



Determination 2016/048

Regarding the requirements under section 112 to remediate the fire separation between units in an apartment complex, and the compliance of the proposed solution at 287 – 289 Shirley Road, Papatoetoe, Auckland

Summary

This determination concerns construction defects that were exposed during building work undertaken to remediate weathertightness issues. The determination considers the code-compliance of the use of intumescent sealant without plasterboard patches for penetrations in intertenancy walls, and discusses the application of section 112 of the Act in respect of the defects in existing construction including those not exposed as part of the proposed building work.

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1. The matter 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 and Assurance, Ministry of Business, Innovation and Employment (“the Ministry”), for and on behalf of the Chief Executive of the Ministry.

1.2 The parties to the determination are:

- the owners of the units acting through the Body Corporate BC339817 (“the applicants”) represented by a building consultant (“the consultant”)
- Auckland Council (“the authority”), carrying out its duties as a territorial authority or building consent authority.

1.3 I have provided the New Zealand Fire Service Commission (“the NZFS”) with the determination documentation for comment by way of consultation under section 170 of the Act².

1.4 This determination arises from a difference in view between the parties as to whether remedial work is required to address all of the non-compliant penetrations through fire separations between the units as part of the consented alterations, and whether the proposed solution using intumescent fire sealant complies with the Building Code (First Schedule, Building Regulations 1992). The application was made on the basis of an individual unit, with the consultant noting that the principles of the proposed remediation would generally apply to all units.

1.5 The matters to be determined³ in this case are:

- whether the authority correctly exercised its powers of decision in requiring all of the penetrations and gaps to the solid timber in the intertenancy walls, including those not exposed during the consented alterations, to be remediated, and
- whether the proposed solution using intumescent fire sealant without plasterboard patches would comply with Clause C3.3 of the Building Code.

1.6 In making my decision, I have considered the submissions of the parties, the advice provided by the applicant’s fire engineer, the report of the independent expert engaged by the Ministry to provide advice on the matter (“the expert”) and the other evidence in this matter.

¹ The Building Act, Building Code, Acceptable Solutions, past determinations and guidance documents issued by the Ministry are all available at www.building.govt.nz or by contacting the Ministry on 0800 242 243.

² In this determination, references to sections are to sections of the Act and references to clauses are to clauses of the Building Code.

³ Under sections 177(1)(a), 177(1)(b) and 177(2)(a) of the Act.

2. The building work and background

2.1 Overview

2.1.1 The property is an existing development of 56 three-storey terraced town houses, in four blocks, that was constructed in 2003/2004 (see figure 1 below). Each house has a garage at the lower level, with living spaces and bedrooms in the two upper levels (see figure 2 below).

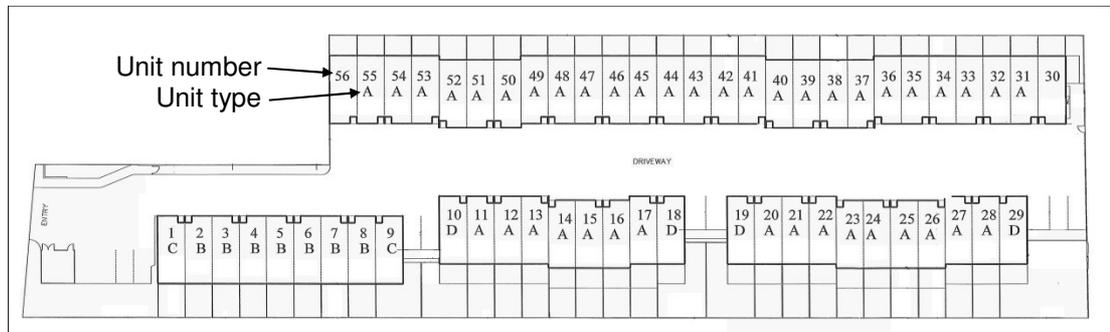


Figure 1: Site plan (not to scale)

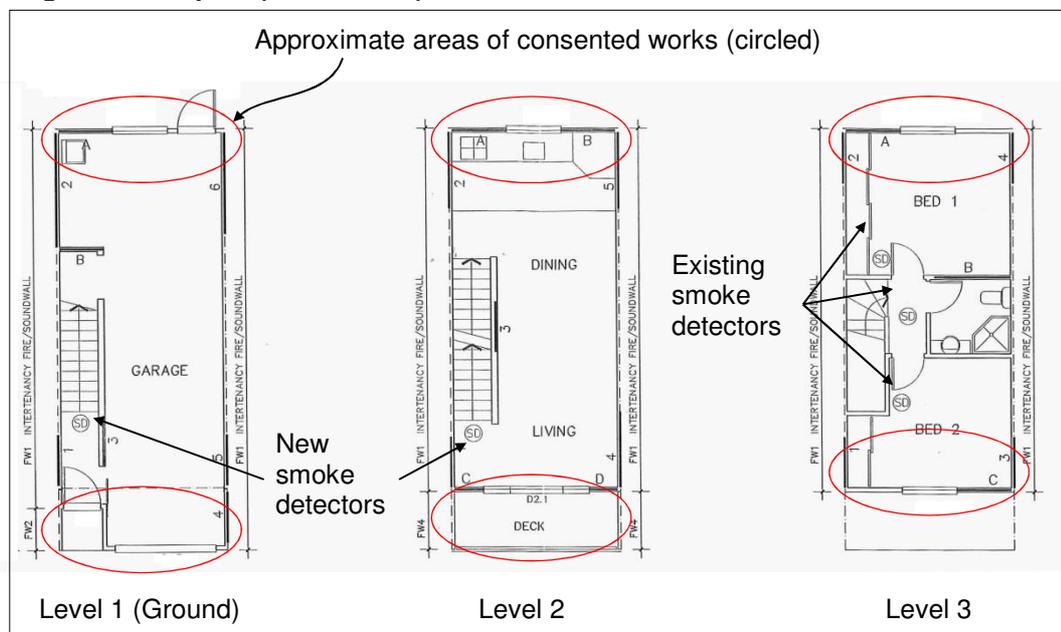


Figure 2: Floor plans unit type A (Taken from bracing plans. Not to scale)

2.1.2 At the time of construction, the fire rating between adjacent units (FRR⁴ of 30/30/30) was achieved with a mix of conventional fire-rated plasterboard lining to timber framing, and, above the wall framing, solid timber blocking. The solid timber blocking comprised a pair of 250x50mm boundary joists located over a pair 100x50mm top plates; this giving a total timber thickness of about 90mm. The solid timber blocking is located in the ceiling void above a 13mm plasterboard lining

2.1.3 The plasterboard linings to the framed walls are 2x10mm plasterboard on acoustic battens to one side, and 1x10mm and 1x13mm plasterboard to the other. The linings are to meet the required acoustic separation between units and are well in excess of the required fire separation.

⁴ Fire resistance rating

- 2.1.4 Each unit has its own egress route independent of any other route, and a compliant single means of escape (<25m) to the front door at ground level, plus an additional door at the rear of the garage. The units have Type 1 smoke alarms in the two bedrooms and above the landing on level 3 (refer figure 2).

2.2 The alterations

- 2.2.1 On 13 November 2013 the authority issued building consent No. B/2013/2209 for alterations to be carried out to address weathertightness issues. The scope of work included removal and replacement of cladding and damaged timber framing, along with some internal plasterboard linings and construction of deck structures. (The extent of the work with respect to removing linings at the front and rear of the units is indicated in figure 2.)
- 2.2.2 The fire report provided in support of the consent application noted that the building was ‘recent ... (built in 2004)’, and all the fire ratings identified in the original fire report were assumed to be in compliance with the Acceptable Solution C/AS1, and that the ‘alterations must not reduce the rating of existing fire separations.’ Under the heading ‘Fire safety design specification: Fire rating of services penetrations’ the report further stated that:

Any penetrations through existing or new fire-rated walls or floors shall be fire-stopped. The design and installation of Passive Fire Protection systems is paramount to the overall fire safety requirements of the building. ... Passive Fire Protection is all about Tested and Approved systems therefore it is imperative that those who will be completing the fire stopping understand the requirements (and limitations) of each system.

2.3 Discovery of the defects

- 2.3.1 The building work commenced, and when internal plasterboard ceiling linings were removed it was observed that there were a number of cable penetrations through the inter-storey boundary joists within the inter-tenancy walls at both upper levels. Some of the penetrations had intumescent fire sealant protection applied but others had no protection applied. In a site instruction notice dated 11 May 2015 the authority recorded:

Wire penetrations through [inter-tenancy] walls to be reviewed by designer. Spread of fire.

- 2.3.2 Also in some areas the timber wall framing was not tight against the underside of the boundary joists, and in a small number of locations plastic flush boxes had been fitted to electrical fittings within the inter-tenancy walls and without intumescent pads having been fitted. In an inspection record dated 22 May 2015 the authority noted:

Fire ratings front entry area. Flush boxes to be addressed. Wire penetrations through [inter-tenancy] walls previously identified yet to be addressed also (Level 1)

- 2.3.3 By email on 22 May 2015 the consultant requested the authority clarify the items that failed during the inspection that day. The authority responded on the same day with the following, referring to clauses C and G6 with respect to the failed fire rating inspection:

1. Areas where Fire rated gib has (*sic*) not screwed off in accordance with the manufacturer’s specifications
2. Design Clarification was required re FW1 type – noise/ fire ratings, front entries vary as to the location of steel columns their fire rating and the horizontal resilient channel specified was not installed/ sighted by [the authority]

3. Plastic Flush boxes in I/T walls
4. Wire penetrations through I/T walls.

2.3.4 The applicants have stated that during the inspection of 22 May 2015 the authority indicated that it expected the penetrations and flush boxes of all areas of inter-tenancy walls to be addressed, not just those that were exposed as part of the alterations. The architect emailed the authority on 22 May 2015, noting in regards to items 3 & 4 (see paragraph above) that this work wasn't included in the scope of the building consent and that generally no work was being carried out to the intertenancy walls as a whole.

2.4 The proposed solution

2.4.1 The consultant received an advice note from a fire engineer on 22 May 2015, which, amongst other matters, recommended that the electrical flush boxes be changed for a fire-rated type (item #1 in the notice), and stated that penetrations through solid timber at the top of inter-tenancy walls should be sealed with intumescent fire sealant (item #2). This advice was forwarded to the authority.

2.4.2 Correspondence followed between the parties, including the applicants' architect, and the fire engineer. In an email on 25 May 2015 fire engineer stated

- 1) Under section 112 of the [Act] there is no requirement to upgrade fire ratings.

...

The email referred to issues associated with the fire protection of steel members that appear separate to the matters considered herein.

2.4.3 The authority referred to the fire report (see paragraph 2.2.2) regarding fire rating of services penetrations and set out its view that existing penetrations through the inter-tenancy walls were within the scope of the consent and would need to be addressed.

2.4.4 By email on 26 May 2015, the fire engineer clarified the extract referred to in the fire report: 'There was no intention to upgrade – just to ensure that the existing ratings were retained.' The architect forwarded this advice to the authority, noting that the building work being carried out as part of the alteration was only to specific isolated areas at the junctions with external walls and querying why the remainder of the inter-tenancy walls needed to be addressed. The consultant considered that an appropriate action would be for remedial work to be carried out in those areas that were exposed as part of the weathertightness work, and the applicants to be advised of the deficiencies that had been found, giving them the option of further investigation and remediation to be carried out separately from the consented weathertightness work so as to avoid delays.

2.4.5 It is my understanding that the proposed solution was implemented to units 23 to 29, which was then inspected by the authority. An inspection record dated 19 June 2015 notes 'fire sealant applied on all [wiring] penetrations'. I take this to apply to only the penetrations that were exposed during the weathertightness remedial work. Implementation of the proposed solution continued to the remaining units in that block. A further inspection record dated 22 June 2015 notes 'fire sealant applied to penetrations through [inter-tenancy] walls not in accordance with [sealant manufacturer's] data sheet ...'

2.4.6 The consultant then sought further advice from a fire engineer as to the method of fire-stopping the penetrations. In advice dated 24 June 2015, which was subsequently forwarded to the authority, the fire engineer observed that he was not aware of any fire stopping systems that have been tested in or on a timber substrate, but that any intumescent fire sealant applied to a penetration into the timber to the depth of at least the expected charring depth (nominally 18mm) would provide at least the same fire resistance as the timber. The fire engineer concluded with the opinion that:

... the use of [intumescent] sealant that has been tested on substrates other than timber is acceptable providing the product is applied to a depth of at least 20-25mm, on an “as nearly as is reasonably practicable” basis.

2.5 The approved solution

2.5.1 The authority responded on 30 June 2015, stating that it considered the proposed solution was not acceptable because no testing had been done of intumescent fire sealant protection applied directly to timber framing, and in its view ‘a 150 x 150 mm [plasterboard] patch would meet the [plasterboard manufacturer’s manual] where details show plaster board extending 75mm out from a penetration.’ (From the photos of the cable penetrations provided by the applicant, many penetrations are close to the edge of timber member concerned, and the 75mm extension sought by the authority is not able to be achieved.) Refer to figure 3 below:

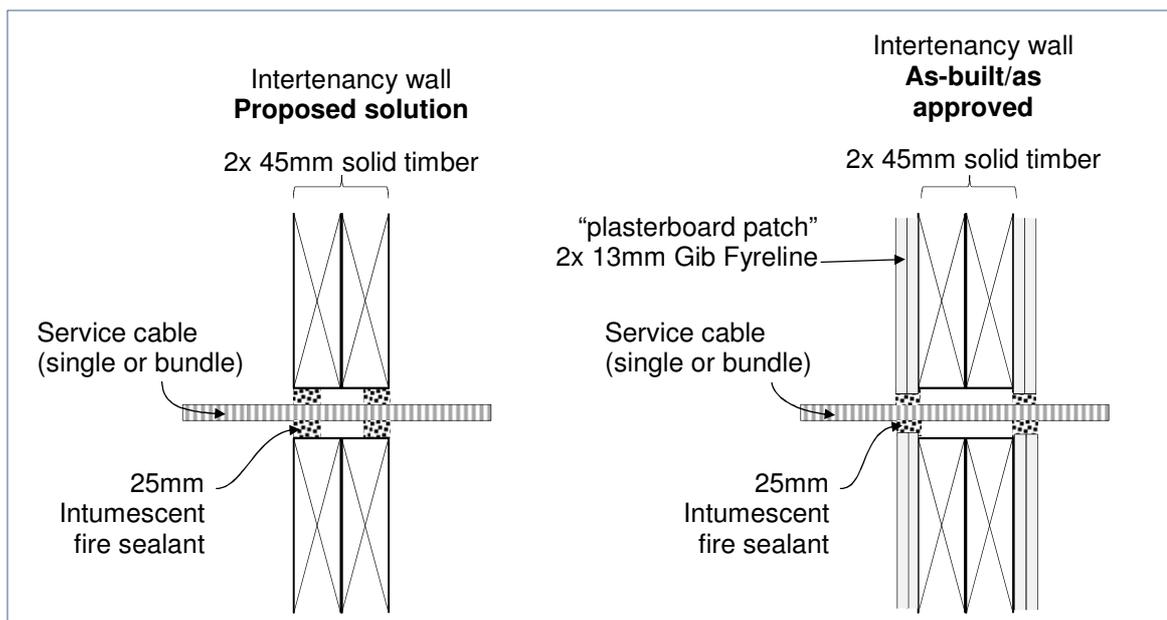


Figure 3: cross section of intertenancy wall (not to scale)

2.5.2 In an email on 1 July 2015 the architect noted that as there was some urgency the authority’s suggested method would be used for the current stages as a minor variation. On 6 July 2015 the architect sought advice from the fire engineer in regards to the horizontal gaps between the boundary joists and the top plate below, noting that the authority would not accept the use of intumescent fire sealant to fill the gaps in the timber. The fire engineer provided advice on 3 July 2015, setting out the fire-stopping of services penetrations through the timber framing, which included:

1. Where the penetration is into bare timber, install a layer of plasterboard around the penetration ...
 2. For cable and metal pipe penetrations, seal any gaps around the cable/pipe with fire-rated mastic, installed to comply with the manufacturer's instructions. Not (*sic*) in particular the minimum depth/thickness of sealant that must be achieved.
 3. For plastic pipe, install an appropriately sized intumescent collar in accordance with the manufacturer's instructions.
 4. Not (*sic*) the location and type of all penetrations on as-built drawings.
- 2.5.3 In order to avoid delay and additional cost to the project, the architect applied for a minor variation to the approved plans in respect of remedial work to penetrations and the gaps between framing based on the fire engineer's advice (see above), which was approved on 13 July 2015.
- 2.5.4 On 23 July 2015 the supplier of the intumescent fire sealant confirmed that the sealant could be used within openings as shown on drawings provided for bundles of cables up to 12 in number 'as long as the annular space between the cables and the inner of the wall opening does not exceed 25mm and the [sealant] is applied at a minimum depth of 25mm'. A further application for minor variation was made on 24 July 2015, which noted that the supplier of the intumescent fire sealant had confirmed it could be used around bundles of cables.
- 2.6 The issue of the compliance of the proposed solution and the extent to which the existing defects required remediating under section 112 remained unresolved between the parties. The Ministry received an application for determination on 5 November 2015, and the application fee was paid on 30 November 2015.

3. The initial submissions

- 3.1 The consultant provided a written submission with the application for determination that set out the background to the dispute and a timeline of events. The consultant stated that the applicants have agreed to remedial work being carried out to penetrations and framing gaps that are exposed as a result of the building work carried out under the consent. In regards to the remaining existing penetrations and gaps the consultant submitted (in summary):
- It is not "reasonably practicable" to remediate all of the penetrations and gaps in the inter-tenancy walls. To do so would require the removal of the staircases to all levels in all units and the partial removal of all ceilings for the length of all inter-tenancy walls in order to verify non-compliance and then rectify where necessary.
 - While the proposed method is not a tested solution, the fire engineer is of the opinion that the proposed solution would mean
 - the buildings comply "as nearly as is reasonably practicable" (ANARP), and therefore would meet the test under section 112(1)(a)(i); and
 - the buildings would continue to comply at least to the same extent as before, and therefore meet the test under section 112(1)(b)(ii).
 - The authority's requirement for the installation of plasterboard patches around each penetration is also an untested solution, and introduces a significant additional cost (estimated to be \$1,000 for each unit) to the project.

- 3.2 The consultant questioned whether the authority was requiring work beyond what was reasonably practicable in requiring all penetrations be replaced or modified with an alternative system, and whether the proposed solution to seal the penetrations and framing gaps as per the fire engineer's advice of 22 May and 24 June 2015 would comply as an alternative solution.
- 3.3 The consultant provided copies of the following documents:
- Inspection records and site instruction notice.
 - Correspondence between the parties, including correspondence from the fire engineer and the supplier of the intumescent fire sealant and relevant drawings and product information.
 - Two applications for minor variations to the approved plans, including drawings and product information.
 - Detail drawing of original construction of inter-tenancy wall, stamped as approved on 19 September 2003.
 - Photographs showing the penetrations and gaps to the framing.
- 3.4 In response to a request from the Ministry the consultant provided a site plan and floor plans and elevations of typical units, noting that the units are generally identical in layout with the same detailing applied throughout with respect to the inter-tenancy wall arrangement. The consultant also provided a copy of the fire safety report dated 28 July 2003 for the original construction.
- 3.5 The authority acknowledged the application for determination and on 15 January 2015 provided copies of the following documents:
- A highlighted extract from the fire engineer's report used to support of the building consent application (refer paragraph 2.2.2).
 - The advice from the fire engineer dated 22 May 2015, with item #2 highlighted.
 - Relevant correspondence regarding the matter.
 - The application for the minor variation (approved on 13 July 2015) and supporting documents.

4. The expert's report

4.1 General

- 4.1.1 As noted in paragraph 1.6, I engaged an expert to assist me ("the expert"); the expert is a Chartered Professional Engineer with specialist expertise in fire safety. I requested the expert provide an opinion on the compliance of proposed alternative solution to use intumescent fire sealant at the penetrations and framing gaps with respect to the means of escape from fire. The expert provided a report dated 23 December 2015 was forwarded to the parties on the same day.
- 4.1.2 In considering the requirements set out in section 112 of the Act, the expert noted that the fire separations between the units constitute part of the means of escape as defined in section 7, in that they form part of the passive protection features that assist in protecting people from the effects of fire in the course of escape.

4.1.3 In regards to the original construction, the expert observed that the requirements of the fire design reports included 30/30/30 fire separations between the units, including fire-rated penetrations. As the as-built construction did not accord with those requirements, the required remedial work should be viewed as remediation of construction defects rather than upgrading.

4.1.4 The expert considered the solid timber thickness of 90mm will 'give well in excess of the 30 minute requirement using a char rate of 0.6mm/minute'.

4.2 Compliance of the proposed solution

4.2.1 The expert agreed with the fire engineer's view that it is reasonable to expect that the intumescent fire sealant is likely to perform its intended purpose in a substrate different to that which it was tested in. The expert stated:

The sealant requires a substrate that it is able to expand against, given the performance of thermally thick solid timber in a fire (i.e. it chars) it is reasonable to expect the sealant would be able to expand against the wood similar to how it would in a concrete wall.

4.2.2 The expert also consulted a respected expert in passive fire protection systems ("the consulting expert") who considered it would be a reasonable solution for single or up to three cables, but not for 'big bunches'.

4.2.3 The expert recommended that the intumescent fire sealant be applied to a depth of 30-40mm into the timber each side of the penetration, and that there needed to be enough of an annular gap to ensure that sealant will fully envelope the cable(s).

4.3 Penetrations without fire rating

4.3.1 In regards to existing penetrations remaining as-is, the expert made the following comments (in summary):

- Assuming the smoke detection system is compliant and functioning, the occupants would be warned and able to escape relatively quickly, with the fire service likely to manage the evacuation of the rest of the complex where necessary.
- Smoke detection systems in adjacent units would not sound unless they also had smoke in their unit – the systems aren't interconnected and the current version of the Acceptable Solution, and the version that was in force at the time the consent was issued, does not require them to be.
- If fire walls are constructed correctly and all penetrations are fire-rated, then fire and smoke should not spread into adjacent units for the fire rating of 30 minutes.
- If the penetrations in the intertenancy walls between units are not fire-rated correctly, then fire/smoke could spread into a neighbouring unit. With respect to means of escape for an adjacent unit this is not expected to be any worse than if the fire started in their own unit; should sufficient quantities of fire or smoke spread to an adjacent unit the smoke detection system should operate and evacuation would be the same as if the fire began in that unit.
- There would be issues with fire/smoke spread in respect of protection of other property. If the buildings weren't constructed properly originally this would require remediation to ensure that a neighbouring property is not damaged by fire.

5. The first draft determination and submissions in response

- 5.1 On 18 January 2016 I issued a draft determination to the parties for comment. The draft determination concluded that the proposed alternative solution using intumescent fire sealant in the gaps in the timber would comply. The draft discussed the application of section 112(1)(a) and compliance as nearly as is reasonably practicable, and concluded that addressing the defects that were exposed during the alterations, or that would be exposed in future alterations, met the requirements of section 112(1)(a).
- 5.2 The consultant responded on 18 January 2016, accepting the findings of the draft and requesting a prompt response from the authority in order that an agreed methodology could be used for the next two stages of the remedial work to avoid delay and increasing cost. On 19 February the consultant confirmed that the first four stages had already been remediated in line with the details 'required' by the authority.
- 5.3 By email on 19 January the authority advised it was unlikely to be in agreement and sought further time in which to respond to the draft. On 4 February 2016 the authority requested a hearing be held on the matter, noting that it was obtaining legal advice on the matter.
- 5.4 In a letter dated 18 February 2016, the authority's solicitor advised that as a result of the expert's report and the determination's reliance on it the authority considered it necessary to engage an independent expert ("the fire engineer") to provide advice on the matter (refer paragraph 5.6). The authority considered the hearing was required in order to address the correct interpretation of section 112 with respect to fire safety features and their compliance.
- 5.5 The NZFS made a submission dated 8 March 2016, received on 9 March 2016. The NZFS expressed concern that the non-fire rated penetrations could put the occupants at risk as a result of smoke movement, and noting the potential non-operation of Type 1 smoke alarms. The penetrations may also lead to undetected spread of fire between adjoining units, and given the construction of the building this could lead to structural failure. The NZFS did not have a view on the compliance of the proposed alternative solution, but considered that an appropriate expert to provide advice on the matter would be someone who undertakes fire testing, and that it was outside the expertise normally held by consultant fire engineers.

5.6 The authority's fire report

- 5.6.1 As noted in paragraph 5.4 above, the authority engaged a fire engineer to provide a report on the proposed alternative solution and the process on which the solution was developed, and the possible consequences of non-fire stopped penetrations between adjoining units.
- 5.6.2 The fire engineer undertook a site visit on 14 March 2016, and provided a report to the authority that was forwarded to the Ministry on 18 April 2016. The fire engineer noted that the proposed solution had not been formally tested⁵ and that no formal opinion⁶ had been provided on the expected performance, commenting also that it was possible that the pressure from the sealant in a fire event would dislodge charred timber and affect the fire rating of the timber framing. The fire engineer considered that the judgement with regard to expected performance was outside the area of

⁵ The relevant standard in terms of testing being Australian Standard AS 1530.4:2005 *Methods for fire tests on building materials, components and structures - Fire-resistance test of elements of construction*

⁶ The process for formal opinions developed under Australian Standard AS 4072.1:2005

expertise of the consultant's fire engineer and the expert engaged by the Ministry, and that further justification would be required in order to establish compliance of the proposed solution.

5.6.3 In regards to the conclusions drawn by the expert, and in particular that that a fire spreading to an adjoining unit would be no worse than a fire starting in the unit itself, the fire engineer commented:

- In the configuration observed on site the detectors at the top level landings would not likely activate until a fire on the first floor had reached the growing stage.
- There are realistic scenarios which could put at risk the lives of the residents in units adjacent to one affected by a fire, including:
 - smoke leaking through the penetrations will not behave in the same way as smoke rising directly above a fire and could cut off the escape route for occupants sleeping on the top level, and
 - a fully developed fire could spread through inadequate fire separation.

5.6.4 During the site visit, which was carried out prior to the approved works being completed, the fire engineer observed three type-1 domestic smoke alarms per unit, all located on the top level with one on the landing and one in each of the two bedrooms. The fire engineer stated this did not comply with F7/AS1, which recommends a minimum of one detector per level in multi-storey dwellings and accordingly in the opinion of the fire engineer did not comply with Clause F7.3.1 (refer Appendix A.4). The fire engineer also noted that the replacement date on the smoke alarm labels was 2014 and was advised by the site manager that the detectors would be replaced once the works were completed.

5.6.5 Given that the smoke alarms did not comply with the current requirements of the Building Code, the fire engineer disagreed with a statement made in the first draft that there was little benefit in terms of life safety to be gained by requiring additional work to be carried out remediate the existing construction defects. The fire engineer did however concur that upgrading defect fire separations through the site may be beyond what is reasonably practicable. The fire engineer considered the two issues should be addressed in conjunction and, for example, an upgrade to existing smoke detection and interconnecting detectors within and between units was one approach that would mitigate the inadequate fire separation.

6. The hearing

6.1 On 22 April 2016 I held a hearing in Auckland. I was accompanied by a Referee engaged by the Chief Executive under section 187(2) of the Act, together with an officer of the Ministry, a legal adviser and the consulting expert who is a specialist in passive fire protection systems (refer paragraph 4.2.2).

6.2 The hearing was attended by three officers of the authority and the authority's solicitor, and two representatives of the consultant acting on behalf of the applicant.

6.3 All the attendees spoke at the hearing to clarify various matters of law and fact and were of assistance to me in preparing this determination. The discussions held at the hearing are summarised in the tables below. The authority tabled a written submission, referring also to the authority's fire safety report (refer paragraph 5.6) which had been provided to the parties a few days before the hearing.

6.4 Table 1: compliance of the proposed solution

Information provided in support of the proposed solution
Authority
The proposed solution has not been subject to testing and no formal opinion was provided. The statements of the applicants' fire engineer do not provide grounds on which the authority can be satisfied the solution is compliant. Section 4.7.2 of AS 4072.1 states: <i>... backing materials may be varied only if it can be shown that it does not contribute to the fire resistance of the system and that it does not degrade the performance of the system in any way.</i>
Due to a lack of expertise in passive fire protection systems, none of the statements made by the experts engaged by the applicant and by the Ministry are considered to provide the required satisfaction to the authority in terms of a 'formal opinion', and the process followed does not provide grounds that the requirements of the Building Code will be met.
In order to properly inform the authority's decision, it should be made clear in a building consent application that the issues have been thought about (for example the likelihood of the defect occurring in other areas not part of the scope of the consent).
Authority's fire engineer
There was a lack of robust process in the information provided. If the process had covered the location of the penetrations and the likelihood of there being no or few penetrations not uncovered, then that can be taken as evidence to support the outcome.
The type of evidence provided by the consulting expert at the hearing is the type of evidence that was required in order to make a decision based on reasonable grounds that the proposed solution would comply.
Applicants' consultant
The proposed solution was supported by advice from the applicants' fire engineer.
It wasn't clear from the authority's response the type of information that would be required in order for the authority to be satisfied, the consultants were left with the understanding it was a flat refusal rather than a case of not having adequate information to support the proposed solution.
Acknowledge more information could have been given, but there was no indication of that at the time of the authority forming its view on compliance.
The approved solution, which required a greater number of inspections and had a greater cost than the proposed solution, was not required in order to achieve compliance.
The effect of non-compliant penetrations
Applicants' consultant
The effect of the non-compliant penetrations in a fire event will be minimal.
Authority's fire engineer
Disagree that the effect would be minimal and disputes the views expressed in the expert's report. (Refer authority's fire safety report.)
It is not correct to say that a fire starting in Unit A would have the same effect on adjacent Unit B as a fire starting in unit B. The fire effect from Unit A could be a lot worse for the occupants of an adjacent Unit (B) because the smoke will behave differently to a fire starting in that unit and may not trigger the smoke alarms.
If the applicant established the number of penetrations not remediated was very limited, and that even those won't lead to significant smoke leakage due to minimal gap around the cables, that would support the "as nearly as is reasonably practical" (ANARP) compliance decision.
Subsequent information to support a compliance decision
Authority
The proposed solution 'needs to be formally tested before it can be accepted as a basis on which [the authority] can be satisfied of compliance with the Building Code'.
Consulting expert
The consulting expert has carried out training with building consent authorities (BCAs) on passive fire protection, with a focus on liability and the need for tested systems. An alternative from a tested system would require substantial back-up.

There is no testing on the proposed solution, so all the information available is theory – see the following discussion on depth of sealant, number of cables and locations of penetrations.
Depth of sealant
Consulting expert
For cables through solid wood with an annular space, a supplier would be likely to recommend sealant applied through entire length of penetration.
Tests are conducted with 'ideal situation', whereas in the consulting expert's own experience in construction monitoring it is not always that exact situation that the product/system is being applied due to construction issues. In those circumstances the consulting expert would then consult with the manufacturer/supplier and comes up with an 'engineering judgement' and seek agreement with the BCA. 99% of the time such situations are due to lack of planning and understanding of fire stopping systems.
When giving advice to the Ministry's expert the consulting expert recommended 30-40mm of sealant installed at each end; this advice was based in part on a research paper regarding sealing products in separating timber elements ⁷ (tabled), specifically section 5 of that research paper. The sealant would expand (potentially up to 10x), filling any gap and also expanding beyond the outer face of the timber (photographs of testing tabled showing expanded sealant).
Regarding pressure forcing some of the charred timber to come away and whether the charred timber would provide adequate expansion support and the aspect ratio (of support to the sealant): pressure of sealant has not been measured, but the consulting expert considers that it would be similar result to plasterboard (reference to research paper). With the gap in the middle of the solid timber due to only sealant applied to 30-40mm each end, there is a possibility of less pressure on the timber as the intumescent sealant would expand into the space not filled with sealant. In this situation the char rating exceeds the required FRR and the chance that the sealant will accelerate the char rating highly unlikely and not supported.
Most tested systems (such as the approved solution in this case) will achieve an hour or two hours; charring therefore becomes a non-issue.
Number of cables through the penetrations and location of penetrations
Authority
A number of penetrations are for bundles that exceed 3 cables. Thicker cables and cable bundles would require special sealing system in place and specialist input to establish the compliance of the solution. Based on inspections, it would be unlikely that the maximum cable bundle (which may be 10 or 12) would occur in every unit.
The approved solution addresses the bundles but the proposed solution does not.
Applicants' consultant
The maximum number of cables in a penetration is 12. The representative penetration would be one cable, though there will be instances where there are bundles. The main cables are: power from distribution board cupboard (the number of power cables reduces as it goes through the block); and gate control cable (which runs right the way through the block). A number of cables don't penetrate all the way through to the adjacent unit but go up into the floor above, remaining within the unit (not shown in fig. 3).
The proposed solution was the same for single and bundles and all penetrations were inspected.
Consulting expert
Requirement would be to check for tested solutions, and if none are available then go back to the manufacturer/supplier regarding an appropriate size/depth ratio, and whether the sealant should be installed between the cables. An engineering judgement on what would achieve the rating could then be made. It is important that a technical person of the manufacturer of the product is consulted.

⁷ N Werther, M Merk, R Stein, S Winter *Fire safe service installations in timber buildings*. Research paper presented at the World conference on timber engineering (July 2012).

6.5 Table 2: the application of section 112

The extent to which s112(1)(a) applies
Authority
Re-scoping of the remediation of defects falls below the s112 test. All inter-tenancy penetrations, not just those exposed in the course of other remedial works, should be reviewed and considered, so that a solution is presented that complies with the Building Code in order to comply with section 112.
The existing fire separation is known to be defective and if not remediated could have significant impacts on the opportunity for means of escape. It is unacceptable to address only some penetrations when it is clear that the issue arises throughout the buildings.
The compliance of all penetrations, or another solution that addressed the provisions regarding means of escape from fire (such as altering the warning system), would need to be addressed before the authority could issue a code compliance certificate.
There is difficulty in putting weight on the likelihood of there being no penetrations in the central areas that weren't uncovered. It would be different if one unit was fully exposed in order to assess the likely location of all penetrations, and that put forward as being representative of all the other units.
Applicants' consultant
Addressing the defects in the existing building that were uncovered during the cladding remediation means that the building complies to a greater extent, not lesser, than it did before.
This issue of the extent of remediation required to existing defects has broader implications for the industry and also relates to another determination application the consultant is acting as agent for.
As nearly as is reasonably practicable (ANARP test)
Authority
The defects must be considered in terms of giving them an appropriate weight in regards to life safety particularly with regard to not addressing the penetrations that have not been uncovered. While remediating all inter-tenancy penetrations would be a significant financial cost, this must be weighed against the purpose of the means of escape provisions in terms of life safety.
Applicants' consultant
It is not reasonable to 'pull the whole building apart' to address issues that may or may not exist in other areas that were not exposed in the remediation. What has been done is reasonable in a practical sense.
The advice received was that if there were one or two penetrations in the areas not uncovered and so were not addressed, it would be of minimal effect in the event of a fire.
The likely extent of existing defects in the building outside of those areas uncovered in the consented works
Applicants' consultant
Most of the cables and plumbing systems run either close to the back wall or front wall, and those are the areas that have been uncovered. Due to the location of the staircases it would be unlikely for penetrations to be in the centre area. Looking at the cables in the penetrations that have been addressed (power, gate, communications) the consultant cannot think of any other cables that would be in the central part of the wall.
Gaps in the timber frame
Authority
Another defect to be addressed was the gaps caused by shrinkage in the timber frame; these must also be considered in the s112/"as nearly as is reasonably practical" (ANARP) test in relation to means of escape from fire.
In modern fire rated walls there is a smoke seal normally provided around the perimeter – unsure if required but is normal practice.
It may be impractical to uncover all the defects, but there are other ways of addressing the means of escape issue.

<i>Applicants' consultant</i>
The gaps don't occur everywhere in the areas that have been opened up, but they have been addressed where they did occur. The potential for gaps in other areas is an 'unknown' without opening up every wall and every ceiling.
For any building that is 10+ years in service, it is likely that these sorts of issues will exist. This raises concerns for ongoing construction of timber-framed intertenancy walls because of the possibility of timber shrinkage causing issues with fire separation during the buildings' serviceable life.

6.6 Table 3: considering fire protection systems as a whole

Consequence of non-compliant fire separation
<i>Applicants' consultant</i>
The consultant's experience of the fire safety systems is that there is a fairly significant safety margin.
<i>Consulting expert</i>
In test situations you will get smoke through a penetration before the system closes up, and that is where the test reports provide useful information. Smoke may be going through for the first 5mins for example and even during the test for some systems. That will depend on the systems used, sealants/collars etc. Reliance on data from suppliers is not always adequate to make an informed decision.
The location of penetrations (underfloor/ceiling) will impact on smoke movement, and smoke behaviour varies along with the amount/strength of fire etc. There is no general rule of thumb that can be applied. Fire modelling may be able to predict that more, but is still theoretical.
<i>Authority</i>
Fire modelling is complex and the outcome will be influenced by changing some of parameters so care is needed in making changes.
The fire protection systems as a whole
<i>Authority</i>
The purpose of the fire separation is for protection of the adjoining unit and its occupants.
In the absence of all inter-tenancy walls being remediated to a compliant standard, other requirements related to the location and use of smoke detectors need to be imposed in order to satisfy section 112.
If a revised approach relied on the provision of smoke detection as compensation for the penetrations, then the smoke detection should be subject to additional controls in terms of testing and maintenance. In the absence of adequate information that would support a compliance decision, then mitigating features may need to be considered. That may not always be the case in all circumstances.
<i>Authority's fire engineer</i>
The authority's fire safety report relies on the site inspection and the original report from the applicant's fire engineer which didn't mention upgrading the existing alarm system to bring it into compliance.
If the proposed solution relies on the fire detection system to compensate for defective passive fire protection system, then a type-1 system is not appropriate for that purpose.
<i>Applicants' consultant</i>
The implications of going to a system that is connected between adjacent units would mean creating more penetrations through the intertenancy walls which would need to be fire-stopped; it would also create a compliance schedule and have testing/maintenance requirements. There is no Building Warrant of Fitness in place or required for the units as constructed.
Smoke detectors
<i>Authority</i>
The number of smoke detectors at present does not comply with F7/AS1, the smoke detector layouts did not comply with the performance requirements of Clause F7.3.1, and the detectors installed have passed their useful life and have not been replaced.

Authority's fire engineer
The Acceptable Solution is minimum one per floor and minimum audibility level – so to meet the second test some testing would be required of the alarm at the second floor level and testing audibility at the bed head. If the test is met then the detectors in the bedrooms would be over and above that required by the Acceptable Solution.
Applicants' consultant
The building consent includes an upgrade to the fire alarm system – two extra smoke alarms are being installed in addition to the three existing, so the system will not only comply with F7/AS1 but would exceed the requirements of F7/AS1 given the number of detectors on the upper floor. They are shown on the consent and construction drawings. (The applicant provided construction drawings that indicate type-1 smoke detectors to be installed above the landings on the lower two levels.)
The three smoke detectors on the upper floor within individual units are interconnected.

6.7 Table 4: regulatory framework

Regulatory framework and scope of the determination
Applicants' consultant
There are five stages with a single consent for the whole lot. The time frame for completion of the work is June for the last stage and the intention is to apply for a code compliance certificate in July (approximately).
The building consent variation uses an accepted means of addressing the uncovered penetrations.
Authority
As the building consent was already issued, s112 can apply to the application to vary the building consent. The extent to which the defects must be addressed must be taken into consideration when deciding whether to issue a code compliance certificate.
The adequacy of what has been done on site is a matter for the determination to consider.
Applicants' consultant
It is not clear on what basis can council withhold a code compliance certificate. The approved solution has been used as approved in the variation to the building consent.
It is the original proposed solution that is the subject of the determination, not the approved variation. It is a question of compliance of the original proposal.
Authority
The scope of the matter being determined is constrained to the proposed solution. However the extent of remediation, for the purpose of s112 needs to be dealt with as well before a code compliance certificate can be issued.

6.8 Additional advice provided by the consulting expert

- 6.8.1 At the hearing the consulting expert provided further information and clarification regarding the performance of the proposed solution in the event of a fire. In a later review of figure 3 (paragraph 2.5.1), the consulting expert indicated the proposed solution applying to penetrations of 1 to 3 cables only.
- 6.8.2 In an email on 9 May 2016, the consultant queried what they considered was a change in view from the consulting expert regarding the number of cables; noting that in the architect's and supplier's opinion the use of the proposed solution for up to 12 cables would be acceptable within set parameters.
- 6.8.3 Subsequently I sought additional advice from the consulting expert, specifically with respect to the performance of the proposed solution for penetrations consisting of bundles of cables exceeding three in number. That advice was received on 18 May 2016 and forwarded to the parties for their information on 20 May 2016.
- 6.8.4 The consulting expert referred to the performance of the proposed solution for bundles of 12 cables, noting that there were a number of variables that required

consideration. The consulting expert set out his view on the critical factors required to achieve a 30 minute integrity rating, noting that those factors will depend on the system used, the annular gap and depth of sealant, and the type and size of cables. The consulting expert concluded that in his opinion ‘a 30 minute rating could be achieved, however for such a decision the *manufacturer* [his emphasis] is required to be consulted’, and noted that the reference to manufacturer was to those involved with the testing of the systems.

7. The second draft and submissions in response

7.1 On 8 July 2016 I issued a second draft of the determination to the parties for comment. The second draft determination concluded that the proposed alternative solution using intumescent fire sealant in the gaps in the timber would comply for penetrations of up to three cables in a bundle, but that there was insufficient evidence to support that view for penetrations of more than three cables.

7.2 The draft discussed the application of section 112(1)(a) and the application of regulations where construction defects are uncovered during alterations. The draft concluded: it is reasonably practicable to remediate the existing penetrations in those areas uncovered as part of the consented alterations; there is insufficient information available to support a conclusion that the cost of requiring these to be remediated will exceed the benefits to a degree that makes remediation of the existing defects unreasonable in the circumstances.

7.3 The applicants

7.3.1 In an email on 3 August 2016 the consultant responded on behalf of the applicants, accepting the second draft of the determination and requesting some points be further clarified. The consultant noted that:

- at the time of the site visits by the authority’s fire engineer, the works were not complete; smoke alarms have since been installed as per the building consent and these have been inspected by the authority
- the three existing smoke detectors on the upper floor are interconnected; it is not a requirement that the additional detectors installed as part of the consented building work be interconnected

7.3.2 The consultant also requested that I confirm

... that the solutions implemented as per [the authority’s] requirements [i.e. the approved solution] are acceptable in those situations where they have been used and inspected (passed) by [the authority] (including where more than 3 cables).

7.3.3 In response to this request I note that the matter for determination is the compliance of the proposed solution, not the approved solution. Where the authority has reached a decision that the building work complies, it is not necessary for me to consider the matter unless a party disputes the authority’s decision.

7.4 The authority

7.4.1 The authority’s solicitor provided a submission dated 5 August 2016 to the second draft determination, generally accepting the findings of the second draft but expressing concern that the decision at paragraph 9 did not incorporate many of the findings and conclusions in the assessment in paragraph 8.

- 7.4.2 The solicitor sought further clarification or amendment in regards to the wording in the decision, and submitted (in summary):
- The authority accepts that penetrations that are likely to exist in parts of the building that were not uncovered as part of the consented building work are not required to be upgraded in terms of section 112.
 - There is minimal assessment on the cost of remediation of the penetrations that were not uncovered to support the conclusion presented in the determination. Some confirmation of the information available or guidance as to the level of information which is suitable for the purpose of such an analysis would be appropriate.
 - The authority's file will need to reflect that penetrations in the building may not be code-compliant. It is accepted that this building consent is not the trigger to require removal of internal linings to remedy those penetrations beyond the scope of the consented building work.
 - Not all of the information available to the determination was available to the authority at the time of its decision.
 - The authority is of the view that none of the statements made by the experts engaged in this matter are sufficient to reach a conclusion as to the building's compliance, and more specificity is required as to what is being relied on in the determination's conclusion.
 - The decision regarding the proposed solution for penetrations of more than three cables affects the ability of the authority to issue a code compliance certificate.
 - Given the finding that there is insufficient information to establish compliance of the proposed solution for penetrations of more than three cables, the authority was correct in its view that the proposed solution was not acceptable (refer paragraph 2.5.1)
- 7.4.3 In response to the view stated above regarding the ability of the authority to issue a code compliance certificate; I note here that the code compliance certificate is in respect of the approved solution as described in paragraph 2.5 of this determination not the proposed solution. However, the conclusion I have reached in regards to the application of section 112 in respect of the gaps in timber framing that have not been uncovered during the consented works does impact on the issuing of a code compliance certificate for the consented work. I discuss this further in paragraphs 8.5.3 to 8.5.5.

8. Discussion

8.1 Compliance of the proposed solution

- 8.1.1 The applicants have requested the determination consider the solution proposed by the fire engineer in the advice notes and whether it would comply as an alternative solution.
- 8.1.2 In the following paragraphs I have considered:
- a) whether there was sufficient information provided to the authority at the time the consent amendment was sought to establish on reasonable grounds that the

proposed solution using intumescent sealant only for up to 12 cables would comply with respect to spread of fire and smoke between adjacent units, and

- b) based on the information now available to me, whether the proposed solution would comply with respect to spread of fire and smoke between adjacent units.
- 8.1.3 The proposed solution is not one that has been tested. In applying for the variation to the building consent the applicants' consultant relied on advice from a fire engineer for the proposed solution using intumescent fire sealant (refer paragraph 2.4.1 fire engineer's advice note of 22 May 2015, item #2). This was followed by a further advice note dated 24 June 2015, which proposed intumescent fire sealant be applied to a depth of at least 20-25mm.
- 8.1.4 I am of the view that the departure from a tested system in this case required additional information or the provision of an opinion from a specialist in passive fire protection systems to support the building consent.
- 8.1.5 As a result of the application for a determination, I engaged the expert to review the proposed solution and provide advice to assist me. The expert in turn sought the opinion of the consulting expert and concluded that: the performance of the sealant with timber as the backing material would be adequate; a depth of 30-40mm of sealant would be recommended; and with regard to remaining penetrations the effect of fire/smoke spread to an adjacent unit and means of escape for those occupants would be no worse than if the fire started in their own unit.
- 8.1.6 The authority subsequently engaged a fire engineer to undertake a review. In the resulting report the authority's fire engineer disagreed with the views expressed by the expert and considered that the process underpinning the advice provided to the authority for the purpose of making a decision as to compliance was not robust.
- 8.1.7 At the hearing the consulting expert provided further information and clarification regarding the performance of the proposed solution in the event of a fire, and further advice was sought subsequent to the hearing.
- 8.1.8 In considering all the information before me, including the information presented at the hearing, I conclude that the proposed solution at the depth recommended by the consulting expert would comply with the Building Code for penetrations of up to three cables in a bundle. However there is insufficient evidence that the proposed solution would comply for penetrations of more than three cables in a bundle. I note the consulting expert's advice was provided to the parties and sets out the sort of information that would be necessary to support a conclusion as to compliance.

8.2 The legislative framework: Section 112

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,—

(a) the building will comply, as nearly as is reasonably practicable, with the provisions of the building code that relate to—

(i) means of escape from fire; ...

- 8.2.1 When a building consent for an alteration is lodged, section 112 of the Act requires the authority make an assessment as regards compliance of the building after the alterations.

- 8.2.2 In this case there was a dispute as to whether remediation of the underlying construction defects was included in the scope of works, and also whether the authority can require remediation to the whole of the intertenancy walls rather than only those areas uncovered as part of the consented building work.
- 8.2.3 The fact that the original construction included unsealed penetrations to the intertenancy walls and there are gaps in the timber framing means that the buildings, without remediation, do not comply with Clause C. I note that it is the original construction of the buildings that does not comply in respect of protection of other property (nor the acoustic separation) and as the original building work had been issued with a code compliance certificate, without an open consent being in place the authority would be limited in terms of its powers under the Act to require remediation of the existing building work unless it was deemed dangerous under section 121.
- 8.2.4 However, an authority can address remediation of existing building work that has a code compliance certificate where the compliance of subsequent alterations or new building work relies on the existing building work (for example a building's existing structure must provide adequate support to a new cladding). Section 112(1)(a) also provides for the authority to require an existing building be brought into compliance as nearly as is reasonably practicable with the provisions of the Building Code that relate to means of escape from fire, and in respect of access and facilities for people with disabilities for buildings to which section 118 applies. It is not disputed that the fire separation between units, being a passive protection feature, constitutes part of the means of escape; accordingly it is section 112(1)(a)(i) which applies in this case.
- 8.2.5 At the time the consent was lodged the existing defects were not readily apparent to the applicants. I accept that the references to fire-stopping in fire engineer's report that supported the building consent application was in respect of the alterations only and did not address the unknown defects. I consider therefore that the remediation of those defects was not included in the original scope of work. I am also of the view the authority's decision to issue the building consent for the alterations was made on reasonable grounds at the time.
- 8.2.6 Once the defects were uncovered and the parties became aware of the issue, it became apparent that the building after the alterations would not comply with respect to means of escape from fire.
- 8.2.7 It is not an uncommon scenario when alterations are being carried out for additional information to come to light during construction and for authorities to become aware of matters of non-compliance in the existing building work. At that point the relevant authority must consider whether there is a requirement to address the defects for one of the following reasons:
- the consented building work is reliant on the performance of existing building elements to achieve compliance with the Building Code
 - the existing non-compliance will affect the compliance of the consented building work in other ways (that aren't related to the building work being reliant on the existing building work)
 - the existing non-compliance is required to be addressed under section 112
 - the defects are such that the building is dangerous, insanitary or earthquake prone.

8.2.8 If the conclusion is that the defects must be addressed as part of consented alterations, authorities may issue a site notice or a notice to fix requiring an amendment to the building consent to address the non-compliant building work.

8.3 The applicants proposal in relation to section 112

8.3.1 In this case the applicants agreed to remediate those defects that were uncovered in the course of the alterations and applied for a minor variation to include the remedial work.

8.3.2 Section 45(4) provides

An application for an amendment to a building consent must,—

(a) in the case of a minor variation, be made in accordance with section 45A; and

(b) in all other cases, be made as if it were an application for a building consent, and this section, and sections 48 to 51 apply with any necessary modifications.”

8.3.3 The application for an amendment is then considered under section 112 as if it is a new consent, and in this case the authority’s requirement in respect of remediation of the penetrations and gaps to intertenancy walls is addressed when granting the amendment. The authority initially refused the amendment on the grounds that it didn’t have sufficient information to be satisfied on reasonable grounds that the proposed solution would comply with the Building Code. The application was altered to a solution that was then approved by the authority.

8.3.4 I agree with the view put forward by the expert that the fire separation between the units forms part of the passive protection features protecting people from the effects of fire in the course of their escape from the fire. Adequate fire separation between units is part of the fire safety system that allows people in the adjacent property sufficient time to safely evacuate.

8.3.5 Accordingly it is the provisions under section 112(1)(a)(i) that apply in this case, rather than section 112(1)(b). As the provision applies to the building as a whole, it is the performance of the intertenancy walls as a whole, meaning all of the penetrations and timber gaps in framing not just those uncovered during the course of the consented remedial work that would require consideration.

8.4 Compliance as nearly as is reasonably practicable

8.4.1 Section 112(1)(a) requires the building as a whole after the alteration to comply “as nearly as is reasonably practicable”. The application of the “as nearly as is reasonably practicable” test has been considered extensively in past determinations⁸. These determinations have established an approach for deciding if a building complies as nearly as is reasonably practicable with the Building Code that follows the approach taken by the High Court⁹. The approach involves the balancing of sacrifices and difficulties of upgrading against the advantages of upgrading.

8.4.2 I am of the view that where the defects are uncovered during alterations (now or in the future) it is reasonably practicable to remedy those defects. I acknowledge that the applicants have agreed to this work being undertaken in those places where the consented work is carried out.

⁸ See for example Determinations 2015/028, 2010/004 and 2009/1

⁹ *Auckland City Council v New Zealand Fire Service* [1996] 1 NZLR 330.

- 8.4.3 In respect of the costs, there would clearly be significant cost involved in removing the linings in each unit to check those areas that have not been uncovered as part of the consented works and remediating underlying defects that may be present.
- 8.4.4 The question then becomes whether the remediation of only those defects that are uncovered as part of the alterations can be considered to meet the test under section 112(1)(a) “as nearly as is reasonably practicable”. In making that decision, the extent of the defects i.e. the number and size of penetrations or gaps in the timber left in the areas that were not uncovered (“the remaining defects”) must be considered.
- 8.4.5 I am of the view that there was insufficient information provided to the authority to support the applicants’ view that the alterations would comply as nearly as is reasonably practicable in respect of the remaining defects at the time the authority refused to grant the amendment for the proposed solution.
- 8.4.6 I acknowledge there was additional information provided by the applicants’ consultant at the hearing as to the location of penetrations and the likely extent of remaining penetrations in those parts of the intertenancy wall not uncovered during the alterations. The applicants’ consultant advised me that: the majority of penetrations to the intertenancy walls would be located at the front and rear of the buildings in the areas that were uncovered as part of the consented works, and that: because of the location of the stairwells there were unlikely to be many penetrations in the areas not uncovered.
- 8.4.7 While the applicants have not quantified the number or extent of penetrations that are not remediated, based on the information provided at the hearing I accept that the remedial work carried out during the alterations will have addressed the majority of the penetrations.
- 8.4.8 With regard to the gaps in the timber framing, I note that for some time it has been common for timber framing to be supplied to site kiln-dried and it would therefore not subject to significant shrinkage, and also that fire engineers do not design with the expectation that timber will shift or open in the future. Gaps in timber framing will have an effect on the fire rating performance of the wall system, potentially allowing the passage of smoke and flame which would increase with charring. I also accept the views put forward by the authority’s fire engineer with regard to the behaviour of smoke having passed through a penetration or gap into an adjacent unit, and that under those circumstances the Type-1 smoke detection units may not be triggered.
- 8.4.9 There has been little quantitative information forthcoming about the gaps in the timber framing; it is unclear how widespread or significant an issue this may be in the areas that have not been uncovered.
- 8.4.10 Given the lack of information regarding the extent, severity and effect of the timber gaps that remain in the areas that were not uncovered, and that there are no other building or fire safety features in place or proposed that would mitigate the reduction in fire separation performance, I am of the view that insufficient information is available to support a conclusion that the compliance “as nearly as is reasonably practicable” will be achieved.
- 8.4.11 I acknowledge that there are other solutions to address the compliance of the means of escape by occupants of an adjacent unit to the extent required by s112 that were discussed at the hearing, namely alterations to the warning system, and that there would also be costs involved in that solution that would need to be quantified if such a proposal was to be put to the authority.

8.5 Conclusion regarding application of section 112

- 8.5.1 With regard to the existing penetrations in those areas uncovered as part of the consented alterations, I conclude that it is reasonably practicable to remediate these to comply with Clause C of the Building Code.
- 8.5.2 With regard to the existing penetrations in areas that were not uncovered as part of the consented alterations, I note that the cost of remediation would not be insignificant. After consideration of the likely number and likely degree of non-compliance I conclude that the cost of requiring these to be remediated, including the removal and reinstatement of linings, will likely exceed the benefits to a degree that makes remediation of the existing defects unreasonable in the circumstances.
- 8.5.3 With regard to the existing gaps in framing timbers that were not uncovered as part of the consented alterations, I am of the view there is insufficient information available to support a conclusion that the cost of requiring these to be remediated will exceed the benefits to a degree that makes remediation of the existing defects unreasonable in the circumstances.
- 8.5.4 The sacrifice involved in sealing the gaps is not quantified but likely to be not insignificant. There are 51 boundary walls, the units consist of three levels and most units will have two boundary walls – making a total of 306 individual spaces to be opened up. Less information is known about the benefits from sealing the gaps as it is unknown how many walls have gaps. Until this information is known, the “as nearly as is reasonably practicable” test in section 112 cannot be made as it is an evaluation of sacrifices and benefits. It is suggested that a considered sample evaluation be made to ascertain the likely number of walls where the fire separation is compromised by gaps. I suggest that the sample be from each block of units, each story and either side. It may be possible for the sample to be viewed with minimal or no damage to the linings by use of a borescope, possibly through light fittings or other ceiling penetrations.
- 8.5.5 I note that the provision of additional information on the extent, severity and effect of the remaining gaps, along with a cost/benefit analysis, would be necessary in order for a conclusion to be reached as to whether the building work, complies to the extent required under section 112. Alternatively, the applicants may propose another means of meeting the requirement to provide for sufficient time for occupants of an adjacent unit to evacuate in the event of fire; this could be by addressing the fire separation in some other way or altering the warning system or by some other means.
- 8.5.6 I suggest that this determination be placed on the property file to inform any future owners of likelihood of defects that may remain after the alterations are complete.

9. The decision

9.1 In accordance with section 188 of the Building Act 2004, I hereby determine that

Compliance of the proposed solution with the Building Code

- the proposed solution, as described in figure 3 of this determination, would comply with Clause C3.3 of the Building Code for penetrations where there are up to three cables in a bundle
- there is insufficient evidence to form a view as to compliance of the proposed solution with Clause C3.3 in regards to penetrations where there are over three cables in a bundle.

Compliance of the building work to the extent required by section 112(1)(a)(i)

- the authority correctly exercised its powers of decision in accordance with section 112(1)(a)(i) in requiring the penetrations and framing gaps to intertenancy walls that were exposed during the consented alterations be remediated
- the authority incorrectly exercised its powers of decision in requiring the penetrations to intertenancy walls not exposed during the alterations to be remediated
- there is insufficient information on which to make a determination as to the compliance of the building work to the extent required under section 112 with regard to framing gaps in the intertenancy walls where these are not exposed as part of the consented alterations.

Signed for and on behalf of the Chief Executive of the Ministry of Business, Innovation and Employment on 3 October 2016.

John Gardiner
Manager Determinations and Assurance

Appendix A

A.1 Relevant sections of the Building Act 2004 include:

7 Interpretation

means of escape from fire, in relation to a building that has a floor area,—

- (a) means continuous unobstructed routes of travel from any part of the floor area of that building to a place of safety; and
- (b) includes all active and passive protection features required to warn people of fire and to assist in protecting people from the effects of fire in the course of their escape from the fire

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,—

(a) the building will 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) ...; and

(b) the building will,—

- (i) if it complied with the other provisions of the building code immediately before the building work began, continue to comply with those provisions; or
- (ii) if it did not comply with the other provisions of the building code immediately before the building work began, continue to comply at least to the same extent as it did then comply.

(2) ...

A.2 The relevant Performance Requirement of the Building Code that was in force at the time the consent was issued:

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....

A.3 The relevant Functional Requirement of the Building Code that is now in force:

C3.3 Buildings must be designed and constructed so that there is a low probability of fire spread to other property vertically or horizontally across a relevant boundary.

A.4 Clause F7 of the Building Code and the relevant sections of the Acceptable Solution F7/AS1 Warning Systems

F7.3.1

A means of warning must alert people to the emergency in adequate time for them to reach a safe place.

3.0 Domestic Smoke alarms

3.3 Location of smoke alarms

3.3.1 Smoke alarms shall be located as follows:

- a) In multi-storey units, there shall be at least one smoke alarm on each level within the household unit.
- b) On levels containing the sleeping spaces, the smoke alarms shall be located either:
 - i) In every sleeping space, or
 - ii) Within 3.0 m of every sleeping space door. In this case, the smoke alarms must be audible to sleeping occupants on the other side of the closed doors.
- c) In all cases, so that the sound pressure level complies with that specified in NZS 4514.

Comment:

Smoke alarms also need to be located so that an alarm is given before the escape route from any bedroom becomes blocked by smoke. This includes those parts of escape routes on other floors. Although not required by this Acceptable Solution, the interconnection of individual smoke alarms should be considered if audibility is a problem