



Recent Experimental Work on Hybrid Timber Systems

BRANZ

David Carradine and Angela Liu





- Hybrid systems
- Structural testing
- Experimental examples
 - Walls and diaphragms
 - Walls on floors
 - CLT
 - SIPs
- New Structures Lab
- Summary

Hybrid Systems Research

- Primarily LTF combinations
 - Vertical hybrids (podiums)
 - Horizontal hybrids (terrace)
 - Steel portals
 - Sheathing material combinations
 - CLT panels
 - Structural Insulated Panels (SIPs)





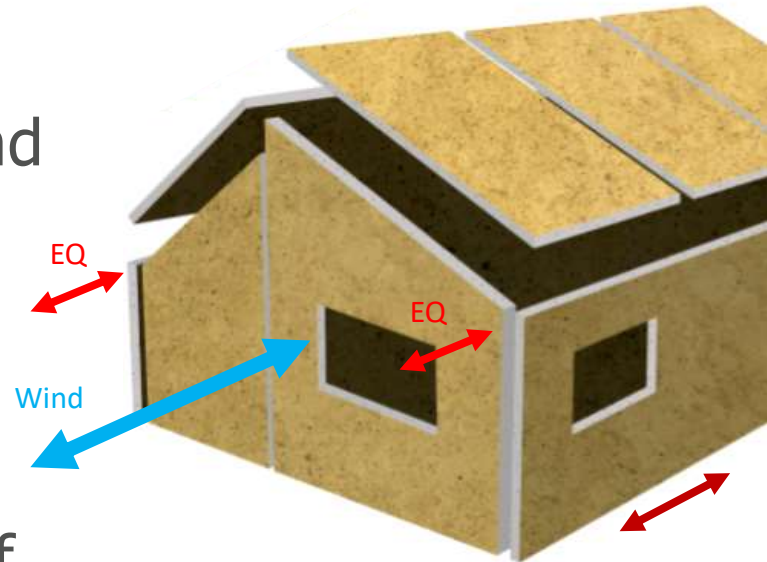
Let's do Some Testing, but Why?

- System/Product Development
 - Strength
 - Stiffness
 - Ductility
 - Failure modes
 - Seismic performance
 - System performance
-
- Compliance evaluations
 - Bracing ratings
 - P21 for NZS 3604
 - Often established standards



Wall bracing in buildings

- Resists lateral loads from wind and earthquakes
- Roofs, walls and floors drive loads
- Bracing walls
 - Resist loads in the plane of wall
 - Carry load to foundations
- Bracing Units (NZS 3604)
 - Indicative measure of capacity
 - P21 Test - 2010

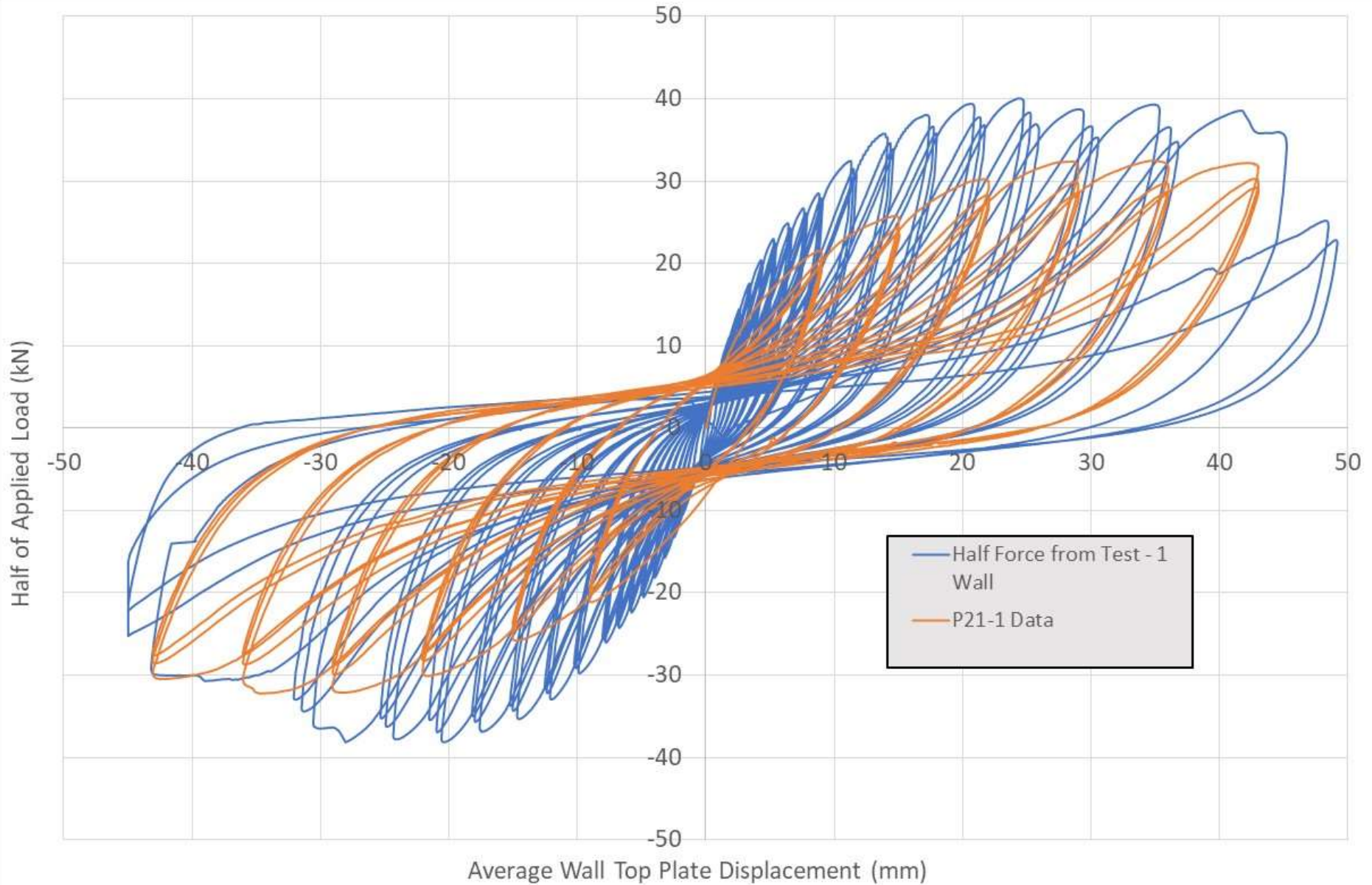




Seismic design of low-rise and mid-rise hybrid residential buildings

- Full-scale diaphragm testing
- 3-D test specimen – 3.6x7.2x2.7m
- Damage/Displacement assessment
- P21 comparisons
- NZSEE 2023 Paper







Hybrid Testing

- Other tests – bracing walls on floors
- CLT at UC
- Data analysis underway

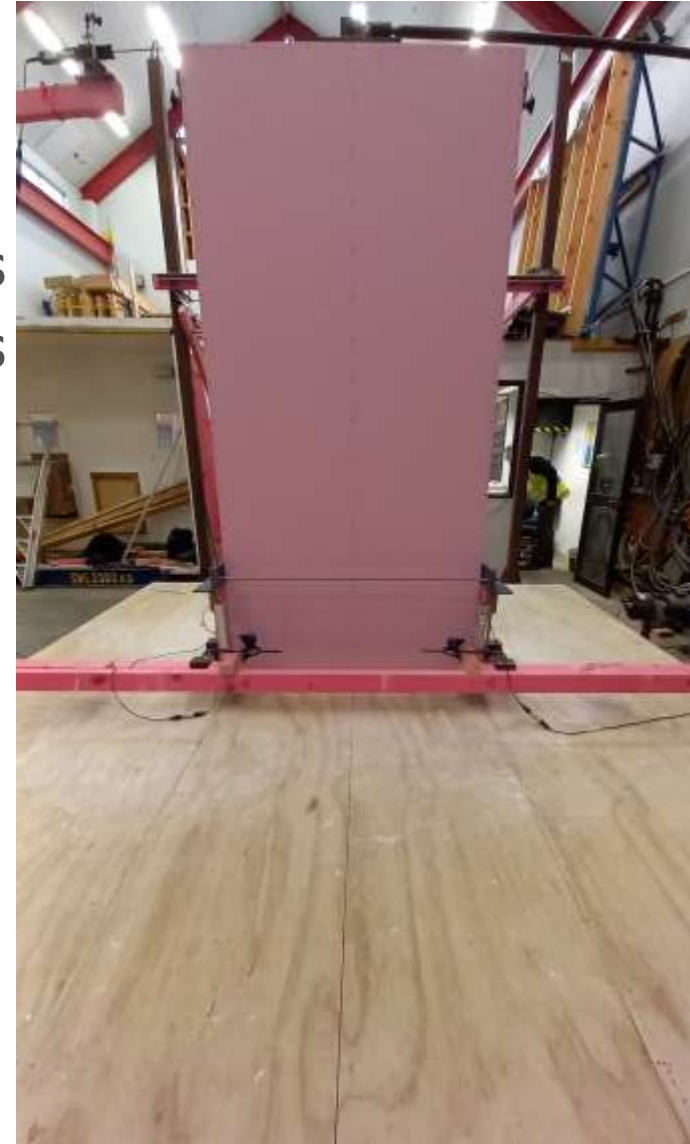
More comprehensive picture of wall performance





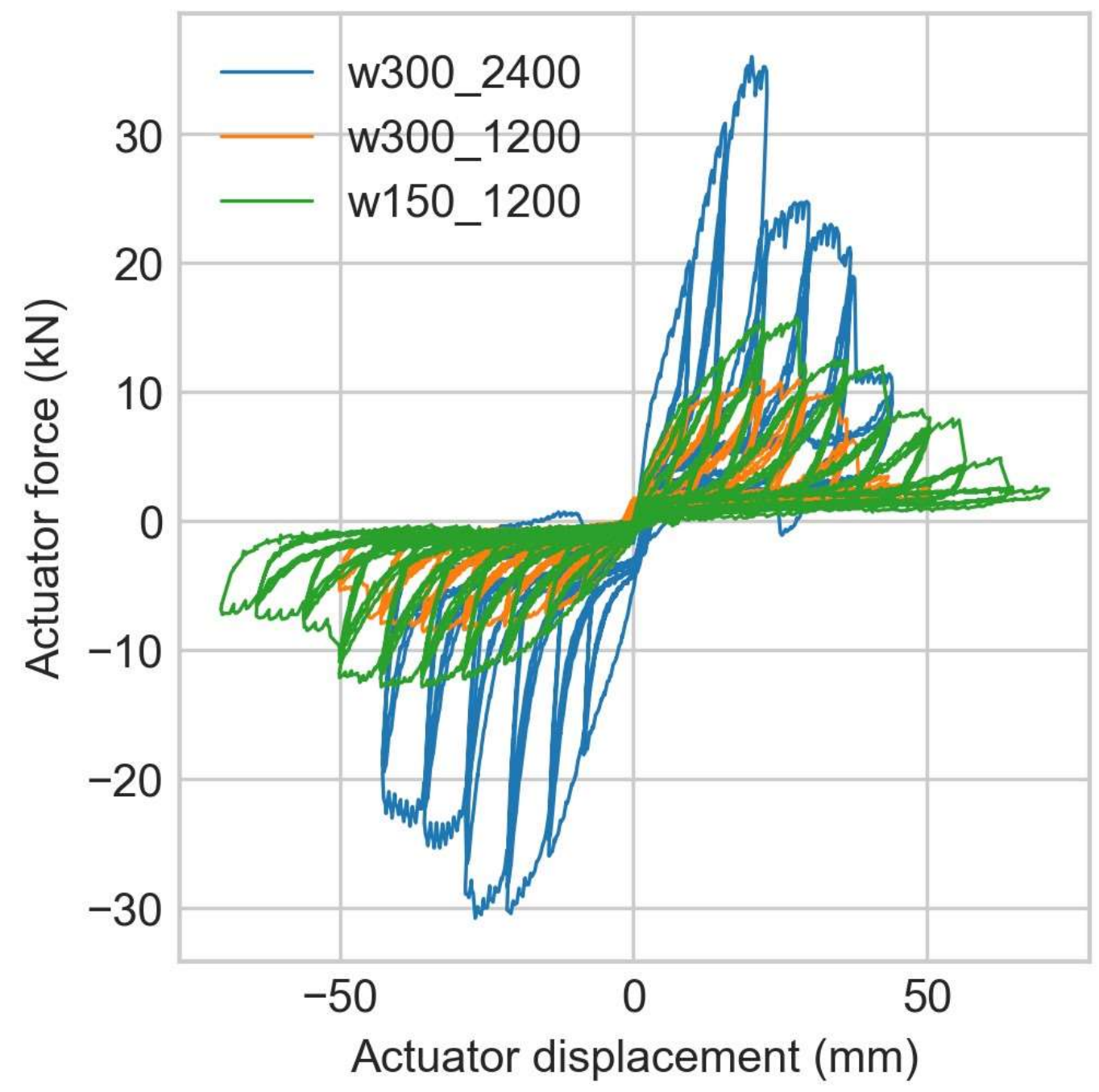
Hybrid Testing

- Bracing walls on floors (4 tests)
 - Approximate P21 with extra cycles
 - 1.2 m parallel and perpendicular to joists
 - 2.4 m parallel and perpendicular to joists
 - Double-sided bracing plasterboard



CLT Test

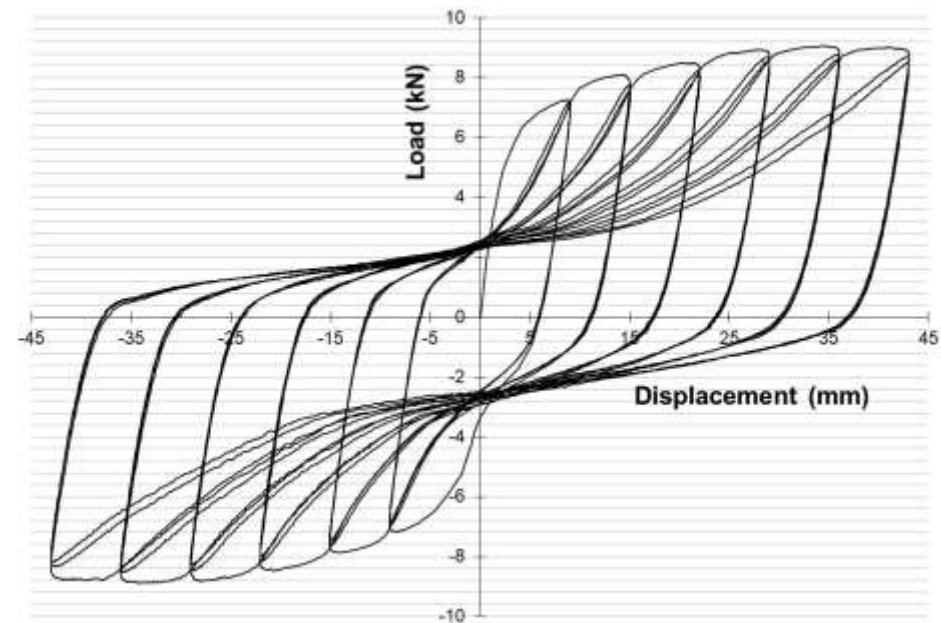
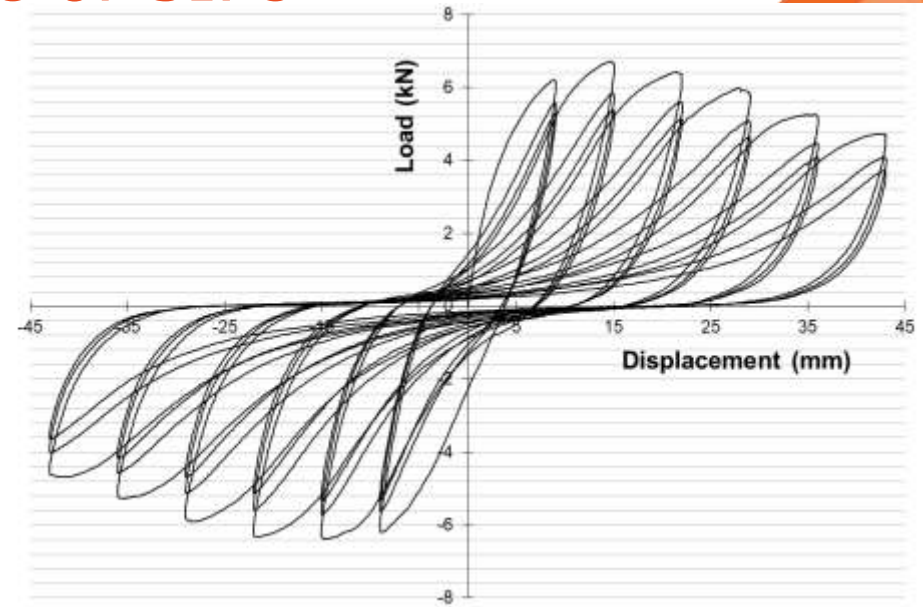
- Comp
- Minim
- Mainta
- 1.2 m
- 150 m



Seismic Performance of SIPs

Range of Bracing Systems

- Plasterboard
- Plywood
- Fibre cement
- Combinations
- Comparisons with SIPs
 - Deformation compatibility
 - Causes of damage
 - Overall performance



SIPs and Plasterboard on LTF

- Combination
- Single-Sided standard plasterboard
- SIP dominated behaviour
- Induced more damage to plasterboard



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Finalis

- New
- 8.5
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- MTS Silent Flow - Increased force capacity – 500 kN





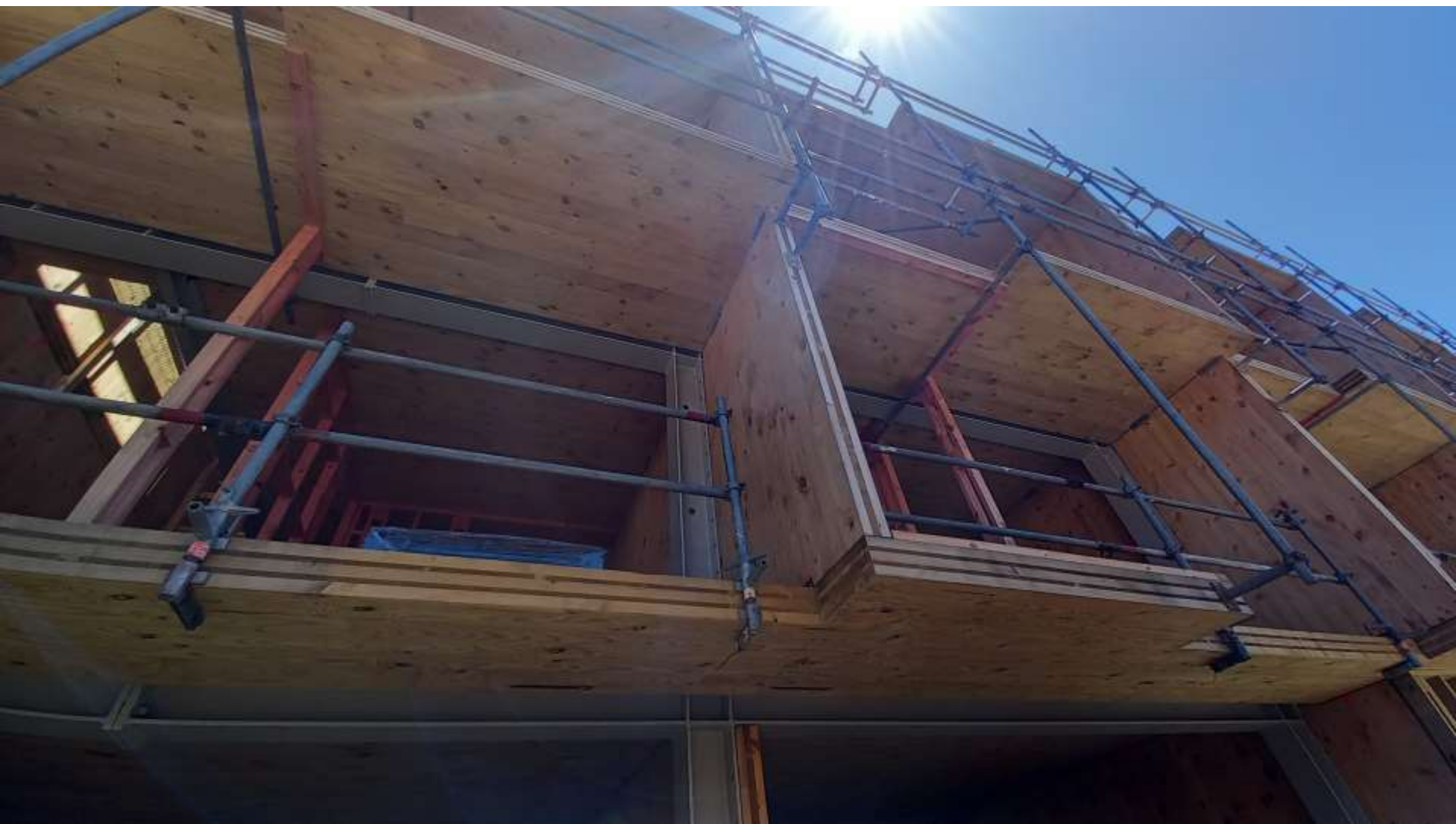


Hybrid timber systems will be the future

- The right material in the right place
- Compatibility
 - Deformations
 - Ductility
- Research providing confidence
 - Capacity and performance
 - Compliance
 - Guidance
- Systems thinking
 - Structure
 - Fire
 - Weathertightness
 - Durability
 - Etc.



Thank you



David.Carradine@branz.co.nz