StoraEnso

Partner of Stora Enso

lendlease

Australian National University (Kambri Precinct) Canberra, Australia

“This precinct is innovation-rich,” said BVN lead architect and co-CEO Ninotschka Titchkosky. “It incorporates two of Australia’s largest mass timber construction buildings, the 450-bed student accommodation and the 5-storey collaborative teaching building. Both buildings set a new standard for reduced carbon footprint, construction innovation, and wellness.

The Australian National University (ANU), renowned as Australia's top research university, is situated on an expansive site in Canberra. Despite its numerous buildings and activities, the campus lacked a central 'heart' and had become outdated and unattractive, necessitating significant renovation.

In 2018 BVN architects embarked on a A$260 million (€158 EUR) redevelopment project to revitalise the campus that was realised by Lendlease.

Student Accommodation:

The student accommodation (Fenner Hall Student Residences) features two tower block buildings, providing residential space for 450 students.

These buildings, standing 7 and 9 levels tall, are constructed entirely of Cross-Laminated Timber (CLT).

The student rooms are situated above a two-level concrete podium that offers communal lounge, social, and kitchen amenities. The structure is solid load-bearing CLT, with no additional structural provisions necessary. The use of CLT was feasible due to the repeatable 10m² room module across the floorplate.

Collaborative learning environments:

The structure includes exposed glue-laminated timber (GLT/glulam) and a CLT cassette floor system fabricated by DesignMake in Eastern Creek, Sydney. The collaborative learning building is a six-storey teaching facility featuring a variety of formal and informal learning spaces connected by a circulating stair.

The lift and service cores are constructed from exposed CLT as well. Exposing all structural elements allows the building to benefit from the multiple physiological, psychological, and environmental advantages of wooden interiors, while also reducing the cost of applied finishing materials.

Accelerated delivery:

The total build time for all buildings was 18 months, with labour on site peaking at around 700 people and an average build cost of $25 million per month. This was one of the largest cohorts of construction workers in Canberra since the building of Parliament House in the 1980s.

Reducing the extent of concrete construction was crucial for meeting the tight schedule. The timber structure for the student accommodation was installed in about three months by a team of 13 people, including 10 on the floor and three for the crane crew.

Fewer labourers and related costs

In contrast, concrete construction would have required around 50 people, including multiple trades such as scaffolders, formworkers, concrete, and drywall partition contractors.

The reduced team and working hours also enhanced site safety. Timber construction involves fewer high-risk activities, such as moving reinforcing around the site and the risk of falls during column pours.

The timber assembly team, part of the facade subcontractors, brought proficiency in accurate and detailed setout and carpentry, complementing the skills needed for timber installation. Despite being new to Mass Timber Construction (MTC), the team improved their sequencing to accelerate and optimize the process. The reduction in labour significantly lowered labor costs from 50-60% in traditional construction to 20-30% for MTC.

As the industry matures, more suppliers enter the market, and a local supply chain develops, the high material costs (70-80%) should decrease over time. Additionally, savings in other trades, such as services, due to the simplified process of drilling into the engineered wood instead of concrete, should be better understood and realised in total cost savings. Source

Facade System:

The prefabricated timber structure, combined with the cost of scaffolding and program pressure, led to the introduction of Australia's first fully prefabricated rainscreen facade at scale.

This system, developed in the US by Island and adopted by CSR for the project, eliminated the need for scaffolding, saving $1.2 million.

Each panel took approximately 20 minutes to install from being hooked to the crane. The timber structure did not require a construction apron, allowing the prefabricated facade panels to be installed in sequence with the timber structure, enabling finishing trades to progress immediately behind the facade installation. In concrete construction, the facade would need to be installed considerably later after the construction apron could be lifted. Source

Flexible adaptable space

Lecture theatres and learning spaces were also re-imagined as ANU's education model shifted. Priority was given to multi-purpose reconfigurable spaces over fixed single-use. Large format spaces that can morph into inviting cultural spaces. And small informal spaces where individuals and small groups could mix socially, unconstrained by departmental boundaries.

Sustainability:

The ANU Kambri development has ambitious sustainability targets using the 'One Planet' system, which measures human demand versus nature's supply. The project aims for an ecological footprint equivalent to 0.6 of the planet, considered "World Sustainable Leadership."

The One Planet system evaluates the project holistically, including bio capacity, operating consumption, transport, and infrastructure. The timber structure is assessed in the buildings component of the measurement.

Adopting timber structures for the collaborative learning environments and the student accommodation reduced embodied carbon by more than 30% over traditional concrete, as well as reducing construction time and increasing safety.

Across the project, over 31,100 tonnes of CO_2 were avoided by specifying low-carbon materials, clever design, and construction-equivalent to delivering the entire Student Accommodation building with zero carbon footprint. The timber-framed teaching building performed better than the CLT Student Accommodation, avoiding 9,673 tonnes of CO_2 versus 4,400 tonnes of CO_2.

A significant advantage in the teaching building is the reduction in finishing materials, as the timber structure was left exposed. No additional ceilings were added, avoiding 20-60kg CO_2/m^2 of finished ceiling.CLT core walls replaced traditional blockwork walls, halving the embodied carbon per square meter and avoiding 175kg CO_2/m^2. Source.

Wood Origins

The CLT elements were made with wood sourced from PEFC-certified forests and FSC Controlled Wood (DNV-CW-001077), ensuring that the timber used comes from sustainably managed forests. PEFC and FSC are the two most trusted and widely recognised certifications for sustainable forest management.

Learning and wellness:

The benefits to wellbeing of timber buildings have been widely documented. The use of wood in the interior of a building has clear physiological and psychological benefits that mimic the effect of spending time in nature. The feelings of natural warmth and comfort that wood elicits in people have the effect of lowering blood pressure and heart rates, reducing stress and anxiety, increasing positive social interactions, and improving corporate image. Stora Enso Health and Wellness Whitepaper

Fire protection engineering

Each room required a 90-minute fire separation. Initially, the project was designed to have one exposed CLT wall in the rooms and exposed soffits in the corridors and rooms. The combined effect of acoustic and fire separation between rooms resulted in all surfaces in the rooms being clad in fire-rated plasterboard. Each panel received a subframe with plasterboard and insulation attached to one side to achieve the acoustic rating.

At the time, this fire protective cladding was applied on-site; however with further maturation of the industry, it is now possible for Stora Enso to apply fire protective liners in our mills before delivery, reducing the construction time even further.

Meet the project team

The success hinged on a close working relationship with the university and the mass timber specialists. An integrated approach to design and construction was essential to minimise the impact on university operations and achieve the seemingly impossible goal of completion within 18 months.

Recognition and Awards

The precinct was gifted the name Kambri, meaning 'meeting place' by Indigenous representatives of the Little Gudgenby River Tribal Council, Buru Ngunawal Aboriginal Corporation, King Brown Tribal Group, and the Ngarigu Currawong Clan.

The Kambri Precinct at the Australian National University (ANU) has received significant recognition for its architectural and urban design excellence. Notably, it won the 2020 ACT AIA Urban Design Award which highlights outstanding contributions to the built environment in the Australian Capital Territory. The award reflect the precinct's innovative approach to blending educational, cultural, and environmental elements into a cohesive and vibrant campus hub.

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2020 ACT AIA Urban Design Award

Photo credit: Australian National University

General

Delivery year

2018

Building type

Education

Area (m²)

10,150

Storeys

9

Products

Products and Services

CLT, GLT

Product volume (m³)

4,175

Team

Partner of Stora Enso

Lend Lease

Developer

Australian National University, Kambri, ACT

Architect

BVN

Timber Engineer

ABS Structural Engineering: Robert Bird Group

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Others

Construction duration (months)

18