



CONSTRUCTIVE

Building for a new way of living - Medium

GUY MARRIAGE – FNZIA

ARCHITECT – FIRST LIGHT STUDIO

ACADEMIC – VICTORIA UNIVERSITY OF WELLINGTON

AUTHOR – TALL, MEDIUM, M.A.D.



VICTORIA UNIVERSITY OF
WELLINGTON
TE HERENGA WAKA

11 years working in London

22 years working in New Zealand

20 years lecturing in Architecture and Construction

75 articles and papers published

3 books published

1 Solar Decathlon (right) USA + back

Relevant Experience in Apartment buildings:

Willis St, Wellington

Wakefield St, Wellington

Frederick St, Wellington

Oriental Parade, Wellington

Halsey St, Viaduct Harbour, Auckland

Townhouses in Ngarara, Waikanae

Kainga Ora + KiwiBuild housing in Auckland

Lives in an apartment building I designed

Built own apartment + Built own bach (Grand Designs NZ)





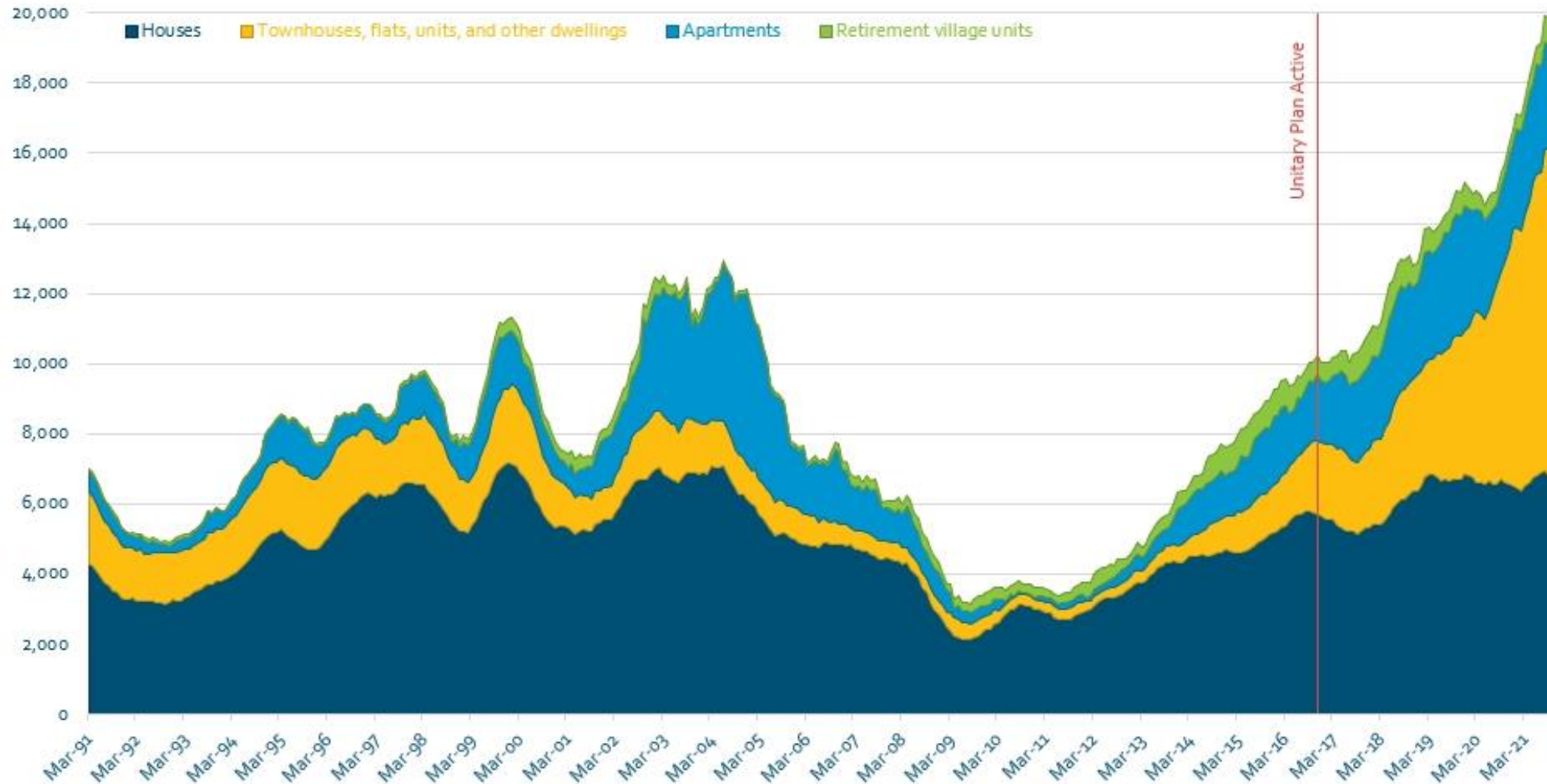
medium is the message

REGISTER FOR A SPONSORED COPY OF MEDIUM FOR ARCHITECTS AND BUILDERS

Building Consents in Auckland: 12-Month rolling total

Source: Stats NZ

GREATER
AUCKLAND



← Apartments

← Townhouses

← Houses

Building Consents to 2021

medium density housing:

- 3-6 storeys tall
- 40+ dwellings/hectare
- Reliant on quality inter-tenancy walls and floors
- Needs common outdoor space
- Needs great master builders!



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medium density housing:

- not really catered for in NZBC
- need to move away from 3604
- standard timber house solutions no longer appropriate
- new wall and floor systems
- new rules for services too



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Your Guide

To guide you through *Medium* each chapter has a corresponding colour.

Chapters

1 Why MDH?

2 Issues

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3 Variety

4 Community

5 Circulation

6 Living

7

7 Construction Materials

8 Inter-tenancy Floors

9 Inter-tenancy Walls

10 External Façade Walls

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15 Altair

16 One Central

17 Conclusion

PLAN

1

Why MDH?

What is medium density housing (MDH) and why do we need it? | 6

Looking back at NZ's history of MDH | 11

How can MDH provide solutions to NZ's housing affordability issues? | 13

What actions have government taken to increase housing density? | 15

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Issues

What are the biggest issues facing architects when it comes to designing MDH? | 16

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DESIGN

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Variety

How can we design better, more liveable medium density housing? | 24

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Community

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Circulation

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BUILD

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Construction Materials

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BUILT

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Bernoulli Gardens

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An Ockham development in Hobsonville Point that features five blocks of apartments assembled around a pleasant courtyard.

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340 Onehunga

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An NZ Living development in Onehunga, Auckland, with strong design features including one big long simple roof and long life material selection.

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Altair

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An infill project in Newtown, Wellington, with several small blocks of townhouses, woven around two small green courtyards.

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One Central

Case Study 04 | 219
A quality townhouse development on the edge of the East Frame in central Christchurch.

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Conclusion

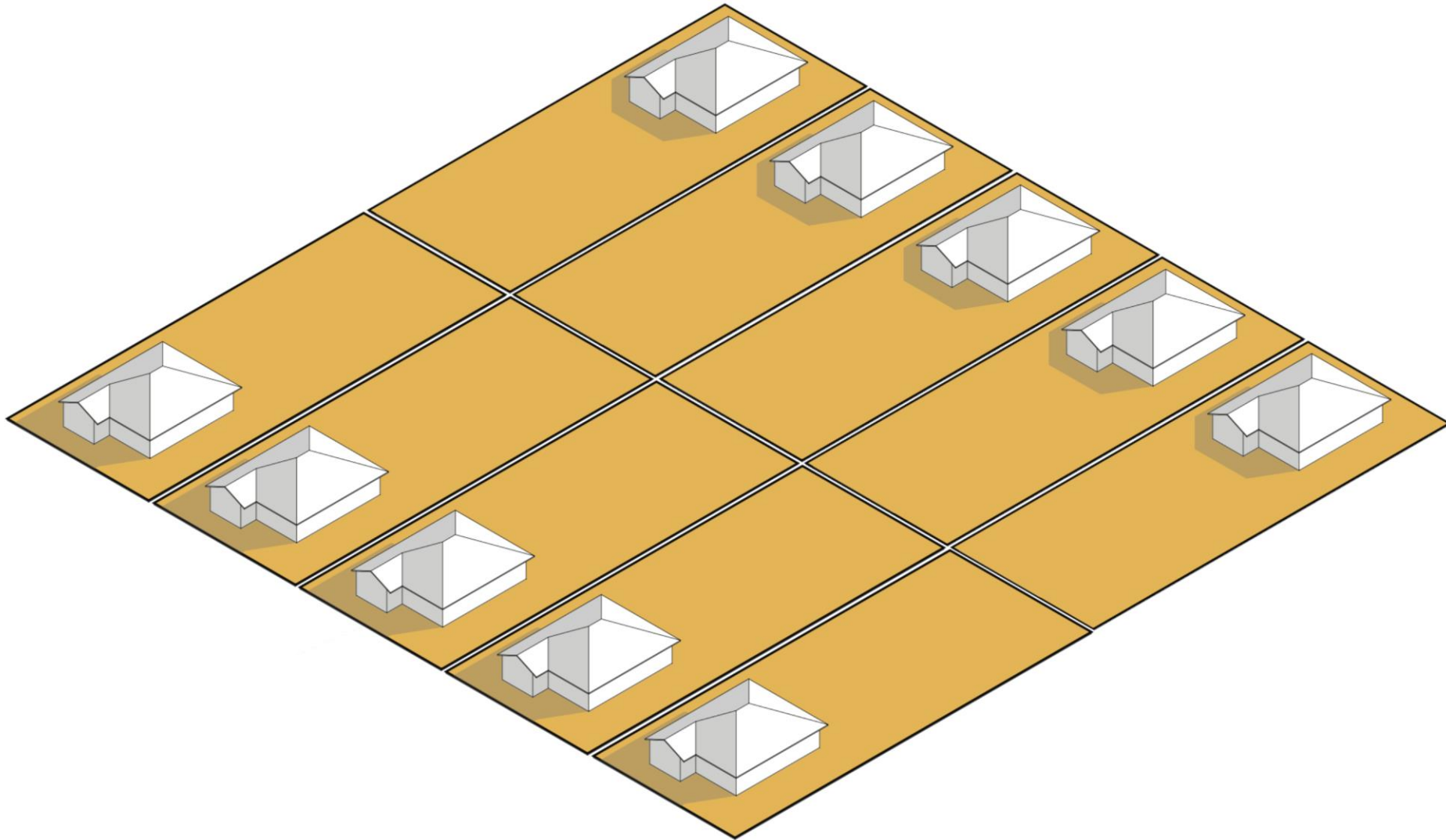
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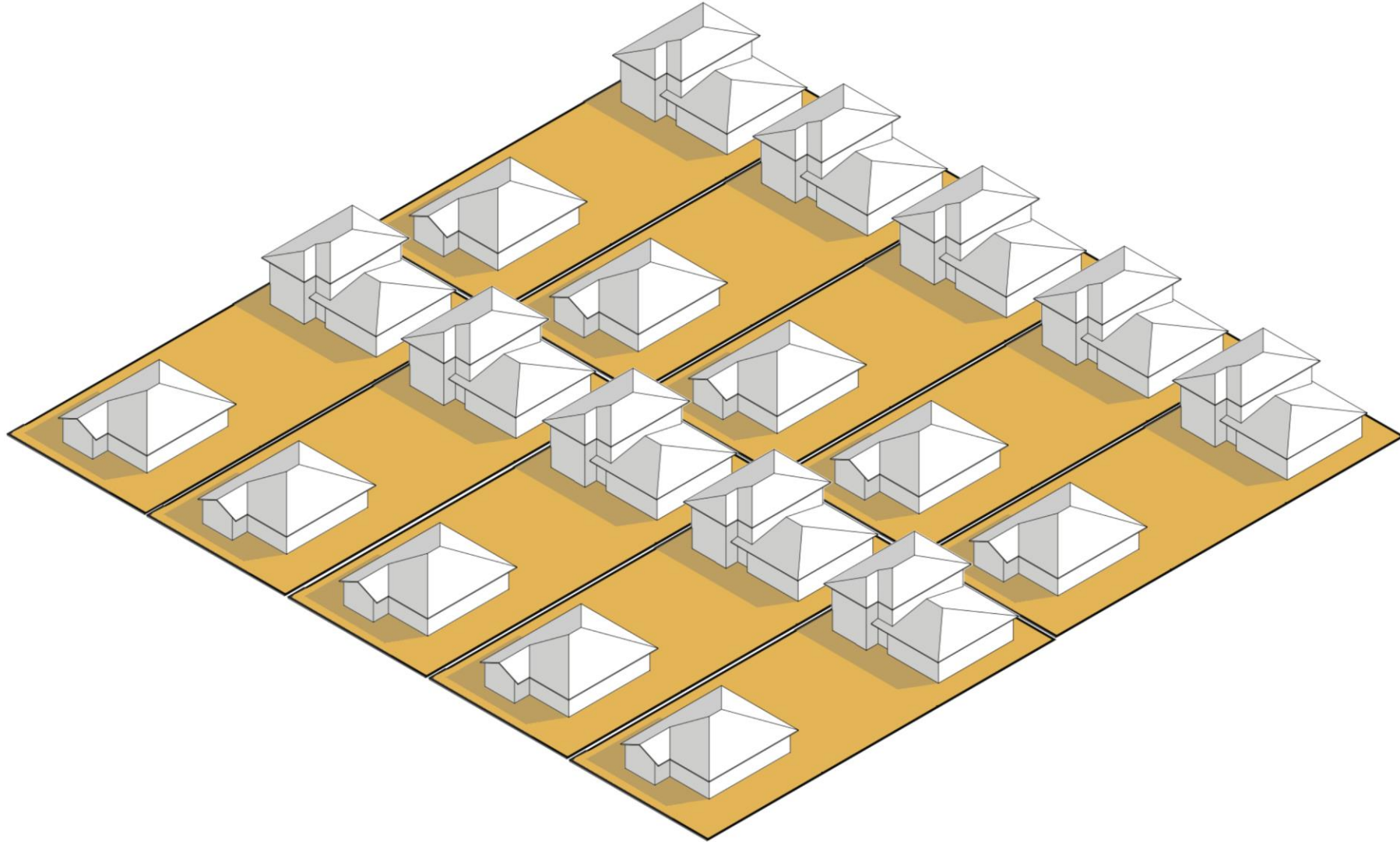
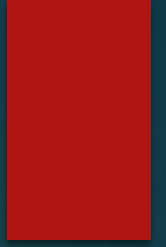
Part One

PLAN

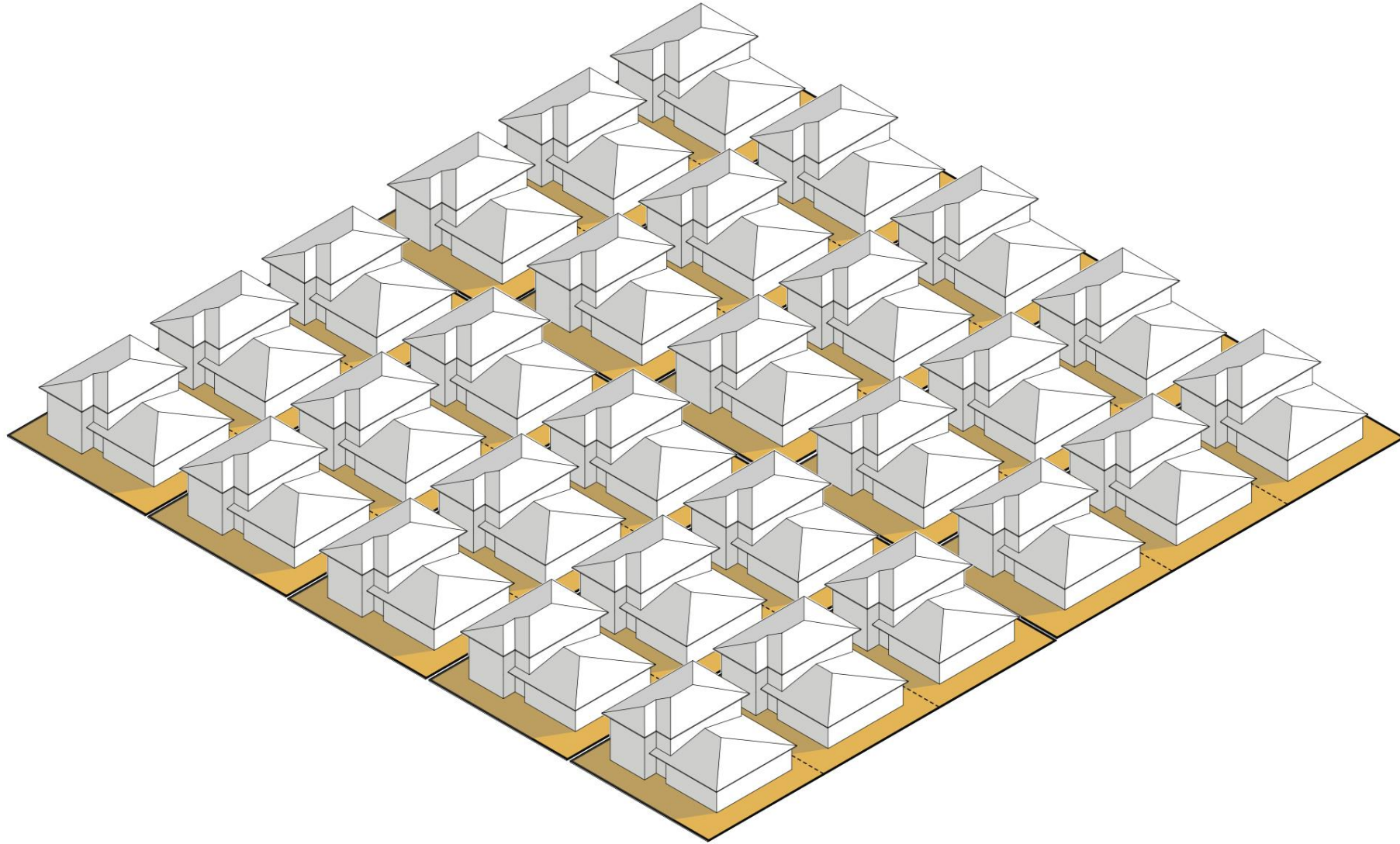
Background story behind the book



10 dwellings per hectare = outdated

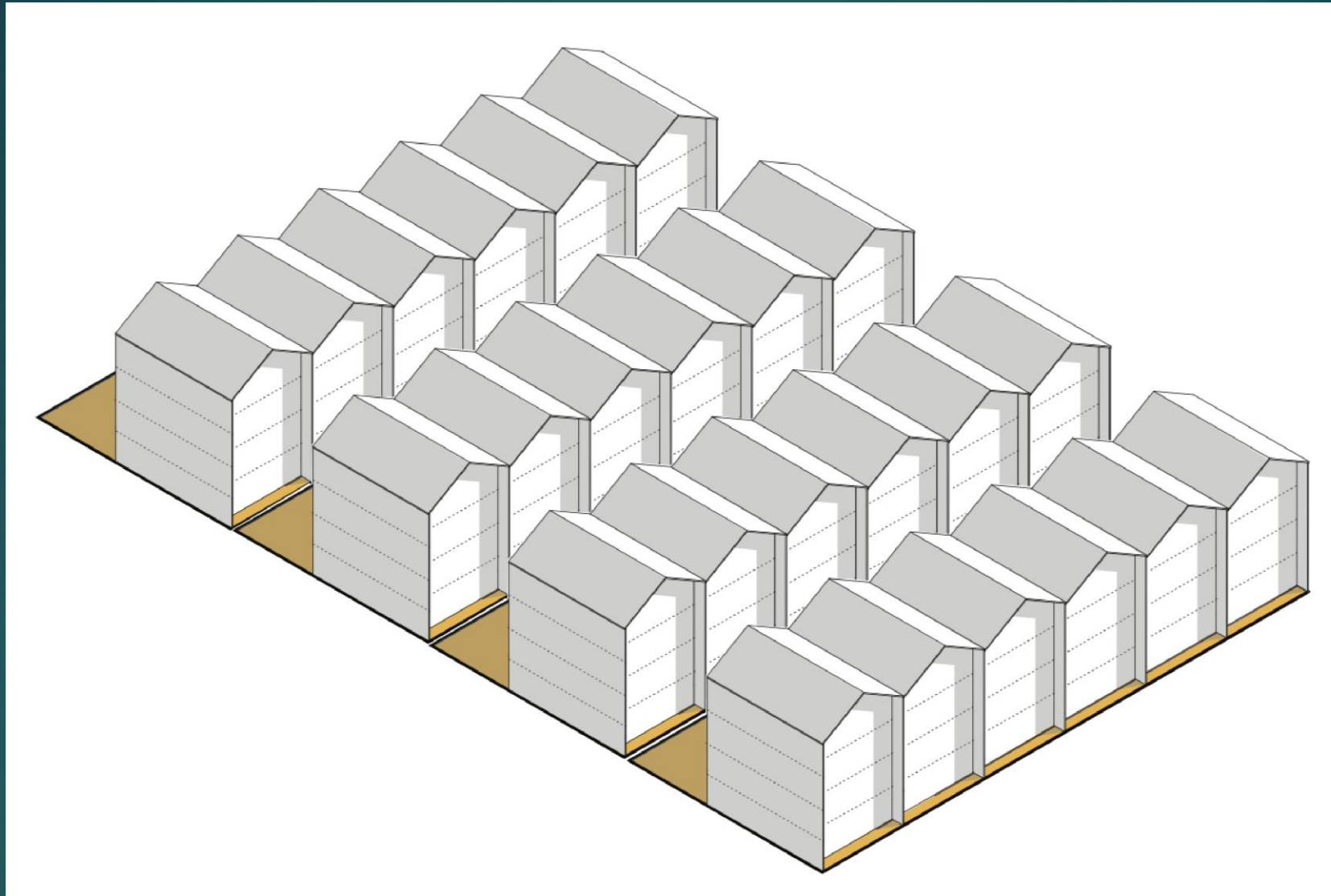


20 dwellings per hectare



And probably:
No on-site
parking either

30 dwellings per hectare = low-to-medium



6 sites per quarter
acre site

168m² per site

4 apartments per
site

Each apartment =
84m²

Good two-bed
size – still only 50%
site coverage

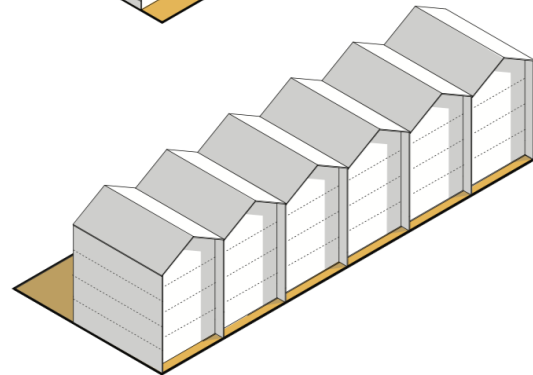
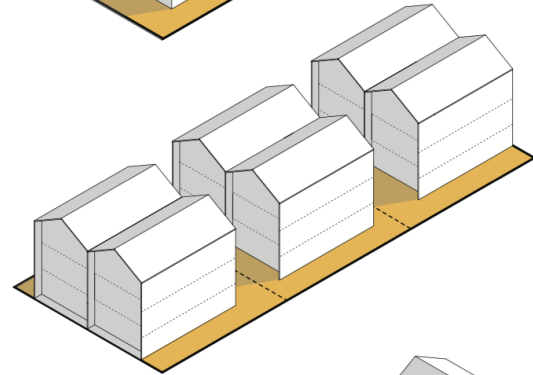
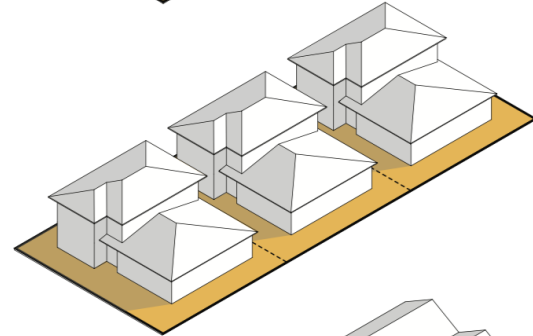
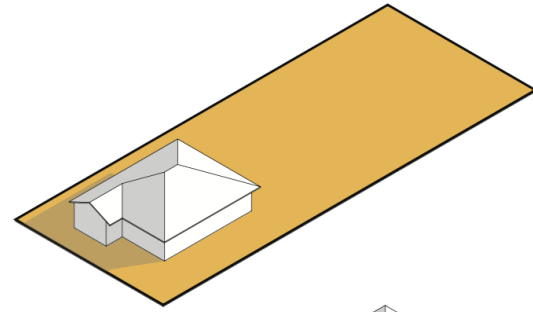
250 dwellings per hectare = medium → high

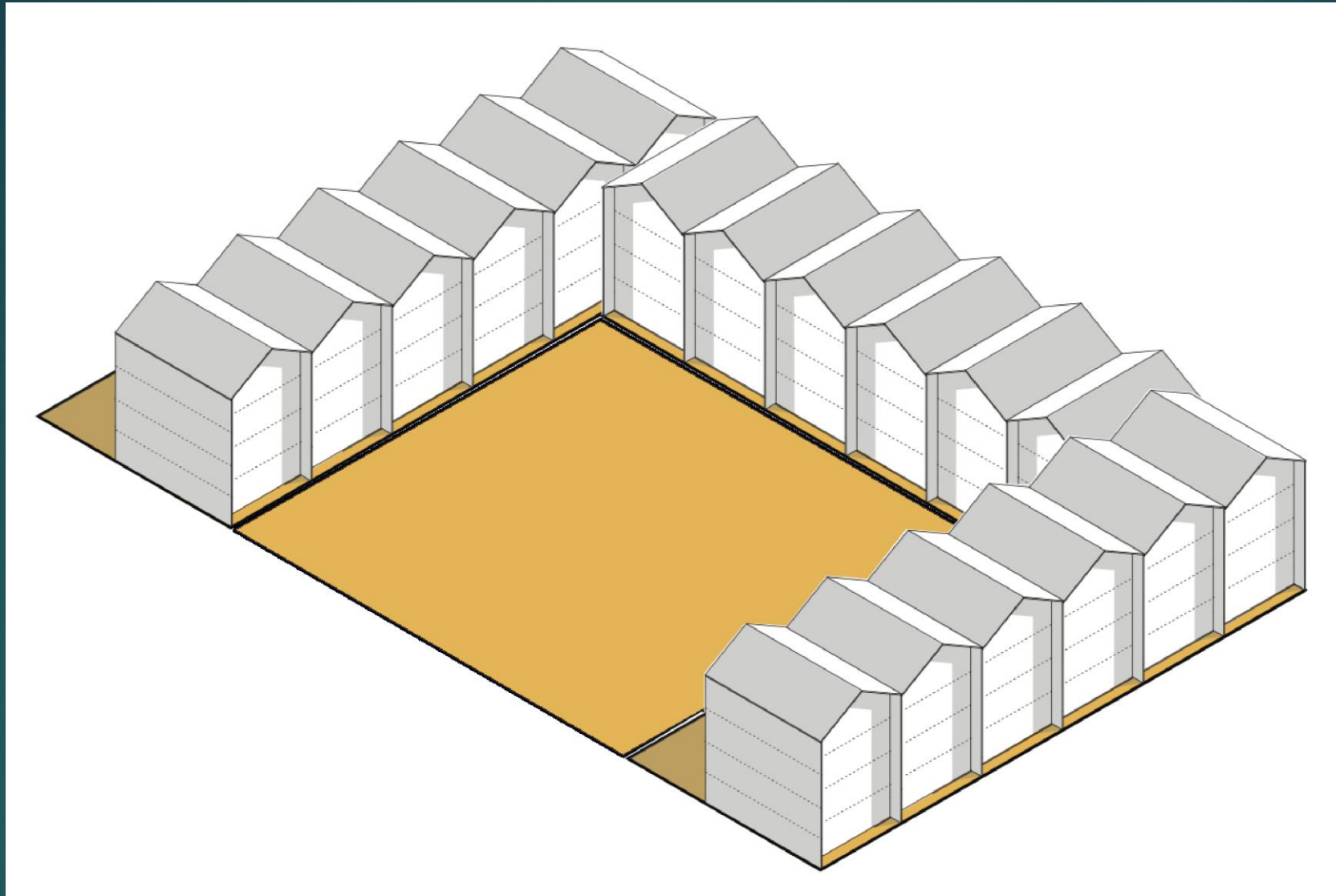
No more this →

Not the answer →

Yes to tall townhouses →

Definitely apartments →





Arranged around
common space

180 dwellings per hectare = medium



Arranged around
well-planted,
sunny, common
space

Chapter 4
COMMUNITY
By
Hannah Hopewell

180 dwellings + Gardens = Homes



Soho Square, Westminster, London



Kensington and Chelsea, London

Arranged around well-planted, sunny, central courtyard or public square, ie. common space



Arranged around street living, sunlight, pleasant local neighbourhoods

New York + Paris

Part Two

DESIGN

Design advice

Design Factors to Consider

Table 3.2

| Density level | Storeys | Approx. height | Lifts | FRR without sprinklers | FRR with sprinklers | Fire Engineer | Wind Report | Urban Design Report |
|---------------|---------|----------------|-----------|------------------------|---------------------|---------------|-------------|---------------------|
| high | 11+ | | required | 60 | 30 | required | required | recommended |
| high | 10 | 30m | required | 60 | 30 | required | required | recommended |
| high | 9 | 27m | required | 60 | 30 | required | required | recommended |
| high | 8 | 24m | required | 60 | 30 | required | required | recommended |
| medium-high | 7 | 21m | required | 60 | 30 | required | required | recommended |
| medium | 6 | 18m | required | 60 | 30 | required | required | recommended |
| medium | 5 | 15m | required | 60 | 30 | required | required | recommended |
| medium | 4 | 12m | required | 60 | 30 | required | required | recommended |
| low-medium | 3 | 9m | voluntary | n/a | voluntary | n/a | n/a | n/a |
| low | 2 | 6m | voluntary | n/a | voluntary | n/a | n/a | n/a |
| low | 1 | 3m | n/a | n/a | voluntary | n/a | n/a | n/a |

Density factors

Material Factors to Consider

Table 3.3

| Density level | Storeys | Approx. height | Light timber frame | Concrete block masonry | Insitu and precast concrete | Structural steel frame | CLT | Plywood panels | SIPS |
|---------------|---------|----------------|--------------------|------------------------|-----------------------------|------------------------|-------------|----------------|---------|
| high | 11+ | | | | recommended | recommended | possible | | |
| high | 10 | 30m | | | recommended | recommended | possible | | |
| high | 9 | 27m | | | recommended | recommended | possible | | |
| high | 8 | 24m | | | recommended | recommended | possible | | |
| medium-high | 7 | 21m | | allowed | allowed | allowed | recommended | | |
| medium | 6 | 18m | | allowed | allowed | allowed | recommended | | |
| medium | 5 | 15m | | allowed | allowed | allowed | recommended | | |
| medium | 4 | 12m | SED | allowed | allowed | possible | recommended | allowed | allowed |
| low-medium | 3 | 9m | allowed | allowed | allowed | portals | possible | allowed | allowed |
| low | 2 | 6m | allowed | allowed | possible | portals | possible | allowed | allowed |
| low | 1 | 3m | allowed | allowed | possible | n/a | n/a | allowed | allowed |

Material factors

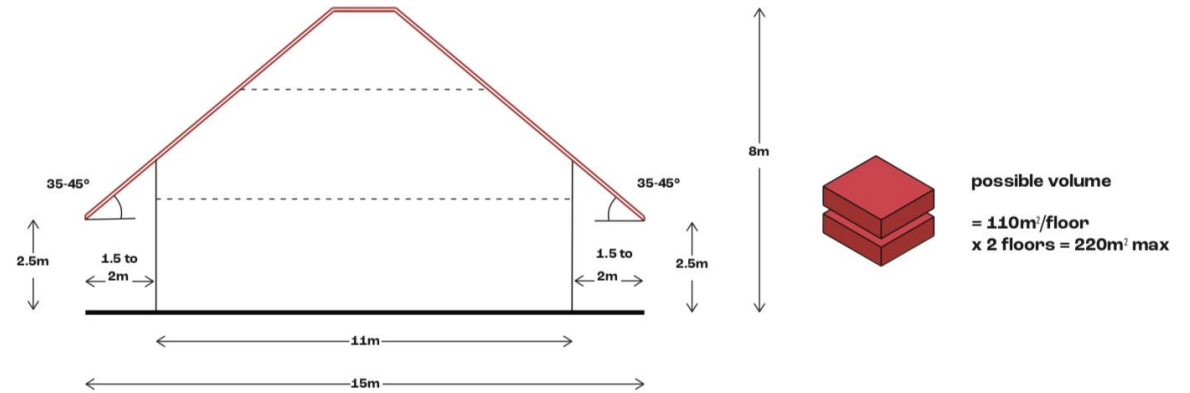
- Existing rules → **Proposed change**
- 1 house only → **3 houses**
- Max height 8-10m → **max height 11-12m**
- 2.5m height at boundary → **4m + 60°**
- Front yard 3m → **Front yard 2.5m**
- Side yard 0m → **side yard 1m**
- Site coverage max 50% → **no change**
- (Porirua & Hutt will change from 35→50%)
- Impervious coverage → **to be 60%**
- Outdoor Living Space **Ground floor 20m²**
- Outlook Space → **4m x 4m space** living
- Outlook Space → **1m x 1m** bedroom

MDRS Medium Density Residential Standards

Pre 2020 Boundaries

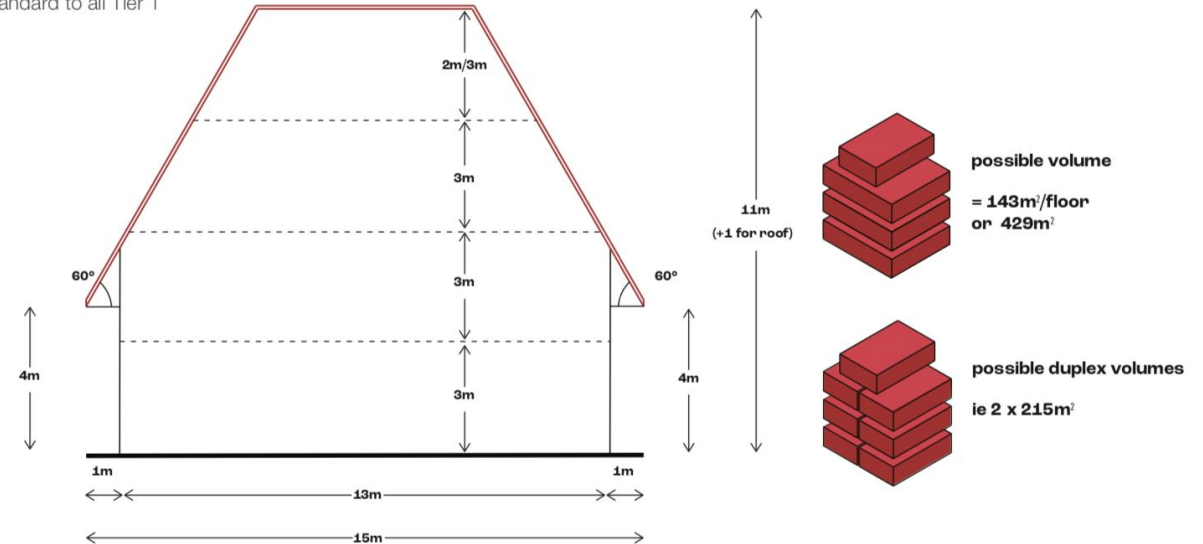
(varied according to Council)

Useable volume of space was heavily restricted



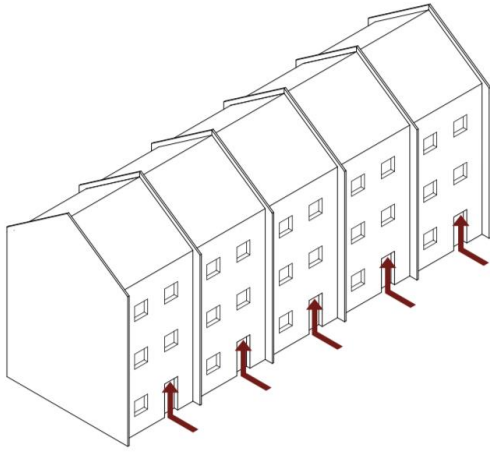
Post 2022 Boundaries

Standard to all Tier 1



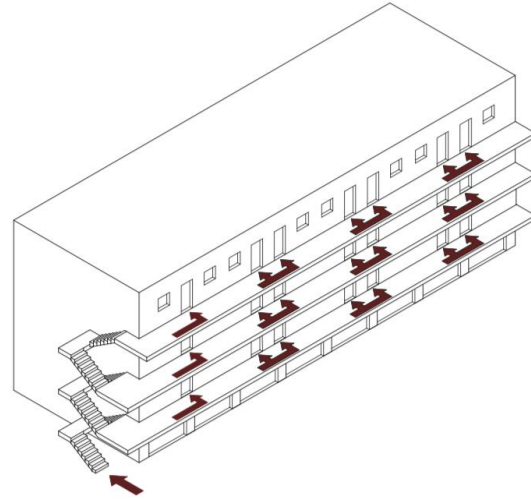
Access Routes

Figure 5.3



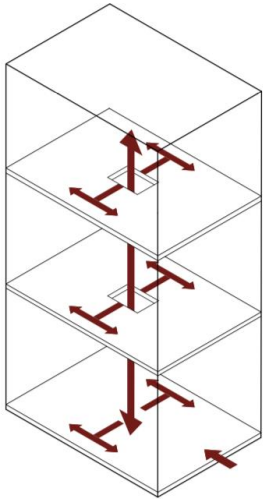
Horizontally adjoining

Vertical, internal, contained circulation routes



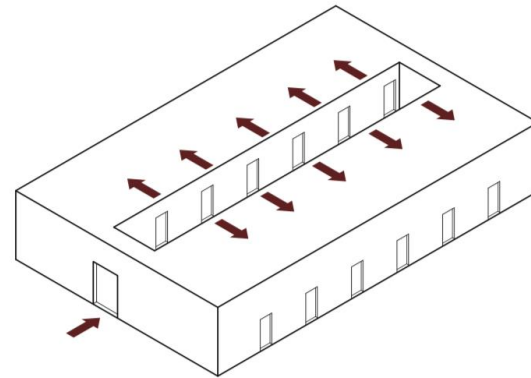
Vertically adjoining horizontal gallery access

- Single sided
- Privacy concerns



Apartment buildings

Central access core with combination of both vertical and horizontally adjoining properties



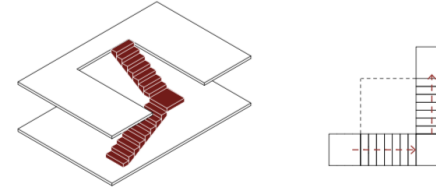
Double-Loaded internal corridor

Hotels/Apartments

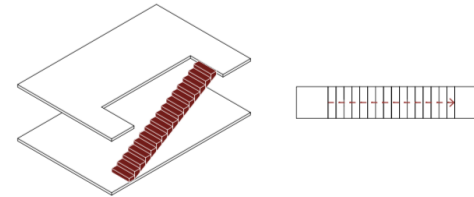
Stair Orientation

Figure 5.6

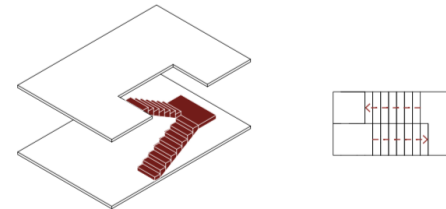
1 Dog leg plus height



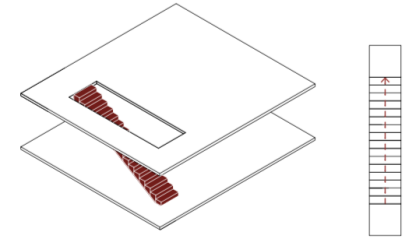
2 Straight side flight



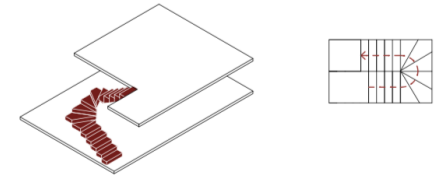
3 Landing half flight



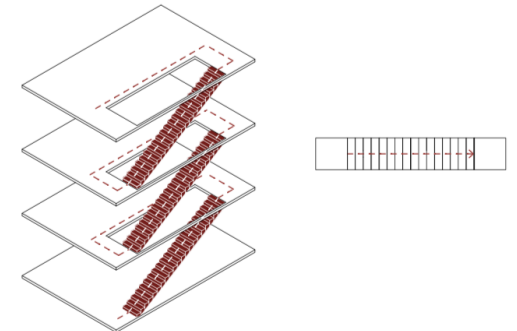
4 Cross width stair flight



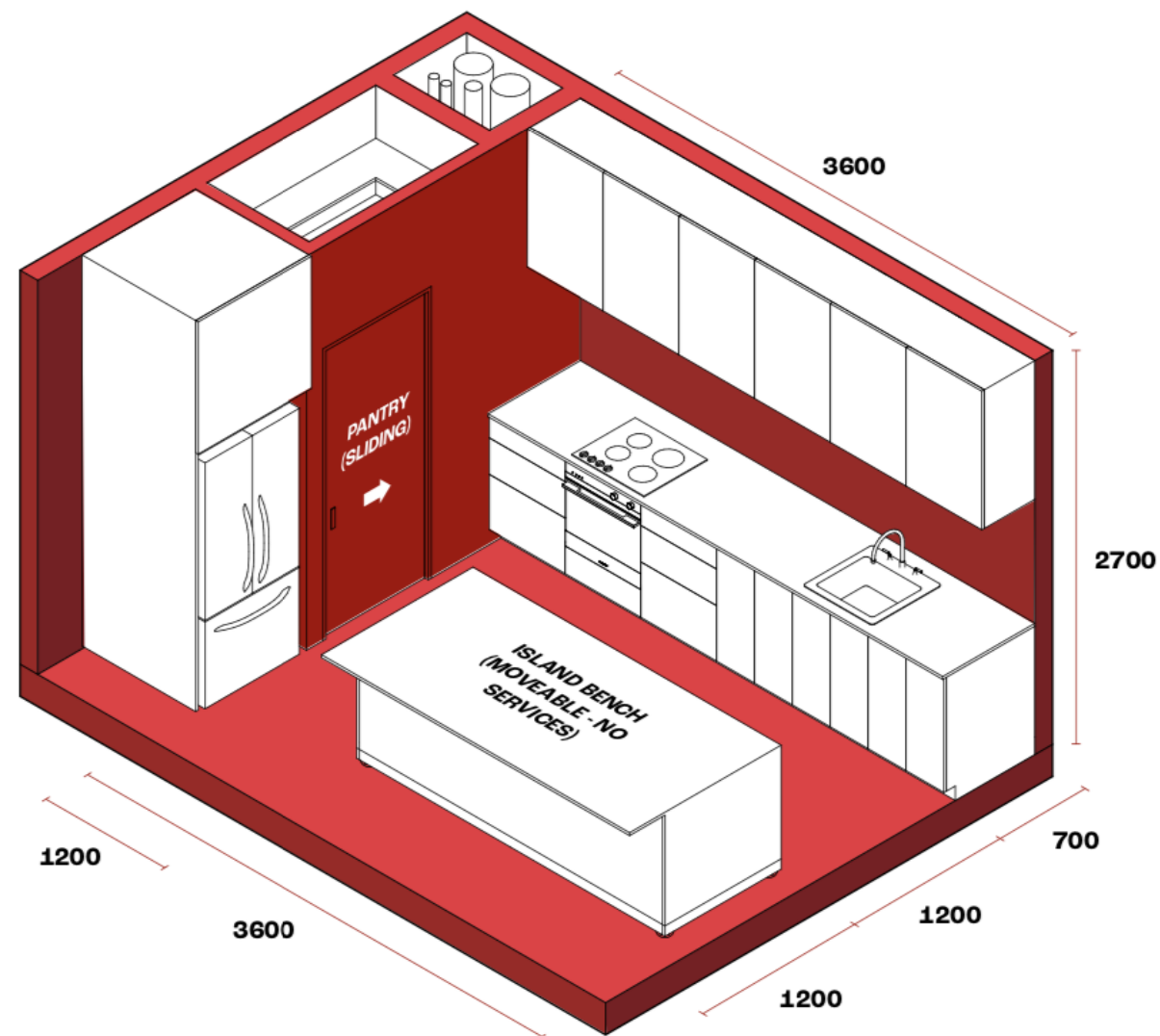
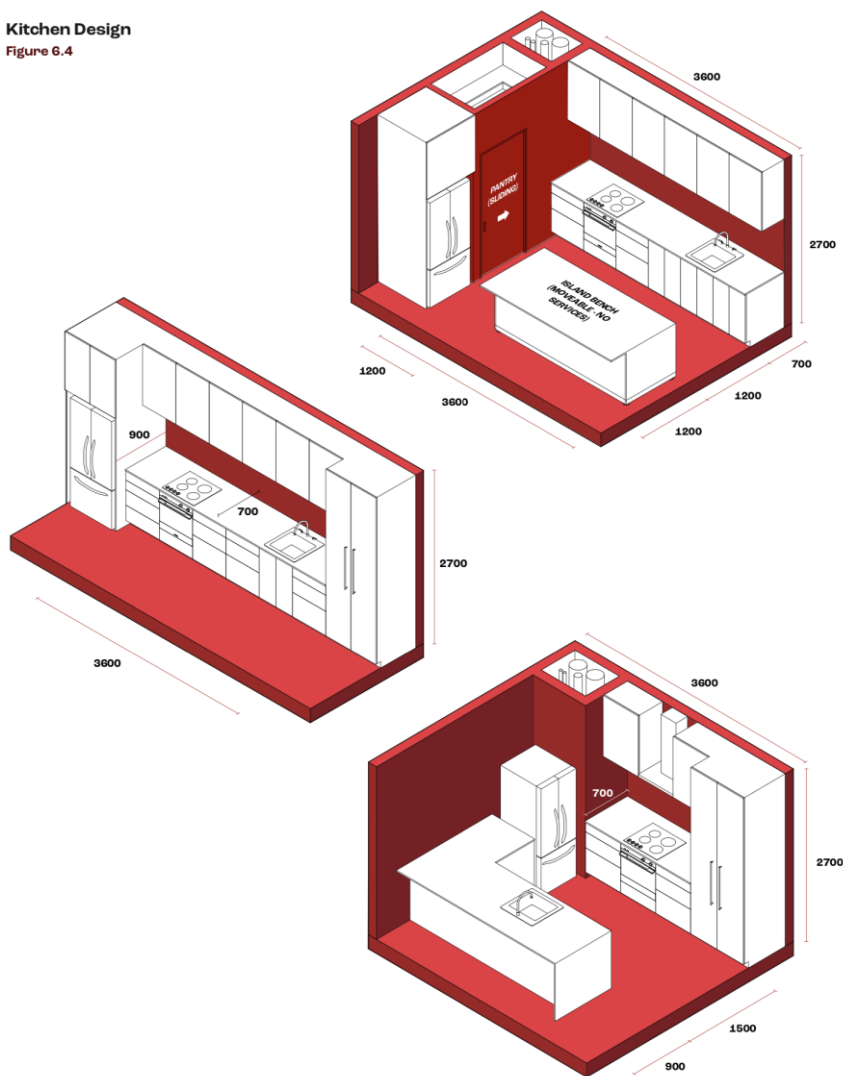
5 Stair with winder



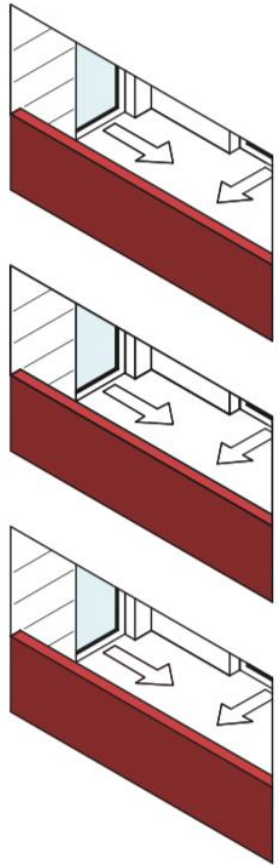
6 Continuous side flights



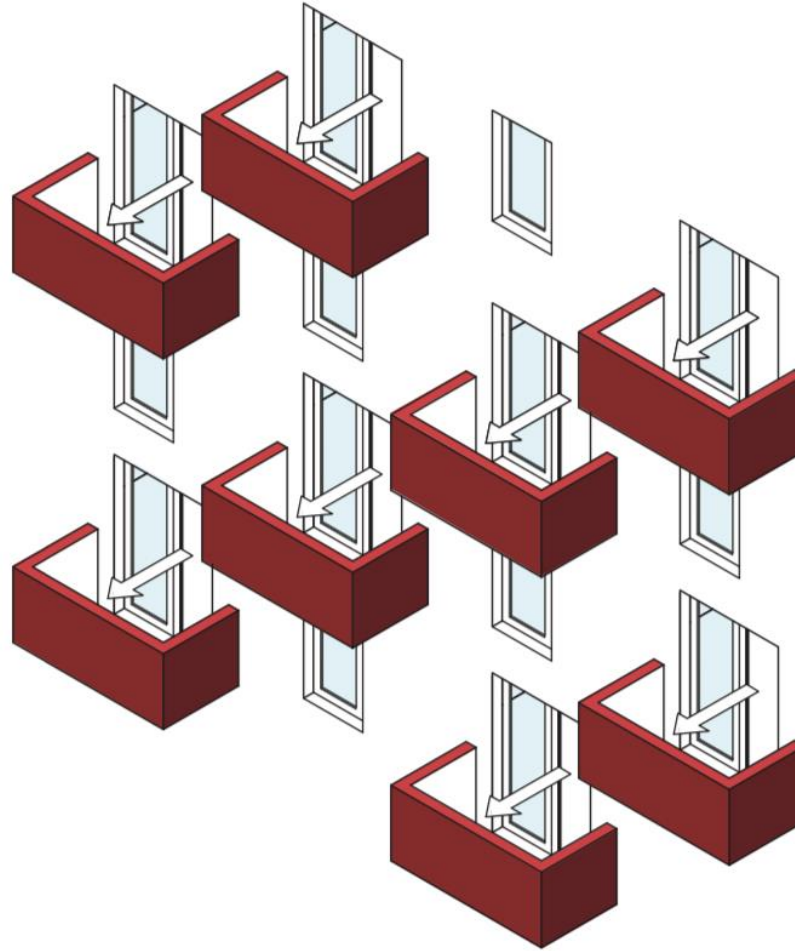
Kitchen Design
Figure 6.4



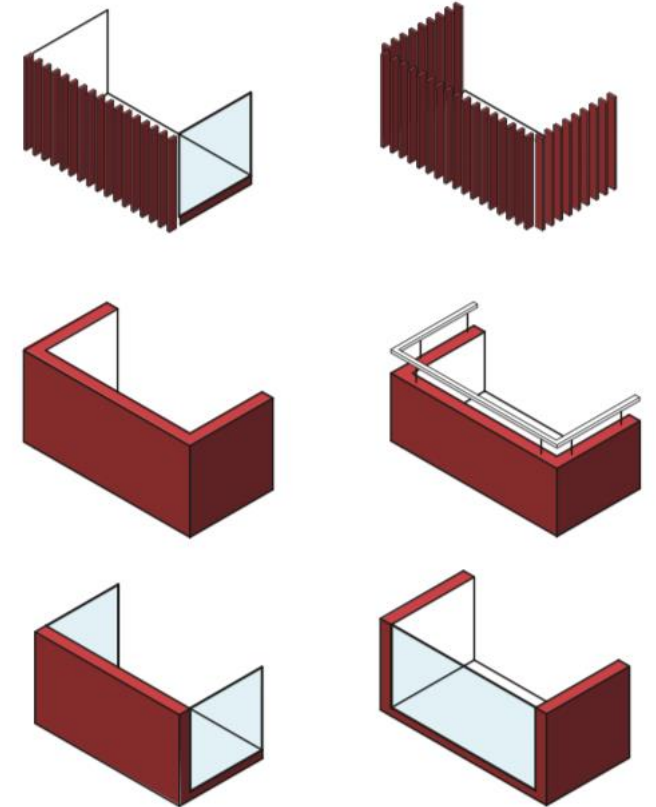
Kitchen planning



Fully recessed



Fully projecting and alternating



Balustrade variations

Balcony variations



Part Three

BUILD

Details and materials and systems

Overview

The system is a lightweight timber construction fire and acoustic inter-tenancy flooring system. The floor system uses two layers of Strandfloor®, the first layer fixed to the timber or steel floor joists and the second layer fixed into wooden battens over a rubber cradle creating a floating floor (Batten & Cradle™). The system also offers solutions for timber joist, CLT and concrete slabs as an overlay in new and existing builds. The system is ideal for inter-tenancy floors in apartments, multi-unit residential, hotels, healthcare, retail, mixed use and office complexes. Strandfloor® is a 20mm thick sheet with strands of wood pressed together under heat and pressure, that can also be treated to H3.1. Sheets can be specified as square edge or can include a polypropylene tongue for tongue & groove (T&G) fixing (T&G only used on the Batten & Cradle™ layer).

Application

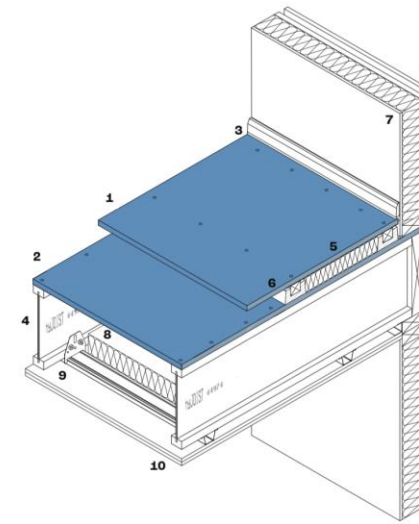
With the growth of medium to high density residential housing, there was a need for an alternative wood-based solution that would address the issue of midfloor acoustic noise in multi-level tenancy buildings.

- Acoustic performance of STC 65 / IIC 56 meaning there is less noise in adjoining rooms/areas. The acoustic performance values are tested on a raw floor (no floor coverings). Improved acoustic performance is achieved with installation of floor coverings, refer to GIB® Noise Control Manual, GBDFA 60e
- Fire performance of FRR 60/60/60 tested by BRANZ (Appraisal 394)
- StrandfloorH3.1® provides a wet area solution
- Concentrated load of 3.6kN and uniform distributed load of 4kPa (office and retail loadings as defined in AS/NZS 1170) providing concentrated or even weight distribution
- Strandfloor® is lighter than comparable solutions
- Strandfloor® & StrandfloorH3.1® engineered wood panels do not require specialist cutting equipment
- Multiple sheet sizes available – 3600 x 1200mm and 2400 x 1200mm
- Battens can be up to 190mm to allow for services in Batten & Cradle™ cavity – an advantage for CLT construction

Refer to website for further technical information and CAD files

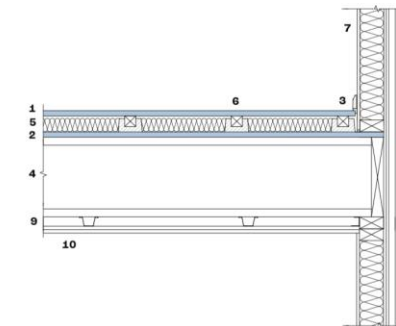
Benefits

- The system is lighter than comparable solutions such as concrete & steel construction or fibre cement solution
- Sheets are lighter and easier to handle
- Easy to install, less complicated than other types of systems on the market
- Does not require specialist cutting equipment, can cut on site with standard carpentry tools, no silica dust management on site required if compared with fibre cement solution
- Lightweight timber frame construction has advantages over heavier systems in certain ground conditions
- To future proof installations during renovation work, acoustic performance can be achieved with no reliance on carpet or acoustic underlay, especially if hardwood flooring or tiles are used




Laminex™ Strandfloor® Flooring System

- 1 20mm Strandfloor®, fixing centres 150mm-200mm along structural floor battens
- 2 20mm Strandfloor®, fixing centres 150mm-200mm along flooring joists
- 3 8mm clearance gap from fixed objects
- 4 hyJOIST® timber I-beam, HJ240 45
- 5 Fibrous insulation, 50mm
- 6 Batten & Cradle™ Acoustic Cradles
- 7 Stud frame wall
- 8 Fibrous insulation, 75mm
- 9 GIB® Rondo® direct fixed ceiling system with Quiet Clip
- 10 2 layers of 13mm GIB® plasterboard suspended below floor system



Technical Data Card

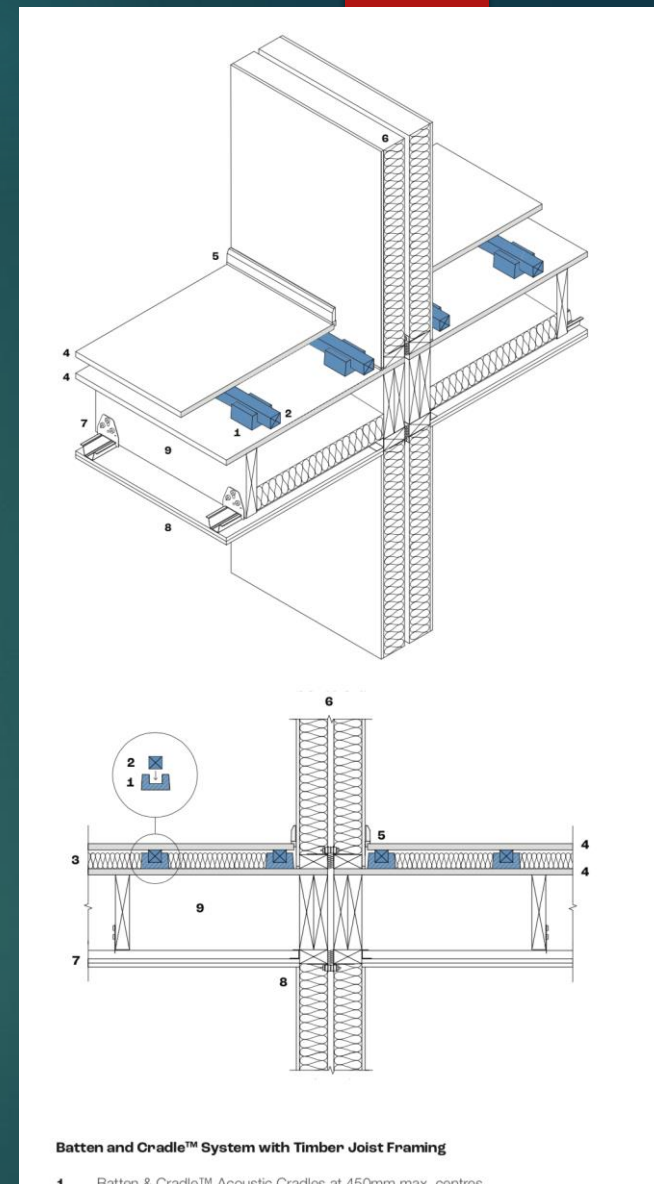
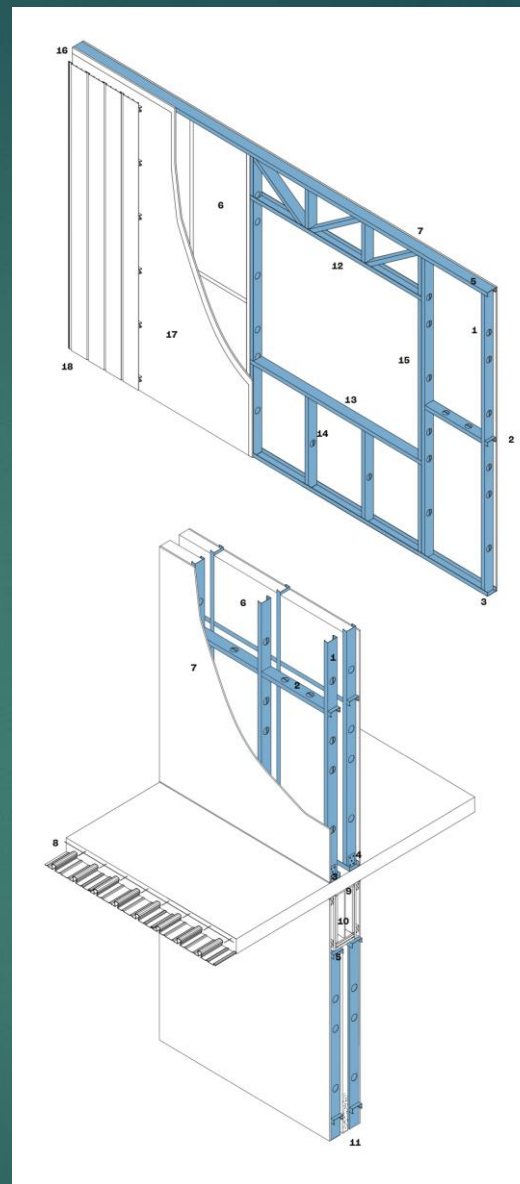
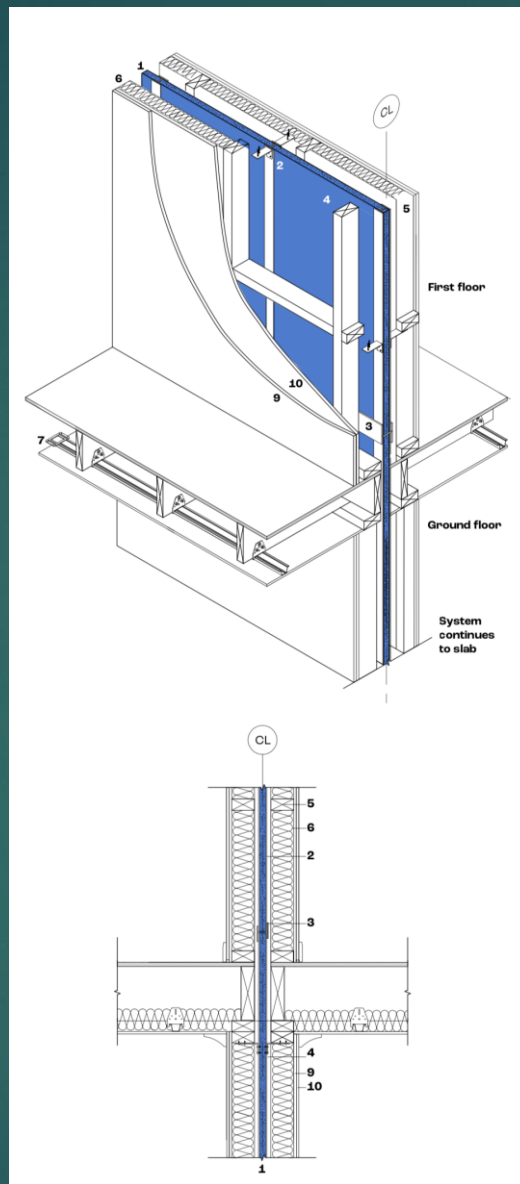
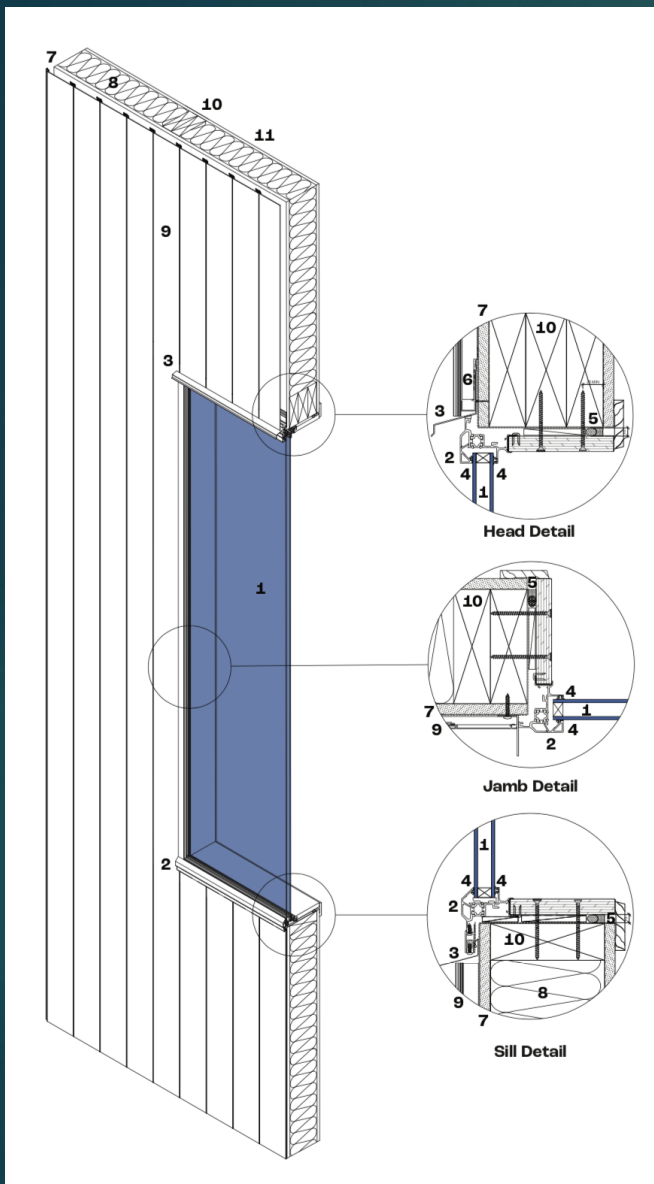
| | |
|---|--|
| FRR | 60/60/60 as full system |
| STC | 65 |
| IIC | 56 |
|  | <ul style="list-style-type: none"> • BRANZ Appraisal 394 (2017) • Strandfloor – Declare Red List Free • Strandfloor – CodeMark BRANZ-CM-1003 • StrandfloorH3.1 – CodeMark BRANZ-CM-1004 • Strandfloor & StrandfloorH3.1 – FSC Certified |
| \$ | \$\$/m² |

For more information:



Laminex NEW ZEALAND BEYOND THE SURFACE

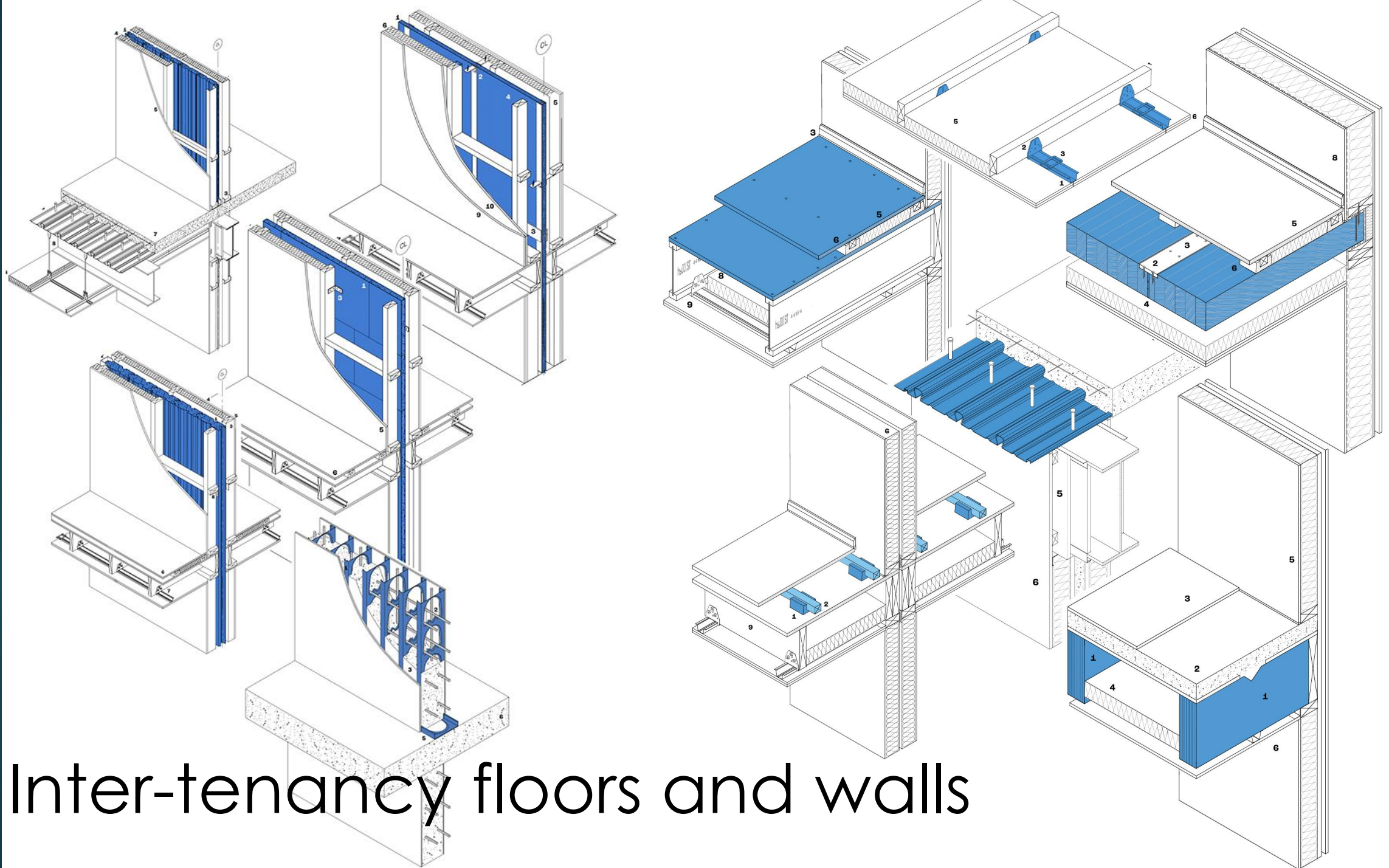
mediumdensity.nz/p/itf-2



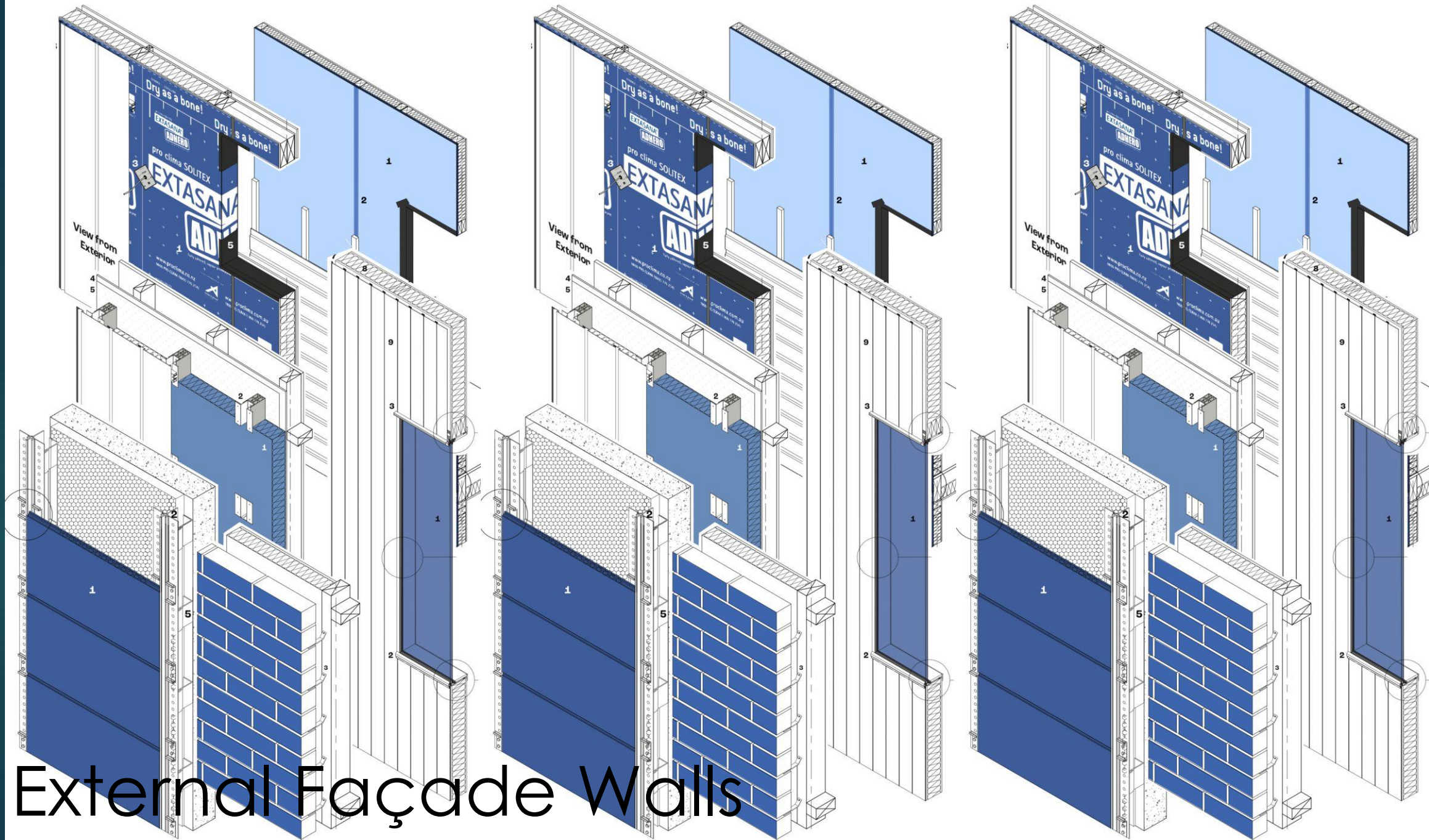
Batten and Cradle™ System with Timber Joist Framing

- 1 Batten & Cradle™ Acoustic Cradles at 450mm max. centres
- 2 Batten & Cradle™ Flooring Systems-approved structural battens, 400mm max. centres
- 3 Acoustic insulation - 50mm when utilising 40mm x 42mm structural battens
- 4 20mm Strandfloor®
- 5 Acoustic sealant, 5-8mm
- 6 ITW Stud frame wall
- 7 GIB® Rondo® direct fixed ceiling system with Quiet Clip
- 8 2 layers of 13mm GIB Fyrelite®
- 9 Timber joists, 600mm max. centres

Industry Solutions



Inter-tenancy floors and walls

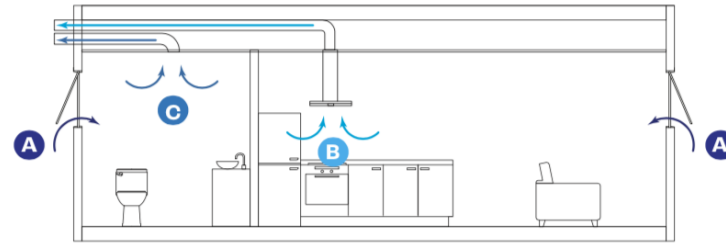


External Façade Walls

Ventüer MEV Mechanical Extract Ventilation

\$

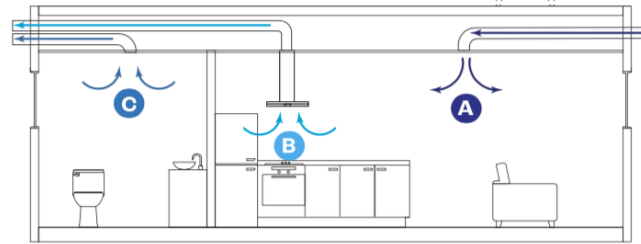
- A** Outdoor air supplied via opening windows
- B** Kitchen area extracted via rangehood
- C** Bathroom zone extracted via bathroom fan



Ventüer BPV Balanced Pressure Ventilation

\$\$

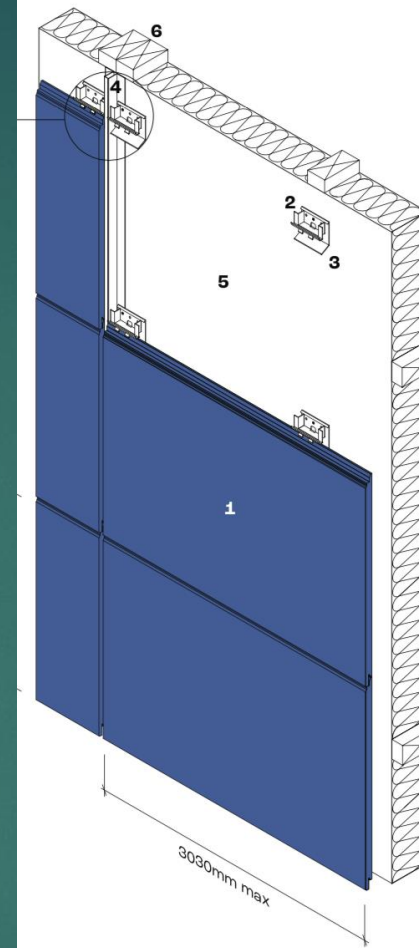
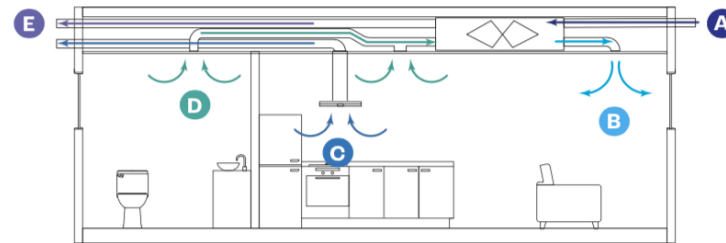
- A** Outdoor air introduced via supply air fan
- B** Kitchen area extracted via rangehood
- C** Stale air drawn out via extract fan at the same rate as outdoor air is being supplied



Ventüer MVHR Mechanical Ventilation with Heat Recovery

\$\$\$

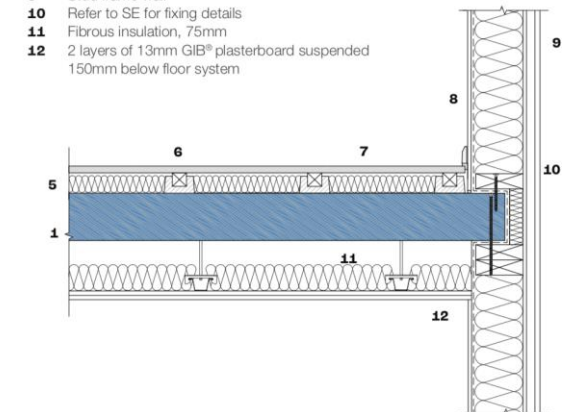
- A** Outdoor air drawn into heat exchanger and passed over outgoing air stream
- B** Pre-heated fresh air introduced to indoor space
- C** Kitchen fumes extracted via rangehood and dedicated duct
- D** Outgoing warm, moist air is extracted from bathrooms and other zones and passed through heat exchanger
- E** Outgoing air streams exhausted to exterior of building



tem

Woodspan® PLT Panels Flooring System FRR 60/60/60 Spline Joint

- 1** WS8 - 140 Woodspan PLT
- 2** Fixings 25mm from edge at 150mm centres
- 3** Plywood, 19mm
- 4** Fireproofing
- 5** Fibrous insulation, 50mm
- 6** Batten & Cradle™ Flooring System
- 7** Particleboard, 20mm
- 8** Continuous vapour barrier (only if required)
- 9** Stud frame wall
- 10** Refer to SE for fixing details
- 11** Fibrous insulation, 75mm
- 12** 2 layers of 13mm GIB® plasterboard suspended 150mm below floor system



30+ Industry Solutions

Part Four

BUILT

Case Studies – Auckland, Wellington, Chch



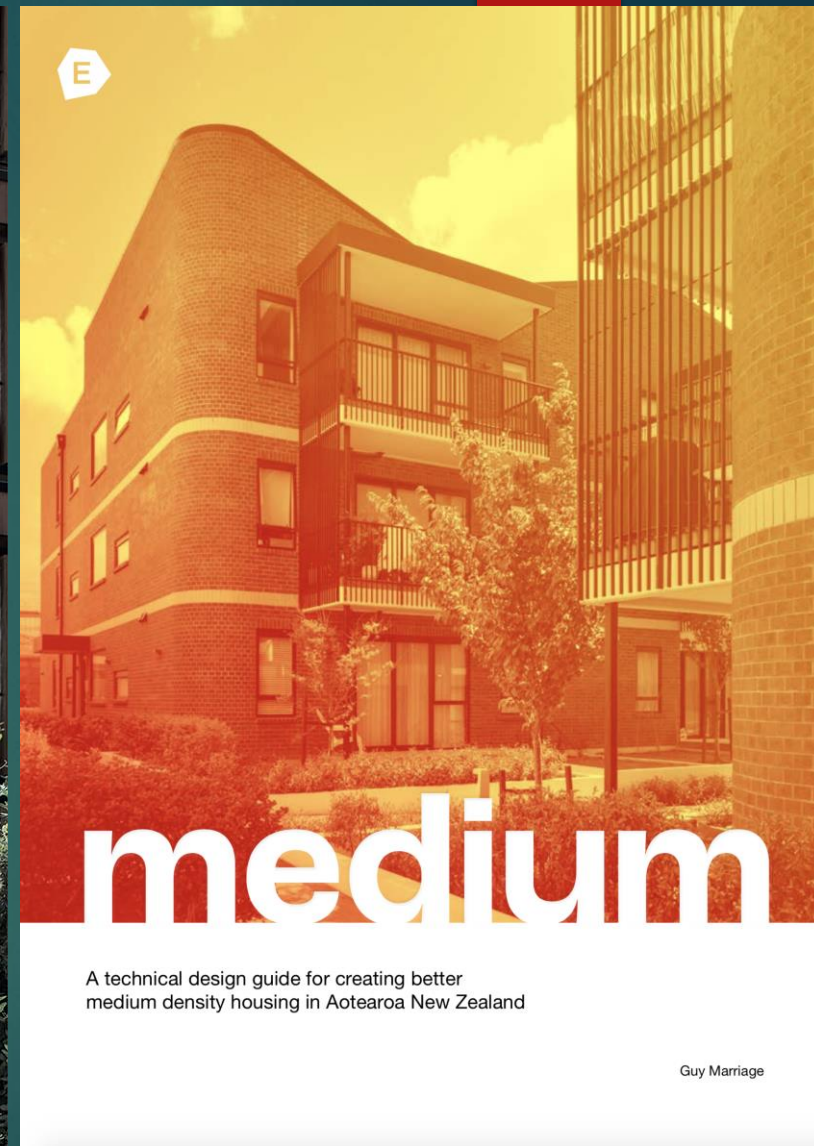
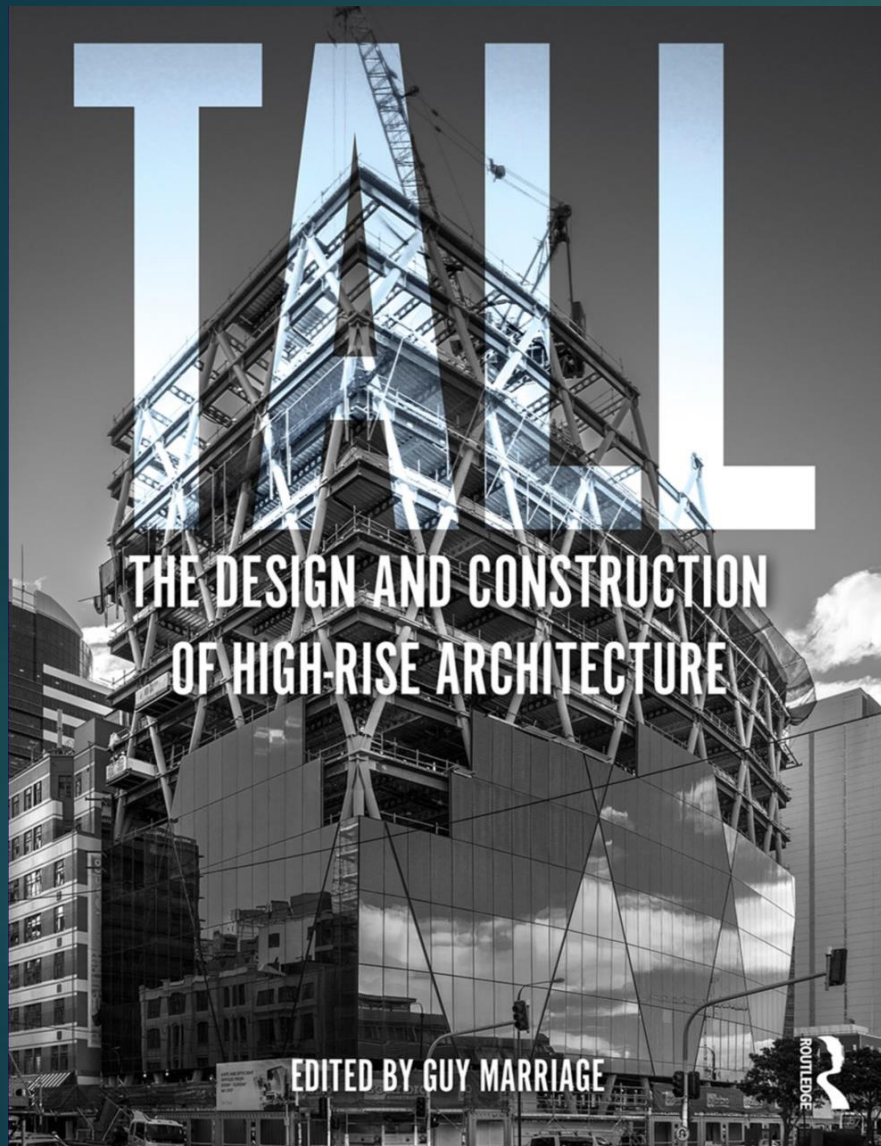
Case Studies – Bernoulli Gardens (Auck), 340
Onehunga (Auck), Altair (Wellington),
Latimer Terraces (Christchurch).

medium density housing needs:

- target how to create good MDH
- excellent design advice
- new Acceptable Solutions aimed at MDH
- higher construction quality standards for building MDH
- better systems for inspection and certification



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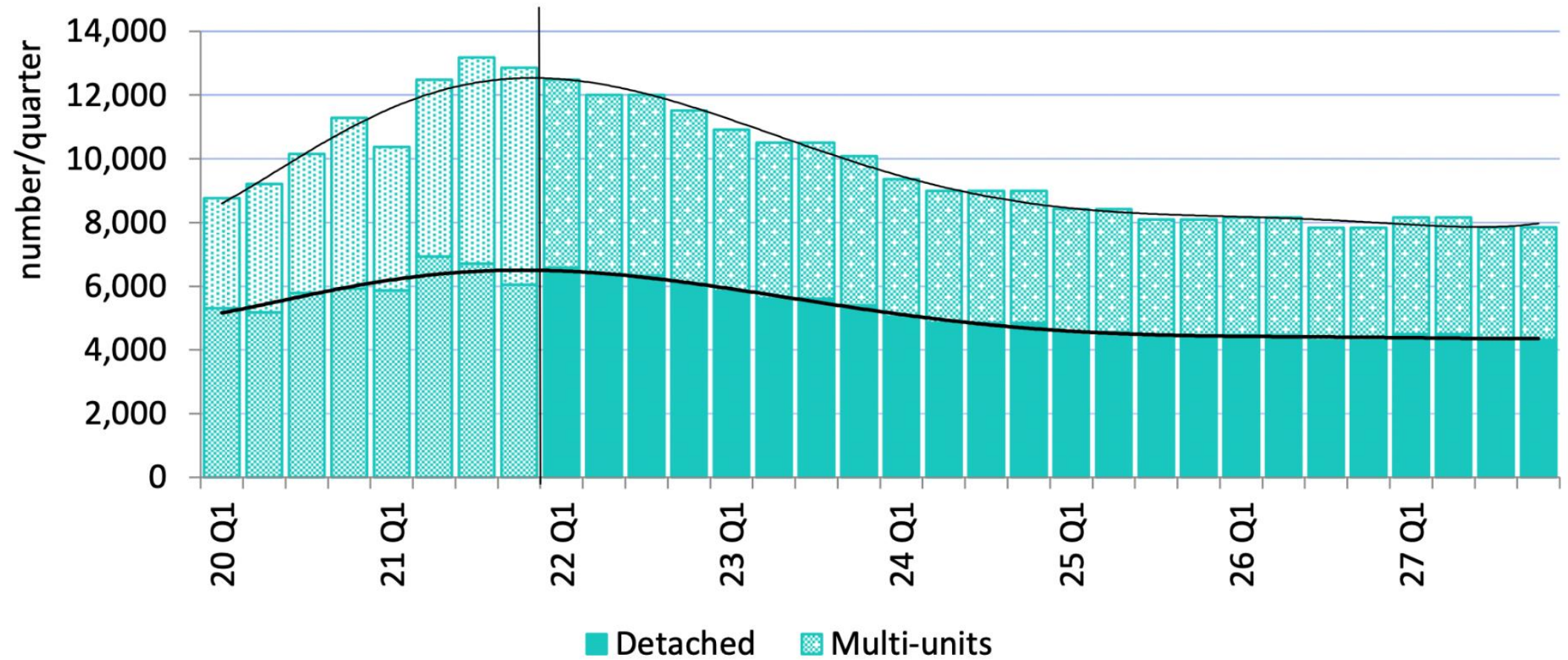
Thank you

ANY QUESTIONS?





Figure 2.4.1 Dwelling units consented nationally



Source: BRANZ



A technical design guide for creating better medium density housing in Aotearoa New Zealand

Guy Marriage

SCAN HERE





Contact

Matthew Duder
Managing Director, EBOSS
matthew@eboss.co.nz