55 Southbank Boulevard Melbourne Challenges of a 10-Storey Mass Timber Vertical Extension

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1. Project Overview

In the heart of the Southbank precinct, on one of Melbourne's busiest intersections, a Cross Laminated Timber (CLT) building extension designed by architects Bates Smart is currently under construction. Expected to be completed early 2020, 55 Southbank will deliver a 220-room serviced apartment complex to be run by Adina Hotels. The new extension seeks to echo and amplify the architectural expression of the existing building, more than doubling the current height.

This is a landmark project for CLT and mass timber construction for several reasons. It will be the world's tallest mass timber vertical extension; a truly remarkable achievement. More importantly, being a lightweight building material – one fifth the weight of concrete – the utilisation of mass timber has been key to the overall feasibility of the project.

The existing building was originally designed to allow for an additional six-storey vertical extension using concrete framed construction. This structure, though, did not provide enough floor area and therefore apartments, to make the operating of the proposed apartment complex commercially viable. In contrast, the use of CLT enabled the extension to be pushed to 10 storeys, unlocking an additional four floors of serviced apartments, achieving the target number. This was critical for developing a viable business case for the apartment complex to ensure the project was able to proceed. Additionally, the low impact nature of CLT's installation has meant that the building underneath has remained occupied and operational throughout the extension's construction phase. The selection of CLT, therefore, was a key factor in making the project financially and structurally feasible overall.

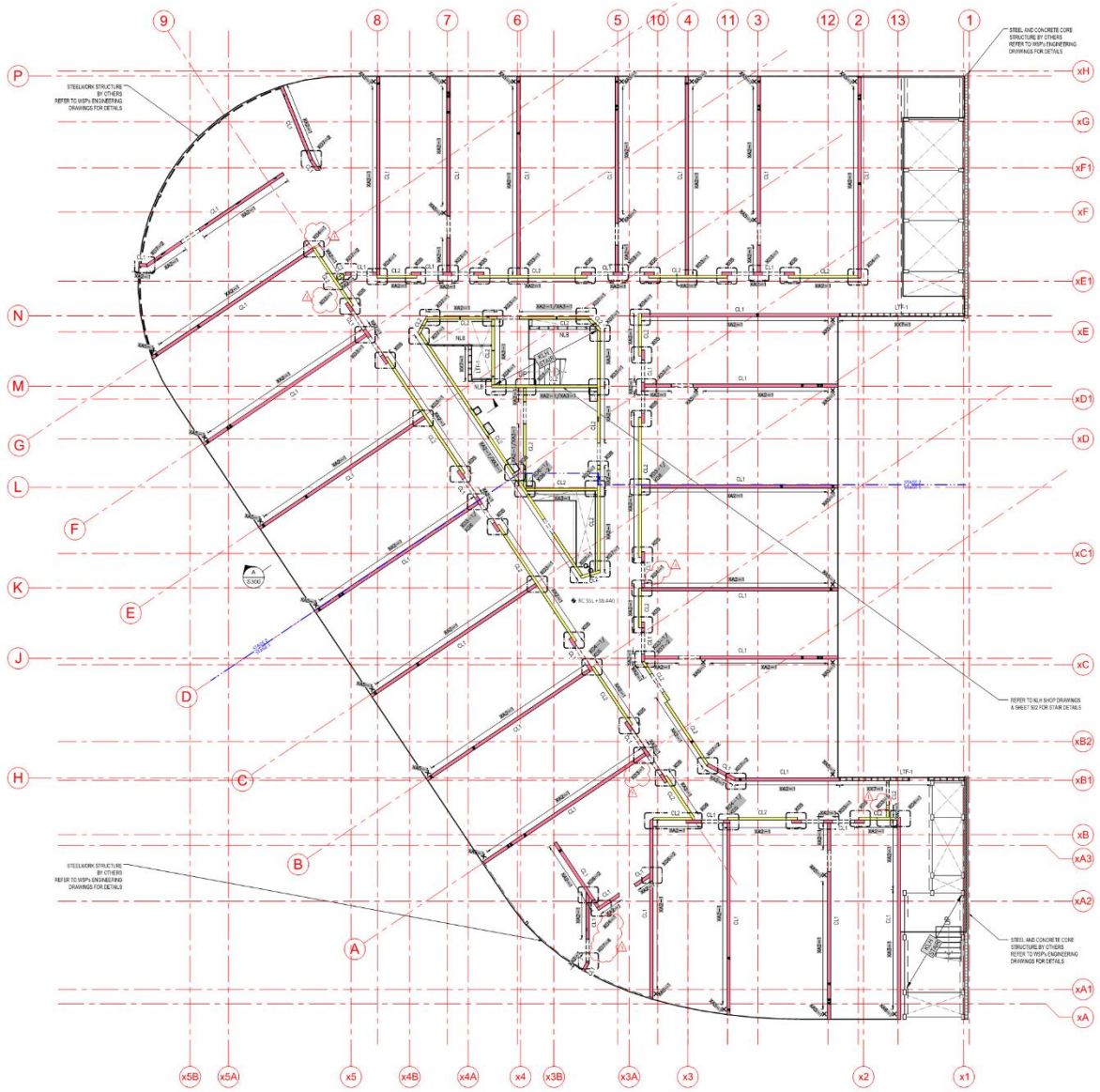
2. Project Data

CLIENT	**Hume Partners**
ARCHITECT	**Bates Smart**
BUILDER	**Atelier Projects**
MASS TIMBER ENGINEER	**Vistek**
CLT SUPPLIER	**KLH (Austria)**
BUILDING HEIGHT	**72m**
STOREYS	**17 (6 existing, 1 transfer and 10 CLT)**
NUMBER OF SERVICED APARTMENTS	**220**
NUMBER OF CLT PANELS	**1,850 approx.**
TONNES OF CLT	**1,730 approx.**
CUBIC METRES OF CLT	**3,675 approx.**
TONNES OF CO_2 SEQUESTERED	**2,800 approx.**

55 outhbank: A 10-storey CLT vertical extension during construction in Melbourne

3. Structural Philosophy

In the architectural design all 10 storeys of 55 Southbank's vertical extension structure have been dedicated to serviced apartments with a regular floor plan. This has meant that the tenancy party walls could be arranged to form a 'honeycomb' structure and that these walls could be continuous through the extension to the supporting transfer deck. This results in walls that not only carry vertical loads down to the existing structure below, but shear walls in various directions, capable of resisting lateral loads (i.e. wind and earth-quake). See typical wall arrangement plan below for details.



55 Southbank: Typical wall arrangement plan

4. Challenges

The 55 Southbank project relies on using CLT on a scale never previously attempted for a timber based vertical extension. This meant that all project stakeholders had to address challenges and complexities that they had not faced before on previous projects and there was little precedent to draw upon in the broader construction industry.

Added to this were the complexities resulting from the project being located on the corner of a very busy major arterial intersection with tight site constraints. The main challenges were:

- Logistics:
  - procurement
  - manufacture
  - sequencing
  - shipping
  - delivery
  - lifting
- Coordination:
  - consultants (structural, mechanical etc.)
  - suppliers (i.e. CLT supplier and bathroom pod supplier)
  - shop drawings
- Weather tightness:
  - water management
- Axial shortening:
  - building tolerances
  - shrinkage
  - creep

For more information please visit our website.