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City of Perth

C-Grade Office Case Study

Exploring options for Adaptive Re-Use
in the Central City

July 2017

Cameron Chisholm Nicol

Executive Summary

Perth is currently experiencing challenging economic conditions, largely driven by a complete transition from the construction phase of the resources boom to the production phase.

This issue is being felt in the City's office market, with a vacancy rate approaching 25% (Y-Research, February 2017) (July Property Council figures at 21.1%, decreasing from 22.5% January 2017) and the equivalent of 11 Woodside Plaza buildings (450,000sqm) vacant across the central city area. With multiple choices for high quality space at an affordable rate, there are limited tenants in the market for older, secondary properties in non-core locations. Weak demand and tenants' flight to quality will ultimately leave many C-grade office buildings in limbo.

As a result of these market conditions, this case study was commissioned by the Economic Development Unit of the City of Perth to explore the potential adaptive re-use of older, C-Grade buildings. The intent of the study is to:

- generate discussion within the industry;
- provide thought provoking concept design schemes:

- identify key considerations, constraints and opportunities; and
- provide relevant information that generates interest in potential redevelopment.

The concepts presented in this report are based on a hypothetical, generic building that is representative of the majority of C-Grade office buildings in the city.

A total of six architectural concepts explore how this building could be:

1. upgraded to an A-Grade office;
2. converted to a secondary or tertiary education facility;
3. converted to student accommodation;
4. converted to multi-residential apartments;
5. converted to mixed-use; and
6. converted to a health and well-being hub.

The six uses were carefully selected based on market research and the opportunity they present for the sustainable growth of the city.

The concepts are also supported by a series of key considerations, including structural interventions, service upgrades and building code compliance.

The key outcome of this report is that a thorough analysis of any proposed scheme in terms of the benefits and constraints, including cost, is required in order to establish its viability. The key findings of the case study are summarised in the table below.

The City of Perth will now engage with industry to explore the potential of the City's under-utilised C-Grade building stock. The design schemes showcase best practice, innovative and creative ways to bring new life to these buildings, which ultimately have the potential to add interest and vitality to the central city area.

With the market now beginning to transition to recovery, now represents the perfect time to consider the repositioning of lower grade assets.

Concept	NLA (sqm)	Yield (# of units)	Car Parking / Bike Parking	Cost Estimate (\$ / sqm)	Indicative Construction Timeframe (months)
Generic Building	3400	N/A	12 / 0	N/A	N/A
A Grade Office	3900	N/A	12 / 50	\$2,798 - \$3,606	15 – 18
Education	3900	n/a	0 / 0	\$2,643 - \$3,558	9 – 12
Student	N/A	79	0 / 87	\$2,254 - \$2,943	12 – 16
Multi-Residential	N/A	38	12 / 17	\$2,428 – \$3,045	12 – 16
Mixed-Use	4400	24	0 / 0	\$2,694 - \$3,157	12 – 15
Health and Well-Being	3600	N/A	12 / 0	\$2,510 - \$3,203	12 – 15

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Contributors



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Introduction

The City of Perth is committed to ensuring the central city's primacy as an office location, with continued and significant investment in the City's presentation and supporting projects and infrastructure. The transition away from the construction phase of the resources boom and current levels of commercial vacancies has, however, presented the opportunity to think creatively about emerging sectors of our diversifying economy and the type of city we want in the future.

Around the globe cities are becoming more complex and multi-faceted, with 'central business districts' being re-imagined as liveable, mixed-use and diverse environments. The continuing transformation of our inner city environment is part of this story, with facilities such as the Perth Arena, the City Library, Elizabeth Quay and the Perth Stadium adding diversity, interest and culture to the central city.

With this development currently underway, there is no better time to think creatively around the role that the City's existing building stock can play in contributing to Perth's future.

With over 60% of Perth's office buildings graded as C-Grade properties and a vacancy rate of 25.7%, the City's C-Grade office stock represents an opportunity of just under 340,000sqm of vacant or underutilised space. From vertical medical facilities to student accommodation and new format retail offerings, the future use of our existing C-Grade building stock has the potential to respond to emerging market opportunities, whilst adding people, life and vitality to the inner city.

This case study explores six concept design

schemes that illustrate how existing C-Grade office buildings can be upgraded or converted to another use for building owners and potential developers to consider.

The report is structured under six key chapters, including:

- **Commercial Context** | Outlining the current market conditions in the Perth central area and frames the opportunity for the six potential future uses;
- **The Generic Building** | Examining the existing C-Grade office stock and the process of defining a hypothetical building on which to base the concept designs;
- **The Design Process** | Illustrating the creative and collaborative approach undertaken;
- **Concept Design Schemes** | Showcasing the concepts and architectural intent for each of the six re-use schemes;
- **Key Considerations** | Explaining the technical requirements for an upgrade or conversion, including structure, services, the approvals process, and heritage and contamination issues; and
- **Cost and Programmes** | Summarising the cost per square metre upgrade for each design scheme and an indicative construction timeframe.

The report is also supplemented through a range of technical appendices, including more detailed considerations and quantity surveyor cost estimates for each of the concepts.



Sheffield House, Perth - The adaptive re-use of a largely derelict heritage building, located in the Hay Street Mall, to create a low-energy, high-performance workplace.

Commercial Context

Perth is a resources city. Iron ore, natural gas and gold have brought people, businesses and investment to our city for over 100 years.

Our reliance on the resources sector (and to a lesser extent, the agricultural sector) to drive economic growth has seen the State locked into the cycles of boom and bust.

As our city continues to grow, measures are needed to improve Western Australia's economic diversity.

Similar resource-led cities in other parts of the world, such as Edmonton in Canada and Cape Town in South Africa, have successfully become centres for technology and education, assisted by city and/or state-sponsored innovation hubs. Attracting international companies and foreign students, and supporting new business models, are suggested strategies for a more sustainable Perth.

Locally, the biggest recent growth in leasing has been for technology, shared workspaces, education and consumer medical (eg. dentist, emergency, GP). However, compared to the resources companies they are replacing in Perth office buildings, these are all small-scale businesses which require limited space.

West Australian Office Market in 2017

Western Australia's highest economic times have been fuelled by commodities. In recent years, the almost complete transition from the construction phase of the resources boom to the production phase has seen our boom and bust economy swing towards the bust stage.

This transition has seen the performance of the Perth CBD office market change dramatically over the past 10 years. A decade ago in 2007, office vacancies in the Perth CBD were the lowest in the

world with less than 5,000 sqm available across the Perth CBD and West Perth. By early 2017, over 500,000 sqm is vacant in the Perth CBD and West Perth.

In response to the resources boom, Perth underwent an office development boom. Between the 2004 completion of Woodside Plaza and the 2016 completion of the David Malcolm Centre, office developments have grown the Perth CBD office market by 30%. Developments such as Kings Square, Raine Square and 140 William Street represent new development precincts away from the traditional St. Georges Terrace address.

This growth was driven by demand created by major resources companies, their suppliers and the record growth of the state economy. At the peak of the boom in 2012, 70% of occupied office space in the Perth CBD was occupied by resources companies, firms servicing the resources industry and the Government. Since then, as construction of new projects has been completed and new supplies of iron ore and LNG have come on stream, office space occupied by iron ore companies and engineering firms has decreased by over 40% from boom times.

Despite slowing demand from resources companies and business in general, over 300,000 sqm of new office space has been completed in the Perth CBD since 2010 with over 200,000 sqm added in suburban areas such as Subiaco, Northbridge and Herdsman over the same timeframe. This level of development combined with lower demand saw vacancy rates for Perth CBD office space return to levels not seen since the early 1990's.

According to local commercial property research firm, Y Research, the Perth CBD office vacancy rate in February 2017 was 25.2% with over 450,000 sqm vacant across the CBD. This is the equivalent to 11 vacant Woodside Plaza buildings.



565 Hay Street, Perth - a 1960s office block stripped back to its skeleton and re-designed as A-grade office space.



Central Park, Perth - a refurbished ground plane restores the tower's identity as a premium office building.



588 Hay Street, Perth - A 1960s building re-developed as high-performance, open-plan commercial office space.



Perth Arena, Perth - the first building constructed as part of the Perth City Link.

The scale of office vacancy in the Perth CBD is highlighted by the number of buildings recording vacancies. Over half of the Perth CBD's 280 office properties currently have a vacancy. Over 10% of Perth CBD office buildings are currently fully vacant.

Perth's high level of office vacancy is underpinned by three main factors:

1. End of the resources boom

The construction phase of the resources boom absorbed nearly every square metre of office space in the Perth CBD and West Perth as resources companies and their project partners rushed to find space to house project teams. Over 500,000 sqm was developed in the Perth CBD and surrounding suburbs to accommodate the requirements of companies such as BHP, Woodside, Chevron, BankWest and Shell.

Since late 2012, the unwinding of project space led demand has seen the amount of office space occupied by iron ore and engineering companies fall by over 40% from boom 2012 levels. A large proportion of resources occupied stock was tied to project space. The broader weak economic conditions have impacted all Perth companies with the amount of office space occupied by non-mining companies falling by 19% from 2012 levels.

This downturn in space occupied by resources and non-resources companies has created significant vacancies across the market but in particular, A-Grade and C-grade rated office space. This space has been offered to the market at discounted prices, giving businesses across the city and further afield the opportunity to upgrade and move to the core precinct of the CBD. Recent tenant moves highlight the preference for the core of the CBD due to choice, amenity as well as public transport

links. Under these circumstances, C-grade space becomes increasingly difficult to lease, particularly on the fringes of the CBD where there is a lack of amenity and secondary transport infrastructure.

2. Ownership structures

Perth has a relatively high ratio of private versus institutional building owners. The institutional owners have the resources to offer generous incentives to attract tenants. Private owners are losing tenants and struggling to replace them.

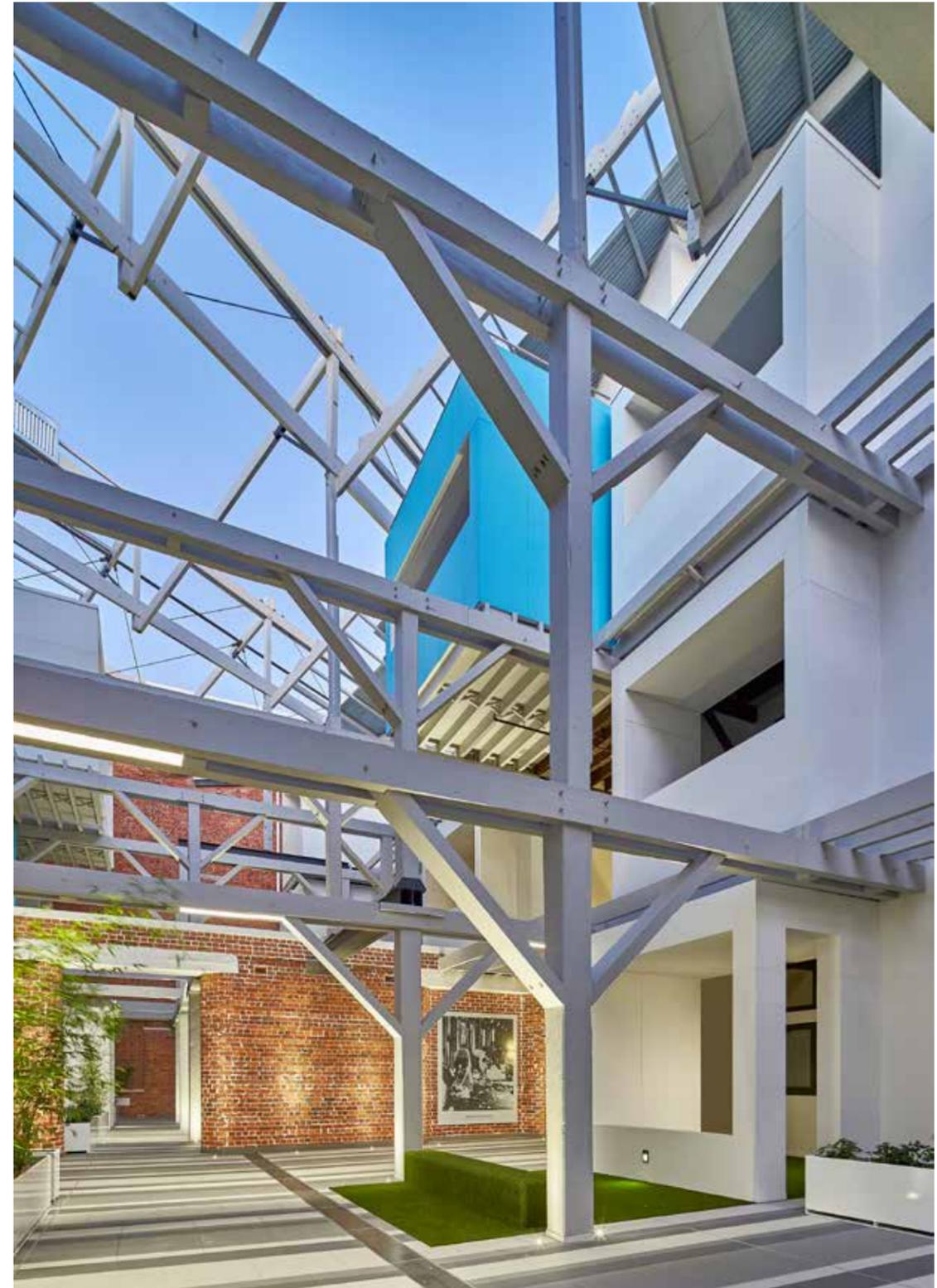
According to analysis by Y Research in March 2017, prime office properties owned by listed property trusts or superfunds have vacancy rates of 21.5%, well below comparative privately owned buildings at 26.3%. Twelve months ago, the spread between public and private properties was just 0.5% - 20.8% for Australian Real Estate Investment Trusts (A-REITs) versus 21.3% for private.

Many private owners do not have the financial capacity to borrow the large amounts necessary to upgrade the building, offer leasing incentives or convert their buildings to alternative uses. Others are debt free and wish to remain that way, with no real incentive to increase their investment level. These owners are prepared to sit out the downturn, leaving many C-grade buildings languishing for an extended period of time.

3. The cost of conversion

The redevelopment of C-grade buildings is heavily constrained by cost. The lack of demand for office space deters investment in upgrades. There may also be a perception that this is difficult to achieve.

The cost per square metre of adapting a building's structure to meet the needs of a new use often outweighs the potential returns.



Heirloom, Fremantle - heritage wool stores re-purposed into 189 apartments.

Finding a model that is commercially viable is difficult to achieve. Whilst there are precedents in other cities for buildings to be converted to hotels, the current supply of hotel beds in Perth does not support this as a feasible option.

With limited demand for continued office use for older secondary grade buildings, the question becomes what else can these properties be used for?

C-Grade Office Stock -The Perth CBD and Beyond

What is increasingly evident in the current market is a flight to quality. Improved affordability, in terms of market rents and leasing incentives, combined with increased choice due to recent office development and the level of vacancy, is allowing tenants unprecedented choice. The flight to quality trend is highlighted by tenants upgrading from secondary spaces or relocating to the Perth CBD and West Perth from suburban markets.

This flight to quality is having two main impacts on Western Australia's office markets. Buildings are either top of the market (Premium or A Grade space) or not in the market for tenants. With multiple choices for high quality space, there are limited tenants in the market for older, secondary properties in non-core locations with limited amenity, poor secondary public transport links and no building services such as end of trip facilities. Secondary property owners unable to compete on building quality are using price to drive absorption. Asking prices under \$100 per sqm are increasingly commonplace.

In 2017, there is now over 4,000,000sqm of office space across the metropolitan area. 33% of this space is C-Grade rated space. In terms of building stock, over 60% of

Perth's office buildings are graded as C-Grade properties. These buildings are typically smaller properties, older than 15 years, located in secondary locations.

According to the latest Y Research for each market (Perth CBD, West Perth and suburban office markets) there is currently just under 340,000sqm of C-Grade space vacant across metropolitan Perth. This represents a C-Grade vacancy rate of 25.7%.

Given the recent addition of over 500,000sqm of Premium and A-Grade space, the competitive offer of secondary properties is increasingly limited to price. Due to low vacancies during the resources boom, many of Perth's older buildings have not had any money invested in them in terms of refurbishment for over twenty years. C-Grade buildings lack facilities, such as end of trip, and environmental performance (NABERS ratings) expected by modern tenants.

Trends and future outlook

After the boom, the resulting changes to the resources sector have impacted all West Australians. If full office buildings are evidence of a robust job market, the current level of office vacancy across metropolitan Perth of over 800,000sqm (equivalent to nearly 20 full Woodside Plaza buildings), is reflective of our current unemployment rate of over 6%.

No industry in WA is large enough to offset the impact of lower commodity prices. The unprecedented level of investment in resources projects swamped all other sectors of the economy.

With limited future office development expected until 2022, Perth office owners are focussing on tenants to fill existing buildings. A current focus has been attracting tenants to relocate

from West Perth and other suburban locations such as Subiaco, Herdsman and Belmont. Over 10 of West Perth's largest private sector office occupiers from 2013 will have relocated to the Perth CBD by the middle of 2017. There is limited scope for this trend to continue or accelerate in the years ahead due to the lack of large scale tenants in suburban markets.

Four new sectors are emerging as major office occupiers in the Perth CBD – shared work space, technology, education and medical. In 2012, these sectors occupied 4.6% of occupied CBD office space. By 2016, these four industries occupied 6.3% of CBD office space. In early 2017, they occupied 7.3% of Perth CBD office space.

In education, Curtin University have expanded their footprint in the CBD, opening a law school on Murray Street. Central Queensland University recently occupied a new facility at 10 William Street, totalling 2,100sqm. In technology, 38 new companies occupied office in the Perth CBD in 2016. Shared offices continue to facilitate further take up by technology companies. A joint venture between a private office owner and an operator saw a new facility called Flux open in 2016, occupying 1,400sqm of ground floor space on St Georges Terrace.

Future growth is likely but these sectors will take years to mature and are currently a fraction of the size of the resources investment being replaced.

In summary, due to economic conditions, demand for office space will be moderate in the years ahead. Weak demand and tenants' flight to quality will leave many C-grade buildings in limbo, with the potential for many to be demolished.

Innovative solutions and new business models will be necessary for those with the will and resources to make a change. The role that the City can play in assisting building owners and businesses in capitalising on existing assets is open to exploration, with the potential for the development of new relationships that will be mutually beneficial in the long term.

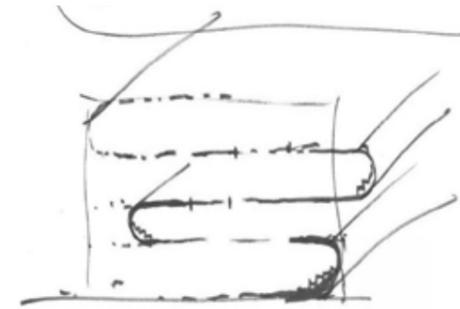
This case study was commissioned in order to facilitate this discussion. The six uses for the concept design schemes have been carefully selected based on market research and the opportunity they present for the sustainable growth of the city. An overview of the commercial context of each re-use proposal is provided in further detail on the following pages.

The latest Property Council Office Report (July, 2017) indicates that the market is now transitioning to recovery, with increased demand for centrally located, prime grade stock and a resultant decrease in vacancy rates (21.1%). This flight to quality continues to generate a two tier market, with challenging conditions influencing the future of lower grade buildings. With wide acknowledgement that we have reached the bottom of the market and a slow recovery ahead, now represents the perfect time to consider the repositioning of lower grade assets.

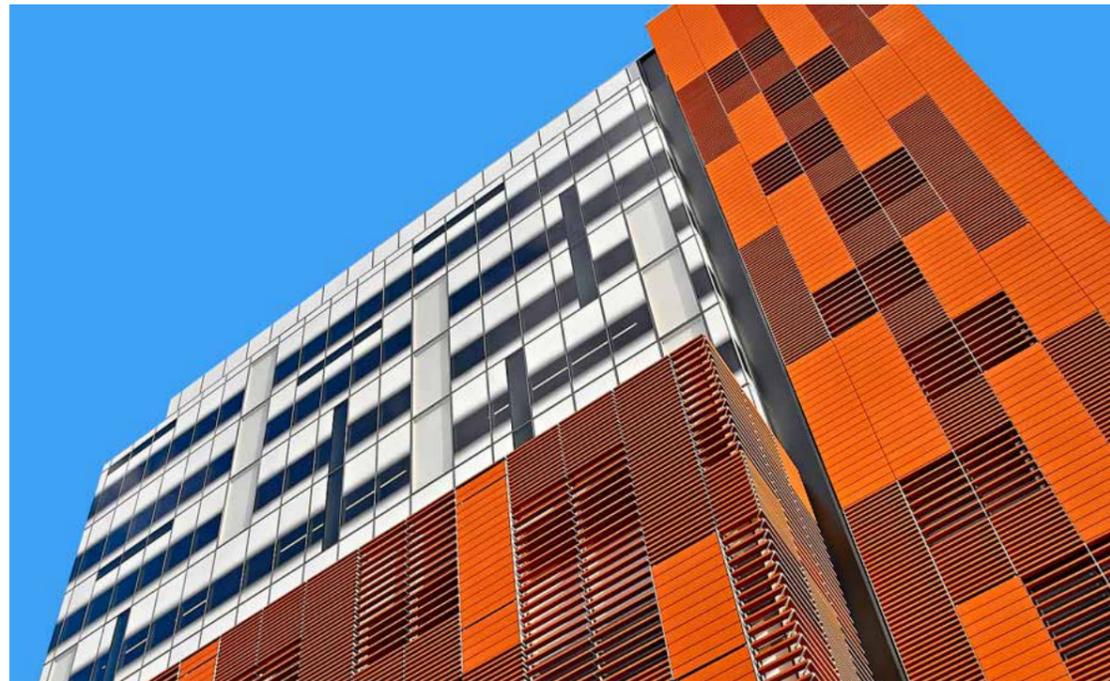
A-Grade Office

The recent office development wave in the Perth CBD has delivered a significant amount of A-grade office space. These buildings have high environmental ratings and modern facilities that attract tenants, such as end of trip facilities, gyms and cafes. A-Grade buildings have larger floorplates offering tenants the option to move to a single office floor allowing for greater connectivity. Recent A-Grade developments in the Perth CBD such as 140 William Street and 100 St Georges Terrace have also delivered significant ground floor retail amenity.

Owners of older A-Grade office buildings are investing in facilities such as end of trip and services such as building concierges to attract and retain tenants. Given recent rental discounts, A-Grade office is now an affordable option for CBD and suburban tenants. Refurbishing C-Grade buildings to an A-Grade standard will allow them compete in the current market.



Concept A-Grade Office Section



565 Hay Street, Perth - Adaptive re-use of a 1960s office building to incorporate 340sqm GFA of active retail and 7,950sqm of Grade-A commercial office space

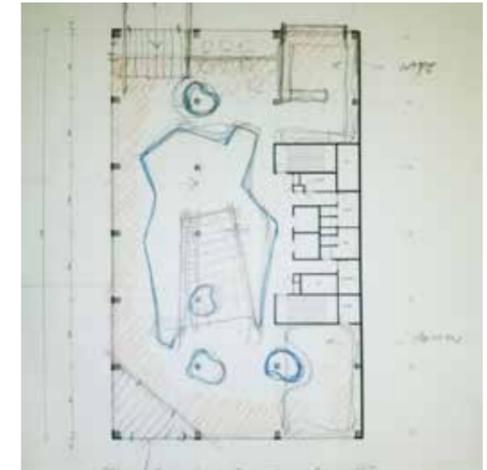
Education

Across the City of Perth there are limited primary, secondary, tertiary and vocational education facilities. This is due in part to the relatively small resident base in the City of Perth and suburban campus nature of WA's universities, TAFE's and schools.

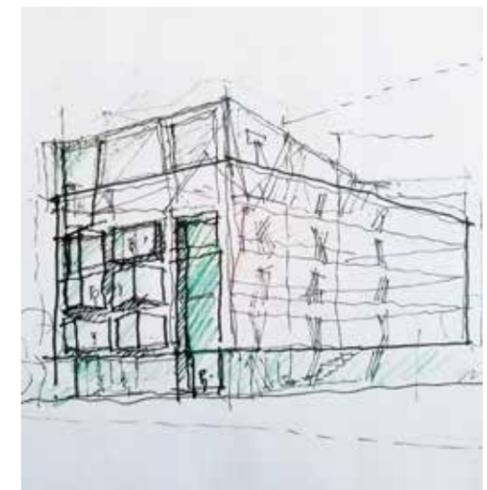
On current resident levels, there is likely demand for new public primary and high schools in the Perth CBD by the end of decade. The nearest public primary schools such as North Perth and Highgate are full. There was significant debate during the recent state election regarding the future site for a new high school in the CBD or western suburbs. The new State Government has decided to create a new secondary school in Subiaco over the Perth CBD.

Facilities for tertiary and vocational students have grown more strongly in recent years. Since 2012, education providers have been the stand out sector in terms of office space occupancy, collectively occupying nearly 40% more CBD office space. Universities have expanded their occupancy in the Perth CBD, underscored by Central Queensland University (10 William Street) and Curtin University's new law school on Murray Street. Major education provider, Navitas, relocated from Mount Pleasant into the Perth CBD as did St George's at 50 William Street. This high school taking a long term lease is an example of the adaptive reuse of an older, vacant office building that will be required over the next decade.

Growing our education sector will benefit more than the CBD office market. Increasing international students will increase demand for residential property. With our growing stock of inner city apartments, encouraging students to live and learn in Perth should become one of our key economic strategies as should increasing student accommodation options.



Concept Education plan



Concept Education massing sketch



50 William Street, Perth - re-purposed as St George's Anglican Grammar School

Student accommodation

Given that UWA, Curtin and recent entrant Central Queensland University occupy less than 10,000sqm of office space in the Perth CBD, there has been limited demand for inner city student accommodation.

Student accommodation in Perth has been centred around university-run facilities in the suburbs such as Nedlands, Bentley, Murdoch, Fremantle and Joondalup. Anecdotally, the apartment market in these suburbs, and suburbs in close proximity to university campuses such as Victoria Park, benefit from demand from students.

Research from commercial agencies JLL and Colliers International highlight that there are approximately 5,000 student accommodation beds currently in Perth. This would accommodate 6-7% of students in Western Australian. As a result of this lack of market penetration by international players, JLL's November 2016 Australian Student Accommodation Market Review highlights "Perth stands out as potentially the greatest opportunity for market expansion of Purpose Built Student Accommodation nationally".

Taking advantage of this opportunity, a development at 89-95 Stirling Street has been approved for student accommodation, consisting of a 22-level tower with 543 beds across 189 self-contained apartments. The project is aiming to be complete for the 2019 academic year. At 80 Stirling Street, a development application for the former Telstra building has also been lodged, seeking to convert the existing office building into a 500 bed facility. An additional 500 bed facility has also been mooted on Lot 4 of the City Link.

Given moves to increase the relatively low percentage of international students studying in Perth, these developments are likely the first of a number of projects required to accommodate the growing number of students in WA's tertiary education network.

Multi-residential

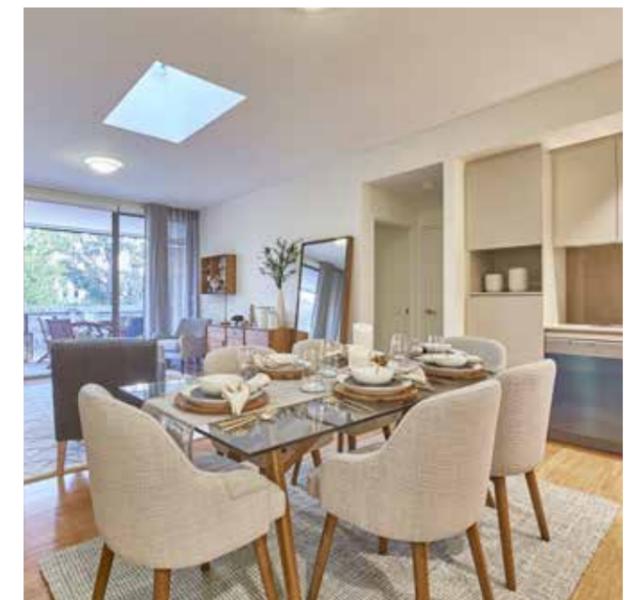
Perth continues to be the home of the residential sub-division on our fringes, but our city is moving to add more residential density. There are now over 11,000 apartments within the confines of the City of Perth boundaries. Adelaide Terrace, Terrace Road and West Perth are hot spots for apartment supply in the City of Perth.

The growing residential population is facilitating demand for 7 day a week amenity in the CBD underpinning investment in retail, public transport and hospitality venues. The removal of older office buildings, particularly in the east end of the CBD, for residential development has given more people the option to live and work in the CBD, reducing congestion on Perth's arterial road network.

On a national and international basis, the number of people living in the City of Perth remains low. Unlocking future development sites is required to continue the growth of Perth's inner city resident base.



Heirloom, Fremantle - an award-winning residential adaptive re-use project



Empire, Perry Lakes - contemporary apartment living

Mixed-use

Whilst CBD retail has undergone a downturn, the opportunity to create a vertical supermarket in the CBD is strong. The east end, where there is a resident population of 10,500 and a considerable workforce, is the obvious location. The suburban supermarket footprint of 3,500sqm plus can be scaled down to 1,500sqm across two levels for a city location.

Research into adaptive re-use of commercial space in other cities around the world shows a strong leaning towards mixed-use development. The buildings become a micro-community for mutually supportive groups, facilitating urban activation and regeneration. This approach supports the smaller space requirements of the consumer and business services tenants currently moving into the CBD. It follows that this mixed-use approach is one area where opportunities for the redevelopment of C-grade buildings in Perth are apparent.

Creating links between organisations is an increasingly common strategy around the globe. Tertiary institutions have been criticized for not adequately preparing graduates for the workforce, and opportunities exist for fostering mutually-beneficial collaborations between industry and educational facilities.

Similarly, business can form successful relationships with technology start-ups to accelerate research and development. In some markets, companies are moving entire teams and functions into co-working spaces to collaborate with start-ups. Co-working spaces can also provide additional space for businesses which require short-term expansion for a specific project.



Sheffield House, Perth - opens up the floorplate of a heritage building to become a contemporary workplace.



A next-generation Coles store

Health and well-being

Consumer medical has been identified as a growth area. With the increasing focus on health and well-being, both in the personal and the business realm, the potential for developing a health and wellness hub is significant. The idea is to attract several smaller businesses to the building to create a one-stop-shop that will service city residents and workers.

A major tenant would be an urban medical clinic offering a range of services such as general practitioners, pathology, dental and medical specialists. A day surgery for minor medical procedures, including cosmetic surgery, is a possibility.

The centre could be the annex of a local hospital, providing ambulatory care on an outpatient basis, including diagnosis, observation, consultation, treatment, intervention and rehabilitation services. Alternatively, an existing private health provider could take up the opportunity to expand into a new market. Smartphone technology would ensure an operational model geared to city patients looking for efficient clinic visits.

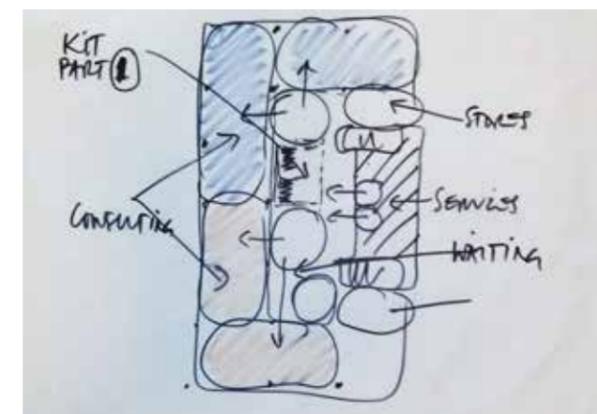
An allied health group health, including services such as physiotherapy, occupational therapist, dietician and naturopathy, could be a second tenant.

A third tenant could focus on preventative health and fitness, including a fitness centre, pilates and yoga/meditation.

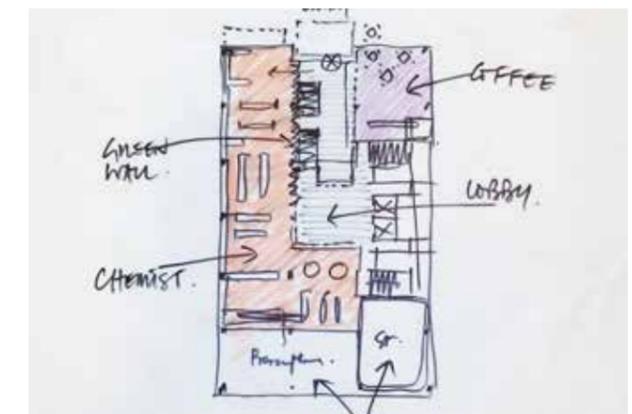
Ground floor retail tenancies would be attractive to a range of associated retailers such as health food store, juice bar / health food café, and chemist. This would provide appropriate activation at street level.

The difficulty with the mixed-use model is that it requires a number of operators. In this instance, existing medical centres or hospitals, allied health groups, and fitness operators of the relevant scale could be approached, with each taking out one or two floors of space. This would minimise the leasing co-ordination required to fill the premises.

Combining all of these in the one location would create a destination and provide valuable amenity in the city. The potential for corporate subscribers to utilise the facility as an employee benefit is another option that could be explored and used to incentivise operators.



Concept Health and Well-being plan



Concept Health and Well-being plan

The Generic Building

3 The Generic Building

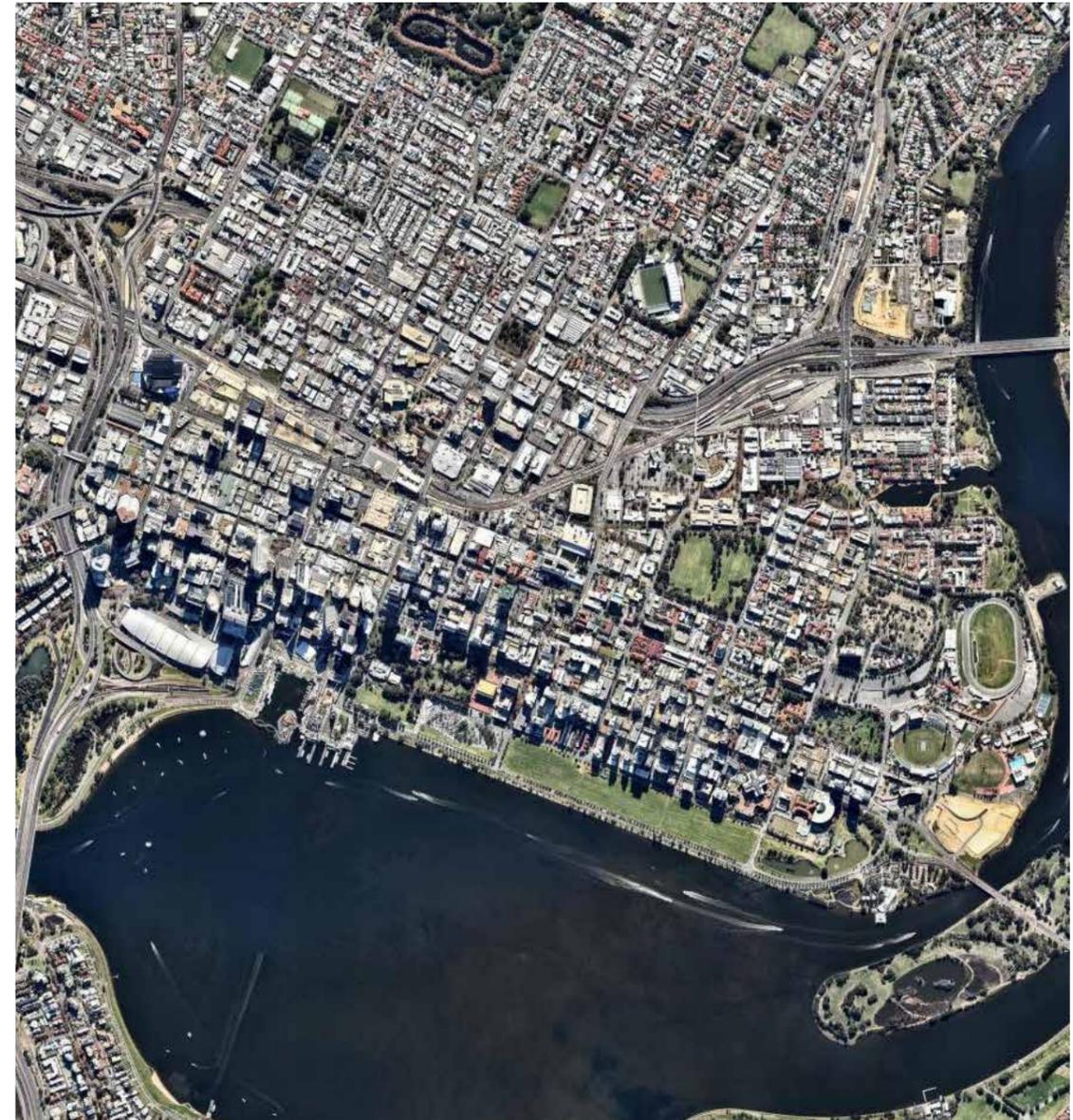
C-grade office buildings in the city form a unique aspect of our built heritage. They are intrinsic to the historical fabric of the city, and as an evolving and maturing community it is important to value the character they bring to the city's built heritage. Upgrading or repurposing for a more contemporary use repositions an undervalued building into a viable asset and extends its life cycle.

The process of adaptive reuse creates a new chapter in the life of the building and adds to the story of the place. It contributes to the sustainable development of the city. As the shell and structure of the building is retained, resources are conserved, and as the upgrade of buildings involve compliance with energy efficiency ratings, the carbon footprint of the building is also reduced.

This supply of building stock for redevelopment offers the opportunity to re-imagine the space and give it a new purpose, adding to the diversity of building types in the city - essential for creating diverse and vibrant communities.

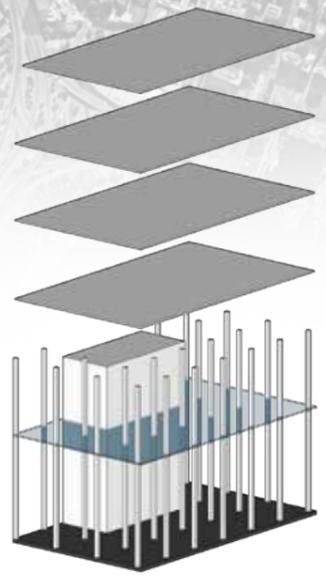
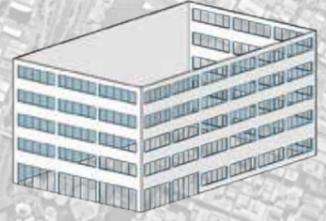
In this study, the characteristics of the C-grade office buildings in the city were analysed and distilled down to a hypothetical generic building on which to base the concept design schemes. This hypothetical building is rectangular in shape, with five storeys and a basement. It has strip windows and a core with two lifts and two stairs located along one side. Structurally, it has a flat concrete slab and column system. It is built to the site boundary on two sides including the street, with a right of way along one side and an access driveway along the back boundary.

The floor to floor heights allow sufficient volume for the building to be upgraded to A-grade offices offer flexibility for many other uses. The structural system also has sufficient capacity for the building to be upgraded or converted, including the addition of one or two additional floors in lightweight construction. It has the structural flexibility for voids and atriums to be created, and for the façade to be refurbished or replaced.



Aerial View of Perth City

GENERIC BUILDING



Over 200 C-Grade office buildings have been identified in the central Perth area, bounded by the Swan River to the south, freeway to the west, Wellington Street to the north, and the causeway to the east. The features of these buildings were analysed and distilled into a generic building on which to base the six concept design schemes. The generic building is hypothetical, and the intent is to establish the collective characteristics of the C-Grade buildings as a starting point for the concept schemes, so that they can be relevant to the largest majority.

It was identified that 73% of the building stock have 5 storeys or less, floor plates typically vary between 500sqm and 800sqm, and that the majority are located in the east end of the CBD. The area for this study is bounded by the Swan River to the south, freeway to the west, Wellington Street to the north and the causeway to the east.

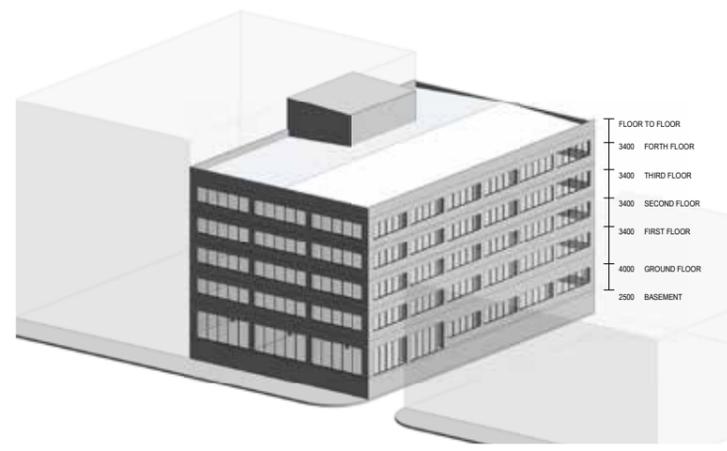
A more detail analysis of building characteristics was then undertaken, identifying:

- width and depth of the building;
- number of floors and whether there is a basement;
- floor to floor heights;
- ceiling heights;
- slab thickness;
- fenestration;
- location of the core;
- number of stairs;
- number of lifts;
- number of toilets; and
- number of carbays and access from the street.

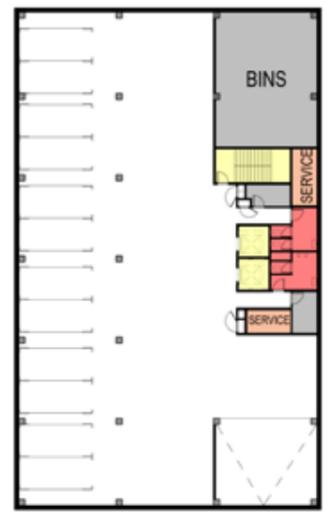
Following this analysis, the properties of the generic building were found to be:

- rectangular in shape with an overall width of 22.5m and length of 37m;
- an overall floor plate of 832sqm, and 716sqm excluding the core;
- structural grid of 6000mm x 7200mm;
- 6 floors in total, comprising of basement, ground, and four upper floors;
- typical floor to floor height of 3400mm;
- typical ground floor height of 4000mm;
- typical basement height of 2500mm;
- typical ceiling height of 2700mm;
- strip windows with a sill height of 900mm;
- core located along the side with two lifts and two stairs;
- male (1WC + 2 urinals) and female (2WC) toilets with no accessible toilets;
- site dimensions of 22.65m in width and 43.05m in length, with a 6m access driveway at the rear; and
- served by a laneway along one side, which is not part of the title.

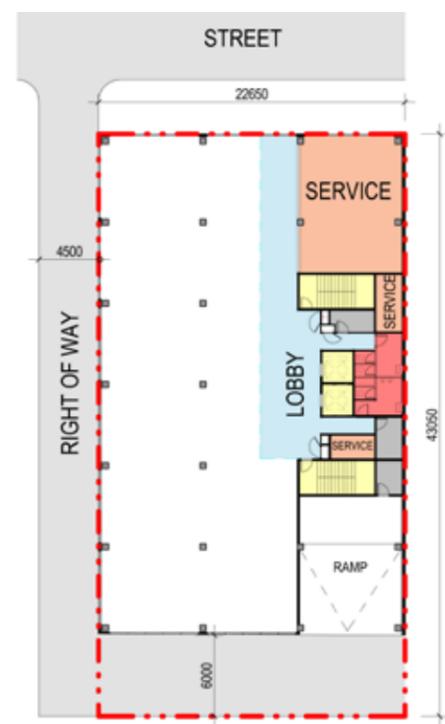
These characteristics have been found to be the most common amongst the C-grade buildings but are representative only. Basing the concept designs on this generic building ensures its relevance to the majority of the actual buildings. However, each building will need to be assessed on an individual, case by case basis.



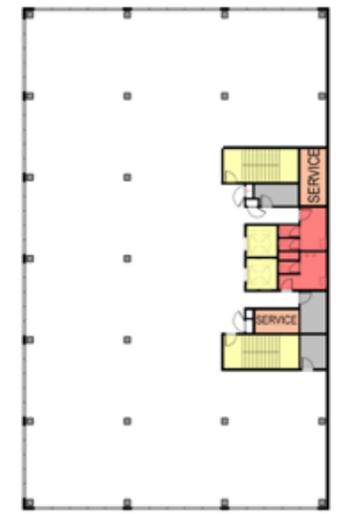
Generic building	
Site area (m ²)	975
Plot ratio area (m ²)	3500
Plot ratio (m ²)	3.6
NLA	3400
Car parking	12
Bicycle parking	0



BASEMENT



GROUND



TYPICAL LEVEL



The Design Process

4 The Design Process

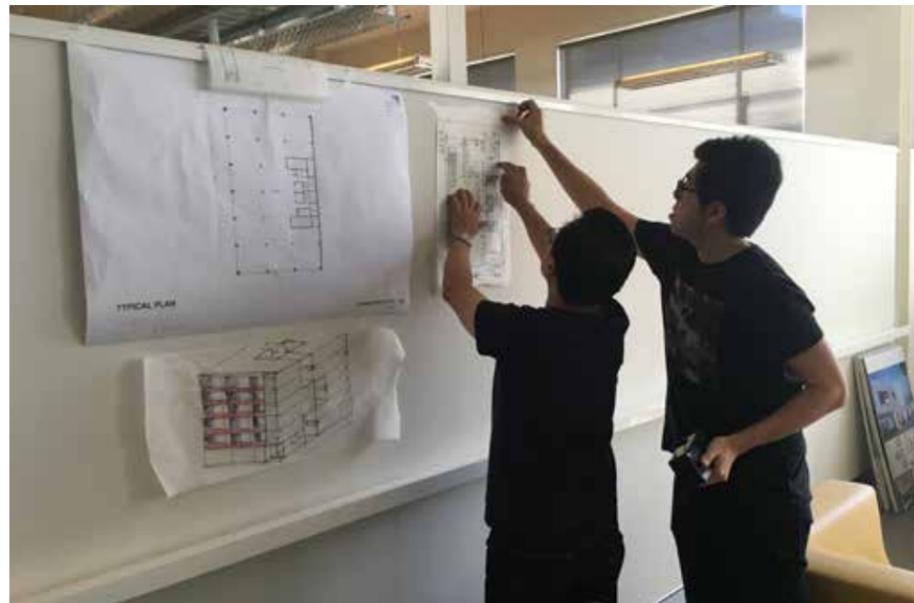
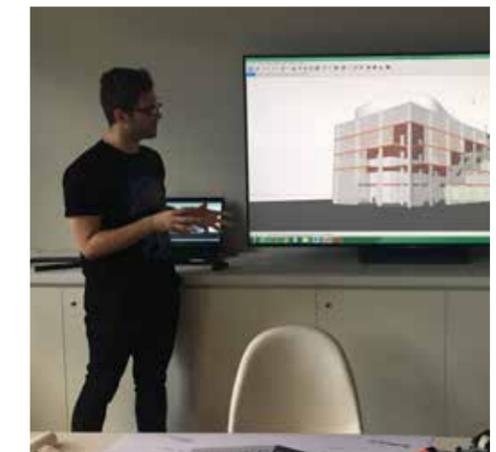
Our design process was highly collaborative, first exploring the potential of each proposed building use, then refining the concepts through comprehensive analysis and review.



The brief was introduced to the design team. Subsequent workshops included the City of Perth and consultants Wood&Grieve, Y Research and BSM.



Design concepts were refined through team reviews and consultant workshops.



At an intensive design charrette, teams explored each of the six design concepts to generate and analyse ideas.



4 The Design Process

Each concept design strives to be innovative as well as respectful of the existing characteristics of the generic building. Extensive benchmarking of international and local examples of adaptive re-use projects was undertaken, and the architectural response explores the ideas of connectivity, branding and identity, flexibility, activity and community. The function of the building informs the design. Incisive architectural interventions enhance the characteristics of the building to create distinctive visual and spatial qualities.

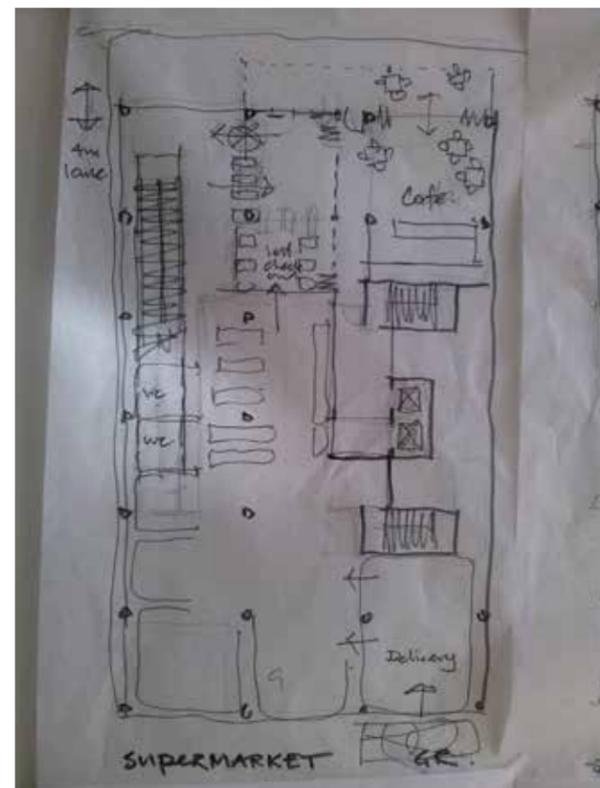
For many of the schemes, voids and atriums have been created to link small floor plates to form larger floor plates. The larger floor plates offer greater flexibility and opportunity for tenants, and the voids and atriums also provide visual and physical connectivity for the building, amalgamating distinct floors into one cohesive space. Any loss in floor area as a result of these voids is compensated by an additional lightweight floor, and the use of the roof as outdoor recreational spaces or roof gardens.

The architectural intent for each scheme responds directly to its use. In addition to creating larger floor plates to meet functional requirements, the design for the **A-grade office** is bold and distinctive, with a fluid green strip physically and visually binding the various floors into one element. This presents the opportunity for the tenant to integrate their branding with the architectural design of their office, and allows the building to stand out from the crowd and successfully compete with other A-grade offices.

A vertical university is proposed for the **education** scheme, for which new voids and stairs are intrinsic to the design. A university is an intellectual community, with young and vibrant scholars engaged in learning and thinking. Linking all the floors into one cohesive

space with circulation stairs supports activity and movement, and facilitates the sharing of knowledge. This verticality is also expressed on the elevation with a feature element cascading along the roof and down the façade, and then folding to form a canopy along the street above the ground floor.

The notion of activity and community is carried through to the design of the **student accommodation**, with a large atrium of circulation ramps connecting the various shared and private spaces. A range of communal spaces are offered to complement the student lifestyle. Private bedrooms are compact and modular, and the modular nature of the floor plan is evident in the design of the façade. The demarcation between public and private spaces is also clearly expressed on the elevation.



The **multi-residential** scheme comprises a mix of two bedroom and one bedroom apartments with a commercial tenancy on the ground floor. The façade becomes quintessentially residential with the creation of balconies. A series of alternating voids along the side elevation connects to a central courtyard, allowing for natural light and cross ventilation.

The **mixed-use** hub integrates retail, office, and residential as three distinct strata layers within the one building. The strata layers are reflected in the floor plans as well as the elevations. This space is envisaged as a thriving hub of commerce and activity, and once again voids and skylights are utilised to connect floors, encourage movement, and allow light to penetrate deep into the building.



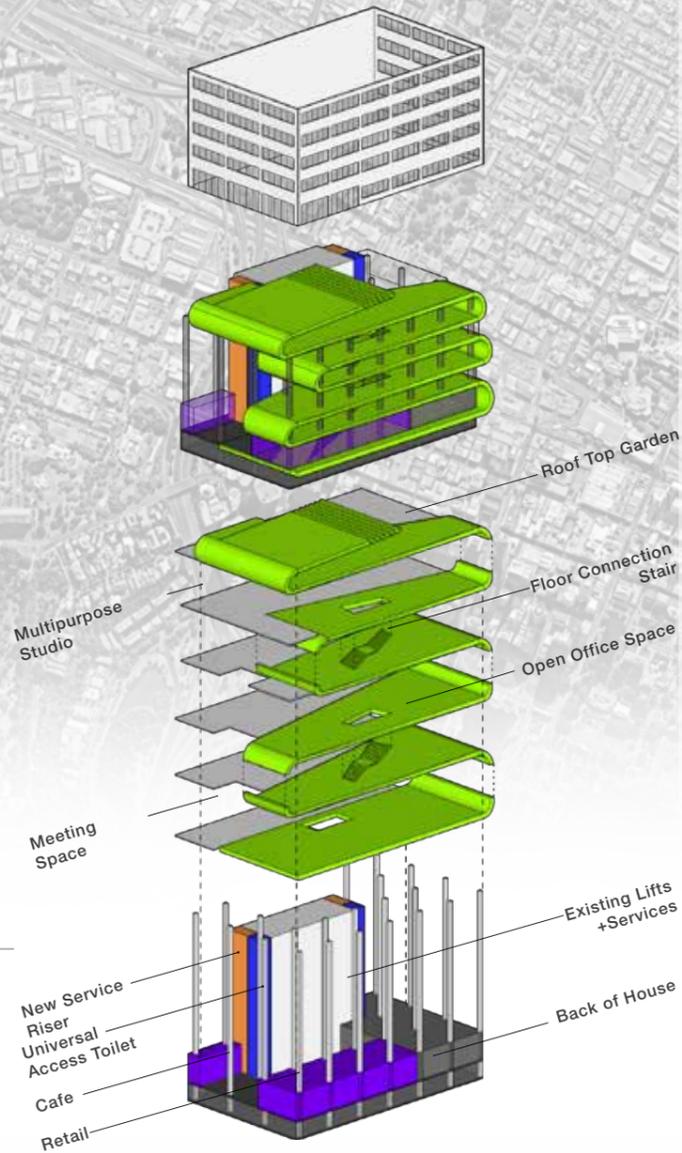
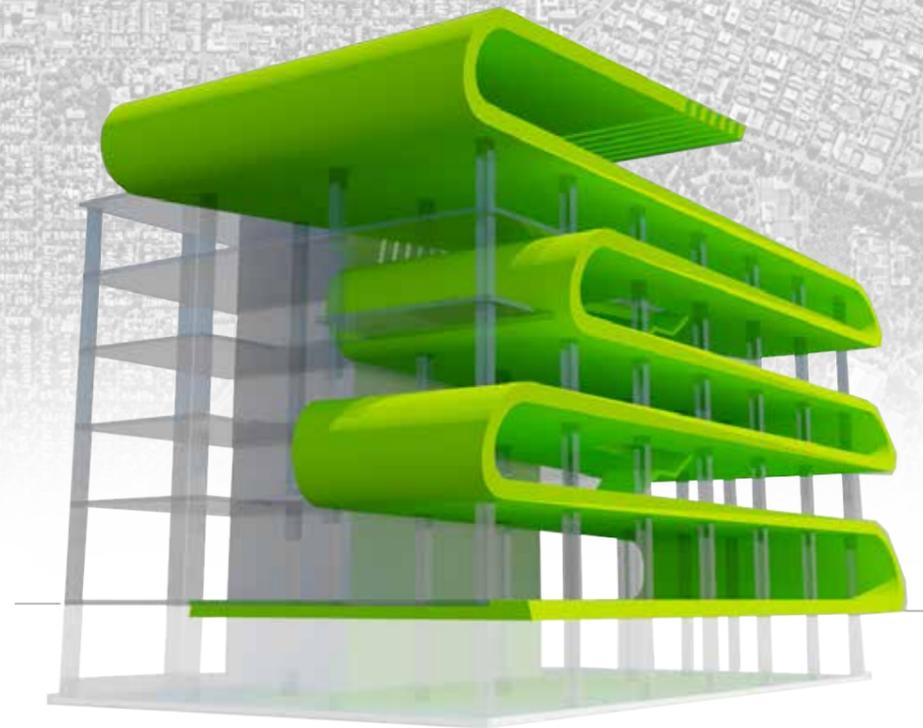
The design intent for the **health and well-being** scheme is to illustrate the idea of a cohesive community made up of many individual health providers. This is achieved by the creation of an entry void spanning several floors, which offers direct line of sight to multiple levels and signifies the building as one entity. This void allows natural light to infiltrate deep into the building, and the abundance of light and the use of natural materials complements the notion of health and well-being. A green wall extending the full height of the void further enhances the atmosphere of health and well-being.

The design responses for each scheme are creative and innovative, responsive to the use, and appropriate for the existing characteristics of the generic building. They illustrate the potential and the possibilities offered by these buildings for adaptive re-use.



Concept Design Schemes

A-GRADE OFFICE



As current A-grade buildings are being upgraded with new lobbies and on-floor amenities, any new A-grade office being presented to the market must stand out in order to attract tenants. A distinctive aesthetic can be aligned with a future tenant's branding and identity.

The architectural design of this scheme provides a unique aesthetic which is derived from the idea of a progressive and connected workplace. The fluid green strip visually and physically links the series of disparate spaces into one cohesive space. Multiple small floor plates are connected into one large continuous floor plate. This integration is further enhanced by the creation of floor voids and new internal stairs. Any loss in net leasable area as a result of these new voids is offset by an additional floor in light-weight construction. The design also allows flexibility for the building to be leased by one tenant or a series of smaller tenants.

Guidelines for the grading of office buildings are outlined in the Property Council of Australia *A Guide to Office Building Quality*. This guide describes the features representative of the A-grade office, and a building does not need to meet all the requirements, but should meet the majority. Meeting the standard expected of an A-grade office means providing well designed spaces with high quality finishes, that are well managed and well maintained. This would entail upgrading the façade with consideration for natural light, sun shading, and energy efficiency. The lobby should have an attractive clear entrance and good street access. Existing amenities would require refurbishment with quality finishes and water efficient fittings, including the provision of universal access toilets and end-of-trip facilities.

Services wise, the lift car should comprise quality materials and offer a smooth ride with short waiting intervals. The mechanical services should be zoned and incorporate building intelligence. The building should also offer good security and access control, and achieve good energy and water efficiency ratings.

One important aspect of the guide is that floor plates should be greater than 700sqm, with the overall building size to be greater than 5000sqm. Rather than be constrained by the size of the existing floor plate, the initiative to amalgamate the various floors physically and visually through the creation of voids, stairs and a unifying design element not only meets this technical requirement, but also provides a design solution that facilitates the practice of a modern workplace and is competitive in the A-grade office market.

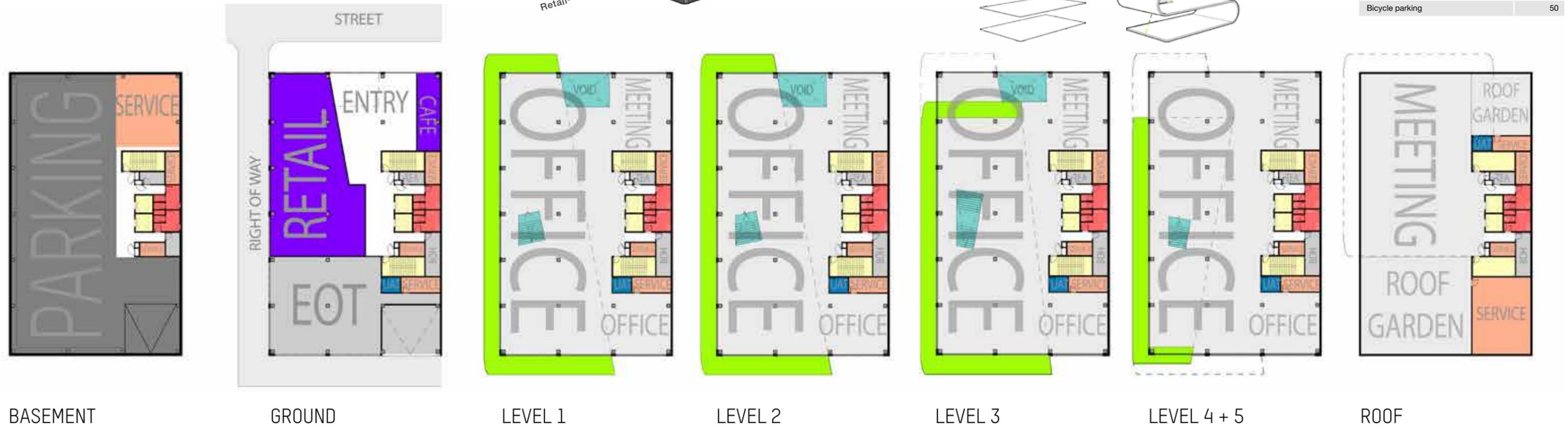
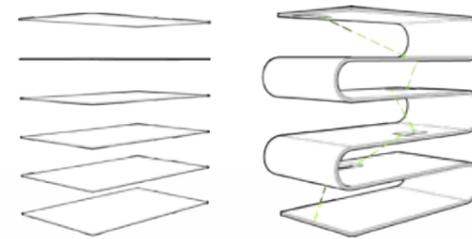
Services wise, the lift car should comprise quality materials and offer a smooth ride with short waiting intervals. The mechanical services should be zoned and incorporate building intelligence. The building should also offer good security and access control, and achieve good energy and water efficiency ratings.

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Benchmark images

A-Grade office	
Site area (m ²)	975
Plot ratio area (m ²)	4000
Plot ratio (m ²)	4.1
NLA	3900
Car parking	12
Bicycle parking	50



BASEMENT

GROUND

LEVEL 1

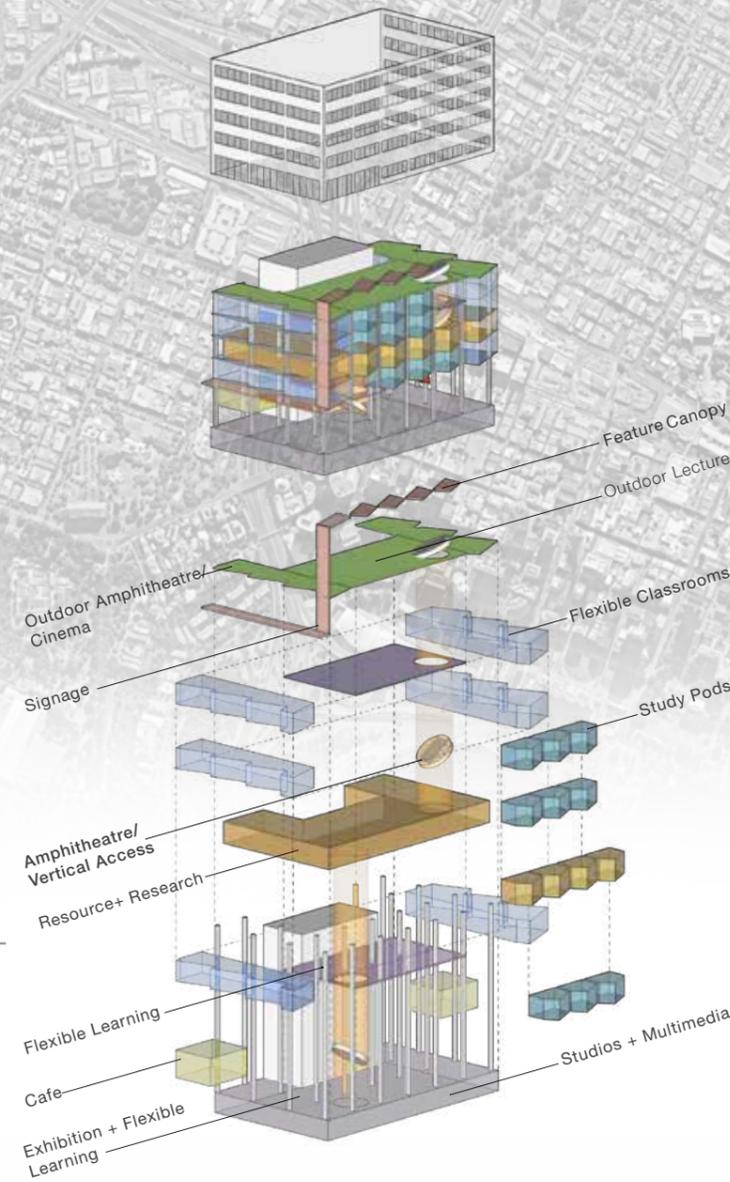
LEVEL 2

LEVEL 3

LEVEL 4 + 5

ROOF

EDUCATION



The city provides good public transport links and an array of food, entertainment, and retail amenities. Drawing on an influx of students presents a synergy of mutual benefits. The architectural design for this scheme entails a vertical university comprising of flexible learning spaces and student facilities that is intrinsic and woven into the fabric of the CBD. The exhibition space on the ground floor invites the public into the realm of the university, and the café at the front fosters activation at street level. The rooftop outdoor cinema and lecture space provides views and visual connection across the city. These spaces illustrate the place educational institutions take at the forefront of thinking and learning. They support the functions of resource, research and development.

New circulation stairs and voids have been provided to link the floors, creating a sense of connectivity and allowing a clear line of sight between the various floors. Focusing on circulation encourage activity and movement, which provides opportunity for discussion, generation of ideas, and exchange of knowledge.

The façade would be upgraded to allow for natural light, sun shading, and energy efficiency. Any loss in floor area from the new circulation stairs and voids are offset by converting the rooftop for outdoor learning and recreational use. Additional toilet facilities are required to meet the student population, and separate facilities will be required for students and teachers.

Providing educational facilities in the city meets increasing demand, and introduces student population that will contribute to the vibrancy and sustainability of the city.

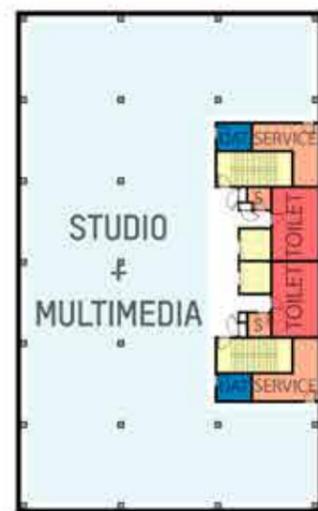


CAMERON
CHISHOLM
NICOL



Benchmark images

Education	
Site area (m ²)	975
Plot ratio area (m ²)	3500
Plot ratio (m ²)	3.6
NLA	3900
Car parking	0
Bicycle parking	0



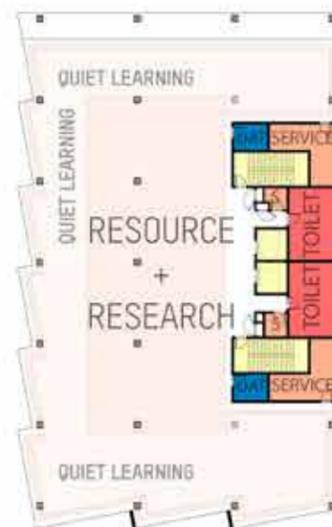
BASEMENT



GROUND



LEVEL 1



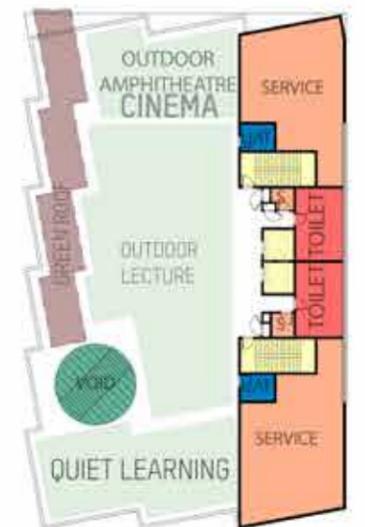
LEVEL 2



LEVEL 3



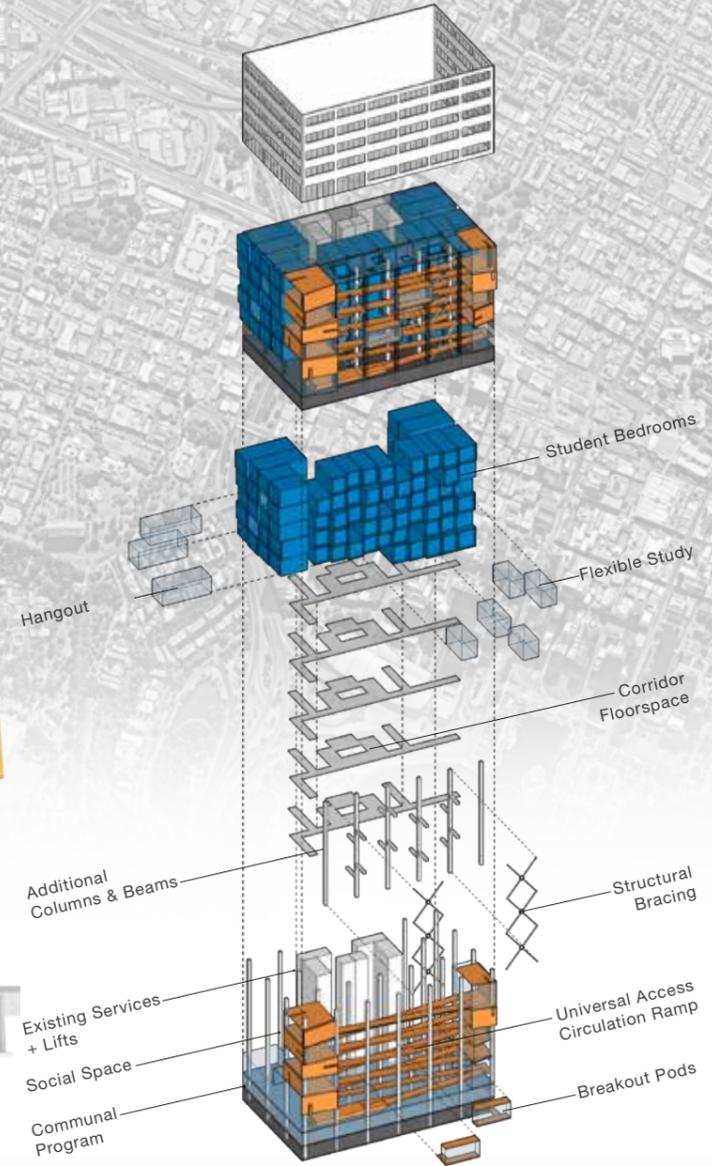
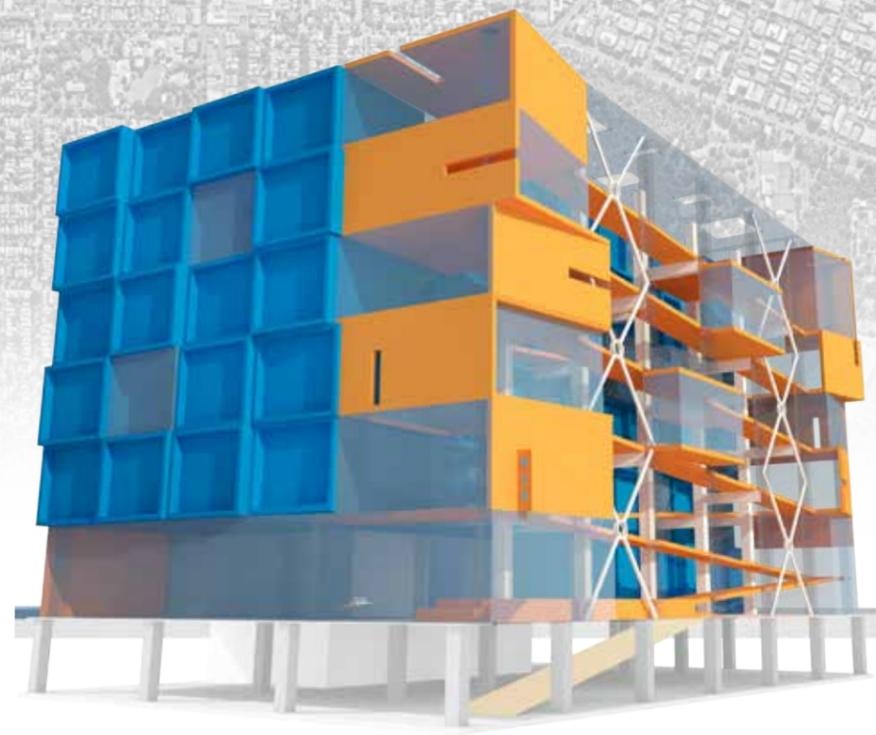
LEVEL 4



ROOF

STUDENT ACCOMMODATION

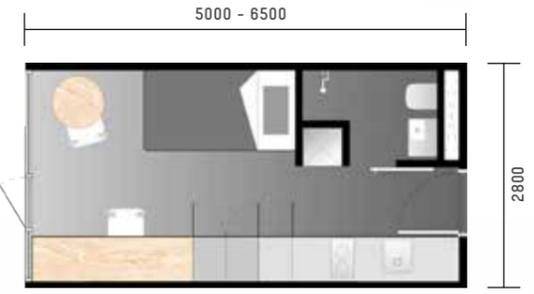
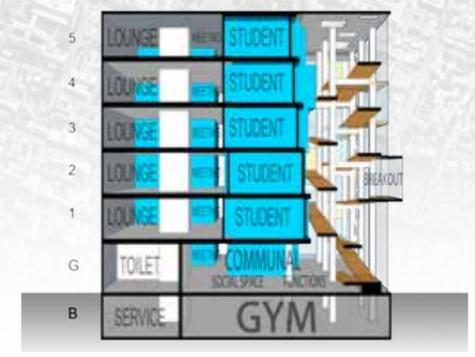
CAMERON
CHISHOLM
NICOL



In this scheme to provide student accommodation to cater to tertiary institutions in the city, the design focus is on the communal areas, where students come together to study, rest and play. A new atrium encompassing the full height of the building forms the main circulation and leisure space. This space is envisaged as a transparent hive of activity. Most of the bedroom pods are orientated towards and open up to the atrium. This not only focuses activity on the atrium, but also allows access to natural light and ventilation for every bedroom. An additional floor is also provided to increase the critical mass of student numbers.

The student bedroom pods are compact and incorporate a bed, study nook, kitchenette and ensuite. They have been designed to be modular for ease and speed of construction, and can either be prefabricated off site or built in-situ. The façade would be upgraded with consideration for natural light, ventilation and energy efficiency, and the aesthetic reflects the hive-like nature of the modular bedroom pods. The atrium is visually transparent to the street, allowing the activity within to be apparent and connected with the city.

The scheme provides not only a variety of communal spaces for students to socialise and quiet spaces for study, but the bedroom pods comprise exclusive ensuite and kitchenette amenities.



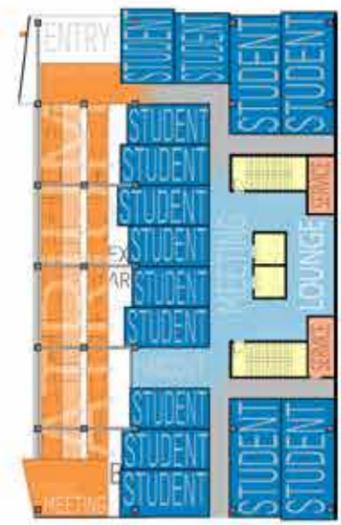
Benchmark images

Student accommodation	
Site area (m ²)	975
Plot ratio area (m ²)	1900
Plot ratio (m ²)	2.0
Yield	79
Car parking	0
Bicycle parking	87

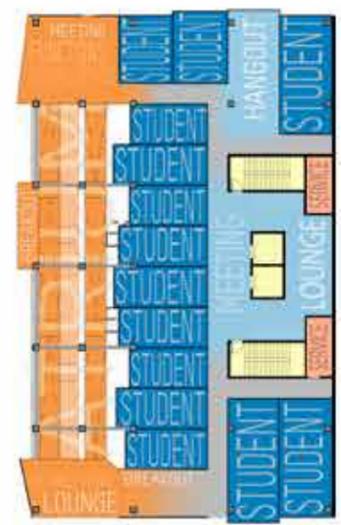


BASEMENT

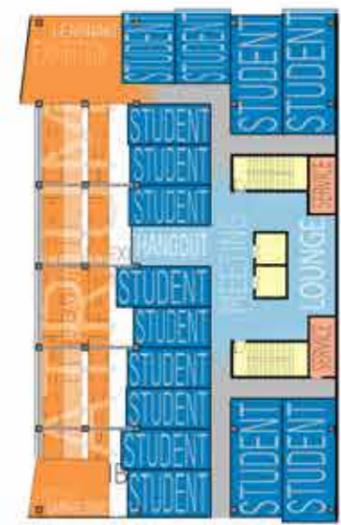
GROUND



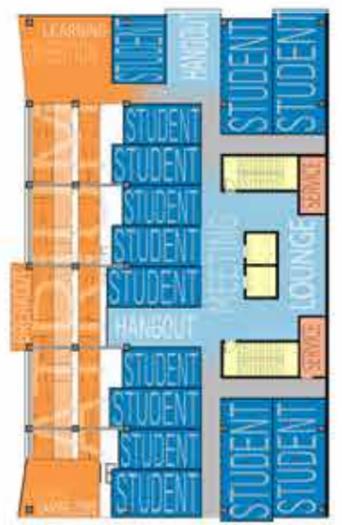
LEVEL 1



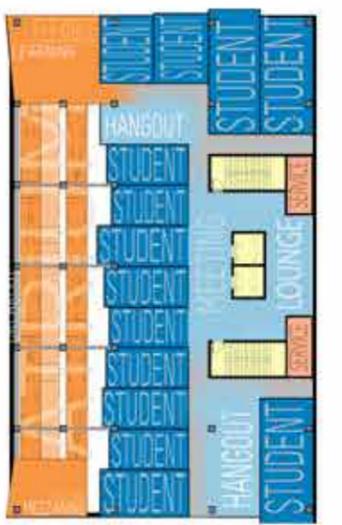
LEVEL 2



LEVEL 3

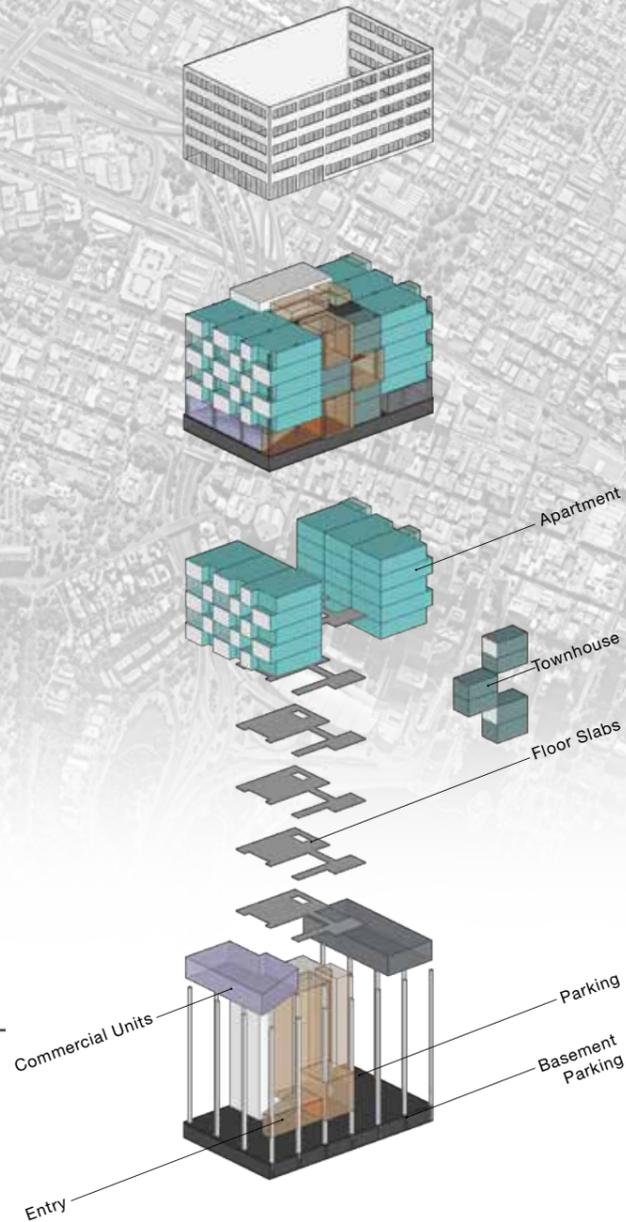


LEVEL 4



LEVEL 5

MULTI-RESIDENTIAL



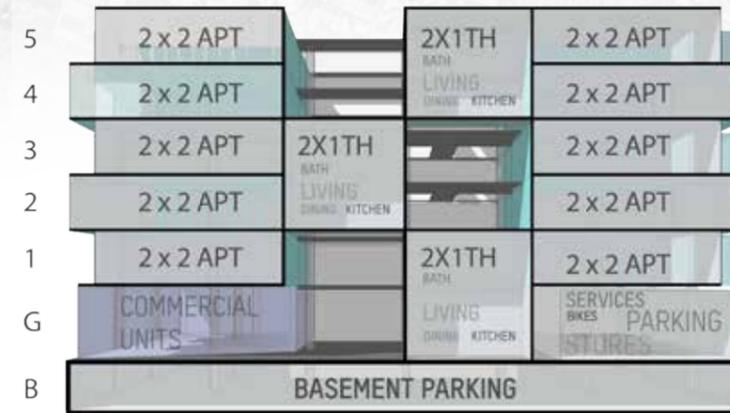
An existing shell provides the rare opportunity to work with the characteristics of a building to create a unique floorplan and design, setting it apart from standard new apartments. The typical C-Grade building translates very well to a boutique development with a small number of occupiers. Adapting an existing building to a new use captures the embodied energy of the structure, and this sustainable aspect is inherent with its marketing value.

This scheme comprise of a mix of 1 and 2 bed apartments, and fundamental to the design is the creation of a landscaped central atrium to provide natural light and cross ventilation. A series of alternating voids along the side façade creates interest and articulation, and further enhances the permeation of air and light into the development. These design features will become an integral part of the building's identity, illustrating the process of adaptive re-use and its new function.

An additional floor in lightweight construction has been included to compensate for the atrium and voids. Commercial units at ground level provide activation at the street front, with parking provided at the back and the basement. There is a dedicated entrance for the residents, and the façade upgraded with consideration for natural light, ventilation and energy efficiency.



Benchmark images



Multi-residential	
Site area (m ²)	975
Plot ratio area (m ²)	2600
Plot ratio (m ²)	2.7
2 x 2	20
1 x 1	5
2 x 1 (two-stoery)	3
Studio	10
Total yield	38
Car parking	12
Bicycle parking	17



BASEMENT

GROUND

LEVEL 1

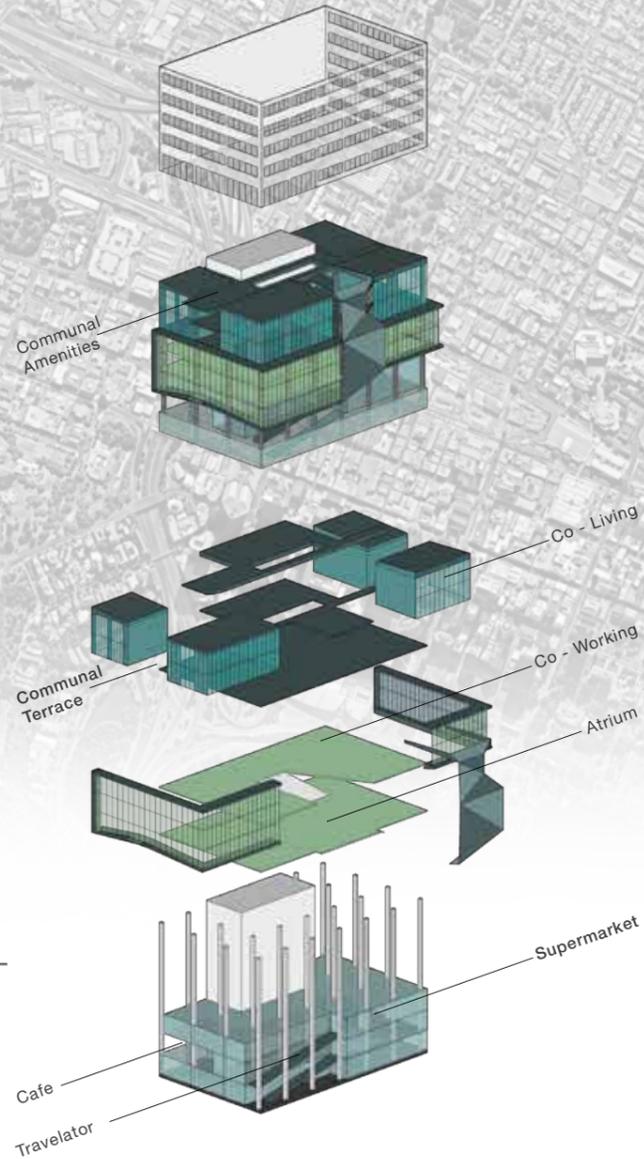
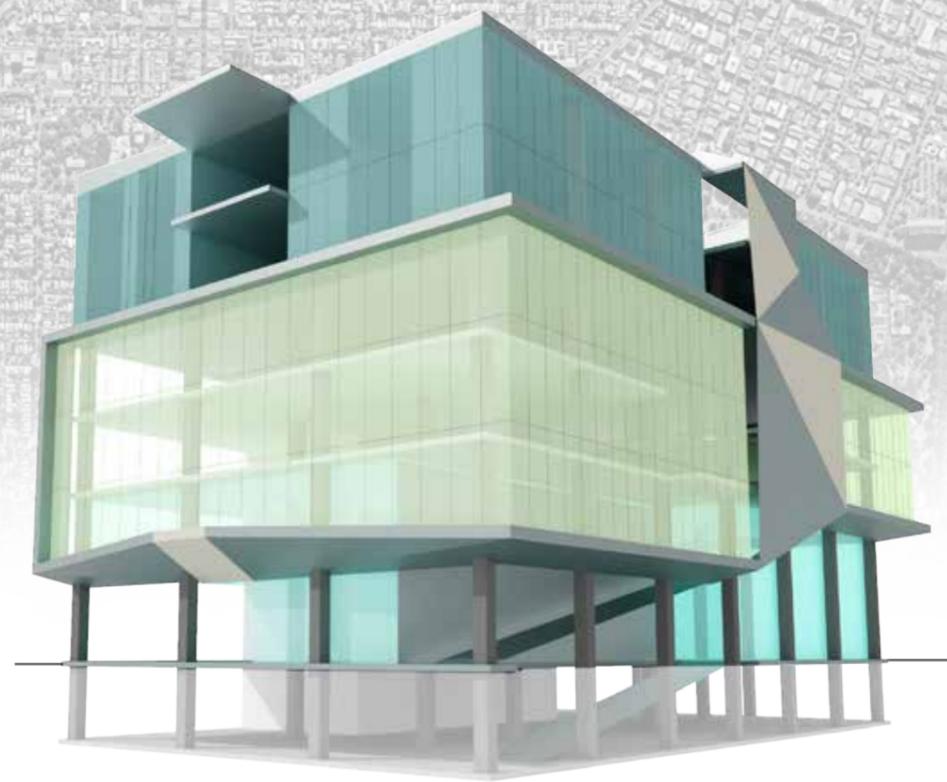
LEVEL 2

LEVEL 3

LEVEL 4

LEVEL 5

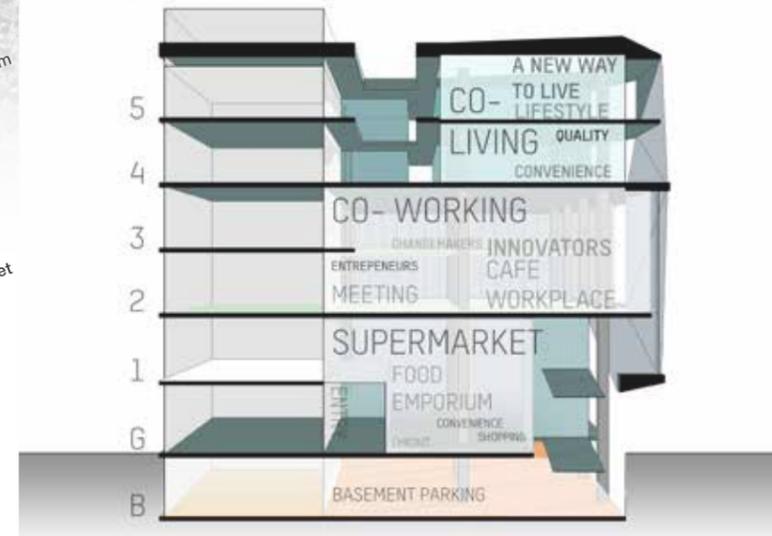
MIXED-USE



This scheme combines three different classifications of retail, commercial and residential into one building, and the three uses read as strata layers in the plans. The three layers are also articulated in the design of the façade, reflecting the function within. A clear entrance for the commercial and residential component is separated from the retail entrance, which can be secured after hours.

Within each classification, new floor voids are created to connect the small floor plates to form larger spaces and double volumes. The vertical supermarket occupies three floors, linked physically by a travelator and visually with a wine tower. The layer above this is commercial, which is envisaged as a flexible co-working space, a hub for innovative and like-minded professionals. The floor plate is left open to allow for tenant flexibility and interaction. Carved into these two commercial floors is a multi-purpose amphitheatre that acts as a theatre and breakout space, as well as the vertical circulation. This amphitheatre also connects the two floor plates physically and visually into one cohesive space.

The top floors are residential, designed with communal living in mind. It comprises a series of private and shared facilities, and is an affordable housing option tailored to suit the professionals working on the floors below. Skylights allow natural light to penetrate the floorplate. An additional floor in lightweight construction with a rooftop vegetable patch has also been included.

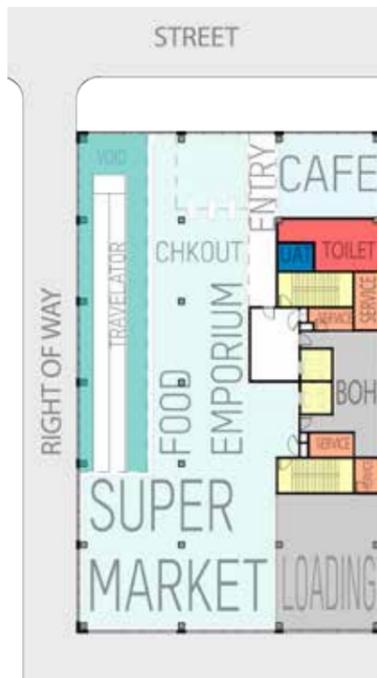


Benchmark images

Mixed-use	
Site area (m ²)	975
Plot ratio area (m ²)	3500
Plot ratio (m ²)	3.6
NLA	4400
Car parking	0
Bicycle parking	0



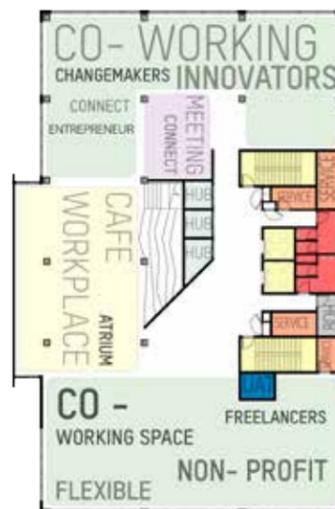
BASEMENT



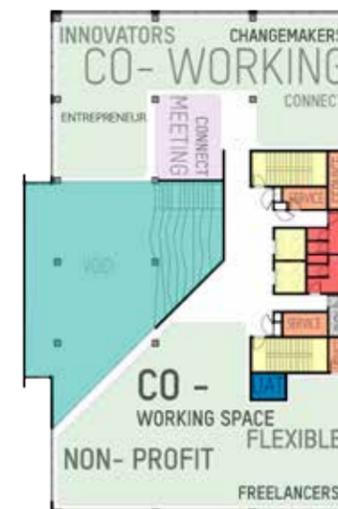
GROUND



LEVEL 1



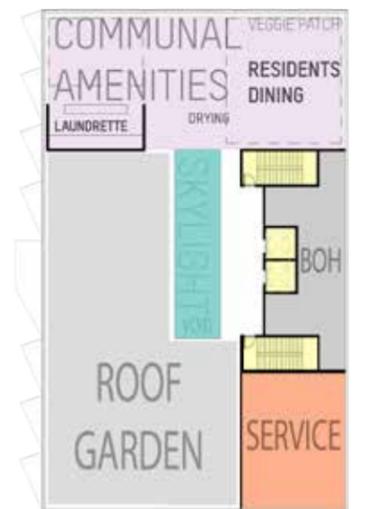
LEVEL 2



LEVEL 3

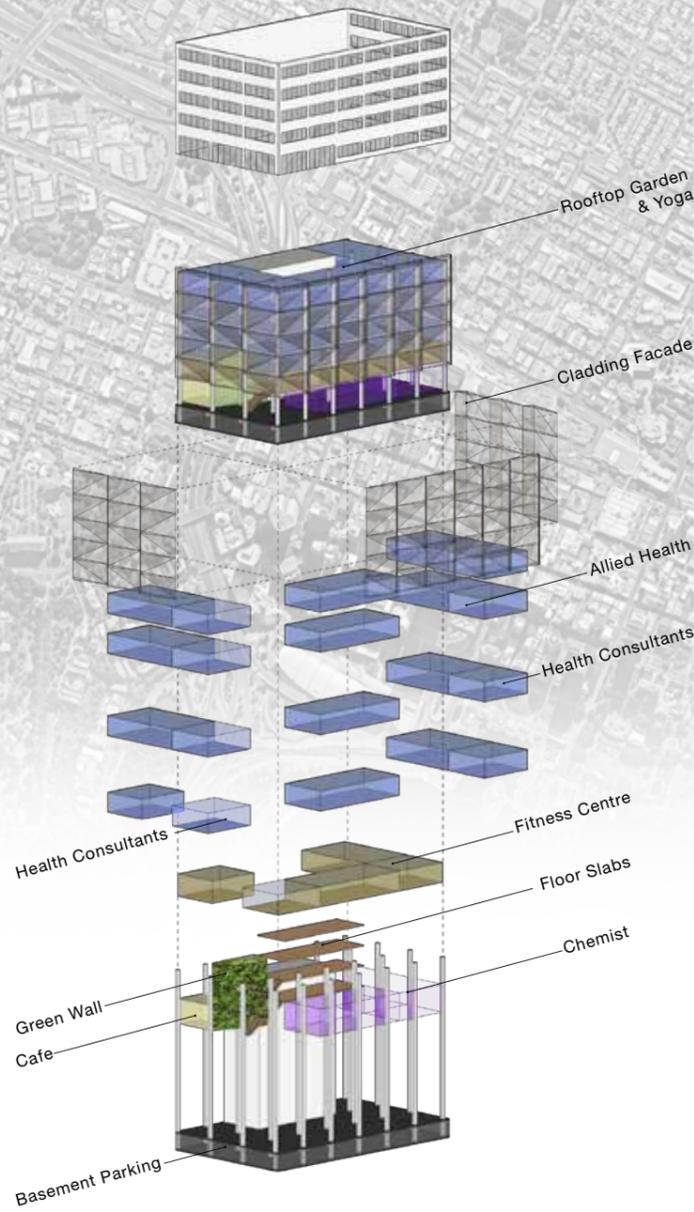


LEVEL 4 + 5



ROOF

HEALTH & WELL BEING



The idea of this scheme is to co-locate complimentary services to create a health destination, to meet increasing demand for medical and wellbeing. The whole is worth more than the sum of its parts, and the architectural design focuses on bringing together these allied services into one cohesive space.

A three storey volume entry creates a sense of arrival. This expansive void provides visual connection to the upper levels and announces this building as an integrated identity. This allows the individual tenants to contribute to an overall building entity as a landmark health destination and is an expression of the sense of community.

This also creates opportunities for the infiltration of natural light, which demonstrates the idea of health and well-being. This idea is reinforced with a green wall extending the full height of this void, which also links the floors visually and physically. The use of natural materials further expresses the function of the building as a health and well-being hub.

The floor plan allows for flexible tenant sizes. Retail uses on the ground floor capture foot traffic from the street. Allied tenants are grouped together on the upper levels to form strata layers of various uses. A shared reception is provided centrally on these floors to serve these tenancies. Secondary green spaces can also be provided on the upper floors as winter gardens.

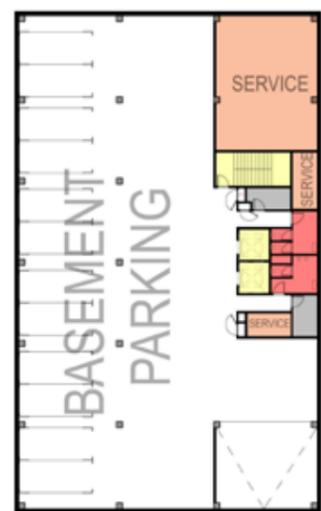
A faceted lightweight façade is a dramatic way to create a play of light and shade on the elevation as well as provide passive solar control. Natural ventilation can potentially be utilised to reinforce the sense of health and well-being.



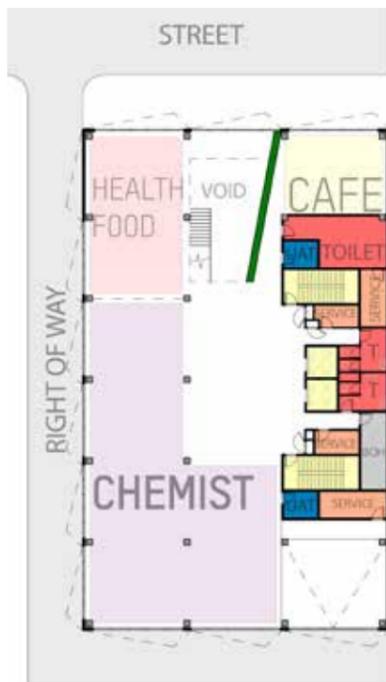
Benchmark images



Health and well-being	
Site area (m ²)	975
Plot ratio area (m ²)	3800
Plot ratio (m ²)	3.9
NLA	3600
Car parking	12
Bicycle parking	0



BASEMENT



GROUND



LEVEL 1



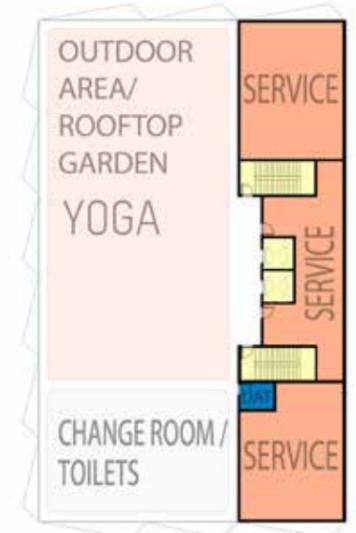
LEVEL 2



LEVEL 3



LEVEL 4 + 5



ROOF

Key Considerations

6 Key considerations

There are technical and procedural issues that require consideration when upgrading or converting an existing building. These include understanding the structural performance of the building, so its structural integrity can be maintained in the new design. Understanding the type and reticulation of services required is also important, in terms of impact on infrastructure, space required, and cost. Major upgrades or conversion will require planning approval and a building permit and any heritage issues or contamination identified will also require addressing.

The key considerations are discussed generally below, with issues specific to each design scheme and use outlined in Appendix A. These are overall considerations based on a hypothetical building, and it is imperative that each individual building is assessed on a case by case basis.

This section outlines the key structural, mechanical, electrical, hydraulic, fire, and ESD requirements that will need to be considered.

Structural

The typical structural type for existing C-Grade office buildings is concrete column and flat slab. There are three main issues to consider for this structural type:

- maintaining restraint to the core;
- maintaining restraint to the columns; and
- managing deflection of the floor slab.

The location of any newly created voids can be optimised to suit the structure by ensuring restraint is maintained to the existing columns. This means avoiding the creation of voids around the columns or the core. Should the creation of voids result in freestanding columns, then new bracing such as steel struts will be required in order to maintain the same level of column restraint.

The four main structural interventions explored in the concept designs are summarised below:

Small void

This is the creation of localised voids in between columns whilst maintaining a portion of floor slab around the column. No additional column stiffening is required however additional strengthening for the adjacent floor slab may be required to manage potential deflection.

Large void

This is the creation of larger voids spanning columns and involves the removal of the floor slab around a column. Additional steel struts will be required to restrain the existing columns.

Release of columns

This is the creation of larger voids spanning multiple columns. Additional steel struts will be required to restrain the existing columns.

Additional floor

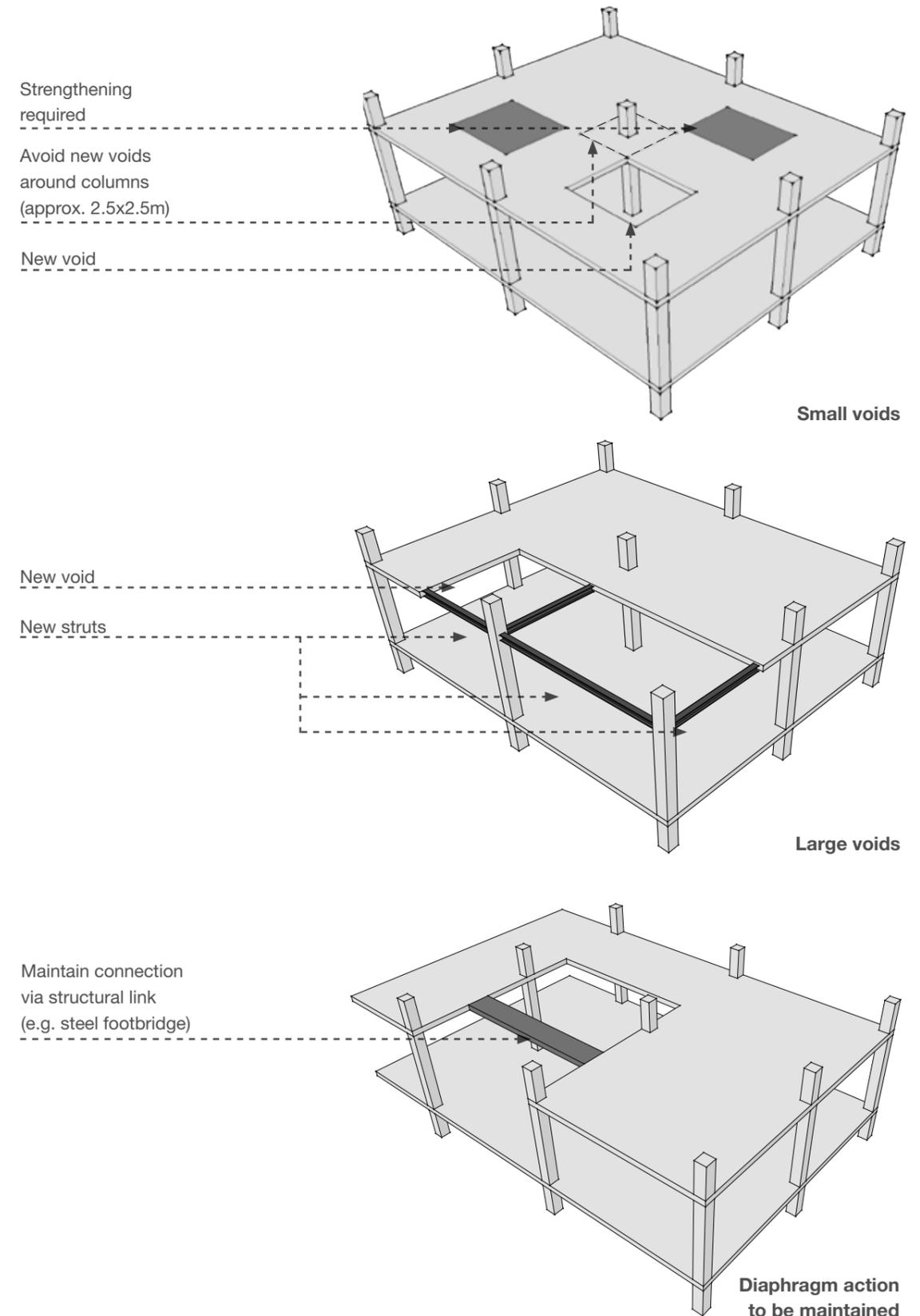
Additional floors in lightweight construction are structurally feasible. One additional floor may be feasible for the A-grade office, education, mixed-use and health and well-being schemes. Two additional floors may be feasible for the multi-residential and student accommodation schemes.

The six schemes based on the generic building do not trigger the need for earthquake code compliance. The triggers for earthquake code compliance are:

- additional weight in excess of the code trigger point; and
- change to the stiffening of the building in terms of the core and shear walls.

These key structural issues were considered during the design process to ensure the need for earthquake code compliance is not triggered due to its impact on complexity and cost.

Therefore, no structural changes were made to the core.



Services inspections of the C-Grade buildings have not been carried out, and this report assumes that the services infrastructure is at the end of its life cycle. In reality some of these buildings may have recently upgraded systems, so the extent of work required to upgrade or convert would not be as extensive as described below.

Mechanical Services

The mechanical system will require upgrading or replacement to suit the use of the building. The system will generally need to be upgraded for the A-grade office, education, and health and well-being schemes. The multi-residential and student accommodation schemes will require the system to be replaced with individually controlled systems. The mixed-use scheme will require the system to be separated, with an upgrade for the retail and office components, and new individually controlled split systems for the residential component.

Upgrading the mechanical system would include capacity, efficient zoning and building management systems.

Electrical Services

The electrical infrastructure will generally require replacement, with a new substation required for all the schemes. New power and communications distribution would also be required.

The communications system would include data, NBN and MATV. New energy efficient lighting, emergency lighting and lighting control system would be required. New fire detection and security system would also be required.

A new lift car providing a better quality ride and with sufficient room to accommodate a stretcher would be required.

Load centres and distribution boards would also be required, the location of which would depend on the use of the building.

A generator for backup power would also be required for the A-grade office scheme.

Hydraulic Services

The hydraulic infrastructure will require partial or full upgrading to suit the use of the building. A full upgrade will be required for the multi-residential and student accommodation schemes, and the street infrastructure will have to be reviewed to ensure it has the capacity to support this upgrade. Partial upgrades will be required for the A-grade office, education, mixed-use and health and well-being schemes.

The upgrade would include new water efficient fixtures and fittings, a grease arrestor for the cafes in the various schemes, and central hot water for the A-grade office scheme.

Fire Services

A change of use will generally mean a change in classification under the Building Code of Australia (BCA), which would trigger the need for achieving compliance for the fire resistance of structure. As the existing buildings will generally not be compliant with deemed-to-satisfy conditions, a fire engineered solution could be explored, which generally means the provision of fire sprinklers and the upgrade of fire detectors and alarms.

The A-grade office scheme will require the upgrade of fire detectors, sprinklers, and alarms.

Ecologically Sustainable Design

A change of use will generally mean a change in classification under the Building Code of Australia (BCA), which would trigger the need for achieving compliance for energy efficiency. This would mean façade upgrades for all schemes in terms of insulation and glazing in order to meet thermal requirements.

The multi-residential scheme would need to comply with NatHERS for energy efficiency. The A-grade scheme would require 3.5 stars NABERS energy rating, with 4.5 stars NABERS required to attract government tenants, as well as 2 stars NABERS water rating.

6 Key considerations

Approvals Process

In order to upgrade or convert a building, approvals are required from the City, and possibly other authorities. This would include but not limited to development approval (planning), building permit and occupancy permits.

Consultation with the City is strongly encouraged to allow greater understanding of the approval process and any potential site restrictions relating to the proposal.

Statutory Compliance (DA)

A change of use as well as any upgrading, converting or new building works must comply with the provisions of the Local Planning Scheme (City Planning Scheme No. 2 in the City) and the relevant policies. There may be some flexibility to vary the building envelope however in the City the maximum plot ratio floor area is fixed. There is potential for plot ratio bonuses to be obtained linked to specific uses (for example some forms of residential) or for providing public or communal facilities in accordance with the Scheme and policy provisions.

Building Code Compliance

The Building Code of Australia (BCA) classification of a building is determined by the purposes for which it is designed, constructed or adapted to be used. A change in a building classification requires the building to be compared and assessed to current building regulations, and the approval process ensures the building is suitable for the proposed use as each classification has different associated risks and requirements.

The first step in the building approval process is engaging a registered building surveyor, who will review the proposal and advise if the building, or part thereof, needs to be upgraded in any way to meet the current building standards.

Where the works are limited to the refurbishment of an existing building and the previously approved classification is remaining, there is no legislative requirement to upgrade the entire building, and in these cases, only the new building works are required to comply with current BCA provisions. However, from a safety in design consideration, the building owner should consider the overall health and safety of the building occupants, and consider the provision and condition of the existing building elements, throughout the refurbishment process.

Environmental Health and Public Buildings

For uses relating to food premises and public buildings, food business registration and maximum accommodation numbers certificate are required to be issued prior to the occupation. As part of the application process through statutory and building compliances, the City environmental health officers will be referred to undertake assessment against relevant legislation and internal policies.

For uses which fall within the requirements of the Health (Public Building) Regulations 1992, it is important to note that the requirements are different to the BCA.

Heritage

Should a building be heritage listed, with the State Heritage Office or City, a development approval (planning) application will be required.

Proposed development on State Heritage listed building will be referred to State Heritage Office for comments, while buildings listed with the City will be assessed against the relevant heritage policies and requirements.

Contamination

Contamination should be identified and managed as required. Contaminated materials or sites have potentially large time and cost implications, therefore it is prudent to engage a specialist consultant to provide a report if contamination is suspected. Common contaminants include asbestos and lead paint, and should they be present, then specialist contractors will be required to address them.

Refer to Appendix A for a summary of key considerations specific to each concept design scheme.

Cost Estimate and Construction Timeframe

7 Cost estimate and construction timeframe

Cost estimates from a quantity surveyor and indicative construction programme are in table format below.

The summary provides the construction cost per square metre for each scheme. The base cost includes demolition and the new works as described in the concept designs. The upgraded cost includes additional works to the basement, upgraded interior finishes, and upgraded services.

Refer to Appendix B for the Quantity Surveyor's detailed cost estimates specific to each concept design scheme.

The construction timeframe for each scheme is based on a hypothetical generic building and is indicative only. The programme for each individual building and design will have to be assessed on a case by case basis.

Cost estimate

Scheme	Base Cost \$/sqm rate	Upgrade Cost \$/sqm rate
A-Grade	\$2,798	\$3,606
Education	\$2,643	\$3,558
Student Accommodation	\$2,254	\$2,943
Multi-residential	\$2,428	\$3,045
Mixed-use	\$2,694	\$3,157
Health and Well-being	\$2,510	\$3,203

Construction timeframe

Scheme	Indicative construction timeframe
A-Grade	15-18 months
Education	9-12 months
Student Accommodation	12-16 months
Multi-residential	12-16 months
Mixed-use	12-15 months
Health and Well-being	12-15 months

Conclusion

8 Conclusion

This study presents concept design schemes of six different uses for a hypothetical, generic C-Grade building. The project explores the potential and possibilities for each of these uses with creative and innovative designs. The intent is for these designs to act as a catalyst for generating discussion and motivate building owners or developers to consider an upgrade or conversion of these buildings.

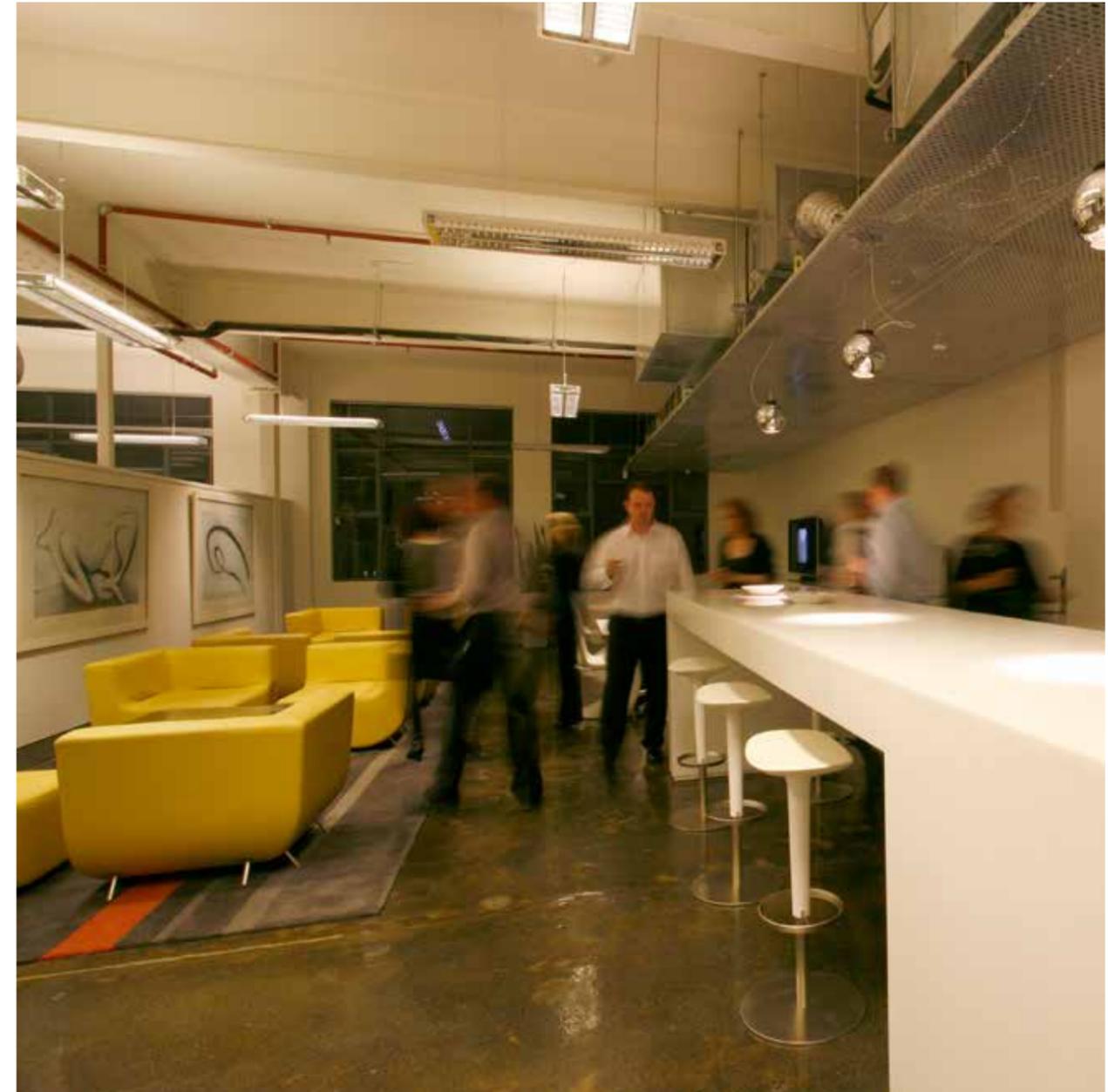
Extensive research was undertaken to select six uses that are economically viable and sustainable for the central city. The uses of A-Grade office, education, student accommodation, multi-residential, mixed use, and health and wellbeing will meet current and expected demand, as well as stimulate economic growth in sectors that are strategic for Perth.

The typical characteristics of the C-grade office buildings in the CBD were analysed and distilled into a hypothetical generic building on which to base the concept design schemes.

The design concepts illustrate progressive ideas for each use. The function of the building is intrinsic to the design, and its spatial and aesthetic qualities are derived from it. The notion of linking several small floor plates through the use of voids to create one larger floor plate is a common theme, as is the addition of a lightweight floor on the top level. The voids provide physical and visual connectivity and contribute to thriving, active spaces. The characteristics of the existing building are respected.

Key considerations, constraints and opportunities from a structural, services, and compliance perspective have been identified and discussed. Cost estimates from a quantity surveyor and indicative construction programme are also included.

In this process, the reimagining of the potential uses and adaptive reuse of the existing buildings indicate a maturing city that values its built heritage, and the resulting increase in population and diversity of sectors can contribute to a sustainable future for Perth.



Sheffield House, Perth - the successful adaptive re-use of a degraded building which received a WA Architecture Award for Sustainability.

Appendices

A / Summary of Key Considerations

B / Quantity Surveyor Cost Estimates

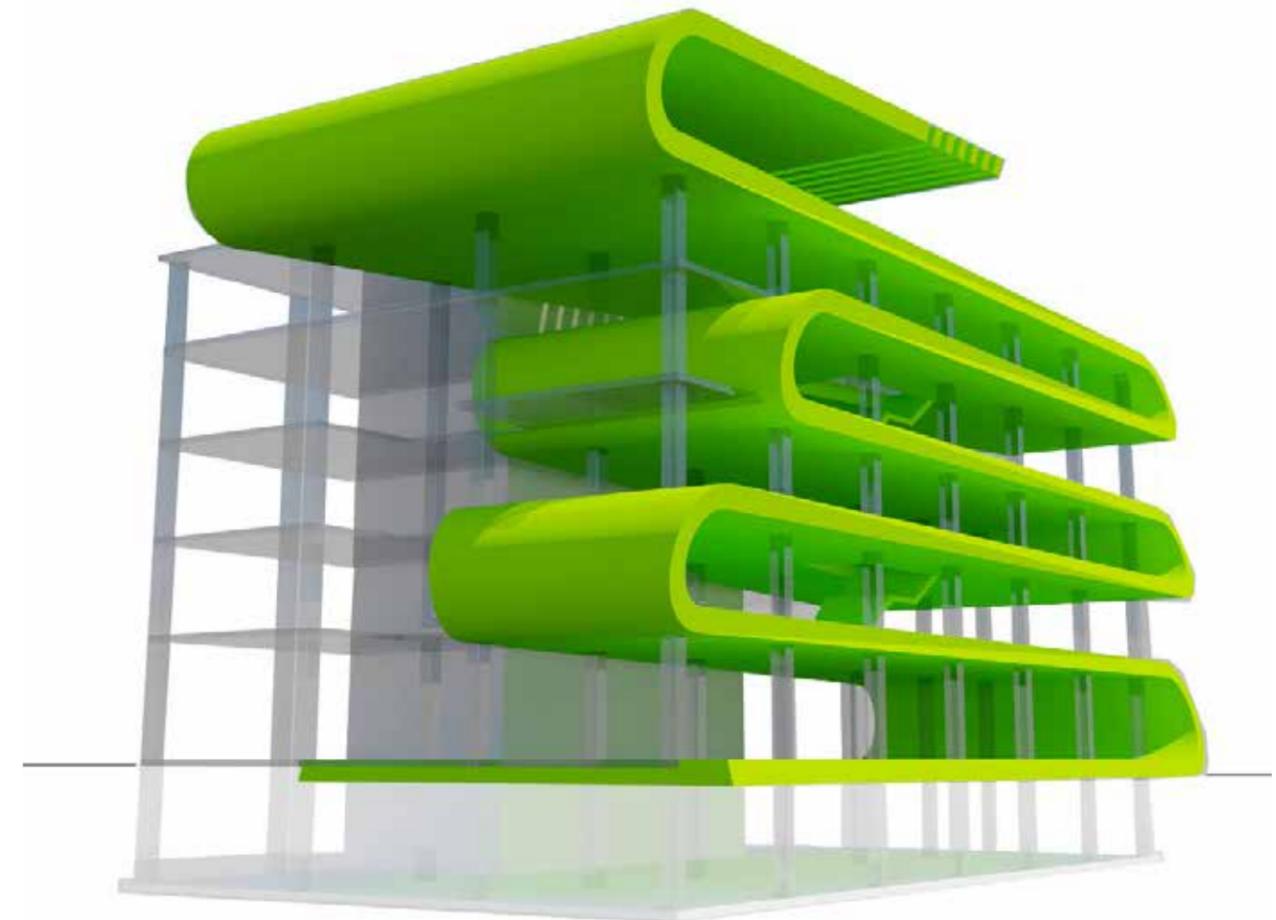
C / Contributors

D / Photo Credits and References

Upgrade to A-Grade Office

Structure	<ul style="list-style-type: none"> Location of floor voids have been optimised to suit its size, to ensure the existing columns are restrained Provide new steel beams to span between columns for the larger voids All columns remain in place One additional floor in lightweight construction is feasible High loads to be located near the lift and stair core
Mechanical	<ul style="list-style-type: none"> Upgrade HVAC system capacity Provide efficient zoning Provide Variable Air Volume operation Convert to gas fired heating hot water for HVAC Provide supplementary ventilation systems Provide new or upgrade supplementary cooling loop Replacement of Full Building Management System (BMS)
Electrical	<ul style="list-style-type: none"> Upgrade lift with good quality lift ride, higher speed and waiting intervals < 30 seconds. Upgrade electrical infrastructure Provide new power and communication distribution Provide new communication services including data, NBN, MATV / Pay TV Provide new architectural, task, and emergency lighting Provide intelligent lighting control Provide new security system including access control and CCTV Provide new Fire detection and OWS/ EWIS system including new FIP Provide separate metering Provide Power Factor Correction Provide back-up generator
Hydraulic	<ul style="list-style-type: none"> Provide water break tank as required Upgrade of hot water system to either floor by floor instantaneous system or gas or solar central hot water system Upgrade existing capacity to allow for End of Trip amenities Upgrade of all amenity fixtures to WELS star rated tapware and fixtures Include water demand sub-metering
Fire	<ul style="list-style-type: none"> Upgrade detection, sprinklers and alarms
ESD	<ul style="list-style-type: none"> Comply with BCA Section J requirements if modifications are significant Replace glazing or provide tinted film to existing glazing Provide ceiling insulation (R2.5) Provide wall insulation where practical (R2.0) HVAC upgrades to include variable volume, economy mode, chiller and boiler upgrade Provide separate metering (light, power and HVAC for each tenancy) and meter validation Achieve 3.5 Star NABERS Energy rating Achieve 2 Star NABERS Water rating Achieve NABERS IEQ and Waste rating Option to achieve Green Star rating

BCA and DDA	<ul style="list-style-type: none"> Assuming there is no change in building classification, only building elements forming part of the upgrade are to comply with current BCA provisions. Where part of the building is undergoing a change in building classification, as part of the refurbishment, that portion will need to comply with current BCA provisions, and items relating to structure, fire resistance, egress, disabled access, services and equipment, and health and amenity will need to be considered. Consideration may also be needed as part of a safety-in-design process if existing building elements require further investigation for replacement or upgrading. E.g. structural requirements, active firefighting system, existing external facade etc
Statutory	<ul style="list-style-type: none"> Consult with the City on site specific restriction against proposed development Obtain development approval (planning), building permit, and occupancy permit Comply with relevant local laws Comply with City of Perth's Disability Access and Inclusion Plan
Heritage	<ul style="list-style-type: none"> Identify and manage heritage requirements as required
Contamination	<ul style="list-style-type: none"> Identify and manage contamination in soil or building materials such as asbestos or lead as required



Concept A-Grade Office 3D View

Conversion to Education

Structure	<ul style="list-style-type: none"> The size and location of the circulation voids have been optimised to ensure the existing columns are still restrained All existing columns remain in place One additional floor in lightweight construction is feasible Provide strengthening to existing slabs of communal areas to absorb greater dead loads No deep planting to rooftop garden
Mechanical	<ul style="list-style-type: none"> Upgrade HVAC system capacity Provide additional air intake to cater for higher population density Upgrade Full Building Management System (BMS)
Electrical	<ul style="list-style-type: none"> Upgrade lift Upgrade electrical infrastructure Provide new power and communication distribution Provide new communication services including data, NBN, MATV / Pay TV Provide new LED and emergency lighting Provide intelligent lighting control Provide new security system including access control and CCTV Provide new Fire detection and OWS/ EWIS system including new FIP Provide audio visual and public address system
Hydraulic	<ul style="list-style-type: none"> Provide new hydraulic infrastructure to increase capacity and service new wet areas Review capacity of street infrastructure to ensure additional loads can be supported Provide WELS star rated tapware and fixtures
Fire	<ul style="list-style-type: none"> Change in building classification under the BCA triggers the need to comply with the fire resistance of structure An alternative is a fire engineered solution with the provision of new sprinklers Upgrade fire detection and alarms
ESD	<ul style="list-style-type: none"> Comply with BCA Section J requirements for insulation and glazing/shading Replace glazing or provide tinted film to existing glazing Provide ceiling insulation (R2.5). Provide wall insulation where practical (R2.0)

BCA and DDA	<p>Compliance against current BCA provisions. Key elements under Deemed-to-satisfy BCA provisions would include:</p> <ul style="list-style-type: none"> Review existing structural elements against current structural provision Comply with fire resistance of existing structural elements Assess fire source features and spandrel protection against vertical fire spread Assess exit travel distance, egress width & exit construction Upgrade existing fire hydrant and fire hose reel systems Provide automated fire detection and occupant warning system & EWIS Comply with energy efficiency requirements Comply with accessibility requirements Upgrade lift to incorporate stretcher lift and comply with access requirements Consider BCA restriction on interconnecting stairways, ramps & escalators and possible atrium construction requirements Provision of hearing augmentation system Allow separate sanitary facilities for employees and students
Statutory	<ul style="list-style-type: none"> Consult with the City on site specific restriction against proposed development Apply development approval (planning), building permit, and occupancy permit Comply with relevant local laws Comply with Health (Public Building) Regulations 1992. This may include upgrade of egress stairs to accommodate handrails to both sides with 1000mm clearance and minimum 280mm stair treads. Comply with City of Perth's Disability Access and Inclusion Plan State Heritage and DFES referral Consult with Department of Education for additional requirements
Heritage	<ul style="list-style-type: none"> Identify and manage heritage requirements as required
Contamination	<ul style="list-style-type: none"> Identify and manage contamination in soil or building materials such as asbestos or lead as required



Concept Education 3D View

Conversion to Student Accommodation

Structure	<ul style="list-style-type: none"> The size and location of the circulation atrium has been optimised to ensure the existing columns are still restrained Provide new steel beams to span between facade columns Provide new columns with steel bracing connecting to existing columns All existing columns remain in place Two additional floors in lightweight construction are feasible Provide strengthening to existing slabs of communal areas to absorb greater dead loads
Mechanical	<ul style="list-style-type: none"> Convert the HVAC system to individual systems for each accommodation pod Upgrade the Building Management System
Electrical	<ul style="list-style-type: none"> Upgrade lift Upgrade electrical infrastructure Provide new power and communication distribution Provide new communication services including data, NBN, MATV / Pay TV Provide new LED and emergency lighting Provide lighting control system Provide new security system including access control and CCTV Provide new Fire detection and OWS/ EWIS system including new FIP Provide separate metering and sub-metering Provide apartment load centres
Hydraulic	<ul style="list-style-type: none"> Provide new hydraulic infrastructure to increase capacity and service multiple new wet areas Review capacity of street infrastructure to ensure additional loads can be supported Provide individual electric hot water system for each apartment or central electric gas hot water system Provide WELS star rated tapware and fixtures
Fire	<ul style="list-style-type: none"> Change in building classification under the BCA triggers the need to comply with the fire resistance of structure An alternative is a fire engineered solution with the provision of new sprinklers Upgrade fire detection and alarms
ESD	<ul style="list-style-type: none"> Comply with BCA Section J requirements for insulation and glazing/shading Replace glazing or provide tinted film to existing glazing Provide ceiling insulation (R2.5). Provide wall insulation where practical (R2.0) Provide operable windows for natural ventilation (minimum 5% of floor area) Provide energy and water metering to each apartment Achieve NatHERS residential (6 Star average, 5 Star minimum)

BCA and DDA	<p>Compliance against current BCA provisions. Key elements under Deemed-to-satisfy BCA provisions would include:</p> <ul style="list-style-type: none"> Review existing structural elements against current structural provision Comply with fire resistance of existing structural elements Assess fire source features and spandrel protection against vertical fire spread Provide boundary construction between Sole Occupancy Units (SOUs) and common areas Assess exit travel distance, egress width & exit construction Upgrade existing fire hydrant system Provide automated fire detection and occupant warning system & EWIS Provide Direct Brigade Connection (DBA) Provide natural lighting Comply with acoustic requirements Comply with energy efficiency requirements Comply with accessibility requirements Upgrade lift to incorporate stretcher lift and comply with access requirements Consider BCA restriction on interconnecting stairways, ramps & escalators and possible atrium construction requirements or provide fire engineered solution
Statutory	<ul style="list-style-type: none"> Seek consultation with the City on site specific restriction against proposed development Obtain development approval (planning), building permit, and occupancy permit Comply with relevant local laws Provide communal laundry facilities under Health Act 1911 if none is available within each accommodation pod Comply with City of Perth's Disability Access and Inclusion Plan
Heritage	<ul style="list-style-type: none"> Identify and manage heritage requirements as required
Contamination	<ul style="list-style-type: none"> Identify and manage contamination in soil or building materials such as asbestos or lead as required



Concept Student Accommodation 3D View

Conversion to multi-residential

Structure	<ul style="list-style-type: none"> The size and location of the central atrium has been optimised to ensure the existing columns and core are still restrained Provide new steel beams to span between columns for the alternating voids All columns remain in place Two additional floors in lightweight construction are feasible Creating set-downs in the existing slab for balconies and wet areas will not be feasible, and this will be addressed as part of the architectural floor finish
Mechanical	<ul style="list-style-type: none"> Convert the HVAC system to individual systems for each apartment Provide ventilation systems and multiple façade discharge locations for each apartment Remove the Building Management System
Electrical	<ul style="list-style-type: none"> Upgrade lift Upgrade electrical infrastructure Provide new power and communication distribution Provide new communication services including data, NBN, MATV / Pay TV Provide new LED and emergency lighting Provide intelligent lighting control Provide new security system including access control and CCTV Provide new Fire detection and OWS/ EWIS system including new FIP Provide separate metering and sub-metering Provide apartment load centres
Hydraulic	<ul style="list-style-type: none"> Provide new hydraulic infrastructure to increase capacity and service multiple new wet areas Review capacity of street infrastructure to ensure additional loads can be supported Provide individual electric hot water system for each apartment or central electric gas hot water system Provide WELS star rated tapware and fixtures
Fire	<ul style="list-style-type: none"> Change in building classification under the BCA triggers the need to comply with the fire resistance of structure An alternative is a fire engineered solution with the provision of new sprinklers Upgrade fire detection and alarms
ESD	<ul style="list-style-type: none"> Comply with BCA Section J requirements for insulation and glazing/shading Replace glazing or provide tinted film to existing glazing Provide ceiling insulation (R2.5). Provide wall insulation where practical (R2.0) Provide operable windows for natural ventilation (minimum 5% of floor area) Provide energy and water metering to each apartment Achieve NatHERS residential (6 Star average, 5 Star minimum)

BCA and DDA	<p>Compliance against current BCA provisions. Key elements under Deemed-to-satisfy BCA provisions would include:</p> <ul style="list-style-type: none"> Review existing structural elements against current structural provision Comply with fire resistance of existing structural elements Assess fire source features and spandrel protection against vertical fire spread Review fire separation requirements between building classifications Provide boundary construction between Sole Occupancy Units (SOUs) and common areas Assess exit travel distance, egress width & exit construction Upgrade existing fire hydrant system Provide automated fire detection and occupant warning system Provide Direct Brigade Connection (DBA) in Class 3 buildings Provide natural lighting Comply with acoustic requirements Comply with energy efficiency requirements Comply with accessibility requirements Upgrade lift to incorporate stretcher lift and comply with access requirements
Statutory	<ul style="list-style-type: none"> Seek consultation with the City on site specific restriction against proposed development Obtain development approval (planning), building permit, and occupancy permit Comply with relevant local laws Comply with City of Perth's Disability Access and Inclusion Plan
Heritage	<ul style="list-style-type: none"> Identify and manage heritage requirements as required
Contamination	<ul style="list-style-type: none"> Identify and manage contamination in soil or building materials such as asbestos or lead as required

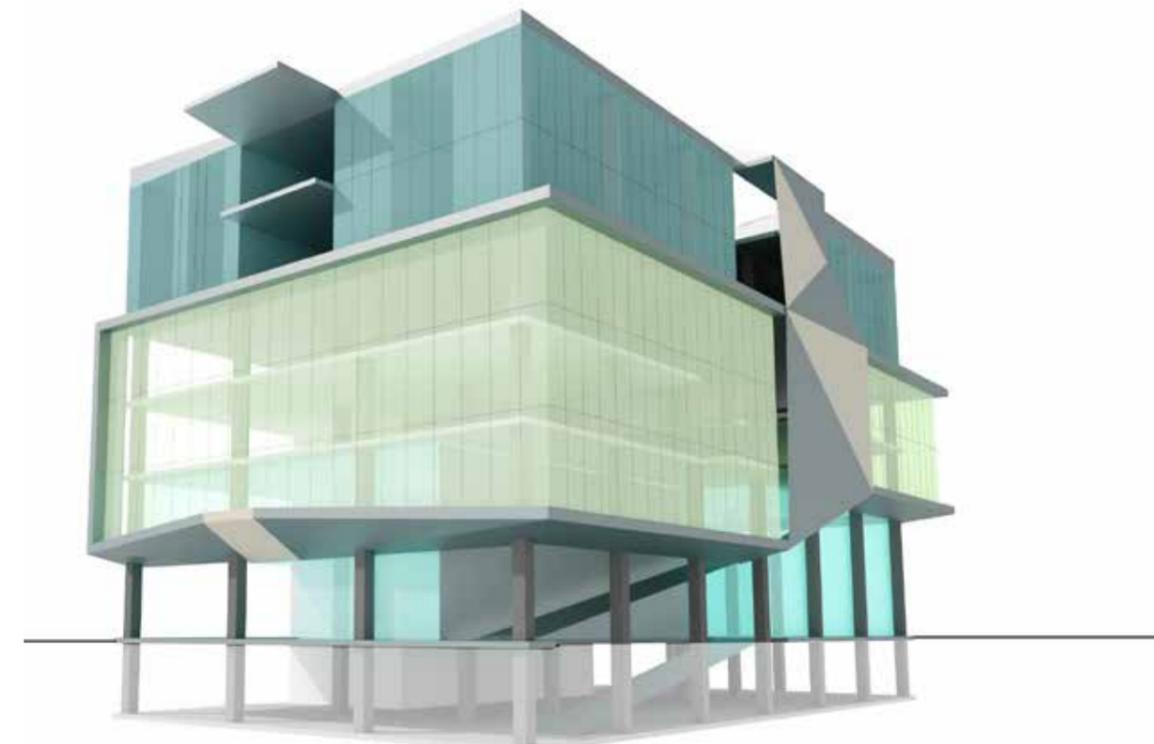


Concept Multi-Residential 3D

Conversion to Mixed-Use

Structure	<ul style="list-style-type: none"> The location of floor voids have been optimised to suit its size, to ensure the existing columns are still restrained Provide new steel beams to span between columns for the larger voids All columns remain in place One additional floor in lightweight construction is feasible Provide strengthening to existing slabs of retail floors to absorb greater dead loads
Mechanical	<ul style="list-style-type: none"> Upgrade HVAC system capacity Provide separate system for the supermarket Provide stand alone HVAC system for the residential component Upgrade Full Building Management System (BMS)
Electrical	<ul style="list-style-type: none"> Upgrade lift Provide new escalators for the supermarket Upgrade electrical infrastructure Provide new power and communication distribution Provide new communication services including data, NBN, MATV / Pay TV Provide new architectural, task, and emergency lighting Provide intelligent lighting control Provide new security system including access control and CCTV Provide new Fire detection and OWS/ EWIS system including new FIP Provide separate metering and sub-metering Provide tenancy distribution boards Provide apartment load centres Provide audio visual and public address system
Hydraulic	<ul style="list-style-type: none"> Provide new hydraulic infrastructure to increase capacity and service multiple new wet areas Review capacity of street infrastructure to ensure additional loads can be supported Provide individual electric hot water system for each apartment or central electric gas hot water system Provide WELS star rated tapware and fixtures Provide grease arrestor for the supermarket Provide gas services for the supermarket
Fire	<ul style="list-style-type: none"> Change in building classification under the BCA triggers the need to comply with the fire resistance of structure An alternative is a fire engineered solution with the provision of new sprinklers Upgrade fire detection and alarms
ESD	<ul style="list-style-type: none"> Comply with BCA Section J requirements for insulation and glazing/shading Replace glazing or provide tinted film to existing glazing Provide ceiling insulation (R2.5). Provide wall insulation where practical (R2.0) Provide operable windows for natural ventilation (minimum 5% of floor area) Provide energy and water metering to each apartment Achieve NatHERS residential (6 Star average, 5 Star minimum)

BCA and DDA	<p>Compliance against current BCA provisions. Key elements under Deemed-to-satisfy BCA provisions would include:</p> <ul style="list-style-type: none"> Review existing structural elements against current structural provision Comply with fire resistance of existing structural elements Assess fire source features and spandrel protection against vertical fire spread Review fire separation requirements between building classifications Provide boundary construction between Sole Occupancy Units (SOUs) and common areas Assess exit travel distance, egress width & exit construction Upgrade existing fire hydrant and fire hose reel systems Provide automated fire detection and occupant warning system Provide Direct Brigade Connection (DBA) for Class 3 applications Provide natural lighting Comply with acoustic requirements Comply with energy efficiency requirements Comply with accessibility, accessible SOUs for Class 3 applications & vehicular head height clearance to disable car bay/s Upgrade lift to incorporate stretcher lift and comply with access requirements Consider BCA restriction on interconnecting stairways, ramps & escalators and possible atrium construction requirements or provide fire engineered solution
Statutory	<ul style="list-style-type: none"> Seek consultation with the City on site specific restriction against proposed development Obtain development approval (planning), building permit, and occupancy permit Comply with relevant local laws Comply with City of Perth's Disability Access and Inclusion Plan
Heritage	<ul style="list-style-type: none"> Identify and manage heritage requirements as required
Contamination	<ul style="list-style-type: none"> Identify and manage contamination in soil or building materials such as asbestos or lead as required



Concept Mixed-Use 3D View

Conversion to Health and Wellbeing

Structure	<ul style="list-style-type: none"> The size and location of the entry void has been optimised to ensure the existing columns are still restrained All existing columns remain in place One additional floor in lightweight construction is feasible Provide strengthening to existing slabs of communal areas to absorb greater dead loads No deep planting to rooftop garden
Mechanical	<ul style="list-style-type: none"> Upgrade HVAC system capacity Potentially provide additional air intake to suit specialist extract requirements and/or pressurisation requirements associated with clean zones Provide smoke control system or provide fire engineered solution Upgrade Full Building Management System (BMS)
Electrical	<ul style="list-style-type: none"> Upgrade lift Upgrade electrical infrastructure Provide new power and communication distribution Provide new communication services including data, NBN, MATV / Pay TV Provide new architectural, task, and emergency lighting Provide intelligent lighting control Provide new security system including access control and CCTV Provide new Fire detection and OWS/ EWIS system including new FIP Provide audio visual and public address system Provide back-up generator Provide equipment suitable for body protection areas Provide assistance/nurse call system
Hydraulic	<ul style="list-style-type: none"> Provide new hydraulic infrastructure to increase capacity and service multiple new wet areas Review capacity of street infrastructure to ensure additional loads can be supported Provide individual electric hot water system for each tenancy or central electric gas hot water system Provide WELS star rated tapware and fixtures
Fire	<ul style="list-style-type: none"> Change in building classification under the BCA triggers the need to comply with the fire resistance of structure An alternative is a fire engineered solution with the provision of new sprinklers
ESD	<ul style="list-style-type: none"> Comply with BCA Section J requirements for insulation and glazing/shading Replace glazing or provide tinted film to existing glazing Provide ceiling insulation (R2.5). Provide wall insulation where practical (R2.0)

BCA and DDA	<p>Compliance against current BCA provisions. Key elements under Deemed-to-satisfy BCA provisions would include:</p> <ul style="list-style-type: none"> Review existing structural elements against current structural provision Comply with fire resistance of existing structural elements Assess fire source features and spandrel protection against vertical fire spread Review fire separation requirements between building classifications Assess exit travel distance, egress width & exit construction Upgrade existing fire hydrant and fire hose reel systems Provide automated fire detection and occupant warning system Comply with energy efficiency requirements Comply with accessibility requirements & vehicular head height clearance to disable car bay/s Upgrade lift to incorporate stretcher lift and comply with access requirements Consider BCA restriction on interconnecting stairways, ramps & escalators and possible atrium construction requirements or provide fire engineered solution Provide hearing augmentation system
Statutory	<ul style="list-style-type: none"> Seek consultation with the City on site specific restriction against proposed development Obtain development approval (planning), building permit, and occupancy permit Comply with relevant local laws Comply with Health (Public Building) Regulations 1992. This may include upgrade of egress stairs to accommodate handrails to both sides with 1000mm clearance and minimum 280mm stair treads. Comply with City of Perth's Disability Access and Inclusion Plan
Heritage	<ul style="list-style-type: none"> Identify and manage heritage requirements as required
Contamination	<ul style="list-style-type: none"> Identify and manage contamination in soil or building materials such as asbestos or lead as required



Concept Health and Wellbeing 3D View

A-GRADE OFFICE OPTION



Project: Default Project		Details:			
Building: C GRADE OFFICE STUDY					
Code	Description	Quantity	Unit	Rate	Total
A-GRADE OFFICE - BASIC					
Exclusions					
1	Asbestos removal		Note		
2	Openings in post tensioned slabs		Note		
3	Fire engineered solution - no sprinklers		Note		
4	Upgrades to incoming services		Note		
5	Changes to core walls or column layout		Note		
6	Office fit-out		Note		
7	Window treatments		Note		
8	Retail/cafe fit-out (shell only)		Note		
9	Professional fees and disbursements		Note		
10	Goods and Services Tax		Note		
Demolition Works					
11	Strip existing partitions, wall, floor and ceiling finishes, mechanical & electrical etc.	4,100	m2	25.00	102,500
12	Remove roof structure & prepare for new floor slab	840	m2	50.00	42,000
13	Remove existing facade	1,450	m2	100.00	145,000
14	Form openings in existing floor slab for new stairs including all making good	2	No	10,000.00	20,000
Alterations & New Works					
15	Minor works to basement including new delivery bay and end of trip facilities		Item		50,000
16	Additional floor complete including lightweight construction for facade, walls etc., toilets, roof, emergency stairs, mechanical & electrical services, additional floor to lift etc.	820	m2	1,800.00	1,476,000
17	New facade to existing structure to meet BCA Section J levels 1 to 4	1,120	m2	900.00	1,008,000
18	Extra over for feature curved facade including overhangs and internal soffits (measured on plan)	1,900	m2	1,500.00	2,850,000
19	Upgrade existing facade to core	650	m2	500.00	325,000
20	Facade to retail	248	m2	800.00	198,400
21	Facade to BOH	208	m2	800.00	166,400
22	New feature stairs between floors	2	No	20,000.00	40,000
23	New UAT to existing building	10	No	15,000.00	150,000
24	Wall, floor & ceiling finishes to existing office space	2,700	m2	200.00	540,000
25	Wall, floor & ceiling finishes to foyer	143	m2	500.00	71,500
26	Wall finishes to retail/cafe - no floor or ceiling finishes (assumed shell only)	401	m2	50.00	20,050
27	New finishes to existing toilets	96	m2	400.00	38,400
28	New finishes to tea prep/cleaners	55	m2	350.00	19,250
29	Hydraulic services - existing building	4,100	m2	90.00	369,000

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A-GRADE OFFICE OPTION



Project: Default Project		Details:			
Building: C GRADE OFFICE STUDY					
Code	Description	Quantity	Unit	Rate	Total
30	Electrical services - existing building	4,100	m2	450.00	1,845,000
31	Mechanical services - existing building	4,100	m2	450.00	1,845,000
32	Lift upgrade		Item		300,000
On-costs					
33	Builder's preliminaries		Item		1,627,000
34	Design Contingency		Item		1,324,800
35	Construction contingency		Item		1,457,300
TOTAL A-GRADE OFFICE - BASIC					16,030,600
Cost/m2 (excluding basement)					3,248
Cost/m2 (including basement)					2,798
A-GRADE OFFICE - UPGRADED					
36	Cost of basic upgrade		Item		16,030,600
37	Upgrade basement	820	m2	200.00	164,000
38	Upgrade facade to existing building (aluminium & glass)	2,100	m2	300.00	630,000
39	Internal partitions & doors (5 No. floors)	1,235	m2	200.00	247,000
40	Upgrade finishes on additional floor	820	m2	400.00	328,000
41	Upgrade office finishes - existing building	2,700	m2	50.00	135,000
42	Upgrade wall, floor & ceiling finishes to foyer	143	m2	1,000.00	143,000
43	Upgrade finishes to toilets	96	m2	100.00	9,600
44	Hydraulic services - existing building	4,100	m2	30.00	123,000
45	Electrical services - existing building	4,100	m2	150.00	615,000
46	Mechanical services - existing building	4,100	m2	150.00	615,000
47	Lift upgrade (additional lift including core)		Item		350,000
On-costs					
48	Builder's preliminaries		Item		470,300
49	Design Contingency		Item		383,000
50	Construction contingency		Item		421,300
TOTAL A-GRADE OFFICE - UPGRADED					20,664,800
Cost/m2 (excluding basement)					4,157
Cost/m2 (including basement)					3,606

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EDUCATION OPTION					
Project: Default Project		Details:			
Building: C GRADE OFFICE STUDY					
Code	Description	Quantity	Unit	Rate	Total
EDUCATION - BASIC					
Exclusions					
1	Asbestos removal		Note		
2	Openings in post tensioned slabs		Note		
3	Fire engineered solution - no sprinklers		Note		
4	Upgrades to incoming services		Note		
5	Changes to core walls or column layout		Note		
6	Window treatments		Note		
7	Loose furniture & fittings		Note		
8	Cafe fit-out (shell only)		Note		
9	Professional fees and disbursements		Note		
10	Goods and Services Tax		Note		
Demolition Works					
11	Strip existing partitions, wall, floor and ceiling finishes, mechanical & electrical etc.	4,100	m2	25.00	102,500
12	Remove roof structure & prepare for new floor slab	840	m2	50.00	42,000
13	Remove existing facade	1,450	m2	100.00	145,000
14	Form circular openings in existing floor slab for new stairs including all making good	2	No	15,000.00	30,000
Alterations & New Works					
15	Minor works to basement including end of trip facilities		Item		50,000
16	Roof slab including waterproofing, walls, finishes, landscaping, roofs over stairs, canopies etc.	865	m2	1,300.00	1,124,500
17	Cantilevered suspended slab	200	m2	500.00	100,000
18	New facade to existing structure - Level 1 to roof	1,553	m2	1,100.00	1,708,300
19	New facade to exhibition, reception and cafe	325	m2	800.00	260,000
20	Upgrade facade to core	650	m2	500.00	325,000
21	Extend lift core to roof		Item	20,000.00	
22	Extend escape stairs to roof level	2	No	10,000.00	20,000
23	New feature stairs between floors	2	No	15,000.00	30,000
24	New UAT to existing building	10	No	15,000.00	150,000
25	Wall, floor & ceiling finishes to learning areas	2,829	m2	250.00	707,250
26	Wall, floor & ceiling finishes to exhibition, admin and reception	566	m2	350.00	198,100
27	Wall finishes to cafe (no floor or ceiling finishes (assumed shell only)	59	m2	50.00	2,950
28	Finishes to external entry foyer	57	m2	300.00	17,100
29	Floor & soffit finish to exposed suspended slab	96	m2	250.00	24,000
30	Internal partitions & doors	1,085	m2	200.00	217,000
31	Operable walls to flexible classrooms	200	m2	700.00	140,000

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EDUCATION OPTION					
Project: Default Project		Details:			
Building: C GRADE OFFICE STUDY					
Code	Description	Quantity	Unit	Rate	Total
32	New finishes to existing toilets	96	m2	400.00	38,400
33	New finishes to tea prep/cleaners	55	m2	350.00	19,250
34	Hydraulic services - existing building	4,100	m2	150.00	615,000
35	Electrical services - existing building	4,100	m2	400.00	1,640,000
36	Mechanical services - existing building	4,100	m2	400.00	1,640,000
37	Lift upgrade		Item		300,000
On-costs					
38	Builder's preliminaries		Item		1,350,500
39	Design Contingency		Item		1,099,700
40	Construction contingency		Item		1,209,700
TOTAL EDUCATION - BASIC					13,306,250
Cost/m2 (excluding basement)					3,144
Cost/m2 (including basement & roof level)					2,643
EDUCATION - UPGRADED					
41	Cost of basic upgrade		Item		13,306,250
42	Upgrade basement (archives?)	820	m2	200.00	164,000
43	Additional fixed furniture (laboratory benches etc.)	2,830	m2	150.00	424,500
44	Upgrade wall, floor & ceiling finishes to exhibiton, admin & reception	566	m2	100.00	56,600
45	Upgrade finishes to toilets	96	m2	100.00	9,600
46	Hydraulic services - existing building	4,100	m2	170.00	697,000
47	Electrical services - existing building	4,100	m2	250.00	1,025,000
48	Mechanical services - existing building	4,100	m2	150.00	615,000
49	Lift upgrade (additiional lift including core)		Item		350,000
On-costs					
50	Builder's preliminaries		Item		467,800
51	Design Contingency		Item		381,000
52	Construction contingency		Item		419,000
TOTAL EDUCATION - UPGRADED					17,915,750
Cost/m2 (excluding basement)					4,199
Cost/m2 (including basement)					3,558

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STUDENT ACCOMMODATION OPTION



Project: Default Project		Details:			
Building: C GRADE OFFICE STUDY					
Code	Description	Quantity	Unit	Rate	Total
STUDENT ACCOMMODATION - BASIC					
Exclusions					
1	Asbestos removal		Note		
2	Openings in post tensioned slabs		Note		
3	Fire engineered solution - no sprinklers		Note		
4	Upgrades to incoming services		Note		
5	Changes to core walls or column layout		Note		
6	Loose furniture & equipment		Note		
7	Window treatments		Note		
8	Retail fit-out (shell only)		Note		
9	Professional fees and disbursements		Note		
10	Goods and Services Tax		Note		
Demolition Works					
11	Strip existing partitions, wall, floor and ceiling finishes, hydraulics, mechanical & electrical etc.	4,100	m2	30.00	123,000
12	Remove roof structure & prepare for new floor slab	840	m2	50.00	42,000
13	Remove existing facade	1,450	m2	100.00	145,000
14	Form openings in existing floor slab for new layout including all making good :[5 no]	636	m2	800.00	508,800
Alterations & New Works					
15	Minor works to basement		Item		50,000
16	Additional student accommodation floor complete including columns, ramps, lightweight construction for facade, walls, roof, hydraulic, mechanical & electrical services etc	820	m2	2,200.00	1,804,000
17	Additional columns to ramps (existing building)	88	m	700.00	61,600
18	Circulation ramps including balustrades	283	m	1,600.00	452,800
19	Cantilevered suspended slab	31	m2	500.00	15,500
20	New facade to existing structure - ground level to meet BCA Section J	478	m2	900.00	430,200
21	New facade to existing structure - level 1 to 4 to meet BCA Section J	1,575	m2	700.00	1,102,500
22	Upgrade existing facade to core	650	m2	500.00	325,000
23	Metal feature to facade		Item		30,000
24	Party walls - ground to level 4	2,786	m2	200.00	557,200
25	Allowance for internal partitions & balustrades		Item		75,000
26	Wall, floor & ceiling finishes to circulation, communal, meeting, function and study spaces	1,572	m2	200.00	314,400
27	Wall, floor & ceiling finishes to student accommodation	1,574	m2	200.00	314,800
28	Cabinetwork to student accommodation (gnd to lvl 4)	67	No	5,000.00	335,000
29	Hydraulic services - existing building	3,348	m2	220.00	736,560
30	Electrical services - existing building	3,348	m2	250.00	837,000

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STUDENT ACCOMMODATION OPTION



Project: Default Project		Details:			
Building: C GRADE OFFICE STUDY					
Code	Description	Quantity	Unit	Rate	Total
31	Mechanical services - existing building	3,348	m2	250.00	837,000
32	Lift upgrade		Item		300,000
On-costs					
33	Builder's preliminaries		Item		1,315,600
34	Design Contingency		Item		1,071,300
35	Construction contingency		Item		1,178,400
TOTAL STUDENT ACCOMMODATION - BASIC					12,962,660
Cost/m2 (excluding basement)					2,619
Cost/m2 (including basement)					2,254
STUDENT ACCOMMODATION - UPGRADED					
36	Cost of basic upgrade		Item		12,962,660
37	Upgrade finishes & fittings additional floor	860	m2	200.00	172,000
38	Upgrade facade to existing building	2,558	m2	200.00	511,600
39	Upgrade wall, floor & ceiling finishes to circulation, communal, meeting, function and study spaces	1,572	m2	100.00	157,200
40	Hydraulic services - existing building	4,100	m2	60.00	246,000
41	Electrical services - existing building	4,100	m2	200.00	820,000
42	Mechanical services - existing building	4,100	m2	150.00	615,000
43	Lift upgrade (additional lift including core)		Item		350,000
On-costs					
44	Builder's preliminaries		Item		402,100
45	Design Contingency		Item		327,400
46	Construction contingency		Item		360,100
TOTAL STUDENT ACCOMMODATION - UPGRADED					16,924,060
Cost/m2 (excluding basement)					3,423
Cost/m2 (including basement)					2,943

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MULTI RESIDENTIAL OPTION



Project: Default Project		Details:			
Building: C GRADE OFFICE STUDY					
Code	Description	Quantity	Unit	Rate	Total
MULTI-RESIDENTIAL - BASIC					
Exclusions					
1	Asbestos removal		Note		
2	Openings in post tensioned slabs		Note		
3	Fire engineered solution - no sprinklers		Note		
4	Upgrades to incoming services		Note		
5	Changes to core walls or column layout		Note		
6	Loose furniture & equipment		Note		
7	Window treatments		Note		
8	Retail fit-out (shell only)		Note		
9	Professional fees and disbursements		Note		
10	Goods and Services Tax		Note		
Demolition Works					
11	Strip existing partitions, wall, floor and ceiling finishes, hydraulics, mechanical & electrical etc.	4,100	m2	30.00	123,000
12	Remove roof structure & prepare for new floor slab	840	m2	50.00	42,000
13	Remove existing facade	1,450	m2	100.00	145,000
14	Form openings in existing floor slab for new layout including all making good: [no 22]	421	m2	800.00	336,800
Alterations & New Works					
15	Works to basement including ramp, parking, bin stores, sprinklers & ventilation etc.	820	m2	300.00	246,000
16	Additional apartment/townhouse floor complete including lightweight construction for facade, walls, roof, hydraulic, mechanical & electrical services etc.: [860m2 incl. balconies]	1	Item	1,500,000.00	1,500,000
17	Cantilevered suspended slab	46	m2	500.00	23,000
18	New facade to existing structure levels 1 to 4 to meet BCA Section J	1,480	m2	900.00	1,332,000
19	Upgrade existing facade to core	650	m2	500.00	325,000
20	Facade to ground floor	330	m2	800.00	264,000
21	Retail canopies	45	m2	400.00	18,000
22	Party walls - level 2 to 4	810	m2	200.00	162,000
23	Internal partitions & doors - apartments & stores level 2 to 4 [msd on plan]	2,053	m2	240.00	492,720
24	Floor & ceiling finishes level 2 to 4	2,510	m2	200.00	502,000
25	Cabinetwork to apartments/townhouses	29	No	15,000.00	435,000
26	Floor & soffit finishes to balconies including balustrades	336	m2	600.00	201,600
27	Wall, floor & ceiling finishes to foyer	220	m2	500.00	110,000
28	Wall finishes to commercial - no floor or ceiling finishes (assumed shell only)	157	m2	50.00	7,850
29	Wall finishes & insulation to soffit of ground floor parking	207	m2	80.00	16,560

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MULTI RESIDENTIAL OPTION



Project: Default Project		Details:			
Building: C GRADE OFFICE STUDY					
Code	Description	Quantity	Unit	Rate	Total
30	Finishes to ground floor toilets		Item		25,000
31	Hydraulic services - existing building	3,348	m2	250.00	837,000
32	Electrical services - existing building	3,348	m2	250.00	837,000
33	Mechanical services - existing building	3,348	m2	250.00	837,000
34	Lift upgrade		Item		300,000
On-costs					
35	Builder's preliminaries		Item		1,276,600
36	Design Contingency		Item		1,039,500
37	Construction contingency		Item		1,143,500
TOTAL MULTI-RESIDENTIAL - BASIC					12,578,130
Cost/m2 (including balconies & excluding basement)					2,828
Cost/m2 (including balconies & basement)					2,428
MULTI-RESIDENTIAL - UPGRADED					
38	Cost of basic upgrade		Item		12,578,130
39	Upgrade finishes & fittings additional floor	860	m2	250.00	215,000
40	Upgrade facade to existing building	2,460	m2	200.00	492,000
41	Floor & ceiling finishes level 1 to 4	2,510	m2	50.00	125,500
42	Upgrade circulation level 1 to 4	400	m2	50.00	20,000
43	Upgrade foyer	219	m2	400.00	87,600
44	Hydraulic services - existing building	4,100	m2	50.00	205,000
45	Electrical services - existing building	4,100	m2	100.00	410,000
46	Mechanical services - existing building	4,100	m2	100.00	410,000
47	Lift upgrade (additional lift including core)		Item		350,000
On-costs					
48	Builder's preliminaries		Item		324,100
49	Design Contingency		Item		263,900
50	Construction contingency		Item		290,300
TOTAL MULTI-RESIDENTIAL - UPGRADED					15,771,530
Cost/m2 (including balconies & excluding basement)					3,561
Cost/m2 (including balconies & basement)					3,045

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MIXED USE OPTION



Project: Default Project		Details:			
Building: C GRADE OFFICE STUDY					
Code	Description	Quantity	Unit	Rate	Total
MIXED USE - BASIC					
Exclusions					
1	Asbestos removal		Note		
2	Openings in post tensioned slabs		Note		
3	Fire engineered solution - no sprinklers		Note		
4	Upgrades to incoming services		Note		
5	Changes to core walls or column layout		Note		
6	Window treatments		Note		
7	Loose furniture & equipment		Note		
8	Retail fit-out (shell only)		Note		
9	Professional fees and disbursements		Note		
10	Goods and Services Tax		Note		
Demolition Works					
11	Strip existing partitions, wall, floor and ceiling finishes, mechanical & electrical etc.	4,100	m2	25.00	102,500
12	Remove roof structure & prepare for new floor slab	840	m2	50.00	42,000
13	Remove existing facade	1,450	m2	100.00	145,000
14	Form openings in existing floor slab for new travelators including all making good	2	No	50,000.00	100,000
15	Form opening in existing slab for skylight	2	No	10,000.00	20,000
Alterations & New Works					
16	Works to basement including new loading dock, parking, bin stores, sprinklers & ventilation etc.	820	m2	300.00	246,000
17	Travelators from basement to level 1	4	No	250,000.00	1,000,000
18	Additional co-living floor complete including lightweight construction for facade, walls, roof hydraulic, mechanical & electrical services etc.	820	m2	1,700.00	1,394,000
19	Additional communal amenities floor complete including lightweight construction for facade, walls, roof, hydraulic, mechanical & electrical services etc.	223	m2	1,700.00	379,100
20	Cantilevered suspended slab	58	m2	500.00	29,000
21	New facade to existing structure levels 1 to 4 to meet BCA Section J	1,120	m2	900.00	1,008,000
22	Upgrade existing facade to core	650	m2	500.00	325,000
23	Facade to retail	330	m2	800.00	264,000
24	Retail canopies	165	m2	400.00	66,000
25	Sunshades (msd on plan)	73	m2	800.00	58,400
26	New UAT to existing building	10	No	15,000.00	150,000
27	Internal partitions & doors - level 2 to 4	1,026	m2	200.00	205,200
28	Wall, floor & ceiling finishes to co-working areas	1,697	m2	550.00	933,350
29	Wall, floor & ceiling finishes to co-living areas	820	m2	550.00	451,000

MIXED USE OPTION



Project: Default Project		Details:			
Building: C GRADE OFFICE STUDY					
Code	Description	Quantity	Unit	Rate	Total
30	Wall finishes to supermarket/cafe - no floor or ceiling finishes (assumed shell only)	1,639	m2	50.00	81,950
31	New finishes to existing toilets	96	m2	400.00	38,400
32	New finishes to tea prep/cleaners	55	m2	350.00	19,250
33	Hydraulic services - existing building	4,100	m2	120.00	492,000
34	Electrical services - existing building	4,100	m2	550.00	2,255,000
35	Mechanical services - existing building	4,100	m2	400.00	1,640,000
36	Lift upgrade		Item		300,000
On-costs					
37	Builder's preliminaries		Item		1,644,300
38	Design Contingency		Item		1,338,900
39	Construction contingency		Item		1,472,800
TOTAL MIXED USE - BASIC					16,201,150
Cost/m2 (excluding basement)					2,976
Cost/m2 (including basement)					2,694
MIXED USE - UPGRADED					
40	Cost of basic upgrade		Item		16,201,150
41	Upgrade facade to existing building	2,100	m2	200.00	420,000
42	Upgrade finishes to toilets	96	m2	100.00	9,600
43	Hydraulic services - existing building	4,100	m2	80.00	328,000
44	Electrical services - existing building	4,100	m2	150.00	615,000
45	Mechanical services - existing building	4,100	m2	100.00	410,000
46	Lift upgrade (additional lift including core)		Item		350,000
On-costs					
47	Builder's preliminaries		Item		239,800
48	Design Contingency		Item		195,200
49	Construction contingency		Item		214,800
TOTAL MIXED USE - UPGRADED					18,983,550
Cost/m2 (excluding basement)					3,511
Cost/m2 (including basement)					3,157

HEALTH & WELL BEING OPTION



Project: Default Project		Details:			
Building: C GRADE OFFICE STUDY					
Code	Description	Quantity	Unit	Rate	Total
HEALTH & WELL BEING - BASIC					
Exclusions					
1	Asbestos removal		Note		
2	Openings in post tensioned slabs		Note		
3	Fire engineered solution - no sprinklers		Note		
4	Upgrades to incoming services		Note		
5	Changes to core walls or column layout		Note		
6	Fit-out to retail and consulting rooms		Note		
7	Window treatments		Note		
8	Gymnasium equipment		Note		
9	Retail fit-out (shell only)		Note		
10	Professional fees and disbursements		Note		
11	Goods and Services Tax		Note		
Demolition Works					
12	Strip existing partitions, wall, floor and ceiling finishes, mechanical & electrical etc.	4,100	m2	25.00	102,500
13	Remove roof structure & prepare for new floor slab	840	m2	50.00	42,000
14	Remove existing facade	1,450	m2	100.00	145,000
15	Form openings in existing floor slab for new stairs including all making good	2	No	15,000.00	30,000
16	Form opening in existing slab for lightwell	4	No	2,500.00	10,000
Alterations & New Works					
17	Minor works to basement including new delivery bay and end of trip facilities		Item		50,000
18	Additional floor complete including lightweight construction for facade, walls, mechanical & electrical services etc.	820	m2	1,800.00	1,476,000
19	New facade to existing structure levels 1 to 4 to meet BCA Section J	1,120	m2	900.00	1,008,000
20	Upgrade existing facade to core	650	m2	500.00	325,000
21	Facade to retail	328	m2	800.00	262,400
22	Sunshades (msd on plan)	234	m2	800.00	187,200
23	Floor & soffit finish to exposed suspended slab	15	m2	250.00	3,778
24	Extend lift core to roof		Item		20,000
25	Extend escape stairs to roof level	2	No	10,000.00	20,000
26	New feature stairs between floors	2	No	20,000.00	40,000
27	New UAT to existing building	10	No	15,000.00	150,000
28	Internal partitions & doors	1,175	m2	200.00	235,000
29	Wall, floor & ceiling finishes to consulting rooms	1,700	m2	220.00	374,000
30	Wall, floor & ceiling finishes to fitness centre	680	m2	300.00	204,000

HEALTH & WELL BEING OPTION



Project: Default Project		Details:			
Building: C GRADE OFFICE STUDY					
Code	Description	Quantity	Unit	Rate	Total
31	Wall, floor & ceiling finishes to foyers	615	m2	300.00	184,500
32	Wall finishes to chemist/health foods/cafe - no floor or ceiling finishes (assumed shell only)	490	m2	50.00	24,500
33	New finishes to existing toilets	96	m2	400.00	38,400
34	New finishes to tea prep/cleaners	55	m2	350.00	19,250
35	Hydraulic services - existing building	4,100	m2	180.00	738,000
36	Electrical services - existing building	4,100	m2	550.00	2,255,000
37	Mechanical services - existing building	4,100	m2	400.00	1,640,000
38	Lift upgrade		Item		300,000
On-costs					
39	Builder's preliminaries		Item		1,383,800
40	Design Contingency		Item		1,126,800
41	Construction contingency		Item		1,239,500
TOTAL HEALTH & WELL BEING - BASIC					13,634,628
Cost/m2 (excluding basement)					2,944
Cost/m2 (including basement)					2,510
HEALTH & WELL BEING - UPGRADED					
42	Cost of basic upgrade		Item		13,634,628
43	Upgrade basement	820	m2	200.00	164,000
44	Upgrade facade to existing building	2,100	m2	200.00	420,000
45	Upgrade consulting room finishes - existing building	1,700	m2	50.00	85,000
46	Upgrade wall, floor & ceiling finishes to foyer	615	m2	300.00	184,500
47	Upgrade finishes to toilets	96	m2	100.00	9,600
48	Hydraulic services - existing building	4,100	m2	120.00	492,000
49	Electrical services - existing building	4,100	m2	150.00	615,000
50	Mechanical services - existing building	4,100	m2	100.00	410,000
51	Lift upgrade (additional lift including core)		Item		350,000
On-costs					
52	Builder's preliminaries		Item		382,200
53	Design Contingency		Item		311,200
54	Construction contingency		Item		342,400
TOTAL HEALTH & WELL BEING - UPGRADED					17,400,528
Cost/m2 (excluding basement)					3,725
Cost/m2 (including basement & roof)					3,203

Contributors



City of **Perth**

Client

City of Perth
Council House
27 St George's Terrace
Perth 6000

Adrian Cagnana
Shawna Doyle
John Fish
Colin Mok



Architect

Cameron Chisholm Nicol
Level 3, Sheffield House
713 Hay Street
Perth 6000

Deborah Binet
Gavin Broom
Alex Dubrawski
Craig Forman
Mitch Hender
Pippa Hurst
Karly Kepert
Jackson Liew
Bianca Lombardo
Anna Mustard
Joshua Pui
Dominic Snellgrove
William Sutrisno
Keat Tan
Irold Van Der Sar



Economic Research

Y Research
PO Box 683
Applecross 6153

Damian Stone



Structural and Services Consultant

Wood & Grieve Engineers
Ground Floor
226 Adelaide Terrace
Perth 6000

Ralf Boepple
Phillip Cook
Alex Deluca
Stephen King
Eric Lemeur
Jonathan Palaya



Quantity Surveyor

BSM Consulting
Suite12/336
Churchill Avenue
Subiaco 6008

Bob Britton

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Heirloom, Fremantle
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Photographer: Greg Hocking

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565 Hay Street, Perth.
Architect: Cameron Chisholm Nicol
Photographer: Greg Hocking

50 William Street, Perth
Architect: Cameron Chisholm Nicol / DWA
Architects / Cusp Design Studio
Photographer: Greg Hocking

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Heirloom, Fremantle
Architect: Cameron Chisholm Nicol
Photographer: Greg Hocking

Empire, Perry Lakes
Architect: Cameron Chisholm Nicol
Photographer: Greg Hocking

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Sheffield House, Perth
Architect: Cameron Chisholm Nicol
Photographer: Greg Hocking

Coles, Joondalup
Architect: Formworks
Photographer: Kelly Rattigan

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Aerial View of Perth City
Source: Nearmaps

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Sheffield House, Perth
Architect: Cameron Chisholm Nicol
Photographer: Greg Hocking

Disclaimer:

The project images in this document are used for the purposes of research. They provide benchmark examples of design excellence with the aim of encouraging good design in the City of Perth.

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