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Shaping Australia's Tall Tower Design And High Livability Standards



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International Conference

The projects featured in this paper will be discussed in **Philip Vivian's** presentation in Session 3C: *Tall Timber* and in **Guy Lake's** presentation in Session 3I: *The Residential Experience*, both on Monday 30 October at 1:45 p.m.

Abstract

With nearly 90% of its population expected to live in its state-capital cities by 2053, Australia is on track to become one of the world's most urbanized nations. Cities such as Sydney, Melbourne, and Brisbane are world-renowned for their livability ratings, but this is not a guaranteed constant. As density increases, more inventive tall building designs will be needed. This case study examines tall building developments in each of the three largest Australian cities, each of which exemplifies a different aspect of sustainable design, supporting the ultimate objective of maintaining and enhancing livability into the future.

Keywords: Livability, Sustainable Design, Urban Planning, Mass Timber

Introduction

Since the mid-20th century, unprecedented growth has characterized city development in countries all across the globe. In 2008, the world's population was evenly split between urban and rural areas; by 2050, it is expected that 70% of all people will live in cities (Population Reference Bureau 2017). Architects, engineers, and urban planners have broadly responded to this growth by pushing for the design and construction of tall towers that can accommodate high population densities.

Tall tower projects have proliferated in Australia over the past 20 years, and Bates Smart has been behind many of their designs, especially in Sydney, Melbourne, and Brisbane. The practice's design ethos is underpinned by efforts to deeply understand the context of each project and create designs that, once built, enhance amenity and holistically improve their surroundings.

However, when designing and constructing tall towers, it is difficult to assess exactly how a building will change the city in which it sits. Increasingly, the architecture, engineering, and construction industries are utilizing quantifiable livability measures to better understand the strengths and weaknesses of existing cities. These measures can be used to inform the design of tall towers to ensure that they contribute to the improvement of everyday living conditions.

Australia's Livability Standards

Livability indexes often determine a city's living conditions at a global scale by assigning a quantitative score to social measures, such as health care, education, sustainability, stability, and infrastructure. On the aggregate, major Australian cities achieve superior performance in the rankings from year to year. Australia is renowned for its lifestyle, which is reflected in its high livability standards and expectations. In 2017, Melbourne was named the most livable city in the world for the seventh year in a row, and Sydney, Adelaide, and Perth all ranked in the world's top 11 cities (The Economist Intelligence Unit 2017).

While architecture is not explicitly evaluated in most livability indexes, there is little doubt that the built environment greatly impacts how daily life plays out in cities. This holds true in Australia's largest cities, where architecture contributes to high livability scores.

Architecture's Impact on Australian Livability

Bates Smart has been an integral force in shaping major Australian cities – especially Sydney, and Melbourne – over the past 165 years. The firm's designers, engineers, and planners have been prolific, working across many different sectors and designing seminal large-scale buildings, such as the State Library of Victoria (1856) and the MLC Centres (multiple commercial towers constructed in

Sydney and other Australian cities throughout the 1950s and 1960s), as well as countless others.

The firm's designs have endured in large part because they respond to specific complexities that contribute to overall livability. Today, this work continues with the design of some of Australia's most innovative tall towers, including 35 Spring Street in Melbourne (see Figure 1), 25 King in Brisbane, and four of Sydney Olympic Park's first residential towers. The final designs of these projects vary greatly, but they were all spurred through the multidisciplinary approach of the practice that integrates urban design, architecture and interior design in order to enhance both the built environment and daily life.

As Australia's population continues to urbanize – 89% of all people in Australia are expected to live in its state-capital cities by 2053 (Australian Bureau of Statistics 2014) – it is essential that the design and construction of tall towers maintain the country's high livability standards. The current body of work, much like its historic portfolio, upholds these standards. A closer examination of three contemporary projects demonstrates how thoughtful Australian architecture sustains high-quality livability and contributes to responsible urban growth. The lessons from these buildings can be applied to design projects all over the world, helping to elevate livability standards at a global scale.

35 Spring Street: Placemaking and Densification in Melbourne

Melbourne's skyline has changed dramatically over the past 20 years. The forms of its skyscrapers read powerfully, but the city has retained an architectural delicacy, derived from its lasting Victorian aesthetic heritage. The distinct aesthetic helps define Melbourne's sense of place. It's an important characteristic that the authors are trying to preserve and reinterpret through the firm's contemporary skyscraper projects, recently completed and currently under construction in the city core.



Figure 1. 35 Spring Street, Melbourne. © Peter Clarke & Impress Air

“While architecture is not explicitly evaluated in most livability indexes, there is little doubt that the built environment greatly impacts how daily life plays out in cities. This holds true in Australia’s largest cities, where architecture contributes to high livability scores.”



Figure 2. View of 35 Spring Street from the Parliament Reserve park. The Old Treasury Building is at left. © Peter Clarke

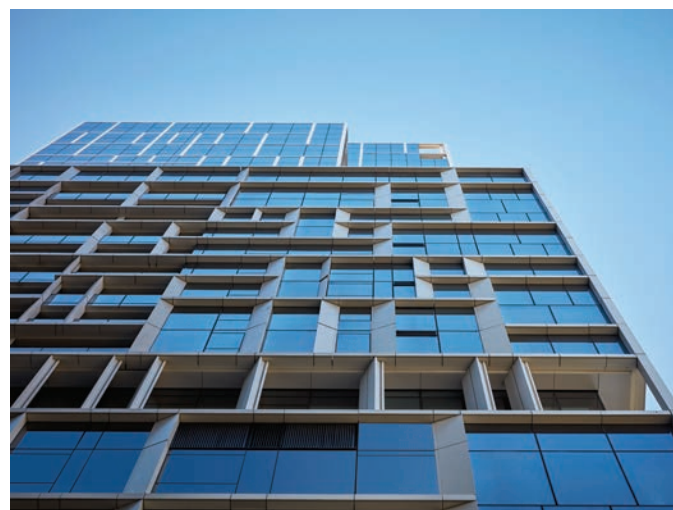


Figure 3. The intricate pattern of 35 Spring Street's façade carries the delicacy of the historic Melburnian commercial street frontage into the air. © Peter Clarke

Like Sydney, Melbourne is cycling through a profound housing shortage. This is especially true in the CBD, where small, poorly-designed apartments have historically dominated the area's multi-unit residential housing stock. These units have been passed over by many Melburnians in favor of single-family homes located in the suburbs. However, attitudes about housing are changing; in a survey by the Grattan Institute, 52% of Melburnians reported that they would prefer to live in high-quality, higher-density housing. The supply unfortunately mismatches the demand, as only 28% of housing in Melbourne supported high-density living in 2011, the study's publication date (Kelly 2011).

The CBD's residential housing market has started to broaden in the six years since the Grattan Institute released its study. A number of high-quality residential towers are going up throughout the CBD, and some have already been completed.

35 Spring Street is one such example. The design team intentionally crafted the 44-story building so that it would enhance, but not disrupt, Melbourne's strong architectural character. The design was inspired by the site's significance, its historical context, and its edge condition, factors which were brought together to create a sculptural form that stitches into the city landscape.

The tower, completed in 2017, sits at the intersection of two of Melbourne's most significant cultural precincts, Spring Street and Flinders Lane. Spring Street is home to some of Melbourne's most significant historical buildings, including the State Parliament of Victoria and the Treasury Building (see Figure 2). During the 1880s, Flinders Lane was the epicenter of Melbourne's fabric and fashion trade. The site is also opposite the Treasury Gardens. In today's Melbourne, this generates an edge condition where the CBD's grid meets open urban parkland.

The design team felt strongly that the site's richness – both historic and contemporary – demanded a massing of significance. The openness of the park opposite Spring Street meant that the tower did not require a setback at street level, allowing the form to go straight up, thereby marking it on the skyline as a gateway to Melbourne. At mid-level, the massing steps back to match the scale of the existing architectural context and to help transition the form to street level. Along Flinders Lane, the building steps back again, this time to preserve the fine-grain quality of the laneway.

35 Spring Street's sculptural quality is further reinforced through its highly detailed, patterned façade that is also carried through into the interior. The design reinterprets the warp, weft and layering of fabric patterns manufactured in Flinders Lane, as well as the ashlar patterning found in the masonry walls of nearby historic buildings. To create the weave, extruded aluminum fretwork climbs up the tower's façades in arrayed two- and three-story sections (see Figure 3). Its white color exhibits a subtle gold sheen when dappled with natural light, complementing the grey palette of the surrounding buildings.

“The design of 35 Spring Street reinterprets the warp, weft and layering of fabric patterns manufactured in Flinders Lane, as well as the ashlar patterning found in the masonry walls of nearby historic buildings.”

The building's double glazing mixes clear and reflective vision glass and horizontal and vertical panel orientations to create a secondary pattern that works in tandem with the fretwork. When read together, the two

patterns unify as a veil that conceals the different layouts and scales of the interior apartments, exterior terraces, and the podium carpark, helping to maintain the elegance of 35 Spring Street's exterior expression.

Internally, 241 generously sized and often customized apartments feature timeless, contemporary design with rich, layered and textural finishes, and a high level of crafted detailing. All apartments have a large terrace or balcony – a feature that is often present in Australian residences – softening the threshold between inside and outside and giving each apartment the feeling of a single-family home. The building also includes many shared amenities, including community dining areas, a pool and gym facilities, and ample storage.

To date, 35 Spring Street is the only luxury apartment development in the CBD to sell 100% off the plan. It signifies a shift in market demand and an increased desire for large apartments planned at high densities within the city. At the same time, its design celebrates Melbourne's industrial and architectural history, and is already an integral addition to the city skyline, exemplifying how livability can be improved by using thoughtful form, aesthetics, and densification to evolve a city's sense of place.

25 King: Environmental, Aesthetic and Social Sustainability in Brisbane

Maximizing sustainability and high performance are the driving goals at the heart of the Brisbane City Council livability agenda. Brisbane has been named Australia's Most Sustainable City multiple times by Keep Australia Beautiful, the governing body that tracks Australian cities' overall sustainability efforts, thanks in part to its extensive sustainability policies, programming and commercial incentives. Reducing the carbon intensity of the built environment is a cornerstone of these plans (Brisbane City Council 2017).

The design for 25 King responds directly to this goal. The 10-story, 15,000-square-meter



Figure 4. 25 King, Brisbane, is a timber-framed office building that emphasizes flexible floor plans and transparency of structure.



Figure 5. The v-shaped columns and extensive overhang make a pleasant enclosure that enhances the public experience of 25 King, Brisbane.

building is supported by an expressed all-timber structure; when complete in 2018, it will be the tallest structural-timber commercial office building in the world (see Figure 4). Like all timber towers, 25 King's structural system will sequester more CO₂ than it emits, helping to improve its surrounding context and set a new standard for commercial building construction that positively contributes to Brisbane's carbon-neutrality targets.

The design team translated timber tower design principles that were previously developed in an unsuccessful competition scheme to the particularities of the 25 King brief. The site is located on King Street in the reinvigorated RNA Showgrounds, three kilometers north of the Brisbane CBD and close to public transit links. Within the showgrounds, development on King Street

integrates event, residential, commercial, and retail spaces at the mid-rise scale and pushes vehicular traffic to nearby streets, so that pedestrian and street-level activity won't be interrupted.

25 King Street's massing responds to the linearity of the street by placing a raised and extruded open-ended box parallel to the street. The services core anchors the form on the north, while a lightweight, glazed, verandah-like volume oriented to the street expresses the building's timber structure. The form steps back from King Street at the ground level to create the sheltered verandah. The V-shaped columns maximize its openness by reducing the number of columns, all while bracing the structure (see Figure 5).

The verandah provides outdoor space on the street and a welcome pathway for passers-by.

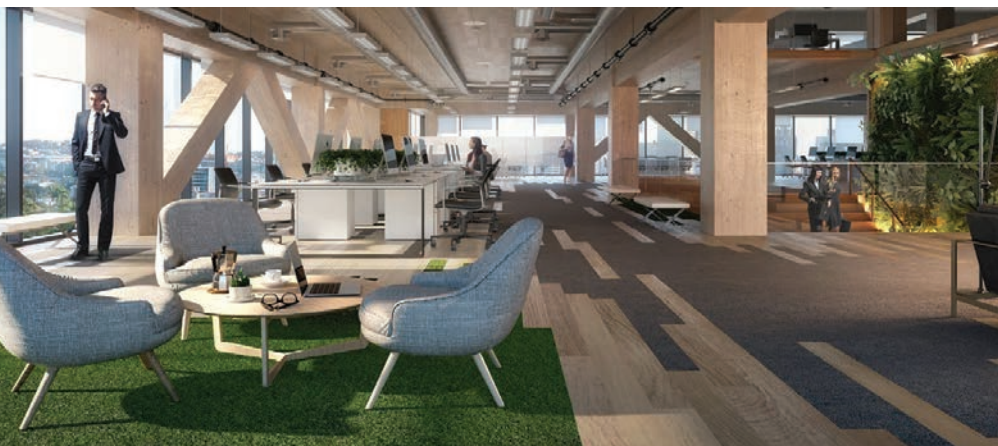


Figure 6. The exposed structure at 25 King emphasizes the materiality of cross-laminated timber (CLT).

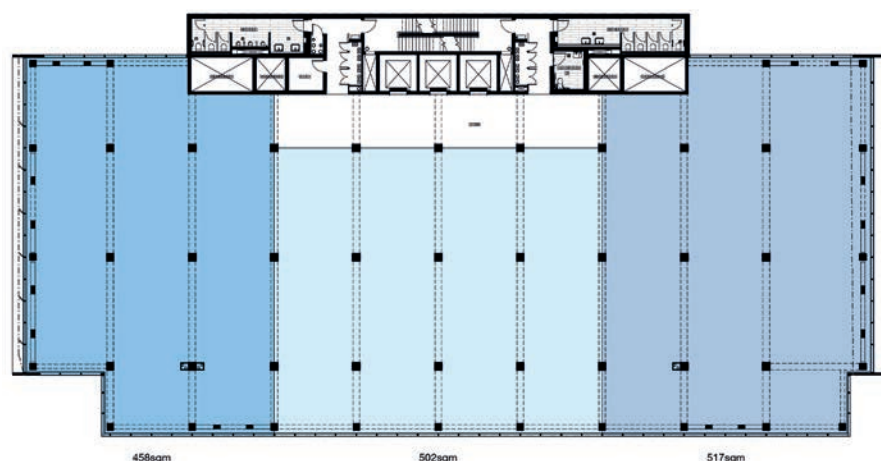


Figure 7. The plan of 25 King provides for flexibility in leasing and office placement.

Open-frame *brises-soleil* on the east and west façades passively protect the building from solar impact. Sheltering both the verandah and the building's eastern and western façades is extremely important in Brisbane's subtropical climate, where excessive sun can make conditions uncomfortable.

The design team intentionally left the structure expressed behind the high-performance façade, so that its honesty as a braced-timber frame can be read from the street and from inside the building. Historically, many wooden pavilions populated the RNA Showgrounds, and Queensland is known for its low-slung timber buildings with wide verandahs. Celebrating 25 King's structure helps tie the building to this heritage. It also creates a new kind of architectural aesthetic that looks and feels more organic – a welcome contrast to the typical glass-and-steel material palette that often dominates

office building architecture. The workspace that results feels more inviting and humane, due to the warmth and connection to nature expressed through the timber.

The building's structural system is composed of 480-by-480-millimeter glue-laminated (glulam) columns and bracing that yield the most efficient structural arrangement and coordination of services. Beams are 760 millimeters deep for longer spans and 320 millimeters deep for short spans at the perimeter, so that services can be run with minimal notching to the structure. This also helps maintain the hardworking commercial floor plates' generous clearances, as does the building's side core (see Figure 6). Cross-laminated timber (CLT) forms the structure of the office floor and core.

25 King's columns form a tight six-by-nine-meter grid. While smaller than a contempo-

rary post-tensioned concrete grid, the column sizes are also smaller and have less of an effect on office fit-outs. Because the plans are open and the grid is regular, each floor can be subdivided into a maximum four tenancies, allowing each business to lease only as much space as it needs and maximize revenues over the long term (see Figure 7).

All the elements that compose 25 King are prefabricated and cannot be altered on-site due to structural approvals; this has helped drastically curb the amount of waste that is normally generated during construction. Additionally, because the structure is lightweight, a small crew can assemble it at a fast rate, further reducing environmental impact.

Once constructed, 25 King's carbon sequestration and low environmental impact will clearly illustrate how timber buildings can help improve living conditions in the urban context. Just as importantly, the street-level verandah and expressed timber structure give back to the RNA Showgrounds, enriching the area through shared communal space and a refined architectural expression.

Sydney Olympic Park: From Sporting Precinct to Vibrant Community

Over the next 20 years, planners and demographers anticipate unprecedented growth in the Sydney metropolitan area, with projections adding approximately two million people, bringing the city's total population to six million (NSW Environment, Climate Change & Water and NSW Planning 2010). Planning NSW and the Greater Sydney Commission have prioritized development in 15 Growth Areas to accommodate this boom. Sydney Olympic Park is central to this plan, making up the eastern precinct in the Greater Parramatta Priority Growth Area, the city's new designated geographic center.

In its current state, Sydney Olympic Park primarily functions as a sporting and events precinct with zoned retail, commercial and

residential sectors that have only recently undergone development. The official suburb comprises 600 hectares – approximately the same size as the Sydney CBD – 425 hectares of which is designated as parkland (Charles Moore interview, 26 July 2017). Prior to the 2000 Sydney Olympic and Paralympic Games, this land area was remediated from degradation incurred due to heavy industrial usage throughout the 20th century.

After the Olympic Games, the Sydney Olympic Park Authority began to think through how the precinct could grow into a community. A great deal of emphasis was also placed on maintaining Olympic Park's high-quality public domain, as the amount of land set aside as greenspace is unrivaled in other Sydney suburbs, and is the area's key differentiator.

Sydney Olympic Park Master Plan 2030, last updated in 2016, lays out the groundwork for Olympic Park's architectural diversity. Unlike the rest of Sydney's suburbs, Olympic Park has a monumental scale, set primarily by the large size of the stadia, event venues and training facilities that ground the town center. The master plan provides for smaller-scale architecture in the suburb's outer precincts to create a finer-grained built environment. But for the first time in its

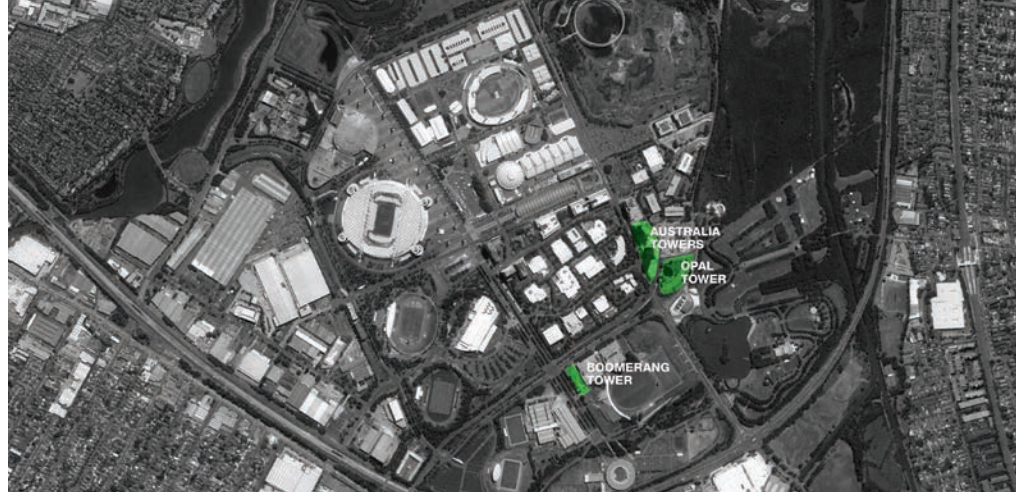


Figure 8. Overview of Sydney Olympic Park, showing the locations of the Australia Towers, Opal Tower, and Boomerang Tower.

planning history, the design and construction of residential and commercial tall towers has been prioritized in the heart of Olympic Park.

Bates Smart designed four of Sydney Olympic Park's first residential towers, setting the precedent for the suburb's tall-tower architecture (see Figure 8). The design teams behind these projects – named Australia Towers (a pair of elliptical towers), Opal Tower, and Boomerang Tower – were essentially tasked with creating a community from the ground up (see Figures 9, 10, and 11). When all three projects are completed, the towers will enhance Olympic Park's livability via their high-quality design, sustainable performance, connections to the parklands and amenities that nurture organic neighborhood growth.

Height has always been controversial in Olympic Park, due to competing problems of

scale. The vaults and arches of the sporting structures define the suburb's skyline, and it was feared that the development of tall tower blocks would overrun this identity. At the opposite end of the scale spectrum, towers were not viewed as contributing to the creation of a humane streetscape.

A great deal of emphasis was placed on the massing design of each of the Olympic Park projects to respond to these concerns. Australia Towers, completed in 2015 and located on Australia Avenue, aims to provide a low-scale and active streetscape, while responding to the site's Olympic heritage (see Figure 12). The towers are shaped like a set of related ellipses and linked through a low podium, drawing loose inspiration from the oval forms of the sporting stadia. The geometry helps soften the solid street wall of commercial rectilinear towers located on Australia Avenue closer to the town center, and gives the project a distinguished



Figure 9. Australia Towers, Sydney. © Brett Boardman Photography



Figure 10. Opal Tower, Sydney. © Ecove



Figure 11. Boomerang Tower, Sydney. © Ecove

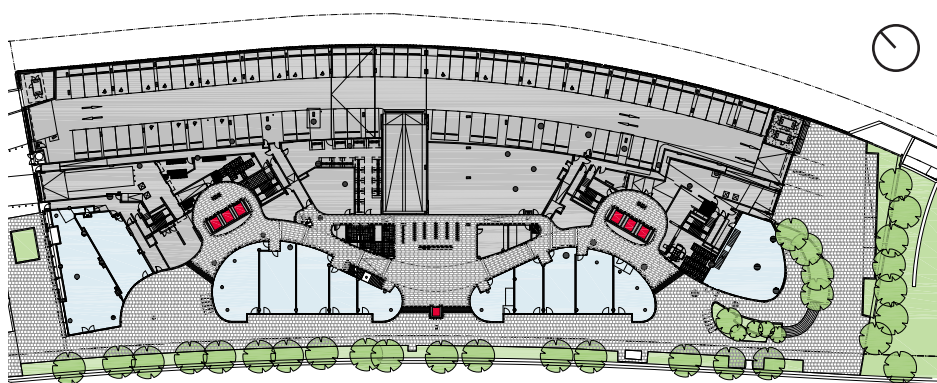


Figure 12. Australia Towers – the ground floor plan softens the otherwise rectilinear streetscape.



Figure 13. Australia Avenue in the Olympic Park has become its high-rise corridor, with Australia Towers (left) and Opal Tower (right) defining the district. © Ecove

character that can be read at both the skyline and street scales.

Opal Tower is currently under construction on the site immediately southeast of Australia Towers (see Figure 13). Its softened triangular form responds to its site geometry and will demarcate the border between Olympic Park's built environment and Bicentennial Park's open, natural space. Boomerang Tower will rise in much the same way on its site, located one block southwest from Opal Tower on Olympic Boulevard (see Figure 11). It will leverage a shape reminiscent of a boomerang to help align Olympic Park's town center with its outer residential development, as well as diversify the geometry of the suburb's skyline.

Typical plans and diagrams for all three projects demonstrate key recurring principles to ensure living spaces do not compromise on amenity. The units in each tower have been oriented for optimal solar access; all units in Boomerang Tower achieve 100% solar access all year round. Access to cross ventilation, natural light and view corridors was also prioritized, while winter gardens replaced balconies on corners to help mitigate wind loads. Together, these design details make the buildings pleasant places to live, helping to combat the prevalent misconception that tall tower units are cramped, dark, and cut off from nature and adjacent surroundings.

The design team also took great care with the connections between the towers and the ground plane to ensure that Olympic Park's two main streets – Olympic Boulevard and Australia Avenue – will be activated (see Figure 12). The shared lobby in Australia Towers' podium has become the development's central social space, where families and residents often gather, and its connection to a nearby retail arcade with cafés, shops, a pharmacy, and gym facilities has helped bolster activity along Australia Avenue. Similar transformations and street-level permeability are expected at Opal Tower and Boomerang Tower.

At Opal Tower, a childcare center located on the corner of the site will allow families living in Olympic Park's residential towers to easily plug into nearby care facilities, simplifying commutes and helping to build the local neighborhood by fostering relationships between families. The adjacency to Bicentennial Park will also enable the center to take full advantage of the parklands year-round, giving kids a great place to play.

Boomerang Tower extends Olympic Park's commercial development to the town center's edge via its commercial podium. This eight-story volume stacks retail space at the ground level, parking on four levels above, and commercial office space, complete with a rooftop terrace, on levels seven and eight. Mixing uses in this manner will help draw more people to this corner of Olympic Park.

The details discussed above offer only a snapshot of how the designs for Australia Towers, Opal Tower, and Boomerang Tower will help responsibly weave tall towers into Sydney Olympic Park. They demonstrate that, when designed well, the building typology can help complement and transition the monumental scale of Olympic Park's core, provide the needed space for compact commercial and residential development, and contribute to the architectural diversity that will catalyze Olympic Park's growth into a vibrant community over the next 15 years.

Conclusion

Ultimately, skyscrapers directly influence livability in cities. Bates Smart has always considered how the firm's buildings impact the built environment and daily life for this exact reason. At their best, tall towers enhance their urban contexts by efficiently plugging into social infrastructure, transport networks, sustainability efforts, and the existing cultural fabric. At their worst, they disrupt these macro systems and impede positive urban growth, making life more difficult on the aggregate for city inhabitants. As the world continues to densify and urbanize, it is important for architects to continue to study these ramifications. Doing so will help produce tall tower designs that improve daily life and catalyze necessary change. ■

Unless otherwise noted, all photography credits in this paper are to Bates Smart.

“The Australia Towers are shaped like a set of related ellipses and linked through a low podium, drawing loose inspiration from the oval forms of the sporting stadia.”

References

AUSTRALIAN BUREAU OF STATISTICS (ABS). 2017. “Capital Cities: Past, Present and Future.” Accessed July 17, 2017. <http://www.abs.gov.au/ausstats/abs@nsf/featurearticlesbytitle/AC53A071B4B231A6CA257CAE000ECC5?OpenDocument>.

BRISBANE CITY COUNCIL. 2017. “Brisbane: Clean, Green, Sustainable 2017–2031.” Accessed July 8, 2017. <https://www.brisbane.qld.gov.au/environment-waste/be-clean-green-brisbane/brisbane-clean-green-sustainable-2017-2031>.

THE ECONOMIST INTELLIGENCE UNIT. 2017. “The Global Livability Report 2017.” Accessed August 17, 2017. <http://www.smh.com.au/cqstatic/gxx114/LivabilityReport2017.pdf>.

KELLY, J. F.; WEIDMANN, B. & WALSH, M. 2011. *The Housing We'd Choose*. Melbourne: Grattan Institute..

NSW DEPARTMENT OF PLANNING. 2010. “Sydney Growth Centres Strategic Assessment: Program Report.” Accessed August 8, 2017: <http://www.environment.gov.au/epbc/notices/assessments/pubs/sydney-growth-centres-program-report.pdf>.

POPULATION REFERENCE BUREAU (PRB). 2017. “Human Population: Urbanization.” Accessed June 2017. <http://www.prb.org/Publications/Lesson-Plans/HumanPopulation/Urbanization.aspx>.

Project Data

35 Spring Street, Melbourne

Completion Date: 2017

Height: 166 meters

Stories: 43

Area: 54,000 square meters

Primary Functions: residential/retail

Developer: Cbus Property

Architect: Bates Smart (design)

Structural Engineers: BG&E (design); Robert Bird Group (design)

Project Manager: RCP

Main Contractor: Multiplex

25 King, Brisbane

Completion Date: 2018 (expected)

Height: 47 meters

Stories: 10

Area: 14,921 square meters

Primary Function: office

Developer: Lend Lease

Architect: Bates Smart (design)

Structural Engineer: Aurecon (design)

Boomerang Tower, Sydney

Completion Date: mid 2019 (expected)

Height: 126 meters

Stories: 39

Area: 25,476 square meters

Primary Function: Residential

Developer: Ecove Group Pty Ltd.

Architect: Bates Smart (design)

Main Contractor: Taylor Construction

Structural Engineer: van der Meer Consulting

MEP Engineer: Insync Services Pty Ltd.

One Australia Avenue, Sydney

(Australia Towers Complex)

Completion Date: 2011

Height: 107 meters

Stories: 31

Area: 29,420 square meters

Primary Function: residential

Owner/Developer: Ecove Group Pty Ltd.

Architects: Bates Smart (design)

Structural Engineer: Bonacci Group (design)

Main Contractor: Parkview Group

Other CTBUH Member Consultants: BG&E

(Façade)

Australia Towers II, Sydney

(Australia Towers Complex)

Completion Date: 2015

Height: 84 meters

Stories: 25

Area: 25,670 square meters

Primary Function: residential

Owner/Developer: Ecove Group Pty Ltd.

Architect: Bates Smart (design)

Structural Engineer: Bonacci Group (design)

MEP Engineers: Haron Robson (design); Erbas &

Associates Pty Ltd (engineer of record); Wood &

Grieve Engineers (engineer of record)

Project Manager: Sterling Project Solutions

Main Contractor: Parkview Group

Other CTBUH Member Consultant: BG&E (façade)

Opal Tower, Sydney

(Australia Towers Complex)

Completion Date: 2018 (expected)

Height: 117 meters

Stories: 36

Area: 41,811 square meters

Primary Functions: residential/retail

Developer: Ecove Group Pty Limited

Architect: Bates Smart (design)

Structural Engineer: Bonacci Group (design)

Project Manager: Sterling Project Solutions

Main Contractor: ICON CO