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|----------------|-----------------------------------------------|-----------------|------------------------|
| <b>Date</b>    | 26 March 2025                                 | <b>Job Ref.</b> | CLM/2011/122912        |
| <b>Address</b> | 427 Armagh Street, Linwood, Christchurch 8011 | <b>Author</b>   | J McCloskey            |
| <b>Client</b>  | Natural Hazards Commission Toka Tū Ake        | <b>Version</b>  | V1.1 Approved          |
|                |                                               | <b>Status</b>   | Issued for Information |

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## TR001: Technical Report – Desktop Technical Review & Structural Inspection



*This Technical Report has been prepared by NZ Civil & Structural Engineers Ltd (NZCSE) at the request of its Client, Natural Hazards Commission Toka Tū Ake, in accordance with the scope of engagement provided.*

*This Technical Report has been prepared exclusively for the Client's use and no liability is accepted by this company or any employee or sub-consultant of this company with respect to its use by any other person without our prior written permission.*

## 1. Overview

| Site Summary            |                                                                                   |                       |    |
|-------------------------|-----------------------------------------------------------------------------------|-----------------------|----|
| Site Location           | 427 Armagh Street, Linwood, Christchurch 8011                                     |                       |    |
| Legal Description       | Flat 2 DP 303406 on Lot 4 DP 10444 having share in 1007 m2                        |                       |    |
| MBIE Technical Category | Green Zone, Technical Category 2, Yellow – Minor to moderate land damage possible |                       |    |
| Topography              | Flat and level                                                                    |                       |    |
| Soil Type               | Dominantly alluvial sand and silt overbank deposits                               |                       |    |
| Identified HAIL Site    | No                                                                                | Flood Management Area | No |

| Building Summary |                                                                                  |                 |                         |
|------------------|----------------------------------------------------------------------------------|-----------------|-------------------------|
| MBIE Foundation  | Dwelling: Perimeter concrete footing – Type B2; Conservatory: Slab on Grade – C2 | Occupied        | Yes                     |
| Walls            | Heavyweight – Bricks                                                             | Levels          | One                     |
| Roof             | Heavyweight – Concrete Tiles                                                     | Floor Plan Area | Approx 73m <sup>2</sup> |
| Age              | Circa 1945                                                                       | Date of Visit   | 29/01/2025              |
| Peripherals      | External Garage (Adjoined with garage for 425 Armagh Street)                     |                 |                         |

| Background Summary                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |  |
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| <ol style="list-style-type: none"> <li>NZCSE has read the Engineering Letter of Engagement provided on 17/01/2025 by the Natural Hazards Commission Toka Tū Ake (formerly EQC). Information provided is summarised below.</li> <li>The property was first assessed by EQC on 14/02/2011. Damage included: <ol style="list-style-type: none"> <li>Interior: Wall &amp; ceiling linings cracks in the Kitchen/Dining room and Entry Hallway; wall lining cracks in the Lounge, Bedrooms 1 &amp; 2, and the Bathroom; cornice cracking in the Lounge and Bedroom 1; tile grout cracking (walls) in the Kitchen &amp; Bathroom and floor tiles in the Kitchen (1x cracked tile). The Bedroom 1 door was noted as binding and damage recorded in the Rear entry (conservatory) included 1.8m<sup>2</sup> of mortar cracking and soffit/fascia separation.</li> <li>Exterior: 1.0m of mortar cracking was recorded on the East (E) elevation (plus the cracking recorded in the rear porch (above)) and plaster cracking in the front porch; 1.0m of ring foundation cracking; 15m of Roof ridge tile mortar cracking and; cracking to the chimney top plaster.</li> </ol> </li> <li>A second assessment was carried out on 23/05/2011 after the February 2011 earthquake. Additional damage recorded: <ol style="list-style-type: none"> <li>Interior: The ceiling was damaged in the Lounge &amp; Bedrooms 1 &amp; 2. The Bedroom 2 door was noted as binding.</li> <li>Exterior: plaster cracking (top of walls) was recorded. The chimney was recorded as structurally damaged above the roof.</li> </ol> </li> <li>Emergency works (EW) involving removing the chimney top and securing the roof was undertaken on 427 Armagh Street under EQC's Emergency Works (EQ) provisions in March 2011.</li> <li>The owner of 427 Armagh Street applied to opt out of the PMO repair program in early 2012. EQC's subsequent cash settlement of the claim was then based upon a customer provided Spence Consultants Ltd. quotation, paid on invoice.</li> <li>It is understood the property changed hands in early 2012 and then again in 2018.</li> </ol> |  |

## Background Summary Continued

7. A bump in the wall in the neighbouring unit (425 Armagh Street) was raised with EQC in March 2015. This was assessed by EQC in January 2016 and concluded as not EQ-related.
8. Following unrepaired EQ damage being noted on the building's exterior during a recent site visit to discuss drainage damage, both units were reviewed by NHC at a second site visit undertaken on 18 November 2024. Dislevelment issues were recorded at the site visit and an engineering review of the building was recommended in the assessment report that followed the site visit.
9. NZ Civil & Structural Engineers Ltd (NZCSE) has subsequently been engaged by the Natural Hazards Commission Toka Tū Ake, in the capacity of independent experts, to review all relevant third-party documents, attend site and perform suitable investigations to assess the property for outstanding earthquake damage, and provide guidance on lawful repair of this damage.
10. A structural assessment, full level survey, verticality survey, and shallow geotechnical investigations were carried out by NZCSE on 29/01/2025.

## 2. Third Party Documentation

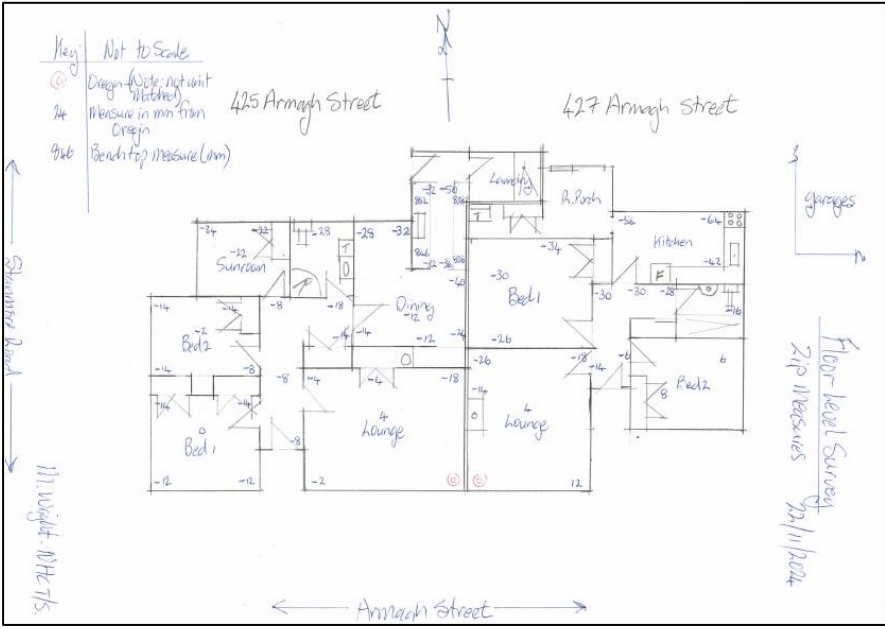
The following section provides a summary of key information gathered from third party documents, and where appropriate includes interpretation of this information by NZCSE. This commentary should be read in conjunction with the full documentation.

| Date       | Document Information                                    | NZCSE Document Summary                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|------------|---------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Various    | Christchurch City Council (CCC) – <i>Property Files</i> | <p>There are no documents on file for the construction of the dwelling or garage. The property files contain the following relevant information:</p> <ul style="list-style-type: none"> <li>• 1977: Building Permit, plans, and specifications on file to enclose carport to form a garage (second garage adjoined to original).</li> <li>• 1978: Building Permit and drawings on file to erect concrete block wall fence.</li> <li>• 1987: Building Permit, plans, and specifications on file to construct fire wall between the two flats.</li> <li>• 1988: Building Permit to construct a Conservatory on 427 Armagh Street</li> <li>• 2001: Subdivision application.</li> <li>• 2011: Rapid EQ Assessment Form Level 1 lists: No Damage.</li> </ul> <p><u>NZCSE Comments:</u></p> <ul style="list-style-type: none"> <li>• The building has existed since the late 1940's according to the historic aerial imagery. No property file records relating to the origin construction found on the council files. The property file records indicate the concrete partition wall was constructed to ceiling level when the building was first constructed but was extended to the roofline in 1987. A block wall extension to this wall was also added along the north elevation at this time to form a complaint firebreak between the two units,</li> </ul> |
| 20/12/2010 | Homeowner Photos                                        | <p>Photos on file show EQ damage as submitted by the homeowner at this time.</p> <p><u>NZCSE Comments:</u></p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |

| Date       | Document Information                                                                                    | NZCSE Document Summary                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|------------|---------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|            |                                                                                                         | <ul style="list-style-type: none"> <li>These photos were taken prior to the February 2011 earthquake. The photos show minimal interior cosmetic damage. The chimney has vertical crack running through the stack and some external veneer cracking is evident.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| 14/02/2011 | <p>EQC – File Note / Statement of Claim Checklist / Scope of Works / Sketch</p> <p>CLM/2010 /011835</p> | <p>The File Note contains the following relevant information.</p> <p>Damage Description</p> <ul style="list-style-type: none"> <li>Land <ul style="list-style-type: none"> <li>No Claim</li> </ul> </li> <li>Dwelling <ul style="list-style-type: none"> <li>Minor damage to dwelling interior &amp; exterior</li> <li>Chimney Damaged <ul style="list-style-type: none"> <li>Minor cosmetic damage to plaster finish.</li> </ul> </li> </ul> </li> </ul> <p>The Statement of Claim Checklist contains the following repair strategy.</p> <ul style="list-style-type: none"> <li>Lounge <ul style="list-style-type: none"> <li>Wall crack – 0.30m <ul style="list-style-type: none"> <li>Rake out stop paint.</li> </ul> </li> <li>Cornice mitre crack – 0.10m <ul style="list-style-type: none"> <li>Gap fill, paint scotia</li> </ul> </li> </ul> </li> <li>Dining Room <ul style="list-style-type: none"> <li>Tile grout crack – 2.00m <ul style="list-style-type: none"> <li>Rake out grout, seal with silicon</li> </ul> </li> <li>Wall crack – 5.00m <ul style="list-style-type: none"> <li>Rake out, stop, paint</li> </ul> </li> <li>Ceiling crack – 1.00m <ul style="list-style-type: none"> <li>Rake out, stop, paint.</li> </ul> </li> </ul> </li> <li>Kitchen <ul style="list-style-type: none"> <li>Broken tile – 0.60m<sup>2</sup> <ul style="list-style-type: none"> <li>Replace tiles</li> </ul> </li> </ul> </li> <li>Front Porch <ul style="list-style-type: none"> <li>Plaster cracking – 5.00m <ul style="list-style-type: none"> <li>Grind out, plaster re finish stucco, paint</li> </ul> </li> </ul> </li> <li>Bedroom 1 <ul style="list-style-type: none"> <li>Door sticking <ul style="list-style-type: none"> <li>Remove door, ease, paint, re hang.</li> </ul> </li> <li>Scotia separation – 0.10m <ul style="list-style-type: none"> <li>Gap fill, paint</li> </ul> </li> </ul> </li> <li>Bedroom 2 <ul style="list-style-type: none"> <li>Wall crack – 1.00m <ul style="list-style-type: none"> <li>Rake out, stop, paint</li> </ul> </li> </ul> </li> <li>Bathroom <ul style="list-style-type: none"> <li>Wall crack – 1.00m <ul style="list-style-type: none"> <li>Rake out, stop, paint</li> </ul> </li> <li>Bath tile grout cracks – 0.60m<sup>2</sup> <ul style="list-style-type: none"> <li>Re grout.</li> </ul> </li> </ul> </li> <li>Entry / Hall(s) <ul style="list-style-type: none"> <li>Wall crack – 1.00m <ul style="list-style-type: none"> <li>Rake out, stop, paint</li> </ul> </li> <li>Ceiling crack – 0.80m</li> </ul> </li> </ul> |

| Date       | Document Information                                                        | NZCSE Document Summary                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|------------|-----------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|            |                                                                             | <ul style="list-style-type: none"> <li>▪ Rake out, stop, paint</li> <li>• Rear Entry <ul style="list-style-type: none"> <li>○ Brickwork cracking – 1.80m<sup>2</sup> <ul style="list-style-type: none"> <li>▪ Rake out, re point brickwork, paint bricks</li> </ul> </li> <li>○ Conservatory fascia separation – 2.00m <ul style="list-style-type: none"> <li>▪ Seal with silicone</li> </ul> </li> <li>○ Timber frame plaster separation – 2.00m <ul style="list-style-type: none"> <li>▪ Gap fill, paint</li> </ul> </li> </ul> </li> <li>• Roof <ul style="list-style-type: none"> <li>○ Broken tiles (3) <ul style="list-style-type: none"> <li>▪ Replace</li> </ul> </li> <li>○ Ridge capping 15.00m <ul style="list-style-type: none"> <li>▪ Rebed capping.</li> </ul> </li> </ul> </li> <li>• External Walls – East <ul style="list-style-type: none"> <li>○ Brickwork cracking – 1.00m <ul style="list-style-type: none"> <li>▪ Grind out mortar re point brickwork</li> </ul> </li> </ul> </li> <li>• Chimney <ul style="list-style-type: none"> <li>○ Chimney cracked – above roof. Minor crack 0.6 to plaster – chimney is sound. <ul style="list-style-type: none"> <li>▪ Replaster crack</li> </ul> </li> </ul> </li> <li>• Foundations <ul style="list-style-type: none"> <li>○ Crack – plaster finish foundation – 0.20m <ul style="list-style-type: none"> <li>▪ Grind out crack, plaster.</li> </ul> </li> </ul> </li> <li>• Supplementary Notes: <ul style="list-style-type: none"> <li>○ Primary heat source – heat pump in lounge.</li> </ul> </li> </ul> <p><u>NZCSE Comments:</u></p> <ul style="list-style-type: none"> <li>• The scope predates February 2011 earthquake.</li> <li>• Minor levels of damage were recorded.</li> <li>• Bedroom doors were reportedly sticking in the centre of the dwelling where steep slopes have recently been measured. These doors were proposed to be eased and repainted.</li> <li>• No foundation releveling works were proposed at this time.</li> </ul> |
| 15/03/2011 | Homeowner – Emergency Works Documents                                       | A letter, photos, and invoice on file show the homeowner arranged to have emergency repairs to the chimney completed after damage caused by the 22 February 2011 earthquake.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| 23/05/2011 | EQC – Inspection File Note / Scope of Works / Sketch<br><br>CLM/2011/122912 | <p>The File Note contains the following relevant information.</p> <p>Damage Description</p> <ul style="list-style-type: none"> <li>• Land <ul style="list-style-type: none"> <li>○ No visible damage and none claimed/reported</li> </ul> </li> <li>• Dwelling <ul style="list-style-type: none"> <li>○ Minor cracks to brickwork and concrete skirt on exterior and minor, cosmetic wall/ceiling cracks (and a little separation around some door/window frames) in most rooms.</li> <li>○ The decommissioned chimney was brought down (after 22 Feb event) &amp; roof made weather proof.</li> </ul> </li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |

| Date | Document Information | NZCSE Document Summary                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|------|----------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|      |                      | <ul style="list-style-type: none"> <li>• Was a full inspection done?                             <ul style="list-style-type: none"> <li>○ Inspected:                                     <ul style="list-style-type: none"> <li>▪ All rooms</li> <li>▪ All accessible external surfaces</li> <li>▪ In roof (not on roof: conc tiles too steep)</li> <li>▪ Sub-floor space</li> </ul> </li> </ul> </li> </ul> <p>The Statement of Claim Checklist contains the following repair strategy.</p> <ul style="list-style-type: none"> <li>• Lounge                             <ul style="list-style-type: none"> <li>○ Rake, stop &amp; paint walls (18.0 x 2.7) and ceiling (5.0 x 4.0)</li> </ul> </li> <li>• Kitchen                             <ul style="list-style-type: none"> <li>○ Rake, stop &amp; paint walls (13.8 x 2.7)</li> <li>○ Rake, stop &amp; paint ceiling (4.5 x 2.4)</li> <li>○ Tiles separations (corner) 4.0 Hrs</li> <li>○ Replace 1.0m floor tiles</li> </ul> </li> <li>• Bedroom 1                             <ul style="list-style-type: none"> <li>○ Rake, stop &amp; paint walls (7.8 x 2.7) and ceiling (4.1 x 2.3)</li> <li>○ Ease door</li> </ul> </li> <li>• Conservatory                             <ul style="list-style-type: none"> <li>○ Paint only 3 walls (7.6 x 2.4)</li> </ul> </li> <li>• Bedroom 2                             <ul style="list-style-type: none"> <li>○ Rake, stop &amp; paint walls (7.6 x 2.7) and ceiling (3.8 x 3.0)</li> <li>○ Ease door</li> </ul> </li> <li>• Bathroom                             <ul style="list-style-type: none"> <li>○ Fill &amp; paint (8.2 x 2.7) walls only</li> </ul> </li> <li>• Entry / Hall(s)                             <ul style="list-style-type: none"> <li>○ Rake, stop &amp; paint walls (12.8 x 2.7) and ceiling (7.7m<sup>2</sup>)</li> </ul> </li> <li>• Entry Main Door                             <ul style="list-style-type: none"> <li>○ Fill &amp; paint 3 walls (4.0 x 2.4)</li> </ul> </li> <li>• Roof                             <ul style="list-style-type: none"> <li>○ Replaster ridge cap (2.0 L/M)</li> <li>○ Inspected roof cavity</li> </ul> </li> <li>• External Walls                             <ul style="list-style-type: none"> <li>○ North                                     <ul style="list-style-type: none"> <li>▪ Cracking to stucco: grind out, fill, restucco &amp; paint (2.2m<sup>2</sup>)</li> <li>▪ Blockwork cracking: grind out &amp; remortar (0.4 L/M – 3 hrs)</li> <li>▪ Replace 2 bricks (2 hrs)</li> </ul> </li> <li>○ South                                     <ul style="list-style-type: none"> <li>▪ Cracking to stucco: grind out, fill, restucco &amp; paint (2.3m<sup>2</sup>)</li> </ul> </li> <li>○ East                                     <ul style="list-style-type: none"> <li>▪ Cracking to stucco: grind out, fill, restucco &amp; paint (1.5m<sup>2</sup>)</li> <li>▪ Replace 1 brick (2 hrs)</li> <li>▪ Wall cracks: grind out crack &amp; remortar (1.0 L/M – 4 hrs)</li> </ul> </li> <li>○ West                                     <ul style="list-style-type: none"> <li>▪ Intertenancy/common wall</li> </ul> </li> </ul> </li> <li>• Chimney                             <ul style="list-style-type: none"> <li>○ Replace above roof (0.5 x 0.6 x 1.5)</li> </ul> </li> <li>• Foundations                             <ul style="list-style-type: none"> <li>○ Replaster 2.8m<sup>2</sup> on skirt</li> </ul> </li> <li>• Services                             <ul style="list-style-type: none"> <li>○ Claimant is having plumber examine sewers outlet – intermittent backflow</li> </ul> </li> </ul> |

| Date       | Document Information                                          | NZCSE Document Summary                                                                                                                                                                                                                                                                                                                                                                                 |
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| 06/09/2011 | EQC – Land Inspection Photos                                  | <p>The annotated aerial photo notes “Paver undulations &gt;10mm” between the conservatory and the garages.</p> <p>Photos recorded show the precast concrete beams above the veneer panels have separated due to wall settlement.</p>                                                                                                                                                                   |
| 2012       | Opt-Out & Cash Settlement Documents<br>CLM/2011/122912        | <p>12/01/2012: Signed forms for the homeowner to opt out of the CHRP repairs programme.</p> <p>16/01/2012: Quotation for \$18,000 including GST from Spence Consultants Ltd: <i>Based on EQC Scope dated 23 May 2011.</i></p> <p>30/03/2012: Invoice for \$16,100 Inc GST from Spence Consultants Ltd.</p> <p>A letter on file from EQC shows this was cash settled to the homeowner in July 2012.</p> |
| 22/11/2024 | Natural Hazards Commission<br>Toka Tū Ake – Floor Levels      | <p>A site inspection was carried out at the property, and floor levels were taken across both units (425 &amp; 427 Armagh Street).</p>                                                                                                                                                                             |
| 04/12/2024 | Natural Hazards Commission<br>Toka Tū Ake – Assessment Report | <p>A site visit was conducted to assess the dwelling after exterior damage was noted during a recent visit to discuss drainage damage with the drainlayer.</p> <p>Conclusions:</p>                                                                                                                                                                                                                     |

| Date       | Document Information                          | NZCSE Document Summary                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|------------|-----------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|            |                                               | <ul style="list-style-type: none"><li>Floor dislevelment across the home exceeds MBIE guidance tolerances both on a global and localised basis and as the cause of the global tilt is not clear, this dislevelment should be assessed by an appropriately qualified engineer.</li><li>Drainage issues on the property remain unresolved at the time of this report.</li></ul> <p><u>NZCSE Comments:</u></p> <ul style="list-style-type: none"><li>NZCSE has been engaged based on the outcome of this report.</li></ul> |
| 12/02/2025 | Cavity Critter – Underfloor Inspection Report | See notes under Section 3.2 <i>Foundations</i> below for further information.<br>A full copy of this report has been attached in Appendix E.                                                                                                                                                                                                                                                                                                                                                                            |

## 3. Observations & Findings

The following section presents an overview of structural observations and findings noted during the recent engineering inspection performed by NZCSE. Photographs and drawings that are referenced within the body of this report are provided in Appendix A & B respectively.

### 3.1. General

4. The subject property is part of a multi-unit building comprising two units, addressed as 425 and 427 Armagh street. Property file records show the existing partition wall was extended to roofline from ceiling height between 425 and 427 Armagh street in 1987. The wall was also extended to form a divide between the laundry areas of both dwellings along the north elevation.
  - The scope of NZCSE's engagement includes both adjoining units. Whilst the focus of this report is 427 Armagh Street, consideration has been provided of the overall structure and holistic performance. A separate report relating to 425 Armagh Street has also been provided to our client.
- Property layout and local features (Photo Set 1):
  - For ease of reference, the elevation facing Armagh street is referred to as the south elevation.
  - The following information has been obtained from review of aerial imagery:
    - 1940-1944 is the earliest available aerial imagery of the property, shows the original property.
    - 1945-1949 aerial imagery shows the new dwelling and original garage.
    - 1960-1964 aerial imagery shows the carport against the garage.
    - 1980-1984 aerial imagery shows the second garage (carport permitted to be enclosed in 1978).
- For external views of the dwelling, refer to Photo Set 2.
- Homeowner information:
  - The current owner purchased the property circa 2018, after the Canterbury Earthquake Sequence (CES) and after the 2011 earthquake repairs were completed. The property has been tenanted ever since.
  - Based on our conversation with the homeowner and the Natural Hazards Commission Toka Tū Ake engineering letter of engagement, we understand that the homeowner's concerns relate primarily to the following:
    - Possible earthquake damage to the drainage and whether the foundation settlement and floor slopes across the dwelling have been caused by earthquake settlement from the 2011 earthquakes.
  - The homeowner informed us of the following private renovations and internal alterations carried out since purchasing the property in 2013:
    - The roof gutters for both 425 and 427 Armagh Street were replaced in the past year.
    - No structural alterations have been carried out to the dwelling and garage since taking ownership of the property in 2018.
- The scope of our engagement is to review the original earthquake assessments and subsequent repairs that were carried out to the multi-unit building and provide recommendations on any potential remediation required and whether any further repairs are required to address outstanding earthquake related damage.

### 3.2 Foundations – (refer to SK4 Foundation Plan for subfloor layout)

- Foundations of the multi-unit building are categorised as Type B2 (timber-framed superstructure with heavyweight cladding supported by concrete perimeter foundation wall and internal piles) in accordance with Table 2.1 of MBIE Guidance Document (Photo Set 3).
  - A perimeter foundation excavation was carried out along the west elevation of 425 Armagh Street that shares the same foundation construction as 427 Armagh Street. The embedment depth was found to be embedded approximately 350mm below ground level (BGL) (Photo 3A).

- According to the NZCSE shallow geotechnical testing carried out on site, the perimeter foundations are embedded within the weaker organic topsoil layer where long term foundation settlement is expected to occur.
- The configuration of the dwelling construction shows the subfloor bearers run from north to south in the same direction as the internal heavyweight partition wall between the two dwellings.
- The perimeter foundation was scanned for reinforcing using a Hilti PS50 Multidetector which did not confirm the presence of steel reinforcing. Given the age of construction and absence of cracks, it is likely that the foundation does contain some reinforcing steel, refer to Photo 3D.
  - The *Cavity Critter* report shows the internal face of the perimeter wall and partition wall is in reasonable condition with only a few minor cracks identified. It should be noted that the northeast perimeter foundation section was unable to be accessed due to obstructions within the subfloor.
  - Most of the foundation cracks identified on the exterior were found along the south and east perimeter foundation. We note that the perimeter foundation cracks have not been previously repaired or infilled as shown in Photo Set 3. However, the post-earthquake scopes allowed for 2.8m<sup>2</sup> of perimeter foundation plaster repairs.
- Externally, NZCSE has observed several cracks to the perimeter foundation of 427 Armagh Street along the southeast and eastern elevation coinciding with the floor falling from south to north along the eastern elevation.
- Based upon the contents of the *Cavity Critter Underfloor Inspection Report*, the following observations have been made (Refer to SK4 Foundation Plan):
  - 427 Armagh Street is supported by a perimeter concrete foundation with a suspended timber floor supported on 47x precast concrete piles. Most of the internal piles have a damp-proof membrane (DPM) of varying thicknesses and have no structural fixings between the pile and bearer. None of the piles appear to have been packed and none of the bearers appear to have been notched in the past.
  - The bearer ends are supported on the perimeter foundation wall.
  - The subfloor report shows areas of broken concrete roof tiles spread across the subfloor between the piles, likely remaining from the when the multi-unit building was constructed.
  - Access to the northeast corner of the subfloor below the kitchen area was restricted due to stacked subfloor insulation and building waste material.

### 3.3 Floors & Fixtures

- A level survey was undertaken throughout the multi-unit building using a Zip Level Pro2000 (Refer to SK1 Floor Levels and SK2 Contours Plan):
  - A total floor height variation of 64mm was measured across the 427 Armagh Street footprint with numerous slopes exceeding 0.5% (1 in 200).
  - The following notable slope trends were observed across the floor plan:
    - The floor exhibits an overall trend of falling from south to north with the lowest point located in the northeast corner of the kitchen.
    - Additionally, the partition wall was found to fall from south to north and the floor slopes across the lounge and bedroom 1 were recorded to fall towards the partition wall, as illustrated on SK2.

The following information was noted during NZCSE's internal assessment, refer to relevant photo sets in Appendix A:

- **Lounge**
  - The heavyweight partition wall that divides 425 and 427 Armagh Street forms the western wall in the lounge. The floor levels across the lounge fall from south to north with the steepest slopes present in the northwest corner of the room found to fall towards the partition wall.

- The slopes across the floor are mirrored by the ceilings. We understand that no wall or ceiling linings have been replaced in this room since the earthquakes, however cracking damage to the ceilings and walls was noted in the post-earthquake scopes.
- No damage to the functionality of the windows or doors in this room was recorded in the post-earthquake scopes. We noted the presence of lining creasing damage above the door which is indicative of differential settlement across the door opening (photo 4E) The floors across the door opening vary by 10mm on the inside of the room.
- The chimney is located alongside the partition wall and according to the council record, the partition wall was retrofitted circa 1987 after the chimney was constructed. It is unclear if the chimney is connected to the partition wall. It is important to note that the subfloor images taken in this area of the dwelling are obscured by the sagging insulation and debris present within the subfloor.
- We understand that the chimney was constructed with reinforced concrete and was removed to below the roofline after the earthquakes. The structure below the ceiling height was deemed to be safe. NZCSE did not see any signs of wall lining damage either side of the chimney to indicate ongoing movement of the remaining chimney structure has occurred since the work was carried out.
- **Bedroom 1**
  - The floor across this room has settled differentially with a high point in the centre room and the steepest slopes present in the northwest corner. Overall, the floors fall to the north and towards the partition wall that forms the western wall of the room.
  - The original EQC scope allowed for crack repairs to the wall and for the door to be removed, eased, painted and rehung. The door head level falls north by 4mm across the opening while the corresponding floor falls by 8mm to the north.
  - Levels recorded across the fitted wardrobe indicate that the wardrobe is tilting in the same direction as the floor. The doors were slightly racked in the framing and the doors are rubbing against the framing when fully closed. The floor is falling to the north across the opening.
  - The window between the bedroom 1 and the laundry is painted shut and were unable to be opened.
- **Bedroom 2**
  - The floor across this room is reasonably level with an overall floor level variance of 18mm, falling towards the north. The door head and windowsills were found to be level.
  - The post February 2011 EQC scope allowed for the door to be eased, however the door head is level and the floor level variance across the door is minor. The door frame is tilting to the north, so it is possible that the door framing was slightly racked which meant the door required easing.
- **Hallway, Bathroom and Kitchen (photo sets 3&4)**
  - The floor and ceiling across the hallway and bathroom follow the overall slope trend of the dwelling and fall towards the north. The bathroom door head falls in the same direction as the floor towards the north.
  - The bathtub and floor levels in the east-west direction are approximately level
  - Post earthquake repair to the bathroom and hallway involved filling the lining cracks and repainting. No wall or ceiling lining required replacement.
  - The floor level across the kitchen falls relatively uniformly from south to north as illustrated by the contours on SK2.
  - The kitchen benchtop was found to mirror the floor and ceiling slopes.
  - Brick cladding cracking and separations were identified along the concrete beams that are seated on top of the veneer along the eastern elevation (Photos 3E and 3F). This damage was noted in the post-earthquake scopes and EQC land assessment. It appears that some of these repairs were carried out, however several of the separations along the top of the wall remain unrepaired.

- **Laundry and porch**

- The porch is founded on a concrete slab-on-grade and is a step down from the kitchen and laundry floor level. The slab was scanned using a Hilti PS50 Multidetector and no reinforcing was detected. Photo 4D shows minor separations between the concrete lintel and the soffit framing.
- The partition wall dividing the two dwellings forms the west and north wall of the laundry. The post-earthquake scopes allowed for mortar crack repairs to the blockwork and for the wall to be repainted which suggests some differential settlement occurred along this wall during the CES. No cracks were identified along the visible area of wall during the NZCSE assessment.

### 3.4 Walls

- The walls of both dwellings are timber-framed and clad externally with a heavyweight red brick veneer cladding. The partition wall (extended above ceiling height circa 1987) is constructed from reinforced concrete and masonry extending from the floor to the underside of the roof.
  - During the NZCSE site inspection, some mortar cracking was identified along the east elevation of 427 Armagh Street outside the kitchen.
- The property file records suggest the partition wall between the two units comprises reinforced masonry blocks with reinforced bond beams at the ceiling and roof line level. Most of the intertenancy partition wall below ceiling level was unable to be inspected for internal cracking damage due to the wall being lined with plasterboard. No damage to the wall above the ceiling level was visible within the roof space.
  - The EQC post-earthquake scope noted cracking damage to the partition wall with a repair and repaint allowed for in the cash settlement provided.
- The walls are lined internally with plasterboard. It is understood that primarily cosmetic repairs were carried out as part of earthquake managed repairs. The following internal wall observations were made during the NZCSE site inspection:
  - Minor wall lining cracks was identified above the lounge door indicating some settlement has occurred in this area.
  - The partition wall was scanned using a rebar scanner and reinforcing was detected.
- A verticality check was undertaken in order to determine the incline of walls and other vertical elements, using a Bosch DNM 120 L Professional digital spirit level (refer to SK3 Verticalities Plan):
  - Overall, the internal walls and door frames were found to tilt in the general direction of the foundation slopes to the north and towards the partition wall.

### 3.5 Roof ( Photo Set 6)

- A limited visual inspection of the internal roof space and the partition wall above ceiling height was carried out as part of the NZCSE site assessment. The following was noted :
  - The concrete tiles are supported by tile battens spanning across rafters connected to a ridge board. The tiles are secured to the battens and rafters using wire ties. The rafters are supported by under purlins with timber struts, and the ridge board is supported by timber props. The under purlins are further supported by props fixed back to the top of the internal walls running through the centre of the dwelling.
  - The roof plane appears to be sagging when viewed externally. This is assessed to be primarily due to a lack of internal support. It is common to observe undulations across the roof plane in dwellings of this construction era, especially where heavyweight concrete roof tiles have been used as cladding. To rectify this issue, it is recommended that additional struts are installed at the ends of the under purlins to reduce the undulations and provide additional structural support.
  - The partition wall was viewed from inside of the roof space, and no step cracking was identified. It was noted that the wall above the ceiling line is constructed using a combination of poured in-

situ concrete and masonry concrete blocks. No cracking was identified on the wall when viewed from the internal roof access.

- An unrestrained concrete header tank was identified in the roof space. We recommend this is restrained or removed if it is no longer in use.
- The internal ceilings are lined with plasterboard. It is understood that only cosmetic repairs were originally required as part of earthquake-managed repairs, with no localised lining replacement deemed necessary following the CES.
- The owners informed us that the external gutters have been fully replaced within the past year across both dwellings at 425 and 427 Armagh Street.

### 3.6 Garage ( Photo Set 7)

- The garage for 427 Armagh Street is the lean-to structure on the right-hand side of the original garage building. It was originally a carport and was enclosed in 1978 to form an adjoining garage space. We understand the concrete slab was initially part of the driveway paving.
- The garage walls are timber-framed with cement sheet cladding, and the roof is covered with lightweight corrugated iron cladding. The garage is currently being used for storage, and the slab is partially covered linoleum.
- A level survey was undertaken throughout both garages using a Zip Level Pro2000 (refer to SK1 Floor Levels and SK2 Contours Plan):
  - A total floor height variation of 108 mm was measured across the footprint of the 425 Armagh Street garage, with slopes exceeding 0.5% (1 in 200).
  - The concrete slab falls from the northeast corner to the southwest corner, towards the vehicular door.
  - The garage door head was measured to be level across a 58 mm slab fall. The vehicle tilting doors are functional. Verticality measurements show the wall framing generally follows the floor slopes.
  - No damage was noted to the garage during the post-earthquake assessments.
  - There is no evidence to suggest that the 2011 earthquakes have had a material impact on the garage structure. No repairs are deemed necessary.

## 4. Shallow Geotechnical Investigations

### 4.1. General

The following section provides an overview of the geotechnical investigation and is based upon a site walkover, shallow soil investigations and a desktop review of the New Zealand Geotechnical Database (NZGD).

- The location of test sites and results of hand auger & Scala penetrometer investigations are provided in Appendix D.
- Soil classification has been carried out in line with 'Field Descriptions of Soils and Rocks' by NZ Geotechnical Society Dec 2005, and Scala penetrometer testing performed in accordance with NZS 4402 Test 6.5.2:1988 – Determination of the Penetration Resistance of a Soil.

### 4.2. Desktop Study

A desktop study of information available on the NZGD was undertaken on 10/03/2025 and recorded the following:

- Moderate to severe liquefaction on and immediately surrounding the property following the 22 February 2011, event was interpreted from aerial photography. Minor liquefaction was observed surrounding the property following the June 2011 Event. The property was not mapped following the 4 September 2010 event.
- No ground crack locations have been mapped on the site or on the adjacent properties.
- Information from the Property Summary Report, based on Lidar survey data, indicates that the property has undergone a mean cumulative elevation change of -0.22m as a result of the CES. A portion of this movement is indicated to be tectonic (-0.18m).

### 4.3. Site Walkover Assessment

A site walkover assessment was conducted on 29/01/2025.

- At the time of inspection, the property showed some evidence of land damage attributable to the effects of liquefaction/liquefaction ejecta:
  - Cracking and settlement of the concrete pavement at the front of the property was observed. This damaged was noted in the EQC land damage team, therefore it is assessed to have been made worse by the 2011 earthquakes.

### 4.4. Shallow Investigations

Subsurface testing completed on 29/01/2025 comprised:

- Two hand augers (HA) to a maximum depth of 2.5m below ground level (BGL) with engineering geological logging of materials recovered, and;
- Two Scala penetrometer tests to a maximum depth of 2.6m BGL to assess soil bearing capacity.

### 4.5. Sub Surface Conditions

Inferred subsoil conditions from combined investigations:

- HA 01 is situated along the east elevation of 427 Armagh Street, in front of the garages. The soil profile consists of a 0.4m thick layer of topsoil over silt and sand to the full depth of investigations (2.5m BGL). The HA was discontinued at 2.5m BGL due difficult retrieval (vacuum pressure). Ground water was encountered at 1.7m below ground.
- SC 01 indicates that Ultimate Bearing Capacity (UBC) of 200kPa and 300kPa is consistently achieved from below the topsoil layer and at 1.1 m BGL respectively.
- HA 02 is located in the garden adjacent to the west elevation of 425 Armagh Street. The soil profile consists of a 0.5m thick layer of topsoil over varying quantities of interspersed silt with sand to the full depth of

investigations (2.5m BGL). The hand auger was discontinued at 2.5m BGL due to inferred gravels. Ground water was encountered at 2.2m below ground.

- SC 02 indicates that Ultimate Bearing Capacity (UBC) of 200kPa and 300kPa is consistently achieved from below the topsoil layer and at 1.1 m BGL respectively.

#### **4.6. Ground Water Regime**

The groundwater table was estimated based on results of HA investigations and data available on the New Zealand Geotechnical Database. Based upon information from the well logs reviewed, the water table in this region is indicated to exist at approximately 1.0m-2.5m below ground level and is subject to change as a result of seasonal variation.

## 5. Conclusions & Recommendations

### 5.1. Assessment of Damage

Key findings of the engineering assessment are as follows:

- The subject property is part of a multi-unit building comprising two adjoining units, referred to as 425 and 427 Armagh Street. The focus of this report is on 427 Armagh Street. However, in accordance with industry guidance and best practices (i.e., Part E of the MBIE Guidance Document), due consideration has also been given to the adjoining unit at 425 Armagh Street, and the overall structure has been assessed holistically.
- Structural survey measurements, including levels and wall verticality, have been taken across floors, window frames, doorways, and ceilings, and have been analysed for indicators of structural damage. A total floor height variance of 64 mm has been recorded across the floors of 427 Armagh Street. The floors slope towards the north elevation and towards the heavyweight partition wall. Mortar cracking damage was noted along this wall in the post-earthquake scope, including damage to the adjacent wall lining, which indicates that the wall has settled to a degree during the CES.
- Mortar crack repairs have been undertaken along the eastern elevation of the dwelling, however cracks to the perimeter foundation have not been repaired.
- Moderate to severe liquefaction was observed around the property following the February 2011 event, including earthquake-related land damage at the front of the property, as noted by the EQC land team. This suggests there has likely been liquefaction that has caused some settlement of the foundation systems across both dwellings at 425 and 427 Armagh Street.
- The heavyweight partition wall has settled and caused the floors in both dwellings to slope inward toward the wall, as illustrated on the contour plan SK2. We also note the post-earthquake EQC land assessment photos dated September 2011, recorded undulations in the pavement alongside the eastern elevation and damage to the eastern wall where the foundations have settled.
- It is probable that the foundations have settled to an extent prior to the CES. We would expect to see greater levels of structural damage to the internal linings and external cladding if all of the settlement measured across the footprint was caused by the 2011 earthquakes.
- Based on a review of third-party documents, site observations, structural survey measurements, and discussions with the owners and tenants, we believe the dwelling has experienced a material change due to settlement damage caused by the Canterbury earthquake sequence. To address this settlement, a partial foundation lift is considered necessary to repair the effects of the Canterbury earthquakes.
- Proposed repair works are listed in Section 5.2 below.

#### Garages:

- We note the settlement across the adjacent garage structures is deemed to have existed prior to the CES and no damage was recorded to the structure following the earthquakes to suggest the settlement has been materially worsened by the earthquakes.
- No repairs are required for the external garage.

### 5.2. Repair of Damage – Refer to Appendix C – SK5 Conceptual Repair Plan

The following repairs are proposed to remediate earthquake managed repairs and address outstanding earthquake related damage to 427 Armagh Street (half of the multi-unit building.) The following repairs to 427 Armagh Street should be carried out in conjunction with the repairs for 425 Armagh Street due to the shared partition wall, external brick veneer, and roof structure.

- Relevel the perimeter foundation wall and intertenancy wall footing using portable jacks in accordance with Lifting Option 1, Appendix A1.1 of the MBIE guidance document. Refer to SK5 with proposed lifting

point locations at 1.5m centres. Depth to bearing for the underpin dunnage is to be 800mm below ground level. The dimension of the underpin pads is to be 600mm square.

- The internal floor area can be lifted by packing between the internal piles and the subfloor bearers to the required height. Install 12kN bearer end fixings above the piles that are to be packed. An estimated 36x internal piles will require packing in conjunction with foundation lift. Recommended lift heights are noted on SK5.
- Allow to remove the remainder of the defunct chimney down to ground level, similar to the works carried out in the neighbouring 425 Armagh Street.
- Given the extent of the proposed lift, we recommend that allowance be made for a suitably qualified geotechnical engineer to be engaged to carry out the geotechnical construction monitoring during the works and to confirm the bearing depth and size of the underpin excavations.
- Allow to grind out, clean, and fully fill internal perimeter foundation cracks. 7x perimeter foundation cracks along the north, west, and south perimeter walls.
- Repair outstanding damage to the roof tiles and roof framing after the lift.
- We also recommend the owners install additional timber struts to support underpurlins in the roof space to reduce the sag of the framing. This repair is to address deficiencies in the original construction as opposed to earthquake related damage.

### 5.3. Expected Consequential Damage

- Removal of adjacent concrete paving and vegetation around the perimeter of the building to facilitate releveling works.
- During the lift, some internal lining damage is expected to occur along with functionality issues of fixtures, which should be addressed accordingly following releveling work.
- Allow to remove the mass concrete slab in the porch and to allow access to underpin the foundation. Reconstruct the slab when the foundation releveling is completed.

### 5.4. Compliance

- It is our understanding that repair work at the property, as outlined above, may be categorised as building work requiring a building consent. It may be possible for this work to be performed as exempt building work under Schedule 1 (2) of the Building Act 2004, however this will be at the discretion of the local building consent authority.

## 6. Appended Documents

The following documents are appended to this report:

**Appendix A:** Relevant Site Photographs

**Appendix B:** Structural Survey Drawings

**Appendix C:** Conceptual Repair Plan

**Appendix D:** Shallow Geotechnical Investigations

**Appendix E:** Relevant Third-Party Documents

**Appendix F:** Cavity Critter Subfloor Report

**Inspected & Prepared By:**



JOHN MCCLOSKEY

**Senior Structural Engineer**

BEng (Hons) Engineering, CPEng 1024064,  
CENG MIEI

## 7. Limitations

This report and documentation have been prepared by NZCSE at the request of its client and are exclusively for the client's use. No responsibility or liability to any third party is accepted by NZCSE for any loss or damage whatsoever arising out of the use of or reliance on this report by any third party.

No structural analysis has been carried out to assess the strength of the buildings and/or structures or to determine whether or not they comply with the current and/or any previous Building Code. NZCSE has not made any assessment of structural stability or building safety in connection with any future earthquake events.

This report and documentation are limited by the restricted ability to carry out inspections. This report and documentation does not comment on structural damage that is not reasonably noted through visual inspection, including any structural damage that is in inaccessible places or has occurred latently.

NZCSE has assumed that any and all documentation and information provided by the client and/or any third party relating to the buildings and/or structures is accurate and reliable. This documentation and information includes but is not limited to Council records, plans, details, and geotechnical information. No responsibility or liability is accepted by NZCSE for any loss or damage whatsoever stemming from inaccuracies in any and all documentation and information provided by the client and/or any third party.

As outlined in the scope of work, NZCSE has been engaged by the client to carry out an assessment and provide conclusions and recommendations relating to the observed structural damage to the relevant buildings and/or structures. Although some observations and comments may relate to non-structural elements, these comments should be read only in the context of adding completeness to this process. Recommendations provided by NZCSE are limited to those that relate specifically to the New Zealand Building Code Clause 'B1 Structure'. It is recommended that all non-structural elements that are governed by the New Zealand Building Code and Acceptable Solutions/Verification Methods, including but not limited to geotechnical considerations, 'B2 Durability' and 'E2 External Moisture', are to have direct involvement from the appropriate consultants, professionals and industry experts. No responsibility or liability is accepted by NZCSE for any loss or damage whatsoever stemming from non-structural related issues.

Without limiting any of the above, NZCSE's liability, whether under the law of contract, tort, statute, equity or otherwise, is limited as set out in the terms of the engagement with the client.



# Appendix A

## Relevant Site Photographs

Photo Set 1: Property Layout and Local Features.



Photo 1A – Screenshot of latest aerial imagery from canterburymaps.govt.nz showing property layout and simplified cardinal directions.



Photo 1B – 1940-1944 earliest available aerial imagery of the property, showing the original property (now 3 titles).

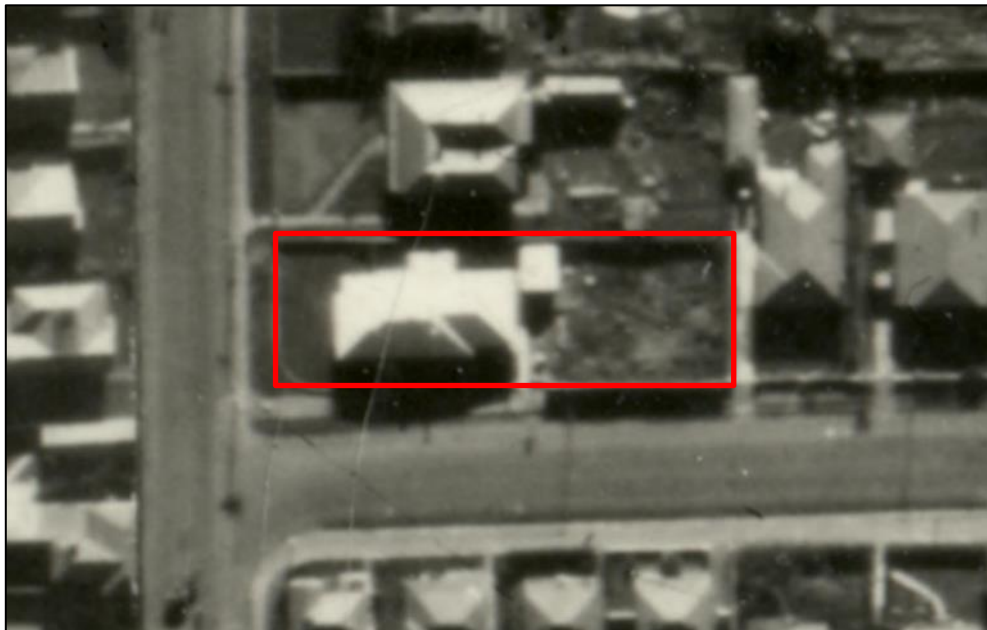


Photo 1C – 1945-1949 aerial imagery shows the new dwelling and original garage.

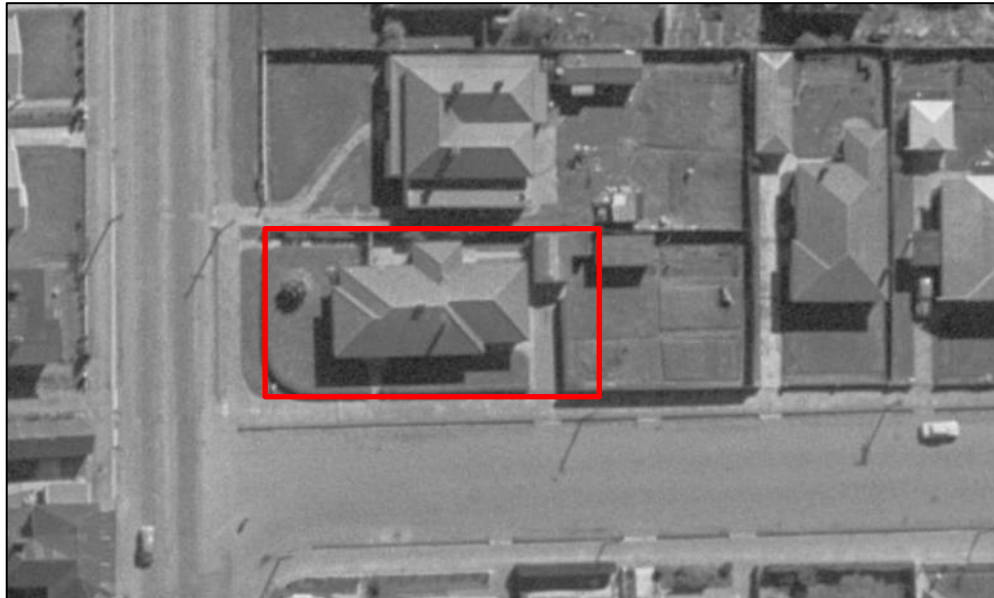


Photo 1D – 1960-1964 aerial imagery shows the carport against the garage.



Photo 1E – 1980-1984 aerial imagery shows the second garage (carport permitted to be enclosed in 1978).



Photo 1F – 2010-2014 first (clear) aerial imagery of the conservatory at 427 Armagh Street.



Photo 1G – 2015-2019 aerial imagery shows the chimney has been removed down to roof level.

**Photo Set 2: External Elevations.**



Photo 2A – South elevation (street facing).



Photo 2B – East elevation.



Photo 2C – Northeast elevation.

Photo Set 3: Foundations.



Photo 3A –350mm Perimeter Foundation embedment depth along the west elevation.



Photo 3B – Foundation crack at vent along the east elevation.



Photo 3C – Plaster and foundation cracks along the north elevation



Photo 3D – No reinforcing was detected in the perimeter foundation wall.



Photo 3E – Separation of the concrete beam above the cladding panel and cracking through the top brick. New mortar suggest recent cladding settlement cracks repairs along the east elevation.



Photo 3F –Separation at the corner joints of the precast concrete beam above the veneer panels at the exterior north east corner of the kitchen.

Photo Set 4: Floors & Fixtures.



Photo 4A –Kitchen floors , ceilings and built in benchtops all fall to the north.



Photo 4B Kitchen bench along the eastern wall falling to the north by 9mm/m , following the floor and ceilings.



Photo 4C – Porch area used as storage.



Photo 4D –Minor separation between the timber trim and the concrete lintel above the porch.



Photo 4E –Minor wall lining damage above the lounge door indication of foundation settlement and racking of the internal wall framing.

Photo Set 6: Roof Observations.



Photo 6A – Unrestrained Concrete water tank in the roof space .



Photo 6B – Partition wall is partly constructed from poured in situ concrete above the ceiling line. Concrete pour joints ( cold joints) can be seen.



Photo 6C – Roof plane sagging towards the middle due to inadequate roof framing underpurlin support .



Photo 6D – Newer masonry block wall ( Partition wall extension) above the Laundry extending to the rooftiles constructed circa 1987.

Photo Set 7: Garage Observations



Photo 7A – South elevation of adjoining garages.



Photo 7B – Garage was full of storage at the time of the assessment. Door head was measured to be level over sloping concrete slab.



Photo 7C –Garage east elevation . Cladding is undamaged,. No stormwater guttering has been fitted.



Photo 7D – North Elevation. Cladding sheet need to be refixed.



# Appendix B

## Structural Survey Drawings

| SHEET | DESCRIPTION        | SCALE      | VERSION |
|-------|--------------------|------------|---------|
| SK1   | FLOOR LEVELS       | 1:100 / A3 | 1       |
| SK2   | CONTOURS PLAN      | 1:100 / A3 | 1       |
| SK3   | VERTICALITIES PLAN | 1:100 / A3 | 1       |
| SK4   | SUBFLOOR PLAN      | 1:100 / A3 | 1       |

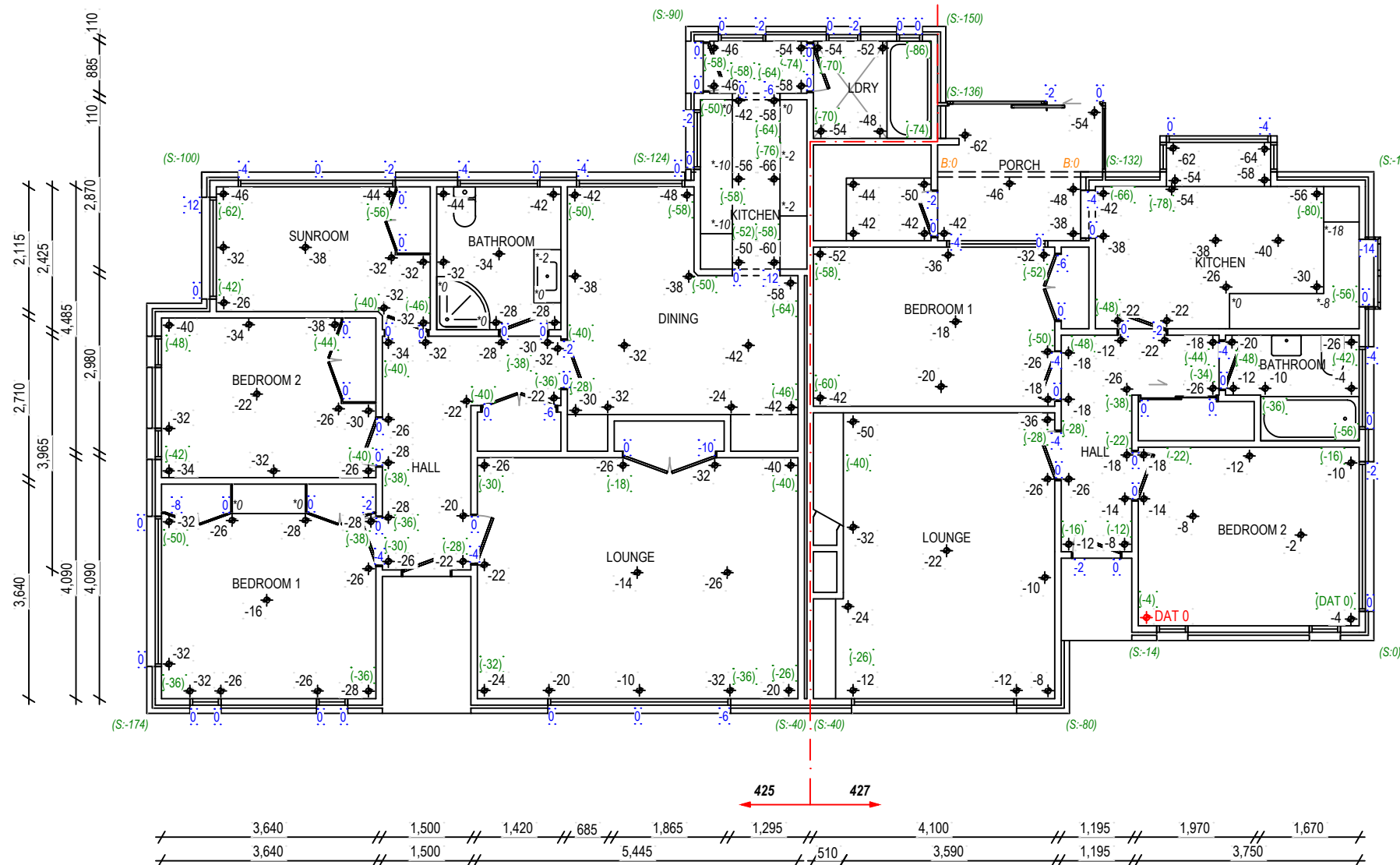
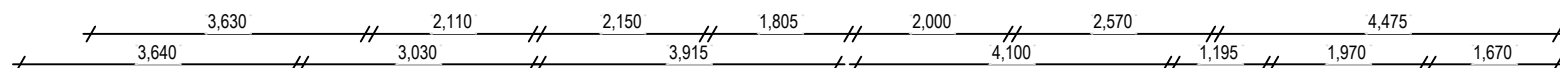
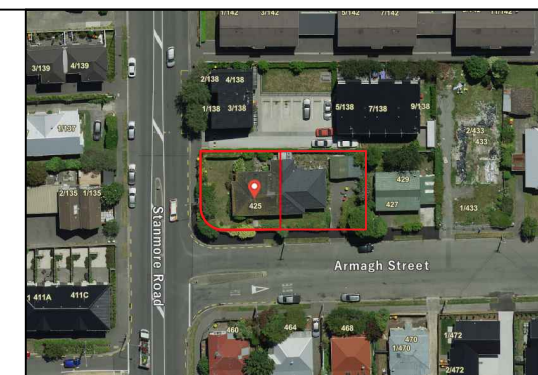


Figure 1 shows a plan view of a building layout. The layout consists of two main rooms: a GARAGE on the left and a DAT 0 room on the right. The GARAGE room has a width of 3,500 units and a depth of 2,875 units. The DAT 0 room has a width of 2,875 units and a depth of 2,875 units. The corner points of the GARAGE room are labeled as follows: -86 (top-left), -94 (top-right), -88 (top-right), -92 (bottom-left), -84 (bottom-left), -94 (bottom-right), -100 (bottom-left), and -94 (bottom-right). The corner points of the DAT 0 room are labeled as follows: -14 (top-left), -44 (top-left), -30 (top-right), -108 (bottom-left), and -50 (bottom-right). A red arrow points to the DAT 0 label.



**KEY:**

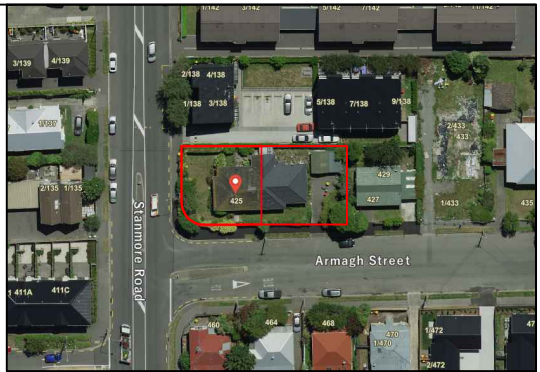
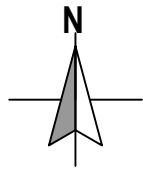
- NOTES:**

- MEASUREMENTS SHOWN ARE IN mm UNLESS STATED OTHERWISE
- LEVELS RECORDED WITH A ZIP LEVEL PRO-2000
- PLANS TO BE PRINTED IN FULL COLOUR



ADDRESS:  
425 & 427 ARMAGH STREET, LINWOOD,  
CHRISTCHURCH 8011

|             |            |
|-------------|------------|
| DATE        | 26/02/2025 |
| DRAWING NO. | SK1        |



## LOCATION PLAN

SCALE: NTS

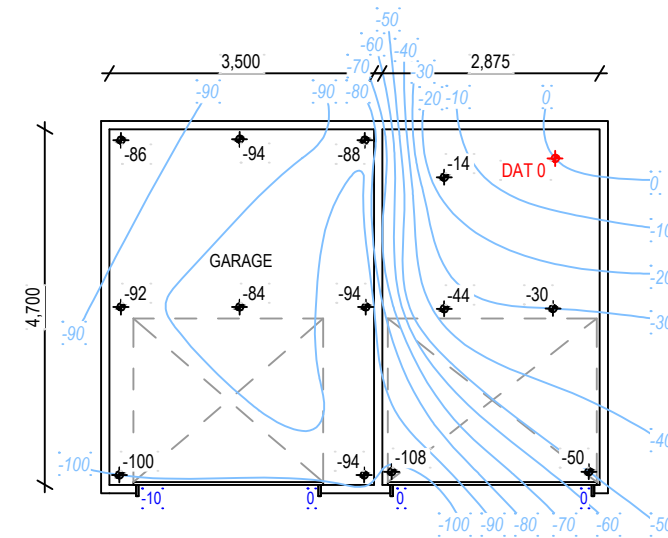


## KEY:

- $\diamond$  FLOOR LEVELS (ADJUSTMENTS FOR FLOOR COVERINGS HAVE BEEN MADE)
- (-X) CEILING LEVELS
- (S-X) SOFFIT LEVELS
- B-X LEVEL TO BASE OF BEAM
- X LEVELS TAKEN AT DOOR HEADS AND WINDOW SILLS
- \*X LEVEL TAKEN TO TOP OF UNIT

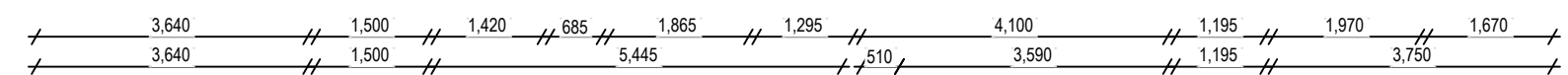
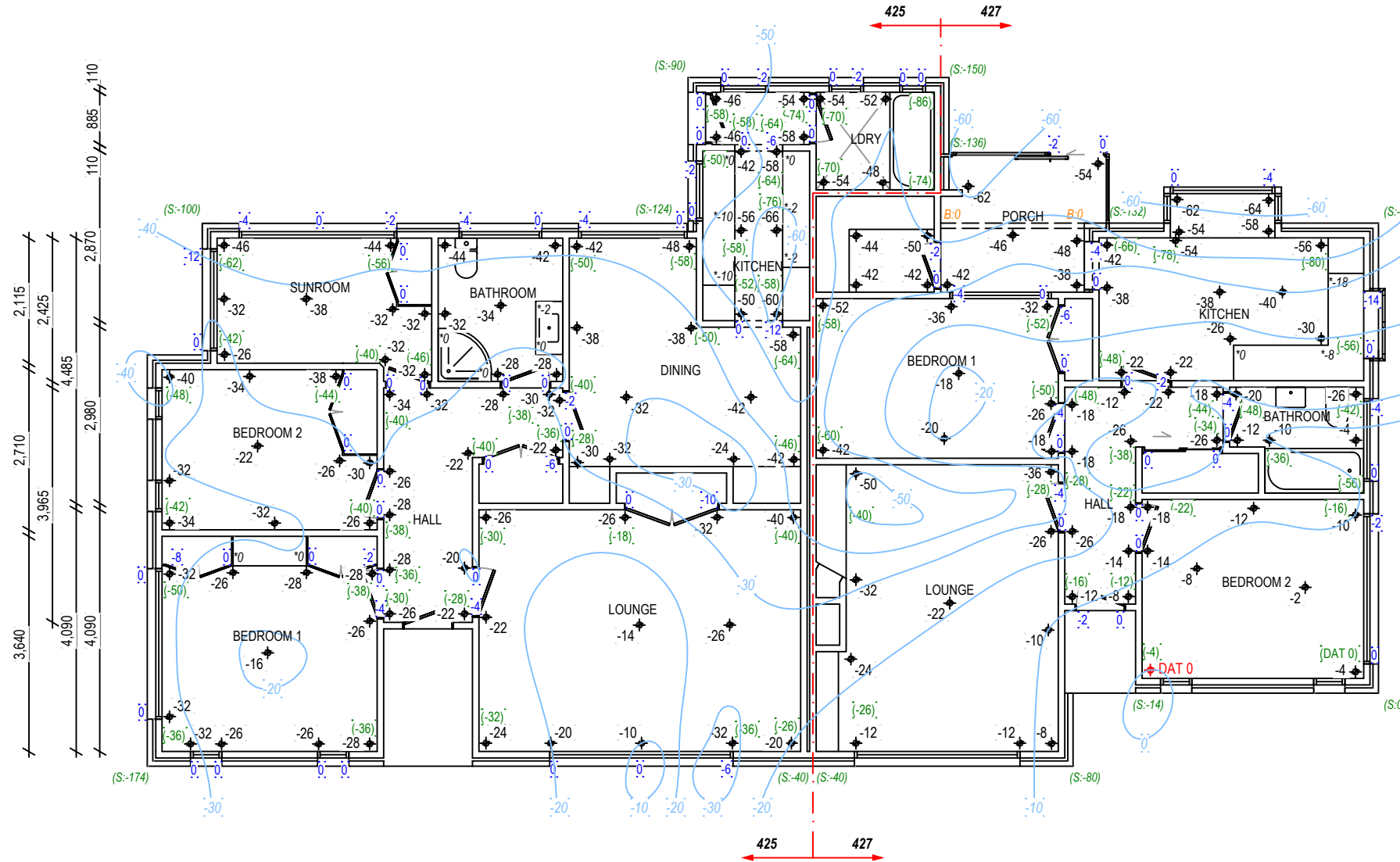
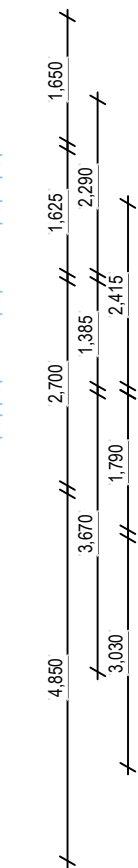
## NOTES:

- MEASUREMENTS SHOWN ARE IN mm UNLESS STATED OTHERWISE
- LEVELS RECORDED WITH A ZIP LEVEL PRO-2000
- PLANS TO BE PRINTED IN FULL COLOUR



## GARAGE CONTOURS PLAN

SCALE 1:100



## DWELLING CONTOURS PLAN

SCALE 1:100



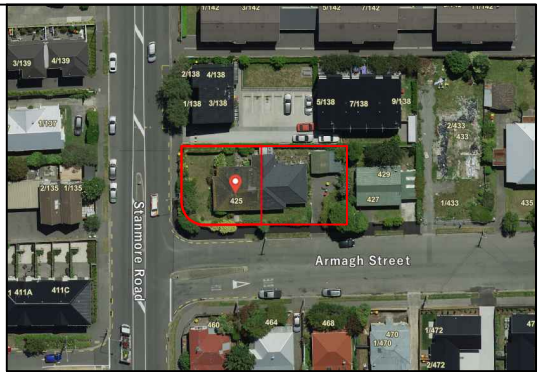
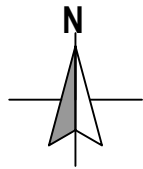
SHEET TITLE  
CONTOURS PLAN

ADDRESS:  
425 & 427 ARMAGH STREET, LINWOOD,  
CHRISTCHURCH 8011

SCALE @ A3  
1:100

DATE  
26/02/2025

DRAWING NO.  
SK2



## LOCATION PLAN

SCALE: NTS

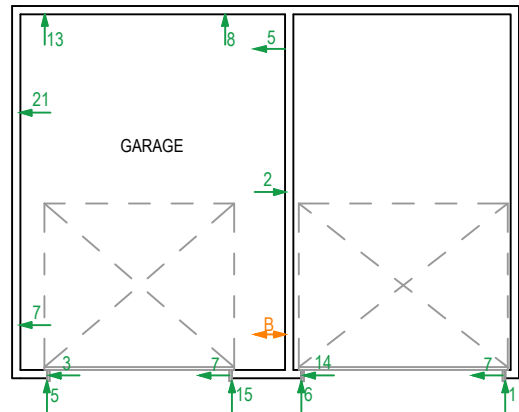


### KEY:

- DISPLACEMENT AND DIRECTION (mm)
- PLUMB
- BOWED

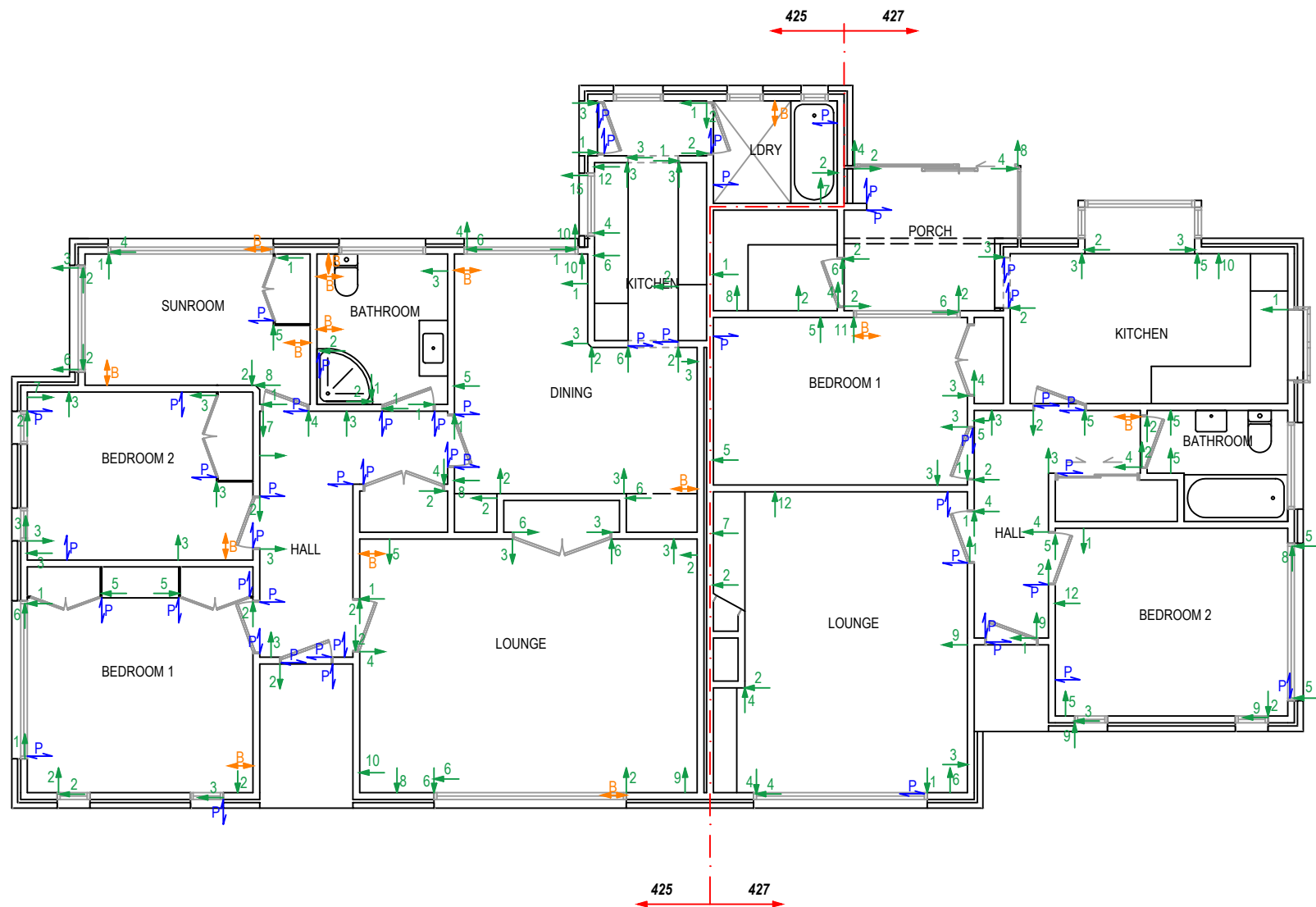
### NOTES:

- MEASUREMENTS SHOWN ARE IN mm UNLESS STATED OTHERWISE
- LEVELS RECORDED WITH A BOSCH DNM 120L DIGITAL LEVEL
- PLANS TO BE PRINTED IN FULL COLOUR



## GARAGE VERTICALITIES PLAN

SCALE 1:100



## DWELLING VERTICALITIES PLAN

SCALE 1:100



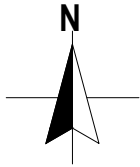
SHEET TITLE  
VERTICALITIES PLAN

ADDRESS:  
425 & 427 ARMAGH STREET, LINWOOD,  
CHRISTCHURCH 8011

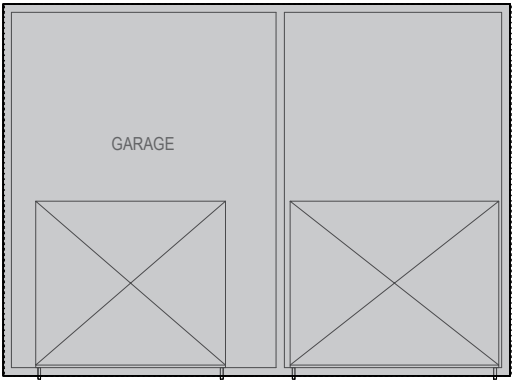
SCALE @ A3  
1:100

DATE  
26/02/2025

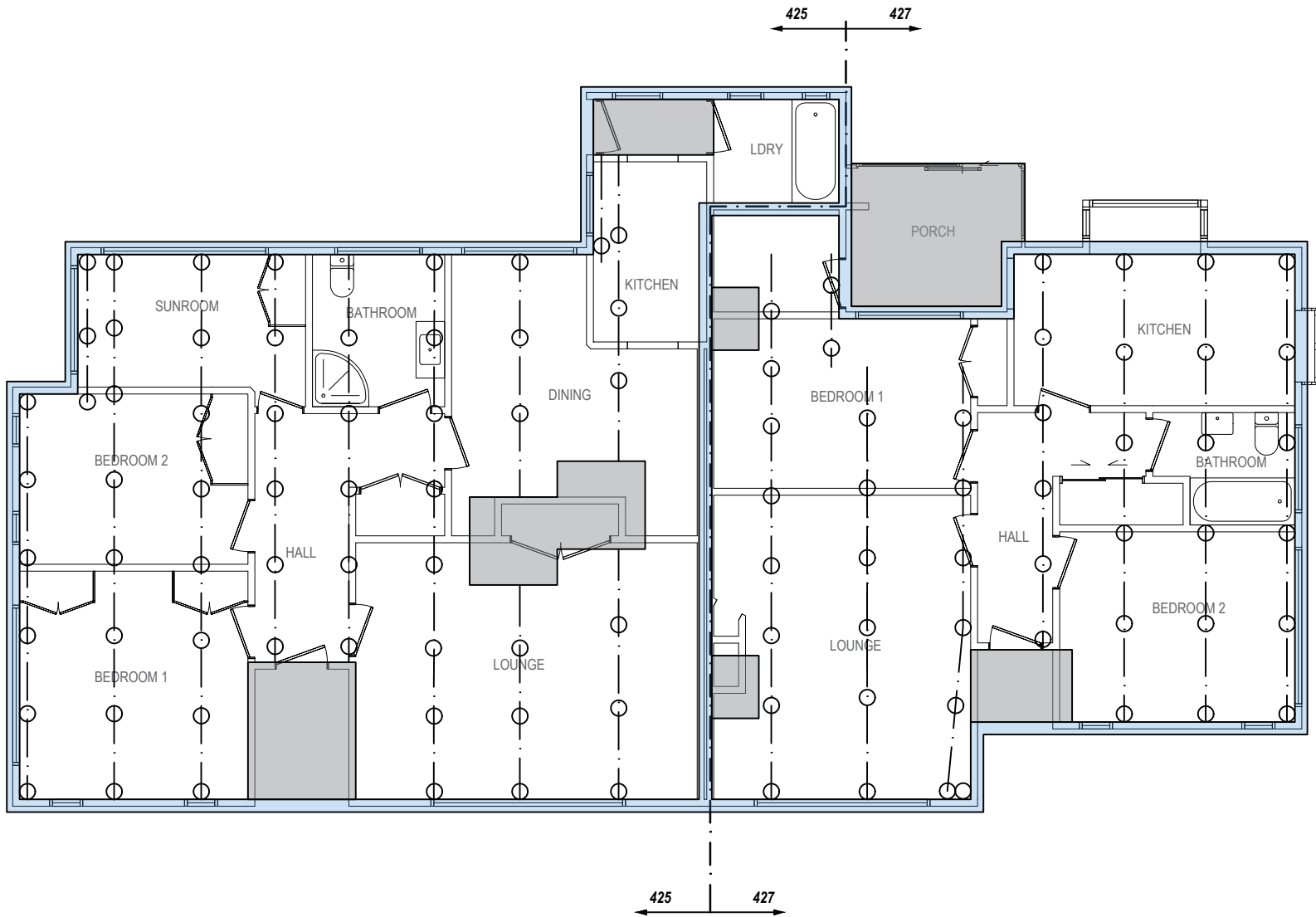
DRAWING NO.  
SK3



**LOCATION PLAN**  
SCALE: NTS



**GARAGE FOUNDATION PLAN**  
SCALE 1:100



**DWELLING FOUNDATION PLAN**  
SCALE 1:100

**KEY:**

-  CONCRETE PERIMETER WALL FOUNDATION
-  CONCRETE SLAB
-  BEARER LINE
-  PRECAST CONCRETE PILE



SHEET TITLE  
FOUNDATION PLAN

ADDRESS:  
425 & 427 ARMAGH STREET, LINWOOD,  
CHRISTCHURCH 8011

SCALE @ A3  
1:100

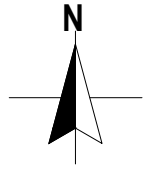
DATE  
26/02/2025

DRAWING NO.  
SK4



# Appendix C

## Conceptual Repair Plan

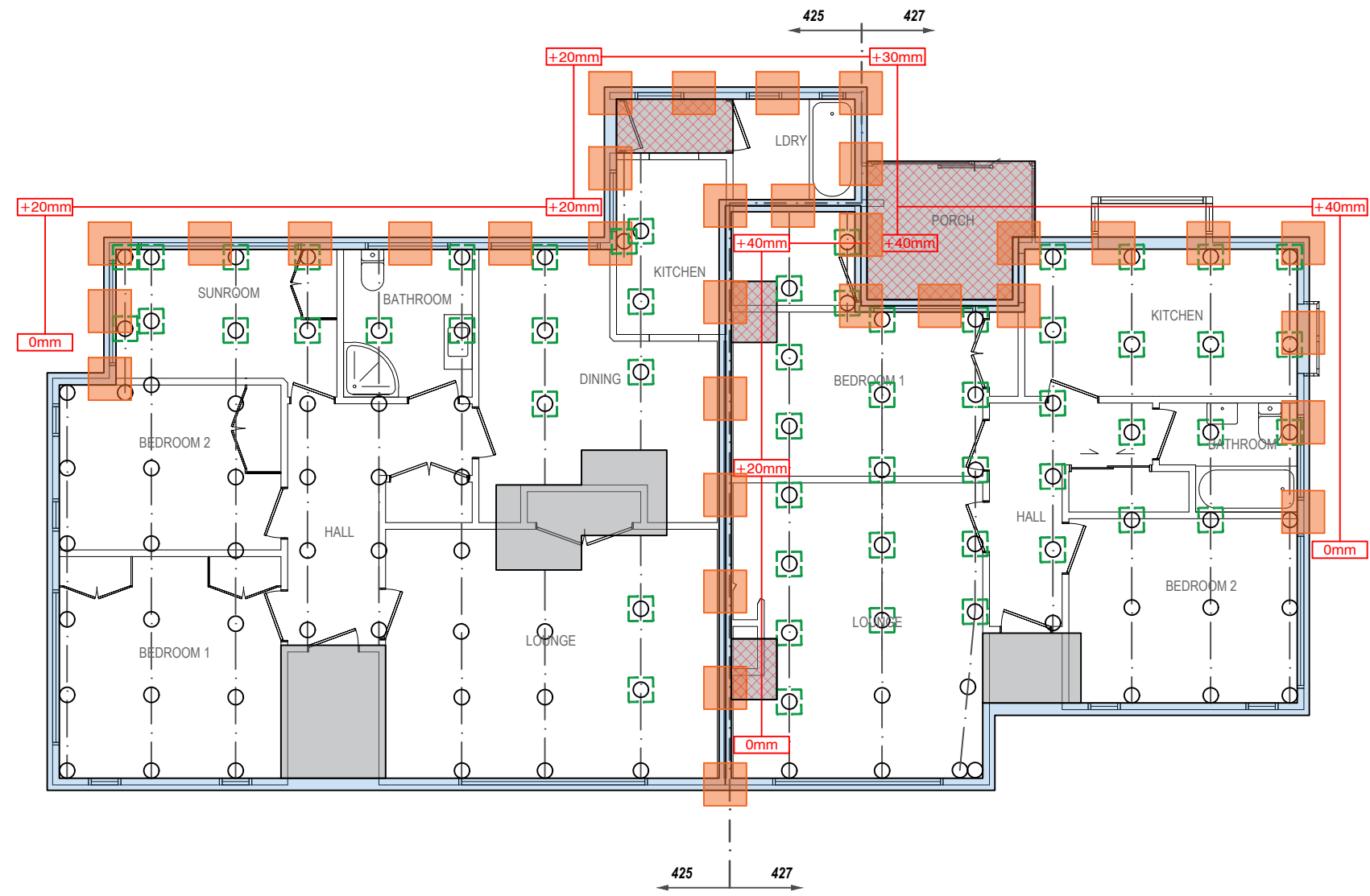


**CONCEPTUAL REPAIRS:**

-  UNDERPIN THE PERIMETER FOUNDATION BY **+XXmm** OFF CONCRETE PADS @ 1.5 CENTERS MAX. UNDERPINS TO BE 800mm DEEP AND 600mm SQUARE SUBJECT TO GEOTECHNICAL ENGINEERING APPROVAL AT THE DESIGN STAGE.
-  RELEVEL THE INTERNAL SUSPENDED TIMBER FLOORS BY PACKING BETWEEN THE PILES & BEARERS.
-  REMOVE SLABS. REPLACE THE PORCH SLAB IN 427 ARMAGH STREET AFTER THE FOUNDATION LIFT IS COMPLETE.



**LOCATION PLAN**  
SCALE: NTS



- KEY:**
-  CONCRETE PERIMETER WALL FOUNDATION
  -  CONCRETE SLAB
  -  BEARER LINE
  -  PRECAST CONCRETE PILE

**CONCEPTUAL REPAIR PLAN**  
SCALE 1:100



|                                                                    |                     |
|--------------------------------------------------------------------|---------------------|
| SHEET TITLE<br>CONCEPTUAL REPAIR PLAN                              | SCALE @ A3<br>1:100 |
|                                                                    | DATE<br>26/02/2025  |
| ADDRESS:<br>425 & 427 ARMAGH STREET, LINWOOD,<br>CHRISTCHURCH 8011 | DRAWING NO.<br>SK5  |



## Appendix D

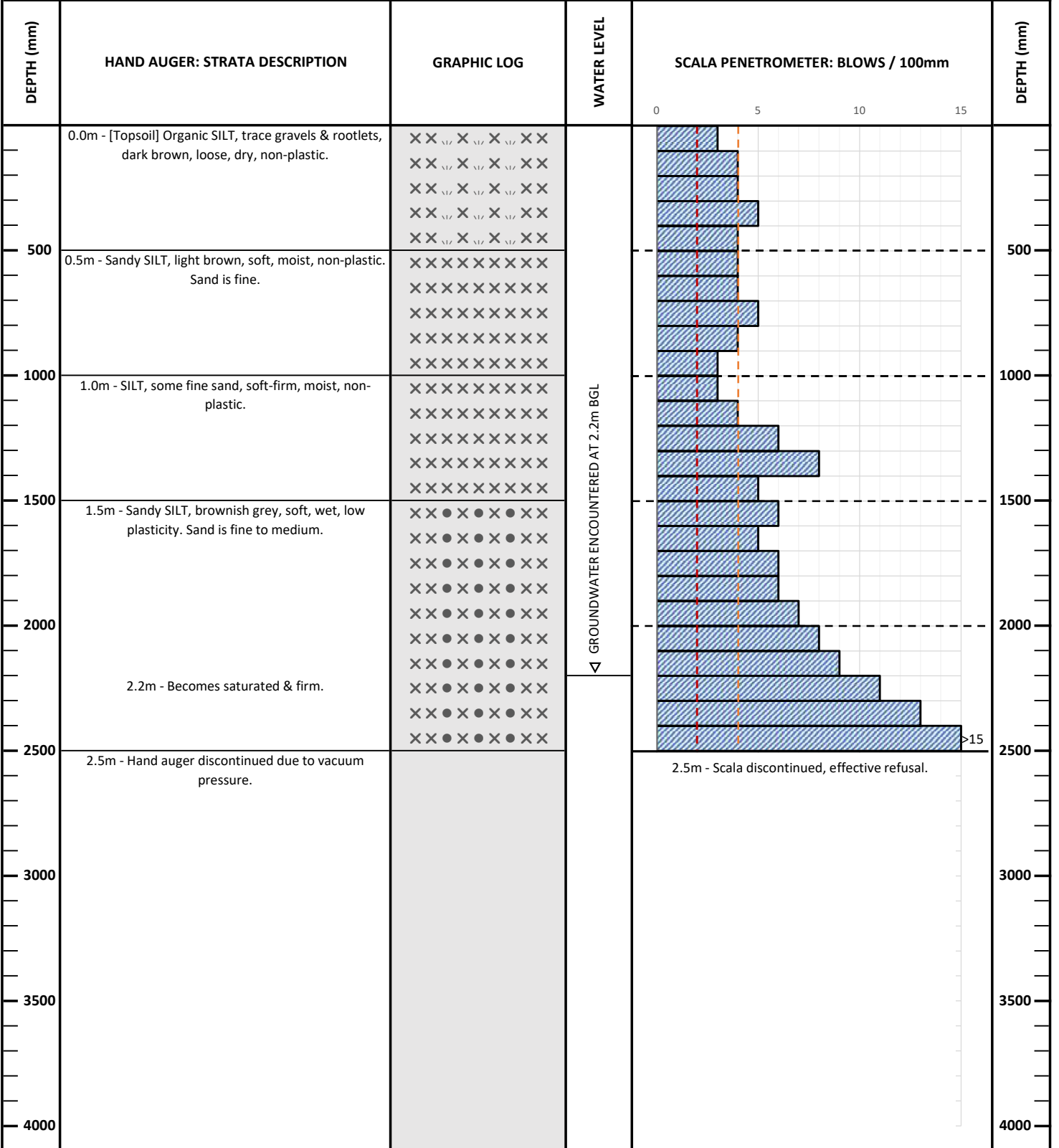
### Shallow Geotechnical Investigations



Test locations are approximate (scaled and aligned using aerial imagery)  
Aerial imagery obtained from [Canterburymaps.govt.nz](https://canterburymaps.govt.nz)

- - - MBIE (2012): 200kPa geotechnical Ultimate Bearing Capacity
- - - >300kPa UBC (indicative bearing capacity is based on MJ Stockwell's "Determination of Allowable Bearing Capacity Under Small Structures" and converted to an uncorrected Ultimate Bearing Capacity (UBC))

|                |                                                     |                         |                          |
|----------------|-----------------------------------------------------|-------------------------|--------------------------|
| PROJECT:       | 425 & 427 Armagh Street, Linwood, Christchurch 8011 | TESTED / SUPERVISED BY: | J. Gill & M.Christie     |
| CLIENT:        | Natural Hazards Commission Toka Tū Ake              | DATE:                   | 29/01/2025               |
| TEST LOCATION: | Refer to Attached Site Layout Plan S2.0             | CHECKED BY:             | J McCloskey (03/03/2025) |



Soil classification has been carried out in line with 'Field Descriptions of Soils and Rock' by NZ Geotechnical Society Dec. 2005. Scala penetrometer testing has been performed in accordance with NZS4402 Test 6.5.2:1988 - Determination of the Penetration Resistance of a Soil. Shallow investigations give an indication of the ground condition at the location of the tests only. While they are representative of the conditions at the site, they do not identify variations in the ground away from the test location

- MBIE (2012): 200kPa geotechnical Ultimate Bearing Capacity
- - - >300kPa UBC (indicative bearing capacity is based on MJ Stockwell's "Determination of Allowable Bearing Capacity Under Small Structures" and converted to an uncorrected Ultimate Bearing Capacity (UBC))



# Appendix E

## Relevant Third-Party Documents

### Contents:

|    | DOCUMENT TITLE                  | SOURCE                    | DATE       |
|----|---------------------------------|---------------------------|------------|
| 1. | Relevant Property File Extracts | Christchurch City Council | Various    |
| 2. | Underfloor Inspection           | Cavity Critter            | 20/02/2025 |



# Appendix E

Christchurch City Council Property File Extracts

# CITY OF CHRISTCHURCH

CITY ENGINEER'S DEPARTMENT

P.O. BOX 237, CHRISTCHURCH, NEW ZEALAND

Mr Bergh,  
425 Armagh Street,  
CHRISTCHURCH



8 September 1977

re Building Application No. 702

BU/1/2

B7/7

Mr O'Malley

Dear Sir/Madam, your application for permission to

enclose carport to form garage at 425 Armagh Street

has now been approved. Before work is commenced the undermentioned fees must be paid and a building permit uplifted from this office.

|                         |             |
|-------------------------|-------------|
| Vehicle Crossing        | \$          |
| Builders Water Supply   |             |
| Water Connection Charge |             |
| Building Permit Fee     | 3.00        |
| Building Research Levy  |             |
| Street Damage Deposit   |             |
|                         | <u>3.00</u> |

The Building Permit Application is approved subject to the following conditions:

1. The stormwater being connected to the existing disposal system and piped to the street side channel.

If the permit is not uplifted within three months of this date the application will be cancelled and the plans disposed of.

Yours faithfully

for Deputy General Manager and City Engineer

c.c. Mr Hart,  
425 Armagh Street,  
CHRISTCHURCH

LIN 3

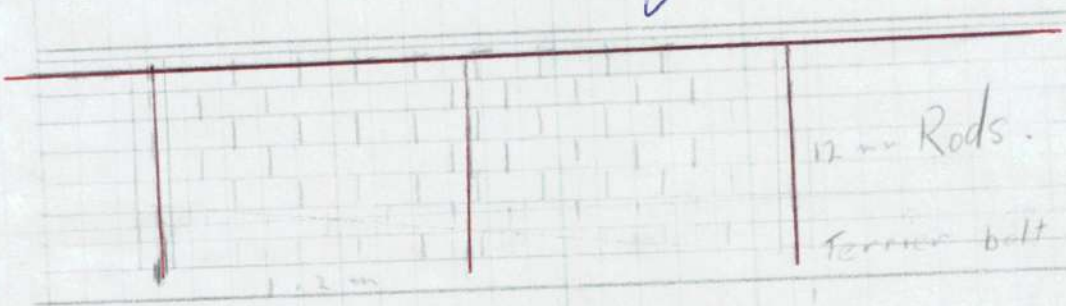
425 ARMAGH ST  
ENCLOSE CARPORT

*Run*

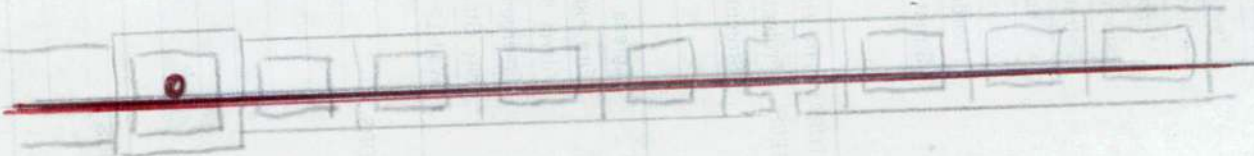
LIN

77-1580

CHRISTCHURCH CITY COUNCIL  
Approved Subject to the By-Laws  
21 SEP 1978  
*[Signature]*  
For City Engineer



2 4 m



|                                 |                                |  |  |
|---------------------------------|--------------------------------|--|--|
| BUILDING<br>INSPECTORS          | Fire Zone and Resistance       |  |  |
|                                 | Siting (By laws)               |  |  |
|                                 | Light and Ventilation          |  |  |
|                                 | Room Sizes and Stud Ht.        |  |  |
|                                 | Heating and Storage            |  |  |
|                                 | Toilet and Laundry Accommod.   |  |  |
|                                 | Mezzanine Floors               |  |  |
|                                 | Storm Water and Section Levels |  |  |
|                                 | Entrance Levels                |  |  |
|                                 | Projections over Street        |  |  |
|                                 | Verandahs                      |  |  |
|                                 | Hoardings                      |  |  |
|                                 | Street Numbers                 |  |  |
| STRUCTURAL<br>ENGINEERS         | Fire Resistance Requ.          |  |  |
|                                 | Projections over Street        |  |  |
|                                 | Structural Stability           |  |  |
|                                 |                                |  |  |
| EGRESS<br>OFFICER               | Egress and Exit Signs          |  |  |
|                                 | Fire Fighting Equipment        |  |  |
|                                 | Alarm Systems                  |  |  |
|                                 | Emergency Lighting             |  |  |
|                                 | Fire Stops                     |  |  |
| HEALTH<br>NSPECTORS             | Wall Linings                   |  |  |
|                                 |                                |  |  |
|                                 |                                |  |  |
|                                 |                                |  |  |
|                                 |                                |  |  |
|                                 |                                |  |  |
|                                 |                                |  |  |
| DANGEROUS<br>GOODS<br>NSPECTORS |                                |  |  |
|                                 |                                |  |  |
|                                 |                                |  |  |
| WATER<br>NSPECTOR               |                                |  |  |
|                                 |                                |  |  |

#25 Armagh St

12 mm Rod

12 mm Rod 1-2

Shamrock Road

Armagh Street

Site of Proposed Block fence  
to be built on existing concrete wall.

CHRISTCHURCH CITY COUNCIL  
Approved Subject to the By-Laws

21 SEP 1978

For City Engineer

Fence 6" Block.  
8" Block Columns  
7 Courses High  
Tension Rods 1/2" dia  
Top Courses -  
bond beam with  
1/2" rod concrete filled

CCC 702.

3/48/33

Mr M. Hart.

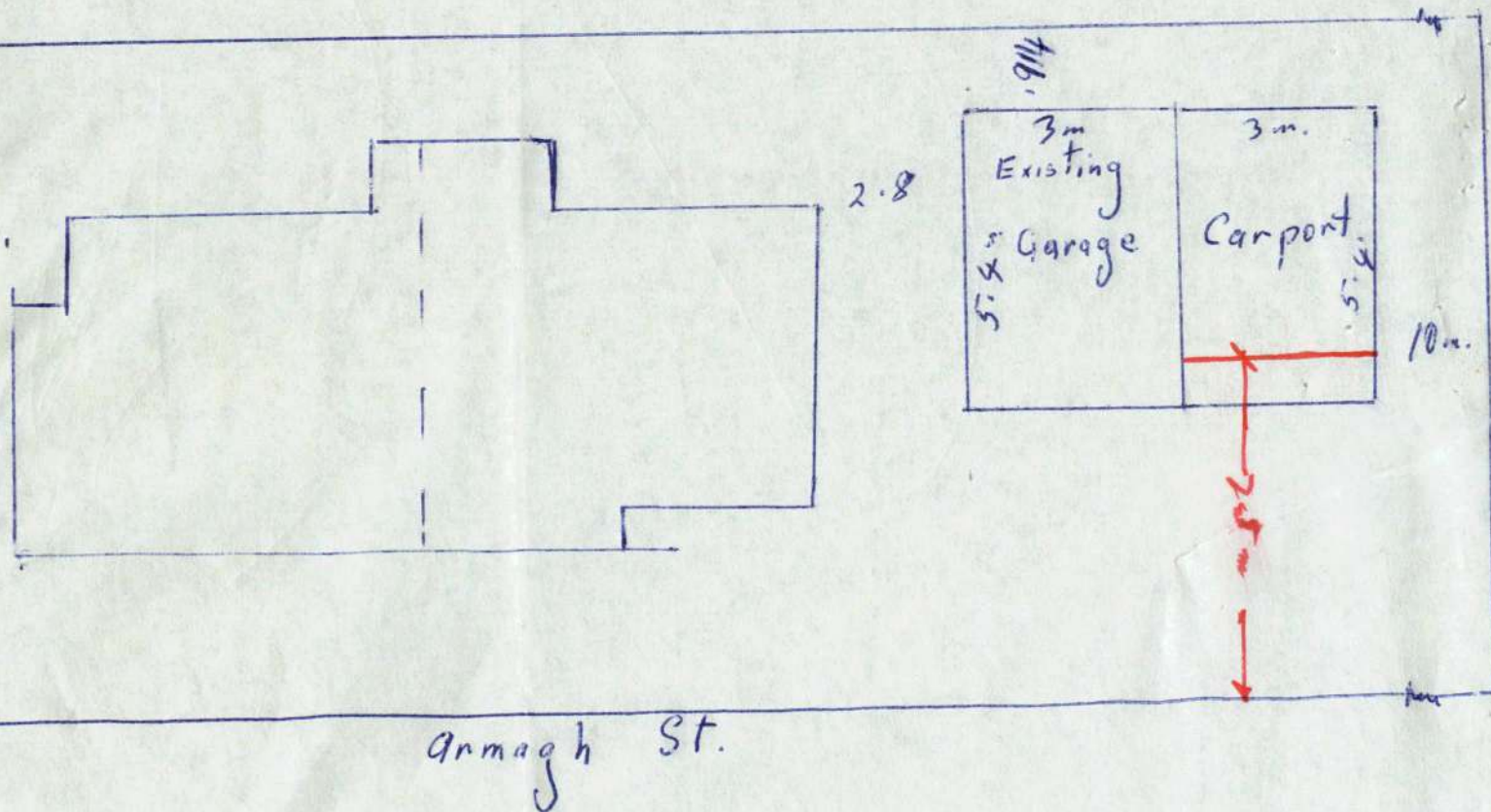
425 Armagh St.

Enclose existing carport as  
garage.

Sewer not involved on this plan.

|                    |               |
|--------------------|---------------|
| CHRISTCHURCH       |               |
| PLAN No. <u>43</u> |               |
| LETTER REF. _____  |               |
| J.H.S.             | <u>96</u>     |
| INSP.              | <u>3/5/77</u> |
| DATE               | _____         |
| DRAINAGE BOARD     |               |

CHRISTCHURCH CITY COUNCIL  
Approved Subject to the By-Laws  
- 8 SEP 1977  
For City Engineer



LIN-77-1580

# Details of Carport

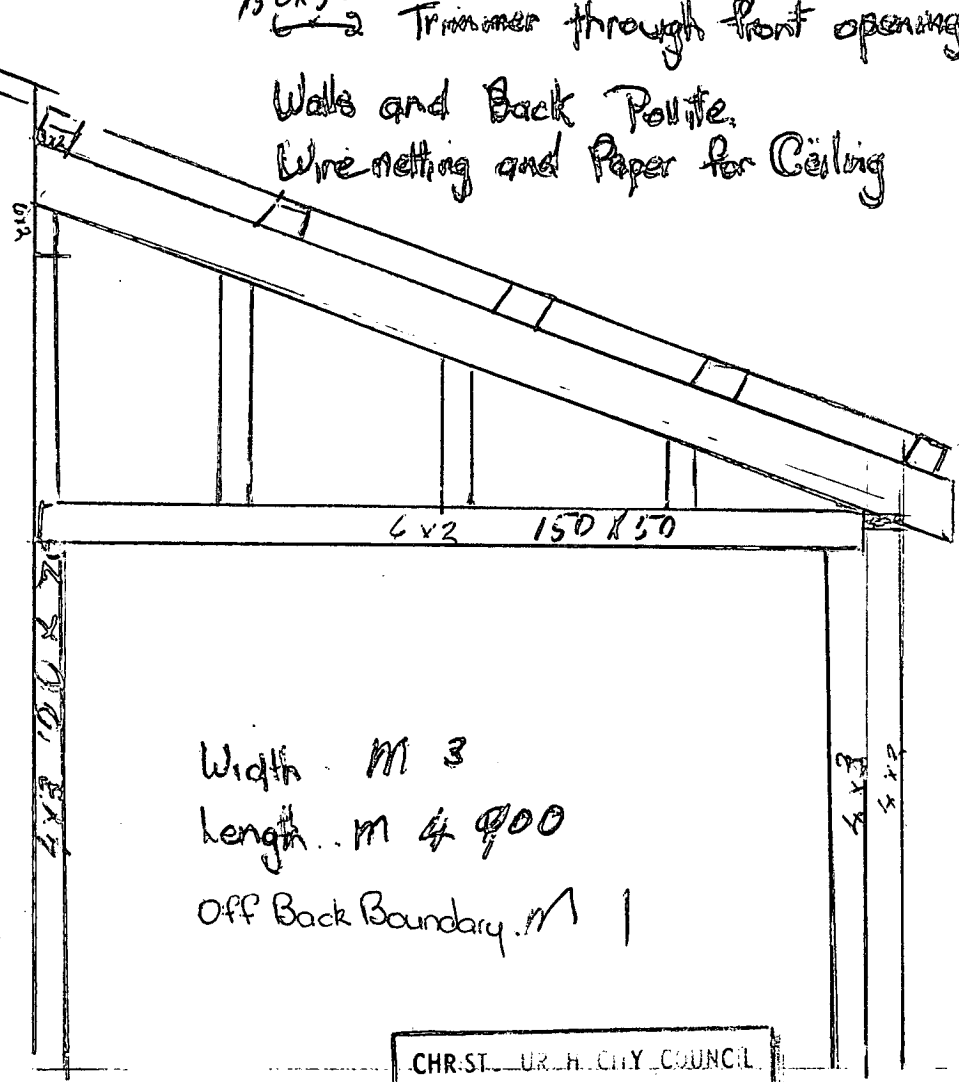
425 Armagh St.

- 100x50  
4x2 Plates
- 125x50  
5x2 Rafters
- 75x50  
3x2 Purlins
- 150x50  
6x2 Trimmer through front opening

Studs Setting 400 - Dwangs at 600.  
Settings 750.  
Setting 750.

Walls and Back Pointe.  
Wire netting and Paper for Ceiling

Existing Garage.



Width m 3  
Length m 4 @ 00  
Off Back Boundary m 1

CHRISTCHURCH CITY COUNCIL  
Approved Subject to the By-Laws  
8 SEP 1977  
For City Engineer

S P E C I F I C A T I O N

FOR

Garbage

AT

1425 Armagh St.

OWNER

M. R. Hart

FOUNDATIONS

Concrete

CLASS OF TIMBER

SPACING

Sleepers

/

Floor Joists

/

Flooring

Concrete

Plates

4X2

Studs

4X2

18"

Bracings

4X2

2 per Wall

Rafters

4X2

3 ft.

Purlins

4X2

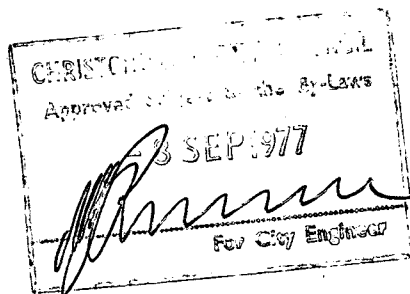
2 ft.

Wall Covering

Plite

Roof Covering

Iron



| DEPT.                            | APPLICATION NO.                | PERMIT NO.                    | Initial |
|----------------------------------|--------------------------------|-------------------------------|---------|
| TOWN<br>PLANNING                 | Zoning                         | 702                           | R/2.    |
|                                  | Siting (ordinances)            | Dis Cont Bldg. Check dwelling |         |
|                                  | Coverage                       | or flat                       |         |
|                                  | Density                        |                               |         |
|                                  | Height                         |                               |         |
|                                  | Outbuildings (height area)     |                               |         |
|                                  | Signs                          |                               |         |
|                                  |                                |                               |         |
| SURVEYOR                         | Building Restrictions          |                               |         |
|                                  | C.D.B. Widening                |                               |         |
|                                  | C.D.B. Clearance               |                               |         |
|                                  | Cash in lieu of Reserve        |                               |         |
|                                  | D.P. or Title Amalgamation     |                               |         |
|                                  | Unit Title                     |                               |         |
| TRAFFIC<br>ENGINEERS             | Access                         |                               |         |
|                                  | Off Street Loading             |                               |         |
|                                  | Off Street Parking             |                               |         |
|                                  | Turning Space                  |                               |         |
|                                  | Motorway                       |                               |         |
|                                  | Street Works                   |                               |         |
|                                  |                                |                               |         |
| STREET-<br>WORKS                 | Vehicle Barriers               |                               |         |
|                                  | Sealing of Areas               |                               |         |
|                                  | Location of Gully Traps etc.   |                               |         |
|                                  | Culverts and Accesses          |                               |         |
|                                  | Drainage                       |                               |         |
|                                  |                                |                               |         |
| BUILDING<br>INSPECTORS           | Fire Zone and Resistance       |                               |         |
|                                  | Siting (By laws)               |                               |         |
|                                  | Light and Ventilation          |                               |         |
|                                  | Room Sizes and Stud Ht.        |                               |         |
|                                  | Heating and Storage            |                               |         |
|                                  | Toilet and Laundry Accommod.   |                               |         |
|                                  | Mezzanine Floors               |                               |         |
|                                  | Storm Water and Section Levels |                               |         |
|                                  | Entrance Levels                |                               |         |
|                                  | Projections over Street        |                               |         |
|                                  | Verandahs                      |                               |         |
|                                  | Hoardings                      |                               |         |
|                                  | Street Numbers                 |                               |         |
|                                  | Insulation                     |                               |         |
|                                  | Access for Handicapped         |                               |         |
| Unit Title                       |                                |                               |         |
| STRUCTURAL<br>ENGINEERS          | Fire Resistance Requ.          |                               |         |
|                                  | Projections over Street        |                               |         |
|                                  | Structural Stability           |                               |         |
|                                  |                                |                               |         |
| EGRESS<br>OFFICER                | Egress and Exit Signs          |                               |         |
|                                  | Fire Fighting Equipment        |                               |         |
|                                  | Alarm Systems                  |                               |         |
|                                  | Emergency Lighting             |                               |         |
|                                  | Fire Stops                     |                               |         |
|                                  | Wall Linings                   |                               |         |
| HEALTH<br>INSPECTORS             |                                |                               |         |
|                                  |                                |                               |         |
|                                  |                                |                               |         |
|                                  |                                |                               |         |
| DESIGN<br>OFFICE                 |                                |                               |         |
|                                  |                                |                               |         |
|                                  |                                |                               |         |
| DANGEROUS<br>GOODS<br>INSPECTORS |                                |                               |         |
|                                  |                                |                               |         |
| WATER<br>INSPECTOR               |                                |                               |         |
|                                  |                                |                               |         |

Specis coming.

10/5.  
OK by TE: HQ  
J. H. L. Smith  
Dis...

|                                                                                                         |                                      |  |  |                  |
|---------------------------------------------------------------------------------------------------------|--------------------------------------|--|--|------------------|
| Preliminary comment by District Building Inspector on initial<br>site inspection: Where appropriate     |                                      |  |  | Tick appropriate |
| Front <input type="checkbox"/> Rear <input type="checkbox"/> Corner <input checked="" type="checkbox"/> | APP NO. 6084                         |  |  |                  |
| Street Number OK <input checked="" type="checkbox"/> Check <input type="checkbox"/>                     | ZONE                                 |  |  |                  |
| ROW Access Yes <input type="checkbox"/> No <input type="checkbox"/>                                     | Letter Sent <input type="checkbox"/> |  |  |                  |
| C/T Attached <input type="checkbox"/>                                                                   | Required <input type="checkbox"/>    |  |  |                  |
| Pegging Cert <input type="checkbox"/>                                                                   | Required <input type="checkbox"/>    |  |  |                  |

|       |                     |                 |                    | Commercial       |
|-------|---------------------|-----------------|--------------------|------------------|
| PLANS | Boundary Pegs -     | Yes             | No                 | Entrance level   |
|       | Earthworks Permit - | Yes             | No                 | Projections/Sc   |
|       | Site Levels         | OK              | Low                | Verandahs        |
|       | Ground Conditions - | OK              | Suspect            | Roofdrains       |
|       | Stormwater -        | CDB             | Soak Pit           | Structural Stab. |
|       | Under/channels -    | To site channel | Via existing (Ind) | Drains           |

Subject to.

(1) 2  
(2) 4  
(3) Compliance with the attached  
single story plan will be  
attached to the plans.

To: The City Engineer,  
Christchurch City Council

R/1

Date 11 - 2 - 1985

I/we hereby apply for a Building Permit for the work described below and in accordance with the plans and specifications deposited herewith in duplicate:

EMPLOYER FOR WHOM WORK IS BEING CARRIED OUT

Name: \_\_\_\_\_

Address: \_\_\_\_\_

DESIGNER

Name: Owner

Address: \_\_\_\_\_

SITE AND LEGAL DESCRIPTION *254*  
 Street Address: *425 ARMAGH ST.*  
 Lot No. *66* DP No. *18454*  
 Site Area CT No. \_\_\_\_\_  
 FLOOR AREA (M<sup>2</sup>)  
 New Building: \_\_\_\_\_ Additions: \_\_\_\_\_  
 Estimated Value: *3500* ✓

DESCRIPTION OF WORK AND MAIN PURPOSE OF USE: **Return to**  
*Five walls* **J. D'MALLEY**

**WATER CHARGE**  
  
**Connection**

Signature of Applicant: \_\_\_\_\_  
 Name of Applicant: K. J. Munn

| AN | WM                                  | CDB | TP | TE | SW | STR | EGR | DES | HI | P & R | SUR | GBI | CB1 |
|----|-------------------------------------|-----|----|----|----|-----|-----|-----|----|-------|-----|-----|-----|
| 0  | 17<br>30-75<br>147<br>84<br>(10) 76 | ✓   | ✓  |    |    |     | ✓   | ✓   |    |       |     |     |     |

See Bu/40/254/425

CITY WORKS AND PLANNING DEPARTMENT  
P.O. BOX 237, CHRISTCHURCH, NEW ZEALAND

K I Milne  
47 Ruru Road  
CHRISTCHURCH  
re Building Application No. 4084 BU/40/254425  
Mr R O'Nalley

Dear Sir/Madam, your application for permission to  
Erect fire walls for flats at 425 Armagh Street  
has now been approved. Before work is commenced the undermentioned fees must be paid  
and a building permit uplifted from this office.

|                                       |       |
|---------------------------------------|-------|
| Water Connection Charge               | \$    |
| Subdivision Fee                       |       |
| Building Permit Fee                   | 37.40 |
| Building Research Levy                |       |
| Vehicle Crossing                      |       |
| Drainage Permit/ Footpath Opening Fee |       |

Total GST Inclusive..... 37,40

The Building Permit Application is approved subject to the following amendments to your proposal.

1. The foundation being taken down to an approved solid bearing.
2. Compliance with the amendments shown on the plans.
3. Compliance with the ~~attached~~ single storey fire wall details attached to

86-3910

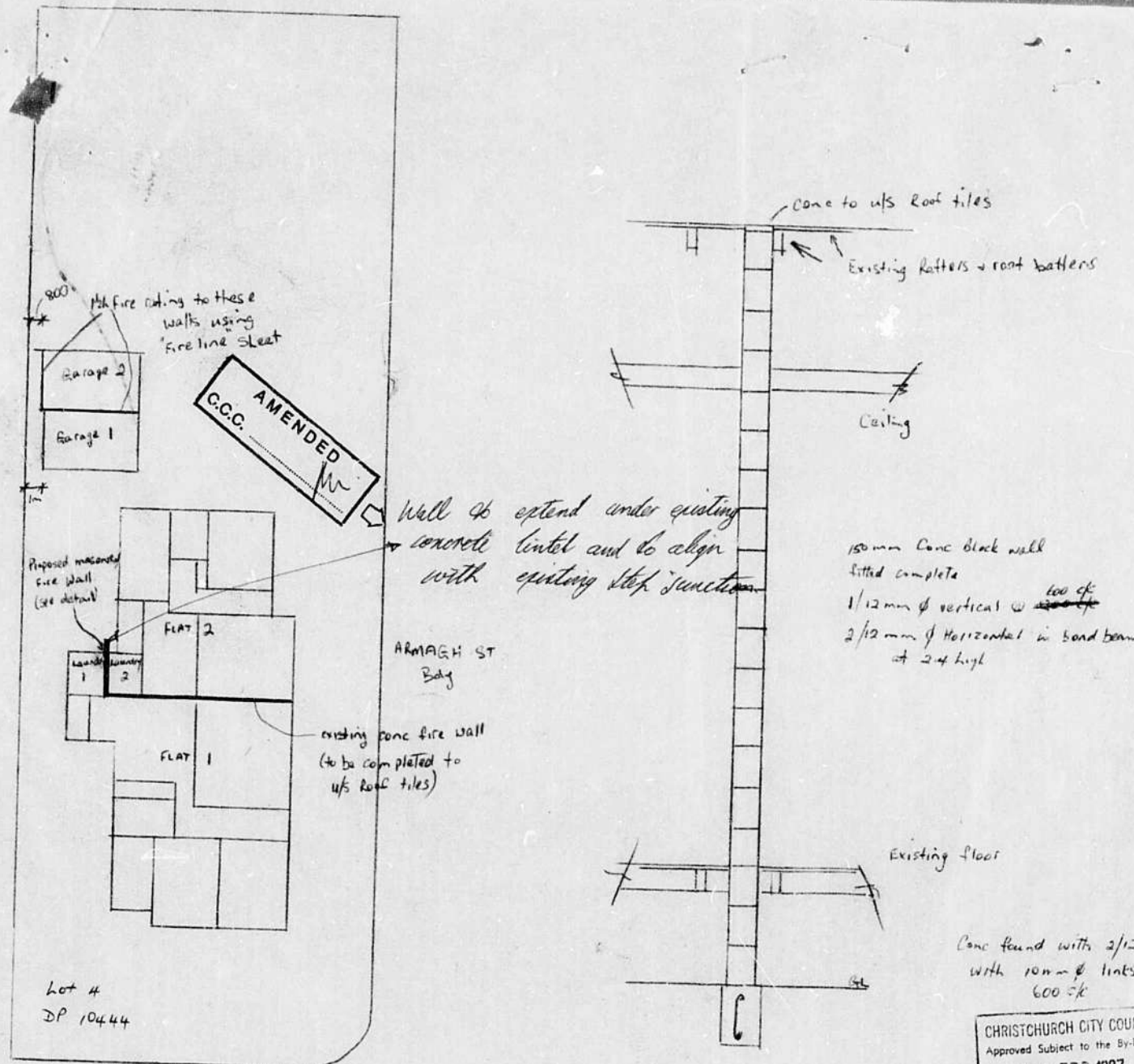
If the permit is not uplifted within three months of this date the application will be cancelled and the plans disposed of.

cc M R & J M Hart  
425 Armagh Street  
CHRISTCHURCH

PWA Ltd 3471

CCC 4084

MIR HART  
425 ARMAGH ST  
ERECT FIRE WALLS



Proposed alterations to flats & garages to obtain separate titles at 42.5 ARMAH ST. for Mr. & Mrs. M. Hart

**BUILDING PERMIT**      **CHRISTCHURCH CITY COUNCIL**

|      |      |              |
|------|------|--------------|
| LIN  | RI   | 3910         |
| AREA | ZONE | CONSERVATION |

The building for which this permit is issued is to be commenced within 12 months of the date of issue of this permit.

| When Issued                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 12                | months of date of this permit. | A4064        | BU/40/254/245 |                  |  |         |  |             |      |                |      |           |         |                 |                   |                 |              |  |  |              |  |              |  |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|--------------------------------|--------------|---------------|------------------|--|---------|--|-------------|------|----------------|------|-----------|---------|-----------------|-------------------|-----------------|--------------|--|--|--------------|--|--------------|--|
| DESIGNER:                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | <b>Owner</b>      |                                |              |               |                  |  |         |  |             |      |                |      |           |         |                 |                   |                 |              |  |  |              |  |              |  |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | NAME              | ADDRESS                        |              |               |                  |  |         |  |             |      |                |      |           |         |                 |                   |                 |              |  |  |              |  |              |  |
| <table border="1"> <thead> <tr> <th colspan="2">OWNER/PROPRIETOR</th> <th colspan="2">BUILDER</th> <th>Date Issued</th> </tr> </thead> <tbody> <tr> <td>Name</td> <td>M R &amp; J M Hart</td> <td>Name</td> <td>K I Milne</td> <td>6/3/87.</td> </tr> <tr> <td>Mailing Address</td> <td>425 Armath Street</td> <td>Mailing Address</td> <td>47 Ruru Road</td> <td></td> </tr> <tr> <td></td> <td>CHRISTCHURCH</td> <td></td> <td>CHRISTCHURCH</td> <td></td> </tr> </tbody> </table> |                   |                                |              |               | OWNER/PROPRIETOR |  | BUILDER |  | Date Issued | Name | M R & J M Hart | Name | K I Milne | 6/3/87. | Mailing Address | 425 Armath Street | Mailing Address | 47 Ruru Road |  |  | CHRISTCHURCH |  | CHRISTCHURCH |  |
| OWNER/PROPRIETOR                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                   | BUILDER                        |              | Date Issued   |                  |  |         |  |             |      |                |      |           |         |                 |                   |                 |              |  |  |              |  |              |  |
| Name                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | M R & J M Hart    | Name                           | K I Milne    | 6/3/87.       |                  |  |         |  |             |      |                |      |           |         |                 |                   |                 |              |  |  |              |  |              |  |
| Mailing Address                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 425 Armath Street | Mailing Address                | 47 Ruru Road |               |                  |  |         |  |             |      |                |      |           |         |                 |                   |                 |              |  |  |              |  |              |  |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | CHRISTCHURCH      |                                | CHRISTCHURCH |               |                  |  |         |  |             |      |                |      |           |         |                 |                   |                 |              |  |  |              |  |              |  |

| PROPERTY ON WHICH BUILDING IS TO BE ERECTED/DEMOLISHED |               | LEGAL DESCRIPTION  |              |
|--------------------------------------------------------|---------------|--------------------|--------------|
| SITE                                                   |               |                    |              |
| Street No.                                             | 425           | Valuation Roll No. |              |
| Street Name                                            | Arragh Street | Lot                | 4 D.P. 10444 |
| Town District                                          |               | Section            | Block        |
| Suburb                                                 |               | Survey District    |              |

| DESCRIPTION OF PROPOSED WORK AND MAIN PURPOSE OF USE |  |
|------------------------------------------------------|--|
| Erect fire walls for flats                           |  |
|                                                      |  |
|                                                      |  |
|                                                      |  |

| FLOOR AREA                                                                                                                                     |  | DWELLING UNITS |  |
|------------------------------------------------------------------------------------------------------------------------------------------------|--|----------------|--|
| Whole                                                                                                                                          |  | Number         |  |
| Sq. Meters                                                                                                                                     |  |                |  |
| <div>ESTIMATED VALUE</div> <div>\$</div> <div> <div>Bldg.</div> <div>Paving</div> <div>Drainage</div> </div> <div>TOTAL</div> <div>3,500</div> |  |                |  |

| NATURE OF PERMIT (TICK BOX)         |                                                                                                               |
|-------------------------------------|---------------------------------------------------------------------------------------------------------------|
| <input type="checkbox"/>            | NEW BUILDING<br>exclude domestic garages and domestic outbuildings                                            |
| <input type="checkbox"/>            | FOUNDATIONS ONLY                                                                                              |
| <input type="checkbox"/>            | ALTERED, REPAIRED, EXTENDED, CONVERTED, RESITED,<br>include installation of heating appliances                |
| <input checked="" type="checkbox"/> | NEW CONSTRUCTION<br>OTHER THAN BUILDINGS: include demolition<br>DOMESTIC GARAGES<br>AND DOMESTIC OUTBUILDINGS |

Permission is hereby granted for the work described above as proposed in the application, and in accordance with the plans, particulars and other documents submitted to me, such work to be subject at anytime during progress to my inspection, and to be carried out in strict conformity with all requirements of the Christchurch City Building Bylaw and other Bylaws for the time being in force, and to other regulations respectively affecting such work.

solemnly declare the estimated value of the building to be under \$ 3,500, and agree to comply and ensure compliance with all Bylaws and Civic Regulations, it being expressly understood that the issuing of a Permit does not dispense with any obligation to comply with all said Bylaws and Regulations.

\_\_\_\_\_  
 (For City Engineer)

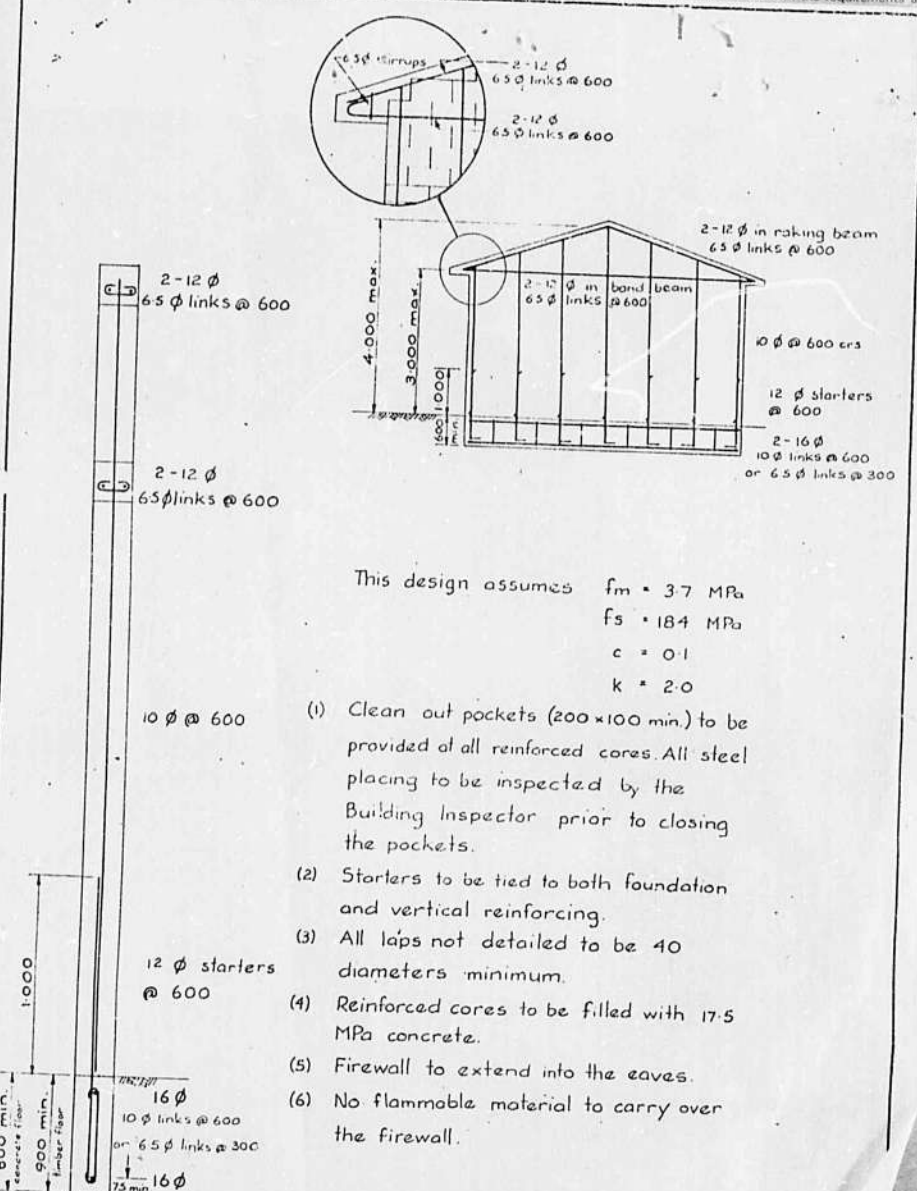
Receipt No. 21424  
 Value of Material 3,500

Value of Fee (INCLUDING GST): **\$37.40**

We agree to pay the full cost of reinstatement of any damage to the roads (including carriageways, kerbs, channels, culverts and crossings, footpaths, berms, verges and services) which results from the execution of the work authorised by this permit.

Signature: .....

application and Agreement for Water Supply  
in accordance with the requirements of the Christchurch City By-Law No. 107 (Water Supply and Plumbing) I hereby apply for a (metered) water supply to serve the premises the subject of the above building permit and agree to accept a supply in accordance with the requirements and



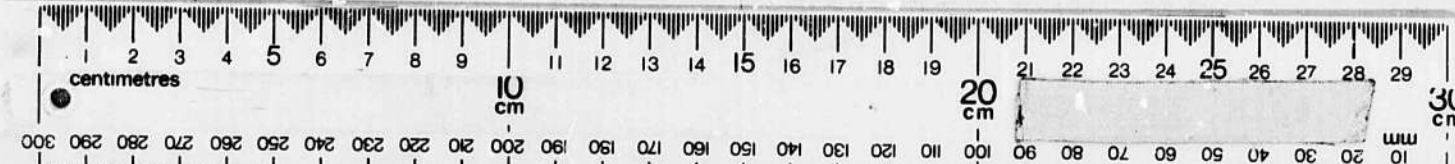
This design assumes

|                         |
|-------------------------|
| $f_m = 3.7 \text{ MPa}$ |
| $f_s = 184 \text{ MPa}$ |
| $c = 0.1$               |
| $k = 2.0$               |

- (1) Clean out pockets (200-300 min.) to be provided of all reinforced cores. All steel placing to be inspected by the Building Inspector prior to closing the pockets.
- (2) Starters to be tied to both foundation and vertical reinforcing.
- (3) All laps not detailed to be 40 diameters minimum.
- (4) Reinforced cores to be filled with 17.5 MPa concrete.
- (5) Firewall to extend into the eaves.
- (6) No flammable material to carry over the firewall.

Note: Where this design is not adequate (e.g. to the CHURCH CITY conditions, wall dimensions, or other factors) or subject to variation from these details must be supported by design calculations or a design certificate.

SINGLE STOREY FIRE W  
CHRISTCHURCH CITY CO.





# Appendix E

Cavity Critter Subfloor Report – 20/02/2025

# Cavity Critter

## Under floor Inspections

**[www.underfloorinspections.co.nz](http://www.underfloorinspections.co.nz)**

106 Raddens Road

Ohoka

RD2 Kaiapoi 7692

021 343156

[gideon@underfloorinspections.co.nz](mailto:gideon@underfloorinspections.co.nz)

**Report prepared for: NZCSE**

**Property address: 427 Armagh Street, Linwood**

**Date: 12 February 2025**

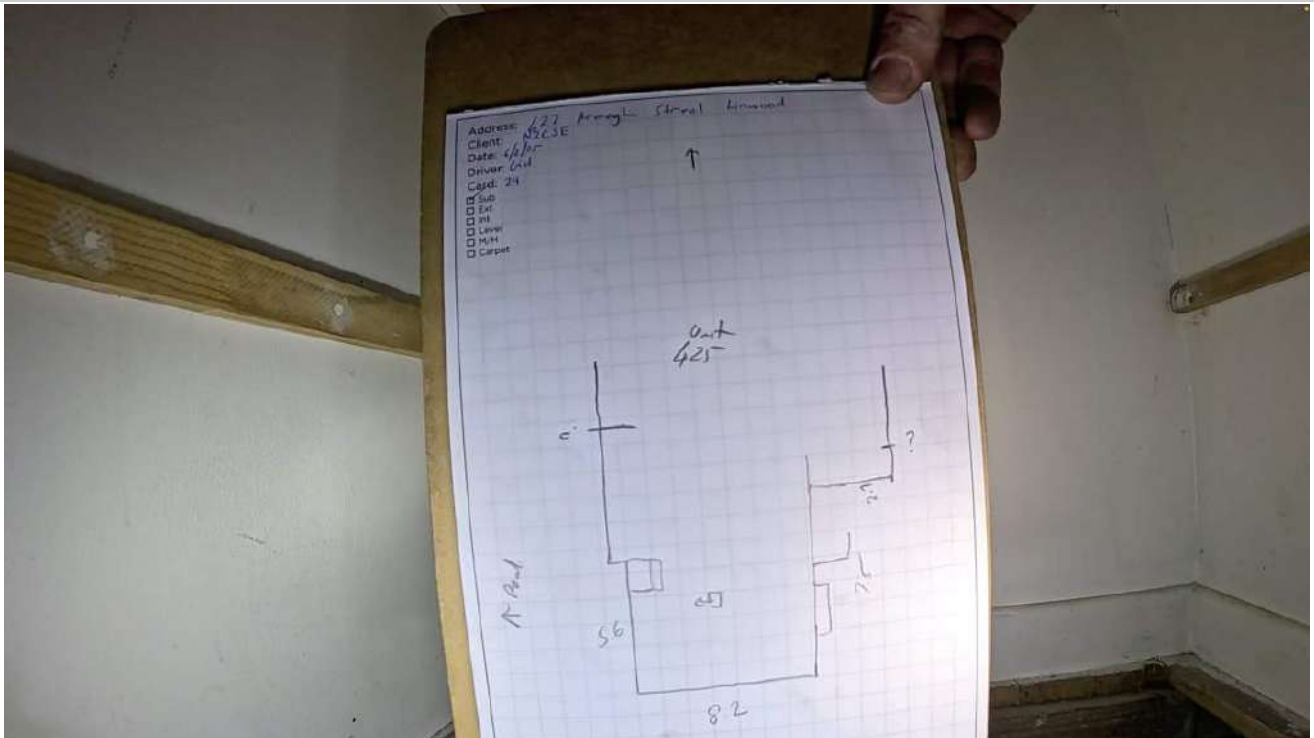
**Prepared by: Gideon Couper LBP Site 2 100074**

**Numbers corresponded to floor layout plan. Arrows represent which direction the photo was taken from.**



# Cavity Critter

1: Photo for legal purposes, showing who did the job and when.



2: The foundations are average quality type “B” foundations. There is a lack of fine sand and cement along with spider webs in some areas, making it hard to discern finer cracks, if they exist. There is also a high level of borer in some of the subfloor timber, as seen here.



3: View along party wall foundation.



4: View of foundation.



5: There are a lot of services and batts that have been pulled down that obstructed our access.



6: The home has precast concrete piles. These maybe concreted into the ground but the polythene obscures this. They are not connected to the bearers. None appear damaged or to have moved from their original positions although this does not preclude changes in height.



7: Precast concrete pile with no connection.



8: Precast concrete pile with no connection.



9: Precast concrete pile with no connection.



10: Precast concrete pile with no connection.



11: I think that there is a concrete base here, but I am not completely sure of the layout.



12: View of foundation.



13: Precast concrete pile with no connection. It is important to note that rodents have been using the insulation for nesting. The yellow marks represent their urine, and they have also caused many of the batts to fall down.



14: View of bearer meeting concrete base.



15: Precast concrete pile with no connection.



16: Precast concrete pile with no connection.



17: Precast concrete pile with no connection.



18: Precast concrete pile with no connection.



19: Precast concrete pile with no connection.



20: View of concrete base with pile to the left.



21: Precast concrete pile with no connection.



22: We couldn't get into this area.



23: View of piles.



24: View of foundation.



25: Precast concrete pile with no connection.



26: Precast concrete pile with no connection.



27: Precast concrete pile with no connection.



28: Precast concrete pile with no connection.



29: View of bearer meeting concrete base.



30: View of concrete base.



31: Precast concrete pile with no connection.



32: There are some non-compliant issues with the wiring seen in this home. They could also be a significant hazard to anybody operating under the floor. This relates specifically to unclipped wires. An electrical inspector could be consulted regarding this. The communication cables have also not been laid in a compliant manner and would easily be damaged by people accessing the subfloor.



33: Precast concrete pile with no connection. Here we see a heat pump drain. It is discharging to ground but should be vented to the outside.



34: View of concrete base.



35: Precast concrete pile with no connection.



36: View of ring foundation with concrete base to the right.



37: Precast concrete pile with no connection.



38: Precast concrete pile with no connection.



39: Precast concrete pile with no connection.



40: Precast concrete pile with no connection.



41: Precast concrete pile with no connection.



42: Precast concrete pile with no connection.



43: Precast concrete pile with no connection and the pile leans to the right.



44: The ground level appears to drop in this area.



45: Precast concrete pile with no connection and the pile leans to the right.



46: View along ring foundation with services.



47: Precast concrete pile with no connection.



48: Precast concrete pile with no connection.



49: Precast concrete pile with no connection.

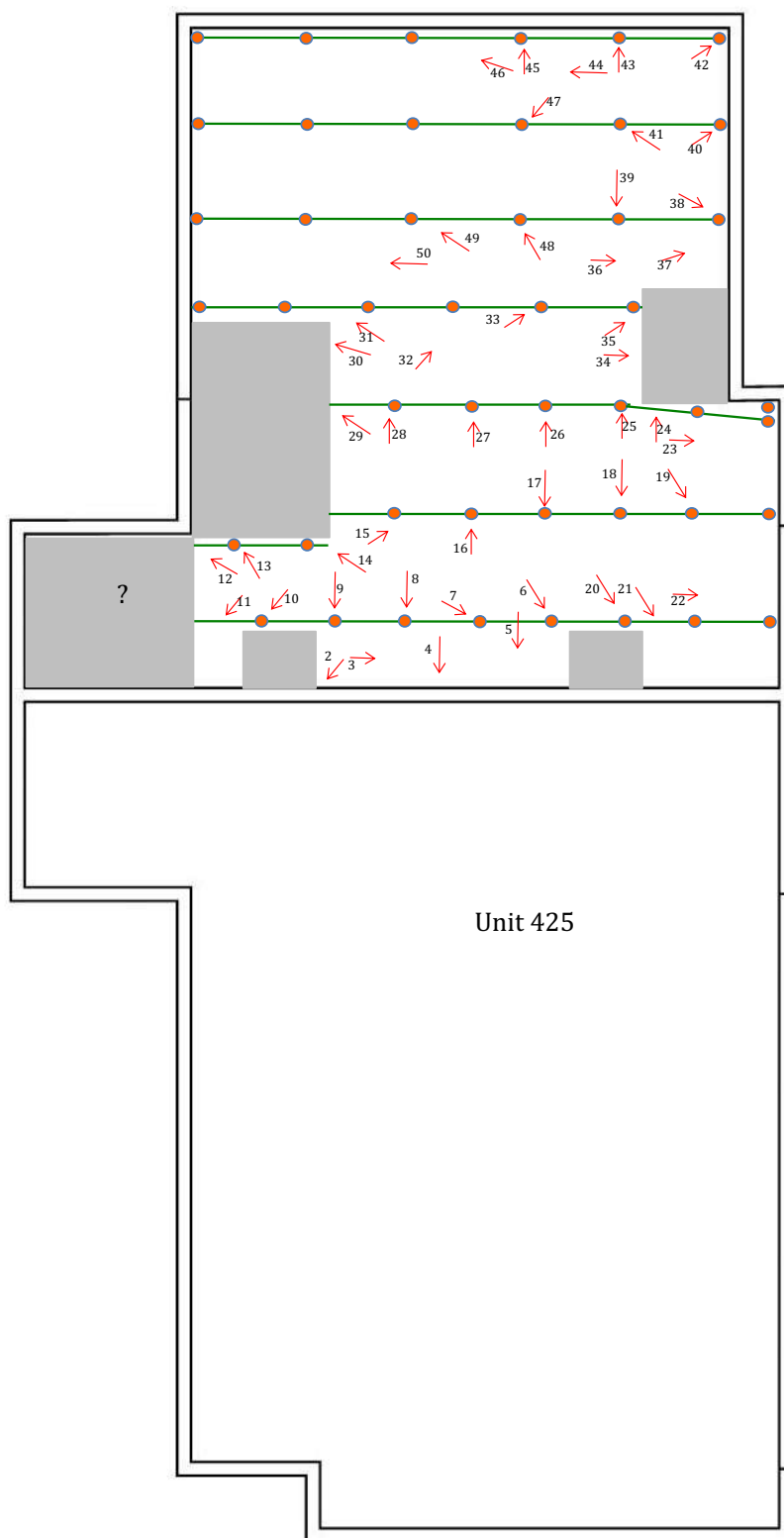


50: We were unable to proceed any further.



## House floor plan

**Numbers corresponded to floor layout plan. Arrows represent which direction the photo was taken from. Plan is also supplied as a separate file to assist with reading of the report.**



This report has been prepared in accordance with and is subject to our document Cavity Critter – Terms Of Trade. Our Terms of Trade include information on the service provided, the limitations of the service, and a limitation of liability. This report must be read in conjunction with our Terms of Trade. A copy will be made available upon request

Some customers will request us to provide the report, either without any commentary or with a limited commentary (on the basis that those customers will be making their own assessment of the photographs provided). Our report needs to be read in conjunction not only with our Terms of Trade but also with the instructions (particular to each report) provided by the customer.

Under no circumstances will we accept liability for the contents of this report to anyone other than the original customer. If you are not the original customer for this report, then (unless you have our specific written permission) you may not rely on its contents for any purpose.