

Title: **Sustainable Groundscrapers and Megaplate Towers**

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Sustainable Groundscrapers and Megaplate Towers

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Rocco Bressi

Rocco Bressi graduated from the University of Sydney in 1978 attaining an honours degree in Structural Engineering followed by a postgraduate diploma in Structural Engineering in 1985. He has followed a career in the structural engineering design of all building types and forms. Specialising in structures designed and constructed from reinforced concrete, post-tensioned concrete and structural steel, he has extensive experience in numerous building systems and construction techniques.

Rocco holds the position of Structural Engineering Design Manager for Bovis Lend Lease and has been responsible for the detailed structural engineering design and documentation of many large-scale projects including retail centres, hotels, industrial facilities and particularly high-rise commercial developments.

He is familiar with the project management processes and fast track construction methods as applied to integrated multi-disciplined design, the setting up and the ongoing management of the concept design, and design management for those projects under his control including cost control and value engineering.

Over the years Rocco has worked and developed mutual relationships with many local and international consultants from all disciplines. Networking through out the consulting industry he has brought specialist knowledge to the projects that Bovis Lend Lease carries out for its clients. This has been supported by numerous technical submissions and presentations.

Darren Kindrachuk

Darren Kindrachuk graduated from the University of Manitoba, Canada in 1984 attaining a Bachelor of Environmental Studies Degree in Architecture followed by a Master of Architecture degree in 1988. Upon completion of this formal education Darren has followed a career as a Design Architect gaining a large body of experience in Asia and most recently in Australia. Specialising in mixed-use and commercial office buildings, he has had extensive experience designing and delivering projects in Asia-Pacific.

Darren holds the position of Executive Architect for Bovis Lend Lease / Lend Lease design and has been responsible for the design and documentation of numerous large scale and innovative commercial developments within Australia. In recent years he has been a leader and strong proponent of sustainable building design and delivery within the Bovis Lend Lease organisation. His firm understanding of development economics, building technology and sustainability as they influence the design and delivery process is key to his ability to innovate and value add in numerous projects.

Currently Darren is involved in the design and documentation of over 350,000m² of office space in Australia, including Australia's largest single office building targeting the country's highest sustainability standards. He has also been instrumental in the design and delivery of the Lend Lease Headquarters in Sydney, 30 The Bond and 825 The Gauge currently under construction in Melbourne. Both projects demonstrate significant design innovation and set notable sustainability benchmarks within the Australian and Asia-Pacific region.

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Abstract

This paper explores the influence of property market aspirations and sustainability issues upon workplace environments presently influencing office buildings in Australia. Emerging trends and influences are shifting the traditional demand for high-rise office towers toward an alternative or evolved building typology of Sustainable Groundscrapers and Megaplate Towers.

In a country where internal space efficiencies are key drivers in virtually all commercial developments, we are witnessing progressive design concepts and the creation of world class benchmarks. The temperate to sub-tropical climate combined with a maturing national sustainability agenda that is supported by both government and private sectors, has most recently served to create an environment for innovation generating new and progressive examples of sustainable commercial built form.

The contents of this paper will seek to highlight the primary considerations for current office building design and construction as well as clearly identify key design and planning drivers for contemporary and future office buildings. Specific focus will be directed toward the informed design and technical processes required to deliver sustainable workplace environments and the buildings which contain them.

Keywords: workspace, environments, generations, sustainable, functional, Groundscrapers, Megaplate Towers

Introduction

In Australia, recent commercial office developments have seen a shift away from tall buildings/towers characterized by small format floorplates with a centre core configuration. Current market demands for highly cost effective and efficient office space combined with a significant corporate trend favouring the consolidation of workspace and workforce is driving the planning of office buildings toward a new typology of Sustainable Groundscrapers and Megaplate Towers (refer *Figure 1*).

These evolving typologies can be generally defined as follows (refer *Figure 5*):

A *Groundscraper* is defined by a large typical floorplate area greater than 4,000m² NLA per level (with recent examples exceeding 9,500m²), serviced by one or occasionally two lift zone core(s). Typically, these buildings provide floorplate depths between 12 and 21 metres (core to exterior wall) and are generally under 15 storeys in overall height. Characteristically, Groundscrapers offer optimised building and tenant efficiencies, embody workspace connectivity/flexibility and often include atria(s) associated with large contiguous floorplate areas and large structural spans.

Recent development opportunities in Australia have also given rise to an even larger scale of development where by a series of Groundscrapers are linked at ground level and elevated 'bridge' connections

to create a large, integrated workplace "campus" environment (refer *Figure 2 & 3*).

A *Megaplate Tower* is defined by a large typical floorplate between 3,500m² and 4,000m² NLA per level providing large format contiguous workplace areas serviced by a multi-lift zone core or cores. Rising above

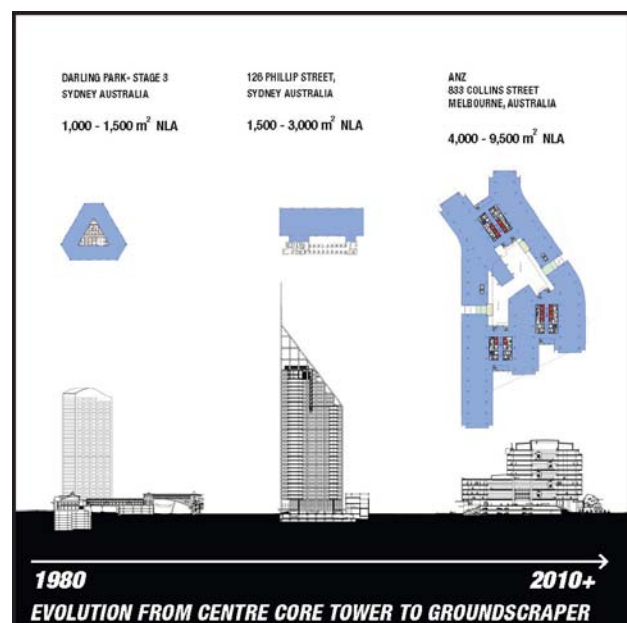


Figure 1. Illustrates the evolutionary trend of office development in Australia from circa 1980 through to 2010+.

15 stories, these towers offer the ability to provide a highly efficient and flexible tenant area with the capability to incorporate potential high and mid zone atrium spaces. Efficient internal spatial connectivity both horizontal and vertical through atria and/or interconnecting stairs further defines this typology (refer Figure 4).

These two building typologies challenge the traditional notion of the high rise office building or tower and have seen greater application in the CBD fringe and urban renewal sectors of Australian cities. Often the nature of this typology carries a strong community and urban planning agenda which significantly informs and links the new office development with key urban and sustainable planning strategies.

Today, many cities experiencing significant economic prosperity and growth are capitalising upon the opportunity for urban renewal or the re-development of “brown field” sites. Typically these sites are former industrial and/or material handling areas, ideal for the application of contemporary urban planning models and the creation of innovative office or workplace environments.

These renewal opportunities, in particular, “set the scene” for the ability to strategize and legislate an integrated framework for highly successful urban, commercial and environmentally sustainable outcomes. From a planning point of view, these areas or sites are often CBD fringe locations which offer the capacity to tailor the urban and sustainability agendas specific to location and economic drivers.

Advancements in telecommunications (enabling technology) and building/material technologies as well as improved methods of building performance analysis and measurement are also influencing our ability to better anticipate, plan and create relevant workplace environments. Further, accounting for evolving generational expectations within society and the workplace is informing current thinking as we move forward to create appropriate built environments within which to work, live and play.

A growing acknowledgement of global warming and the world wide implications is generating a greater sense of respect and support for positive environmental stewardship. In Australia, we are experiencing a significant rise and measure of this sentiment in both the urban/social and commercial/economic context. A good indication of this sentiment is the rapid rise and property market acknowledgement of the Green Building Council of Australia. The Council’s profile and influence in the commercial office market has become highly visible and measurable within the space of only a few short years.

Objectives

This paper has been structured to identify five key objectives which influence and determine the design principles for Sustainable Groundscrapers and Megaplate Towers. The objectives have been organized for discussion beginning with the determinants and

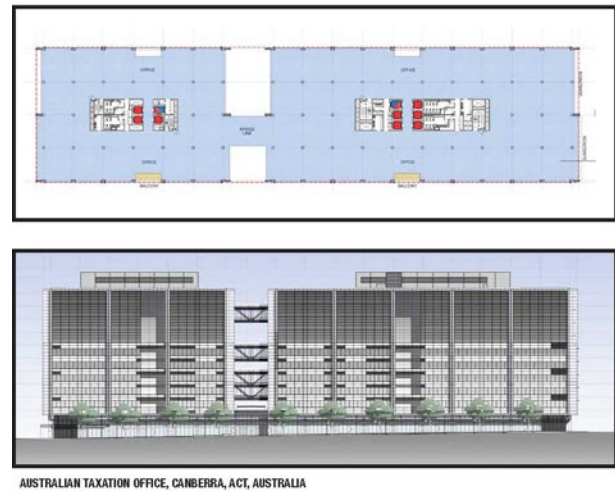


Figure 2. Groundscraper example, Australian Tax Office, Canberra, ACT, Australia; owner/developer: Queensland Investment Corporation.

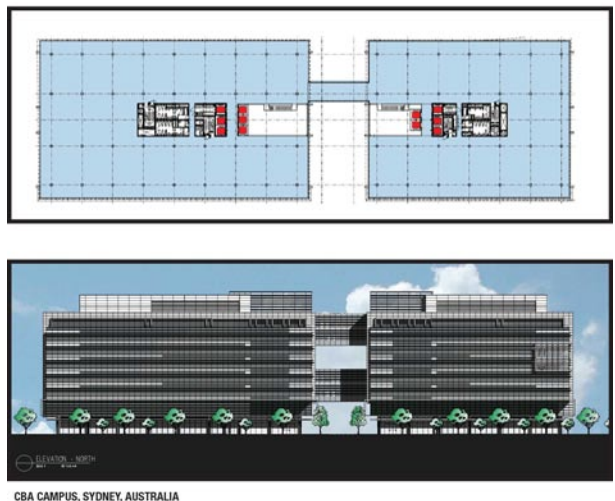


Figure 3. Groundscraper example, Commonwealth Bank Campus at Sydney Olympic Park, Sydney NSW, Australia; owner/developer Colonial First State Property Limited

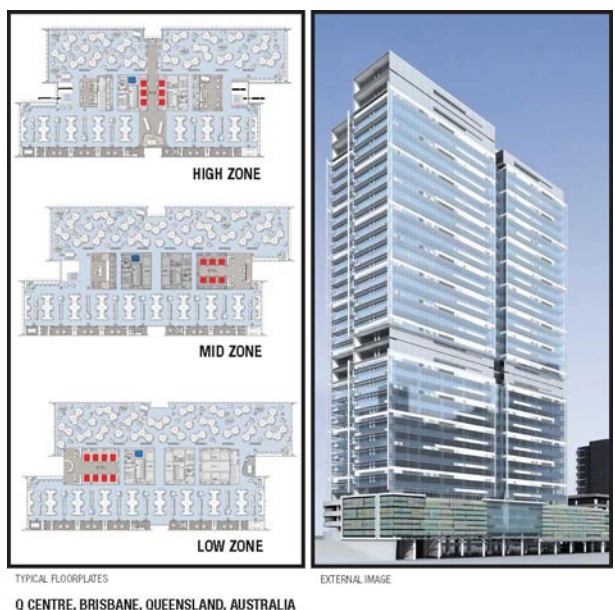


Figure 4. Megaplate Tower example, Q Centre, Brisbane, QLD, Australia owner/developer: GPT Wholesale Office Fund and Australian Prime Property Fund.

procurement of workplace environments through to “sustainable form follows function” a paradigm for an evolving building typology.

Objective 1: Creation of the workplace environment – first and foremost

The content of this objective reviews and recognises the emerging aspirations and methods of procurement for contemporary workspace environments. Office space and/or building procurement can be classified within three primary categories (refer *Figure 6*):

- A. Basic – speculative development (a basic market response)
- B. Elaborated – meeting specific market demands/niches and/or tailored tenant briefs.
- C. Aspirational – attaining high level market targets, setting new benchmarks and/or achieving a specific client/tenant brief.

A clear demand exists for “high performance” workspaces which are balanced and connected with environmental, social and urban aspirations. The ability of the office space to provide tenant flexibility and adaptability as well as vertical and horizontal connectivity is significantly influencing the planning and design of current office developments. Further, the capacity of the workspace environment to embrace, reinforce or become a “vehicle” for corporate or organisational “step change” is now firmly recognised and targeted by numerous large corporate tenants. The result is an expectation for the internal space of an office building to embody a workplace culture and the values of an organisation. In some cases, this manifests to a greater degree within the actual spatial qualities of the office building, often generated by tenant purpose build scenarios. These purpose build opportunities ultimately influence the building architecture, structure and mechanical systems as well as the exterior representation of the building (refer *Figure 7*).

Objective 2: Contemporary and potential future workplace environment drivers

What do contemporary workplace environments look like and how will they evolve to meet future needs/generations?

The evolving commercial office building market in Australia is responding to the increasing important issues of sustainability and significant technological advances in telecommunications and building systems. Environmental and social accountability (within the local and world wide community) combined with generational shifts in individual values and expectations are influencing the design of contemporary workplace environments. The flexibility and adaptability of these spaces and the buildings which contain them will, in the future, require the ability to respond to evolving social, environmental and urban issues.

Present workplace environment drivers and tenant expectations can be categorized within the procurement definitions of basic, elaborate and aspirational office






| FEATURES | GROUND SCRAPERS | MEGAPLATE TOWER |
|--|--|---|
| Floorplate Size | 4,000 – 10,000m ² | 2,000 – 4,000m ² |
| Floorplate | Contiguous with Atria or Atria Potential | |
| Floorplate Depth (core to perimeter glass) | 12 – 21 metres | |
| Nett/Gross Typical Floor Area Efficiency | Usually approaching up to 90% | Can exceed 90% |
| Structural Spans | 12 – 21 metres | |
| Spatial Connectivity | Horizontal and vertical | Horizontal with tenant determined vertical |
| Building Height | Generally under 15 storeys | |
| Passenger Lift Rises | 1-2 zones maximum | 1-2 zones |
| Lift core Permeability | Allowance for cross circulation | |
| Core Efficiency | High | |
| Fire Safety | Fire engineered solution to meet egress requirements | |
| HVAC Systems | Reliant upon highly integrated solutions | |
| |  |  |

Figure 5. Outlines the characteristic features of Groundscrapers and Megaplate Towers

| FEATURES | BASIC | ELABORATED | ASPIRATIONAL |
|-------------------------------|--|--|---|
| Structure | Functional and economic | Closely informed by coordination of services and façade leading to integrated solutions | Innovative solutions integrating performance, efficiency and architecture. Potential for unique and expressive exterior and interior solutions. |
| HVAC | Base building response | Application of unique and improved performance system and implementation of quality systems to benefit market position and tenant | Indoor environment and world class sustainability targets identified and considered for project application |
| Technology and Communications | Basic response and limited future proofing | Application of unique and improved performance system and implementation of quality systems to benefit market position and tenant | Incorporation of the latest technologies. High level of future proofing and anticipation of future workplace demands |
| Hydraulic systems | Code compliant | Unique tenant and building efficiency targets with sustainable outcomes | Tenant flexibility and adoption of water conservation strategies |
| Fire services | Code compliant | Exploration of fire engineered solutions and opportunities | Incorporation of the latest systems and fire engineering concepts |
| Facade | Address basic concepts of waterproofing, solar performance, installation and economics | Exploration of facade systems integrated with direct environmental and interior (tenant) responses | Innovative world leading solutions integrated with workplace, environment and structural innovation |
| Lifts | Adequate service and redundancy | Exploration of new technologies and adoption of fit for purpose systems | Unique and innovative systems to provide increased servicing, performance and energy efficiencies |
| Building maintenance | Limited systems | Apply maintenance strategies for the development | High level strategies to maintain building surfaces |
| Example projects | 818 Bourke Street, Melbourne Australia  | Commonwealth Bank Campus, Sydney, Australia  | ANZ, Melbourne Australia  |

OFFICE BUILDING PROCUREMENT - CATEGORIES

Figure 6. Represents a comparison matrix outlining the definition of basic, elaborated and aspirational office buildings

buildings. The more progressive and innovative examples of contemporary workplace environments clearly fall within the elaborated and, most significantly, within the aspirational examples. These examples are consistently associated with purpose build scenarios specific to a considered tenant brief which, in many cases, embody corporate or organisational change or evolution. In the current market re-emerging themes and concepts for the workplace can be identified. These include, but are not limited to:

1. a considered desire for healthy and sustainable indoor air and light quality
2. a clear sustainability agenda promoted and embraced by stakeholders and occupants
3. the ability to target and achieve a work/life balance
4. the physical facility(s) to allow for engagement with both the man-made internal and the natural external environment (spatial diversity)
5. flexible work hours, location and structure
6. equality of space and accessibility to internal and external amenities
7. the availability and ease of access to communication (enabling) technology
8. the ability for rapid and cost effective workspace flexibility and churn

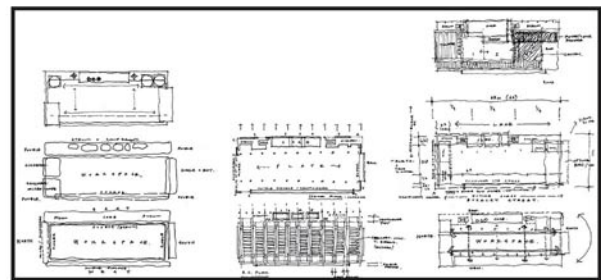
Given the present workplace concepts noted above and the experience gathered from working with numerous corporations and institutions, Lend Lease design believes future workplace environment concepts will focus upon individual well being and the employee group needs of an organisation. The business desire to attract and retain a high quality and productive workforce is the prime motivator. Further, progressive and future generational focused organisations are beginning to acknowledge the need to offer an environment which easily facilitates employee needs and expectations within a flexible and sustainable context. To forecast, the future workplace could be defined as a flexible/permeable container or vessel which supports employee engagement allowing for individual and personalized aspirations of work/life balance.

Future Directions

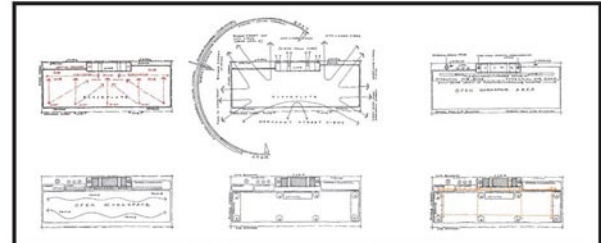
As a method to identify and investigate future commercial office building trends, Lend Lease design have also embarked upon a study/compilation for a "Genesis Brief". The intent is to inform the continuing evolution of the office buildings and identify potential paradigm shifts in the design and delivery of workplace environments/office buildings.

Objective 3: Key factors in the creation of workplace environments and their critical design and planning elements.

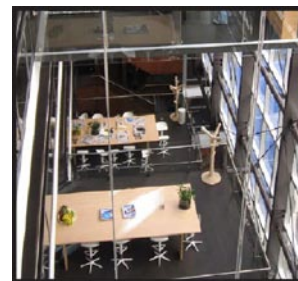
The creation of the office building or workplace environment begins with outlined project objectives or a brief defined by client, tenant and/or market determinants.



CONCEPT SKETCHES - WORKPLACE ENVIRONMENT PLANNING - EXAMPLE



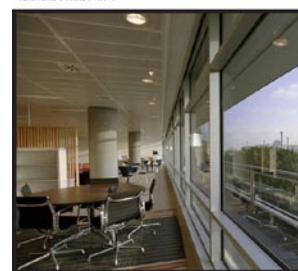
CONCEPT DIAGRAMS - WORKPLACE ENVIRONMENT ANALYSIS - EXAMPLE



VERTICAL CONNECTIVITY



ATRIUM - POOLS & INTERCONNECTING STAIRS

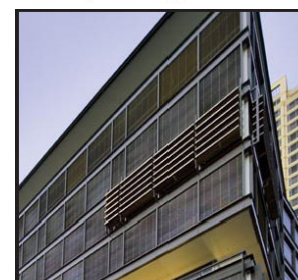


EQUALITY OF SPACE



BREAKOUT + COMMUNAL SPACES

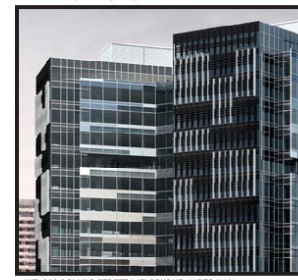
30 THE BOND, MILLERS POINT, SYDNEY NSW AUSTRALIA



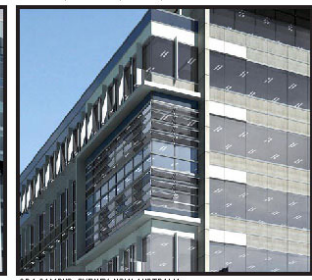
30 THE BOND, SYDNEY, NSW, AUSTRALIA



THE GAUGE, MELBOURNE, VICTORIA, AUSTRALIA



ANZ, 833 COLLINS STREET, MELBOURNE, AUSTRALIA



CBA CAMPUS, SYDNEY, NSW, AUSTRALIA

INTERNAL WORKPLACE ENVIRONMENT - INFORMED ARCHITECTURE

Figure 7. Illustrates a series of diagrams and images of workplace design and environments which represent/embody organisational/corporate culture.

Once clearly identified and outlined, the design of the workspace environment is informed and molded by the pragmatics of building structure and systems as well as addressing relevant building codes and the statutory approval processes. The opportunity for greater creativity and informed exploration, within current contemporary thinking, often manifests in the actual design process. A process which defines the required space and structure while being informed by the latest systems, practices, materials and technologies.

To quantify and identify the critical design and planning elements for commercial office development, a systematic series of inter-related disciplines and methodologies can be highlighted. These elements are generally hierarchal as noted below, but influence one another as the design path for the project is defined (refer Figure 8 & 9):

1. Structure
2. Services
3. Façade
4. Materials + Technology
5. Analysis tools
6. Programme and Construction Systems
7. Statutory Approvals and Compliance Certification

As an overlay to all the elements noted above, an agreed sustainable agenda will contribute to and at times, guide the approach and outcomes required to meet the agreed development aspirations and targets.

Objective 4: Emerging and maturing influences of sustainable outcomes for workplace environments and office building design

The content of this objective will identify and elaborate upon key sustainability issues as they influence the creation of workspace environments and inform the building design process.

The sustainability outcomes for office building design are embedded within an evolutionary process, beginning with the project inception through to completion and the occupation / operation of the building. This evolutionary process progressively shifts as market, technological and social expectations increase, in effect continually “raising the bar” of market standards and targets. Good examples of this momentum can be noted by accessible and cost effective advanced building technologies as well as increasing tenant expectations for more sensitive responses to social/cultural considerations. Ultimately, a balance of physical, social and financial goals within the immediate development context is necessary to truly achieve a recognised and relevant sustainable outcome.

To a degree, this can be equated to the concept of corporate “triple bottom line” typically defined by a measurable accountability related to people, planet and profit. This concept offers an alternative to conventional stakeholder scenarios, which focus predominately upon profit, in favor of accountable corporate actions and their impact upon society and the environment, (considered

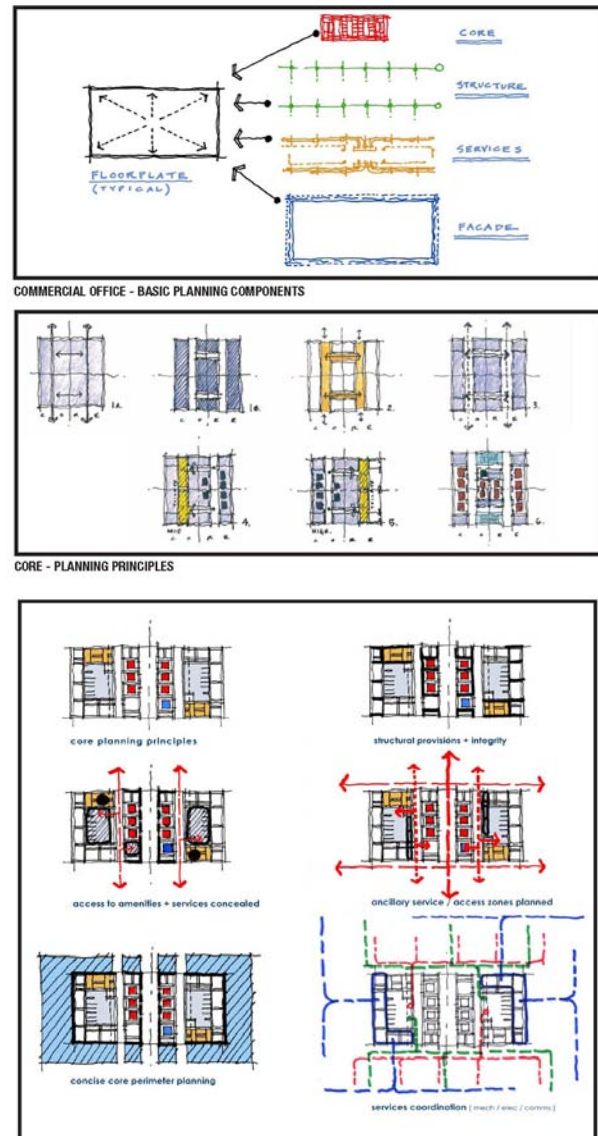


Figure 8. Provides a series of 2 dimensional descriptive sketches highlighting the critical design and planning elements for a commercial office development.

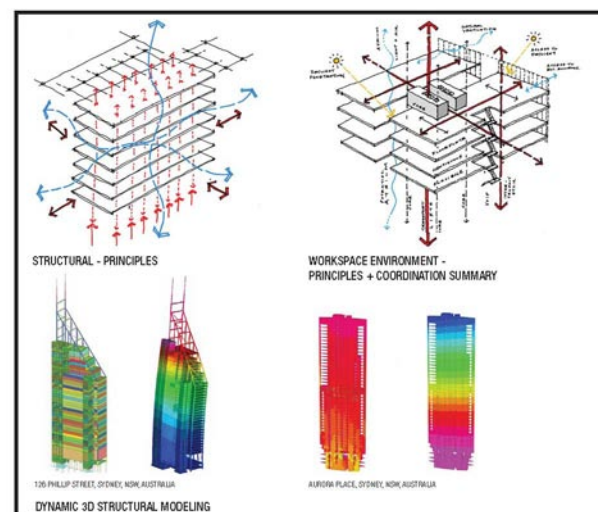


Figure 9. Provides a series of 3 dimensional descriptive sketches and diagrams highlighting the critical design and planning elements for a commercial office development.

within the context of the company's success or output). In architectural and planning terms, the concept of "TBL" can be interpreted specifically in workplace/office development as follows (refer *Figure 10*):

- A. Physical – workplace environment + architecture
- B. Social – work/life balance, functional uses, + urban context/condition
- C. Financial – market responsive + rationalized

In the context of a new typology of Sustainable Groundscapers and Megaplate Towers, a forerunner of this direction is clearly seated in environmental and financial sustainability. In Australia, two standards of sustainability measurement are active within the current office development market, the Australian Building Greenhouse Rating (ABGR) system of measurement and the Green Building Council of Australia (GBCA) Green Star method of measurement. Both identify and offer a method of measurement and record which is respected and targeted by market leaders and innovative developments. Importantly, confirmed measurement and performance is encouraged and monitored by these bodies suggesting that recognised sustainability targets will contribute significantly to the future of the commercial property market in Australia (refer *Figure 11*).

Objective 5: Sustainable form follows function

Office buildings are "vessels" in context, containing the workspace environment created to meet (or exceed) the needs of the occupants within. The provision and quality of the internal (or potentially both internal/external) workspace to meet the occupants needs and their ability to perform work place tasks efficiently is the primary objective of an office building. Therefore, the building design, systems, structure and technology must first serve this purpose. Once facilitated or identified through the design process the opportunity to evolve the project beyond the primary objective is possible. This process has the ability to better evolve the internal/external building relationships, building structure and systems, technology and materials. The result often leads to the creation of a statement or, landmark building with some form(s) of sustainability representing the context and/or era in which they are created.

In recent years, we have seen the strong emergence of a trend toward "shape-making" and "pattern-making" architecture, particularly in the design of office buildings. Often this design approach requires the inherent qualities of building/tenant efficiencies and important workplace environment/sustainability issues to be secondary to the building architecture.

In Australia and within the scope significant commercial office developments by Bovis Lend Lease / Lend Lease design, we have seen a market and tenant demand for highly efficient, large format and sustainable office developments. Floorplate nett areas between 2,000 to 3000m² with 85-90% nett/gross efficiency are standard owner/tenant expectations. This has led to a rise in the



Figure 10. Illustrates the concept of "TBL" interpreted within a workplace/office development context

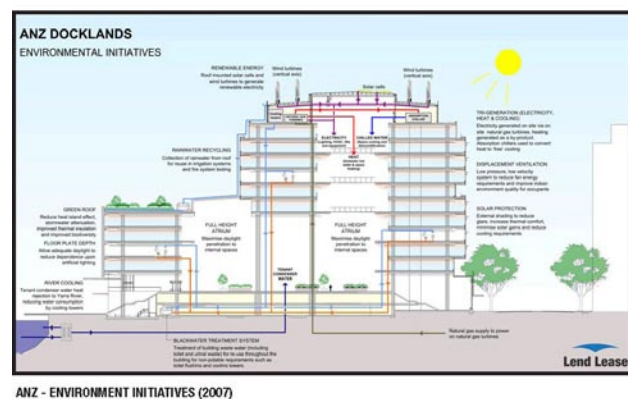


Figure 11. Environmentally sustainability design initiatives illustrated: ANZ, 833 Collins Street, Docklands, Melbourne, Australia.

prevalence of “Groundscrapers” and large format floorplates for medium to high rise Towers. Recent examples in Australia include the new ANZ Development in Melbourne, a Groundscraper with floorplate Nett areas ranging from approximately 6,500m² to 9,500m² Nett per floor and the Q Centre Tower in Brisbane featuring high zone Nett floorplate areas of approximately 3,000m². Within these examples, we see a design and planning approach which represents sustainable form follows function. The outward appearance or architecture in these examples are informed and reactive to the functional workspace environment within (refer *Figure 12*).

To illustrate the contrast between design as “shape-making” and design “informed by function”, a series comparison of product design is provided below (refer *Figure 13*):

Shape-making and Pattern-making

- Jewellery
- Perfume

Informed by function

- Camera
- Mobile Phone
- Automobile

Conclusion

In Australia and other select locations in the western world, we are witnessing the emergence of a new or evolved office building typology. This is a typology, created from the “inside-out”, and is based upon the needs and aspirations of the occupants and the workplace culture(s) they embody. Within the commercial realms of site location and development cost, balanced with increasingly important urban and sustainability issues, Lend Lease design have identified a series of key factors in the design and delivery of workplace environments/office buildings. These key factors can be identified as follows:

- Demonstrate a duty of care to the greater natural environment and be accountable for the creation of sustainable workspace environments;
- Address and creatively resolve commercial office buildings principles while embracing technological evolution and innovation;
- Incorporate + innovate with sustainable design initiatives for positive environmental, social + financial outcomes;
- Search for opportunities to encourage a tenant/market tuned project brief which embraces a robust sustainability agenda;
- Form follows Function and Form follows Sustainable Workspace Environments.

These factors are inspiring a new and progressive office building typology, making a strong case for Sustainable Groundscrapers and Megaplate Towers (refer *Figure 14*).

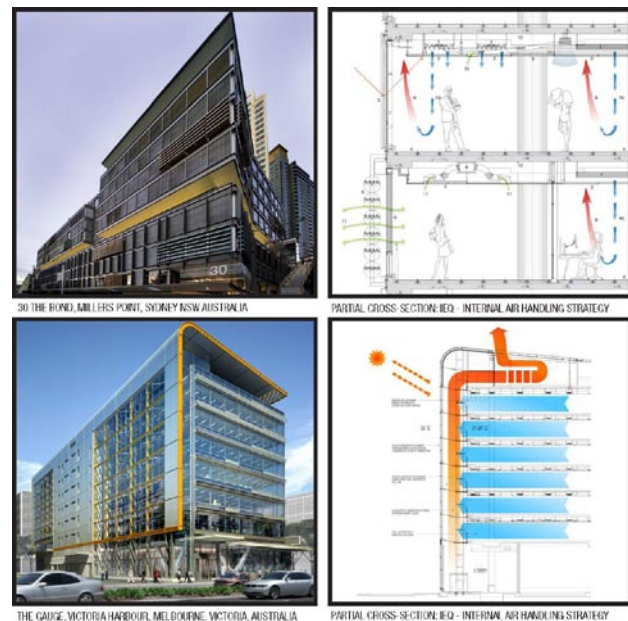


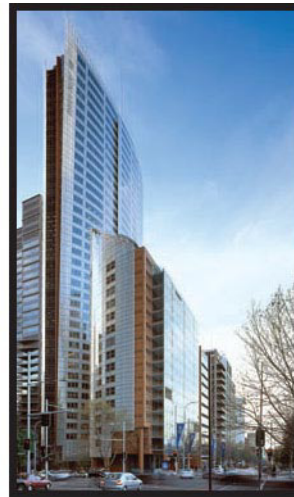
Figure 12. Illustrative examples of workplace internal environment informing external appearance - architecture



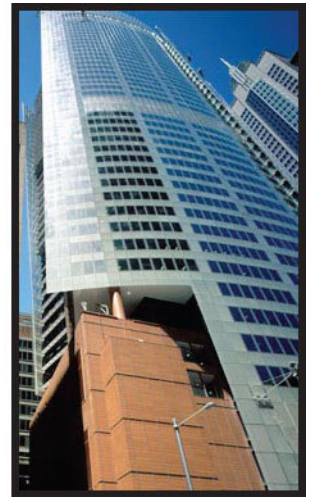
Figure 13. Provides a figurative illustration of the design contrast between “shape-making” and “informed by function”, evident in product design



126 PHILLIP STREET, SYDNEY, NSW, AUSTRALIA



AURORA PLACE, SYDNEY, NSW, AUSTRALIA



AUSTRALIAN TAXATION OFFICE, CANBERRA, ACT, AUSTRALIA



COMMONWEALTH BANK OF AUSTRALIA CAMPUS, SYDNEY, NSW, AUSTRALIA



ANZ, 833 COLLINS STREET, MELBOURNE



LEND LEASE design PROJECTS - SERIES ILLUSTRATION

Figure 14. An illustrative series featuring highlighted images of Lend Lease design projects: Sustainable Groundscrappers and Megaplate Towers.