

Level 4/178 Collins Street, Melbourne Victoria
admin@SheerForceEng.com
+61 421 809 111
SheerForceEng.com

Residential Capability Brochure

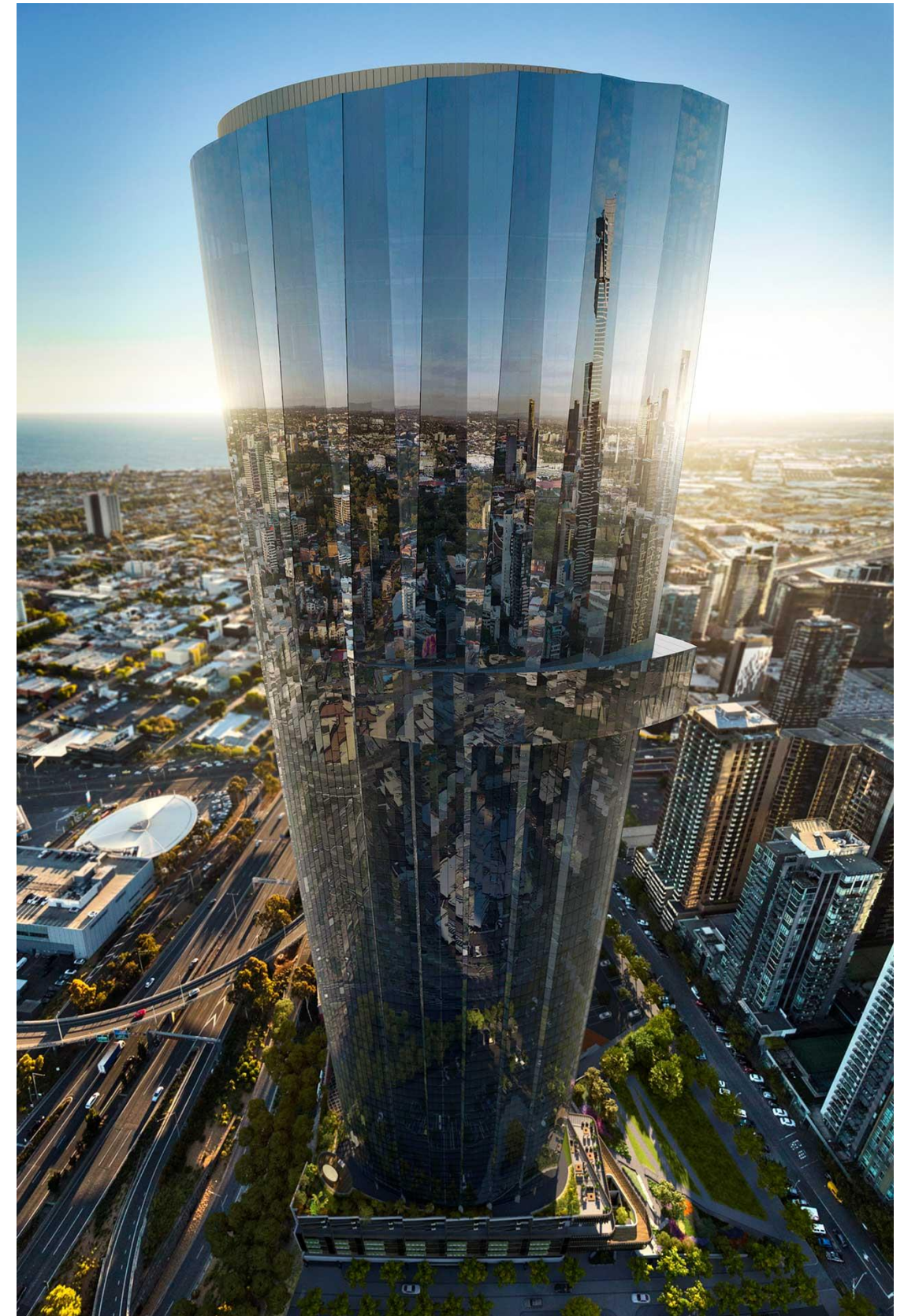
Engineering Better

We are an Australian business owned by the people who manage and deliver our projects.

When you work with us, you get the key leaders who are owners of the business, on your project from start to finish. The success of our clients' projects is directly linked to the success of our business; our approach is to embark on a collaborative journey with our clients on each and every project we deliver.

Residential developers are feeling the pressure of a tightening property market in Australia with rising construction costs and rising interest rates squeezing profit margins on projects across multiple sectors.

Now, more than ever, efficient engineering is mandatory to ensure the financial success of your development. Having experienced engineers actively delivering your projects with a focus on value engineering sets your project up for success... This is our promise, experienced advice and value engineering.



Our Approach



A successful residential building development is a harmony of Engineering Disciplines and Architecture coordinated to provide its occupants with inspiring spaces while striving to minimise the impacts on our environment to leave a positive legacy for generations to come.



We take a wholistic approach to Structural Design with respect to residential developments.

It all starts with the “bones” of the building; the column grid arrangement. Whether it be a low-rise apartment building in the suburbs or a high-rise development in the heart of the CBD, multi-level developments often provide multiple uses over different floor levels.

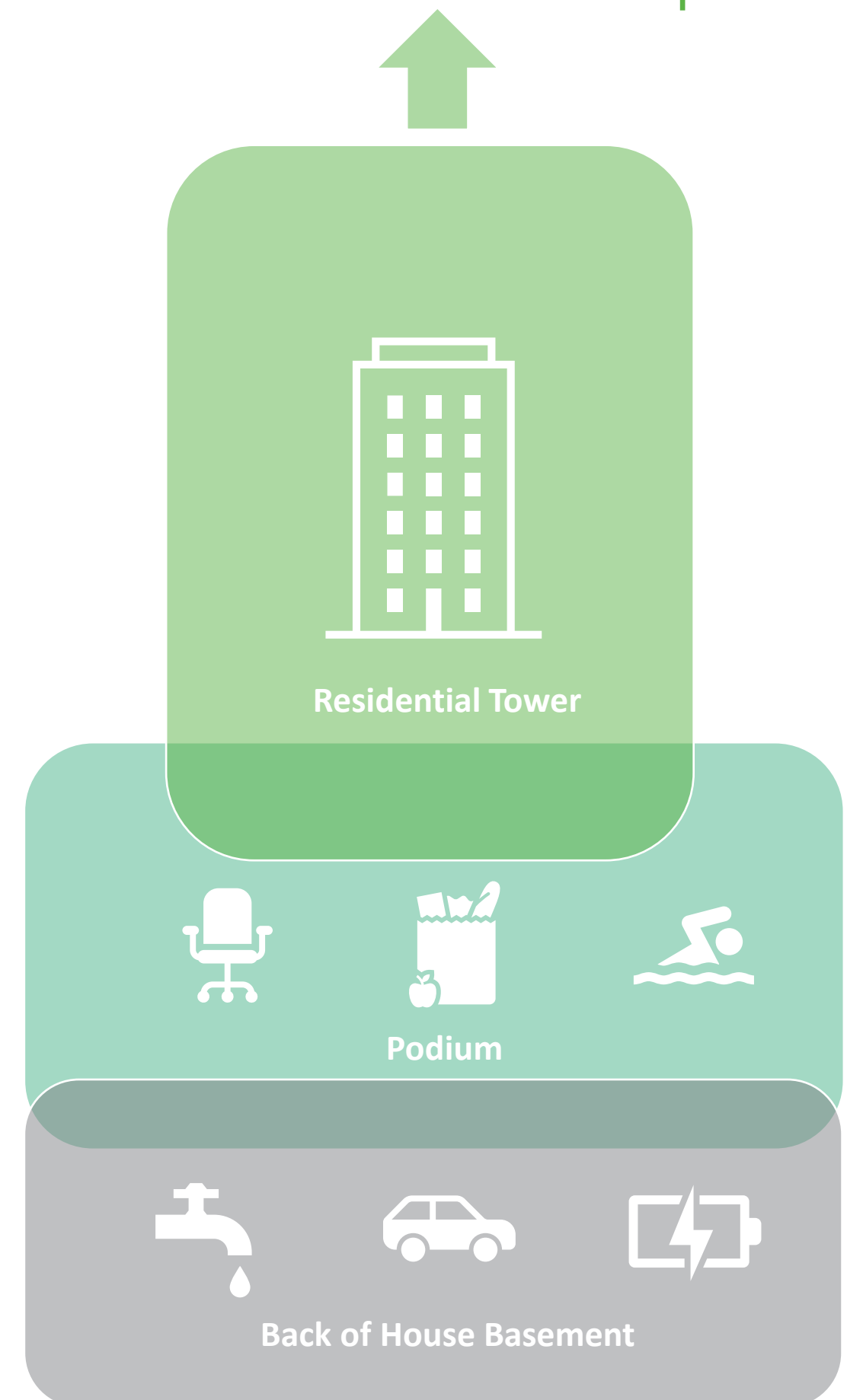
A conventional residential building form comprises a series of residential levels sitting above an activated podium or ground floor level comprising offices, public spaces, restaurants or commercial areas. In most cases, this all sits above a back-of-house area which may comprise car parking, plant rooms or storage within one or more basement levels.

Each one of these floor uses across each separate floor has competing needs with respect to space requirements and therefore column locations. A column arrangement which caters for the residential levels may not be the appropriate column arrangement for an office floor which also may not be the optimum column arrangement for a restaurant, gym or car parking area.

To achieve a *“harmony of Engineering Disciplines and Architecture”* these transitions from floor to floor over multiple floor uses requires effective collaboration and experience. Senior involvement from our key Structural Engineers allows us to produce highly efficient structural solutions which provides the required flexibility and floor arrangement for the building's occupants without reducing the yield of the development while at the same time minimising structural costs and often eliminating the requirement for transfer structures.

Transfer structures are costly to the developer, time consuming to build and reduce the developments amenity which can result in lower floor-to-ceiling heights for its occupants, or in the worst case, a reduction in the developments NLA potential.

We achieve effective coordination by challenging car parking arrangements, plant room locations and apartment layouts. Our experienced engineers have a proven track record in delivering multi-disciplinary projects which can save not only structural cost but costs across multiple disciplines.



Value Engineering

We strive for value and efficiency in all that we do. We draw upon our depth of experience and cutting-edge analysis techniques to produce cost-efficient, buildable and safe solutions for our clients. Now more than ever, smart and efficient engineering is a mandatory pre-requisite in today's economic climate of inflation and labour shortages.

The critical period where the most efficiency can be found on a project in our experience is through the schematic and concept phases. To allow us to leave no stone unturned when it comes to exploring the most efficient outcome for your project, we leverage the assistance from our internally developed **Rapid Engineering Design Software; LOGAN**.

LOGAN allows us to rapidly assess and analyse structural options and produces reinforcement and concrete tonnages for comparison purposes to allow our clients to make informed decisions for their structural solution.



Use the QR Code to see an example of our LOGAN software in action constructing a wind and earthquake analysis model using data extracted from CAD documentation.

“ The principles of value Engineering lie at the heart of everything we strive for. Every project is a relentless pursuit to find value and efficiency for our clients while maintaining aesthetic, form, yield and architectural intent.



200 Victoria Parade – 11 Storey Commercial Building

We performed a wholistic third party peer review as part of our client's due diligence process in purchasing a partial stake in this development. Part of our review involved an assessment of the post-tensioned office floor slabs.

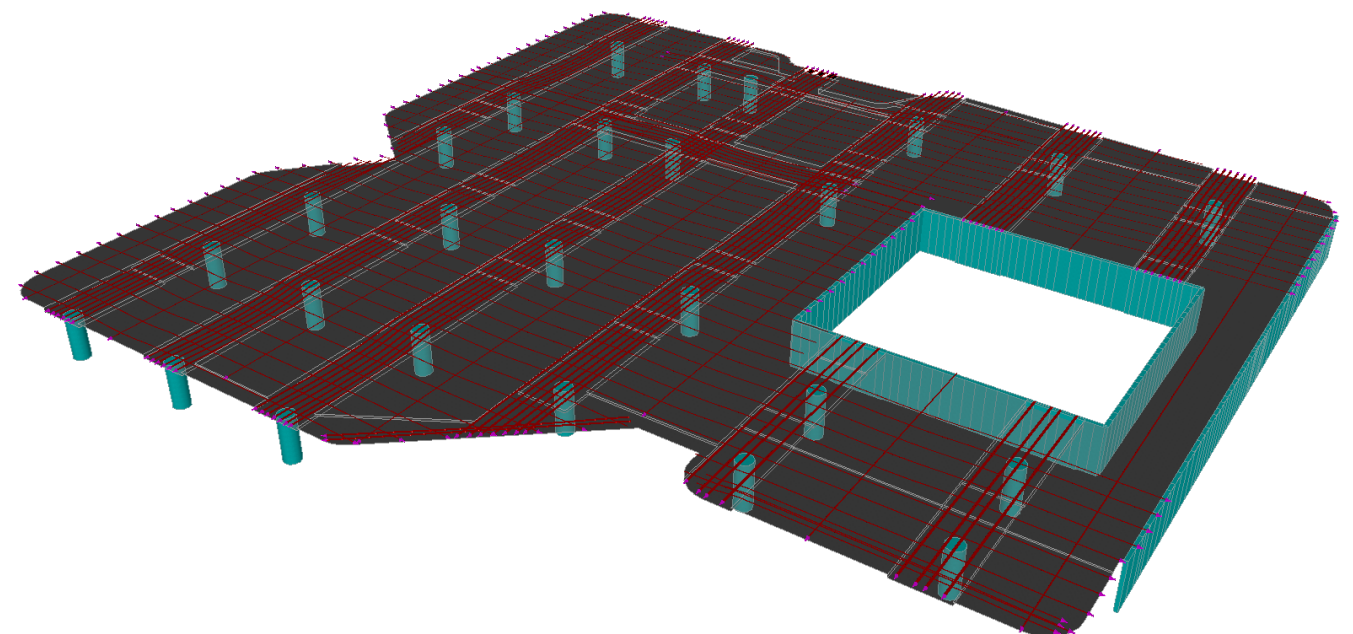
Through refinement of the column grid arrangement, we were successful in reducing the concrete volume across all typical office floors while improving performance and deflection of the typical office floors. The end result was an overall concrete and reinforcement saving equivalent to that of an entire office floor slab.

435 Bourke Street – 52 Storey Commercial Tower

We performed a wholistic third party peer review for a Melbourne contractor as part of their tendering process for this project. We performed a full analysis on the lateral, system, vertical load bearing system and floor system.

We developed an alternative floor framing arrangement which resulted in an overall depth reduction to the floor structure allowing one full additional floor of NLA to be introduced to the tower.

Our proposed refinement to the core and stability arrangement allowed for significant core wall thickness reductions through the height of the building. This resulted in a circa \$2Mil materials cost reduction and a further NLA increase of 550m² through the height of the building.



Our Services

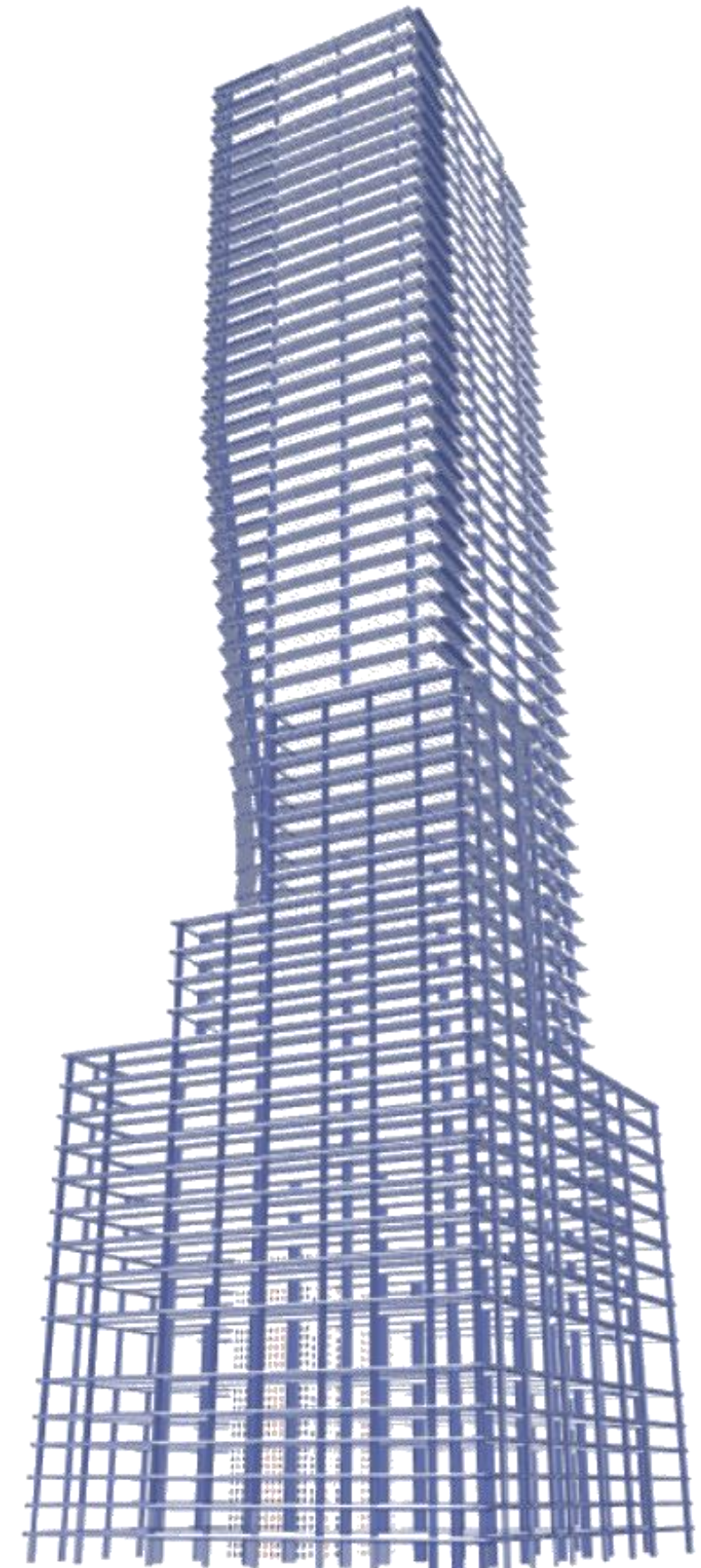
Engineering Better with Sheer Force Engineering

Our specialist Structural Engineering practitioners provide a broad range of engineering services and capabilities to satisfy our client's needs:

- High Rise and Long Span Structures
- Post-tensioning design
- Wind Engineering
- Seismic Engineering
- Deep Basement Design
- Shallow and Deep Foundations
- Existing structure assessment and adaptive re-use
- Performance Based Solutions
- Structural simulation and FEA modelling
- Temporary structures
- Demolition advice and sequencing
- Erection sequencing and temporary stability analysis
- Heritage Structures
- Forensic Engineering
- Structural Dynamics and Vibration Assessment

Beyond our enviable technical capability, it is often the simple things we do which clients value the most. Often the simple things are hardest to implement. We believe that Technical Consulting, above all else, is a role of service and we strive to provide best-in-industry service for all our clients:

- Responsiveness
- Commitment to return a phone calls on the same day
- Commitment to promised and agreed deadlines
- Commitment to provide experienced engineers on all our projects, big or small.
- Listening and understanding our clients' needs
- Promoting a positive, helpful and friendly environment
- Meeting our clients' expectations
- Creative problem solving
- Knowing our product and our service, inside and out.



City Defining Projects

“Our key technical staff have an enviable track record of experience in residential projects on a broad range of project scales and typologies.”

CASE STUDY

Melbourne Square Towers 2-3, 93-119 Kavanagh St. Southbank

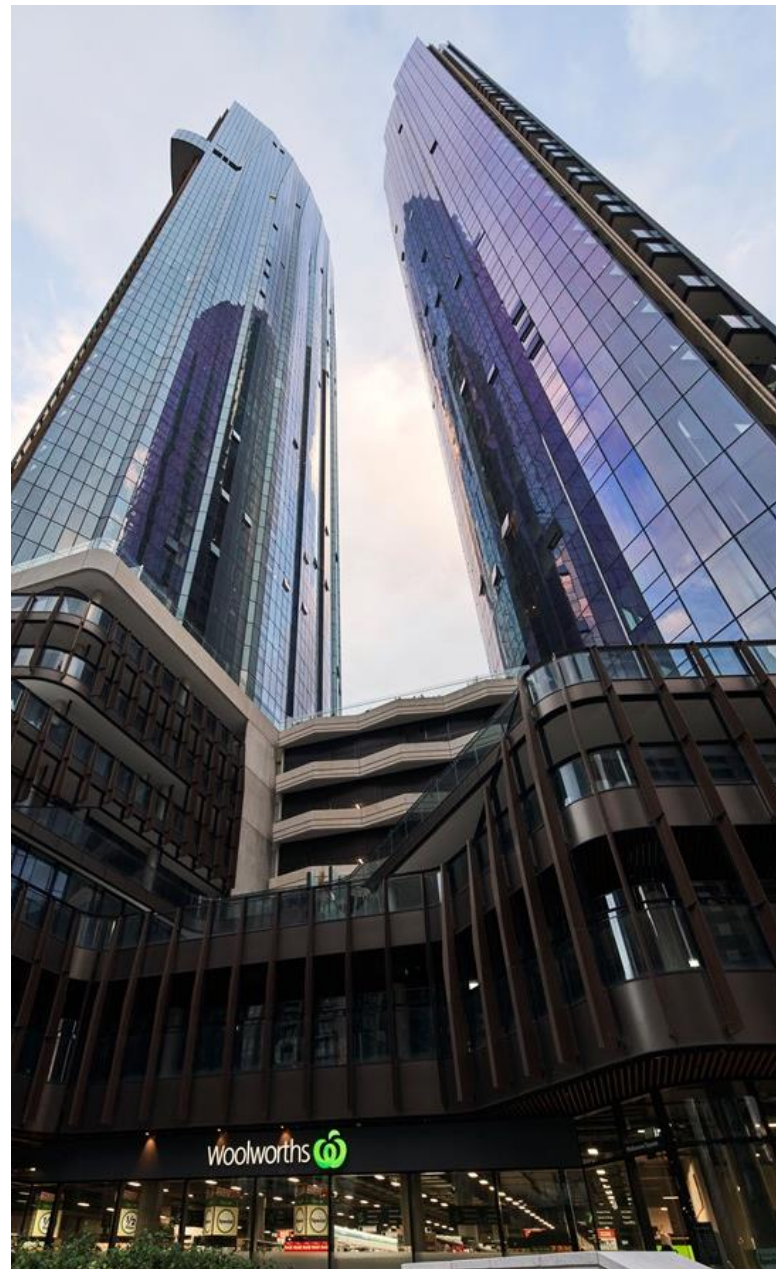
Melbourne Square stage 1 (towers 2 and 3) is the first stage in a multi staged precinct.

Tower 2 stands at circa 230m in height (70 storey) with a stability system comprising a centralised core structure coupled to perimeter mega columns via outrigger walls at three locations.

Quentin Suckling led the design team as project principal and design leader. Multiplex were engaged under an ECI role.

Both towers sit above a shared 8 storey podium structure encompassing a large landscaped zone to the north, outdoor swimming pool, water fountains and gym all on suspended structure.

With hundreds of columns to be coordinated across multiple levels, the outcome was a triumph in detailed coordination resulting in zero transfer structures being required across the precinct.



CASE STUDY

Victoria One, 462 Elizabeth St, Melbourne

Victoria One at 452 Elizabeth Street is a 75 Storey tower which joined the growing number of high-rise developments beyond 200m in height through the northern end of the CBD (240m to be precise).

The 75 level building features 10 level podium, containing car parking with a fully automated parking robot and apartments fronting Elizabeth and Franklin Street. The development contains a total of 629 Apartments.

The stability system comprises a centralised core with mega-column/outrigger wall system.

The project was constructed by ProBuild in service to developer Golden Age.

The project value was \$350Mil and was designed by renowned high-rise architects Elenberg Fraser.

After its completion, Victoria One takes the mantle of being the most slender super-tall tower in the Melbourne CBD grid.



City Defining Projects



Without a doubt, Quentin has the most exceptional approach to resolving complex design with a calm, structured and collaborative approach

- **Brian Donovan**

Senior Project Manager Mirvac



CASE STUDY

380 Lonsdale Street "380 Melbourne"

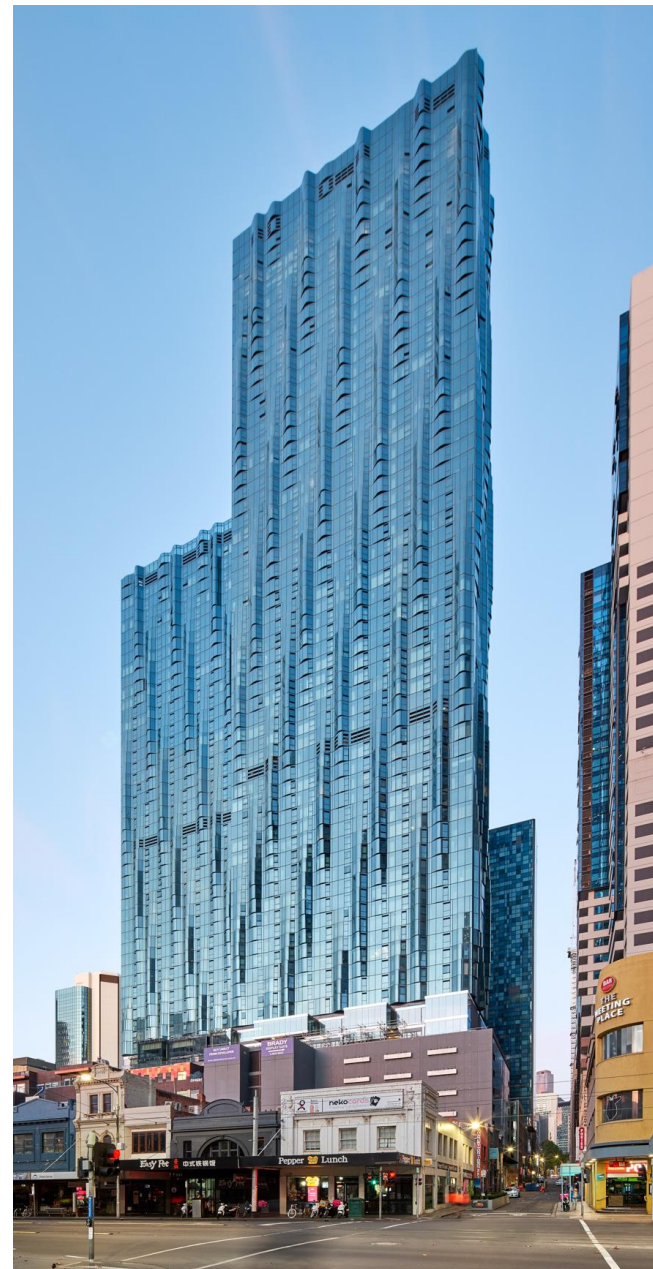
380 Lonsdale street is a dual tower development comprising a northern tower 68 levels (220 m) and the southern tower at 52 levels.

The two towers are joined, making structural analysis complex when dealing with differing heights and stiffness of the north and south core structures.

The stability system comprises two centralised cores for each tower coupled with shear walls.

The stiffness aspect ratio of the joint towers is circa 1:13.5 making it an extremely slender very tall building. This is further exacerbated by its large wind sail catchment area with the combined length of the towers measuring at 48m.

The overall structural cost came in well under budget following release of tender documentation to the relevant structural contractors. An innovative "H" core structure was adopted which resulted in an efficient design and no supplemental damping system being required at roof level.



CASE STUDY

Melbourne Quarter

A landmark project and a jewel in the crown of Lend Lease developments stretching across 2.5 hectares on the corner of Melbourne's CBD grid and valued at circa \$1.9Billion.

With its proximity to the Yarra River and location at the top end of docklands, the site exhibited a varying soil condition across its length in the north-south direction. High level Basalt exists which is underlain by sandy/gravel soil with the underlying Melbourne Formation bedrock beneath.

Relevant towers delivered include residential towers "R1" and "R2" with concept being completed on residential tower "R3". Across all residential towers, our staff were responsible for overseeing the structural design of floor space to cater for 1,600 apartments ranging from 1, 2, 3 and 4 bedrooms. The R1 and R2 buildings are circa 44 levels in height.



Luxury Apartments

CASE STUDY

139 Queensberry Street Carlton, The Eminence Apartments

The Eminence offers 193 apartments and two retail spaces across 14 storeys above three levels of basement.

The site retention system is designed to support the existing neighbouring building to the west to allow construction of the new three levels of basement.

The façade is an interplay between structural and non-structural vertical elements designed to be indistinguishable from each other resulting in a seamless synergy between Structural support and Architectural form.

Each third level is framed with horizontal concrete beams. Both vertical and horizontal elements are of pre-cast fabrication which adopt a unique wet-stitch detail. The horizontal beam elements are also detailed to provide a forming edge for the in-situ post-tensioned slabs allowing efficiency of construction and reduced site times.

The lift/stair core structure is constructed from pre-cast concrete which utilises corner wet-stitches and vertical “drop bars”. This unique pre-cast detailing was developed in close collaboration with the contractor Crema.



CASE STUDY

280 Albert Street East Melbourne Eastbourne Apartments

The Eastbourne, developed by Mirvac, comprises 258 apartments and a project budget of \$460Mil.

The development offers high end luxury apartment amenity including roof level penthouse with dedicated infinity edge lap pool, open fire places to select dwellings, wine cellar and communal gym/amenities areas.

In honouring the sites unique history and connection with Freemasonry, stone detailing is used as a signature feature throughout with associated secondary steel structural support.

Directly opposite Fitzroy gardens, the location provides breathtaking views to trees and outdoor spaces. This is further enhanced by the buildings form, progressively stepping back with each rise in level. This posed a unique structural challenge requiring careful coordination to ensure minimisation of transfer structures to optimise efficiency.

Two-way flat plate post-tensioned slabs are provided throughout the building.

Due to the large footprint of the development, three separate core structures were required which adopted pre-cast construction and a combination of wet-joint and stitch plate connections.

Staged construction analysis was undertaken and introduction of temporary movement joints to control cracking and differential settlement of the development during construction.

The project was fully documented in the 3D environment which included 3D collaboration with architecture and shop detailing as well as the production of 2D drawings.

Luxury Apartments



CASE STUDY

812 Elgar Road Doncaster Garden Hill Apartments

Garden Hill apartments is a 10-storey “L” shaped apartment building above 3 levels of basement designed by world renowned architects Woods Bagot.

A highlight of the development is the communal ground floor outdoor area and dog park supported by a suspended post-tensioned slab over the basement footprint.

The project adopted the AFS wall system to reduced cost and increase speed of construction.

The project was a testament to effective coordination between architecture and structure with no transfer elements being required through the height of the building.

The development was the first major project for Beulah International in the local Australian market.

CASE STUDY

227 High Street Prahran, Zac Apartments

Zac Apartments in Prahran is an exemplary piece of structural engineering in the medium density residential space. It showcases the perfect combination of strength, durability and architectural elegance. The building is located in one of the busiest areas of Prahran and has been designed and constructed to withstand the challenges of an urban environment.

The development offers 36 apartments, 5 above-ground levels and 2 basement levels.

Due to local council requirements, the basement has been designed as a fully tanked un-drained system.

The structural system of Zac Apartments consist of reinforced concrete frames utilising pre-cast concrete construction supported on piles and basement box.

The project budget was \$9Mil with construction being undertaken by Figurehead.



Social and Student Housing



CASE STUDY

Monash Clayton NRAS Student Accommodation

Monash NRAS student housing provides accommodation for students studying at Monash University Clayton campus.

The project comprises two identical structures, each having 4 levels of mixed residential, office and communal/games areas.

The project ultimately provides single unit accommodation for 600 students.

The engagement of structural services began with a third-party peer review for the tendering contractor.

Significant structural efficiencies and improvements were identified during the review process

The proposed structural refinements contributed to the contractor becoming the successful bidder for the project. Key structural solutions which the client and contractor enjoyed cost savings included:

- Alternative foundation system of pre-cast driven piles
- Reduction in ground beam volume by introducing spanning wall beams
- Introduction of a simple one-way post-tensioned slab spanning across two tenancies
- Light-weight steel roof supporting solar panel array.

CASE STUDY

Cheddar Road, Reservoir

The supportive housing precinct located at the corner of Cheddar and McMahon roads in Reservoir offers a range of low to medium density public housing across multiple allotments.

The development comprises 5 separate stand-alone town houses adjacent to a three-level apartment block above a single level of basement.

The detailing brings together domestic and commercial construction with post-tensioned floors supported by pre-cast concrete columns, masonry façade and timber framed timber roof for the main apartment building.

Features of the development include aged timber slats to the main entry elevation and dwelling balconies and a glass framed feature communal stair within the apartment complex.

Construction was undertaken by Broad APM with architectural design completed by McCabe Architects.





Engineering Better

Level 4/178 Collins Street, Melbourne Victoria
admin@SheerForceEng.com
+61 421 809 111
SheerForceEng.com