IN THE CANTERBURY EARTHQUAKES
INSURANCE TRIBUNAL CEIT-0037-2019

IN THE MATTER OF CANTERBURY EARTHQUAKES INSURANCE TRIBUNAL ACT 2019

BETWEEN D, G AND S (AS TRUSTEES OF THE D G TRUST)
Applicants

AND IAG NEW ZEALAND LIMITED
First Respondent

AND MAX CONTRACTS LIMITED
Second Respondent

AND MAX EQ LIMITED
Third Respondent

AND ORANGE H MANAGEMENT LIMITED (IN RECEIVERSHIP AND IN LIQUIDATION)
Fourth Respondent

AND ORANGE H GROUP LIMITED (IN RECEIVERSHIP AND IN LIQUIDATION)
Fifth Respondent

AND QBE INSURANCE (AUSTRALIA) LIMITED
Sixth Respondent

Date: 8-10 July, 16-18 September, 23-25 September, 1-2 October, 4-6 November 2020

Appearances: A Prebble with D and G, for the applicants.
O Colette-Moxon and S McIntyre for the first respondent.
R Smedley for the second and third respondents
S Galloway for the sixth respondent.

DECISION # 2 OF C P SOMERVILLE
[Defects and Their Causes]

Dated: 4 December 2020

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General

Introduction

[1] The applicants are dissatisfied with repairs undertaken to address the insured earthquake damage suffered on their property at XXXXX, Christchurch. Their experts have provided evidence of a long list of defects that are said to be attributable to unscoped earthquake damage, unexecuted repairs, or badly executed repairs. The cost of rectifying these repairs is said to be just over $1 million.

[2] The parties have agreed that the hearing of the claim should be divided into stages, with this first stage dealing with physical deficiencies in the property. The Tribunal will examine those deficiencies to decide whether they existed prior to the earthquakes, whether they are unscoped or unrepaired earthquake damage, or whether they are the result of defective repairs.

Later hearings will deal with the development of an appropriate scope of works for remedying those defects, identify the cost of that repair, and determining who should bear that cost.

The house

[3] The house at XXXX was built in 1925 by well-known Christchurch merchant and City Councillor, Thomas Kincaid, who gave it to his niece as a wedding present.

[4] This 324 m² two-storey dwelling is constructed on a concrete ring foundation and piles, is clad with timber weatherboard cladding and has a Welsh slate tile roof. The current owners are taking steps to have it listed with the Christchurch City Council as a heritage home because it has numerous special features including rimu joinery, panelling, and built in furniture. The original windows are either arched wooden windows or rimu frames containing wrought iron windows with lead-light transoms.

[5] The service areas of the house appear to have been modernised on several occasions. Aluminium windows were installed in the kitchen and dining room at some stage before being replaced during the earthquake repairs. The downstairs bathroom was modernised in 2003. During the earthquake repairs, the downstairs kitchen was renovated.

[6] Some additions have also been made. Part of the attic was converted in 2000 to enable the first floor to be leased as a self-contained apartment. After the earthquake repairs had been completed, a conservatory was added at the rear of the house, adjacent to the kitchen/dining area.

[7] At the time of the earthquakes, the house was in good condition, having been well maintained by its owners over the preceding 85 years.

The current occupants

[8] D purchased the property in November 1983 and was joined by G in 1999. The property is now owned by the D G Trust (the Family Trust). Tenants live in the first floor flat.

The earthquakes

[9] Houses built during the 1920s were not designed to withstand earthquake forces. It was inevitable, therefore, that this house sustained damage during the Canterbury Earthquake

Sequence (the earthquakes), but it is a testament to the skill of the original builder that the damage it suffered was only moderate and could be readily repaired.

[10] The most serious damage was inflicted on 4 September 2010 when one of the three chimneys collapsed and fell through the roof into one of the upstairs bedrooms. Temporary repairs were quickly undertaken by the Earthquake Commission (EQC). The other two chimneys, which had been badly damaged but had not collapsed, were also removed. Other emergency repairs were undertaken to ensure that the occupants could continue to safely reside in the house.

[11] Further damage, although not as dramatic, was sustained by the house in subsequent earthquakes, particularly in December 2010, February 2011, and June 2011.

The policy

[12] The house was insured at the time of the earthquakes by State Insurance, a business division of IAG, under a home comprehensive insurance policy which provided cover for any unexpected and unintended sudden physical loss or damage to the house that happened between 5 June 2010 and 5 June 2011. Cover includes any part that, although not damaged in the earthquake, must be repaired or replaced to repair a part that has suffered earthquake damage but expressly excludes the cost of fixing faulty design or faulty construction.

[13] The policy records IAG's promise to repair damage "to a condition as similar as possible to when it was new, using current materials and methods." This is an objective standard, requiring all buildings (whether award-winning or basic in design) to be restored to their original condition.

[14] The Family Trust must prove that every part of its claim falls within the terms of its cover under the policy. Not only must it establish that an insured loss has been suffered, but it must prove the extent of that loss.[1] IAG can avoid liability for any part of the claim established, however, by proving that an exclusion applies.[2]

[15] I agree with IAG that where items have a functional purpose, the required standard is a reasonable re-creation of that part's strength, durability, functionality and relative quality

[1] *He v The Earthquake Commission* [2017] NZHC 2136.
[2] *O'Loughlin v Tower Insurance Ltd* [2013] NZHC 670.

(where relevant). Where items have an aesthetic purpose, the required standard is a reasonable re-creation of the part's size, appearance, character and relative quality (where relevant).[3]

[16] I also agree with the Family Trust, that damaged items should be replaced if that is the only realistic option and that the goal of the repair process should be to render the fact of the earthquake damage immaterial.[4]

[17] In the present case, this house was built by craftsmen in circumstances where quality was paramount, and cost was secondary. That is the standard to which this house should be repaired. A lower standard, however, applies to the garage (which is an ad hoc combination of two old structures) and to the south fence.

The repair

[18] Once EQC acknowledged that the cost of repairing the earthquake damage would exceed its statutory cap, IAG and the trustees of the Family Trust agreed that the earthquake damage would be repaired under IAG's managed repair programme. Geotechnical and structural engineering reports were obtained and used to prepare a comprehensive scope of works.

[19] Canterbury Reconstruction Ltd (CRL) was identified as the builder responsible for the repairs, and on 27 May 2014, the Family Trust signed a building contract with that company for the completion of the earthquake repairs to the house. Hawkins Construction Ltd (Hawkins), which had a separate arrangement with IAG, was also a party to that contract. Contemporaneously, CRL entered into a contract with Max Contracts Ltd (Max Contracts) to undertake the repair work as a sub-contractor.

[20] The occupants moved out of the house after the building contract was signed in May 2014. Repair work began on 1 July 2014. By the time those repairs had been completed, about March 2015, the occupants, as trustees of the Family Trust, had become disillusioned with Max Contracts, were openly critical of the standard of repair, and were complaining that the original scope of works was inadequate to properly repair the earthquake damage. Numerous meetings followed without any resolution. High Court proceedings were issued, and then transferred to this Tribunal after an unsuccessful settlement conference. Further negotiations have proved

[3] *Parkin v Vero* Insurance New Zealand Limited [2015] NZHC 1675, at [120]-[124].
[4] At [118].

fruitless, resulting in a 13 day hearing to determine the extent to which the repairs are defective and whether that is the result of poor workmanship or inadequate scoping.

The respondents

[21] State Insurance has been the insurer of the house since at least 1983 when it was acquired by D, but this association with the house may well have begun many years before that. The close relationship between State Insurance and the Riccarton community probably explains why its last remaining office in New Zealand is located 350m from the house.

[22] The Family Trust's claim against IAG is for the full cost of restoring the house to the policy standard. As far as the Family Trust is concerned, this was its contractual right under the policy, and it fails to see why it should be concerned about the reasons why the earthquake repairs have fallen short of that standard.

[23] IAG, however, sees things very differently. It has been at pains to establish that its role in the repairs has only been as the insurer required to meet the reasonable cost of those repairs. It considers that if those repairs have fallen short of the policy standard, then that is the responsibility of those who scoped the repairs, those who contracted with the Family Trust to carry them out, and/or the builder instructed to do so.

[24] Hawkins and CRL cannot be held accountable as each is now in liquidation, but QBE (Australia) Limited was joined to the High Court proceedings under s 9 of the Law Reform Act 1936 as the insurer of Hawkins.

[25] Max Contracts is still trading and has therefore been joined as a party.

The issues

[26] The purpose of this stage of the proceedings is to establish the physical deficiencies in the property and their likely causes so that the parties can:

(a) develop a scope of works to repair those physical deficiencies;

(b) cost that scope of works; and

(c) address liability issues to determine how the cost should be met.

[27] This stage of the proceedings, therefore, will involve:

(a) determining IAG's liability to the Family Trust under the policy of insurance, by identifying:

(i) the earthquake damage to which the policy responds;

(ii) the standard to which that earthquake damage should be repaired (the policy standard); and

(iii) the extent of any deficiencies in that repair by comparing the actual standard of repair with the policy standard.

(b) helping the parties to produce a scope of works by suggesting, where possible, what remediation should be included to address these deficiencies; and

(c) helping the parties to address the liability issues by identifying where those deficiencies:

(i) breach the Building Code;

(ii) breach the contract specifications, and/or

(iii) amount to defective workmanship.

[28] There are seven areas of the property in which defects are alleged to be found:

(a) the foundations and floor levels;

(b) the downstairs bathroom;

(c) the windows;

(d) internal decoration;

(e) the roof;

(f) the garage, and

(g) the exterior, including the cladding, drive, paths, gates, and south fence.

Approach

[29] When considering each of the damaged areas in the house, I intend to:

(a) identify the damage covered by the policy (which I will refer to as "the earthquake damage");

(b) describe the policy standard that the repairs are required to meet;

(c) describe the standard to which the damage has been repaired;

(d) compare the two standards and, where there are deficiencies in the repair standard, identify whether those deficiencies are either unscoped, unexecuted or defective repair work; and

(e) help the parties in any way I can to address these deficiencies, either in the creation of the scope of works, or, in the subsequent deliberations about liability.

[30] Other issues might also be identified, such as whether these deficiencies are covered by an exception to the policy or whether they are defective repairs of damage that is not covered under the policy.

The foundations and floor levels

Generally

[31] After the September 2010 and February 2011 earthquakes, the occupants reported that there were many areas in the house where the floors were not level and where doors and windows that were previously functional would no longer open or close easily. This was confirmed in reports obtained shortly after the earthquakes by EQC.

[32] IAG concedes that the earthquakes caused some dislevelment in the floors, that the repairs have left them out of level, and that the current dislevelment does not meet the policy standard. However, it maintains that much of the dislevelment occurred through static

settlement prior to the earthquakes. It also emphasises that construction tolerances in 1925 were significantly less than they are today. Although it acknowledges that some relevelling is required, it submits that this should be undertaken on a performance basis to limit flow-on effects to features of the house that were built to accommodate that static settlement, rather than to the higher standard required under the MBIE Guidance. which it says, does not reflect the likely condition of the house following construction or after extensions were added in 2000. Its engineer, Mr Cook, has submitted a proposal for relevelling that is endorsed by QBE and Max Contracts but not by the Family Trust.

[33] The engineers agree that the house is likely to have been designed and built without the involvement of architects or engineers. As was common at that time, the concrete perimeter foundation and the piles would have been built into, but not through, the topsoil, which has less bearing strength than the layers underneath. Foundations of all houses settle slightly during construction as the load of the structure is transferred to them. Naturally, this is more pronounced where the foundations are footed in topsoil. Although this settlement ceases at the end of construction, later additions will also have an effect. So too will re-piling, which appears to have been undertaken in the 1960s or 1970s. Moreover, further settlement occurs as the organic matter in the topsoil decays and compresses, but the rate of settlement diminishes over time.

[34] Static settlement of this sort can be identified during initial construction and afterwards by comparing floor levels with the level of surfaces designed to be level, such as kitchen benches, baths, built-in furniture, windowsills, shower glazing and door lintels. Static settlement can also be identified in adjustments made over time to ensure that windows and doors remain functional. Engineers describe this as "locked-in" settlement.

Earthquake damage

[35] Sinclair Knight Merz (SKM) was instructed by EQC after the September 2010 earthquake to inspect the house for earthquake damage. Its report noted that:

(a) the corner posts at the front of house were out of plumb and were likely to have rotated off their bases;

(b) some door frames were out of plumb;

(c) some floor levels were uneven;

(d) settlement was presumed where floors were uneven;

(e) there was some new cracking and some exacerbated cracking to the perimeter strip footing; and

(f) there was minor cracking/separation to the timber door frames.

[36] They examined the house again a few months later, just before the February 2011 earthquake, and noted that:

(a) the effects of the floor dislevelment included:

(i) noticeable gradients in the floor;

(ii) doors and windows that did not shut properly; and

(iii) opening of door and window frame joints.

(b) there was a high point in the lounge that was higher by approximately 30 mm than the surrounding area; and

(c) although there were new cracks in the perimeter footing, there were also repaired cracks, some of which had re-opened, indicating that there may have been settlement in the house prior to the September 2010 earthquake.

[37] Once IAG accepted liability under the policy, it instructed MSC Consulting Group Ltd (MSC) to carry out a floor level survey which revealed that floor gradients exceeding 1:200 (0.5%) were formed when the front of the house, including the two studies, settled around the perimeter at the same time as the central piles under the studies punched up, causing large gradients to form. The remainder of the house appeared to have a general slope down towards the rear. MSC's floor level plan can be found in Appendix 1 as Figure 1.

[38] After taking into account the level of foundation damage observed, type of construction and geotechnical information provided, MSC also reported that the MBIE Guidance criteria indicated that foundation relevelling was necessary.

[39] Although IAG's building surveyor, Mr McGunnigle, later identified "locked-in" settlement in items such as the built-in furniture on the internal south wall of study 2 and the kitchen bench on the first floor, there are many signs around the house indicating that significant dynamic settlement occurred during the earthquakes, including:

(a) the sudden appearance of discernible hogging in the two studies, the lounge, and bedroom one;

(b) the functional impairment of internal doors and cupboard doors on both floors; and

(c) the association of these impaired doors with significant floor dislevelment and signs of wracking.

[40] Moreover, the re-piling in the 1960s and 1970s would have provided an opportunity for addressing some of the static settlement and, because the new piles are likely to have better footings than the originals, would have slowed the rate of further static settlement.

[41] "Locked-in" settlement when discussed in relation to floor levels, only has relevance when deciding whether there is earthquake damage to repair or when deciding that a particular repair strategy is not reasonably practicable. In the first context, it is simply a means of identifying pre-existing damage not covered by the policy. Whereas here, there is clear evidence of earthquake damage, its only relevance is in the second context.

Policy standard

[42] As explained in [12] to [17], IAG was required to restore these damaged foundations "to a condition as similar as possible to when [they were] new, using current materials and methods." The strength and durability of the foundations was not compromised by the earthquake damage, and the focus, therefore, is on the functionality of having a level floor.

[43] Because the house was nearly 90 years old at the time the repairs were being contemplated, it was reasonable to make allowance for construction tolerances exceeding those appropriate today, the use of construction timber that had not been kiln dried, and both the elastic settlement experienced during construction and the static settlement likely to have occurred in the 12 months after that. I accept IAG's submission that repairing the floor to the

"as new" policy standard involved creating floor levels as similar as possible to the likely floor levels at the end of that 12-month period. I also accept that it is not practical to relevel the floor of a 90-year-old house to perfectly flat and level. As its engineer, Mr Cook, pointed out, relevelling an old house with historic level differences is challenging.

[44] Although MSC used the MBIE Guidelines in 2015 to determine whether floor relevelling was required, IAG correctly says that this is not the appropriate tool to use when assessing floor levels in an older house. I accept IAG's suggestion that it is more appropriate to set the policy standard by using the tolerances outlined in the quality guidelines for buildings, namely 0.5% slopes or ±10 mm across each room.

[45] Another complicating factor is that the first floor alterations carried out in 2000 would have taken into account the floor levels as they then existed. Although IAG submits that these are the "as new" floor levels to which this part of the floor should be repaired, these floor levels depend upon support from the original 1925 foundations. The appropriate solution is to ensure that relevelling the original foundations does no more than restore each room of the house to the locked-in levels established from fittings such as bench tops and doors.

Repair standard

[46] SKM recommended to EQC in its 2010 report that a full level survey be undertaken to determine whether a new perimeter strip footing was required or whether repairing cracks to the perimeter strip footing with epoxy grout would be sufficient. It also recommended that the floors be relevelled by packing/replacing the internal foundation piles where necessary. Its second report went on to recommend that the house should be elevated, or moved offsite, to allow a working area to re-pile the property and construct new perimeter footings.

[47] Then, in 2013, MSC recommended, instead, that the ground floor be relevelled in the kitchen and hallway by jacking and packing to within the tolerances of the other areas, following which the cracks in the perimeter foundation and entranceway floor slabs would be injected with epoxy grout. WeirWalker Architects drew a plan of the ground floor of the house and incorporated into it the floor level measurements taken by MSC. It was this plan that was eventually modified and produced to the Christchurch City Council to support an application for a building consent. The consented plan for the ground floor can be found as Figure 2 in Appendix 1.

[48] No plan was produced of the relevelling required on the first floor. Instead, the consented plan noted "upper level relevelled during repairs."

[49] The scope of works prepared by Hawkins and attached to the building contract specified that the foundations were to be repaired and the floors relevelled by relevelling and packing the perimeter foundation “as per the engineer’s report” and jacking and packing the piles “as per the engineer’s report”. Because of the way in which the scope of works was prepared, I infer that the engineering report referred to is that provided to Hawkins by MSC, which recorded in the executive summary that the repair strategy for relevelling the floor was:

> Jack the house and relevel using timber packers. The front section of the house will need to be jacked and packed in the centre where the upper floor is bowing. Following this re-assessment of the outer posts/walls will be required to check if further foundation construction is necessary.

[50] As can be seen from the consented plan reproduced as Figure 2 in Appendix 1, the Christchurch City Council was informed that:

(a) the spalled perimeter foundation concrete would be rebuilt and the cracks epoxy injected;

(b) areas in study one, study two, and bedroom one (referred to as bedroom three in the MSC report) would have piles replaced; and

(c) an area in the centre of the house, roughly equivalent to the area identified by MSC but extending further along the hall and into the laundry, was to be relevelled by packing beneath the timber bearers.

[51] Relevelling of the kitchen/dining area, as recommended in the MSC plan, was not included in the consented plan.

[52] It is accepted that the cracks in the perimeter foundation were injected with epoxy grout by Max Contracts, but no spalled sections of the perimeter foundation concrete were rebuilt.

[53] The only evidence of the work undertaken by Max Contracts to level the floors is provided by the Cavity Critter photographs taken in November 2016 after the work had been completed. I acknowledge that these photographs can be misleading (they are taken of only one side of each pile with a wide-angle lens) but I was disappointed that neither engineer

attempted to locate these piles on the plan of the ground floor. Although the plan of the Cavity Critter photographs is not drawn to scale, it is possible to use the photographs to locate the approximate site where the bearers meet the north and south perimeter foundations. Nor is it too difficult to roughly identify where the piles are situated under the ground floor of the house, because they are evenly spaced under the bearers and run in lines across the house. Moreover, the Cavity Critter photographs can be used to identify which piles were packed, coinciding with those areas where the floor needed to be raised. It also appears from the photographs, that where the floor had high spots, the bearers in these areas were raised above the original piles by placing new piles on either side. This analysis reveals that the first technique was used under the hallway area and the second under the two studies. This is demonstrated in Figure 3 of Appendix 1.

[54] Although Max Contracts raised the level of the bearers in studies 1 and 2 and packed the piles under the southern end of the hallway, there is no way of knowing how it identified its target floor levels, as the original floor level survey undertaken by MSC Consulting Group Limited (MSC) was inadequate and I heard no evidence from anyone who undertook or supervised the relevelling. But I was provided with two floor level surveys, one made by Terra Consultants in May 2017 and the other made by Cook Costello in July 2018. Both surveys were based on a datum point just inside the front door and show the relativities between that datum point and the point at which the measurements were taken using plus and minus signs. These measurements need to be treated with some caution as they were taken in different places and on top of floor coverings. The other measurements in the Cook Costello survey are the heights of windowsills or interior door lintels at the point indicated by the arrow. The plans prepared from these surveys can be found in Appendix 1 as Figures 4 - 8.

[55] The Family Trust's building expert, Mr Richardson, also undertook a floor level survey. The plan he prepared from that survey, using a separate datum point for each room, can be found in Appendix 1 as Figure 9.

[56] The Family Trust's engineer, Ms Critchley, used the Cook Costello plan to prepare a floor slope diagram which can be found in Appendix 1 as Figure 10.

[57] Max Contracts points out that each of these three floor level surveys was undertaken well after the repair work was finished in 2014 and could reflect some level of damage caused by the 726 earthquakes exceeding 3.5 in magnitude experienced by the house since then.

Although the occupants suspect that these earthquake events and changes to groundwater levels may have indeed induced some form of dynamic settlement in the foundations of the house since the repair work was completed, this is not supported by the engineers, who inspected the house and surrounds during the hearing and agreed that there was no evidence anywhere of such settlement. I therefore conclude that these three floor level surveys accurately reflect the level of the floor immediately after the repair work was completed.

Comparison

[58] The following table analyses the three floor level surveys for height differential and slope:

Room	Survey	Height Differential	Slopes > 0.5%
Study 1	Cook Costello	32	6
	Terra Consultants	38	
Study 2	Cook Costello	30	6
	Terra Consultants	40	
Hall	Cook Costello	20	9
	Terra Consultants	17	
Bedroom 1	Cook Costello	20	4
	Terra Consultants	18	
Lounge 1	Cook Costello	22	5
	Terra Consultants	28	
Kitchen	Cook Costello	18	6
	Terra Consultants	10	
	Richardson	17	
Dinette	Cook Costello	12	0
	Terra Consultants	4	
	Richardson	27	
Bedroom 2	Cook Costello	28	
	Terra Consultants	14	
Bedroom 3	Cook Costello	62	
	Terra Consultants	74	
Bedroom 4	Cook Costello	28	
	Terra Consultants	28	
Kitchenette/lounge 2	Cook Costello	16	
	Terra Consultants	28	

[59] On this analysis, every room except the dinette requires relevelling to ensure that the floor dislevelment meets the policy standard by being within the tolerances outlined in the quality guidelines for buildings. I record at this point, a general concession by IAG that the floor is currently out of level and does not meet the policy standard.

[60] Although my analysis is subject to the caveat that it is not reasonably practicable to raise the floor to a level which causes consequential damage to other areas of the house, which in this case includes any element which has pre-existing settlement "locked" into it, my own analysis of the pile locations indicates that consequential damage is less likely than the parties' engineers feared. In my view:

(a) the dislevelment on the first floor tends to mirror the dislevelment on the ground floor, as one would expect;

(b) the windowsills in the lounge and bedroom 1 reflect the dislevelment in the floor beneath them;

(c) some items, such as bench tops, are capable of adjustment; and

(d) adjustment of floor levels in the middle of rooms carries far less risk of consequential damage than adjusting floor levels under walls.

Cause of deficiencies

[61] Targeted earthquake repairs should have returned the floor to level within the tolerances set by the quality guidelines for housing. The fact that they did not achieve that policy standard indicates that the repairs were defective, but there are likely to be many causes which are better addressed in a later hearing about liability.

[62] It will be of assistance to the parties, however, if I make the following comments:

(a) although the repair strategy recommended by MSC, and reflected in the scope of works attached to the building contract, involved jacking and timber packing the perimeter foundation, there is no evidence of this work having been carried out;

(b) although there was some suggestion by Ms Critchley that some of the "bony" sections of the perimeter foundation should be replaced to prevent them being damaged during the relevelling process, I do not consider that any relevelling to be undertaken is likely to endanger the perimeter foundation;

(c) although the original MSC report recommended relevelling in the kitchen/dining area, there is no evidence that this work was carried out;

(d) although the consented plans reflected the recommendation in the MSC report that relevelling be undertaken in an area around the bottom of the stairs, there is no evidence that much work was undertaken in this area;

(e) although the consented plans indicated that relevelling would be undertaken in the centre of the lounge and the centre of bedroom 1, there is no evidence that this work was carried out; and

(f) although the consented plans indicated that the first floor would be relevelled during repairs, there is no evidence that this work was carried out.

Other issues

[63] Mr Cook produced a relevelling proposal, but I do not consider that it goes far enough as it should have involved: jacking and packing the perimeter foundation, relevelling the northern end of the hallway, the kitchen/dining area, and the first floor. If jacking and packing the perimeter foundation is not practicable, consideration should be given to replacing all or part of it.

[64] I would be concerned about any suggestion that levels set in the kitchen/dining area after the earthquakes, whether in the course of the repairs or during work commissioned by the Family Trust, should be regarded as "locked-in" so as to restrict the extent of the floor relevelling. If these levels were set during the repair work, then any financial consequences of properly relevelling the floors cannot be said to be unreasonable or impracticable. Any consequential damage caused by the relevelling to work commissioned by the Family Trust is likely to constitute a loss from which damages would flow, either in contract, tort, or under the Consumers Guarantees Act 1993.

[65] Development of a scope of works for this relevelling would probably benefit from: a more comprehensive and accurate floor level survey of both the ground floor and the first floor, a more precise pile location plan that could be used to relate the piles to features on the ground floor plan, and some means of being able to establish the relationship between the ground floor and the first floor. However, I do not consider that a further geotechnical investigation should

be undertaken to determine whether the land is still settling, as suggested by the Family Trust, because there is no evidence to suggest continuing settlement.

[66] Finally, there are numerous piles which fail to comply with the Building Code. The engineers conferred and produced a detailed schedule of these compliance issues. I adopt the findings of that schedule, which is attached as Appendix 2. There are three piles about which they are disagreed. During the preparation of the scope of works, each of those three piles is to be examined and measurements taken to ascertain the combined depth of the spalling. If the depth of that spalling exceeds one third of the diameter of that pile at the midpoint of the spalling, then the pile is to be replaced. If it does not, then no repairs to that pile are required.

[67] Because it is not disputed that the work undertaken to the piles was the responsibility of Max Contracts, I find that the failure to comply with the Building Code as outlined in Appendix 2 amounts to defective workmanship by Max Contracts.

The downstairs bathroom

Generally

[68] Although the downstairs bathroom was subject to the same earthquake forces as the rest of the house, there was relatively little damage identified in this area by the engineers who examined the house and commissioned the repairs.

[69] The scope of works attached to the building contract allowed for cosmetic repairs to the walls and ceiling, re-grouting of the bathroom floor, and the replacement of one floor tile. That work was carried out by Max Contracts without any complaint from the Family Trust about the quality of this workmanship.

[70] However, in 2016 a "hump" was discovered in the bathroom floor and it has got steadily worse. It is now apparent that major repairs need to be commissioned to rectify the problem.

[71] The applicants contend the problems they now face in the downstairs bathroom are either the result of unrepaired earthquake damage or defective workmanship.

[72] IAG attributes the deteriorated state of the bathroom floor to decay damage caused by pre-existing workmanship defects. It contends that the floor had been so badly damaged prior

to the earthquakes that it required replacement. For that reason, neither the earthquakes nor the repairs can have had any negative impact on the floor's attributes.

[73] QBE claims that there is clear evidence of a pre-existing leak and pre-existing decay. In its view, the leaks in the downstairs bathroom cannot have been caused by defective repairs and have probably not been caused by unrepaired earthquake damage.

[74] Max Contracts contends that the very limited repairs it undertook in the downstairs bathroom cannot possibly be responsible for the problems that are now apparent.

Earthquake damage

[75] The Family Trust's claim is focused upon three defects in the downstairs bathroom which it considers are unrepaired earthquake damage:

(a) a cracked tile in one corner of the shower;

(b) the cracked pebble-mat in the shower; and

(c) the hump in the floor.

[76] The first two items can be quickly dealt with:

(a) The shower tile in question is divided by a perfectly straight line running diagonally from the middle of one corner to near the other corner. I consider that this straight line is more likely to be a sawcut than a crack because:

(i) it is completely straight;

(ii) an earthquake crack is unlikely to be completely straight;

(iii) the line in the tile coincides with the line along which two adjacent slopes join,

(iv) a workman would be better able to lay the tile on those converging slopes if the tile were divided in half along the sawcut; and

(v) none of the other tiles in the shower that were similarly located on the corner show any sign of cracking.

(b) Whether the cracks in the pebble-mat were earthquake cracks (as alleged by the Family Trust) or shrinkage cracks (as alleged by IAG), I am not satisfied that the function of this mat has been negatively affected by these cracks as:

(i) the cracks are almost invisible; and

(ii) any water that penetrates through the cracks to the surface below will be intercepted by a waterproof membrane on a sloping surface and allowed to drain away.

[77] The hump in the floor is a much more complex subject.

[78] Although the Family Trust initially believed that this hump could have been caused by foundation relevelling undertaken by Max Contracts, it was eventually established that Max Contracts had not undertaken any levelling under the bathroom. It is possible that the bathroom may have been slightly affected by relevelling undertaken in other parts of the house but there was nothing in the evidence to suggest that this was likely.

[79] All witnesses now agree that the hump in the floor has been caused by swelling in the particleboard under the bathroom floor. They also agree that this swelling has been caused by long-term exposure to moisture. However, they cannot agree on the source of this moisture or when the exposure began.

[80] One of the principal objects of the Building Code is to safeguard people from illness or injury resulting from external moisture entering their home.[5] Another is to safeguard people against illness, injury, or loss of amenity that could result from accumulation of internal moisture.[6] To further those objectives, buildings must be constructed to provide adequate resistance to penetration by, and the accumulation of, moisture from outside and to avoid the likelihood of damage to building elements caused by the presence of moisture.[7]

[5] Building Regulations 1992, sch 1, cl E2.1
[6] At sch 1, cl E3.1.
[7] At sch 1, cls E2.2 and E3.2.

[81] The particleboard under the bathroom floor is a building element that has been damaged by the presence of moisture. It follows, therefore, that this damage can only have been caused through:

(a) faulty design/faulty workmanship of work on the exterior of the building;

(b) faulty design/faulty workmanship of work on the interior of the building;

(c) an event the house was not designed to withstand, such as a flood, a storm or an earthquake; or

(d) a combination of the above.

[82] In this context it is relevant to note that:

(a) extensive renovations, including replacing the floor and installing a new shower, were carried out to the downstairs bathroom in 2003;

(b) repairs were made to the roof above the bathroom by the Family Trust in 2009, just before the earthquakes;

(c) repairs were made to the roof above the shower by Max Contracts in 2014 – 2015;[8] and

(d) grout repairs and the replacement of a tile were carried out in the bathroom by Max Contracts in 2014 – 2015.

[83] It is notoriously difficult to find the source of leaks, especially in roofs, as water can cause damage some distance from the source of the leak. It is relevant to the present enquiry that not only is there a steep pitch on the roof with rafters down which water could run, but also the floor and the supporting timbers are themselves not level.

[84] It is also relevant that:

[8] See photo E-337 which appears to show a slate repair above the shower.

(a) there is extensive decay in the floor timbers behind the shower that predates the 2003 renovations, indicating the possible presence of a long-term leak;[9]

(b) Mr McGunnigle has identified a roofing detail immediately above the shower which he says permits water to enter the fabric of the building;

(c) one of the photographs produced by D shows that Max Contracts repaired a roof slate immediately above the shower; and

(d) the removal of the bathroom tile by Max Contracts, which is most likely to be the tile immediately adjacent to the north-east corner of the shower box, could have damaged the waterproof membrane and is near the damaged particleboard.

[85] It is not my role, however, to identify the source of the moisture. Instead, I am required to evaluate the evidence presented to me and determine the most likely source of that moisture. The two building surveyors who gave evidence, each of whom is an expert in identifying and explaining weathertight issues, ignored option [82](a), presumably because they did not consider it likely. They were focused, instead, upon issues that might explain how the particle-board substrate of the bathroom floor became exposed to moisture from the shower.

[86] When the bathroom was remodelled in 2003, new flooring was installed together with white wall tiles, blue floor tiles, a new toilet, a new bath, a new wash hand basin and a new shower with glazed screens. Figure 11 in Appendix 1 is a photograph of the bathroom showing the shower. The layout of the bathroom can be seen in Figure 12 in Appendix 1 but with alterations in red pen showing that there is a cupboard behind the shower with access from the adjacent laundry. This error in the drawings was only discovered during the hearing.

[87] Mr Martin, the builder who carried out the renovations for the Family Trust, told how he removed the existing floor so that he could completely replace the pipework under the bathroom and construct a walk-in shower set into the floor. The bathroom floor consists of particleboard overlaid with a fibre-cement tile and slate underlay. The shower floor comprises a compressed fibre-cement sheet on which a concrete screed has been laid, level with the floor at the entrance to the shower and tapered to a drain in the centre. A continuous waterproof membrane has been laid over the bathroom floor underlay, across the shower threshold, over

[9] McGunnigle sample 5

the screeded base of the shower, and up the southern and western walls of the shower. Ceramic tiles have been laid on top of the waterproof membrane. Figure 13 in Appendix 1 is a cross-section through the shower threshold drawn by Mr Martin during his evidence. The diagram at the bottom left shows a close-up of the shower threshold; at the bottom right is a cross-section through the western wall between the shower on the left and the laundry on the right.

[88] IAG's building surveyor, Mr McGunnigle, took moisture meter readings from under the floor of the particleboard surrounding the shower. These measurements reveal that the particleboard in the laundry floor behind the shower and in the bathroom floor in front of the shower had moisture readings greater than 40%, the highest reading on the moisture meter he used. Much lower readings were obtained on the eastern side of the shower. Mr McGunnigle's plan showing where the readings were taken is shown in Figure 14 in Appendix 1. I am discounting the reading behind the shower as it was not taken in particleboard and I am uncertain of its location now that we know there is a cupboard behind the shower.

[89] Figure 15 in Appendix 1, drawn by Mr McGunnigle during his evidence, shows the location of the hump in the floor described by D. When he carried out his site inspection in 2019, the hump was as shown by the solid red line; he and Mr Brooks agreed that, by the time of the hearing, it had expanded as shown by the dotted red line. They also agreed that the only mould present in 2019 was black mould but, by the time of the hearing, white mould had begun growing on top of the black mould.

[90] Both Mr McGunnigle and Mr Brooks took timber samples from joists and bearers under the floor and sent them to Dr Wakeling of Beagle Consultancy Ltd for analysis. Two of the three samples taken in 2019 showed the presence of soft rot in radiata pine joists beneath the shower entry, one of which had advanced soft rot which Dr Wakeling suggested should probably be replaced. In his view, the other sample only showed superficial soft rot and did not need replacement. Two further samples were submitted in 2020, one from the rimu bearer under the shower threshold, and the other from a joist under the wall between the bathroom and the laundry. Although the rimu bearer showed signs of what Dr Wakeling suspects was incipient brown rot, he did not recommend replacement. Although, he did of the second sample in which he identified advanced soft rot and brown rot.

[91] In each of the two reports provided by Dr Wakeling, one in 2019 to Mr Brooks and the other in 2020 to Mr McGunnigle, he commented:

> Whilst it is possible that post-earthquake damage may have compounded moisture issues, it is reasonably clear that the bulk of the actual fungal decay damage identified would have had its origins well before the earthquake and that damage well beyond "more than de minimis" would have arrived before the earthquakes.

[92] Both building surveyors appear to have accepted that the particle-board substrate in the bathroom floor may have been exposed to moisture through failure of the waterproof membrane, but each identified a different explanation for how this membrane might have failed. Mr Brooks believed that this waterproof membrane had become torn by the earthquake above the threshold between the shower and the bathroom. Mr McGunnigle, instead, believed that this membrane failed from a combination of design and workmanship defects. Mr McGunnigle also advanced an alternative hypothesis that the source of the moisture was a leak from the plumbing behind the wall between the shower and the laundry and that this moisture had tracked north along the plate at the bottom of the wall and into the particle-board under the bathroom floor.

The earthquake hypothesis

[93] Waterproof membranes are designed to prevent the penetration of water. Although the brand of membrane applied in this case is not known, it is agreed that it was fibre-reinforced and applied as a liquid. Such membranes are not designed to have horizontal structural strength, although they have a degree of elasticity to cater for surfaces, such as concrete, prone to expansion cracking.

[94] As can be seen from Figure 13, there are different substrates on either side of the junction between the shower and the bathroom (under the shower door) linked underneath by two joists nailed together. Mr McGunnigle considers that differential movement between these two substrates is inevitable as timber-framed buildings, especially of this age, and on piles, move regularly because of expansion/contraction, wind loading, occupants walking around inside the house, and ground movement transmitted to the floor by the piles. In his view, only a very small degree of movement would be needed to crack or split the membrane.

[95] The Family Trust says that if the membrane in this location was susceptible to damage from such moderate forces, then there was no chance of it surviving the much more significant forces to which the house was subject during the earthquakes.

The defective design/workmanship hypothesis

[96] Mr McGunnigle claims to have identified four areas in which the design of the bathroom and/or of the workmanship involved in the renovation have been defective:

(a) it was wrong to construct the two parts of the floor separately by using different flooring materials;

(b) the waterproof membrane laid across the junction between the shower floor and the wall framing behind the tiles does not comply with E3-AS1 of the Building Code:

(c) H3 treated plywood should have been used instead of untreated particleboard when constructing the bathroom floor; and

(d) the waterproof membrane was, at the most, only one third of the recommended thickness.

[97] Nothing I have read in E3-AS1, or in any of the product material provided by Mr McGunnigle from manufacturers of membranes intended for use in bathrooms makes any mention of the dangers involved in applying those membranes across junctions between different floor materials. All that E3-AS1 requires is that "ceramic… tile finishes shall be laid on a continuous… membrane" and it refers to a diagram reproduced as Figure 16 in Appendix 1. I accept that the membrane applied by Mr Martin's subcontractor did not use a fillet at the junction between the shower floor and wall lining as required by E3-AS1, but this fact does not cause the actual method used to breach the Building Code. An examination of the literature produced by the membrane manufacturers reveals that they all recommend the use of a "bond breaker" or "bond breaker tape" in such circumstances. Although Mr Martin is not certain which product was used by his subcontractor, he is adamant that bond breaker tape was laid across the junctions under the shower door and along the bottom of the shower walls.

[98] I consider, therefore, that the use of bond breaker tape across those junctions was an alternative solution that was sufficient to address the problems identified by Mr McGunnigle. It is not a design defect.

[99] Mr Martin accepted that, with hindsight, it would have been preferable if he had used treated ply in the bathroom floor, but it was common to use untreated particleboard in 2003 when such work was undertaken. In any event, this would have only reduced the damage caused by moisture from the shower and is not relevant to the issue of causation I am addressing.

[100] Finally, both Mr Martin and Mr McGunnigle took samples from the particleboard to confirm the presence of the waterproof membrane. Mr McGunnigle measured the thickness of the membrane on his sample, recording an average depth of 0.285 mm. From this he has concluded:

> It is very likely that the measured thickness (average 0.285 mm) of the waterproof membrane put in place to the ground floor bathroom is significantly less than the commonly/normally required minimum dry film thickness of about 1 mm. That is 28.5% of the normally required dry film thickness.
>
> The thinner than normal application of the waterproof membrane will have reduced the capability of the waterproof membrane to accommodate movement of the substrate and could crack as a result of normal use of the shower.

[101] Mr Martin could just as easily have measured his sample. If he did, he has not supplied his measurements and I draw the adverse inference that his sample matches Mr McGunnigle's.

[102] The thickness of the membrane sample, however, is only relevant if I consider that it is a reasonable representation of the thickness of the membrane at the junctions below the shower door and along the bottom of the shower walls.

[103] Both samples were taken from the same place under the floor. Mr McGunnigle says that his sample was taken about 1 m from the shower door threshold and in line with the shower outlet. Mr Martin describes the site as being alongside the bath. Photographs taken by Mr McGunnigle demonstrate that the particleboard from which the sample was taken was not affected by moisture. The description given by Mr McGunnigle indicates that it was more than 1 m away from the hump in the floor.

[104] I do not consider that this membrane sample, taken from a part of the bathroom floor that is only exposed to splashing, is representative of the membrane laid under the shower, an obvious wet area. Moreover, it is the thickness of the membrane over the floor/wall junctions that is in issue, and in each case, there is the presence of bond breaker tape which may, or may

not, be incorporated in the membrane. Finally, because the membrane is a viscous liquid, it is likely that its thickness at the foot of the shower walls is greater than it is higher up the wall.

[105] However, these findings do not explain Dr Wakeling's evidence that "the bulk of the actual fungal decay damage identified would have had its origins well before the earthquake and that damage well beyond "more than de minimis" would have arrived before the earthquakes."

[106] The commencement of the fungal decay is likely to have coincided roughly with the arrival of the moisture. If that occurred before the earthquakes, as Dr Wakeling says, then that cannot have been caused by the earthquakes and is likely to have occurred outside the policy period.

[107] As already discussed, there are only two other possible sources of this moisture, the shower or the roof. The latter seems unlikely, leaving the shower as the more likely of the two, despite my findings in [97] – [104]. I conclude, that there must be some unknown defect, whether of design or workmanship, in the 2003 renovations that resulted in water escaping from the shower into the particle-board substrate of the bathroom floor.

The leak in the plumbing hypothesis

[108] Although this hypothesis was disproved during the hearing by the removal of the laundry wall lining to expose the back of the shower, it was a valid hypothesis, nevertheless. However, the way Mr McGunnigle advanced it in his May 2020 addendum to his brief caused me to have reservations about his independence from IAG.

[109] Much was made by IAG about Mr McGunnigle's experience, his use of the "scientific method," and his co-authorship of the Risk Matrix Assessment adopted by MBIE in its guide to diagnosing leaky buildings. With his expertise, the time and energy he devoted to exploring the issues in the bathroom, and his knowledge of the High Court Code for Expert Witnesses, his evidence should have been consistent across both briefs and his evidence about the bathroom, but it was not. For example, here is what he has said about the possibility of the membrane being cracked under the shower door:

> I believe that the waterproof membrane laid across the junction between the two different floor structures was compromised soon after it was laid and began leaking moisture through into the substrates. *(Brief dated 3/7/2019)*

> There is no direct evidence of a crack in the waterproof membrane at the door threshold of the shower. The claimants have not carried out any dye test to show a leak at the shower door threshold and have not undressed the tiles at the door threshold to the shower to discover any crack in the membrane. (*Supplementary brief dated 27 May 2020*)
>
> Now, if there was a leak in the situation here between the shower and the – the shower threshold in the bathroom floor; you would have expected that this moisture in the particle-board which you can see from underneath would be around this area and would have spread from this area round this way, that way and so on, you don't find that. What you find is that the moisture has spread from this point here where there is a leak in the wall this way and when you do moisture meter readings at the back into the timber you also see high levels of moisture. So therefore the – my view is that the cause of this hump in the floor here is due to ongoing leak from the plumbing installation to the shower rose and so on, in this wall between the shower and the laundry, okay. And that's ended up with a swelling of the particleboard because particleboard does swell over a long period of time when it's exposed to water, okay. (*Oral evidence 16/9/20*)
>
> … If this leak is ongoing then the water can continue and it can cause the hump to grow which is incremental. You won't notice it actually because you go in there every day. The other thing is that there's not been dye test been carried out at the door threshold. If there was a leak surely one would do some dye test and see if there is dye come out underneath and that hasn't been done and so you can't conclusively say that there is a leak at this door threshold as a cause of this hump. There is a definite leak in the wall between the shower and the laundry and that's my proposition for this causing this hump to occur. (*Oral evidence 16/9/20*)
>
> That's what Robin Wakeling tells us in his report. So, he is quite clear that this is not down to some issue related to a waterproof membrane cracking because of the earthquake. It's because of a leak between the shower wall and the laundry. (*Oral evidence 16/9/20*)

[110] In my view, this is not the evidence of a witness who is opening his mind to new information as it comes to hand, but one who is actively intervening to improve the case of the party he represents.

[111] Moreover, he acknowledged to me that he had not carried out a separate investigation of his own but was simply responding to the claimant's view of what happened because he was "on the defence side."

[112] I am therefore treating Mr McGunnigle's evidence with some caution, despite his acknowledged expertise.

Evaluation of the hypotheses

[113] Despite my finding that water was escaping from the shower into the particle-board substrate in the bathroom floor prior to the earthquakes, I am still required to examine the earthquake hypothesis.

[114] I consider that the earthquake forces are very likely to have cracked the waterproof membrane under the shower door because:

(a) there is a division in that area between the two different floor substrates;

(b) differential movement in those two floor substrates could cause them to separate;

(c) there is a point at which the separation between those two substrates would be enough to crack the waterproof membrane;

(d) the rolling motion in the earthquakes is likely to have been severe enough to cause the two substrates to separate beyond the point at which the waterproof membrane would crack; and

(e) the location of the moisture in the particleboard is consistent with this hypothesis, albeit the hump is higher at one end then the other.

[115] I also find that it is likely that the earthquakes have caused moisture to enter the junction between the shower floor and the wall linings, because:

(a) there is evenly distributed moisture along the bottom plate in the wall behind the shower;

(b) the mortar in the junction between the shower floor and the wall behind the shower is clearly damaged;

(c) the mortar between the tiles on the bathroom floor was cracked during the earthquakes and replaced by Max Contracts;

(d) the mortar in the junction between the shower floor and wall behind is likely to have been similarly cracked in the earthquakes but was not repaired;

(e) the shower has a junction between the floor and the wall boards similar to the junction under the shower door;

(f) that junction was vulnerable in the same way as the junction under the shower door to earthquake forces;

(g) the vertical motion during the earthquakes is likely to have been severe enough to cause the two surfaces to separate beyond the point at which the waterproof membrane would crack;

(h) the location of the moisture in the wall plate, in the particle board flooring in the laundry, and in the particle board flooring in the bathroom is consistent with this hypothesis; and

(i) the greatest swelling of the particleboard flooring in the bathroom coincides with that part of the floor receiving moisture from two sources.

[116] IAG contends that the bathroom floor required replacement before the earthquakes because, by then, the decay had progressed by more than a trivial amount. If that is the case, then the Family Trust had already suffered the loss of the floor; even if the earthquakes inflicted further damage, that did not increase the Family Trust's loss. As Mr McGunnigle put it in his original brief of evidence:

> I agree that the earthquake loads are likely to have exerted stress and strain on the waterproof membrane laid across the junction of the adjacent floor structures. But by then I believe it was already substantially compromised and any further degradation caused by the earthquake would not have materially increased the amount of moisture that was already being allowed through it.

[117] Taking the last point first, I do not accept that the earthquake would not have materially increased the amount of moisture escaping from the shower. In the first place, this is speculative and has no sound basis in fact. Secondly, the earthquake forces were likely to be far more significant than any of the other likely operative forces and were therefore likely to have caused far more damage.

[118] I am also cautious about accepting Mr McGunnigle's assertion that, by the time of the earthquakes, the particle-board substrate was "already substantially compromised." No doubt he relies upon Dr Wakeling's evidence that, by the time of the earthquakes, the fungal decay damage he identified in the untreated pinus radiata joist was well beyond de minimis. However, Dr Wakeling's evidence requires examination.

[119] In the first place, Dr Wakeling reported to Mr Brooks in March 2019 that the type of decay patterns observed in samples 1 and 2, taken from two separate joists beneath the shower, were "not typical of sudden moisture ingress around the time of the September 2010 and February 2011 earthquakes but was typical of closer to 10 years exposure to a decay hazard." In other words, he believed that it was closer to 10 years than 8 or 8 ½ years.

[120] Secondly, if Dr Wakeling's assessment is correct, then the damage caused by the moisture is likely to have begun in about March 2009.

[121] Thirdly, it is clear that Dr Wakeling's conclusion that by the time of the earthquakes the damage was well beyond de minimis is based upon an opinion that the bulk of the damage initiation had occurred by then.

[122] Finally, sample 5 tested by Dr Wakeling for Mr McGunnigle and identified as having decay patterns typical of well in excess of 10 years exposure to a decay hazard, had been taken some distance away and was unlikely to be associated with the other samples.

[123] Neither party sought to have Dr Wakeling produced for cross-examination, from which I infer that they accept his expertise and do not challenge his conclusions.

[124] I therefore find that:

(a) moisture began leaking from the shower before the earthquakes;

(b) this leak is the result of an unknown defect, either in design, materials, or workmanship;

(c) by the time of the September 2010 earthquake, the pine joists damaged by this moisture required replacement as the damage could not be repaired;

(d) the earthquakes caused cracks to form in the waterproof membrane under the shower threshold and at the junctions between the shower floor and walls;

(e) there were no defects of design, materials, or workmanship that caused or contributed to this earthquake damage; and

(f) no elements of the bathroom or laundry, other than the two pine joists mentioned above, required replacement prior to the September 2010 earthquake.

Repair standard

[125] No attempt has been made to repair the moisture damage in the bathroom.

Comparison

[126] Because no attempt was made to repair the moisture damage, no comparison is possible.

Cause of deficiencies

[127] Although I have identified two likely causes of the damage to the bathroom floor that operated at different times, I am satisfied that the two causes are independent of each other. In other words, the earthquake, which came later in time, would have caused the same degree of damage regardless of whether moisture had been earlier leaking from the shower from the same or another source.

Other issues

[128] I received no submissions about, and cannot therefore comment upon, whether the damage being discussed in this section of the decision is covered by any exclusion clause in the insurance policy.

The windows

Generally

[129] There are three different types of windows in the house:

(a) steel windows (21);

(b) wooden windows (5); and

(c) aluminium windows (6).

[130] In the following discussion I use the numbering adopted by Mr McGunnigle as shown in Appendix 1 Figures 17 and 18. The steel windows are numbered in red.

[131] The twenty-one steel windows, with their lead-lined transoms, were installed inside rimu frames when the house was constructed. The mild steel from which they are made is vulnerable to rust and regularly needs thorough maintenance. Although some rust has been detected on these steel frames since the earthquakes, I am satisfied that they were well maintained after 1983, with the most recent comprehensive overhaul occurring in March 2009.

[132] The five wooden windows were installed in 1925 and had been well maintained by regular painting, except for one window that had been covered over at some stage and was only re-discovered during the repairs.

[133] Two of the six aluminium windows (13 and 25) were installed in the kitchen/living room of the upstairs flat during the 2000 renovations. The remaining aluminium windows (10, 11, and 14) together with window 15, which is actually a door, were all installed during the repairs to replace aluminium joinery installed in the kitchen/dining area in 1941.

[134] The Family Trust says that most of the steel, wooden and aluminium windows in the house were damaged during the earthquakes (broken glass, distorted frames and wooden surrounds) and require either repair or replacement.

Earthquake damage

[135] My conclusions have been drawn from looking at the evidence in the round and I have not found counsel's submissions about witness credibility to be helpful. Certainly, some of the expert witnesses had more experience with steel windows than others, and I noted Mr McGunnigle's deference to Mr Richardson's experience during the conferral process, but the conclusions I have reached do not depend upon credibility.

[136] D says that during the September 2010 earthquake a window was shattered, and another was shaken open. The big sitting room bay window was cracked across diagonally and all the

downstairs kitchen aluminium window frames were twisted and unable to be shut properly. Leaks appeared under the back aluminium door, and many of the steel windows could not be shut or opened, causing drafts and leaks.

[137] I accept D's evidence that all but two of the windows were fully functional and weatherproof prior to the earthquakes. After the earthquakes however, many of the windows did not function properly and/or leaked badly.

[138] The only window damage reported by SKM in December 2010 was one broken window (presumably a pane of glass) which had been "replaced." Its more detailed structural report provided in February 2011, just before the second major earthquake, reported doors and windows that would not shut properly and door and window frame joints opening up, which it attributed to floor dislevelment. It is important to note that SKM's report was focused on structural damage and was not intended to highlight repairs that were either aesthetic or non-structural.

[139] Although the September 2013 Structall Ltd report commented that the building had been well maintained and was generally in good condition that was appropriate for its age, there was no specific mention of the windows.

[140] In October 2016, the Family Trust's builder, Mr Richardson, provided IAG with a table outlining his measurements of the windows, including the 21 steel windows and noting wracking in all windows accept window 24.

[141] In May 2017, Terra Consulting reported to IAG that:

(a) windows 1A, 5, 5A, 5B and 9A were warped, had gaps, and could not be opened;

(b) windows 1, 2A and 18 were warped and could not be opened;

(c) window 22 was warped; and

(d) window 20 could not be opened.

[142] Despite IAG's building surveyor, Mr McGunnigle, applying intense scrutiny to the steel windows, he vacillated about whether the windows had experienced earthquake damage.

[143] In his 59 page brief of evidence dated 3 July 2019, he agreed that nine steel windows (2A, 2B' 9, 12, 18, 20, 21, 22, and 23) required replacement because they could not be repaired but said that it was likely that they had been distorted to a degree by static settlement prior to the earthquakes. He was unable to say whether the damage observed had been caused by that pre-earthquake static settlement or by the earthquakes which, he conceded, was a possibility.

[144] He identified a further five steel windows (2, 5, 5A, 5B, and 19) that he was convinced were already damaged or defective before the earthquakes, either because they had bowed timber supports, or because of the presence of foam/filler that he wrongly assumed had been applied prior to the earthquakes.

[145] It is of significance that Mr McGunnigle's 2019 brief includes the following comments:

(a) the misalignment of a steel window does not necessarily prevent it from operating properly or allow rainwater penetration:

(b) a timber frame house which is 90 years old or more will have settled over time;

(c) prior to the earthquakes, the external timber framed walls would not necessarily have been perfectly vertical and aligned, and nor would the steel windows have been perfectly aligned and fully operational;

(d) no physical inspection can distinguish between the two possible causes of distortion; and

(e) in consequence, there is a lack of certainty about whether all the recorded misalignment of the steel windows has been caused by the earthquakes.

[146] Mr McGunnigle, however, changed his mind in May 2020 after meeting with Mr Richardson and carrying out further investigations and analysis. Contrary to his earlier evidence, he concluded that 15 of the 21 steel windows had been damaged in the earthquakes and required replacing.[10] He also accepted that two other steel windows required replacement to be compatible with the windows around them that had been damaged and required replacement.[11]

[10] Windows 1, 2, 2A, 2B, 5, 5A, 5B, 9, 12, 18, 19, 20, 21, 22, and 23.
[11] Windows 9A and 9B.

[147] Mr McGunnigle gave the following reasons for changing his mind about the steel windows:

(a) it was reasonable to consider that the twisted windows were likely to have become distorted due to the earthquakes;

(b) because the bay windows were supported on separate foundations from the main part of the house, they would undergo different movement compared to the main structure of the house when subject to an earthquake;

(c) all three of the bay windows were twisted; and

(d) the alignment of the un-twisted windows (east and west) and the twisted windows (north and south) was likely to indicate the presence of earthquake forces.

[148] In summary, therefore, Mr McGunnigle conceded that 17 steel windows should be replaced.

[149] The schedule of damage prepared by the parties to guide the Tribunal in its consideration of this claim incorporated this concession. Similarly, IAG's counsel conceded in opening that, of the 32 windows in total, the only windows in dispute were seven where Mr McGunnigle had been unable to identify any clear earthquake damage.

[150] Consequently, D was cross-examined by IAG's counsel only about those seven windows.

[151] I was surprised, therefore, when IAG's counsel announced, midway through the expert evidence about the windows, that IAG no longer considered that any windows should be replaced. Apparently, Mr McGunnigle had renounced the views he had expressed in his May 2020 brief and had returned to the opinion he had expressed nine months before in his earlier brief. According to IAG's counsel, this change of heart was prompted by a sudden revelation that the steel windows were likely to have been damaged by dynamic settlement caused when the house was re-piled, something Mr McGunnigle only became aware of when listening to the evidence of the engineers a week earlier. Although IAG's counsel attempted to lead Mr McGunnigle through an explanation of how the re-piling might have damaged the steel

windows, I ruled that this evidence was inadmissible as Mr McGunnigle did not have the engineering expertise to proffer this opinion evidence. Counsel then discussed this theory with the two engineers who were part of the witness panel discussing the windows.

[152] I do not need to discuss this theory in any detail. Instead, I make the following comments:

(a) IAG had been told in December 2013 by its engineers that most of the damage observed in the house had occurred "as a combination of the settling of the unconsolidated fill under the substructure and the horizontal "shaking" of the superstructure during the earthquakes";

(b) Mr McGunnigle's July 2019 brief disclosed that he was aware that the steel windows could have been damaged by static settlement;

(c) that brief also contained a concession by Mr McGunnigle that the damage could have been caused by the earthquakes;

(d) Mr McGunnigle's theory, first announced at the hearing in October 2020, that dynamic settlement caused during re-piling in the 1960s/1970s may have caused the damage to the windows did not justify renouncing the concession he made in May 2020;

(e) the engineering discussion initiated by IAG's counsel about the role that the re-piling might have played in damaging the steel windows through static settlement, although interesting, began with a concession from IAG's engineer that he could not rule out the possibility that the windows had been damaged by the earthquakes; and

(f) the forces involved in the theoretical engineering mechanism identified by the engineers in this discussion as possibly damaging the steel windows were the same, whether they were generated by re-piling or earthquakes.

[153] Moreover, Mr McGunnigle's May 2020 concession that 15 of the steel windows had been damaged by the earthquakes was properly made. Even allowing for the possibility of the windows being damaged during the re-piling process, there were only three possibilities;

(a) all damage was caused by an uninsured risk, such as static settlement/re-piling;

(b) all the damage was caused by an insured risk, such as the earthquakes; or

(c) the damage was caused by the combined operation of an insured risk and an uninsured risk.

[154] If there are two independent proximate causes of damage, the Tribunal need only decide whether the earthquakes were an effective cause of that damage and need not be concerned whether one cause was more effective than the other.[12]

[155] When the three possibilities listed in [153] above are considered, I have no difficulty finding that the third possibility is more likely than either of the other two possibilities.

[156] I find, therefore, that it is more probable than not that windows 1, 2, 2A, 2B, 5, 5A, 5B, 9, 12, 18, 19, 20, 21, 22, and 23 were damaged in the earthquakes.

[157] My findings about the windows can be found in Appendix 3.

Repair standard

[158] No attempt has been made to repair these windows.

Policy standard

[159] As explained in [12] to [17], IAG was required to restore these damaged windows to "a condition as similar as possible to when [they were] new, using current materials and methods." The strength and durability of the windows has not been compromised by the earthquake damage, and the focus, therefore, is on a repair that results in functioning windows. Quality must be paramount and cost secondary.

[160] I reject IAG's suggestion that any allowance should be made because the steel windows had maintenance issues and were at, or towards, the end of their useful life.

[12] Chitty 26-076; *County Ltd v Girozentrale Securities* [1996] 3 All ER 834 (CA)

Comparison

[161] Because no attempt was made to repair the windows, no comparison is relevant.

Cause of deficiencies

[162] The defects in the windows are unrepaired earthquake damage.

Other issues

[163] The following factors should be considered when designing the scope of works for repairing the windows:

(a) the damaged steel windows will need to be replaced as they cannot be repaired;

(b) bearing in mind the high quality standard, care will need to be taken to ensure that undamaged steel windows are not aesthetically damaged by their proximity to replaced windows;

(c) IAG's submission that there is a "medley" of different styles of windows is disingenuous as:

(i) the wooden windows are a design feature that complement other structural features and do not conflict with the steel windows;

(ii) none of the aluminium windows are visible from the street or to visitors approaching the external doors on the north or west sides of the house; and

(iii) the aluminium windows in the kitchen/dining area are confined to that area of the house, are in keeping with the function of that area, and do not detract from the appearance of the steel windows;

(d) any steel windows that are not replaced should, at the very least, be stripped back, the fixings checked, and the timber trims made good;

(e) it is important, aesthetically, for window 9A to match the other two windows that are being replaced and form part of the bay window;

(f) windows 1A, 4, 7 and 24 should be replaced for aesthetic reasons because:

(i) window 1A is a pair with window 1 that is being replaced;

(ii) window 7 should match window 12 as they are both within the same room;

(iii) window 24 is a pair with window 23 that is being replaced;

(iv) window 4, which is in the entranceway, has the highest profile of all the steel windows and can only be approached by walking past windows 1, 2, and 2A;

(v) there is no guarantee that the replacement windows will be indistinguishable from the old windows; and

(vi) at the very least, the age of the old windows will be readily apparent.

(g) replacing the steel windows is not simply a matter of finding similar steel windows and installing them in the existing rimu surrounds as they will be required to meet code compliance for weather tightness and thermal resistance;

(h) all windows should be re-inspected after floor relevelling to ensure that they have not suffered further damage during that process; and

(i) there is a possible issue of accord and satisfaction between the Family Trust and IAG in relation to window 6 (the bi-fold window).

The interior decoration

[164] These issues are addressed in Appendix 3.

The roof

Generally

[165] The Family Trust considers that all roof surfaces, corrugated iron, butynol and slate tiles, have defects that are either unrepaired or badly repaired earthquake damage, and contends that the extent of the defects is such that the entire slate tile roof should be replaced.

[166] IAG considers that no earthquake damage went unrepaired, that the repairs undertaken were adequate, and that any defects in the roof, such as leaks or slipping slates, are derived from pre-existing conditions or works undertaken by the Family Trust.

[167] Max Contracts, supported by QBE, denies that any of the repairs it carried out were defective.

[168] Although two of the witnesses (Brooks and McSorley) had worked on slate roofs early in their careers, the only witness who qualified as an expert at installing and repairing slate roofs was the Family Trust's expert, Mr Minkley.

Earthquake damage

[169] According to D, prior to the earthquakes the roof had been regularly maintained, was free of leaks for the entire 35 years that they had occupied the house and was in a good state of repair. In 2009, only a year before the first earthquake, the iron ridge caps were replaced with colour-steel and the valleys lined with black butynol.

[170] D says that leaks were noticed immediately after the September 2010 earthquake in bedrooms 1 and 2, study 1, and the upstairs bathroom. For the first time, sparrows were able to nest in the space under the roof, gaining access through gaps between the slates.

[171] SKM's initial report, shortly afterwards, reported that some tiles had fallen and that some roof timbers were observed to be "badly cracked". Because they had only been able to access part of the roof where they had seen some roof rafters with apparent damage, the report recommended undertaking an intrusive assessment to establish the extent of the damage to the roof timbers. Judging from this report, it is likely that the damaged roof timbers observed by SKM were in the roof space behind the first floor living area which could be easily accessed.

[172] SKM returned to undertake the recommended intrusive roof inspection by opening up two areas in the vicinity of the chimneys. One of those opened areas revealed structural damage whereas the other did not, despite severe bowing and cracking of the roof timbers. An attempt was made to access the north part of the attic, but this was prevented by the presence of asbestos. This inspection resulted in a recommendation for the "roof rafters to be repaired/replaced where badly damaged."

[173] In December 2012, the Family Trust obtained an engineering report from RB Knowles and Associates Ltd which noted that "there appear to be some new cracks in the slate tiles of the roof, which appear to be due to the recent earthquakes."

[174] Then, in September 2013, CRL obtained a comprehensive report from Structall Ltd noting that there were areas of the roof where splitting had occurred to the timber rafters and recommending a repair strategy that included "replace split timbers throughout the house, including stairway stringers and roof rafters". Attached to that report was an engineering report from MSC that included three photos of rafters showing splits and one photo showing separation between roofing slates. According to MSC, the cause of most of the damage observed was a combination of horizontal shaking during the earthquakes and settlement of the unconsolidated fill under the substructure.

[175] No repairs have been undertaken to the rafters, so they are in the same condition today as they were immediately after the earthquakes.

[176] Mr Martin, the builder who undertook the attic conversion in 2000, has inspected the rafters in the roof space above the kitchen/dining area and considers that some are split. He considers that this damage was caused during the earthquakes because he was sure that he would have noticed had they been damaged at the time of the attic conversion. Although he is relying in part upon memory of events 16 years ago, he is also relying on the fact that neither he, nor the engineer supervising the conversion, recommended repairs which he is certain would have happened had either of them observed damage.

[177] Ms Critchley, as the Family Trust's engineer, considers that the splits on the roof rafters are earthquake damage but IAG's engineer, Mr Cook, takes a contrary view. He points out that the rafters are native rimu and considers that the splits are simply "resin shakes" commonly found in such timber. He also points out that the alterations made in 2000 reduced the span of these rafters so that, despite the presence of the resin shakes that have occurred in the process

of normal ageing, they have spare capacity when compared with the original 1925 design load. He also notes that there is no apparent damage to the fixings at either end of these rafters, which would have been likely had the earthquake forces been sufficient to split the rafters.

[178] I make the following findings of fact in relation to these rafters:

(a) resin shakes are commonly found in aged rimu timber;

(b) resin shakes are clearly visible in the photographs of the rimu bearers under the house;

(c) rimu framing is generally only encountered these days when undertaking repairs or alterations to older houses, meaning that younger builders and engineers are less familiar with them than are their older counterparts;

(d) Mr Martin, as a retired builder with over 40 years in the industry, can distinguish a split from a rimu shake and has undertaken earthquake repairs to similarly damaged rafters under engineering supervision;

(e) Mr Cook, although an older engineer, is not a structural engineer and has significantly less familiarity with rimu framing then has Mr Martin;

(f) The condition of many of the fixings relied upon by Mr Cook is unknown as they are not visible;

(g) Ms Critchley, as a younger structural engineer, will be less familiar with rimu framing than either Mr Martin or Mr Cook, which is borne out by her mis-identifying a rimu shake in a sub-floor bearer as rotten timber;

(h) the engineers who prepared the MSC report to Structall Ltd believed that the rafters were damaged and took photos to support their opinion;

(i) Structall Ltd, in relying upon the MSC report and the photographs, believed that the rafters were damaged;

(j) the intrusive inspections undertaken in bedrooms 2 and 4 resulted in repairs to all structurally damaged elements discovered;

(k) after the asbestos was removed, a manhole was created to enable access to the north attic space where a thorough investigation was undertaken; and

(l) many of the rafters observed to be damaged were in the roof space above the kitchen/dining area, were not affected by the alterations made in 2000, and retained their original span.

[179] Based on these findings, I am satisfied on the balance of probabilities that:

(a) Mr Martin's assessment of the rafters is the most reliable;

(b) the rafters in question were split during the earthquakes;

(c) those splits have affected the functionality of those rafters that have not had their span shortened by the 2000 alterations; and

(d) there is a realistic possibility that similar damage has been caused to rafters above the first-floor hall and lounge, which could be identified and repaired by an invasive inspection, either through the ceilings or by removing slates above those rooms.

[180] Although there is an allegation that roof battens have been damaged, either by the earthquakes or by the repairs, I do not consider that the evidence supports this. The photographs are equivocal and are more consistent with the damage, if that is what it is, being pre-existing rather than earthquake related. As far as the repair damage is concerned, there is insufficient evidence to connect the split rafters battens with the earthquake repairs.

[181] There are tears in the butynol roofing, most likely caused when the solar units were replaced in the course of the repairs. This is damage caused by defective repairs.

[182] Identifying earthquake damage to the slate tiles on the roof is a more complicated exercise. During my analysis, I will use Mr McGunnigle's system for identifying the different faces of the roof that can be seen from the street, as outlined in Figure 19 of Appendix 1.

[183] Earthquake damage to the roof was clearly suffered in September 2010 when the eastern chimney collapsed onto faces A and B. The western and kitchen chimneys did not collapse but were so badly damaged in the same earthquake that they were immediately removed. The removal process probably resulted in consequential damage, such as split slates, surrounding these chimneys.

[184] As recorded earlier in this decision, the earthquake forces experienced by the house caused differential settlement in the foundations which must have been reflected in the roof. It would also have experienced the same vertical forces and accentuated lateral forces. It would be reasonable, therefore, to anticipate that these forces could have cracked, separated, and mis-aligned slates. That slates became separated and misaligned is corroborated by the MSC photo of separated slates, other similar photos taken subsequently, the bird infestation reported by D, and her comments about dust in the roof space.

[185] Identifying cracked slates is more difficult, not because there were none, but because those cracks need to be differentiated from cracks that existed prior to the earthquakes. It is now accepted, although that was not the situation at the commencement of the hearing, that there were many slates on the roof, particularly on faces A – E, that were cracked prior to the earthquakes. We now know that the roofer engaged to carry out the 2009 improvements to the roof was also instructed to "touch paint poorly sealed slates." It is not particularly clear what this involved, but it is now accepted that the roofer was told to apply grey paint on cracked slates that had previously been repaired with a sealant, probably silicon. Although silicon comes in several colours, it is apparent that the silicon in question was white which, particularly on faces A – E, would have been noticeable from the street. Applying grey paint would have made these repairs less visible.

[186] Photographs taken immediately after the September earthquake show that faces A – E were peppered with such repairs. Photos taken of other faces of the roof at about the same time show similar marks, but to a much lesser degree. One such photo, a section of which is enlarged as Figure 20 in Appendix 1, shows a section of the roof adjacent to the kitchen chimney. Two grey painted cracked slates can be seen in the bottom right of the photo: an un-painted/unrepaired cracked slate can also be seen. It is a reasonable inference from this photo, that the unrepaired crack was not present when the other two repairs were painted in 2009 and was most probably caused during the September 2010 earthquake that damaged the chimney.

[187] Generalising from this photo, therefore, I find that the cracked slates that were present on the roof prior to the earthquakes had been painted with grey paint. Any cracked slates still evident on the roof are either unrepaired earthquake or consequential damage.

Policy standard

[188] As explained in [12] to [17], IAG was required to restore the damaged roof to "a condition as similar as possible to when [it was] new, using current materials and methods." The strength of some of the rafters has been compromised by the earthquake damage, so their repair must focus on restoring their strength; the focus of the slate repairs is to restore their functionality and appearance to what it was when they were new. Quality must be paramount and cost secondary.

[189] I reject IAG's suggestion that any allowance should be made because the slates were at, or towards, the end of their useful life, first because that is not true and secondly, because it is not relevant.

[190] It is not true, because the slates themselves deteriorate only slowly and have been known to last for upwards of 300 years in climates much harsher than ours. Although ridge cappings and valleys need periodic replacement, the roof itself does not. Like weatherboard cladding, the life of a slate roof depends upon its maintenance and can be extended indefinitely.

[191] It is not relevant, because the proper comparison under this policy for a fully functioning roof, as this was, is between its condition after the earthquakes with its condition after construction in 1925. It does not matter, therefore, that the roof was a patchwork of coloured slates at the time of the earthquakes; it was not like that in 1925.

Repair standard

[192] The scope of works attached to the building contract required the "roof rafters to be inspected and replaced where necessary as per engineers report." The respondents acknowledge that this work was never undertaken.

[193] However, repairs were undertaken to the slates, initially by EQC as emergency repairs in relation to the three chimneys, and then by Max Contracts in relation to the roof generally.

[194] At some stage during the emergency repairs, the pre-existing cracked slates painted grey in 2009 were over-painted in a lighter colour or re-sealed with fresh white silicon. In any event, what had previously been hard to detect from the street became highly visible. I accept Mr Minkley's evidence that whoever did this intended to signal to the eventual repair contractor that these slates needed attention in the final repairs.

[195] The scope of works prepared by Hawkins/CRL simply noted that "Welsh slate tiles, damaged, replacement required, inspection of roof and repair required." In December 2013, a variation was issued authorising Max Contracts to spend five hours inspecting the roof using a cherry picker. All witnesses accepted that this inspection was sub-standard and not capable of properly identifying the repair work to be undertaken.

[196] A further variation was issued shortly after this inspection, authorising Max Contracts to repair 1000 cracked slates, presumably based on Max Contracts' recommendation. A later report provided by Axis Building Consultants Ltd to IAG was only able to identify 260 repaired slates. Payments made to Max Contracts on invoices relating to 1000 repaired slates were then reversed. However, I am cautious about accepting the reduction from 1000 slates repaired/replaced to 260 because of the inspection methods used by Axis and the method they used for identifying the repaired slates which would not have identified slates re-used by Max Contracts in the repairs or repairs made using methods other than black adhesive.

Comparison

[197] The repairs undertaken failed to measure up to the policy standard in four separate respects:

(a) the damaged rafters were not restored to their "when new" strength;

(b) the damaged slates were not restored to their "when new" appearance because:

(i) the colour of the slates on faces A – E is not uniform;

(ii) some slates on those and other faces are mis-aligned; and

(iii) the replaced slates are narrower than the slates they replaced.

(c) the damaged slates on the roof generally were not restored to their "when new" durability:

(i) some slates on the roof remain cracked;

(ii) many slates have fallen off the roof since the earthquakes, some before the repairs and some after; and

(iii) some slates were repaired using black adhesive.

(d) the damaged slates on the roof generally were not restored to their "when new" functionality:

(i) some slates on the roof remain cracked;

(ii) the replaced slates are narrower than the slates they replaced; and

(iii) areas of the roof are leaking.

Rafters

[198] No further discussion about the rafters is necessary.

Aesthetics

[199] When faces A – E of the roof were constructed in 1925 they would have been uniform in colour, all the slates having come from the same batch. Because the chimney repairs were undertaken with replacement slates from a different batch, they are slightly different in colour from the original slates and this is noticeable from the street.

[200] I accept Mr Minkley's evidence that:

(a) the Welsh slate used in 1925 was of the highest quality;

(b) the quality of these slates would have made them difficult to replace;

(c) the chimney repairs were undertaken on an interim basis, with more permanent repairs being completed subsequently;

(d) it is more important to get a good match on faces A – E because they face the street; and

(e) the slates used in the temporary repairs on faces A – E are pinker in colour than the original slates and not a proper match.

[201] I do not suggest that this degree of colour match should apply to the other faces of the roof, none of which can be seen from the street, but I consider that this is a significant defect in the appearance of faces A – E and is more than de minimis. In that latter respect, I have not ignored the evidence of Mr Winder but have discounted its relevance for several reasons:

(a) the de minimis test relates to an assessment of the earthquake damage and, as such is a comparison between the state of an element before and after the earthquake;

(b) the "value" being considered is aesthetic value, not monetary value or market value;[13] and

(c) it can hardly be de minimis if, as Mr Winder acknowledged, some prospective purchasers would be deterred by the appearance of a mottled slate roof.

[202] If, as Mr Minkley and Mr McGunnigle suggest, replacement slates are unlikely to be an exact colour match, then restoration of faces A – E, at the very least, will require that all the slates be replaced with new slates to achieve the desired uniform effect.

[203] Although some slates can become mis-aligned as the roof ages, they would have all been properly aligned when the roof was constructed in 1925, and that is the standard to which they should have been repaired. There is evidence of repaired tiles that have been misaligned all over the roof. An example is shown in Figure 21 in Appendix 1.

[204] An examination of the roof photos shows that the replacement tiles were narrower than the tiles they replaced. An example is shown in Figure 22 in Appendix 1. The original imperial slates measured 20" x 10" (which converts to 508 mm x 254 mm) but Variation 7 to the building contract reveals that the replacement slates were to be 500 mm x 250 mm. Replacing an

[13] *Sadat v Tower Insurance Ltd* [2017] NZHC 1550, [269]; *Krall v EQC + Allianz New Zealand Limited* [2015] NZCA 13

imperial slate with a metric slate leaves an 8 mm gap, which is observed in almost every close-up photo of the slates replaced by Max Contracts. It is probable that these gaps will create shadow lines in certain lights and be visible from the street.

Durability

[205] There are cracked slates on the roof that have not been repaired. Because of my finding that all visible cracked slates were identified after the earthquakes using white paint or silicon, any cracks not treated in this fashion are most likely to have occurred since the emergency repairs were undertaken. I find that the durability of slates is adversely affected if they are cracked.

[206] A 90-year-old slate roof is likely to have, at any given time, slates whose fixings have failed for a variety of reasons. Part of the bi-annual maintenance recommended by Mr Minkley would be directed at identifying these slates and repairing them before they slip off the roof. D, however, is adamant that far more slates have fallen off the roof since the repairs than ever did before. They have retained many of these slates but none of the witnesses examined them in any detail. D and Mr Minkley each said, however, that at least one of these slates had black adhesive on the back. The link between these slates and the earthquake is rather tenuous but I find that it is more probable than not that these slates were damaged in the repair process when I consider Mr Minkley's evidence that:

(a) copper tingles (that can be found all over the roof from pre-earthquake repairs) are only able to sustain the weight of the slate itself,

(b) walking on the roof is the most common cause of slipping slates; and

(c) the emergency repairs, Max Contracts' repairs, and the repairs to the solar tubes involved workmen walking on the roof.

[207] It is accepted by all witnesses that many of the slates on the roof were repaired by Max Contracts using black adhesive. This method of repair is not mentioned in any of the literature I have seen and is not included in the United Kingdom standards for repairing slate roofs. IAG's witness, Mr McGunnigle, admitted in both briefs he prepared for the High Court that this technique was not good trade practice, did not provide like-for-like, and did not have the required durability.

[208] During his oral evidence before the Tribunal, Mr McGunnigle changed his view of this repair method. Now, IAG and Max Contracts consider it complies with the Building Code's requirement that such elements have a 15-year durability.

[209] I do not accept the argument presented in support of this proposition as it is based on the premise that the black adhesive supporting each slate is likely to support the slate for 20 – 30 years. Slates are traditionally supported by two nails attaching them to the roof battens. Each square metre of roof is therefore supported by 36 nails, assuming 18 slates per square metre. Max Contracts' method does not involve any form of direct support being provided to the slates by the battens on which they rest. Instead, the replaced slates are glued to the underside of the surrounding slates and rely for their support on those existing slates, presumably nailed in the traditional way. The method used by Max Contracts, therefore, significantly reduces the number of nails per square metre, inevitably reducing the durability, not only of the replaced slates, but their neighbours.

[210] Nor do I accept IAG's argument that the repairs cannot have made the roof less durable than it would have been when it was new because the roof, when it was new in 1925, was not required to comply with any performance standards and needed regular maintenance. In the first place, the weathertightness of slate roofs has been refined over centuries without performance standards to require weather tightness. Secondly, the need for maintenance does not detract from the finding that an element is durable. Thirdly, repairing the roof to the policy standard involves executing repairs that are as durable as a new roof, not an old one.

Functionality

[211] The functionality of cracked slates is clearly adversely impaired.

[212] I heard no evidence about the impact that using metric slates to replace imperial slates might have on functionality, but I am concerned about this issue and would want to hear further evidence about it in a subsequent stage of the hearing.

[213] By contrast, I received large volumes of evidence about leaks. IAG claims that any leaks are derived either from pre-existing conditions or the alterations carried out by the Family Trust in 2000. Mr McGunnigle, who is a weathertight expert, identified 32 separate construction defects present before the earthquakes by undertaking a very detailed

investigation, inspecting as many areas as he could, testing them with a moisture meter, and using a hose on some areas to identify the source of leaks.

[214] It is significant that the quotations supplied at various stages by roofing contractors all had disclaimers about leaks. For example, the quotations supplied by Huston Cross Ltd to EQC said that, because leaks could be persistent and difficult to track down, the company used a process of elimination, beginning with the most obvious solution, to find the cause of the problem. Mr Minkley commented on the difficulty of identifying the source of a leak as it can track down rafters and emerge much lower down the roof. He, too, would adopt a trial and error approach, beginning with the most obvious possibility.

[215] Although D has an opinion about the source of some leaks, she could easily be mistaken. Certainly, I accept that some of the leaks might be associated with roof work undertaken prior to the earthquakes, but not all of them. I accept D's statement that the roof had not leaked prior to the earthquakes but did afterwards. The slates that were cracked prior to the earthquakes had been sealed and were therefore an unlikely source of the leaks. However, there are cracked slates remaining on the roof that were either damaged in the earthquakes or during the repairs and each cracked slate is a potential, although not necessarily an actual, source of leaking.

Cause of deficiencies

[216] The damaged rafters and some of the cracked slates are unrepaired earthquake damage.

[217] The remaining defects identified in the preceding paragraphs relate to the repair process and are therefore defective repairs. I am not in a position to determine who should be held accountable.

Other issues

[218] For the sake of clarity, I find that all the grey-painted slates were replaced by Max Contracts during the course of the repairs despite none of them amounting to earthquake damage. It may be relevant in this context that Variation 7 of the building contract records that Max Contracts was to replace "broken and repaired slating."

[219] It may also be helpful if I indicate now that although the replaced slates on faces A and B are not a good enough match for faces that can be seen from the street, they would be a good enough match for the rest of the roof.

The exterior

[220] These issues are dealt with in Appendix 3.

The garage

[221] These issues are dealt with in Appendix 3.

The outside areas

[222] These issues are dealt with in Appendix 3.

General issues

Accommodation

[223] The occupants will need to live elsewhere during the repairs. They seek a commitment from IAG to pay them a fair weekly rate for the period they are required to be out of the house. This issue was not debated and is not within the scope of the present hearing.

General damages

[224] Although the Family Trust seeks general damages, this was not debated and is not within the scope of the present hearing.

Costs

[225] The Tribunal's powers to award costs are outlined in s 47 of the Canterbury Earthquakes Insurance Tribunal Act, 2019. Should any party think that they are entitled to costs in terms of this section then they should file and serve written submissions detailing their claim and the grounds upon which they seek costs. Those submissions should be filed and served no later than 4.00 p.m. on the 15th working day after this decision has been issued. Any party against whom costs are sought will then have 10 working days (excluding any working days between 24 December 2020 and 8 January 2021 inclusive) within which to file a response. The party making the initial claim will then have a further five working days within which to file a reply.

C P Somerville
Chair
Canterbury Earthquakes Insurance Tribunal

Appendix 1

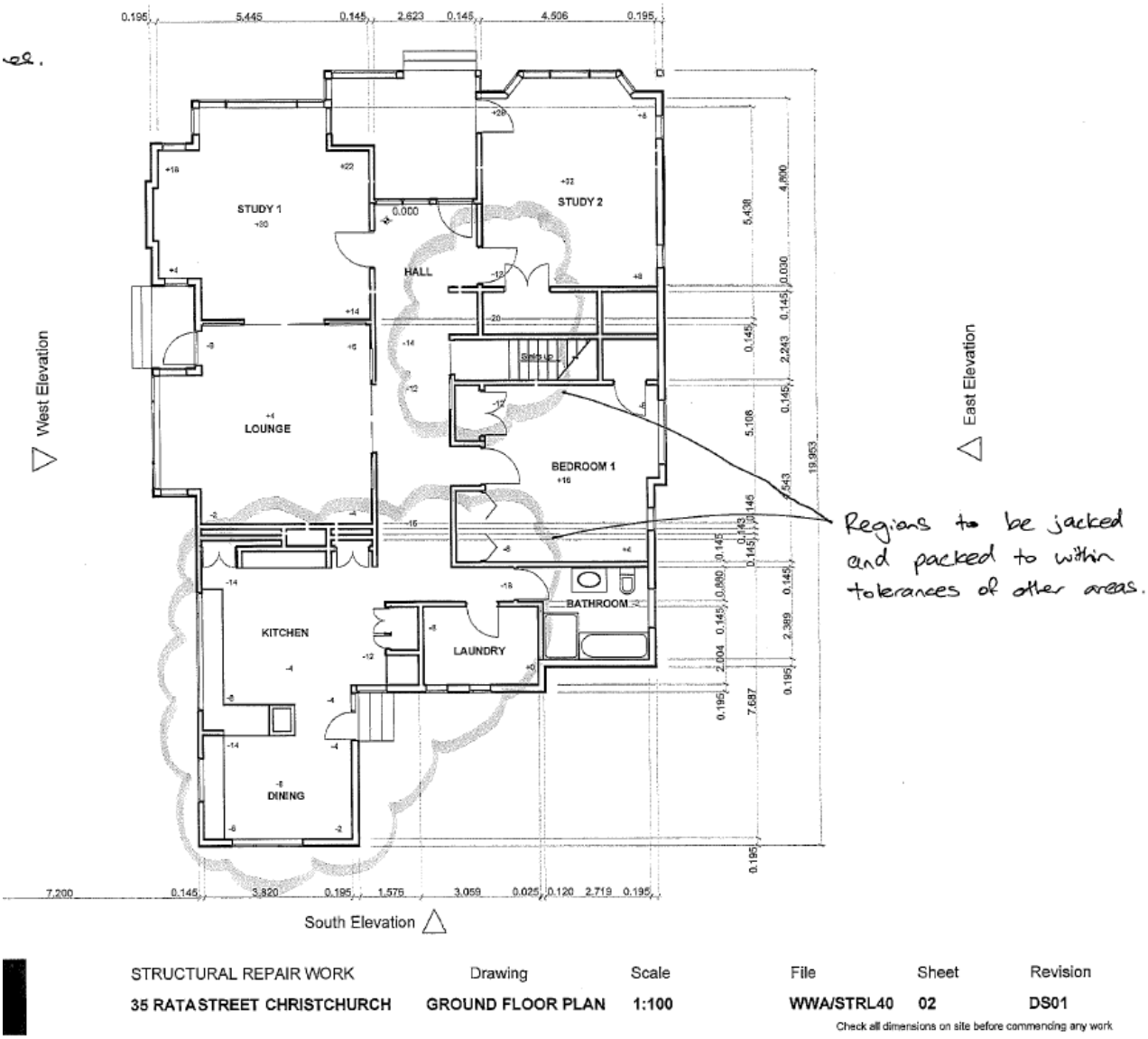


Figure 1: MSC floor level plan

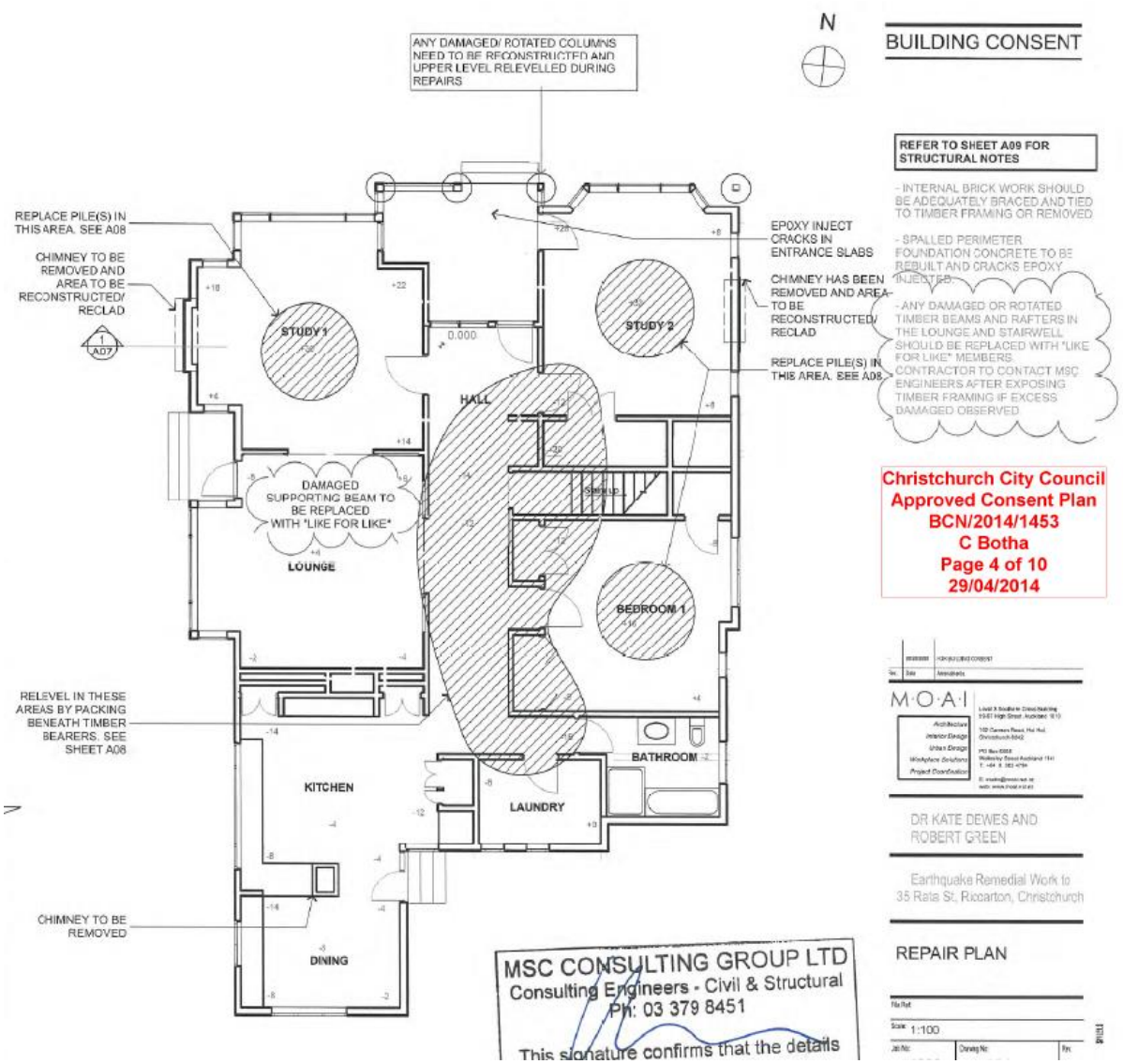


Figure 2: Consented plan for the ground floor

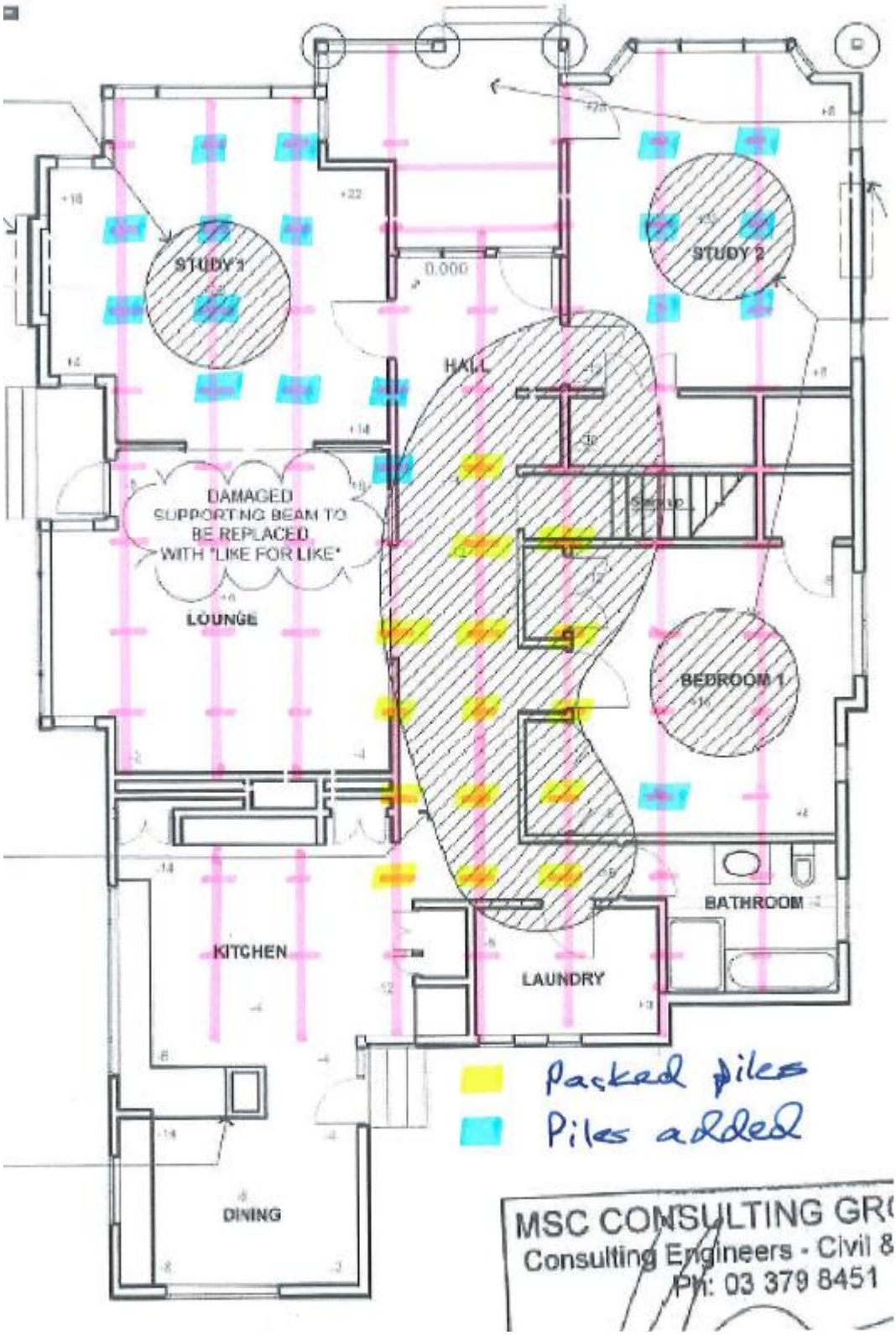


Figure 3: Location of subfloor repair works

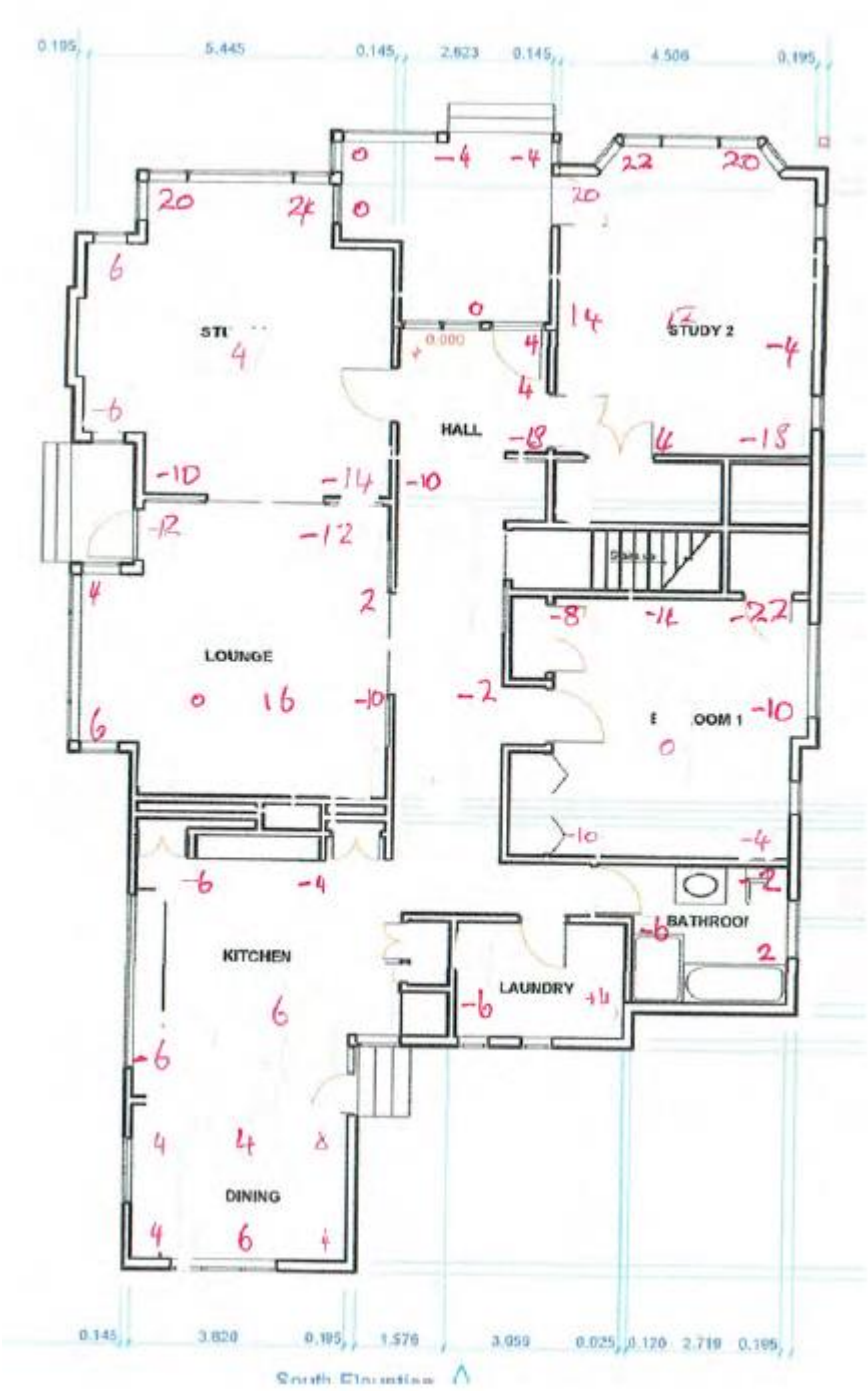


Figure 4: Terra Consultants ground floor post-repair floor level measurements

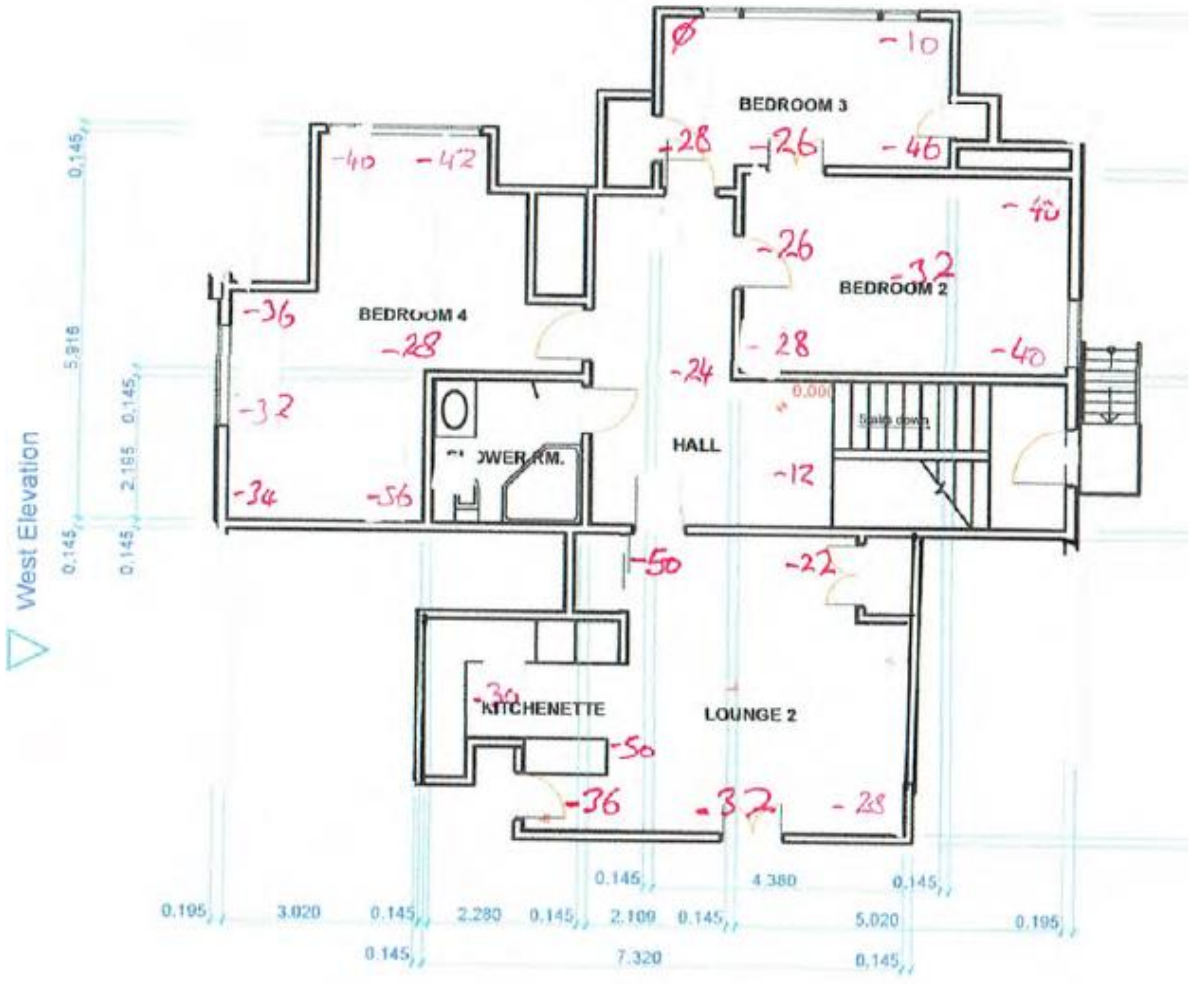


Figure 5: Terra Consultants first floor post-repair floor level measurements

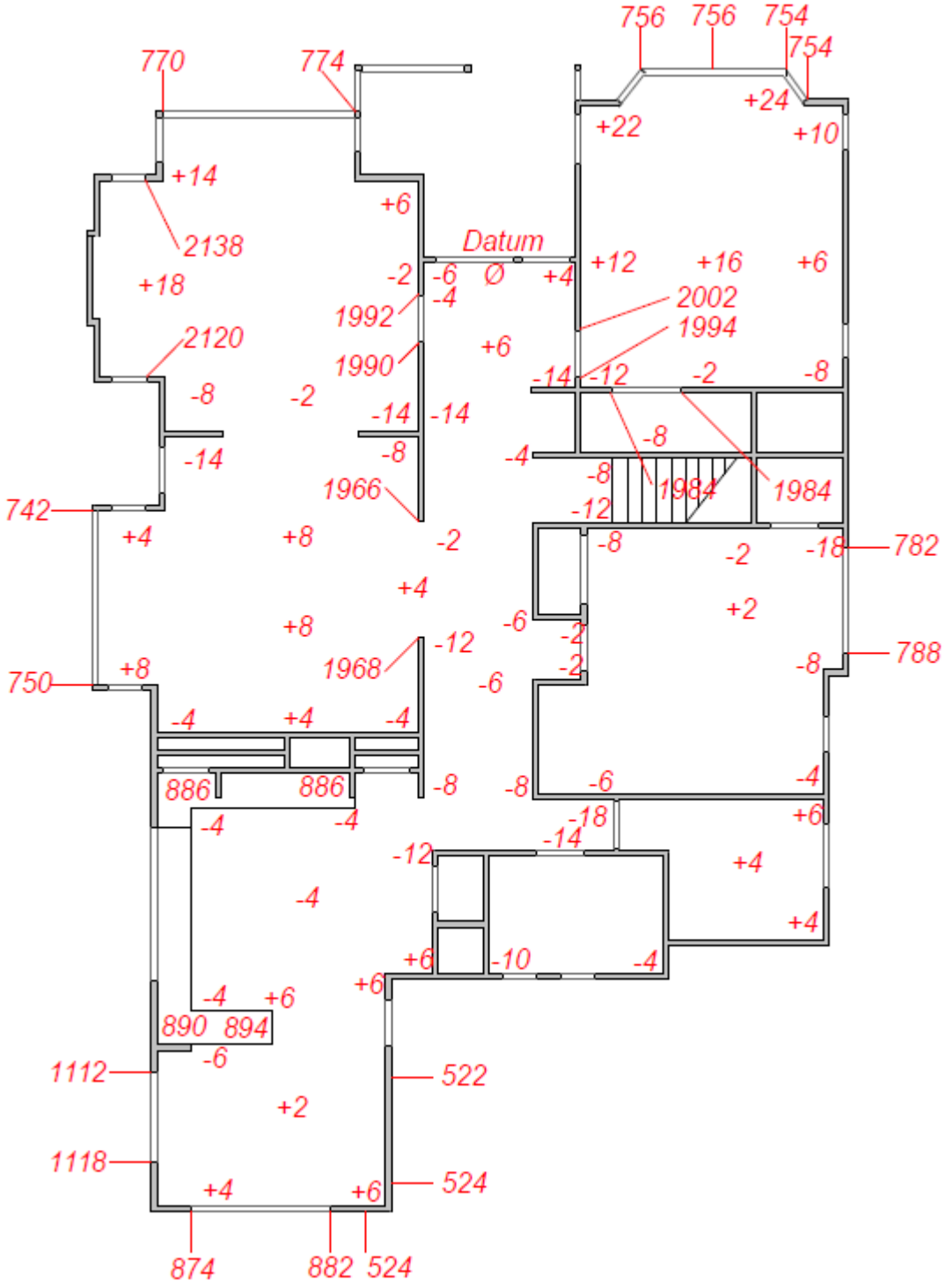


Figure 6: Cook Costello ground floor post-repair floor level measurements

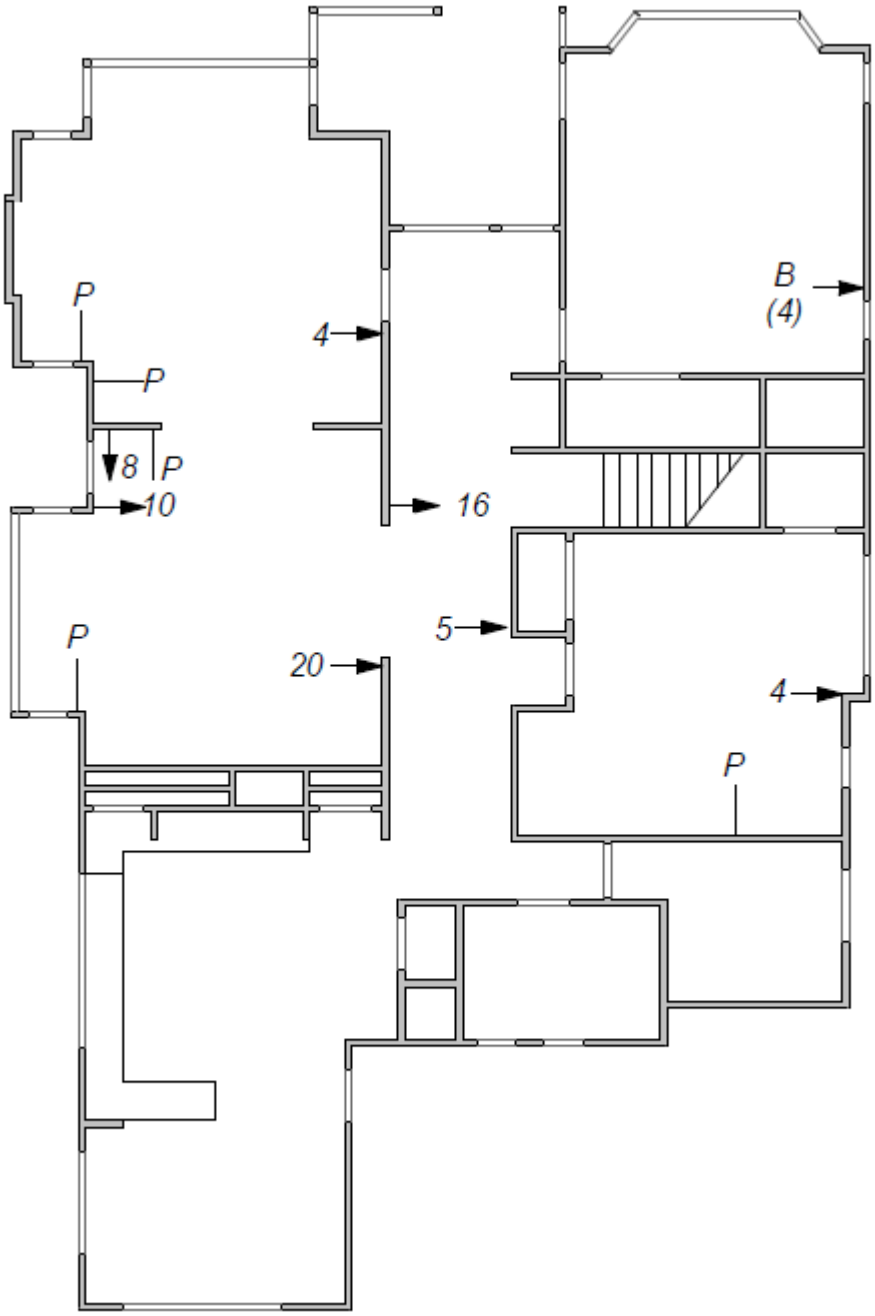


Figure 7: Cook Costello ground floor post repair verticality measurements

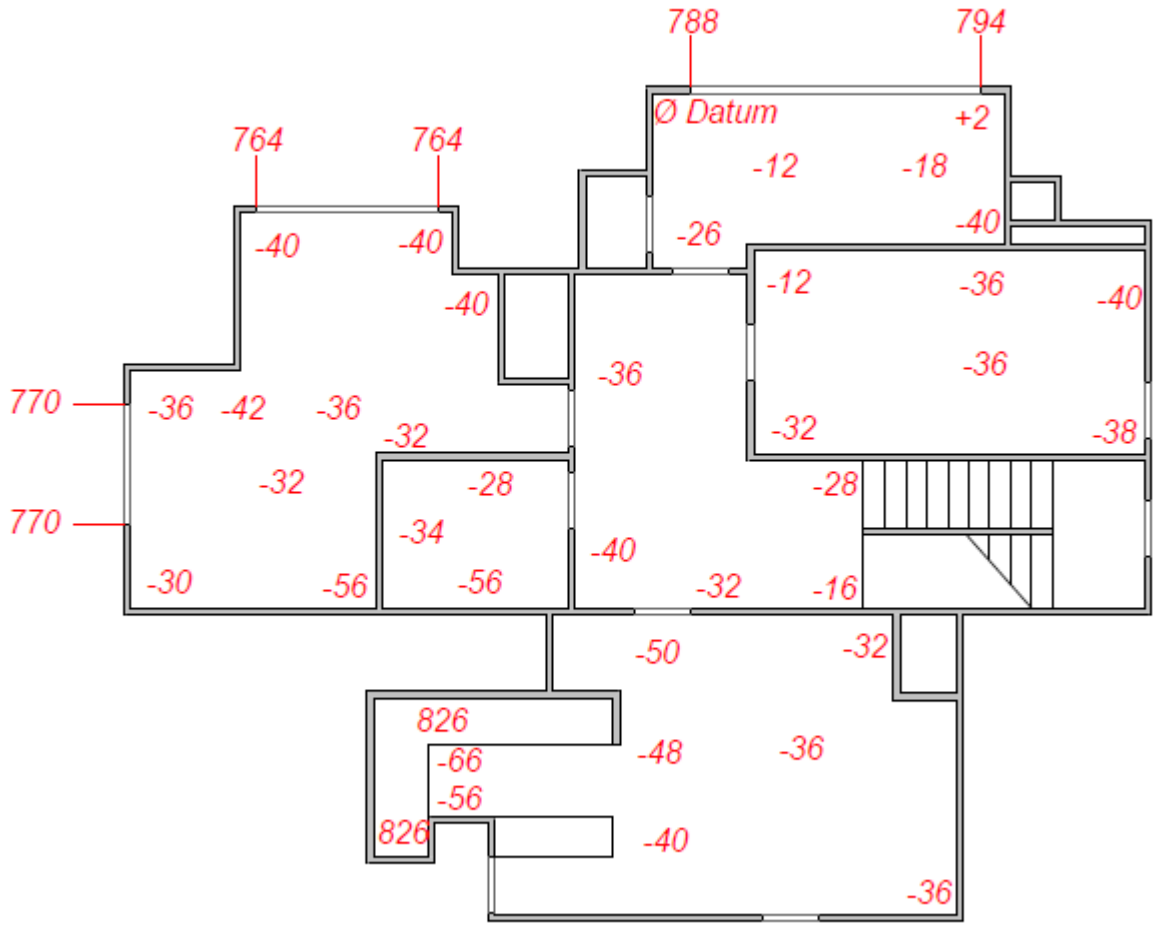
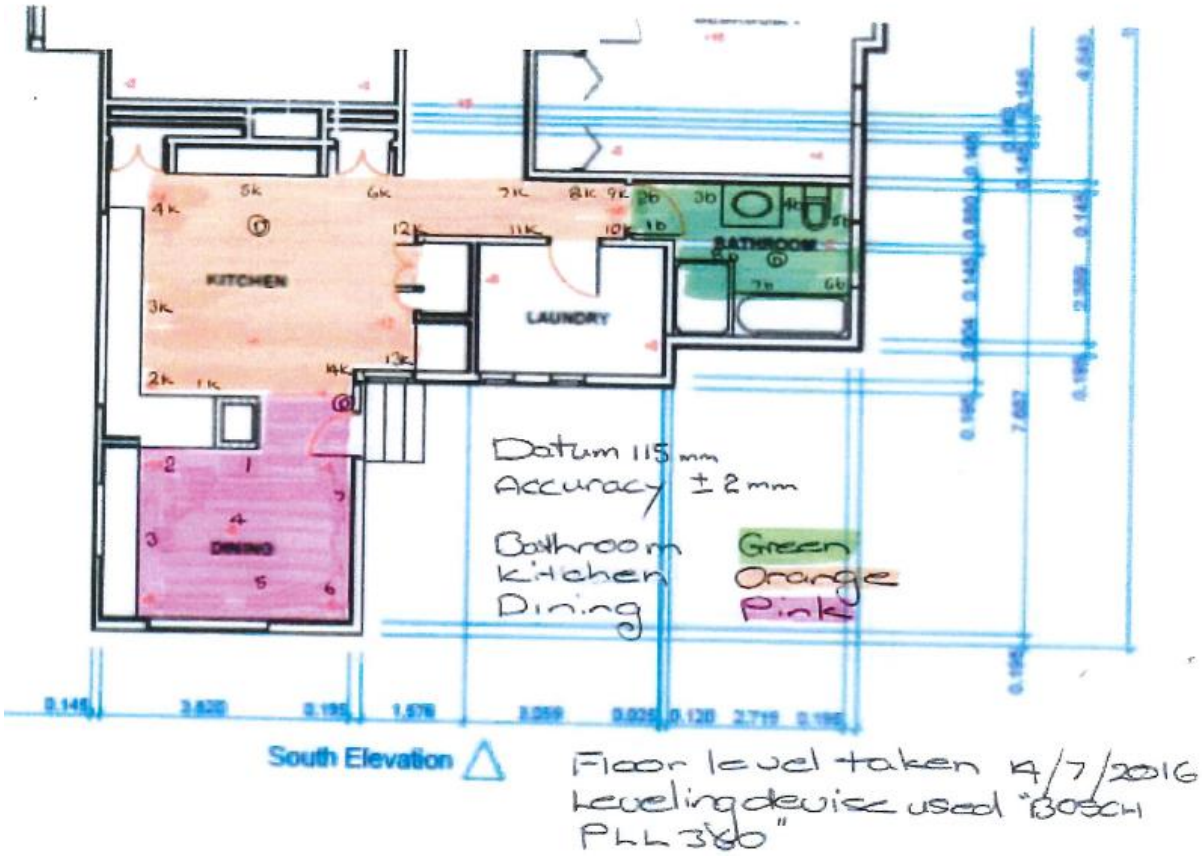


Figure 8: Cook Costello first floor post-repair floor level measurements

35 RATA STREET, CHRISTCHURCH



Bathroom (Green)

1b	130	+15
2b	130	+15
3b	125	+10
4b	120	+05
5b	124	+09
6b	110	-05
7b	110	-05
8b	114	-01

Dinette (Pink)

1	120	+05
2	133	+18
3	133	+18
4	123	+08
5	131	+16
6	106	-09
7	117	+02

Kitchen (Orange)

1k	108	-07
2k	112	-03
3k	117	+2
4k	115	0
5k	116	+01
6k	118	+03
7k	122	+07
8k	127	+12
9k	130	+15
10k	131	+16
11k	125	+10
12k	122	+07
13k	105	-10
14k	103	-12
15k	105	-10

Figure 9: Richardson kitchen floor level measurements

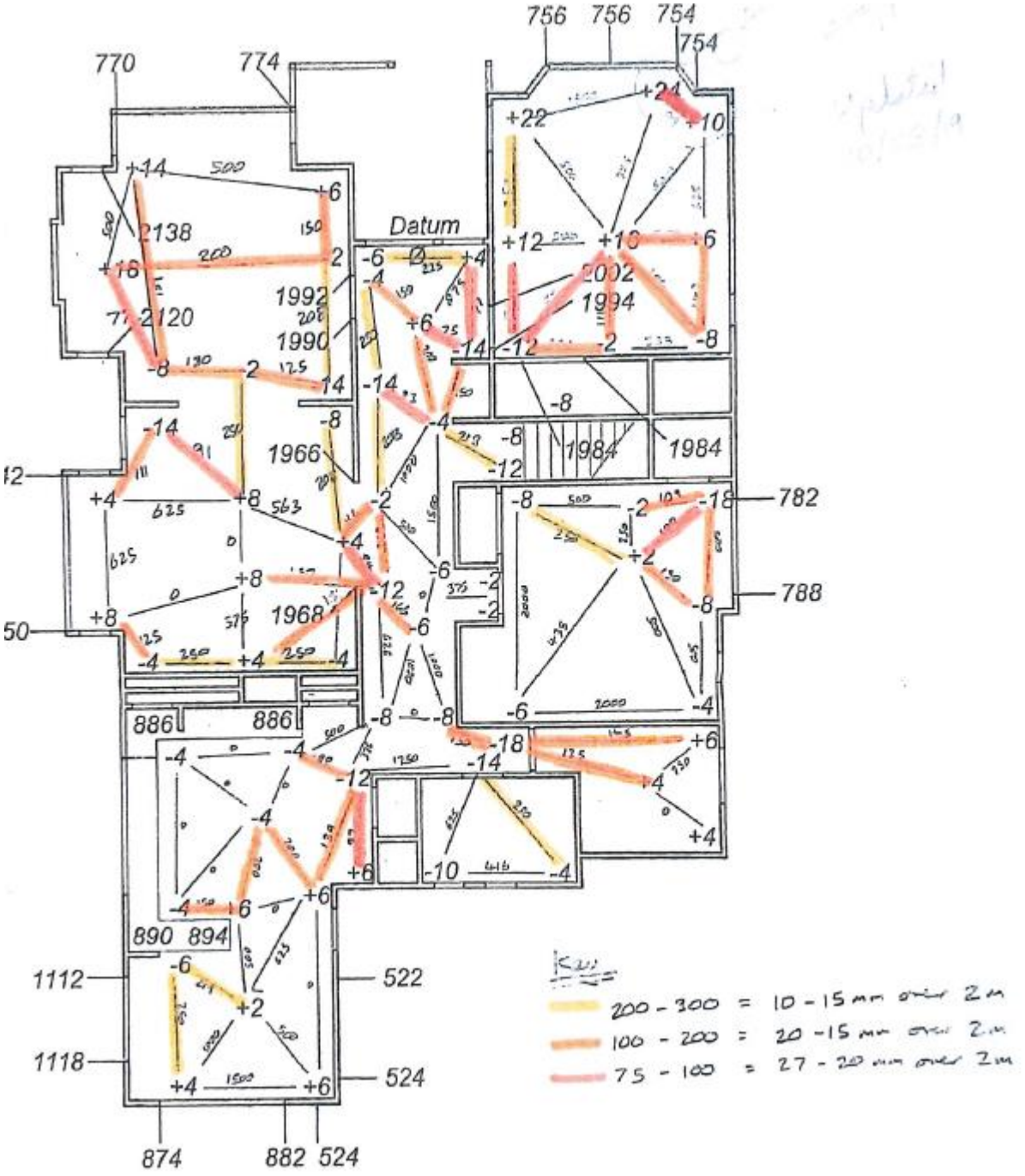


Figure 10: Critchley floor slope diagram

Photo 11.1
Ground floor bathroom

Arrow A indicates the point of very elevated moisture readings corresponding to this location on the plasterboard to the wall between the laundry and shower.

This point corresponds precisely with the connection of the shower hose (D) from the shower rose (C) to the supply from the shower mixer valve (B).

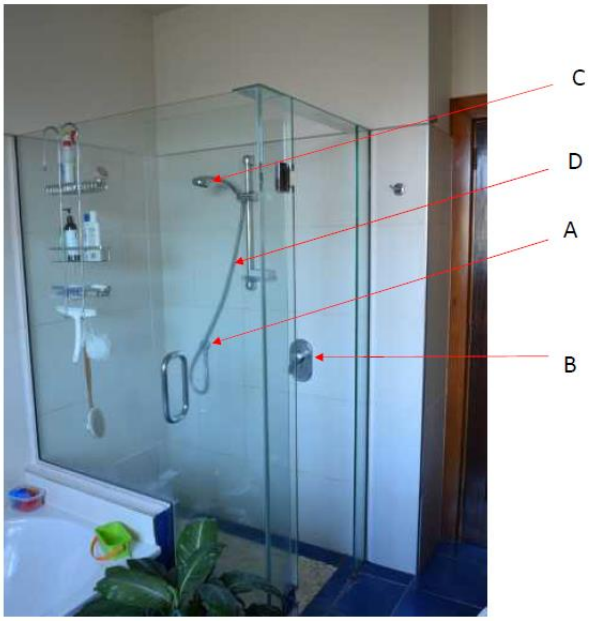


Figure 11: Shower

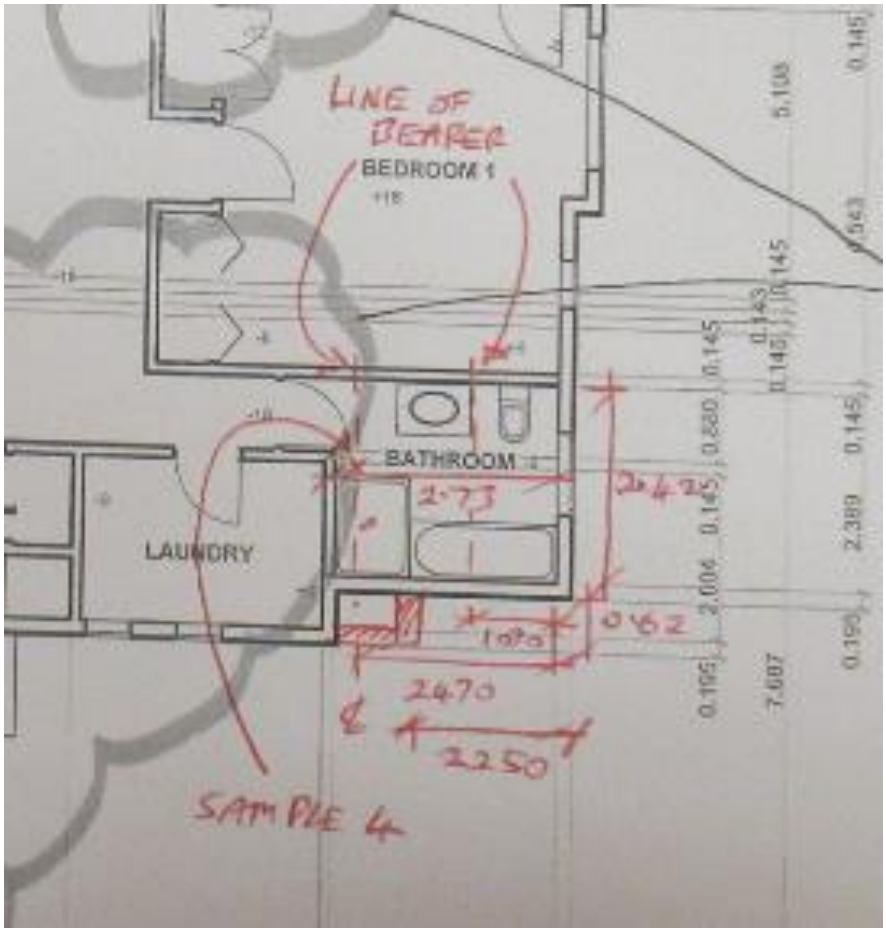


Figure 12: Bathroom layout

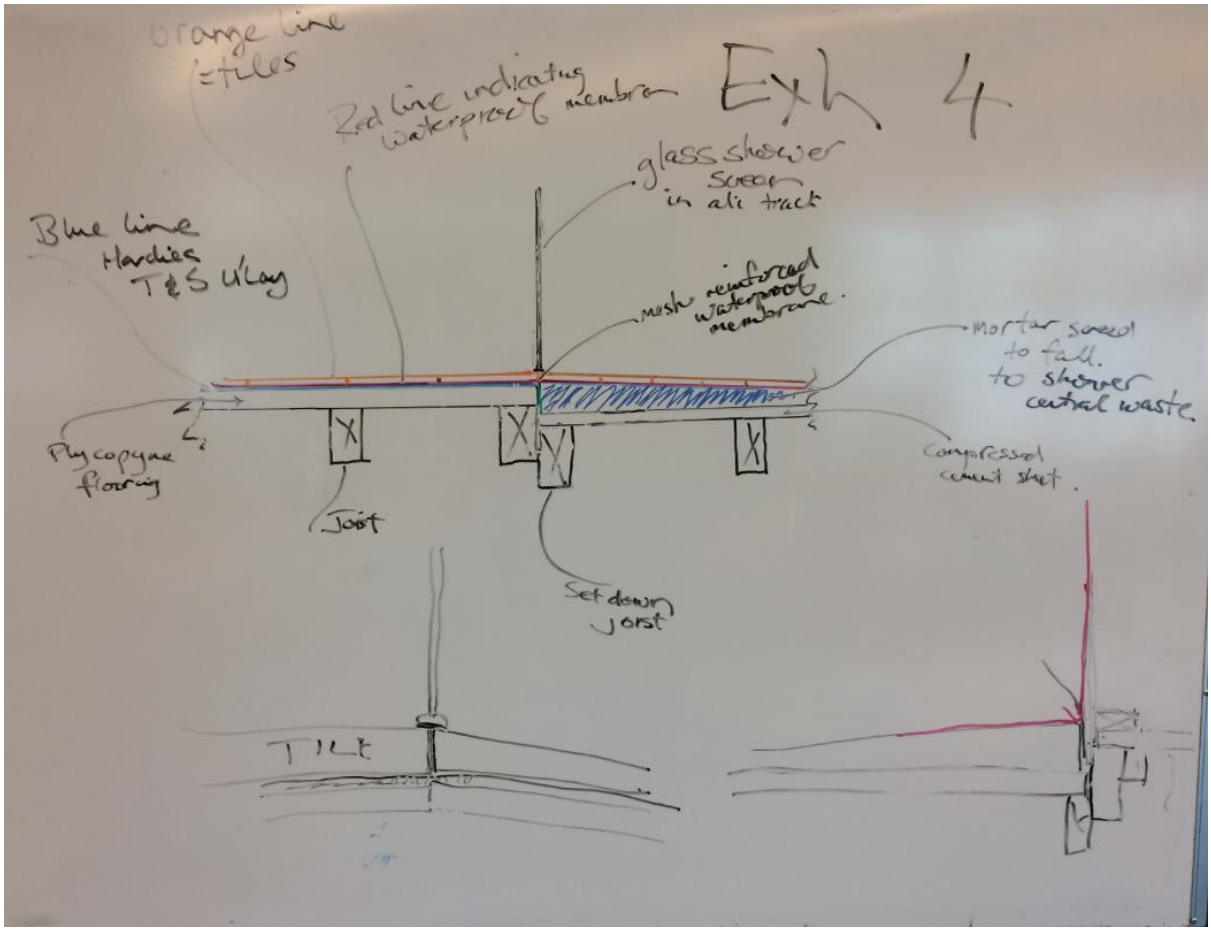


Figure 13: Cross section through shower threshold

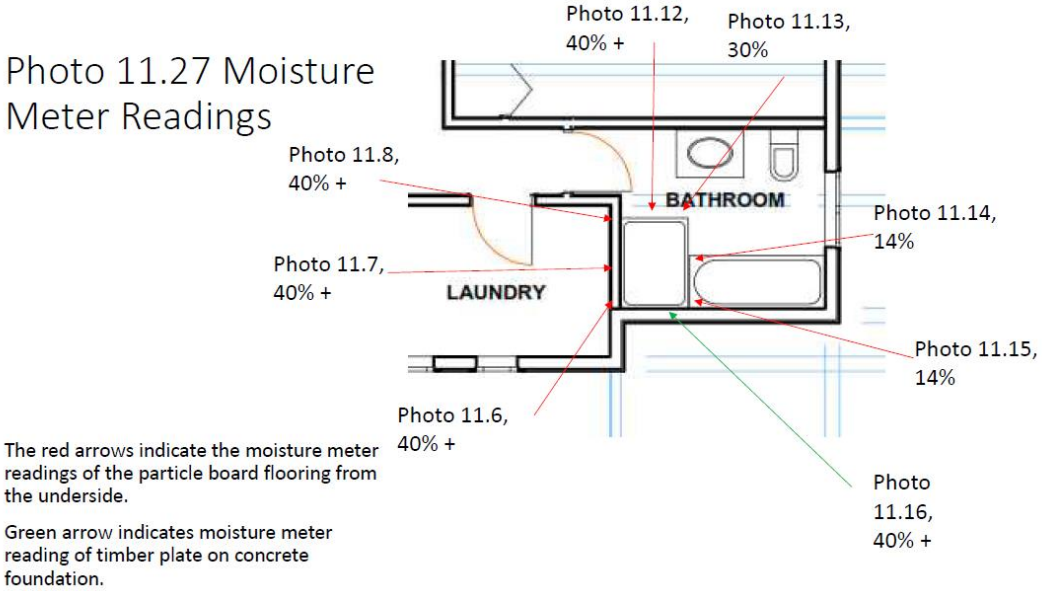


Figure 14: McGunnigle plan showing location of moisture readings

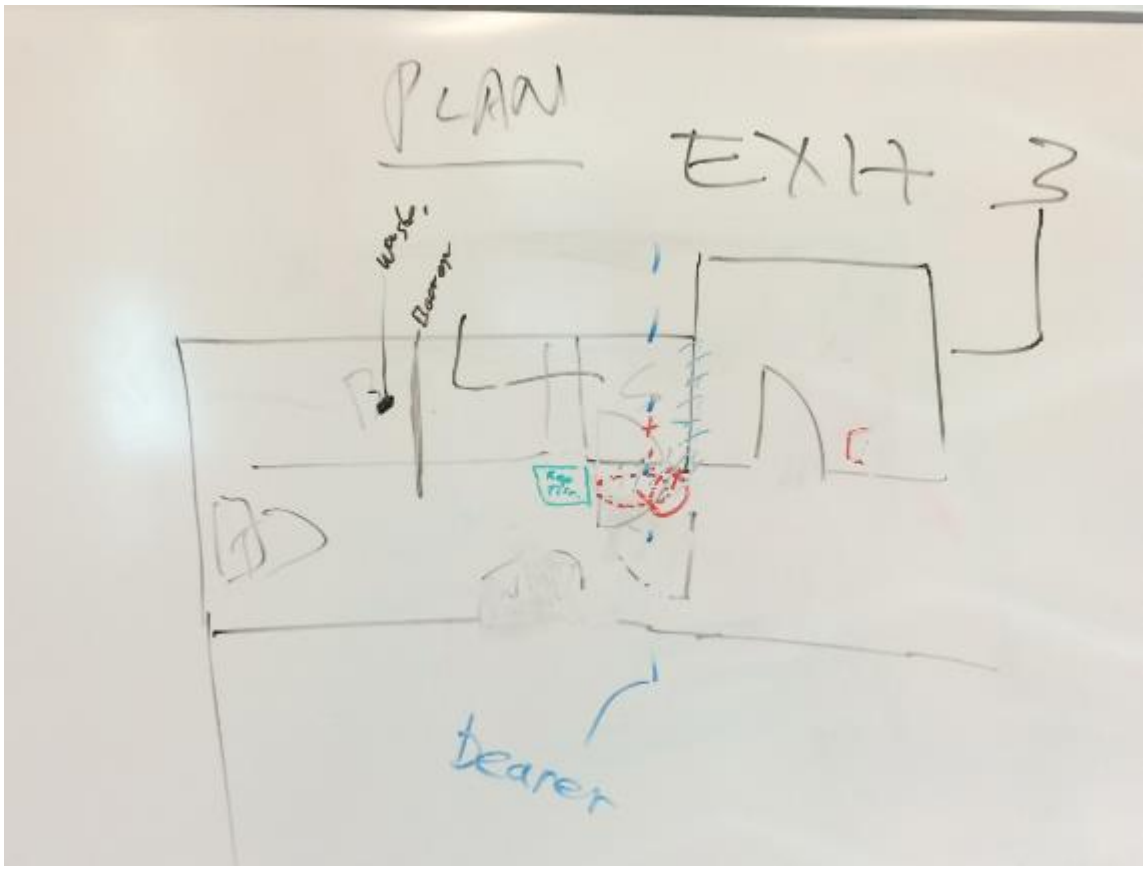


Figure 15: McGunnigle diagram showing location of floor hump

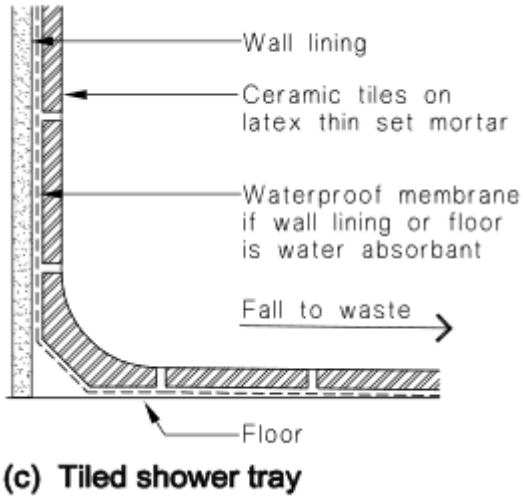


Figure 16: Diagram 4(c) from E3-AS1

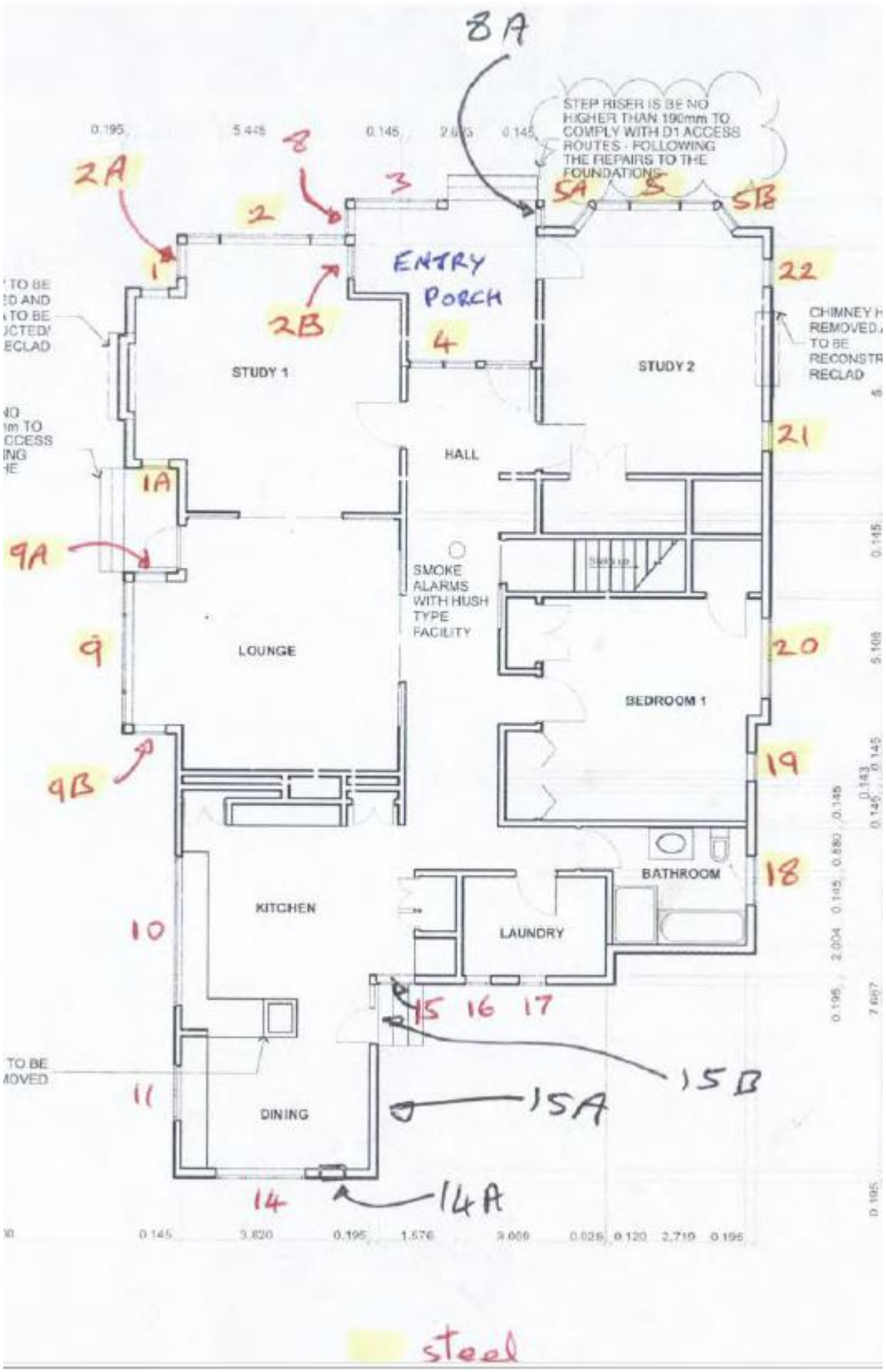


Figure 17: McGunnigle ground floor window numbering

Figure 18: McGunnigle first floor window numbering

Figure 19: McGunnigle roof face numbering

Figure 20: Slates near kitchen chimney

Figure 21: Misaligned slate

Figure 22: Metric slates

Appendix 2: Analysis of Crittercam images and comparison with Cook Costello report and Brief to identify agreed foundation and sub-floor repairs

Key

- Agreed repair. The priority repair is noted e.g. a defective packer
- Repair not agreed between Mr Cook and Ms Critchley. Ms Critchley remains of the opinion a replacement is required.
- In discussion with Mr Cook and based on evidence presented at Triunal Ms Critchley agrees that this repair may not be required.
- Pile now identified as pre-dating the earthquake repair works

Notes: Assume all DPM's are to be replaced
Assume all fixings are galvanized. Only wire tie fixings can be galv within 600mm of ground so assume all non-wire fixings are to be replaced.

Photo		Type				Defects										
	Defect	Ring Foundation	Timber pile	Concrete pile	Packers present	Replace packers	Concrete pile damaged	Concrete pile to replace	Timber pile to replace	Pile/Bearer fixing to replace	Bearer splice to replace	Missing or failed DPM	Bearer span increased	Ring beam damage to repair	Other defect
1	N/A - Pic of floor plan and survey details														
2	Bearer notched to 60mm at support. Looks like this is a short spanning bearer. Probably not a concern, would need to measure up and assess loads to definitively confirm.	1													
3	Boney concrete	1													
4	Services penetrations	1													
5	Boney concrete	1													
6	Boney concrete	1													
7	Boney concrete	1													
8	Crack in ring beam. Difficult to see details. Probably reasonable to make some allowance for additional ring beam foundation repairs.	1												1	
9	None - Services penetration	1													
10	None - Services penetration. Part obscured photo	1													
11	Damaged concrete pile			1			1			1		1			
12	Damaged concrete pile. Can see timber pile that is off bearer line in background. Assume this does not affect this pile.			1			1			1					
13	Pic of pile 12 from reverse - defects added to 12														
14	Timber pile under joist not bearer. Should cut down or remove this. Not in an effective location.		1		1	1				1		1			1
15	Can see timber pile 16 in this photo			1						1					
16	Not clear if pile is skew nailed, poss non compliant connection. Can see concrete pile 17 in this photo		1							1					
17				1						1	1				
18			1							1					
19	Possible DPM is present but just can't be seen.			1						1		1			
20	Timber pile. Pile/bearer connection may be compliant. Concrete pile. Signs of dampness from above possibly?		1	1						1		1			
21	Timber pile under joist not bearer. Should cut down or remove this. Not in an effective location.		1		1	1						1			1

22				1						1		1
23	Boney concrete. Shows a notched bearer	1										
24		1										
25	Damp timber under bathroom. Pipework visible suggests this pile is under the bathroom.			1			1			1		1
26	Can see extent of damp in bearer to the left of this pile (towards pile 25)			1						1		1
27	Pile/bearer connection possibly OK, hard to see, untidy work		1									
28	10mm gap above pile. Pile no longer load bearing. No packers.			1		1				1		
29	Possibly OK, hard to see, untidy work		1									
30	Bearer splice does not appear centred above the pile. Poss not enough seating. Min bearer seating = 45mm (refer NZS3604 6.12.6)			1						1	1	
31	Possibly OK, hard to see, untidy work. Can see pile 32 in the right of this picture		1							1		
32				1	1	1	1			1		1
33				1	1	1				1		1
34	May not need to replace pile but hard to tell from pic.			1	1	1	1			1		1
35	May not need to replace pile but hard to tell from pic. CC note as potentially leaning.			1	1	1	1			1		
36				1	1	1				1		1
37				1	1	1				1	1	1
38				1	1	1				1		1
39				1						1		1
40				1			1			1		1
41	Missing pile under bearer over ring beam vent? I'm not convinved this pile was ever connected. Doesn't look like EQ damage.	1										
42	Same location as 41. Bearer over vent not ideal. Suggest install pile.	1										
43		1										
44	May not need to replace pile but hard to tell from pic.			1			1			1		1
45				1	1	1	1			1		
46				1	1	1	1			1		
47				1	1	1	1			1	1	
48				1	1	1	1			1		1
49				1	1	1	1			1		1
50				1	1	1	1			1		1
51				1			1			1	1	1
52				1						1		1
53	Poorly supported bearer, prob original however. There is a poorly supported perpendicular bearer but unlikely to be due to EQ or repair.			1			1			1		1
54				1			1	1		1		1

55	Concrete above vent and under bearer(?) is cracked. However, top plate prob OK to span this short distance.	1												1
56	Chimney breast													
57				1						1	1	1		
58	Bearer connection almost ok but z-nail in wrong place, pile wider than bearer		1							1		1		
	Concrete pile in same pic as 58			1	1	1				1		1		
59	Bearer connection almost ok but z-nail in wrong place, pile wider than bearer		1							1		1		
60	Possible gap between bearer and pile. Refer background of pic 63			1	1	1	1			1				
61	z-nail only on one side, refer background of pic 63		1							1		1		
62	Gap between pile and bearer. Pile shattered. No timber piles adjecent. Bearer now spanning further.			1			1	1		1		1	1	
63	Chimney breast													
64	Crack above vent. No bearer above so not critical but should have been part of EQ repairs	1												1
65		1												
66		1												
67	Gap between pile and bearer. No timber pile between pile and ring beam. Bearer now spanning further.			1		1	1	1		1		1	1	
	Pile on right in pic 67		1							1				
68	Gap between pile and bearer and pile damaged. There are timber piles either side so possibly OK depending on location of loads above. Note to replace for now.			1			1	1		1		1	1	
69			1							1		1		
70	Gap between pile and bearer. There are timber piles either side so possibly OK depending on location of loads above. Note as needing packers for now.			1		1	1			1		1	1	
71				1						1	1	1		
72	Suggest pile to be replaced as the bearing surface is damage. Only have a view from one side. May be further damage present.			1	1		1	1		1		1	1	
73				1						1		1		
74				1			1			1		1		
75	Boney concrete and cracks. Cracked concrete should have been addressed as part of EQ repairs. Notch in bearer seems large but not EQ related so not relevant here. Poss OK if span small.	1												1
76	Pile on a lean. Refer 137 for view of rear. Pile concrete damaged as well. Pile to replace because of lean. Poss some excavation around it? Assume EQ or repair related as other piles are OK. Maybe got halfway through replacing and gave up?			1			1	1		1				

77	Poorly supported bearer, poss original however. Bearer to right needs better connection detail. Assumed not EQ related so no relevant here however. Could fix with mi-tek type connection?			1			1			1		1			
78															
79				1			1	1		1		1			
80	Notched bearer needs a bearer splice fixing, suggests hogging in this area. Assumption is that the notch was cut during re-levelling to relieve hogging. Loadbearing capacity should really be checked.			1			1	1		1	1	1			
81				1	1	1				1		1			
82	Pile installed too short, to be replaced. Max recommended packing depth = 100mm		1		1	1			1	1					
83				1	1	1				1	1				
84	Left front - under joist. Under joist not bearer. Should cut down or remove this. Not in an effective location.		1							1		1			1
	Right front - under joist. Refer pic 84. Under joist not bearer. Should cut down or remove this. Not in an effective location.		1							1		1			1
	Back - under bearer. Refer pic 84. Can't see bearer connection. Assume likely defective		1							1		1			
85	Timber pile between joists and not under bearer. Should cut down or remove this. Not in an effective location.		1							1					1
	Refer pic 85.			1	1	1				1					
86				1	1	1				1					
87	Concrete damage visible in pic 94 which shows rear of piles			1	1	1	1			1					
88	Concrete damage visible in pic 94 which shows rear of piles			1	1	1	1			1					
89				1						1		1			
90	Boney concrete	1													
91	Boney concrete	1													
92				1						1		1			
93	Chimney breast														
94	Chimney breast - Rear of piles 88 (nearest) and 87 (middle) is visible in this pic														
95	Chimney breast - boney concrete														
96	Chimney breast - boney concrete. Broken pile in this pic shows the concrete piles have no reinforcing.														
97				1						1		1			
98				1			1			1		1			
99				1			1			1		1			
100	Bearer splice possibly hanging in mid-air. Top edges not aligned. Adjacent timber pile possibly supposed to replace concrete pile but this has left the bearer cantilevering.			1		1				1	1	1	1		
			1							1					

101			1							1					
102	Cracked through pile. Timber piles either side possibly intended to replace but no confidence about location of loads above having been taken into account.			1			1	1		1			1		
103			1							1		1			
104			1							1		1			
	Gap between pile and bearer. Timber piles either side possibly intended to replace but no confidence about location of loads above having been taken into account.			1		1				1			1		
105	Gap between pile and bearer. Bearer now spans further as no timber pile between this pile and the ring beam. ALSO perpendicular bearer spans onto this bearer so greater than normal loads!			1		1				1			1		
106		1													
107	Ring beam cracked above vent and under bearer. Crack should have been repaired with EQ damage. Not critical as top plate likely to span this short distance OK.	1												1	
108															
	Pile top cut off on an angle and gap left. Bearer now spans further as no timber pile between this pile and the ring beam			1			1	1					1		
109			1							1					
	Concrete pile visible in pic 109. Timber piles either side which may replace damaged concrete pile but no confidence that account has been taken of loadbearing walls above.			1			1	1		1		1	1		
110	Not labelled but assume this is other side of 109		1							1					
111	Pile top cut off on an angle and gap left. Pile also appears to be on a lean?			1			1	1		1		1	1		
112	Galv fixing.		1							1					
113	Gap between pile and bearer. Adjacent timber piles probably supposed to replace this but this has left bearer splice unsupported and cantilevering			1		1	1			1	1		1		
114	New timber pile appears to be leaning		1						1	1					
115				1			1			1	1	1			
116				1			1	1		1		1			
117				1						1		1			
118				1			1			1		1			
119	Chimney breast														
120	Chimney breast														
121	Crack to corner of ring foundation	1													1
122	Difficult to see extent. Assume critical damage.			1			1	1		1		1			
123				1			1			1		1			
124	Possible water damage to bearers and joists. Poss related to water ingress at Western entry?	1													1
125				1						1		1			
126			1							1		1			
	Concrete pile visible in pic 126			1	1	1				1	1	1			

127				**1**									**1**			**1**			
128	Refer pic 132 for view of critical damage to rear				**1**				**1**		**1**		**1**			**1**			
129					**1**								**1**			**1**			
130		**1**																	
131		**1**																	
132	Refer 128																		
133	Jerry can used as formwork for poured concrete. Would be difficult to make a connection to this pile. On balance, given other piles are closer here, could leave this connection out.												**1**			**1**			
134	Noted as cracked but hard to tell from photo alone.				**1**				**1**		**1**		**1**			**1**			
135	Refer 134																		
136		**1**																	
137	Refer pic 76 for other side of concrete pile in background	**1**																	
138	Cracked concrete ring beam.	**1**															**1**		
		30	**28**	**76**	**26**	**32**	**44**	**16**	**2**	**100**	**13**	**69**	**13**		**7**				
					% defective		**58%**	**21%**		**96%**		**66%**							
			Total piles	**104**															

Appendix 3

Windows

Item	Discussion	Cause
1	Twisted. Likely to have suffered damage from the earthquakes.	Unscoped earthquake damage.
1A	Twisted, could not be opened by Terra Consultants, and was recently noticed by Ms Critchley as having a 5 mm bow. Is a pair with window 1.	Unscoped earthquake damage
2	Twisted. Leaks. Foam applied to stop drafts. Likely to have suffered damage from the earthquakes.	Unscoped earthquake damage
2A	Twisted. Will not open. Likely to have suffered damage from the earthquakes.	Unscoped earthquake damage
2B	Twisted. Will not open. Likely to have suffered damage from the earthquakes.	Unscoped earthquake damage
3	Wooden window not inspected by Mr Richardson. Unlikely to have suffered damage from the earthquakes.	
4	Not twisted. Unlikely to have suffered damage from the earthquakes. Should be repaired for aesthetic reasons.	Unrepaired consequential damage
5	Twisted. Timber post has bowed forming a gap between the post and the steel frame. Foam applied to stop drafts. Likely to have suffered damage from the earthquakes.	Unscoped earthquake damage
5A	Twisted. Leaks. Likely to have suffered damage from the earthquakes.	Unscoped earthquake damage
5B	Twisted. Foam applied to stop drafts. Likely to have suffered damage from the earthquakes	Unscoped earthquake damage
6	May have had a broken corner joint in the sash and may have been difficult to open, close and lock effectively, but the defects with this window are more likely to have been caused by maintenance issues and the actions of the occupants than by the	

	earthquakes. Has been resolved between Family Trust and IAG and is the subject of accord and satisfaction.	
7	Not twisted. Leaking. Unlikely to have suffered damage from the earthquakes. Should be replaced as this is in the same room as window 12.	Unrepaired consequential damage
8	Wooden window which had some irregularities but was not considered by Mr Richardson to be outside acceptable tolerances. Was not commented on by D in her evidence or in the Schedule of Defects. Unlikely to have suffered damage from the earthquakes.	
9	Twisted. Leaks. Likely to have suffered damage from the earthquakes.	Unscoped earthquake damage
9A	Welded shut by a previous owner, probably because it interfered with the western external door. Unlikely to have suffered damage from the earthquakes.	Unscoped consequential damage.
9B	Welded shut after the earthquakes as could not be properly closed. Likely to have suffered wracking damage during them.	Unscoped earthquake damage
10	New aluminium window was installed after the earthquakes. The original aluminium window, although likely to have been damaged in the earthquakes, was nearing the end of its active life and the claim for this window was resolved between the Family Trust and IAG with an apportionment that amounts to accord and satisfaction.	
11	New aluminium window was installed after the earthquakes. The original aluminium window, although likely to have been damaged in the earthquakes, was nearing the end of its active life and the claim for this window was resolved between the Family Trust and IAG with an apportionment that amounts to accord and satisfaction.	
12	Twisted. Gaps between timber and metal frame. Leaks.	Unscoped earthquake damage
13	Only been in place for 10 years at the time of the earthquakes, is twisted, and is likely to have been damaged in the earthquakes.	Unscoped earthquake damage
14	New aluminium window was installed after the earthquakes. The original aluminium window, although likely to have been damaged in the earthquakes, was	

	nearing the end of its active life and the claim for this window was resolved between the Family Trust and IAG with an apportionment that amounts to accord and satisfaction.	
15	New aluminium window was installed after the earthquakes. The original aluminium window, although likely to have been damaged in the earthquakes, was nearing the end of its active life and the claim for this window was resolved between the Family Trust and IAG with an apportionment that amounts to accord and satisfaction.	
15A	New aluminium window was installed after the earthquakes. The original aluminium window, although likely to have been damaged in the earthquakes, was nearing the end of its active life and the claim for this window was resolved between the Family Trust and IAG with an apportionment that amounts to accord and satisfaction.	
15B	New aluminium door was installed after the earthquakes. The original aluminium door, although likely to have been damaged in the earthquakes, was nearing the end of its active life and the claim for this door was resolved between the Family Trust and IAG with an apportionment that amounts to accord and satisfaction.	
16	Damaged but repaired. Not inspected by Mr Richardson who incorrectly thought they had not been damaged. Did not feature in the conferral between the experts. Damaged in the earthquakes but repaired. May need repainting.	Defective repair
17	Damaged but repaired. Not inspected by Mr Richardson who incorrectly thought they had not been damaged. Did not feature in the conferral between the experts. Damaged in the earthquakes but repaired. May need repainting.	Defective repair
18	Fully refurbished in 2003. Twisted. Left-hand awning window jammed shut. Right-hand awning sash catches when operating. Leaks. Foam applied to stop draft and leaks. Likely to have been damaged in the earthquakes.	Unscoped earthquake damage
19	Leaks. Foam applied to stop drafts. Likely to have been damaged in the earthquakes.	Unscoped earthquake damage
20	Twisted. Bottom sash will not open. Leaks. Likely to have been damaged in the earthquakes.	Unscoped earthquake damage

21	Twisted. Leaks. Likely to have been damaged in the earthquakes.	Unscoped earthquake damage
22	Twisted. Leaks. Likely to have been damaged in the earthquakes.	Unscoped earthquake damage
23	Paint line broken between sash and frame. Leaking badly. Likely to have been damaged in the earthquakes.	Unscoped earthquake damage
24	Not twisted. Unlikely to have suffered damage in the earthquakes. Should be repaired for aesthetic reasons as it is a pair with window 23.	Unrepaired consequential damage
25	Very slightly twisted but is within acceptable tolerances and is unlikely to have suffered damage in the earthquakes.	

Interior

Item	Discussion	Cause
Wall verticality	it is no longer possible to tell whether wall verticalities were affected in the earthquakes. In any event, the wall verticalities will be affected by floor levelling. After that has been completed, there is likely to be some making-good required, but this is likely to be limited and subject to structural engineering advice. This work is to be undertaken to the highest standards compatible with the age of the house.	Because wall verticality was never addressed in the initial repairs but would have been required because of the floor levelling, all the wall verticality making-good is unscoped repair work.
Wooden window joinery	it is probable that replacing the steel windows will involve extensive alterations to the wooden window joinery. Some of the windowsills suffered water damage from leaking, either through the damaged steel window joinery or through likely earthquake damage on the roof. Some of the mitres will have opened in the earthquakes and is therefore earthquake damage. In any event, the wooden window joinery should have been repainted/varnished to be aesthetically	None of this work was included in the scope of works and is therefore unscoped repair work.

	compatible with the extensive redecoration being undertaken in each room. This work is to be undertaken to the highest standard.	
Minor internal blemishes	Minor defects can be rectified in situ as minor repairs. In the kitchen, the original kick board should be removed, the kitchen cupboards adjusted to accommodate the new floor level, and a new kick board installed after the floor has been relevelled.	The work required in the kitchen is unexecuted repair work. All other minor internal blemishes are defective repairs.
Eastern external door	This door needs to be checked and adjusted in its frame after the relevelling, as necessary. A new, larger, aluminium weather-shield should be fitted to the outside bottom rail. The lack of a weather-bar to prevent rain ingress under the door is a pre-earthquake defect.	The door adjustment is unexecuted repair work. Replacing the weather-shield relates to defective workmanship.
Western external door	The Family Trust has not satisfied me that the use of a bolt to keep the door shut tight has been caused by earthquake damage. This door needs to be checked and adjusted in its frame after the relevelling, as necessary.	The door adjustment is unexecuted repair work.
Front door	This door needs to be checked and adjusted in its frame after the relevelling, as necessary. A new, larger, aluminium weather-shield should be fitted to the outside bottom rail. The lack of a weather-bar to prevent rain ingress under the door is a pre-earthquake defect.	The door adjustment is unexecuted repair work. Replacing the weather-shield relates to defective workmanship.
Lounge internal door	To be rectified in situ when relevelling is completed.	The door adjustment is unexecuted repair work.
Other internal doors	These doors need to be checked and adjusted in their frames after the relevelling, as necessary. Although installation of HRV in most rooms and the placement of polythene over the ground under the floor would cause the ambient humidity of the air in the room spaces to be lowered, reducing the moisture level of all finishing timbers and causing some shrinkage movements in door reveals, doors	These repairs were never undertaken and are therefore unexecuted repair work.

	and architraves, it is unlikely that this is the only cause of the damage to the door joinery. I find that it is more likely than not that the door joinery suffered damage in the joins caused by either the earthquakes or the subsequent relevelling. All this damage will, therefore, need to be repaired.	
Floor-wall abutments	The internal finish in these areas is consistent with a house of this age and nature. I am not satisfied, therefore, that these defects were caused by the earthquakes.	
Staircase blemish	Although Mr McGunnigle may not have noticed this damage during his inspection of the house, it is visible on the CRL video. I am satisfied that it is unrepaired earthquake damage.	This work was included in the scope of works and is therefore unrepaired earthquake damage.
Roof void access	The finish to the repaired access hole was left incomplete after the roof space had been investigated by a consultant and should be made good by completing the painting.	This repair relates to defective repair work.
Internal surface finish	The standard of surface finish of walls and ceilings is generally satisfactory except where noted specifically. I am not satisfied, therefore, that there is evidence of defective repairs in this respect.	
White substance falling from cracks near window	I am not satisfied that this has been caused by earthquake damage or defective workmanship.	
Other internal repairs	Further minor making-good work is likely to be necessary after the floor relevelling has been completed.	This is unexecuted repair work.

Exterior

Item	Discussion	Cause
Weather tightness generally	The presence of weatherboards affected by borer could be related to defective repairs causing dampness in the timber but is more likely to be due to the extensive borer infestation in the neighbouring property. I am not satisfied, therefore, that this damage has been caused by the earthquakes.	

	No current weathertight issues have been recorded. The exterior of the house should be examined for weathertight issues after the relevelling has been completed. All weathertight issues identified in this examination are to be repaired.	This is unscoped repair work.
Eastern wall chimney repairs	The butt-joints in the weatherboards are to be repaired/eliminated.	This is defective repair work.
North-eastern eaves/soffit	There are visible mismatches in finished lines of joints in the replacement timber soffit boards which need to be repaired.	This is defective repair work.
Timber shake cladding	Although this cladding shows some deviation from the horizontal, it is de minimis and need not be repaired.	
Western wall chimney repairs	The horizontal line of timber weatherboards is not parallel with the horizontal cornice between the storeys. The weatherboards should be removed, and new weatherboards installed in line with the cornice between the upper and lower storeys. It will then need painting to match the other weatherboards. The butt-joints between the old and the new timbers are not flush and require repair. The corrosion to the original steel flashing above the cornice pre-dated the earthquake and is therefore not earthquake damage.	This is defective repair work.
Cladding touching the slates	I am not satisfied that this defect has been caused by the earthquakes as it is more likely to be pre-existing damage.	
Western entry steps	These steps, like the foundations, would have been laid on topsoil and were likely to experience pre-earthquake static settlement. Like the foundations, however, it is probable that they would also have suffered earthquake damage. As the earthquake forces experienced by these steps would have been different from the forces experienced by the foundations, there is likely to have been differential settlement. I accept D' evidence of the changes she observed after the earthquakes but there is no evidence that the repair solution adopted was unreasonable. I find, therefore, that no further repair of this area is necessary.	

External chimneys	I am not satisfied that there is any visible damage to the wall linings in these areas.	
Painting	I accept Mr Brooks' evidence that the exterior was never properly scoped prior to painting, that the painting was undertaken without proper access, and that only one coat of topcoat was applied. There may have been some areas that required preparation because of pre-existing damage but this should have been brought to the homeowner's attention. It was poor workmanship to simply paint over these defects without consulting the homeowner. The exterior of the house should be completely repainted. I accept that six years has elapsed since this painting was undertaken but the superficial way in which this painting was undertaken has shortened its durability and has therefore advanced the repainting by four years ahead of when that would have been necessary in the course of normal maintenance (10 years).	This is defective repair work. The Family Trust should meet 60% of the cost of repainting.

Garage

Item	Discussion	Cause
Rear wall	Although the CRL video taken in 2014 shows bowing in the corrugated metal cladding behind the garage, this was not apparent when the engineers visited the site together in 2019. I am not satisfied, therefore, that the earthquake damage suffered during the earthquakes is either unrepaired or badly repaired.	
West wall	There is no apparent damage to the corrugated metal cladding on this wall.	
Northern window on the east wall	The original timber sill is missing and has been replaced by a planted-on timber sill which does not provide a rebate up stand behind the window sashes, allowing water access to the inside of the garage stop nor are there are sill trays or sill flashings.	This repair relates to defective repair work. Easing/adjusting the sash is unexecuted repair work.

	This window was repaired because it had suffered earthquake damage. It is therefore likely that the stiffness in the opening sash is earthquake damage and needs to be repaired.	
Floor	The floor of the garage is unreinforced concrete which would have had some shrinkage cracks before the earthquakes. However, it is probable that the earthquake caused further cracking to the floor. I consider that this damage was properly repaired. Although there may be some new cracks in the floor, these are likely to have occurred since the repairs and are not linked to the original earthquakes. I am not satisfied, therefore, that there is any unrepaired earthquake damage or any defective repairs relating to the floor.	
Roof	The fact that daylight is visible through the roof covering/external abutments despite the presence of roof flashings satisfies me that this has been caused by the earthquakes. Although there may be no sign at present that water is gaining ingress through this gap, the utility of the roof flashing is nevertheless negatively affected. I am satisfied that this constitutes earthquake damage and must be repaired.	This is unexecuted repair work.
Asbestos	Although I accept that some of the external cladding contains asbestos, this did not need to be addressed during the repairs.	
Painting	Although the scope of works required the exterior walls to be repainted, repainting of the block work on the western elevation was not required to be undertaken under the policy as this wall was not painted when new. The comments made about the exterior painting of the house also apply to the painting of the garage which should be fully repainted.	This is an issue that should be addressed during the liability hearing. The homeowner is to meet 60% of the cost.

Outside areas

Item	Discussion	Cause
Driveway	Although there is photographic evidence to corroborate D's evidence that the section of the driveway outside the garage flooded after the earthquakes, during the reconstruction of the driveway a drain was installed in this area which should be sufficient to prevent flooding. However, I accept that the level of the drive near the garage was lowered unnecessarily and amounts to a defective repair. The consequence of this defective repair is that an unsightly asphalt patch was used as a transition between the drive and the entrance to the garage/carport. This defective repair should be remedied.	This is defective repair work.
Gate	I am not satisfied that the gate is out-of-plumb as a result of earthquake damage or defective repairs. I am satisfied, however, that the new drive was constructed lower than the old drive, leaving an excessive gap below the gate which should be repaired by re-hanging the gates.	This is defective repair work.
Paths	I am satisfied that the paths are breaking away on the side which would not have occurred if they had been properly repaired. The cause of this damage needs to be identified and addressed with a proper repair.	This is defective repair work.
Grating	A metal, rather than a plastic, grating should have been installed.	This is defective repair work.
South fence	Although I am satisfied that the south fence suffered damage during the earthquake, it was so old and in such poor repair that it required replacement before the earthquakes. Its utility, therefore, has not been affected by the damage it suffered during the earthquakes.	