
SECTOR CASE STUDY

Commercial

One The Esplanade — Perth, WA, Australia.



**BG
&E**
Part of SYSTRA



Canva Global Headquarters

SYDNEY, NSW, AUSTRALIA

CLIENT: CANVA

BG&E is providing structural engineering and construction engineering services from tender through to construction phase for the new global headquarters of Canva on Kippax Street in Surry Hills — a landmark adaptive reuse project designed by Cox Architecture.

Targeting a 5 Star Green Star rating, the commercial development involves:

- The addition of four structural floors to an existing above-ground 10 storey building.
- Relocation of the existing cores to support additional levels through the construction of a temporary lateral stability system utilising steel framing.
- Demolition of part of the existing building, including cores.
- Relocation of the substation while remaining 'online' for the entire duration of construction.
- Strengthening of columns.

Unknown latent site conditions were minimised via Early Contractor Involvement (ECI) with the builder, Infinity Constructions, through early presence and significant investigation onsite during the tender phase.

A key constraint was the assessment of the existing structure to inform both architectural changes and loading increases based on the proposed building upgrade works.

Assessments were also required to determine fire ratings for existing slabs, beams, columns, and walls in accordance with BCA and relevant standards.

Set to open in 2027, Canva Global Headquarters will become a global benchmark for innovative, sustainable, and people-centric workplace design.

333 Kent Street

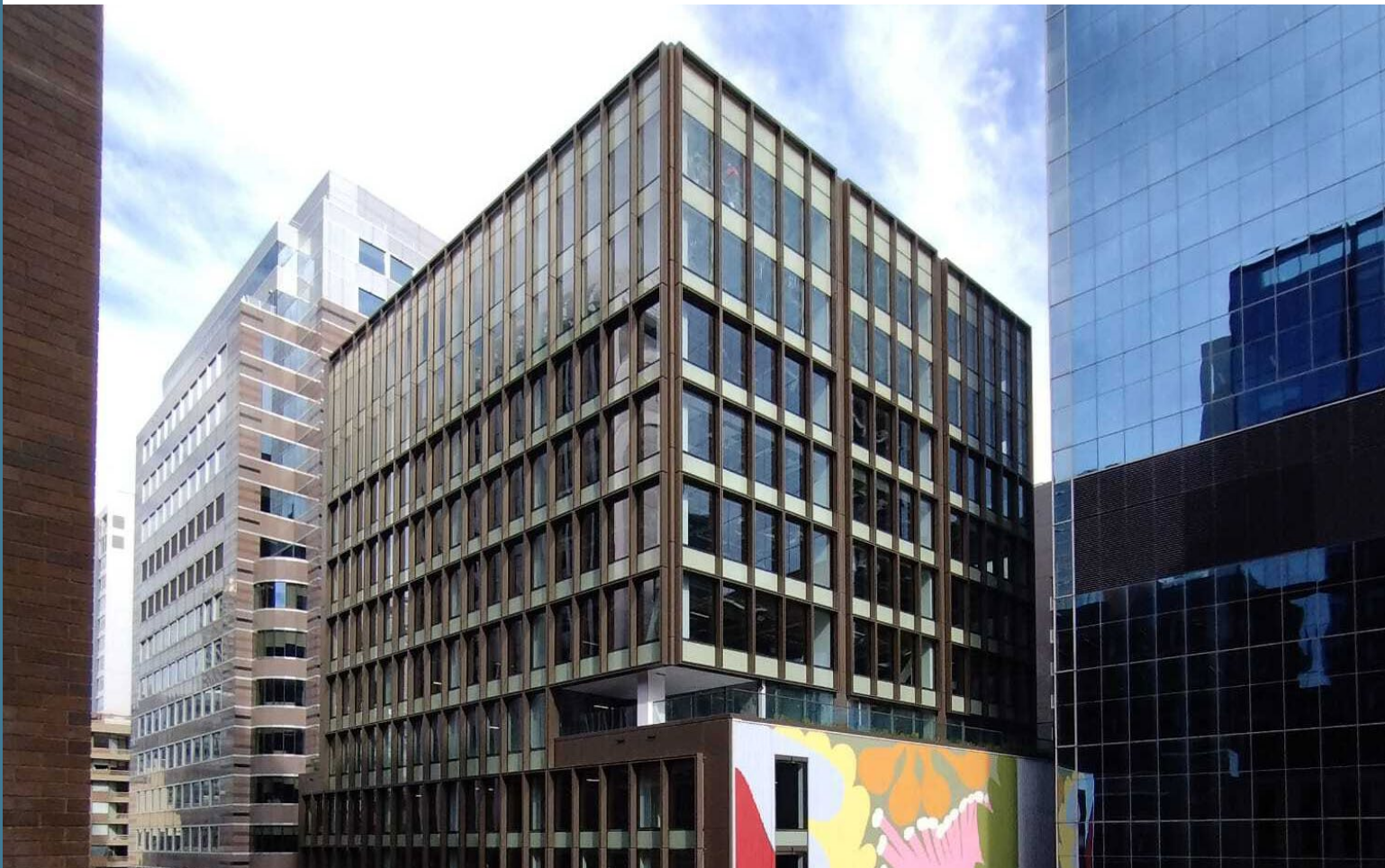
SYDNEY, NSW, AUSTRALIA

CLIENT: FDC

The revitalisation of a 1980's Sydney merchant house at 333 Kent Street has transformed this site into a state-of-the-art workplace.

This \$400 million office tower redevelopment project seamlessly merges past and future, maintaining the integrity of the original building character — a nine story structure with a ground and mezzanine level, while implementing significant internal and external alterations — including seven additional stories and a section of new commercial façade while retaining the heritage façade.

BG&E provided comprehensive material testing, construction engineering, and structural engineering services from concept to construction completion.



Our work involved in-situ concrete wall and slab testing and investigation and analysis of the existing building's concrete properties to preserve the original structural elements.

A key challenge was strengthening the structure to meet the latest design code, and ensuring compliance through preparing performance solutions.

The project emphasised adaptive reuse and sustainability, delivering a carbon-efficient design solution while upcycling the iconic existing structure into an A-Grade commercial building in the heart of Sydney's CBD.

*333 Kent Street —
Sydney, NSW, Australia.*



Quay Quarter Tower

SYDNEY, NSW, AUSTRALIA
CLIENT: DEXUS

The Quay Quarter Tower (QQT) project comprised conversion of a 50-year-old, 45 storey asset into a highly sustainable commercial vertical village, wildly recognised as the largest adaptive reuse project in the world.

BG&E played the key role in transforming the architect's ambitious vision into a constructible solution through our structural and construction engineering services from concept to completion.

In a construction world-first, one side of the tower was demolished and reconstructed while the other side of the tower was retained and refurbished simultaneously — enabling significant environmental and operational efficiencies.

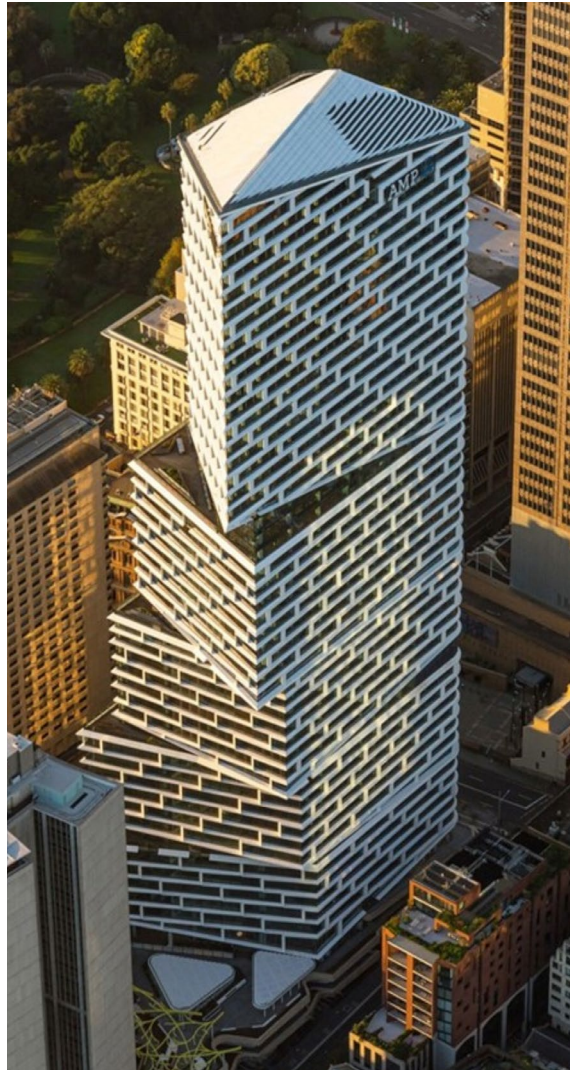


During the upcycle of the existing building, around two-thirds of the tower's original core were retained — conserving approximately 12,000 tonnes of embodied carbon.

The upcycled QQT now boasts doubled usable area and user accommodations, compared to the original tower — from 45,000 to 102,000 square metres of usable area, and from 2,500 to 9,000 user accommodations, respectively.

Awarded the 'World Building of the Year' at the 2022 World Architecture Festival (WAF) in Lisbon and the prestigious 2022/23 International High-Rise Award — these accolades highlight the extraordinary transformation and sustainability of the project, setting a new global standard in adaptive reuse.

*Quay Quarter Tower —
Sydney, NSW, Australia.*



Parramatta Square

PARRAMATTA, NSW, AUSTRALIA

CLIENT: WALKER CORPORATION

BG&E provided schematic design development in collaboration with the architect, as well as civil, flooding, and drainage engineering services from concept through to construction for Parramatta Square, a landmark project of major significance to the community.

Parramatta Square is a three hectare mixed-use precinct developed by Walker Corporation, consisting of a total of six stages and accommodating a mix of commercial, education, and retail developments.

3PS, 4PS, and 6PS/8PS are Class A commercial office towers with a 5 Star rating, directly adjacent to the Parramatta Train Station and the main western train line.

Civil works included road design, pavement grading, stormwater drainage, subsoil drainage design, utility coordination, water sensitive urban design, and erosion and sediment control.

BG&E was commissioned to undertake a flood assessment of the site to consider local overland and mainstream flooding from the Parramatta River. This involved developing a 2D hydraulic model, preparing flood maps and reports as well as scenarios that informed design, and diverting lunch trunk stormwater drainage infrastructure to accommodate site development.

Perth Film Studio

PERTH, WA, AUSTRALIA

CLIENT: HESPERIA PROPERTY

Working alongside Hesperia, TPM, Hassell, Built, and the greater project team, BG&E provided structural and civil engineering services.

The WA State Government has invested \$233.5 million to construct a screen production facility in Perth to highlight the creative industry in the West and strengthen the state's capacity to attract larger national and international film, television, and gaming projects.

The facility includes four sound stages, providing 8400 square metres of production space, with connecting annex buildings, workshops, a separate office building, other ancillary structures, and a five-acre backlot and boneyard.

Civil services provided by BG&E included:

- Site earthworks design and modelling.
- Site drainage, sewer, and water reticulation design.
- Design of the site's internal roads, carparks, and footpaths, and widening of existing roads and intersections.



One The Esplanade

PERTH, WA, AUSTRALIA

CLIENT: MULTIPLEX

BG&E played a central role in the delivery of Chevron's new headquarters at One The Esplanade — a 130 metre tall commercial tower in the vibrant Elizabeth Quay precinct in Perth.

One The Esplanade by Brookfield Properties is a 29 storey Chevron-anchored development comprising 54,000 square metres of office space, including lobby, conference, and exhibition spaces. Best-in-class amenities include a gymnasium, childcare centre, cafes and restaurants, and retail tenancies throughout the podium.

Engaged under a D&C contract, we delivered full structural, civil, and construction engineering services, including design, documentation, and contract administration.



Key aspects of the development:

- The typical office floor plate is a banded prestressed concrete system delivering 12 metre spans within a maximum 450 millimetre structural zone. Post-tensioned concrete was also implemented across the ground plane and first basement slab to minimise structural depth and floor cycles.
- The 2.5 level hydrostatic basement constructed alongside the Swan River utilised a top-down methodology with diaphragm walls forming the basement envelope.
- Through early supplier engagement and a collaborative approach, the design team was able to provide lower-carbon solutions for every concrete element, achieving a CO₂-e/tonne reduction of 7,560T.

The development presented several challenges:

- The building's offset core required careful structural engineering and consultation with wind consultants to achieve sufficient stability and stiffness to meet horizontal acceleration serviceability standards.
- To align with the top-down construction methodology, internal barrettes directly support the building core, 1800 millimetre diameter mono-piles support the tower columns, and a combination of concrete piles and steel plunge columns support the podium levels.

*One The Esplanade —
Perth, WA, Australia.*





167 St Georges Terrace, Westralia Plaza

PERTH, WA, AUSTRALIA

CLIENT: INSURANCE COMMISSION OF WESTERN AUSTRALIA

BG&E was responsible for the structural and civil engineering services for Westralia Plaza — a 13 storey premium commercial building, prominently located in the heart of the Perth CBD at 167 St Georges Terrace.

The building has a floor area of approximately 10,500 square metres, comprising:

- Landscaped public plaza at ground level.
- 11 levels of office accommodation.
- Two levels of basement car parking.
- Targeted performance outcomes include an A Grade PCA rating, a 4 Star Green Star rating, and a 4.5 Star Australian Building Greenhouse Rating.

A two storey secant piled wall was also constructed along the remaining site boundaries, allowing for excavation directly adjacent to neighbouring buildings.

The project presented a number of design challenges, most notably the presence of an existing diaphragm wall along the eastern boundary, with active ground anchors extending beneath the site. To address this, BG&E developed an innovative foundation solution using a piled raft system, designed to share load with the existing diaphragm wall while avoiding interference with the anchors.

The superstructure consists of an in-situ concrete frame with a combination of conventionally reinforced and post-tensioned floor slabs. A structural steel-framed plant room sits above the roof level.



ENEX100 Redevelopment

PERTH, WA, AUSTRALIA

CLIENT: ISPT

The Enex100 redevelopment is a \$40 million project aimed at transforming the Enex retail precinct and the adjoining A-grade office tower at 100 St Georges Terrace into Perth's first urban commercial village. Spearheaded by ISPT, BG&E was engaged to provide structural engineering services for the redevelopment, designed by architect Woods Bagot.

Key structural features of the redevelopment include:

- Installation of new strip windows within existing precast façade panels.
- Construction of a new fire-protected stair on the south side.
- Installation of new shopfront steel framing to accommodate reconfigured tenancies.
- Reconfiguring the central forecourt, including a floor load capacity assessment.
- Design of structural infill for existing escalator voids and locally strengthened surrounding floors.
- Assessment and demolishing of non-load-bearing partition walls following structural review.
- Design of structural infills and floor strengthening for existing service riser openings.
- Evaluation and strengthening of floors around new service riser openings and penetrations.
- Design of a lift shaft and locally reinforced floor for the new office lobby lift core.
- Preparation of repair specifications for identified concrete defects.
- Conducting load capacity checks of office super floors for general and heavy loading zones; designed local strengthening as required.

Completed in 2025, the redevelopment offers a unique blend of hospitality, premium fashion, convenience retail, and innovative office spaces under one roof.



Central Park Tower

PERTH, WA, AUSTRALIA

CLIENT: FRASERS LOGISTICS & COMMERCIAL TRUST & PERRON GROUP

The upgrade to the exterior façade of Perth's iconic Central Park Tower established a new benchmark in design sustainability, driven by a rigorous material recovery and recycling program.

BG&E provided both structural engineering and 4D animation construction engineering services for the project. Led by Duratec Australia, the renovation prioritised environmental responsibility — recycling over 150,000 kilograms of materials and achieving a recovery rate of nearly 100%.

Key aspects of the upgrade included:

- Removal of approximately 26,000 square metres of façade panels from the spandrels, columns, parapets, and lift overrun zones.
- Installation of nearly 8,000 locally made façade panels with tonal variations in metallic warm grey, designed to diffuse a golden hue across key structural elements.
- Introduction of new lighting to highlight the structural elements of the tower.
- Structural strengthening via additional façade reinforcement to enhance durability.
- Implementation of a new curtain wall system, including upgraded insulation and sarking.
- Installation of temporary access decks above the podium to ensure unimpeded access and egress for building operations.

211 High Street

CHRISTCHURCH, NEW ZEALAND
PORTUS PROPERTY & LEIGHS CONSTRUCTION

The project involved the construction of a new four storey, 4,500 square metre commercial building with basement car parking, prominently located on the south-east corner of High Street and Manchester Street in Christchurch.

The superstructure showcases mass timber construction, featuring glulam beams and columns paired with CLT floors.

BG&E was responsible for the structural engineering design of non-structural seismic restraints for building services, including electrical, mechanical, hydraulic, and fire protection systems.

Our scope also included the seismic restraint of partition walls, deflection heads, bulkheads and suspended ceilings. In addition, BG&E was engaged by Leighs Construction to deliver structural design services for their fit-out floor.

We also developed the structural timber drawings to a LOD400 standard equivalent to shop drawings allowing the client to tender the timber package without being tied to a specific supplier and explore different markets to secure the best value for the project.



New Court Theatre

CHRISTCHURCH, NEW ZEALAND

CLIENT: THE COURT THEATRE & CHRISTCHURCH CITY COUNCIL

BG&E provided façade and structural engineering for the new Court Theatre, which features two performance spaces: the 377-seat Stewart Family Theatre and a smaller, flexible auditorium, alongside rehearsal studios and set workshops.

Engaged late in the design process to address a scope gap, BG&E delivered a steel and timber structure that was installed and suitable for adaptation on-site, ensuring efficiency and quality.

Working closely with Athfield Architects, we prioritised the use of timber when developing a bracing scheme for the various sections of the façade, aligning with the mass timber construction visible from the inside of the theatre and reinforcing the architectural intent.

The theatre marks an exciting new chapter for Christchurch's arts scene, attracting world-class performances and restoring the cultural centre post-earthquake.



Kakano Centre

AUCKLAND, NEW ZEALAND

CLIENT: NEW ZEALAND RETAIL, PROPERTY GROUP (NZRPG)



BG&E was engaged to provide a structural peer review of the Kakano Centre development — a new two storey retail precinct in West Auckland, designed by DHC Consulting.

The building involves:

- The ground floor, a partial basement created by a bored pile and a shotcrete retaining wall on three sides of the structure's perimeter.
- The first floor, constructed with composite steel-concrete construction and suspended between the retaining wall and composite columns.
- The roof structure, constructed with lightweight steel.

BG&E worked with DHC to overcome significant structural challenges on this project, including the design of the large retaining wall structure, long-spanning suspended floor, composite construction, and the seismic performance of the roof canopy.

Air New Zealand Hangar 4

TĀMAKI MAKĀURAU, AUCKLAND, NEW ZEALAND

CLIENT: AIR NEW ZEALAND



BG&E provided construction engineering and temporary works for Air New Zealand's Hangar 4 in Tāmaki Makaurau, Auckland. Completed in August 2025, this facility is the largest single-span timber arch aircraft hangar in the southern hemisphere.

At 1.5 times the size of Air NZ's previous largest hangar, Hangar 4 has capacity to accommodate one wide-bodied and two narrow-bodied aircraft simultaneously.

Key challenges:

- The capacity of timber, including the torsional capacity of the arch and the chord out-of-place bending at splice locations.
- The rigging arrangement, including over-centering actions, the movement of COG relative to lifting points, and the movement of spreaders relative to the horizontal arrangement.

Key design features:

- Arch: spanning 95 metres with a height of 35 metres to the apex, the arch was fabricated in 20 metre segments and spliced on site. It features RB32 Reidbrace roof bracing and a tensioned ETFE cladding system.
- End wall: uses timber box beams with CLT webs and LVL flanges, and was lifted in two stages using hinged baseplates. The curved nature complicates the lift and a custom support frame was required to support the mullions.
- Nose cone: a standalone steel structure designed to carry only its own loads, with lifting capacity limited by its concrete plinth supports.
- Pavement verification: various pavement designs were assessed with outrigger loads compared to a Boeing 777 and deflection monitored during lifting.
- Bracket design: designed to act as a torsionally rigid point, the brackets provide direct bearing to support the arch, are removable at height, and are adjustable to allow for timber tolerances.

*Air New Zealand Hangar 4 -
Tāmaki Makaurau, Auckland, New Zealand.*



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 780 highly skilled people, in offices across Australia, New Zealand, Singapore, 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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