

DISCIPLINE CASE STUDY

# Timber

OPPORTUNITIES  
THROUGH  
EXCELLENCE

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Welcome



# Our Team

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# Castle Towers Zone 3 Redevelopment – East Village Office

CASTLE HILL, NSW, AUSTRALIA

CLIENT: QIC



**The East Village Office is a proposed 12-storey A-grade commercial building within the Castle Towers Zone 3 Redevelopment at the Castle Towers Shopping Centre. The project aim was to produce a lighter-weight, lower embodied carbon exposed timber structure - a standout commercial building in the Hills District.**

#### The project includes:

- 12-storey hybrid timber office structure over four levels of concrete podium/basement structure.
- The office tower comprises composite timber-concrete floors supported on Deltabeams (Peikko).
- The internal columns and bracing are glulam timber.
- The building is supported using a concrete core.
- The internal timber is proposed to be European spruce CLT and GLT.
- Hardwood Australian timber is proposed for the external bracing.
- The podium structure interfaces with the existing and proposed retail structure and a new hotel. This requires design coordination with three different architectural teams.
- The eastern end of the commercial structure is supported over an existing metro tunnel.

The project is currently in the design phase and has been issued for tender.



### BG&E SCOPE

Structural design from concept phase.  
Providing a structural solution for the office floors that is lighter weight and allows a reduction in embodied carbon, compared to a 'business as usual' concrete frame structure.  
Civil design from concept.

### Key Technical Achievements and Innovations

To achieve a timber solution at greater spans to suit an open office floor plan, a hybrid timber floor structure has been proposed. This system is designed to remain exposed for a 90 FRL and provides a flat soffit for simple service reticulation and floor-to-floor savings.

### Features include:

- Timber concrete composite floor – 120 thick reinforced concrete + 240 thick CLT.
- Deltabeams – concrete-filled steel box sections, a proprietary system by Peikko.
- Lower embodied carbon structure.
- Lower weight structure over the existing metro tunnel.

Castle Hill Towers Zone 3 Redevelopment – East Village Office – Castle Hill, NSW, Australia.





# Gardeners Road Distribution Centre

ALEXANDRIA, NSW, AUSTRALIA  
CLIENT: GOODMAN

**To reduce the developments upfront carbon, BG&E designed ancillary offices using mass timber.**

The proposed development comprises the construction, fit out and operation of a two-storey warehouse and distribution centre with ancillary offices, which includes:

- Demolition of all existing structures and buildings on site.
- Retention of existing fire tanks and pump room.
- 24,485m<sup>2</sup> of total gross floor area (GFA) comprising approximately:
  - » 19,864m<sup>2</sup> of warehouse GFA across eight warehouse units,
  - » 2,790m<sup>2</sup> of office GFA, and
  - » 773 m<sup>2</sup> of rooftop garden area.

The office structure comprises:

- one level of concrete mezzanine floor,
- two levels of timber office floor with Glulam timber columns and beams and CLT floor panels, and
- one level of timber rooftop terrace floor with Glulam timber columns and beams and CLT floor panels.

### BG&E SCOPE

- Structural design for the timber office building attached to the main warehouse core - from concept design to 70% tender detailed design.
- Provide specialty timber services, including acoustics advice for timber floor and fire design of timber elements.
- Auto-extinguishment analysis of timber structure.
- Provide high level costing plan.
- Undertake embodied carbon calculation of office structure with different construction methodology.

### Key Technical Achievements and Innovations:

- Provided structural design options to keep timber procurement options open.
- Provided auto-extinguishment analysis of timber office structure to prove each compartment fire will put itself out within the specified FRL.
- Lowered the embodied carbon of the development by utilising exposed timber for the office structure.



*Gardeners Road Distribution Centre –  
Alexandria, NSW, Australia.*



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# Oakdale West Industrial Estate Amenities

KEMPS CREEK, NSW, AUSTRALIA

CLIENT: GOODMAN

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**BG&E designed the curved timber structure that is proposed to house the estates open-air café. The project was developed with a holistic approach to sustainable design. The timber structure, cladding and decking was designed to be a mix of Australian timber species.**



# Timbertop Estate

OFFICER, VIC, AUSTRALIA  
CLIENT: PARKLEA

**Located in Officer, Victoria, Timbertop is a residential development that was completed in 2023. It showcases a hybrid structure - consisting of one level of suspended concrete and a mass timber roof structure.**

Timber Design Studio (TDS) undertook the following roles as part of the project design team:

- timber structural engineering,
- procurement advice,
- cost planning,
- LOD400 modelling of the timber structure, and
- construction planning in collaboration with the Early Contractor Involvement contractor.

Their LOD400 model, independent of a manufacturer, allowed the builder the opportunity to tender the market without fabricators having to take on any Design and Construct responsibilities.

A testament to the high-standard design and coordination, the timber framed level achieved a four day construction of the timber columns, beams and roof, a remarkable contrast compared to three weeks for the columns and suspended concrete slab on the first floor.

*This project was delivered by our partner, Timber Design Studio (TDS). In 2023, TDS merged with BG&E after more than two years of partnership - to leverage TDS' long history and expertise in mass timber construction in the advanced European market.*



# St. Luke's Health

LAUNCESTON, TAS, AUSTRALIA

CLIENT: ST. LUKE'S HEALTH



## The St. Luke's Health building, situated in Launceston, Tasmania, stands as the first carbon-positive structure in the state.

This building for the healthcare sector is a hybrid construction - comprising two levels of concrete, five levels of mass timber, and a steel-framed roof.

As a part of the project design team, Timber Design Studio (TDS) provided the timber design services, including timber structural engineering, procurement guidance, cost planning, LOD400 modeling of the timber structure, and collaborative construction planning with the Early Contractor Involvement contractor.

TDS undertook the independent LOD400 model to allow the builder the competitive opportunity to tender to the market without the fabricators having to take on any Design and Construct responsibilities. This led to the Glulam being supplied from Germany, and two separate Cross Laminated Timber fabricators supplying the project.

Due to the high degree of design and coordination, the project was able to achieve a 50% reduction in construction time in the structure and will see this project completed in just under 12 months in duration, in 2023.

*This project was delivered by our partner, Timber Design Studio (TDS). In 2023, TDS merged with BG&E after more than two years of partnership - to leverage TDS' long history and expertise in mass timber construction in the advanced European market.*

# Busselton Jetty

BUSSELTON, WA, AUSTRALIA  
CLIENT: SHIRE OF BUSSELTON

**Busselton Jetty was first constructed in 1865 using timber and has numerous extensions, up until the 1960's – creating a remarkable 1.8-Kilometre jetty.**

BG&E was engaged to carry out the structural assessment and restoration design of the historic Busselton Jetty. This involved:

- detailed inspection and structural assessment of the existing jetty,
- analysis and design of the skeleton jetty section, and
- repair, reconstruction, and refurbishment of the deteriorated jetty sections.

The jetty represents a significant asset to the local community. After officially closing as a Port in 1973, the jetty was left unmaintained. In 1987, the Busselton Jetty Environment and Conservation Association (BJECA) formed. From 1987 to 2003, BJECA raised sufficient funds to replace 50% of the Jetty structure, establish the train service, and construct the iconic Underwater Observatory and Interpretive Centre - which was completed between 2003 and 2011.







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# Curtin University – Engineering Pavilion B215

BENTLEY, WA, AUSTRALIA

CLIENT: CURTAIN UNIVERSITY OF TECHNOLOGY

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**The Curtin University of Technology commissioned the Engineering Pavilion project to create an additional shared use building for the engineering department. Several cutting-edge material technologies were used in the structure of the building, which helped the University to achieve a 5-star rating on the Green Star Rating System.**

Purposefully designed to explicitly show the engineering aspects of the building, the Engineering Pavilion houses communal space for numerous functions, including as an exhibition space, general meeting area, and for teaching and self-learning.

The building boasts a triple-height atrium, located next to the floors containing walkways and vertical circulation.

One key design aspect is the roof structure atop a 19-metre x 17-metre exhibition space. A bow-string truss was used, comprised of two 115-millimetre x 460-millimetre glulam timber beams on either side of a six-millimetre-thick steel flitch plate as the top chord of the truss, and a 25-millimetre diameter tensioned stainless steel rod as the bow-string bottom chord.



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# ECU – Administration & Academic Buildings

CAMPUS WEST JOONDALUP, WA, AUSTRALIA  
CLIENT: EDITH COWAN UNIVERSITY

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**BG&E provided structural and timber engineering services for the revitalisation of the administration and academic buildings at the Joondalup Campus of ECU. The colonnade is a striking feature of the project and has become the signature building on the campus and represented in all University publications. The principal members of the colonnade comprise large, laminated timber sections acting compositely with steel spine sections.**



# Shire of Dardanup Community Hub, Library & Administration Building

DARDANUP, WA, AUSTRALIA  
CLIENT: PERKINS BUILDINGS



**The project brief was to design a community hub of the future - providing an engine room for collaboration, connection and innovation while showcasing the potential for leading sustainable timber construction.**

The contractors, Perkins Builders, and Peter Hobbs Architects developed an 80% design with BG&E prior to sending it to a carpentry subcontractor for final design. The new Shire of Dardanup Community Hub – comprising a library, council chambers, administration centre, makerspace plus mixed-use of community spaces – is a modern two-storey, L-shaped building clad predominantly in stringy

bark with charred jarrah timber as accents. The L-shaped building will allow for a formal civic courtyard space, accessible from the library and council chambers. Chosen to suit local fabrication, BG&E designed the structure using Laminated Veneer Lumber (“LVL”) columns, beams and bracing, and light-weight timber floor cassettes.

### BG&E SCOPE

- BG&E was the structural designer on the project. Our brief from the Client was to design a timber structure that could be sourced from the local supply chain. The Client had already been in preliminary discussions with a local timber fabricator, and our role was to design with consideration of their preference for LVL framing.
- The building required a hybrid lateral system due to the large plan area, combining concrete shear walls for the lift structure and timber bracing elements in areas of the façade.
- The FRL considered was 30 minutes, with timber columns and beams remaining exposed.

### Key Technical Achievements and Innovations:

- The project was designed using a LVL cassette system that was able to be prefabricated and transported to the site and installed by traditional carpentry trades in the WA market.
- Large twin-beam cantilevers ran either side of the columns to support the curved fascia elements that were unique to the structure.



*Shire of Dardanup Community Hub, Library and Administration Building – Dardanup, WA, Australia.*



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# Katara Hills Pedestrian Bridge

DOHA, QATAR

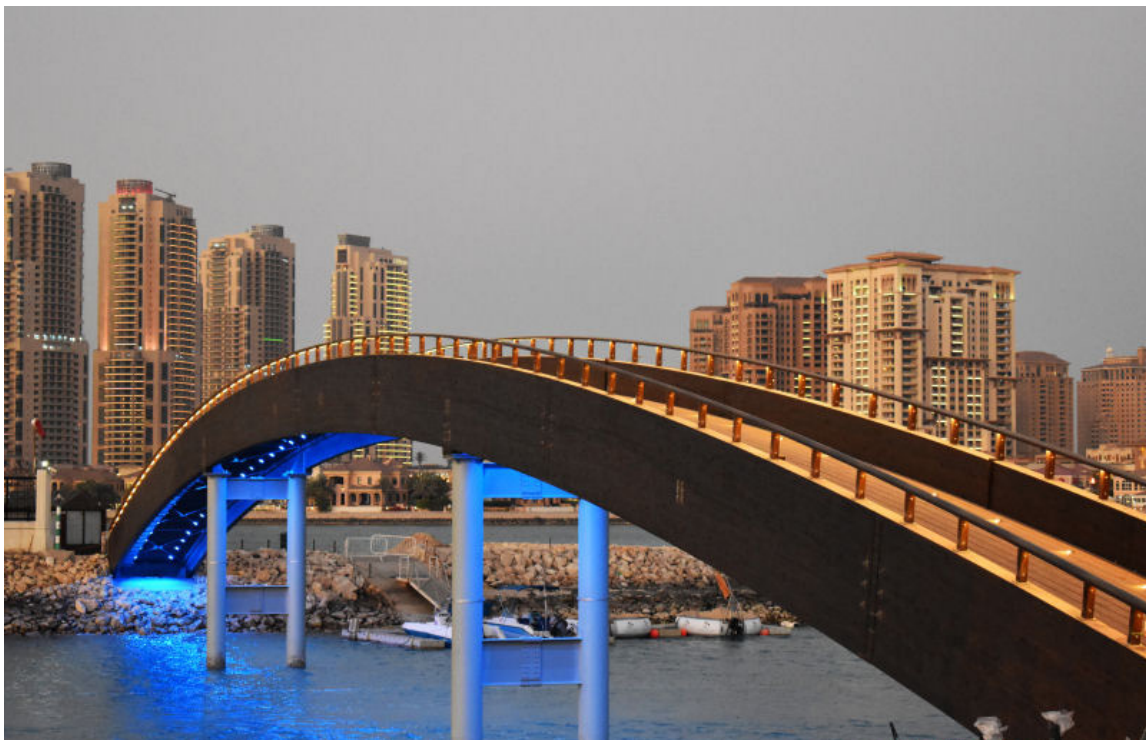
CLIENT: TIMBERLAB

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The bridge is a 92 metre span pedestrian timber Glulam bridge. Concept design for the bridge, for various span options and arrangements, included:

- cable stay Glulam,
- timber truss, and
- various span options for Glulam beams.

BG&E undertook the design verification of Timberlab's final timber design, the chosen span arrangement 92 metre long glulam super structure (29 metres + 34 metres + 29 spans), as well as the design of steel substructure.



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At BG&E, we are united by a common purpose – we believe that truly great engineering takes curiosity, bravery and trust, and is the key to creating extraordinary built environments.

Our team of more than 1100 highly skilled people, in 15 offices across Australia, New Zealand, South East Asia, the United Kingdom and Middle East, design and deliver engineering solutions for clients in the Property, Transport, Ports and Marine, Water, Defence, Energy and Resources sectors.

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