consent proposal to the form of critique [Expert D] had taken you would have to question whether any building would get a building consent . . . there is an air of unreality in that level of analysis . . .
>
> "Your decision has to be informed by the evidence before you not by what is largely a negative critique of various possibilities or various risks that may be open to better and further analysis."

5.2.12 I do not accept that there was in fact a consensus of all experts. I do not consider that in general I am bound to decide simply in accordance with experts' opinions. I consider that I must give due weight to experts' reports, but a simple opinion carries less weight than a detailed technical analysis based on established fire engineering

principles. I expect an expert's report to be robust enough to withstand peer reviews. I recognise that there must be a practical limit to the depth of analysis given to any particular building, but the more the building differs from the norm, in this case the acceptable solution C/AS1, the more the rigorous the analysis that is necessary to establish that the building complies with the building code.

5.2.13 Legal submission on behalf of the territorial authority also recognised that particular care would be needed to ensure that the building pressurisation system achieved its performance parameters throughout the life of the building. That could be achieved by appropriate provisions in the compliance schedule for the building.

5.2.14 It was also submitted for the territorial authority that the current use of the building as a hotel as distinct from a multi-unit dwelling was "a matter for the Council to deal with under its powers in the Building Act 2004". See 6.4 below.

5.2.15 It was also submitted for the territorial authority that even if it were to be determined that the building did not comply with the building code, it would be "impractical and unreasonable for the determination to reverse [as distinct from modify] the decision to grant consent".

5.2.16 I recognise the validity of that submission, which I have taken into account as described in 6.2.10 below.

5.3 The second risk assessment and the peer review

5.3.1 It was common ground that the second risk assessment and the assessment review were to be read together. The assessment review did not merely review the second risk assessment but also noted that:

"Some errors were found and corrected. A number of assumptions were challenged and tested. A substantial amount of supportive material was added to ensure the assessment was robust. Notably, by providing CFD [computational fluid dynamics] modelling to justify scenario selection."

5.3.2 I understood the risk assessor to accept that where the two documents differed, the assessment review was to take precedence. From here on, reference to "the assessment" is to be taken to be to the combination of the second risk assessment and the assessment review.

5.3.3 The assessment was a comparative analysis between the building concerned and a hypothetical building ("the comparison building") that has the same escape height and number of apartments (but a larger footprint) and complies with C/AS1. A typical floor plan for the comparison building is shown in Figure 3. In particular, the comparison building has two stairways but only a single source of supply to the sprinklers, only a diesel booster pump but no additional electrical booster pump for the sprinklers, has apartments separated from each other and from common areas by 30 minute instead of 1 hour FRR construction, and has no pressurisation system. The comparison building does not have an atrium and therefore is not required to have a smoke control system subject to specific fire engineering design. The assessment took no account of the voice communication system and the proposed staged evacuation

procedures. Nevertheless, the voice communication system must be installed as a requirement of the building consent and must be included in the compliance schedule.

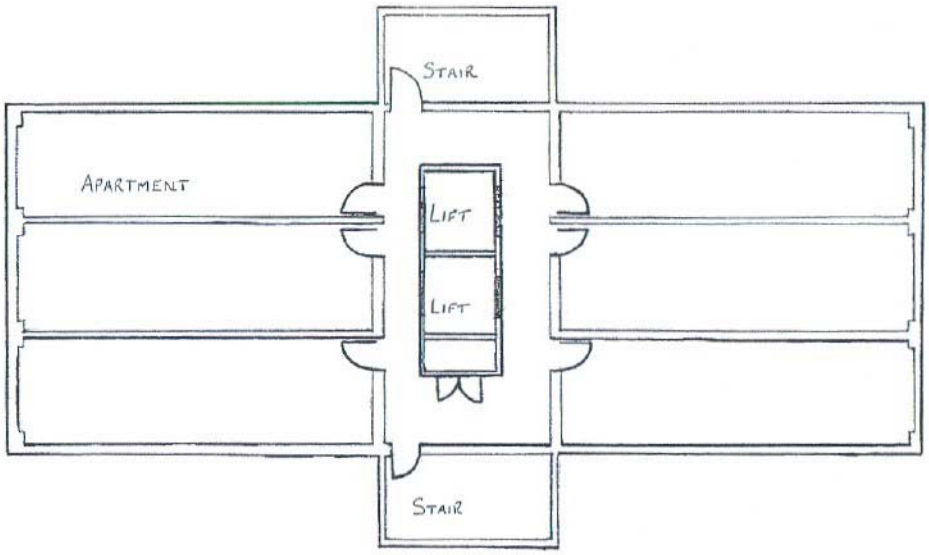


Fig. 3: Typical floor plan for the comparison building

5.3.4 The assessment identified various risk scenarios which were subjected to event tree analysis using a range of probabilities for the relevant events to calculate the individual risk of fatality for each outcome (typically of the order of 0.00001 to 0.0001 fatalities per occupant per fire).

5.3.5 Experts A, B, and D commented on the assessment. Most of those comments were addressed by the risk assessor and the assessment reviewer to the satisfaction of the experts.

5.3.6 The results of the assessment indicated that the, depending on the particular probabilities used in the analysis, building concerned had a probability of being as safe as or safer than the comparison building within the range of 51 to 74%. To put it another way, there was a 1 in 4 to 1 in 2 chance that the building concerned was not as safe as the comparison building.

5.3.7 The assessment review's executive summary included the following:

"The result is highly sensitive to the effectiveness of the sprinkler system, the effectiveness of the buildings pressurisation system, the effectiveness of the fire barrier between the apartment and stair/atrium and assumptions made of occupant load. . . . Considerable care will need to be taken during inspections and maintenance to ensure that the pressurisation system achieves its performance parameters. . . . We recommend that the owner engages, and continues to engage an Independently Qualified Person from a nationally recognised mechanical services company with an externally audited, and ISO9000 accredited quality management procedure."

5.3.8 At the hearing, the owner indicated acceptance of that advice, see 6.3.3.2 below.

6 DISCUSSION

6.1 Overview

6.1.1 The building is significantly different from the comparison building complying with C/AS1. In particular, whereas C/AS1 requires two stairways for an escape height greater than 25 m, and requires that each of those stairways is in a protected shaft, this building has an escape height of 48 m but has only one stairway which is not in a protected shaft.

6.1.2 To establish that the building nevertheless complies with the building code, the owner obtained:

(a) The fire report, see 2.4.1 above, was essentially a comparison of the fire safety features required by C/AS1 and those provided in the building. Emphasis was placed on a staged evacuation system. There was no comparative risk analysis.

The fire report was reviewed by the territorial authority's consultant, who also emphasised the importance of the proposed staged evacuation system. The review resulted in some modifications to the fire report, which was then accepted by the territorial authority for building consent purposes.

Both the fire report and the review were essentially exercises of engineering judgment. In my view, such judgment can be valuable but has inevitable limitations. In particular, I consider that engineering judgment cannot be accepted as the basis for deciding whether an unusual building such as this one, which is so different from the acceptable solution, nevertheless complies with the building code. In general, I take the view that where it is possible, as in this case, to use an objective methodology then that is to be preferred.

(b) The risk assessment report, see 3.1.2 above, included a limited risk analysis comparison with several hypothetical buildings complying with C/AS1. It concluded in effect that the risk of loss of life in the building was similar to that in a complying building of the same height and occupant load, but significantly less than in complying buildings with higher occupant loads.

I obtained reports on the risk assessment report from Experts A, B, C, and D, and after careful consideration I concluded, in the first draft determination, that I could not be satisfied on reasonable grounds that the building complied with the building code, see 3.2.1 above.

(c) The second risk assessment and the peer review, see 5.3 above, collectively referred to as "the assessment".

I obtained reports on the assessment from Experts A, B, and D. The assessment and those reports were discussed at the hearing, at which more information was tabled.

That information, together with my conclusions, is discussed below.

6.2 Alternative solutions and acceptable solutions

6.2.1 The owner contends that the design is an alternative solution complying with the building code but not with the acceptable solution C/AS1. The Authority said in Determination 2004/5:

> "5.2.2 As for the proposed alternative solutions, the Authority's task is to determine whether they comply with the performance-based building code. In doing so, the Authority may use the acceptable solution as a guideline or benchmark[1].
>
> "5.2.3 The Authority sees the acceptable solution C/AS1 as an example of the level of fire safety required by the building code. Any departure from the acceptable solution must achieve the same level of safety if it is to be accepted as an alternative solution complying with the building code.
>
> "5.2.4 As it has in several previous determinations, the Authority makes the following general observations about acceptable solutions and alternative solutions:
>
> > "(a) Some acceptable solutions cover the worst case so that in less extreme cases they may be modified and the resulting alternative solution will still comply with the building code.
> >
> > "(b) Usually, however, when there is non-compliance with one provision of an acceptable solution it will be necessary to add some other provision to compensate for that in order to comply with the building code."

6.2.2 The independent experts were asked to report in accordance with that approach. Expert D pointed out that the fire safety systems were not in fact independent, and that the provision of multiple systems, whether or not they are independent, does not necessarily result in a safer building. It is often better to have one reliable system than two or more ineffective or less effective systems.

6.2.3 In the light of those comments, I accept that the Authority's reference to "the worst case" is too broadly worded in an application of this type. A better formulation would be:

(a) Some acceptable solutions cover the worst case of a building closely similar to the building concerned. If the building concerned presents a less extreme case, then some provisions of the acceptable solution may be waived or modified (because they are excessive for the building concerned) and the resulting alternative solution will still comply with the building code.

(b) Usually, however, when there is non-compliance with one provision of an acceptable solution it will be necessary to add some other provision or provisions in order to comply with the building code.

"[1] *Auckland CC v NZ Fire Service* [1996] 1 NZLR 330."

6.2.4 In this case, I consider that the type of comparative risk analysis used in the assessment is an appropriate method for deciding whether an alternative solution is effectively equivalent to the corresponding acceptable solution in terms of fire safety. In particular, I accept the following comment from Expert D:

> "In considering changes to the fire safety system in a building of the sort proposed (deletion of a stairway, improvements to the sprinkler system, stair pressurization, etc) it needs to be understood that each of these changes affects the level of fire safety in the building in different ways. Consequently the only way of comparing these changes is on a risk basis – how much (and in which direction) each of them changes the level of safety in the building."

6.2.5 However, I recognise that there is as yet inadequate data for fire engineering to achieve the accuracy that is expected from, for example, structural engineering. In particular, the probabilities used for a fire analysis must be based on fire statistics derived from a comparatively small data pool of mainly overseas buildings of unknown design. That applies not only to fire scenarios but also to the proper functioning of critical systems including the sprinklers, the pressurisation system, the smoke detectors and fire alarms, the automatic drop windows, and the door closers. There appears to be no certainty as to the extent to which those statistics and probabilities are appropriate for use in the New Zealand context.

6.2.6 That does not mean that the method cannot be used in New Zealand, but it does mean, in my view, that the results of such analyses need to establish a high probability that an "alternative solution" building would be safer than the corresponding "acceptable solution" building in all relevant fire scenarios and across a realistic range of probabilities.

6.2.7 In this case, I do not consider that the 51 to 74% probability mentioned in 5.3.6 above is high enough.

6.2.8 I accordingly conclude that I do not have reasonable grounds on which to decide that the building concerned complies with clause C2 of the building code (as to clause C3, see 6.5 below).

6.2.9 However, that is not the end of the matter. I have no specific information about the extent to which the building concerned is likely to be less safe than the comparison building. However, my firm impression, having read the various reports and listened to the discussion at the hearing, is that each of the fire engineers involved accepted that the building concerned was, if not equivalent to the comparison building, was not far short of equivalence.

6.2.10 I take the view that under sections 20(a) and 34(4) of the Act I have the power to modify the territorial authority's decision to grant the building consent by adding a waiver or modification of the building code subject to appropriate conditions. I take that to be the course advocated by the territorial authority, see 5.2.15 above. Factors to be considered include:

(a) There is some probability that the building is not as safe as the comparison building. However, on the evidence placed in front of me I consider that the difference, if any, is small (see 5.3.4).

(b) I do not consider that modification is likely to be unfair to individual unit title holders. Subject to final inspections by the territorial authority for code compliance certificate purposes, I conclude that the building complies with the plans and specifications so that unit title holders will presumably receive what they bargained for except that in some circumstances there is possibly a marginally higher than expected risk to life safety.

(c) I consider that a modification of the building consent will not have adverse consequences for future purchasers or in the event of alterations to the building provided that the background to the modification is understood. Accordingly, the territorial authority is requested to ensure that this determination is included with any future land information memorandum in respect of the building.

(d) Cancelling the building consent would have very significant commercial consequences for the owner. Of course, such consequences carry much less weight than considerations of life safety.

6.2.11 In the circumstances, and taking account of the factors listed above, I consider that the reasonable and appropriate course is to modify the territorial authority's decision to issue the building consent by:

(a) Making the consent subject to a modification of the building code in accordance with section 34(4)(a) of the Act.

That modification is such, if any, modification of the extent to which the building must comply with clause C2 as is necessary to enable the territorial authority, under section 43(3)(b) of the Act, to issue a code compliance certificate for the building as constructed but only after successful commissioning of the pressurisation system and completion of any other building work required under the building consent.

(b) Making that modification subject to the conditions specified below.

6.3 Conditions as to the pressurisation system

6.3.1 General

6.3.1.1 The assessment reviewer said that "the pressurisation system is the key component in this building in achieving fire safety". It is therefore necessary to ensure that:

(a) The system as installed does in fact perform as assumed for the purposes of the assessment; and

(b) The system is properly maintained so as to continue to achieve that performance throughout the life of the building.

6.3.1.2 I take the view that the pressurisation system includes all items relevant to smoke control, including self-closing apartment doors, automatic drop windows, and internal partitions in the apartments.

6.3.1.3 Of course, other systems such as the sprinklers, smoke detectors, and fire alarms, are also critical to life safety and must be properly installed and maintained, but that should be ensured by the normal operation of the Building Act 2004 without the need for special conditions on the building consent.

6.3.2 Condition as to the commissioning of the pressurisation system

6.3.2.1 I would expect the territorial authority to refuse to issue the code compliance certificate unless and until it had reasonable grounds on which it could be satisfied that the building had been constructed in accordance with the plans and specifications and the fire report and that all systems, including the pressurisation system, were performing as intended. However, for certainty I consider that the building consent should be subject to a condition to the effect that the mechanical designer or an independent mechanical engineer of at least equivalent skill and experience with pressurisation systems, is to oversee and report on commissioning tests that establish that the system performs as assumed in the assessment.

6.3.3 Conditions as to the on-going maintenance of the pressurisation system

6.3.3.1 The assessment depended on the maintenance of the pressurisation system being subject to a significantly higher level of quality management than can be assured by the ordinary operation of the ordinary compliance schedule/independent qualified person/licensed building practitioner regime under the Building Act 2004.

6.3.3.2 As mentioned in 5.3.8 above, the owner accepted the assessment reviewer's recommendation "that the owner engages, and continues to engage an Independently Qualified Person from a nationally recognised mechanical services company with an externally audited, and ISO9000 accredited quality management procedure".

6.3.3.3 After the hearing, the owner submitted proposed compliance schedule procedures in respect of the pressurisation system, which are attached as the Appendix to this determination.

6.3.3.4 I consider that draft compliance schedule to be acceptable providing that the commissioning test results referred to in the draft do in fact establish that the system performs as assumed in the assessment (see 6.3.2.1 above).

6.3.3.5 However, it is not clear to me whether the territorial authority has the power to enforce the final compliance schedule as a condition of the building consent. The requirement that the procedures shall be undertaken by an independent qualified person/licensed building practitioner with special qualifications is over and above the requirements authorised in the Act or in the Building Act 2004, whichever applies. Arguably, all that can be enforced is that the relevant independent qualified person is acceptable to the territorial authority under section 44(9) of the Act or, from 30 November 2009, that the compliance schedule procedures are undertaken by a licensed building practitioner under section 103 of the Building Act 2004.

6.3.3.6 Accordingly, the conditions of the building consent as to the on-going maintenance of the pressurisation system need to consist of:

(a) That the compliance schedule shall consist of the procedures set out in the Appendix to this determination together with commissioning test results which establish to the satisfaction of the territorial authority that the system performs as assumed in the assessment; and

(b) That the owner shall execute such formal instruments, if any, that are binding on the owner and the owner's successors in title and that the territorial authority accepts as adequate to ensure that the territorial authority can enforce compliance with that compliance schedule.

6.4 Conditions as to the use of the building

6.4.1 As mentioned in 2.5.1 and 5.2.5 above, the building was advertised as a "hotel" and at the time of the hearing some of its apartments are being used for short term accommodation.

6.4.2 That means that for the purposes of C/AS1, the building currently comes within Purpose Group SA as "transient accommodation". However, the comparison building used in the assessment came within Purpose Group SR as a multi-unit dwelling. If the comparison building had been SA then it would have been required to have an escape route pressurisation system. In that case, there can be no doubt that the assessment would have shown that the building fell well short of being as safe as the comparison building. I note that Purpose Groups SA and SR correspond to Uses SA and SR in the Building (Specified Systems, Change the Use, and Earthquake-prone Buildings) Regulations 2005.

6.4.3 There was some discussion at the hearing about the building being used for transient accommodation. Both the owner and the territorial authority submitted that if the building had undergone a change of use, that was irrelevant to the determination and should be dealt with by the territorial authority.

6.4.4 I accept those submissions in principle, but have some problems with them in practice:

(a) It is not clear to me whether the building was ever used as anything other than a hotel. If it was not, then it is difficult to see how there has been any change of use.

(b) If there was a change of use the territorial authority took no action, which detracts from its submission that a change of use is a matter for the territorial authority to deal with by way of its regulatory powers under the Building Act 2004.

(c) The relevant power is to bring a prosecution under section 114 if the owner has failed to give advance notice of the change of use or, having given such notice, has failed to satisfy the territorial authority that, in its new use, the building will comply as nearly as is reasonably practicable with the provisions of the building code (amongst others) that relate to means of escape from fire. I take the view that owners cannot change the use of brand new buildings and then be

able claim that they are not required to comply completely with the relevant provisions of the building code (I hasten to add that the owner in this case has made no such claim).

(d) Under section 378 of the Building Act 2004, the territorial authority must bring any such prosecution within 6 months after the time when it knew or should have known of the change of use. I have no information as to when that was in this case.

6.4.5 The justification for the modification of clause C2 of the building code discussed in 6.2.9 to 6.2.11 above applies only if the building comes within purpose group SR for the purposes of C/AS1, or Use SR for the purposes of the Building (Specified Systems, Change the Use, and Earthquake-prone Buildings) Regulations 2005, see 6.4.2 above. To avoid doubt on that point, I consider that the building consent should be subject to a specific condition that it applies only in respect of the building in Use SR under the Building (Specified Systems, Change the Use, and Earthquake-prone Buildings) Regulations 2005. That necessarily implies that the code compliance certificate for the building is not to be issued if the building is currently being used as a hotel or the like.

6.5 Clause C3 of the building code

6.5.1 The assessment was concerned solely with compliance with clause C2 of the building code (means of escape). However, I considered that clause C3 (spread of fire) should also be considered, and specifically clause C3.3.9, which reads:

"**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."

6.5.2 The term "fire safety system" is defined in clause A2 as:

"The combination of all methods used in a building to warn people of an emergency, provide for safe evacuation, and restrict the spread of fire, and includes both active and passive protection."

6.5.3 In response to questions at the hearing, I understood Counsel for the Fire Service to say:

(a) Clause C3.3.9 relates, among other things, to evacuation schemes under the Fire Service Act 1975 and the Fire Safety and Evacuation of Buildings Regulations 1992, which in turn relate primarily to the internal management of buildings.

(b) The Fire Service had no input into building consents under the Act so that evacuation schemes have to be framed around buildings as constructed. I observe that the Fire Service can have input by applying for a determination as

in this case. I also note that the situation is different under the Building Act 2004.

(c) The focus of clause C2 is on safe escape from the building. In this case, if the building complies with clause C2 then clause C3.3.9 "is largely dealt with because occupants are safe by the time the Fire Service arrives".

(d) If I determine that compliance with clause C2 has been achieved, then the Fire Service will not pursue matters under clause C3.3.9.

7 REMARKS

7.1 The building consent

7.1.1 In the first draft of this determination I said:

"14.2.1 I do not know what particular building work is authorised by the building consent. All I have been given is the fire report and the mechanical report together with outline architectural drawings and schematic drawings of the pressurisation system. As far as I can tell, that is all the information available to the territorial authority when it issued the building consent.

"14.2.2 In such circumstances, I take the view that the proper course would have been to issue the building consent in stages as final "approved for construction" plans and specifications for each stage were received and considered.

"14.2.3 However, the building consent did, very properly, require certification of systems by the designer and commissioning tests (which the territorial authority and its consultant could witness) before a code compliance certificate would be issued.

"14.2.4 Nevertheless, because of the lack of full plans and specifications, I would not have confirmed the territorial authority's decision to issue the building consent even if I had concluded that submissions justified the use of a single means of escape from fire."

7.1.2 Those comments are still valid despite the fact that I am modifying rather than cancelling the building consent.

7.2 Establishing compliance with the building code

7.2.1 When an alternative solution is significantly different from the corresponding acceptable solution, particularly in respect of design against fire, then it is legitimate to establish that the alternative solution complies with the building code by comparing it with the acceptable solution.

7.2.2 The comparison must be between the alternative solution building and a building for the same use that has closely similar physical parameters that complies with C/AS1. It is not acceptable to compare the alternative solution building for a different use or having significantly different physical parameters. That is because C/AS1 does not

necessarily result in the same level of safety for buildings having different uses or different parameters.

7.2.3 An acceptable method of comparison is to evaluate the individual risk of fatality in each building for realistic ranges of fire scenarios and of probabilities that building elements will fail to perform as intended.

7.2.4 The comparison must show a high probability that the alternative solution will be as safe or safer that the comparison building in all such scenarios and for all such probabilities.

7.2 Granting waivers or modifications of the building code

7.3.1 A waiver or modification of the building code must not be granted without careful consideration of all the circumstances of the particular case concerned. In this case, the particular circumstances are such that the partial waiver of clause C2 mentioned in 6.2.11 above cannot be taken as a precedent for any similar waiver or modification in respect of another building. Indeed, any particular waiver or modification is unlikely to be of any precedent value for another waiver or modification in anything other than the simplest of cases, such as marked-out car parks that are accessory units under the Unit Titles Act 1972, see Determination 2005/34.

8 THE DECISION

8.1 In accordance with section 20 of the Building Act 1991, I hereby:

(a) Determine that the building does not comply with clause C2 of the building code.

(b) Modify the territorial authority's decision to issue the building consent by incorporating in that consent a modification of clause C2 of the building code as specified in 6.2.11(a) above subject to the following conditions:

(i) That the mechanical designer responsible for the design of the pressurisation system, or an independent mechanical engineer of at least equivalent skill and experience with pressurisation systems, is to oversee and report on commissioning tests in accordance with AS 1668 that establish, to the satisfaction of the territorial authority, that the system performs as assumed in the assessment.

(ii) That the compliance schedule for the building shall include the procedures set out in the Appendix to this determination together with commissioning test results which establish to the satisfaction of the territorial authority that the system performs as assumed in the assessment.

(iii) That the owner shall execute such formal instruments or change in the rules of the body corporate that are binding on the owner and the owner's successors in title and that the territorial authority accepts as adequate to ensure that the territorial authority can enforce compliance with that compliance schedule.

(iv) This building consent applies only if the building comes within Purpose Group SR of C/AS1, which corresponds to Use SR of the Building (Specified Systems, Change the Use, and Earthquake-prone Buildings) Regulations 2005.

Signed for and on behalf of the Chief Executive of the Department of Building and Housing on 22 July 2005.

John Gardiner
Determinations Manager

APPENDIX
Compliance schedule procedures for the pressurisation system

CS 5 ESCAPE ROUTE PRESSURISATION SYSTEM

A. Arrangement

The main feature of the escape route pressurisation system, is that the vertical escape route (the Atrium and stair) is pressurised with outdoor air to create a pressure difference between the escape route and occupied spaces.

The system consists of roof-mounted supply fans one ground level supply fan and importantly, it also includes the atrium wall systems, doorsets and air relief via 'drop windows'. This escape route pressurisation system shall be known as the "Pressurisation System".

The pressurisation system includes the following systems:

A1 All doors to units situated in the building shall have self closing doors, so as to ensure that each door closes automatically;

A2 Prevention of the construction of any internal partitions in any of the units in the building which will have the effect of restricting air flow from the drop windows situated in each of the units;

A3 The maintenance of the drop windows in each of the units and ensuring that such drop windows are not obstructed by occupants of the units so as to make such drop windows ineffective;

A4 Ensuring that the physical integrity of the fire rated doors and walls situated in the building are not compromised.

B. Inspections

The Pressurisation System shall be inspected regularly to ensure continued effective operation. Inspections shall be monthly, quarterly, six monthly, and yearly. Inspection content in respect of the Pressurisation System shall be in accordance with the standard known as "AS 1851.6" which is annexed to this Compliance Schedule as Schedule A and shall be deemed incorporated within it, and shall be known for the purposes of this Compliance Schedule as the "Standard".

C. Maintenance Standard

The Pressurisation system shall be maintained in accordance with the following part of the Standard: 'Maintenance of fire protection equipment. Part 6: Management procedures for maintaining the fire and smoke control features of air-handling systems'.

The Standard is current at the time of issuing this Compliance Schedule, and is based upon the Australian Standard known as AS 1851.6 which is the Second Edition (1997) of that Australian standard ("Current Standard"). Where the Current Standard is updated by the relevant Australian authority, and Subsequently incorporated in the New Zealand Compliance Documents, this Compliance Schedule shall be updated and amended as necessary and in a timely manner to suit the revised standard.

D. Persons Responsible

All inspection and maintenance shall be undertaken by independent qualified persons, from a nationally recognised mechanical building services company that has an externally audited, and ISO 9000 accredited, quality management procedure. The independent qualified persons shall also meet the requirements of Part 4 of the Building Act 2004 so as to be licensed building practitioners for the nature of the inspections and maintenance contemplated by this Compliance Schedule when Part 4 of that Act becomes operative.

E. Additional Requirements

The following mandatory requirements apply and are additional to those of the Standard.

E1 Six monthly inspections shall be to the Level 1 routine described in the Standard in section B10.1.

E2 Section B10.1(b)(ii) of the Standard the check, while the system is operating, of the "ease of opening of doors", shall be extended to include a check also while operating, "and also of the ability for the doors to auto-close and latch."

E3 Six monthly inspections shall include inspections of each apartment to ensure the non-mechanical relief air path is maintained. This includes, but is not limited to, checks that internal partitions remain less than full height and that the air relief 'drop window' is not obstructed by curtains or drapes.

E4 Annual inspections shall be to the Level 3 routine described in the Standard in section B10.3, except that B10.3(a) Note 1 (representative sampling) of the Standard shall not apply, that is all doors shall be tested, and for B10.3(b) of the Standard all doors shall be similarly tested.

E5 Annual inspections shall also measure the inlet air flow rate at all fans to ensure that commissioning test results are maintained which shall be in accordance with the commissioning test results annexed as Schedule B which are deemed incorporated in and form a part of this Compliance Schedule).

E6 Annual inspections shall also include a check of the physical integrity of the Atrium walls and doorsets.