TRANSIENT WORK SPACES:
THE DEVELOPMENT OF HIGH TURNOVER OFFICE BUILDINGS IN BANGKOK

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ในตัวเมืองที่มีตึกมากมายแบบกรุงเทพฯ ที่อยู่และที่ทำงานก็จะเป็นที่ต้องการอย่างสูงทำให้เกิดความแออัดเอียด พร้อมด้วยอากาศที่มีพิศมากขึ้นและค่าครองชีพที่แพง คนทำงานออฟฟิศธรรมดาไม่มีเงินมากพอที่จะหาที่อยู่ดีๆอยู่กลางเมืองได้ เพราะฉะนั้นจะต้องเสียเวลาในการเดินทางมาทำงานอย่างมาก ในขณะที่ ASEAN กำลังจะมาถึงประเทศไทยก็กำลังเตรียมตัวให้พร้อมที่จะได้รับประโยชน์จากข้อตกลงนี้อย่างหลายรูปแบบ ประเทศไทยมีคนทำงานที่มีความศึกษาขั้นสูงและมีค่าแรงที่ถูกว่าเพื่อนบ้านจึงเป็นที่สนใจสำหรับผู้ลงทุนที่จะหาคทำงานออฟฟิศที่มีคุณภาพ วัตถุประสงค์ของวิทยานิพนธ์ครั้งนี้ก็คือการหาวิธีทางที่จะใช้เชิงสถาปัตยกรรมในการศึกษาตึกออฟฟิศหลายๆแบบเพื่อจะได้เลือกสิ่งที่ดีจากออฟฟิศเหล่านั้นมาช่วยในการออกแบบออฟฟิศรุ่นใหม่ที่มีทั้งความสะดวกและความประหยัดไปในตัว เพื่อจะได้เป็นที่สนใจจากนักลงทุนจากต่างประเทศ

การศึกษาครั้งนี้จะเน้นไปที่การใช้เทคโนโลยีนั้นให้เป็นประโยชน์ต่อขั้นตอนการทำงาน เพื่อวิธีการทำงานจะได้ง่ายขึ้นพร้อมกับช่วยลดค่าใช้จ่ายในออฟฟิศ การศึกษาครั้งนี้รวมการพิจารณาว่าตึกออฟฟิศที่ออกแบบไปแล้วจะมีส่วนกระทบต่อสิ่งแวดล้อมด้วยอย่างไร

ในขณะที่คอมพิวเตอร์และอุปกรณ์การสื่อสารส่วนบุคคลทำให้เราสื่อสารกันได้เร็วขึ้นนั้น ผลข้างเคียงของอุปกรณ์เหล่านี้ก็คือความแยกแยะของทีมงานความก้าวหน้าของเทคโนโลยีเปลี่ยนวิธีทานการทำงานและเปลี่ยนวงจรชีวิตของฮาร์ดแวร์และซอฟต์แวร์ ความต้องการในการใช้ออฟฟิศก็เปลี่ยนด้วย การวิจัยครั้งนี้จะหาทางที่จะใช้การออกแบบโน้มเหนี่ยวความคิดและเปลี่ยนวิธีการทำงานของคนทำงานออฟฟิศให้เพื่อมการสื่อสารต่อกันและกันมากขึ้น

สถานที่ได้เลือกสำหรับตึกออฟฟิศนี้ อยู่ชานเมืองกรุงเทพฯ และจะไปถึงได้ง่ายด้วยระบบรถไฟฟ้า การออกแบบของสถานที่นี้ใช้การจัดระดับของพื้นที่จากโซนในสู่โซนนอกของตึก เพื่อให้อาคารมีความสมดุลย์กับการเช่าในระยะสั้น และเพื่อให้บริษัทเล็กๆหรือบริษัทที่ไม่ใหญ่นักเช่าได้อย่างประหยัดโซนในของตึกจะเป็นห้องออฟฟิศที่มีความปรับเปลี่ยนได้ง่าย โซนนอกจะแบ่งไว้เป็นที่บุคคลส่วนรวมสำหรับใช้เป็นที่พบปะสังสรรค์ให้เกิดการพูดคุยหรือการประชุมอย่างไม่เป็นทางการ เพื่อที่จะได้เพิ่มความปฏิสัมพันธ์ต่อกันและกันระหว่างพนักงานในออฟฟิศ ในทางด้านสังคม อาคารจะมีปฏิกิริยาต่อภูมิทัศน์ของเมืองที่ดีด้วยการเพิ่มสวนสาธารณะในเมือง เพิ่มตลาดในท้องถิ่น และมีร้านค้าบนชั้นหนึ่งและชั้นสองของอาคารและสิ่งอำนวยความสะดวกหลากหลาย

ผลของการวิจัยครั้งนี้คือการได้ออกแบบที่เป็นประโยชน์ต่อทุกฝ่ายที่จะใช้ตึกออฟฟิศนี้ เจ้าของตึกจะได้อาคารที่ปรับปรุงและเปลี่ยนแปลงได้ง่ายทำให้รับคนเช่าใหม่ได้เร็วขึ้น คนทำงานออฟฟิศก็จะได้ที่ทำงานที่ดี ส่วนนักลงทุนก็จะได้ประหยัดราคาเช่าโดยการสามารถเช่าแบบระยะสั้นได้ ง่ายขึ้น เพื่อนบ้านก็จะได้อาคารที่เป็นประโยชน์ทั้งทางด้านสังคมและทางด้านการเงิน

ภาควิชา สถาปัตยกรรมศาสตร์ ลายมือชื่อนิสิต .....

สาขาวิชา การออกแบบสถาปัตยกรรม ลายมือชื่อ อ.ที่ปรึกษาหลัก .....

ปีการศึกษา 2557

5473705625 : MAJOR ARCHITECTURAL DESIGN
KEYWORDS: URBAN CITY / TECHNOLOGY IMPACT / MODERN OFFICE / CULTURALLY APPROPRIATE

MARIESSA BURGESS: TRANSIENT WORK SPACES:THE DEVELOPMENT OF HIGH TURNOVER OFFICE BUILDINGS IN BANGKOK. ADVISOR: PONN VIRULRAK, Ph.D., 179 pp.

In high density urban cities like Bangkok, the space requirements for a living and working in extremely high demand. The result is a crowded environment with lower air quality and higher cost-of-living. Typical office workers cannot afford to live downtown therefore spend a lot of time on the commute. Thailand has an abundant of highly educated workers at a lower costs than its neighbors thus are of interests to investors looking to access talents. With the ASEAN initiative approaching, Thailand is engaged in multiple efforts in order to benefit from this agreement. The objective of this thesis is to find architectural solutions to help investors economically access Thai office workers, thus increasing the possibility of higher investments coming to Thailand.

This research aims to study viable alternatives to traditional downtown high rise offices. The study focuses on ways to take advantage of changes in technology to improve office work processes while reducing the cost of space usage. The study also considers ways to reduce the environmental impacts the building would have on its surrounding areas.

While computers and personal communication devices have improve the speed of communication, they have contributed to the isolation of the workers from their own work team. Advances in technology shorten and change the working life cycles for both hardware and software products. The physical requirements of the office architecture also begins to change. This research also looks for ways the architecture can influence workers behavior to increase collaboration and social interaction within the workspace.

The resulting site selection is a location that can easily be reached by the train system at the outskirts of Bangkok. The design uses a layering concept starting from the interior to the exterior of the building. Supporting a hoteling concept allowing the leases to become shorter and more flexible, core of the building is designated as easily reconfigurable office work areas that can be leased by small or medium sized companies. The outer ring if the building is designed as shared spaces for casual meetings and interactions. On a social level, the building interacts with the cityscape by providing urban park, and space for a local market, as well as dedicated shops on the first and second floors of the building complex.

The benefit of this design is a holistic solution that support requirements of all parties from the building owners for an easily changeable space which provide for the least amount of down time between leases; office workers for a high quality work space; and investors for a lower cost and less restrictive lease terms; and lastly, the neighborhood for a socially conscious building with added amenities for the local area.

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Student's Signature ----------
Advisor's Signature ----------

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LIST OF ABBREVIATIONS/ DEFINITIONS

Flex Staff- staff with a variable work schedule, in contrast to traditional work arrangements working a standard 9am-5pm every day.

Just-in-Time Staff- workers in many parts of the organization that can move into jobs in other parts of the organization based on demand.

Hoteling System- attribution of a particular office space or work area via reservation using an online system or a reception counter.

Effectiveness- Using space to improve the quality of work

Efficiency- Driving down occupancy costs

R&D Cycle Time- Research and Development Cycle Time

DSF- Double Skin Façade

PSALI- Permanent Supplementary Artificial Lighting Interiors

CIIE standard general sky- set of 15 sky luminance distributions which model the sky from heavily overcast to cloudless sky for day lighting calculations

lx- lux: the SI unit of luminance, equal to one lumen/m²

KKJ- *kwamkrengjai*: 'deferential heart', where one is aware of other people's feelings and showing politeness, respect, and consideration towards them. Also tied with the Thai concept of not wanting to lose face; and displaying KKJ is one way of helping another save face.

MNCs- multinational corporations

SMEs- Small and Medium Enterprises

Mpbs- Mega bits per second: the measurement of peripheral data transfer or network transmission speed. Megabits refers to serial data transmission such as Ethernet and Wi-Fi.

ADA- Americans with Disabilities Act.

Open Space- area without roof or cover structures. Such areas can be allocated for water ponds, swimming pool, waste water retention, garbage area, or parking.

CHAPTER I INTRODUCTION

The digital revolution has propelled the global economy and created new expectations to living and working in locations with progressive communications infrastructure. The need for space to live and work in cities continues to grow at an alarming rate. This in turn contributes to the rapid growth of urban areas, turning them into sprawling mega-cities with inadequate and complex transportation challenges.

Mobile technology also contributes to the changing behavior in work habits and patterns. Environmentally conscious modern workers demand a new, different, and flexible type of workspace. Foreign investors and local workers need modern office solution that leverage productivity technology as well as the ability to address the multicultural needs and atmosphere present in the diverse city.

As advances in technology shorten and change the working lifecycles of both hardware, and productivity software products, so too should the physical requirements of office architecture change. Leases will become shorter and more flexible, and the interior spaces will be freed to adapt to new kinds of tenants and technology resulting in a more disposable, adaptable type of architecture.

1.1 Thesis Statement

With wireless internet and increase in mobile technology, are the ways that people work outgrowing the places they work in? Leveraging emerging technology to create environmentally conscious schema enables all parties involved in the development and use of modern office facilities to benefit both socially and financially. An immediate positive change to the working atmosphere in Bangkok would be realized by moving the construction of office spaces to the less populous outskirts of the cities, allowing for greater freedom in building design from the ground up. Newer, environmentally conscious buildings for example, will not only attract foreign tenants, but would also result in a lower economic and physical impact whether they are occupied or not, an important characteristic for rentable workplaces with high tenant turnover.

Much space is wasted due to dedication towards pre-wireless workspaces. Rather than providing an overwhelming plethora of dedicated workspace choices, an appropriate marriage between private and public spaces will enable the modern worker to be productive by providing appropriate options. Wireless sets up the potential for space efficiency and calls for technology friendly spaces. Workers will be able to easily find the right environment for their day for meetings and private use, and still have the freedom of working in an environment that suits their personal work style.

1.2 Research Methodology

The methodology used for this study is based on publication research and qualitative analysis of current office spaces. I employed a 3 phase approach as depicted in the figure below.

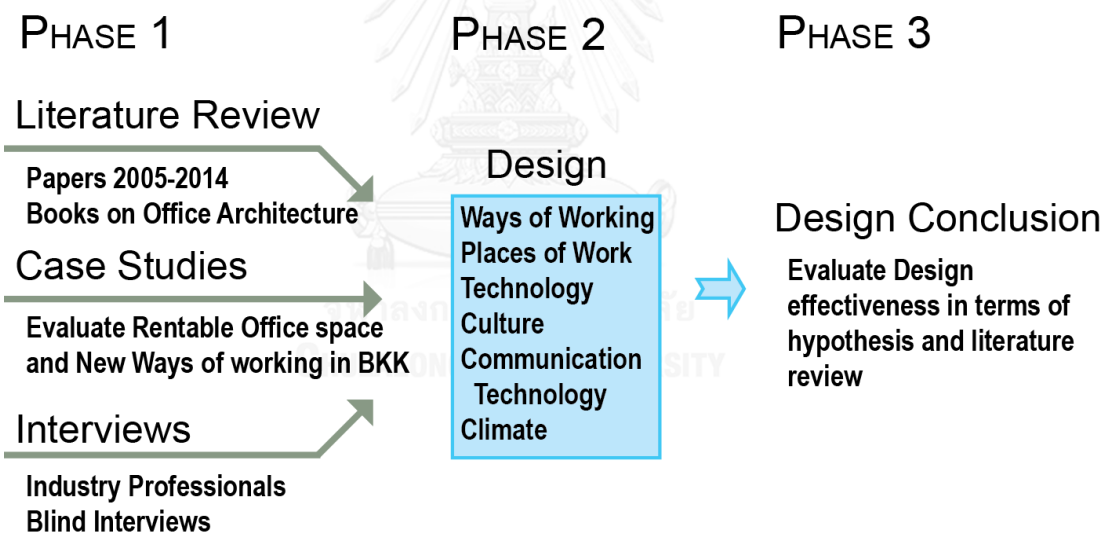


Figure 1. 1 Research Methodology Diagram

Phase 1 purpose: Use literary review to establish current conditions.

Phase 2 purpose: Refine thesis topic and develop design.

Phase 3 purpose: Validate usability of the design in terms of hypothesis and research.

1.3 Research Procedure Explanation

The publications selected for literature review are architectural design books used as office planning guidelines for the past 10 years. The culmination of theories and techniques cataloged in these books were used to determine the framework of the way that people think about the office paradigm today.

To supplement this framework, several scholarly articles from different scientific journals were reviewed. These papers were selected to give a current analytical perspective on the published theory behind designing the office. (See figure 1.3) The selected papers were evaluated on 6 different architectural influences.

1. Ways of Working
2. Paces of Work
3. Technology in the Workplace
4. Working Culture
5. Existing and Available Communication Technology
6. Climate

Experts and a blind interview were also conducted to find if the analytical evaluation of the office was being put into practice. The interviews were designed to address the 6 architectural influences in Thailand. (See figure 1.4)

The qualitative analysis activities consisted of reviewing case studies of current and alternative offices present in Bangkok today. The findings of the differences between the literature reviews of the traditional modern building, anticipated social changes, and the leasable office spaces from the case studies formed the basis of my hypothesis.

Additional research involved checking market conditions, demand, and cultural applicability for the development of various types of business models. Once all conditions were assessed, they were employed in creating final recommendations and solutions used for the potential programs and design solutions.

Academic Paper Review

	Ways of Working	Places of Work	Technology in the Workplace	Working Culture	Existing and Available Communication Technology	Climate
The Effect of a Re-Designed Floor Plan (2005)	✓		✓			
Social Networks and Spatial Configuration (2011)	✓			✓		
6 New Workspaces (2014)	✓			✓		
Effective Office Enviornment Architecture (2011)	✓			✓		✓
Double-Skin Façade Office Buildings (2012)		✓				✓
Estimating Depth of Daylight Zone (2006)		✓				✓
Organizational Features of Office Spaces (2004)		✓	✓			
Occupants Interaction with Lighting and Shading Systems (2013)		✓				✓
Sound Annouance in Open-Plan Offices (2014)		✓		✓		
Adoption of Three New Types of Computers in Taiwan (2014)			✓		✓	
Acceptance of Teleconferencying Systems Among Employees (2014)			✓		✓	
Job Performance Through Mobile Enterprise Systems (2014)			✓		✓	
Happiness at Work of Employees (2011)				✓		
Hybridizations of management cultures in Thailand and Israel (2011)	✓			✓		
Politeness motivated by the 'heart' (2011)				✓		
The Commoditization of White Collar Work (2009)	✓			✓		

Table 1. 1 Academic Paper Review Summary

Other Academic Paper Review

	Ways of Working	Places of Work	Technology in the Workplace	Working Culture	Existing and Available Communication Technology	Climate
A Company Office System "Valentine" (1999)					✓	
Influence of Shading Control Patterns (2011)						✓
Internal vs External Shading Devices (2013)						✓
Lighting Control Strategy (2013)			✓			
Measuring Energy Usage (2014)						✓
Modelling Sheltering Effects of Trees (2006)						✓
Office Appliance Power Consumption Data Mining (2014)				✓		
Network-Based Space Layouts (2014)	✓					
Passive Perfomance of Glazed Components (2013)						✓
Thermal comfort in air-conditioned and naturally ventalated offices in Thailand						✓

Table 1. 2 Other Academic Papers Reviewed

Interview Summary

	Ways of Working	Places of Work	Technology in the Workplace	Working Culture	Existing and Available Communication Technology	Climate
Khun Ek Buranakul (Workplace Strategy Director, peoplespace;TFMA)	✓	✓	✓	✓	✓	✓
Khun Chakrapan Pawangkrat(Property and Asset Management JLL; Mechanical Engineer; LEED)	✓	✓	✓	✓	✓	✓
Blind Interviews	✓	✓	✓	✓	✓	✓

Table 1. 3 Interview Summary

CHAPTER II LITERATURE REVIEW

For the purpose of understanding the current views and attitudes around the office, literature related to theory behind designing workspaces were reviewed. These books covered topics such as technology and the mobile workforce, office planning and office architecture, occupancy comfort and behavior, as well as the urban landscape.

Literature by Zelinsky (1998), Allen & Henn (2007), Duffy (1997) are key to understanding office expectations of the 21st century. Zelinsky and Duffy covered new workspaces and work styles, while Allen & Henn discussed the organization of architecture and technology. Both Duffy and Zelinsky were often referred to by other authors attempting to address emerging issues with the office typology.

Academic papers discussing the adoption of technology in the workforce, effective office environments, office sound and lighting, and occupants interaction with the office environment written from 2005-2014 were selected to give a current analytical perspective on the published theory behind designing the office. These papers, addressing current issues, impacts and efforts towards evaluating the modern workforce were used to simulate criteria towards creating an effective office environment.

The acquired information can be categorized into three main items that affect the modern workplace.

1. Ways of working
2. Places of Work
3. Technology in the Workplace

"The office building is one of the great icons of the 20th century.
Office towers dominates the skylines of cities in every continent.
The most visible index of economic activity, of social technology,
and financial progress come to symbolize what this century is

about... at least 50% of the working population as opposed to a mere 5% at the beginning of the century –fundamental anti-office attitudes persist." (Duffy 1997; 14)

Yet, for being a great icon, it has not evolved much in the last hundred years, and most of the advancements stem from a technological standpoint. Even though we live in a materialist century, office architecture is still considered one of the least attractive. Time and people have changed, while much of the archetypes have not. Perhaps the struggles stem from the business ideology in the 19th century and for much of the 20th century. CEO's subscribed to Taylon's C**e**--"scientific management", which treated people as if they were simply so many units of production, resulting in the dehumanization of work. Intelligence and inventiveness were not expected from ordinary workers, and it was thought that people on their own could not be trusted. Using Taylonism, *"honesty and commitment were rewarded with...a larger desk, more space...your own office." (Duffy 1997; 16-17)* Though no one takes Taylonism seriously today, it is most remarkably persistent in large corporations as possible are managed but treated as unthinking automatons; perhaps not because they are considered incapable of innovative thinking, but because it is easier to manage large groups as if they were not capable of thinking.

Social and business climate has rendered the need to re-think the workplace. What commercial tenants expected in the 1950's compared to the 1990's is drastically different due to the advancements in technology. Since 1990's there have been significant contributions to the development of technology and its potential applications; subsequently the expectations of the workplace have also changed. (Table 2.1) As powerful personal technology and self-employment becomes more prevalent, the intelligent worker is able to take advantage of the mobility it affords.

1950's	1990's	2014
Large Footprints	Small Footprints	Small Footprints
Mail Chute	Bandwith	Bandwith
Private Offices on Window Wall	Private offices at Core Workstations on Perimiter	Collaborative Spaces throughout Workstations
Open 9am - 5pm	Open 24 hrs	Open 24 hrs
	Watts/ sqm	Watts/ sqm
Accessibility to Telephone Wires in Janitors Closet	Controlled, secure telecom closet	Building wide Wireless, Secure IT

Table 2. 1 Tennant Expectations

The shift from corporate technology to personal technology has created a new and independent type of worker that is struggling within the paradigm of the past office. Corporations of all sizes are using contracted employees, and outsourced workers for technical and professional tasks. *"Urban planners agree, as self-employment grows, it behooves a city to respond to the fact that microbusinesses operate on a different schedule and in a different physical pattern than ever before." (Zelinsky 1998; 15)*

This means that offices shouldn't just be a 9-5 operation, but accessible 24 hours a day. The shift in tenant expectations opens the possibility for a hoteling system over an entire office complex, referring to the attribution of a particular office space or work area via reservation using an online system or a reception counter.

Yeang notes *"Contemporary lifestyles and the increasing combined pressures of urbanization and population growth in our cities demand a redefining of our conventional perceptions of working and living in the high-rise structures in the city... The question now confronting designers of these high-rise buildings is whether the current approaches adequately provide the occupiers of those buildings with an acceptable quality of urban life in the sky."* (2002; 10) In terms of appropriate high-rise living, the South East Asians are attempting to approach a higher quality of life with their shopping mega malls. These endeavors, however have yet to be translated into the white collar work sector and such integration with offices have merely been proposed as part of a super structure in terms of a larger landscape. It is imperative

that the modern office address integrating the physical space with work process, technology, organizational documents, and design while incorporating leasing flexibility to address their own corporate needs. In order to incite change quickly in a stagnant field, it is necessary to prove that other companies have already made the shift towards a more transient workplace. CEO's realize that space efficiency is important, but want to know what other companies in their field are doing to reduce occupancy costs and property expenditures. The surest motive for change is driving down operations costs by increasing efficiency and effectiveness. In business efficiency means driving down the occupancy costs while effectiveness relates to using the space in ways to improve the quality of work. (Figure 2.1)

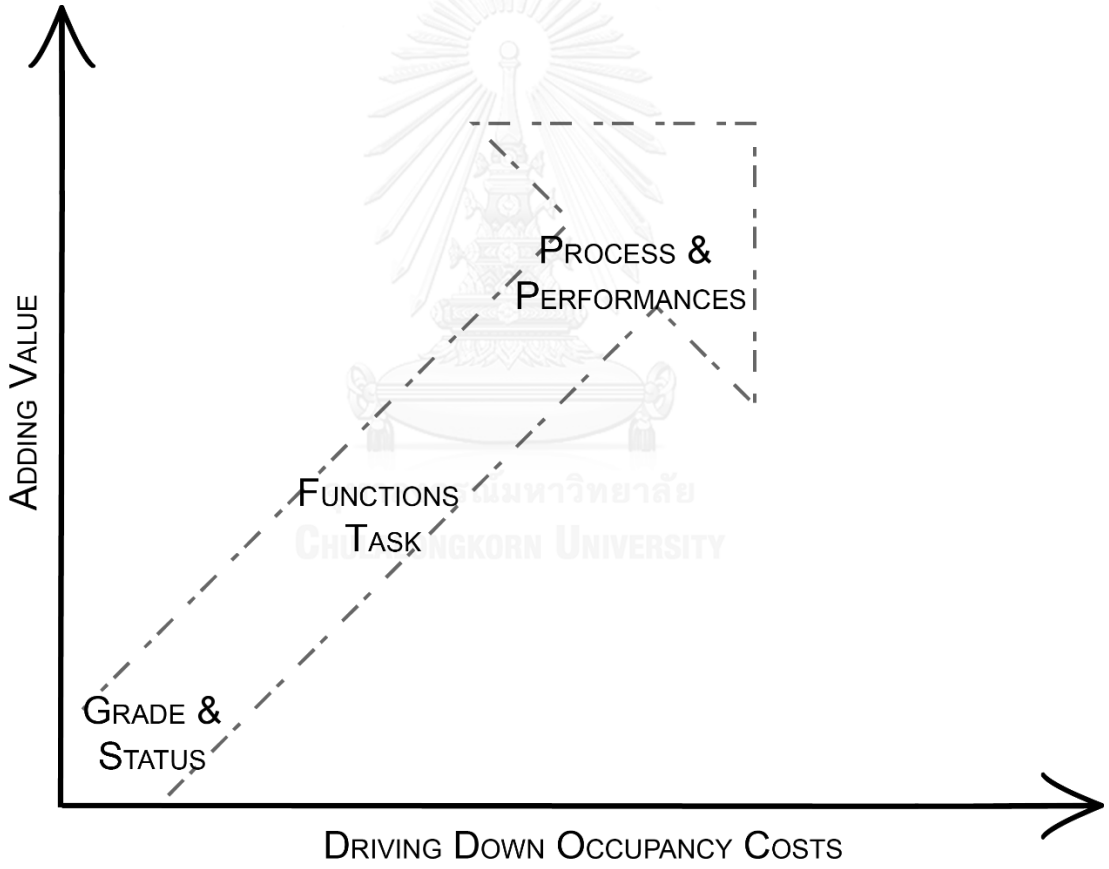


Figure 2. 1 Occupancy Costs

As synergy between different aspects of the work place becomes more important; understanding the different tools necessary and the different ways of working becomes more important to the developers of office buildings if they want

to see a profit in their investments. Zelinsky (1998) refers to three different types of tools:

1. Tools Needed to Reduce Real-estate Costs
2. Tools Needed to Increase Sales and Revenue
3. Tools Needed to Increase Team Interaction to Reduce R&D Cycle Time (Figure 2.2)

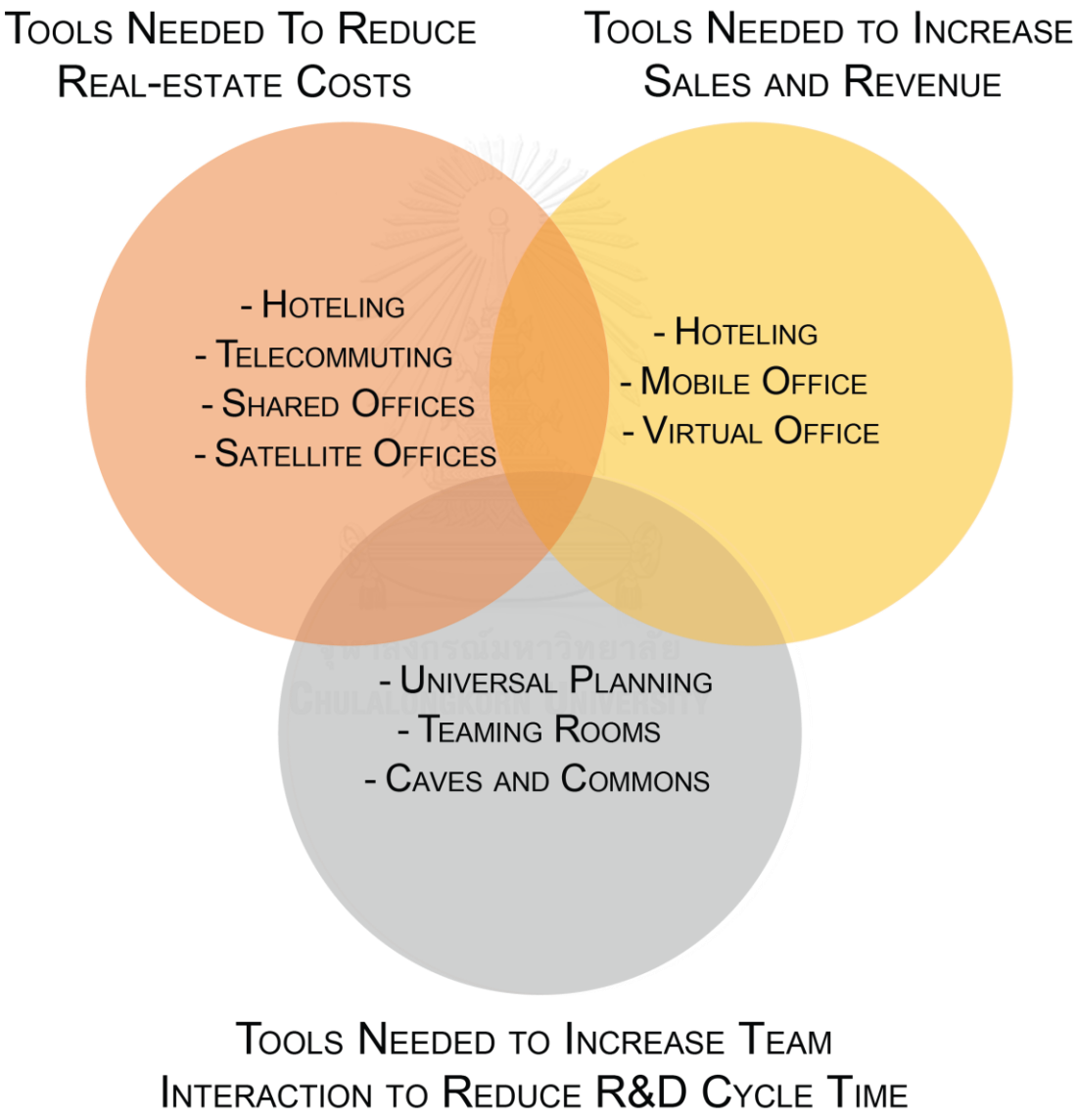


Figure 2. 2 Tools to Develop a Profitable Office

What this suggests is a highly mobile and increasingly transient workforce. However the rented workspace is non-responsive to this shift, and only corporate offices can afford to invest in developing their workplace to this end.

2.1 Ways of Working

In one office there are several different types of people. Within a large company there is a need for a variety of workspaces available to an office for the extroverts, introverts and the occasional exhibitionist. However, in smaller companies, with limited funds and space, it is unlikely that every type of worker will be accommodated within the office. Thus, within the entire office complex, a variety of spaces should be provided. As a smaller company or a new venture it is less important to be provided with a signature office, and more important to encourage the flexibility and growth of space. Underscoring the potential of a 3rd party hoteling office as a suitable building model for modern office development.

"Organizations go through cycles of centralization and decentralization. They need a mix of organizational forms at any one time: individuals working on specific tasks, groups of individuals coming together for long term projects, or for quick decisions." (Allen and Henn 2007; 14)(Figure 2.3)

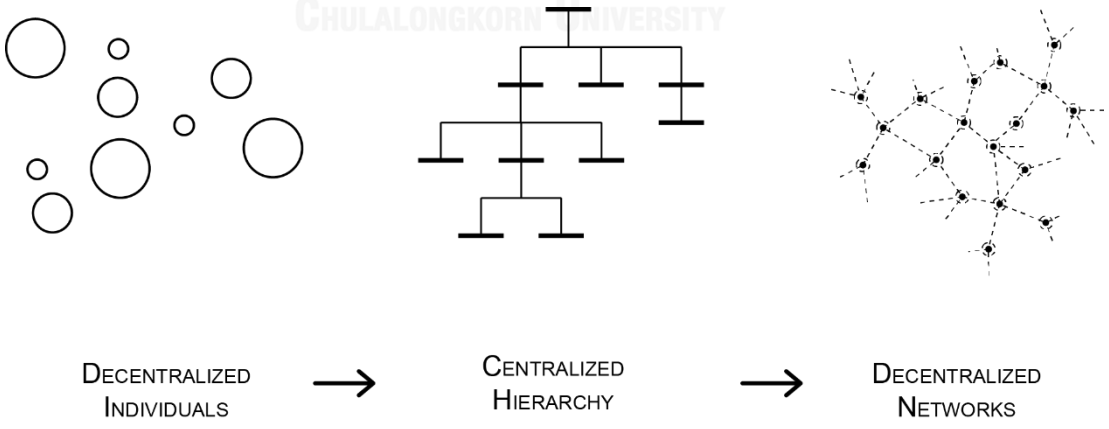


Figure 2. 3 Types of Organizational Structures

To ensure the office is a workable and positive fit for the end user it is necessary to understand that putting everyone in a room and expecting them to be

able to communicate and be productive will not work. Nor will throwing laptops at employees and telling them they have to work at home or on the road without a place in the office, any training, or counseling.

Elmahadi, Tahir et al. (2011) suggests in Effective *Office Environment Architecture: Finding Ingenious Ideas in a Home to Stimulate the Office Environment* using ideas from the home to create an appropriate office space. They postulate that current work environments lack interest, comfort, and the element of surprise. After conducting a survey of 119 occupants of office buildings in Malaysia, they determined that the work place should have an intrinsic social dimension. They postulated that this could be achieved by providing a space or communication and chance encounters to integrate a social aspect into the physical aspect of the work spaces. Surveys also showed that communication was better in open spaces.

Still, the survey indicated a need for mixed spaces. For social spaces more open environments were considered the most effective; while enclosed spaces are more effective for private work. Varying heights, widths, and lengths of space while moving through public and private spaces in the office will establish a visual rhythm simulating moving through a house. Elmahadi et al. (2011) also suggests varying color, texture, furnishings, lighting, and room planning to offer an element of surprise in the office that can also be found naturally in moving through homes.

We can surmise that in 2011 it is still important to have effective movement through space through linkage and variation in volume to generate movement and a visual rhythm of space. This way the office will be able to integrate lifestyle with a mixture of private and social spaces. We can also conclude that using multiple textures, furnishings, lighting in each space allowing the user to influence the space will result in positive response to the work place. These user influences can take the form of writing on glass walls, moving furniture, or influencing the façade.

> *"Ways of working are changing radically. Information technology is seeing to that. Based on very new, and very different assumptions about the use of time and space, new ways of working are*

emerging fast. They are inherently more interactive than old office routines, and give people far more control over the timing." (Duffy 1997; 46)

Duffy expounds that much of the office work can now be done in ways that are mobile, peripatetic, even nomadic, creating a conundrum for upper management to effectively communicate and use this new type of worker, and cope with the resulting hierarchical changes. This shift is altering from catering to a handful of important managers controlling a vast subservient labor force, to a more complex organizational structures weighted, if anything, toward the professional and senior management staff.

Though management has witnessed an influx in the most powerful technology today, many are hesitant to incorporate, or are unsure of how to take advantage of many of the capabilities that this technology affords. This lack of awareness does not necessarily negate the effectiveness of the senior management, but it can be something akin to attempting to create a PowerPoint presentation without being able to import images or use animation effects. Acknowledging the autonomous worker and being able to harness their effectiveness and innovation must come through the management level. Autonomous workers have a high degree of control and responsibility of their own work process, and are more likely to want to control their own working environment. To understand the workers capabilities, it is essential to communicate effectively. *"communication… structure hierarchically… presents difficulties for coordination and information essentially quashes inspiration."*

Types of Communication in the modern office can be broken down into three types.

1. *Communication for coordination*
2. *Communication for information – keep up-to-date*
3. *Communication for inspiration –creating knowledge*

(Allen and Henn 2007; 15, 27-28)

The organizational structure can either harness or hinder the processes of communication. A matrix organization can lead to a “Battle Zone” as people work for different bosses. (Allen and Henn 2007) This organization often causes tension between competing bosses and increases the stress on the workers caught in the middle if there is ineffective communication across the company. (Figure 2.4) Unfortunately, a change in organizational patterns to eliminate hierarchical barriers is unlikely to be applicable to all companies.

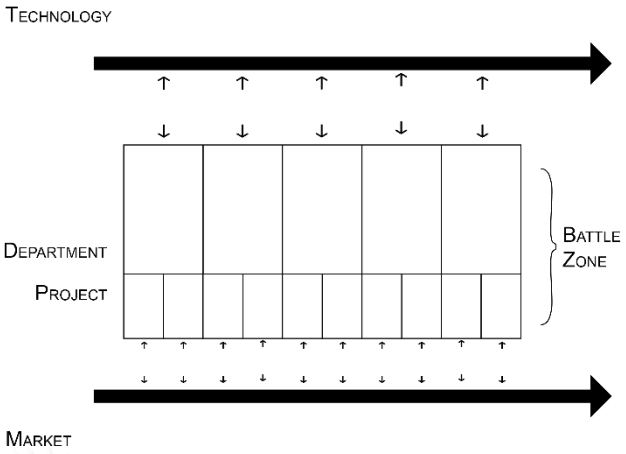


Figure 2. 4 "Battle Zone"

Despite the advances in instant information technology, colleague contact is still proven the most effective way to stay up-to-date. Workers tend to communicate more readily with those within close physical proximity rather than those with similar fields. Unfortunately, when creating a team with various specialties, the longer they work together, the members cease seeking new knowledge from outside their membership. Effectiveness of teams wanes after 3 years and should be shuffled around to re-disperse knowledge and re-activate the effectiveness of their colleague communication. (Figure 2.5) The need for human interaction and creative programming can be seen in market needs, and cross disciplinary research. Effective cross-disciplinary interaction and communication enables amazing products and innovations.

“Awareness through communication…research…found that 80% of information

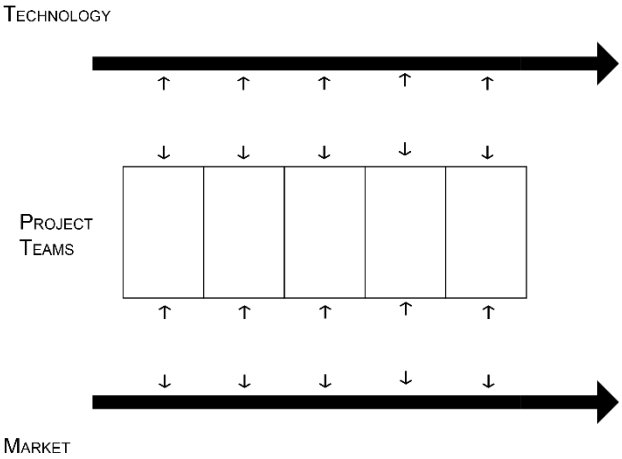


Figure 2. 5 Project Teams

underlying new ideas came through personal communication." (Allen and Henn 2007; 88); this awareness is dependent on interaction. The most frequent interactions (personal, face-to-face contact necessary to carry out office tasks) are with clients and colleagues. Outside of the office workers tend to be more autonomous and their interactions are in areas of intermittent occupancy. Both interaction and autonomy are strongly correlated because it affects the workers expectation of the layout and available work settings.

Allen and Henn discuss the relationship between physical space and organizational structure; and how they interact to influence organizational communication patterns. They focused on maximizing the potential of people and the way maximizing that potential takes place. (2007; 1-2) Both recommend designing separate spaces for concentration and communication. In other words, the physical space has a direct impact on the effectiveness of the organizational structure of a company. Conversely, physical space can have a negative impact on an organization if it impedes the company's ability to innovate.

Saari, Tissari et al. (2006) further explored the concept of efficiency in their paper *The Effect of a Re-Designed Floor Plan, Occupant Density and the Quality of Indoor Climate on the Cost of space, Productivity and Sick Leave in an Office Building—A Case Study.* Through this paper they examined the changes in the overall costs of an office when the efficiency of space is increased based on the Floor Area per Employee and potential health implications.

In 1997 Duffy evaluated 20 offices that had an average space index of 25.7m²/ person. By 2005 Saari, Tissari et al. attributed 20m² to western offices, while the eastern average was documented at just over 10m²/ person. Accounting for a traditional cubical space with a computer (2.05m x 2.05m) 4m², it can be deduced that shared spaces stand at about 13m². Saari et al. (2006) determined that too much efficiency can be counterproductive as respiratory illnesses are more difficult to contain, and demand larger heat loads. They found that in multi-space offices there must be air conditioning and good ventilation to help with the productivity and reduce sick leave.

Architecturally, the space attributed to work stations in 2005, where desktops are standard issue is already significantly less than the late 1900's where offices were still primarily paper driven. The space needed in 2014; where laptops, tablets and smartphones are commonly used, and work information is stored on the cloud; it is inferable that space needed in the workspace is less than in 2005. Technology has given us the ability to layer multiple users in one workspace over a day instead of requiring a dedicated space for each employee. In most offices there is already more sharing and less private spaces in the work environment. Still, ergonomically a dedicated work space must maintain about 4m². But there should be a much larger emphasis of the overall workspace dedicated towards shared spaces such as meeting rooms, café areas, lounge areas, storage spaces, and exterior break areas.

The mobility of work, while creating an anywhere-anytime work ideology in the newer generations, it has also resulted in several management strategies faux pas. CEO's initially felt that supplying the tech savvy workers with laptops would be the end of it, and thus would significantly cut office costs. Human Resources found that this was not the case. Telecommuters still need to come into the office for meetings, and touch base with their bosses and collaborate on projects. Their lack of designated or even appropriated space tends to give them a feeling of dispensability, and lowers their loyalty to the company. Or Telecommuters would feel alienated due to lack of physical presence in the company, and work more hours than those in a traditional office to justify their unconventional working environment.

When speaking of offices, they are most often categorized into four basic organizational structures that best suits the kind of work that the companies do. They are as follows and depicted in figure 2.6:

HIVES: characterized by individual routine process work with low levels of interaction and low autonomy. Hive workers tend to be at their work stations for long periods of time. Settings are typically uniform, open plan, screened and impersonal.

CELL: concentrated work with little interaction. Workers have intermittent and irregular working patterns, often working elsewhere part of the time. Each person

occupies either an enclosed room, or a highly screened workstation in a more open-plan layout.

DEN: typically highly interactive but not necessarily highly autonomous. They are designed on the assumption that individual office workers occupy their 'own' desks, but tasks tend to be team oriented. The office will have a range of simple settings.

CLUB: knowledge workplaces. The workers are highly autonomous and highly interactive. Occupancy of these places tend to be intermittent over an extended working day, and they occupy space on an 'as needed' basis. The club office has a wide range of facilities for open-ended problem solving.

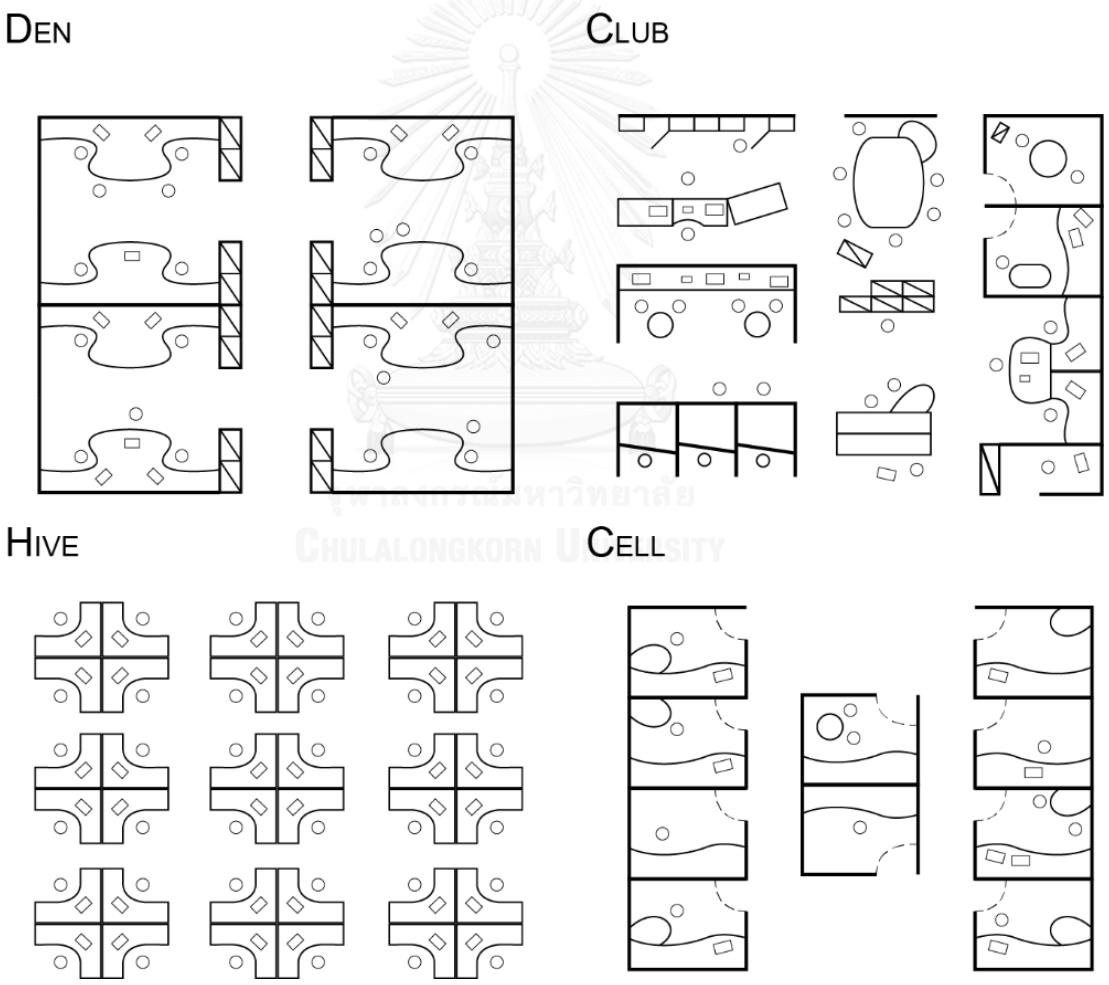


Figure 2. 6 Types of Office Layouts

Each layout is attributed to, though not confined to various fields of work. Hives are typical for telemarketers, data entry, or routine banking, financial and administrative operations and basic information services; cells are typical layouts for

accountants, lawyers, management, employment consultants, and computer scientists. Dens are typical for insurance processing, some media work (radio and TV) and advertising. Finally, clubs are typical for advertising and media companies, information technology companies, and management consultants.

"No one organization can be categorized as being completely a hive, cell, den or club. Most are combinations. Similarly, the sum of all offices at any one time must consist of a proportion of all four types. As time goes on this proportion is likely to change."(Duffy 1997; 67) It is important to remember that these categories are only guidelines in terms of space planning the types of space that would need to be emphasized for various work processes. But that the way that people work is constantly in flux. (Figure 2.7)

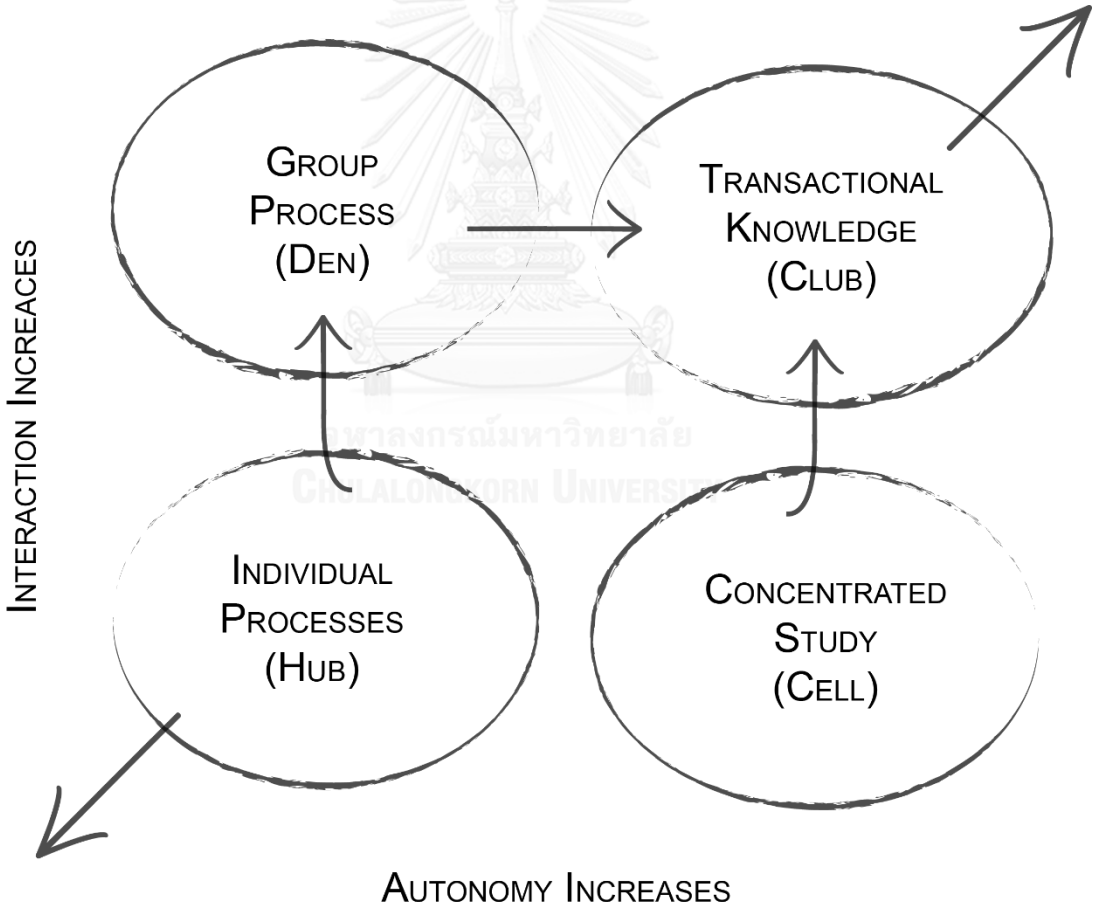


Figure 2. 7 Type of Work and Their Spatial Properties

In Greg Lindsay (2014) September article *6 New Workspaces That are Killing the Corporate Campus* he points out that the modern office is a relatively recent construct. As work becomes digital and accessible anywhere people are looking for

alternative ways and places to work, and as a result the working environment is evolving. He explains the 6 new workspaces and how they are adapting to people's work process.

Real Time Offices are based on easily movable furniture so that the set-up can change with group projects. Permeable offices feature moving walls for the public to 'walk through' the work space. While Office Neighborhoods focus on developing the surrounding site to appeal to the 24/7 urban lifestyle facilitating work, shopping, dining as well as living. The two most prominent working formats currently are Office Networks and Office-as-a –Service. Both offer various amenities such as printing and cleaning services, fast internet and utilities, conference rooms, coffee shops or dining areas, convention of gathering areas in addition to the workspace. Thus, providing startups a professional place to conduct business.

The working environment is evolving, reflecting mobile ways of working thanks to laptops, tablets, and smartphones. Requirements for personal space is also reduced, though due to ergonomics 4m² per dedicated work space should be maintained. Within one working space the separation between co-workers should be no more than 25m walking distance to maintain high levels of communication.

Technology has enabled workers to be layered in one workspace over a day rather than requiring dedicated spaces for each employee. Work has shifted towards a group interactions, and an emphasis of the overall workspace should have a much larger emphasis on 'large' centralized shared spaces such as meeting rooms, café areas, lounge areas, storage spaces, and exterior break spaces. These spaces are broken up with smaller fragmented spaces.

The spaces should still be linked, but distinguished through a variation in volume to generate both movement, and a sense of space. The areas can be further defined by varying the textures, furnishings, and lighting to make the office seem less artificial.

2.2 Places of Work

Suggesting that any design can be the 'ideal' solution for the work space is naïve. Attempting to solve all organizational problems through one solution will

result in creating an ineffective stereotype that is unable to address the diverse needs of the white collar workforce. Any design is a highly situational solution in an ever shifting field, and no single business relates exactly to a single unit of space for very long. Boundaries are becoming more permeable, and less formal between smaller and larger organizations as a response to the new ways of working.

Areas directly affecting the workplace are as follows:

1) Unfolding information technology
2) Unfolding real-estate and settlement patterns
3) Unfolding employment patterns
4) Unfolding social patterns.

(Zelinsky 1998; 105)

We will address the unfolding information technology in the next section. For now, let us focus on real estate and settlement patterns. Alvin Toffer said, *"Commuting is the single most anti-productive thing we do."* In the current urban fabric, it would behoove CEO's to locate their offices near public transportation. Long commutes add to psychological stress, resulting in less enthusiastic and less productive workers. Studies show that people are willing to walk up to 800 meters to get to a public transport station. Khun Chakrapan Pawangkarat from JLL Thailand backs a different number due to Thailand's hot and humid climate, he says that in general walking more than 200 meters is too much.

Satellite office in a suburban area provides shorter commutes and increases the likelihood of finding quality employees in proximity to their workplace. Satellite and headquarter offices within the vicinity of public transportation would additionally alleviate further stress of commuting to meetings in vehicle clogged streets. Due to the increasing mobility of work, it is important for developers to ensure that the office is a valuable contribution to the workforce.

The character of modern offices is determined by the relationship between scale, time, and management. *"Poor office design is so extensive: space that costs too much to run; leases that cannot be escaped from in times of recession; square feet that suddenly becomes too abundant or too scarce; cranky building forms that makes face-to-face internal communication difficult." (Duffy 1997; 9)* An office

complex with flexible leases and temporarily rentable spaces for meetings would minimize the cost for the lessor and maximize potential profits for the owner by enabling him to capitalize on available space at any time. Khun Ek Buranakul from Peoplespace Thailand says that the average lease in Thailand is 3-5 years. Providing an office space with short term leasing options is an attractive option for small start-up business and international companies looking to test the market in Thailand.

Decisions on where to locate will depend more on 'Quality of Life' and the environment of that locality. As Europe has the highest quality of office life in the world, it would seem that it would be more appropriate to emulate their office spaces in future developments. The quality of life in any surrounding area can be measured in terms of the public amenities available in proximity (within 800 meters) to the main building. (Table 2.2)

Basic Services
Bank
Place of Worship
Convenience Grocery
Day Care Center
Cleaners
Fire Station
Beauty Salon
Hardware
Laundry
Library
Medical or Dental Office
Senior Care Facility
Park
Pharmacy
Post Office
Restaurant
School
Supermarket
Theater
Community Center
Fitness Center
Museum

Figure 2. 8 Basic Amenities

In addition to ensuring that the office is a resource, CEO's are looking to cut wasted time. "*Office space will be used more intuitively with less emphasis on traditional long term "ownership" of individual workplaces & more flexible & shorter-term "ownership" of office space by ever-changing groups…implication is that office design & office location will be prompted by highly opinionated, intelligent dispersed, & changing users, leading to an increasing demand for similar & less centralized offices."* –Edward Lawler, University South Carolina 1995

Lawler is suggesting that the needs of transient workers may be limited to client meetings and group work. Encouraging the autonomy of generation Y workers will increase the likelihood of their commitment to their work and the company in the long term. Millennials tend to also prefer more transparent and collaborative work spaces with a diversity of spaces to communicate and collaborate in. The likelihood of a physical office is not altogether necessary for the traditional work hours for the younger workforce.

An office that is available 168 hours a week but occupied for perhaps 20 is a luxury that organizations can ill afford. –Harvard Business Review: Hendy 1995

Not only should a modern office space maximize its tenant-ability, but it should also maximize accessibility for its users from 8am-8pm to 24 hours. In addition to hoteling office spaces, hoteling shared amenities, within the office complex cuts down on wasted space. The shared amenities is also appealing to new or small companies who wish to create a larger and more professional appearance.

Allen and Henn have noted that the physical space within which people work strongly affects what occurs, and can occur in an office. People are much more likely to communicate with those in proximity, so a mix of spaces is beneficial to the cross pollination of ideas. "both physical and organizational separation between two departments reduces communication…While transferring people between two departments even physically separated introduces new physical bonds to offset the organizational separation." (Allen and Henn 2007; 67) See figure 2.8 and figure 2.9. Vertical separation will have a more severe negative effect on communication based on the types of vertical separation. Due to their visual isolation, we quickly forget the existence of other floors. These can be negatively or positively influenced by their

vertical separations: fire stairs, elevators, escalators, or open stairs.

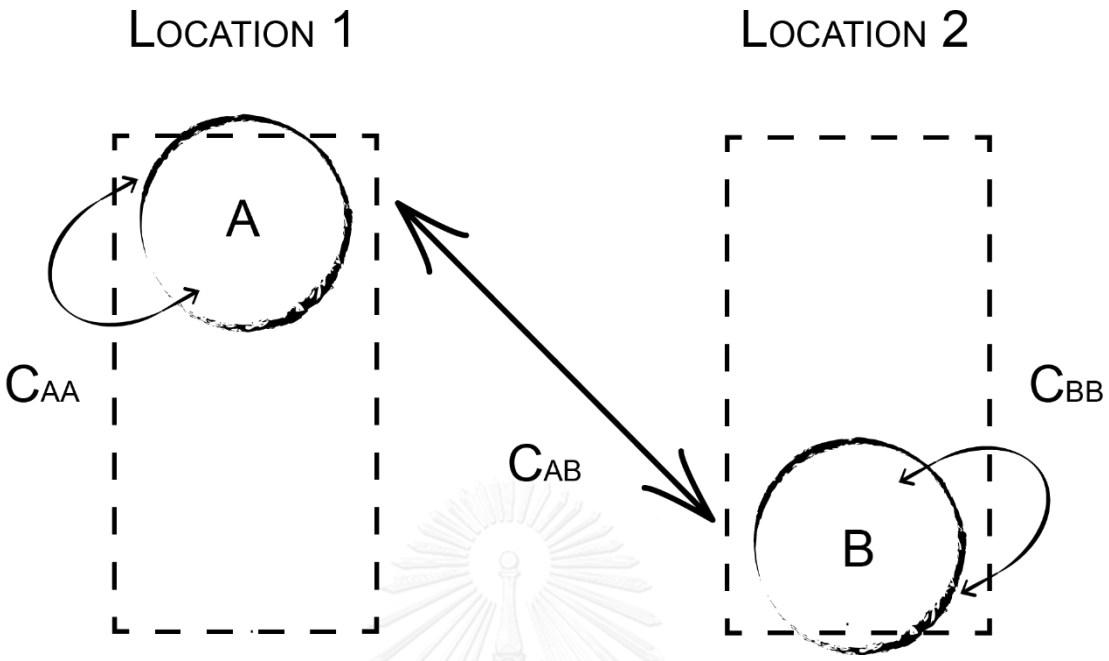


Figure 2. 9 Organizational Separation Between Two Departments

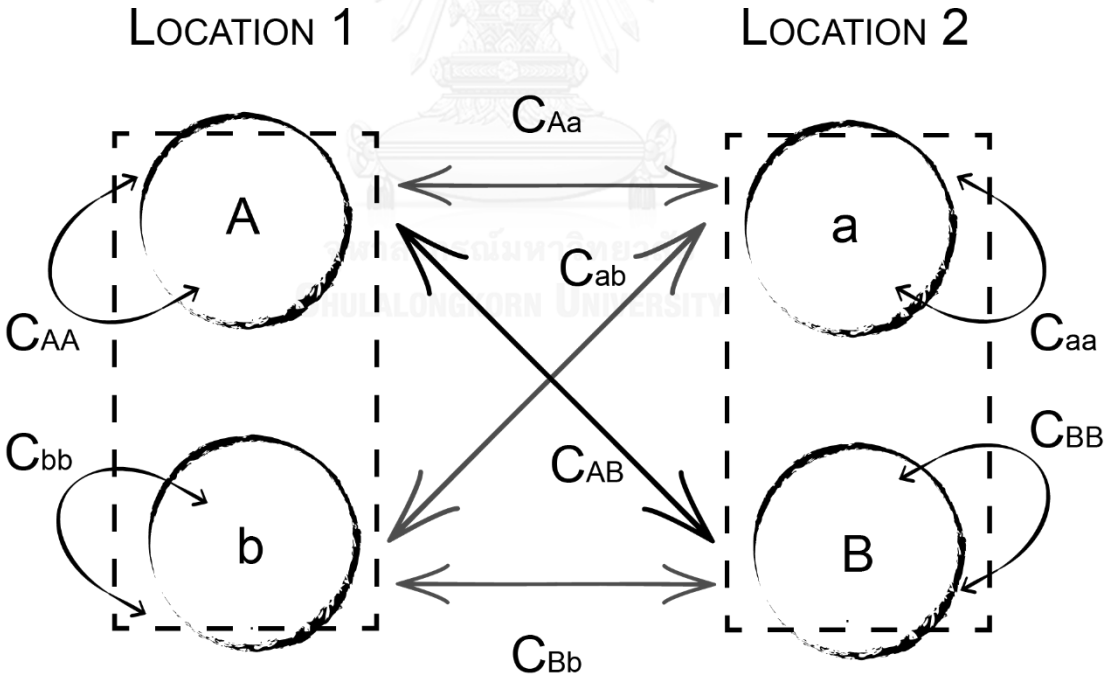


Figure 2. 10 Organizational Separation with Transferred Workers

Allen and Henn recommended shared facilities every 50 meters, because a mere 50 meters separation between people essentially results in the end of regular communication. (2007; 63)

Social networks and spatial configuration—How office layouts drive social interaction by Sailer and McCulloh (2012) collaborated to analyze the spatial dimensions of office layouts in knowledge-intensive workplace environments. Showed that proximity still gives rise to clustering. And different office layouts still correspond with distinct organizational structures, where integrated spaces tend to have a higher centrality and livelier work segregated spaces are more private. Their research has however shown, that co-workers in 2011 separated more than a 25 meter walking distance have significantly lower probability of communicating with each other.

It can be concluded then, that the physical proximity of worker interactions was reduced with an increase of technology. Thus, to encourage worker interactions smaller work spaces should be broken up by large centralized spaces. And within one working space, the separation between co-workers should be no more than 25 meters.

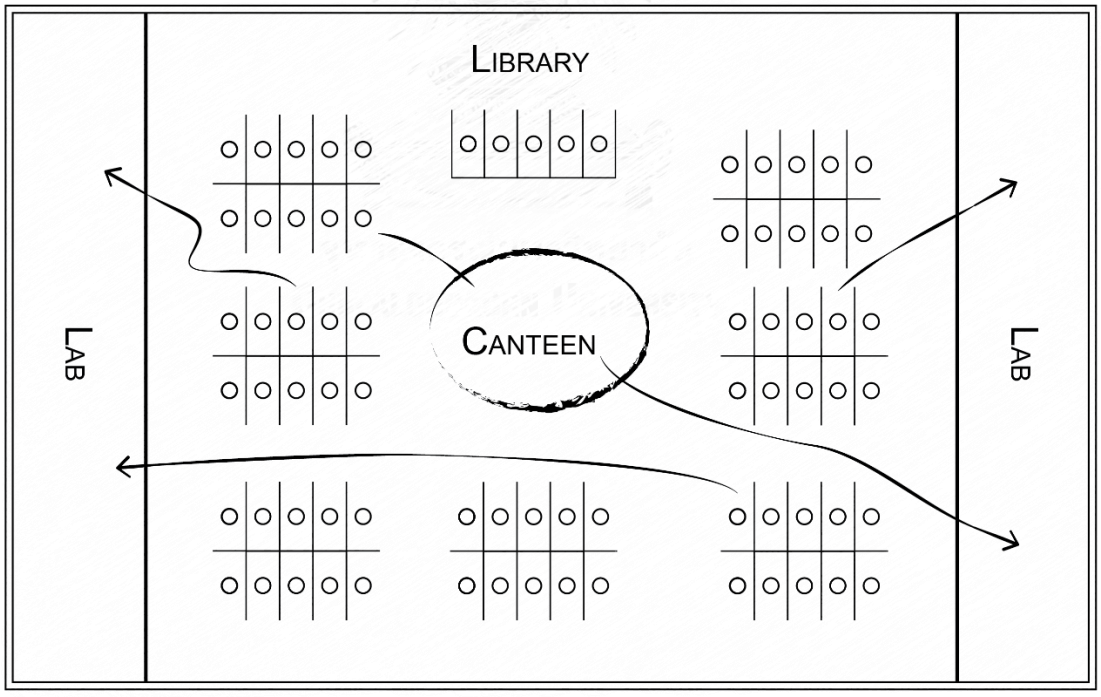


Figure 2. 11 Axis of Communication

To promote less formal interactions there should be shared or common spaces. (Figure 2.10) It is common in large offices to employ an axis of connectivity. Most commonly referred to as a SPINE. A spine promotes a degree of awareness over

large building areas, and enables interaction at every level. In high-rise office spaces the spine takes on the form of an atrium. (Figure 2.11) With designing spines, the flow of spaces in group areas where activities for groups and individuals can unfold along the main axis is important.

Zelinsky defines an alternative office as a mix of spaces that include convertible space, team and activity areas and virtual strategy tool if feasible. Duffy encourages more time spent planning a corporate office to make sure the building fits them rather than assuming they should fit the building. The new ways of working encourage zoning workspaces so that office workers could choose the environment that bests suits the task at hand. Allen and Henn advocate transforming closed workspaces into open spaces in the pursuit of 'flexibility'.

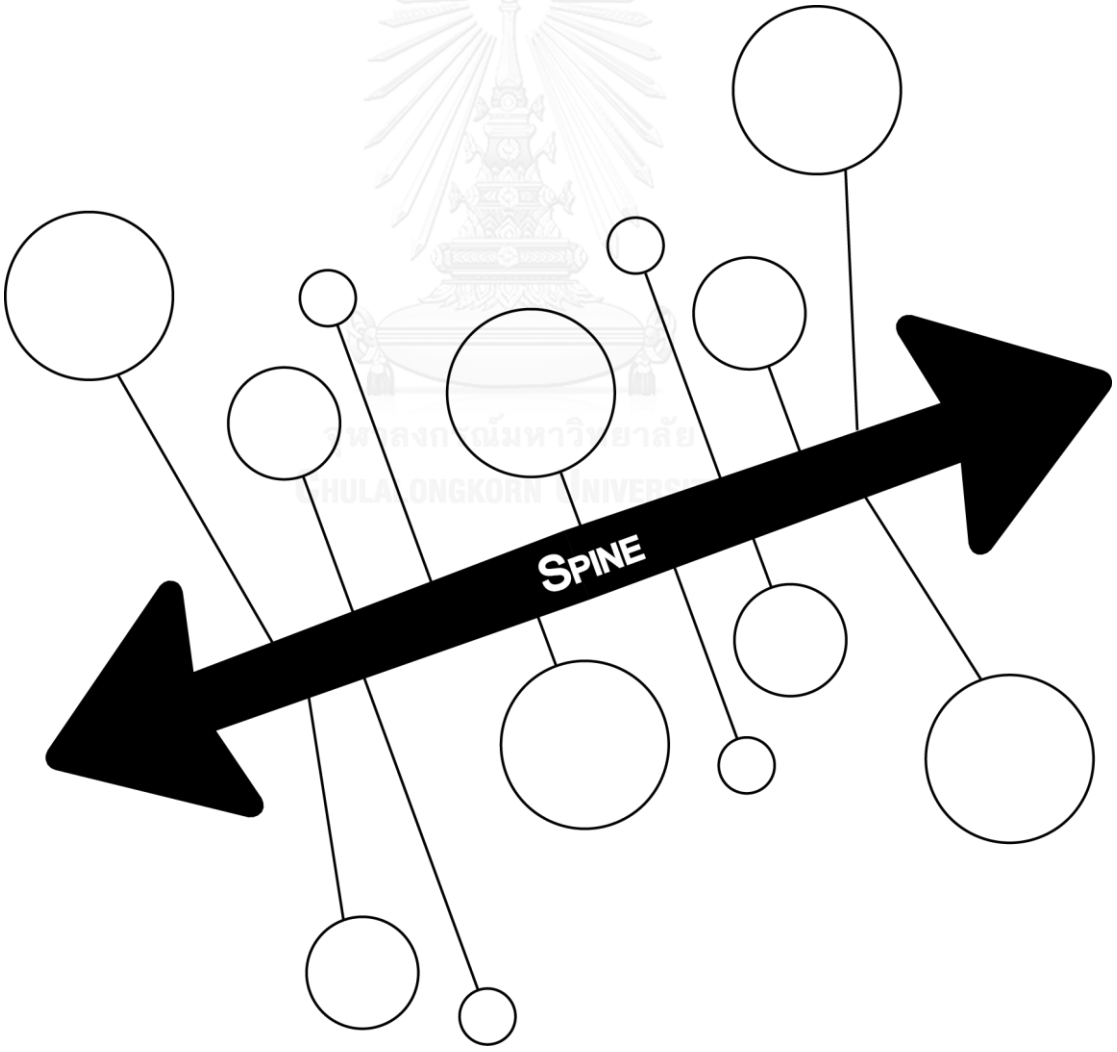


Figure 2. 12 Spine

The panel systems so favored in the early 90's were the epitome of flexibility. For today's needs, the panel system is too static and lacks natural daylight. Flexibility according to Zelinsky means something on wheels. Yet, in the pursuit of flexibility, furniture designers have capitalized by slapping wheels onto almost every conceivable piece of furniture. In practice, just because it has wheels doesn't mean the end user will move it on a regular basis. People still move more easily and more frequently than any rolling file cabinet.

The open plan causes noise problems, and designs should employ anti-noise technology such as "Noise Cancelation" and "sound masking" to cover up ambient noises. Ebissou, Parizet et al. (2014) from France researched the *Use of Speech Transmission Index for the Assessment of Sound Annoyance in Open-Plan Offices*. Open-plan offices require employees to work despite the potential of being distracted by multiple sound sources. They studied 57 individuals and the effect that speech noise has on workers effectiveness. They found that speech noise is particularly disruptive in open offices, and performance seemed to decrease when speech intelligibility improved.

Workspaces in 2014 should therefore provide 'quiet zones' for focused work, or 'phone booths' for conversations to help with effective concentrated work as suggested by Mahdavi and Unzeitig (2005) in *Occupancy Implications of Spatial, Indoor-Environmental and Organizational Features of Office Spaces*. The design should also use a variety of sound-dampening materials to reduce the overall transmittance of sound in large work areas. The variety of materials will further emulate the home environment to create a simulating workplace as studied in *Effective Office Environment Architecture* by Elmahadi et al. (2011)

2.3 Technology in the Work Place

The largest impact on the way that people assimilate information today was the invention and propagation of the internet. It caused in social changes that have resulted in working changes, but have yet to fully manifest as architectural changes. Technology is already altering the workplace, Duffy remarked that with the modern personal computers people do not occupy the same space from 9am-5pm 5 days a

week, but are choosing when as well as where to work. This opens up a potential within the office to occupy different settings. Though the internet and computer have considerably condensed the amount of real-estate required for the office, it has created a new problem of being able to provide adequate bandwidth as well as power outlets for a surplus of end-users. Yeang further postulates that “The worldwide computer network & the digital revolution subvert, displace, & radically redefine our notions of community life & urban life & the concept of the gathering place” (2002; 113) An example would be mobile workers going to the coffee shop. Regardless of if their computers are initially fully charged, the first thing that people look for is an available power outlet. A similar demand can be further noted in other areas of semi-permanence such as airports, libraries, and bookstores.

With the declining costs of technology, it creates easier access to global resources. Many cafés and restaurants now offer free wifi with a purchase from their shop, and several people opt to have study sessions and casual business meetings in places like True Coffee and Starbucks. “In theory, the internet is becoming an enabler for cyberspace retailing, working, and communicating, thus reducing the need for physical space once necessary for such activities.” (Zelinsky 1998; 11) The internet may not be the downfall of all commercial spaces, but it has already impacted the amount and types of space used. As time goes on, and technology continues to alter human interaction, spaces will be directed more towards community, rather than individual work. A current example of technology impacting the work force are cyber workers, these employees that do not need a permanent work station in the office. See figure 2.12.

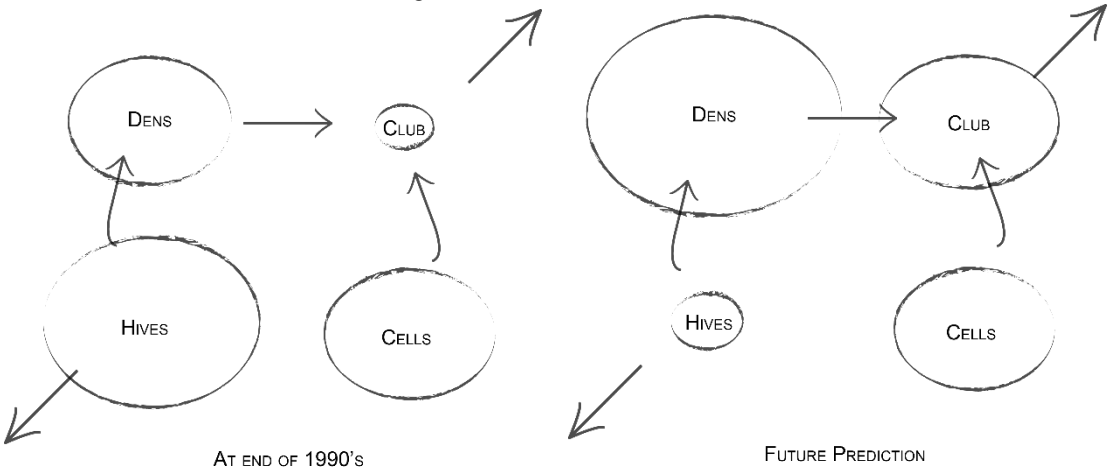


Figure 2. 13 Work Patterns and Use of Space

The virtual corporation is not for everyone. And though virtual meetings can be held at any time inexpensively, they are still not the most popular method for meetings. Various communication structures have emerged and are affecting the workforce in response to the implementation of mobile technology.

The Adoption of Three New Types of Computers in Taiwan: Tablet PCs, netbooks, and Smartphones was written by Li (2014). In his paper, he explored the adoption of technology in Taiwan and the causes as well as their specialization. Li found that "media" and "lifestyle" were a higher indicator of adoption than "work". The result of the adoption of technology is new ways of thinking about how we work. Through intensive interviews he found that Tablet PC's, netbooks, and smartphones were an indicator of lifestyle influenced by mass media.

Park, Rhoads et al. (2014) investigate the factors that affect employee's acceptance and use of teleconferencing systems in the business setting in their paper *Understanding the Acceptance of Teleconferencing Systems Among Employees: An Extensions of the Technology Acceptance Model.* In a two part blind survey they evaluated the comfort of individuals from several companies with using teleconferencing. Teleconferencing can streamline business affairs by reducing the costs and time associated with travel, allowing communication without the need to be co-located. Some teleconferencing platforms allow sharing of documents and notes via whiteboards and other similar interfaces. Individual can choose to communicate through a variety of platforms. When co-location is not feasible, it best simulates face-to-face communication in allowing users to see and hear one another.

To support this in the office there needs to be a dedicated space for a reliable internet connection, and a large server to support users as determined previously in papers by Li (2014), Chung, Lee et al. (2014), and Mahdavi and Unzeitig (2005). IT Support staff should be located where they are easily accessible by long term and transient users to facilitate the use of the facility and multi-media technology.

The importance of IT knowledge is rapidly growing in modern society. In order for corporations to survive in the current job market, there should be a disbanding of

brand buildings that are monumental to the companies in favor of dispersed offices in “suburban” locations.

Despite the increasingly efficient ability to communicate remotely, people still need to interact with other people. “Technology has extended the global reach of those who transact such businesses and so has reinforced the status of world cities” (Yeang 2002; 203) There is still a continued need for office space despite the increasing prevalence of technology, though it may seem absurd in the 21st century. Allen and Henn (2007) say that as we continue to submerse ourselves in communication through modern media, it will become more obvious that it seldom substitutes for a face-to-face meeting. Instead the use of different media is more likely to be used to augment real life meetings and vice versa. We are more likely to reach out to someone via the phone if we talk to each other on a regular basis in person. As such, technology is not likely to replace human contact so spaces for people to work and thrive in the virtually inundated offices are imperative.

Job Performance Through Mobile Enterprise systems: The Role of Organizational Agility, Location Independence, and Task Characteristics by Chung et al. (2014) examines how job performance and organizational agility is associated with the perceived ease of use of technology. Research estimate that by 2016, 350 million workers will be using smartphones for business purposes. The increased mobility of workers and Mobile Enterprise Systems (MES) allow for workers to remotely access and update enterprise databases from any location at any time. The 21st century worker has entered into an anytime, anywhere workplace.

This change in the working culture suggest a higher need for collaborative spaces as suggested by Saari et al. (2006), Chung et al. (2014) evaluation of smartphones pervading the workforce supplements Li (2014) paper in Taiwan, supporting the inference of a higher need for outlets in semi-transient spaces as well as a dedicated space for fast internet connection and a large server to support the end users.

There is still no appropriate media through which to conduct meetings, enabling the participants to evaluate opinions on the fly, gauge reactions as they attempt to cajole and persuade in negotiating deals. Most video conferencing is of

insufficient resolution to simulate the same perception available in a face-to face encounter. There are additional drawbacks as technical problems may arise, communication may drop out or be delayed in time, and video conferencing is restricted to formally scheduled meetings. Communication for information and inspiration are seldom conveyed in these settings. Even though IT allows for greater flexibility in terms of immediate locations, the centers for activity will remain within larger towns with good linkages to facilitate communication. In the end, people still need people.

Allen and Henn (2007) defined an “intelligent building” as a successful integration of building management, space management, and business management. While Yeang (2002) postulated that combining the office with other amenities would be more economical. Turning the office into a place to socialize with fellow workers. It seems unlikely that electronic technology will make offices obsolete.

Another emerging trend in office design is what is being branded as ‘sustainable and ‘ecological’. Bay and Ong (2006) caution that we avoid assembling all the eco-gadgets such as solar panels, biological recycling systems, building automation systems etc. into one building and expect it to instantaneously become ecological architecture. The other misconception is that if a building gets a higher rating on a green-rating system it is sustainable. The rating system creates a paradigm of architects and developers pushing an agenda for corporate offices towards rating systems rather than finding a suitable design for the occupants.

A side effect of ignoring occupants’ behavior is designing them “out of participant because they cannot be trusted”. Buildings designed this way tend not to allow human intervention, causing the owners to revert to energy wasteful practices to achieve comfort. It is thus advisable that developers and designers attempt to allow for multiple ways to achieve comfort in an office space. Sustainable decisions that are accessible to the end user can be simple. They can take the form of things such as operable windows and blinds, control over their AC units and lighting. One of the most immediately understandable features of ecological design for the tenant is lighting. This can be influenced by double skinned facades, day lighting, artificial lighting, and shading systems.

To refine the conditions of building in tropical climates, academic papers with studies done in Malaysia were selected due to its proximity and similarity to Bangkok, Thailand. Shameri, Alghoul et al. (2013) collaborated to write *Daylighting Characteristics of Existing Double-Skin Façade Office Buildings* in Malaysia. They studied the reduction of energy costs through the implementation of a Double Skin Façade (DSF) By comparing 12 buildings internationally and evaluating their effectiveness. The cavity between the two facades should be between 0.2m and 2m, and should be naturally or mechanically ventilated.

To apply the principles of this paper to Bangkok, the day-lighting levels in transient spaces should be higher to create a more active circulation. It also endorses veranda spaces 1.5m-2m in width to be used as the DSF to allow for appropriate shading and ventilation in between workspaces. These veranda spaces can be used as informal meeting and lounge spaces for office workers.

In Malaysia to displace the electric lighting demands Shahriar and Mohit (2007) wrote: *Estimating Depth of Daylight Zone and PSALI for Side Lit Office Spaces Using CIE standard General Sky*. They predict the depth of the daylight zone and Permanent Supplementary Artificial Lighting of Interiors (PSALI) in Kuala Lumpur, Malaysia. The acceptable values for office work is between 300lx and 500lx. Using an average of interiors of several high rise offices to determine the penetration of daylight in Kuala Lumpur. Where the average interiors floor to false ceiling were 2.63m, the depth of the floor plate is 16m and the sill height is 0.71m with tinted glazing; the penetration of daylight is as follows:

Minimum 300lx at 3.5m and 500lx 3m

Maximum North and South: 8m -85.m

Maximum East and West: 9.7m-9.8m

Using these parameters we can estimate the probable penetration of daylight in an office space adhering to the same dimensions. Though it is possible to use these as a starting point for the office spaces, we are unable to apply the same parameters for shared spaces, as the volumetric differences varying with task will change the penetration of daylight. Using Shahriar and Mohit's data we can determine that using a DSF, the veranda on the East and West sides should be

deeper than those on the North and South due to the sun path over this part of the hemisphere.

Occupants Interaction with Electric Lighting and Shading Systems in Real Single Occupied Offices: Results from a Monitoring Campaign by Silva, Leal et al. (2013) compare observed behavior with predictions found commonly in literature on the use of electric lighting and shading for 8 private workspaces in Switzerland. There two month survey period uncovered that occupants traditionally set their 'ideal' office environment upon arrival to the office regardless of natural environmental decisions. For occupants that are sensitive to the natural environmental conditions, manually controlled electric lights will only be switched off when light levels are above 500lx. Otherwise use of electrical lighting is driven more by occupant profile than lighting and related to the occupant's arrival and departure.

These three papers suggest that for a modern office, an automated system started at the arrival of occupants and ending their departure would be the most effective use of shading. The primary shading device should be integrated into the façade, and separate from the secondary shading device. The secondary shading device would be primarily controlled by the end users.

The places of work should reflect the appropriate climactic region. For the tropical south-east Asian countries that deal with warm climates, sun year round and a heavy rainy season, proper shading should be employed. A veranda space 1.5-2m deep should be used at the office to allow for appropriate shading and ventilation between work spaces. The veranda on the east and west sides should be deeper than those on the north and south sides due to the sun path in this part of the hemisphere.

Technology has transformed the working mindset to an anytime/anywhere workplace. It can be inferred that there is a higher need for outlets in the semi transient spaces as well as a need of dedicated space for servers for a fast internet connection. Staff in the office should be able to support those in need of multi-media assistance, and be located in a visible and accessible space.

2.4 Literature Review Conclusion

Literature review has revealed various areas of consideration when attempting to develop a future office complex. The largest impact on the way that people consume information today is the internet; and with declining costs of technology, it provides easy access to a global resource. Despite the advances in instant information technology, colleague contact is still proven the most effective way to stay up-to-date. However, mobile technology such as laptops, netbooks, tablets and smartphones allows for a more flexible workspace without the need for a large desktop computer. We are thus able to layer multiple users in one workspace over a day instead of requiring dedicated space for each employee. Dedicated workspaces should maintain about 4m², but shared spaces should have much larger emphasis in the overall workspaces; and workers in the same office should be no more than 25m apart.

The smaller technology still needs power, so there is a higher demand for outlets in semi-transient spaces as well as the need for a dedicated space for fast internet connection and a large server to support users. There should also be staff to facilitate teleconference meetings and related IT affairs in the office, a highly visible designated area ideally the same as the reception area.

Information technology has dramatically impacted ways of working. Due to the increasing mobility of work, developers must ensure that the office itself is a valuable resource. Developers should attempt to allow maximum user intervention in the office so that they are able to achieve professional creativity and personal comfort. Offices should use multiple textures, furnishings, and lighting throughout to make each space seem less artificial, and allow for user influence in shared areas such as the ability to write on glass or erasable walls, and move furniture. Users should at minimum have control over the lighting and temperature of the room by giving them access to individual AC units, operable windows, blinds, and dimmable light sources. Daylighting levels in transient spaces should be higher to create a more active circulation, and veranda spaces (1.5m-2m deep) should be used as the DSF for appropriate shading and ventilation in between workspaces. Thus, the primary

shading device is integrated into the façade, and the secondary shading device can be influenced by the users. An automated system started at the arrival of occupants and ending at their departure would be most effective for conserving energy, and provide appropriate lighting for work.

A smaller company or new venture values the potential flexibility and growth of a space over branding, and would be a prime market for office complex leases based off of a hoteling concept. There is already a higher emphasis on sharing spaces and less on private spaces in the working environment, but there should be a variation of the volume of spaces to denote the hierarchy. The 'large' centralized spaces should also be broken up with fragmented private spaces such as 'quiet zones' or 'telephone booths' for focused work. Workers are able to choose the appropriate space for their work at that time. Shared spaces should not only consist of official meeting areas, but also spontaneous ones to provide satisfaction with the quality of communication amongst workers.

The office should also be accessible to users 24 hours a day or at the very least extended, to accommodate the mobile worker who does not subscribe to traditional office hours. The extended hours would also maximize the potential occupancy of a work space. IT has enabled a greater flexibility in terms of potential locations for work, but it has conversely resulted in a higher urban density to accommodate face-to-face activity. The resulting urban fabric makes offices located within proximity (800 meters) to public transportation more appealing. Office complexes in the suburban area would provide shorter commutes, and reduce the psychological stress resulting from traffic causing more enthusiastic and productive workers.

Chapter III RESEARCH STUDY APPLICATION TO THAILAND

The paragraphs below summarize the evaluation of research using Bangkok, Thailand as the model city for the study. The key criteria for consideration in potential design solutions are as follows:

1. Transportation Infrastructure
2. Climate
3. Zoning and Regulations
4. Working Culture
5. Existing and Available Communication Technology

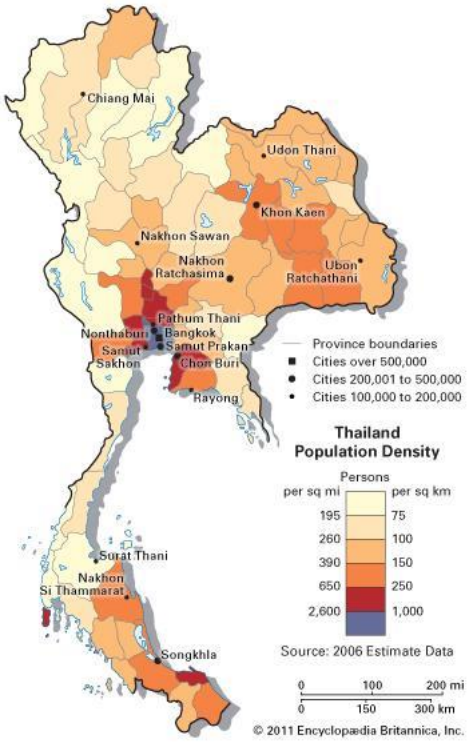


Figure 3. 1 Thailand Population Density Map

Thailand has many spots where the population density is less than 75 people per square kilometer, but Bangkok has more than 1,000 people per square kilometer. (Figure 3.1) This urban density is the highest concentration in Thailand, and has generated intense social connections. However, these dense environments tend to generate excess stress on humans when not planned properly, ideally producing extensive zoning plans by the government. One of the unique things about Bangkok's city is it has developed mostly organically, resulting in the possibility of high rent properties next to large slums. According to Oran Sakkayarojkul, the Director of national and Regional Planning Bureau, this patchwork of urban sprawl came from a series of rapid urban expansions and a growing population. As a result, open spaces and more tropical forms of architecture have given way to the international style for their easy of assembly and high-density applications.

Political jurisdiction precedents have negated any hope for easy urban planning solutions. Various political factions and their pressure groups are hanging on to control over previously granted dominions, including the mass-transit networks and utilities such as telecommunications. As a result, Bangkok and its metropolitan

areas are expanding rapidly with little semblance of comprehensive urban planning that will ensure a high sustainable quality of life for its citizens. The Cabinet, however, has tried to regulate the urban growth by mandating the Department of Public Works and Town & Country Planning (DPT) to develop an urban plan to govern all areas throughout the country over the next 50 years; yet the National Spatial Development Plan, is now facing revision with ASEAN integration by 2015.

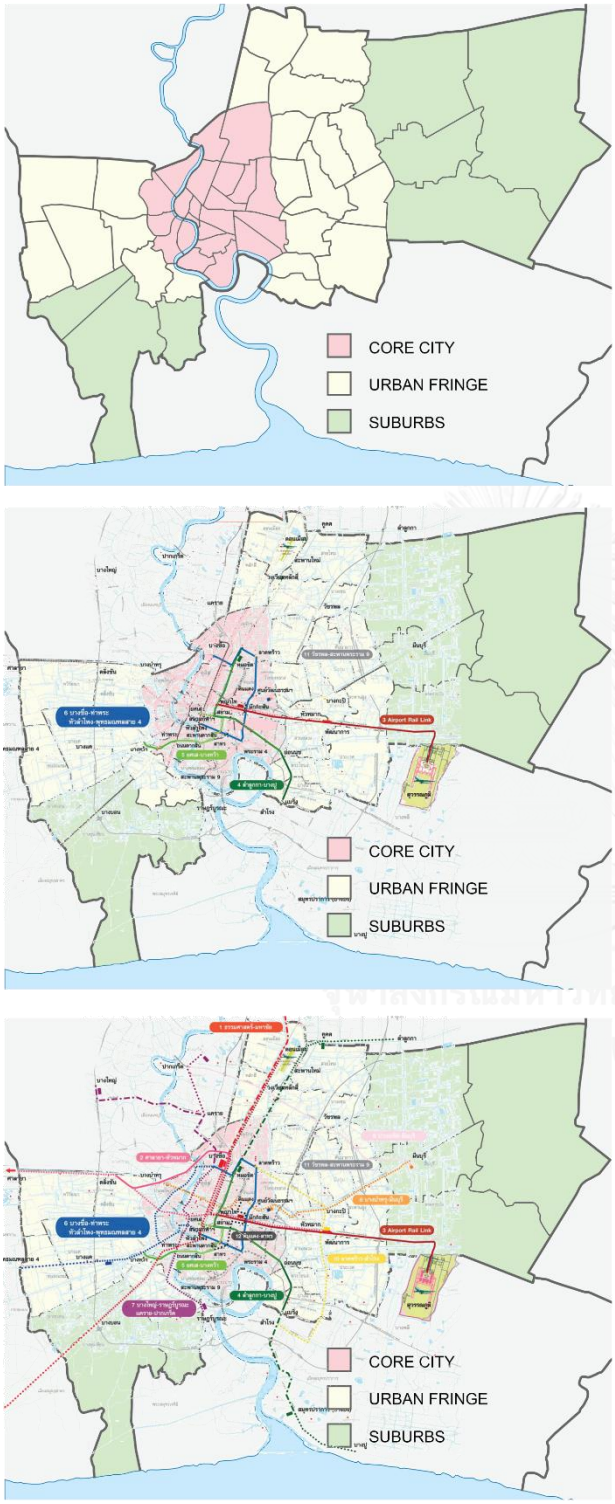


Figure 3. 2 Bangkok Transportation Overlay

3.1 Transportation Infrastructure: Transformation from Centralized to Decentralized.

Urban development greeted the opportunity for more inward migration to support many smaller businesses and mobile trades (Duffy 1997; 51) This is evident in Bangkok's colorful street life, where the initially generous sidewalks are cramped with street hawkers and food vendors. This compounds the problem of urban congestion by placing many obstacles in the way of pedestrian movement.

Building higher office tower blocks in the city center only exacerbates the problem as the population density rises. Instead, investors should take advantage of the organic urban sprawl of Bangkok, creating multiple suburban hubs to act as nodal city centers. Khun Chakrapan Pawangkrat (2014) from JLL Thailand has noted that there has been concentrated development towards a new hub of commerce in Bangkok in the Rangsit area in the last 5 years.

These hubs would in turn be connected to the existing city center via mass transit, negating the need for driving to work, or a meeting, thus reducing traffic congestion issues. Both the BTS and MRT have extensive plans for future development in the surrounding suburban sprawl, but due to corruption and different ownership of both lines future development is slow going. It would be prudent to build immediate projects along the existing lines, in their more suburban areas going from On Nut, the previous end of the BTS line towards Bearing, the new end of the BTS.

Due to the chronic unplanned growth of Bangkok, different urban sectors have sprung up in a very organic manner. (DPT) This has created a long commute situation with little to no emphasis on the mass transit system. Office of Transport and Traffic Policy and Planning says that 2014 will be the worst for traffic congestion due to the sharp increase in the number of vehicles and the construction of several mega-projects. As of 31 October, 2012 the number of vehicles in the greater Bangkok area was 7,384,934 which was an increase of 535,721 vehicles from the end of 2011.

Traffic conditions in Bangkok are very unpredictable, and generally speaking, extremely bad. Therefore workers have a high risk of either arriving early or late. Most of the time Bangkok residents will understand that in some cases, unforeseen traffic prevents you from arriving on time on an occasional basis. But workers who took a survey by Verluyten (1997) generally prefer to chance arriving early rather than late. Because of traffic, Thais prefer to work later in the evening rather than early in the morning.

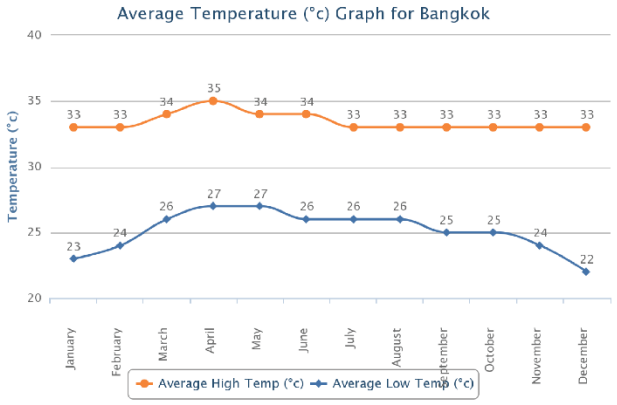
Most of the land in Bangkok is off of small soi's with two or three lanes of traffic averaging somewhere between 9-12 meters. Suburban Office Complexes for rent in Bangkok would provide alternative spaces and a higher quality of life in

comparison to the inner city. Giving the option of shorter commutes on a regular basis, and if situated near mass transit stations they would be able to go to meetings in the business district with little difficulty, leaving their cars at the suburban office, or better yet, within walking distance of home.

3.2 Climate

Thailand is a tropical country with three seasons; the cool or dry season, the hot season, and the rainy season. (Figure 3.3) In central Thailand, the cool season lasts from December to February, followed by the hot season from March to June where temperatures can get as high as 40° C and is quite humid. The rainy season lasts from July to mid-November. Though it is still hot, the rains bring some relief in the late afternoon, and usually lasts for only a few hours. Storms can be quite heavy and accompanied with gusty winds. These sudden downpours can cause flash flooding as many parts of Bangkok are resting on what used to be the floodplain, and have poor drainage systems. What wind there is travels from the South West, across central Thailand.

In order to reduce energy costs for an office building, the easiest solution would be to run only those operating costs for areas that are in use. The traditional office towers tend to run towards glass towers with central air-conditioning systems. In a tropical climate, these building types take more energy to keep running at comfortable levels. Generally this is disregarded as a negligible



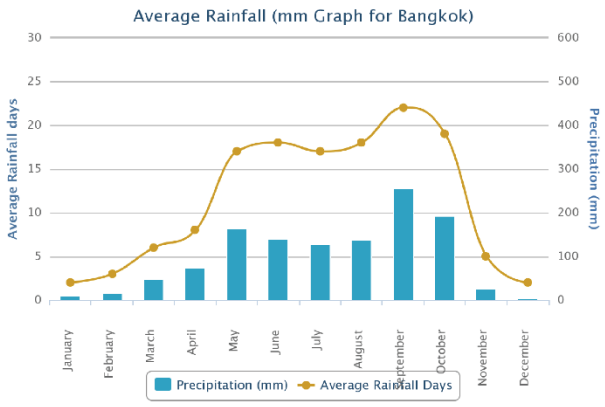


Figure 3. 3 Bangkok Annual Weather Summary -- World Wide Weather Online

operating cost, but the sealed glass towers also reduce indoor environmental quality.

Smaller office blocks, with user operable permeations in the façade and a mix of interior and exterior spaces will not only reduce the operations costs, but provide an often needed change in environment for the end users. Due to the tropical climate, adequate shading and the creation of micro-climates is needed for comfortable exterior spaces. Building construction and open design used in a tropical climate may have to be altered for cooler climates and different energy saving methods employed.

3.3 Zoning and Regulations

Thailand does not have an effective national building code. Rather, their regulations are scattered across several different ministries. Currently, the building regulations are issued under the Thai Ministerial Regulations on Building Control, and are controlled by over 200 ministerial regulations related to building control. In addition, there are regulations issued under the Energy Conservation Act that relate buildings and building development. On top of the national laws, local administration agencies may also issue different ordinances with stricter requirements.

In spite of Thailand agreeing to the Energy Conservation Act, regulation and enforcement of building codes is slow, and corruptible. Yet many conscious designers and large business owners looking to cut costs are grasping at several different assessment methods in hopes of creating better buildings. Though there is yet to be a dominant rating system, Green Label Program, Green Leaf Hotel, TREES, TEEAM, PCD, TGBI and LEED are all battling for dominance.

In order to get a return on investment, due to the fluctuating zoning regulations, it is better to invest in immediately developable areas and not try to go for long term development. For example, it is wiser to build along existing mass transit routes instead of projected ones. The Bangkok Rail Mass Transit plans, finalized in 2004 were scheduled to be finished by 2015, including extending the existing lines, and opening a purple, orange, dark read, and light read lines. None of these lines have opened, and the extensions of the existing lines are still in progress.

3.4 Culture of Thai White-Collar Workers

Thailand's rapid economic growth has turned it into a country where many foreign companies do business, invest, and set up joint ventures. This business involves an intercultural communication as the Thai worker's values and communicative style are very different from their own. S.Paul Verluyten realized that this can lead to potential misunderstandings between Thai and foreign counterparts and wrote "some cultural Aspects of Thai Companies, with Recommendations for Westerners" in hopes of increasing cultural understanding.

The representation of cultures in international and cross cultural management: Hybridizations of management cultures in Thailand and Israel by (Shimoni 2011) studies management in multinational corporations (MNCs), and local management cultures in Sweden and the US. They interview several managers raging from the age of 30 to 50 who have previously held at least three managerial positions prior to the time of the interview. MNC's impose their management cultures on their local offices, while local managers attempt to keep the values that are culturally highly regarded while simultaneously adopting the MNC's resulting in a hybridization of management.

The intercultural management practices can take a few forms. The first is intercultural interaction, which can refocus attention on interactions among people of different nations. The multicultural approach attempts to break down the boundaries between cultures that arise from the competitive pressure of the company and the increase in globalization; they attempt to involve workers with a variety of backgrounds in community based activities to increase creativeness and competitiveness. The last form that Shimoni discusses is hybridization. Hybridization recognizes various cultures within the same space. The key criticism of this approach in practice is that it assumes the pre-existence of a pure and stable culture rather than the adaptive and ever-changing reality of it.

Thai managers have an overall positive view towards the MNC's. The primary cited benefit to their companies being that it brings new technology and techniques to Thailand. There is dissatisfaction however in the MNC's management impositions. Thai managers feel that the MNC's attempt to change the core values of Thai

people, namely their ‘politeness’. Thai people have a desire to compromise and work together to make all of the decisions. Their desire to work ‘together’ means that companies should provide group work desks even for individual tasks. They value the harmonious relationships between people, going as far as internalizing their own feelings for others to save face.

Verluyten (1997) noted that Thai white collar workers have a different scale of cultural values than most European companies, and hold an emphasis on ‘cool-heartedness’ (*jai yen*) as a way to interact with co-workers. Through surveys Verluyten noted in general, Thai workers are hesitant to display contrary emotions and try to go with the flow. The emphasis on harmonious interpersonal relationships generates a need for face saving and indirect communication patterns. There is also an emphasis on strict social hierarchy and respect *(kwamkrengjai*) of the ‘inferior’ towards the superior. And business is kept separate from family aside from the top-level management where they are often related. Family comes before business.

Intachakra (2011), a student from Thammasat University in Bangkok, further studied the effect of *kwamkrengjai* (KKJ) in her paper *Politeness motivated by the ‘heart’ and ‘binary rationality’ in Thai Culture*. Intachakra discussed the potential integration of politeness from different cultures to further enable better global communication. The problem in overall company management is that the definition of politeness is driven primarily by Western languages, individualism, rationality and market economy. This means that there is a motivation to be polite, and disregards the ‘rapport-oriented’ rationality.

Intachakra further explains that KKJ is criticized by non-Asian and non-Thais as irrational, impractical, and at times even impolite. Thais in contrast, have a disinterest in interactions based solely on task-focused goals; emphasizing instead interpersonal connections and relationship maintenance interactions. For Thai’s KKJ is not merely an attitudinal representation, but are deeply ingrained social obligations of younger to elders, subordinate to superiors (ect.) to discouraging self-indulgence.

KKJ is often misinterpreted by non-Thai’s as there is no equivalent word or phrase in English. And Thai’s are expected to carry out KKJ practices throughout their life, both in formal situations and informal situations to show their concern for

others. Where western cultures may feel that politeness is about voicing their concerns about a particular work issue, KKJ in Thai culture is about saving the 'face' of others by not speaking their mind. KKJ can manifest architecturally through the distribution and organization of dedicated work spaces within the social hierarchy. Khun Ek Buranakul notes that this usually takes the form of a larger or separate office for the owner of the company.

Traffic in Bangkok has affected the outlook of the worker, inciting them to leave the house several hours before the workday traditionally starts to either avoid morning gridlock, or at the very least prevent being late. In contrast to general work, meetings tend to start later than the appointed time, but usually no later than meetings in Western countries. Verluyten explains that negotiations are a lengthy process where process takes precedence over content. First meetins are used as a getting to know you period, to produce good humor, smiles, and plenty of polite conversation with few actual results; and the second meeting usually includes a meal invitation.(1997; 6)

What makes the Thai white-collar worker unique is their consumerist culture. Several times during the workday they will take 'coffee breaks', which do not consist of going to the office kitchen and grabbing a quick cup of joe. Rather, these breaks are when the workers will leave the building and go to the Talat Wat (local street market) and may not include coffee at all. At the very least the workers will exit the building for lunch, and visit the street stalls to buy little things on their way back. The result is a hectic street life where sidewalks are jammed with small stalls of street vendors selling anything from food and drink, to clothing, or accessories for you or your smart phone. Thai's find this break as fulfilling, if not more so, than a cup of coffee or a cigarette break.

Indirect communication style, coupled with requirements for breaks during the day, contribute to lengthen the decision-making process, which can slow down productivity. The combined effect of technological change and globalization has resulted in the significant intensification of work in Bangkok. (Holmes and Ryan January 2009; 3) Intensification can be noted in the increasing number of hours people are working, and the degree to which work now spills over into leisure time.

Thai white-collar workers spend at least 8 hours a day in centrally air-conditioned office towers that are kept at glacial temperatures to combat the tropical heat. With an additional 2 hours minimum of total commute time from their homes to the city center, workers are spending an average of 10 hours a day on their job.

Spending such a long time on a job calls into question the satisfaction of their workers. Chaiprasit and Santidhirakul (2011) investigated this issue in their paper *Happiness at Work of Employees in Small and Medium-sized Enterprises, Thailand*. They study the factors affecting happiness to determine the success of SMEs business in Thailand. They studied 300 different businesses equally drawn from the manufacturing industry, the service industry, and the commercial sector. As businesses in Thailand are predominately driven by SMEs (73 percent in the industrial sector) it seemed like practical assessment of the overall job satisfaction. Chaiprasit and Santidhirakul used 5 factors to determine the happiness of workers:

1. Job Inspiration
2. The Organization's shared values
3. Relationships
4. Quality of Work Life
5. Leadership

They believe that happiness is when it doesn't feel like work, it is efficient, and achieves goals and both a personal and organizational level. Through their assessment, they have determined that age and education level have no impact on the 5 factors.

Three factors affect Thai employee's happiness. The first is relationship, related to interaction and group bonding. The second is the quality of work life. This refers to their relationship between the work environment, their feeling of personal participation, and humanization by the business their working for. The final factor affecting their happiness is a feeling of leadership in the company. Thai workers feel that the leaders should create happiness for personnel via motivation, awareness, and a sense of dedication.

Creating happiness at work does not necessarily mean spending money, but rather creating a friendly atmosphere. The office building then should address the

three factors affecting their happiness to help facilitate a good working environment. Relationship can be addressed through providing spaces that can facilitate easy communication and group bonding. Improving the quality of work life and leadership can be attained through visually connected spaces.

3.5 Existing and Available Communication Technology

Thailand is a quick assimilator of new technology, however it is slow in implementing regulatory practices for the technology it adopts. This causes sluggish announcements, unclear development plans, and sluggish development. Within the last ten years, mobile personal technology has not only made drastic advances, but has also has become increasingly affordable. The white-collar workforce is now armed with not only a personal computer (often times a laptop), but also a tablet and smart phone. These mobile devices are rapidly becoming a major computing platform, and all of this this technology is available at your fingertips at all times. During recent years, mobile cellular telephone ownership has grown due to the communication price wars of 2004-2005, which pushed prices down as low as 0.25 Bhat/minute. (Bangkok Post, 2002) In general, slightly over half of the Thai population owns more than one phone. Smart phones enable workers to be reached at any time, while also allowing them to check their e-mail, surf the internet, and play increasingly involved games at any place or time. This has generated a new mobile culture of social media, which Thailand has embraced. The new mobile culture has created the opportunity for the decentralization of the work force.

While the white-collar workforce has access to a personal computer and internet, they are still wasting time on long commutes to a central office location. There are many ways of sharing files over the internet, in addition to company networks so that computers are able to access shared files and the same library of information. There is also Cloud storage for web-based storage, enabling users to access their files from any computer that has internet access.

A multitude of communication applications that run using the internet, such as Instant Messenger, and programs like Skype allow not only text based chatting, but voice and video calls; creating a platform for impromptu teleconferences to

discuss problems in a shifting work place. There are also several different free screen-sharing programs such as join.me and Screenleap to enabling online meetings and work to be done on the same issue by two people in different locations at the same time. These advances in technology should not be used as a replacement for face-to-face communication.

In the next decade, both mobile and digital technologies are going to continue to advance and be sold for lower prices, enabling broader access of information from more places. The faster and greater amount of information dissemination has enabled larger companies like PTT to decentralize their offices, the branch offices being closer to the local amenities. Fragmentation of people and information in Bangkok will give the white-collar workforce freedom to move. “Communication technology will also help in the decentralization process, enabling the branch offices to keep in touch with the main offices, and to better assist their local clientele.” (Holmes and Ryan January 2009)

As demand pushes the telephone companies like TOT Public Company Limited and True Corporation to increase their broadband capacity to accommodate the larger computing programs on wireless devices. “This means that a National Broadband plan is needed in Thailand to develop the new Information Communication Technology policy.” (Santipaporn 2010) Implementing and updating the national broadband will enable Thailand to stay current and take advantage of new social communication technology, in addition to remaining competitive internationally.

Chapter IV OFFICE SPACE USAGE STUDY

In order to verify the findings in the literature review section, and their applicability to the working environment in Bangkok, it was necessary to see what kind of co-working spaces are being offered. Many transient workers favor coffee shops. But for extended and regular working sessions they can feel too crowded, noisy, the comfy chairs aren't suited for spreading out your work, and the WiFi can be unreliable.

I searched instead for the types of leasable office space that are available to SMEs, start-ups, and freelance expats.

4.1 Wisdom

4.1.1 Summary:

A traditional leased space in an office tower by one company. Wisdom Strategic Consultancy Co. Ltd. is a consulting and solution firm for the development, organization, and management of other companies.

4.1.2 Location:

Wisdom is in Lake Rajada Office Complex, situated between Asok BTS Station and the Queen Sirikit National Convention Center MRT Station, within 1 km of each. The two separate approaches are along two different sois. The main approach along a road with 4 lanes of traffic, and the second along a tree lined soi

.

4.1.3 Target User Profile:

A single white collar company occupied space. Intended for knowledge oriented work.

4.1.4 Building:

The building is a traditional office tower with low security. The leased space is in the middle of the building floor plate, and as a result only the meeting room has

access to views outside. The front of the office is lined with glass to allow for the opportunity for views. Unfortunately, this glass wall flanks a narrow dark granite hallway failing to contribute towards the natural lighting of the office space, and in the end, the tenants have covered most of this wall in shelving. The open plan office accommodates about 10 workers and the meeting room about 6. The arrangement of desks are mini islands facing towards the center of the room where a center table can be used as a guest workspace, a group workspace, or most commonly, the snack table. The office has its own bathroom/shower, and a kitchenette, with one 4m² room dedicated to IT and general storage.

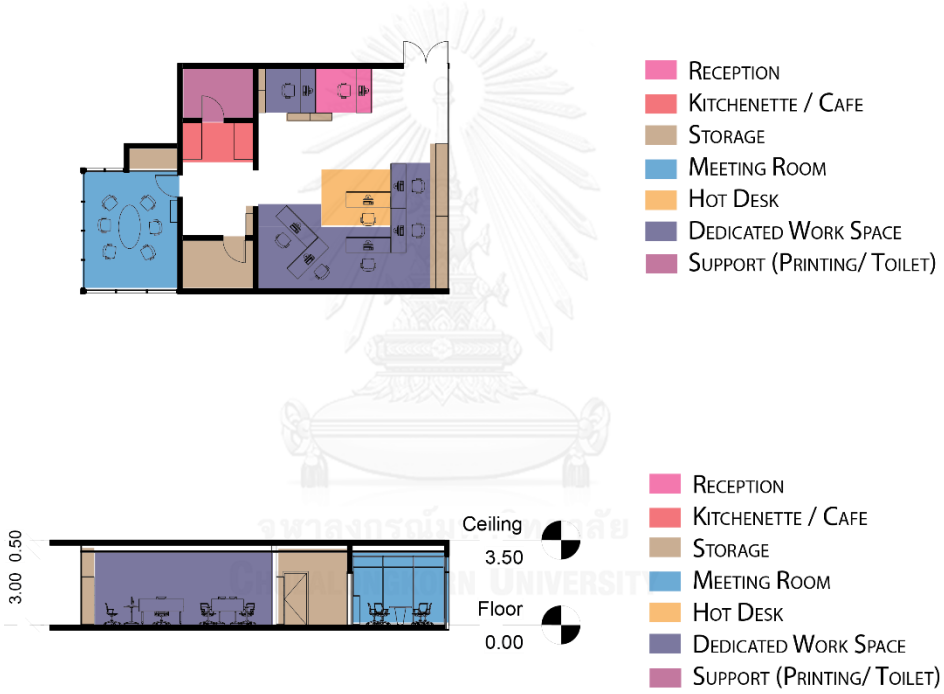


Figure 4. 1 Wisdom Program Diagram

4.1.5 Assessment in Thailand:

The single occupied office space is representative type of the white collar workforce in Bangkok. Where the initial space is predominantly unaltered by the tenant over their 3-5 year lease.

4.2 Peoplespace

4.2.1 Summary:

A traditional leased space in an office tower by one company. The company focuses on efficiency workplace design, facilities planning, and saving space. Initially established in 2004 in the UK, peoplespace has opened a separate branch in Thailand.

4.2.2 Location:

People space is located in the ninth Towers Grand Rama 9 building on the 17th floor. 500m from the Param 9 MRT station no more than a 7 min walk. It is located in the dense urban landscape, surrounded by large shopping centers.

4.2.3 Target User Profile:

A single white collar company occupied space. Intended for knowledge oriented work.

4.2.4 Building:

The building is a traditional office tower with high security and the office is on the perimeter of the floor plate. The space itself is designed for a small company of no more than 15 people and broken up into 4 separate areas in two spaces. The first space is collaborative, and the second is dedicated work areas.

There is a reception desk to the left as you walk in the door, guests need to be buzzed in. To the right is a formal meeting area facilitating meetings for 8 people and equipped with a projector, white boards, and tack walls for presentation or brainstorming sessions. Straight back is the community space, broken up into three areas, a lounge area, a casual work area, and a kitchenette area for snacks, breakfast, coffee or even beers after work.

To the back is the dedicated work space, but even these are arranged in a group desk to re-enforce the sense of company community.

4.2.5 Assessment in Thailand:

Designed for a single company the space caters to group and creative work while taking into consideration the Thai cultural needs within the office.

4.3 Regus

4.3.1 Summary:

REGUS is a multinational corporation providing office accommodations in business centers around the world. REGUS provides fully furnished and serviced offices, virtual offices, meeting, conference and training rooms, as well as videoconferencing to clients on a contract basis. They are the largest provider of flexible work space planning in 85 countries, and have over 1,100 business centers.

4.3.2 Location:

In Bangkok they currently have 11 different business centers, all located near public transportation both MRT and BTS. The distance ranges from 42m and a 1 min walk from the station to up to 700m and a 10 min walk from the nearest station.

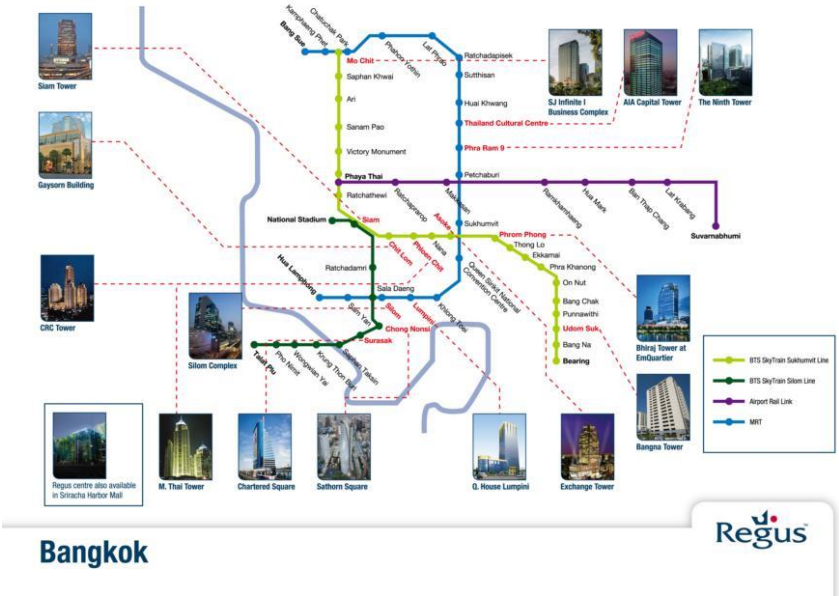


Figure 4. 2 Regus building locations in Bangkok. --REGUS website.

4.3.3 Target User Profile:

REGUS attempts to accommodate every type of worker, and promote their space by marketing a removal of the burden of property ownership and management while paying ‘only for the space they use’. Offering full or part-time space, on short or extended terms for as long as needed. (day, month, year) REGUS appeals more to the traveling businessmen than to the small and start-up businesses.

4.3.4 Buildings:

REGUS does not develop any of the buildings that they own. Rather, they lease from pre-existing buildings, use third party designers to renovate the spaces to their company design and build standards, and sublet to third-parties. The renovations are to provide consistency in their ‘branding’. Their offices can accommodate from 1-500 workers in a tenant space.

4.3.5 Assessment in Thailand:

REGUS is having difficulty expanding into Bangkok. Its international branding standards have created a higher lease costs than is found in other locations in Bangkok, even after renovation. (Buranakul 2014) Small businesses are not as interested in the brand that REGUS has created, and expats seem to be looking for a more local flavor in their work spaces. REGUS seems to gain the most traction with the transient international clients. They are currently working with peoplespace to see what they can do to improve their offices.

4.4 Hubbah

4.4.1 Summary:

HUBBAH claims to be Bangkok’s first co-working space for technology and creative startups. They offer three office spaces for rent on a monthly basis (4,400 bhat), desks daily (260 bhat). The second floor is able to host private gatherings such

as seminars of brainstorm sessions. Their main goal is to create and encourage a culture of entrepreneurism in Bangkok.

4.4.2 Location:

HUBBAH is located near the Ekkamai BTS station. 9 Soi Ekkamai 4, Sukumvit 63 Rd. is about a 14 min walk from the station (1.1 km). The route follows a main road before turning down a smaller, residential soi.

4.4.3 Target User Profile:

The owners, Amarit and Charle Charoenphan are focusing on encouraging inter-business relationships for start-up entrepreneurs of any kind. The space is not intended for long-term occupation, rather as a launching point for new businesses with hopes that they will grow out of the space as they develop. HUBBA provides a community feeling for people to work at their own pace.

4.4.4 Building:

The building is a renovated house offering 6 rooms, 70 desks within 300m². The space is modern while maintaining a communal feeling, with stations to plug into a conference room-style table encouraging community work and discussion.
There is a small kitchen off of the main room, to make coffee or tea, and space for recreation in the backyard. If needed there is a shower upstairs.
They provide 20 Mbps WiFi from True Internet. The average in Thailand was reported at 8.84 Mbps from OOKLA on speedtest.net, dropping to 6.1 Mbps for hotspots in café's and other public spaces.

4.4.5 Assessment of Effectiveness in Thailand:

HUBBA capitalizes on the Thai culture's desire for group support and community work spaces. They provide a platform for the startup 'community' to physically meet and collaborate on ideas. They do a lot of virtual marketing to bring

in the expat freelance community and host weekly events such as lectures or workshops to help with the startups. And the general feeling is that the HUBBA atmosphere motivates people to work.

4.5 The Hive

4.5.1 Summary:

Founded in Hong Kong, Khun Constant Tedder has expanded his fourth co-working space to Bangkok. Wanting to expand to more locations throughout Southeast Asia, he selected Bangkok because of the success of the Thai startup scene.

4.5.2 Location:

On Sukhumvit 49 nearest to Tonglor BTS station, 1.1 km down Klang alley the Hive is about a 13 min walk

.

4.5.3 Target User Profile:

The Hive Bangkok caters to creative freelancers, entrepreneurs, and established 2-8 man companies. They offer flexible part-time, full-time hot desk memberships and workstation memberships starting at 3,200 thb/month.

4.5.4 Building:

The interiors were designed by Alexander Waterworth interiors based in London. A new 6 floor office building now has two floors of open co-working space and two floors of private offices and meeting rooms accommodating between 3 to 20 people. There are also a line of ‘telephone booths’ for two people to work in a quiet space. The 6th floor has a café, rooftop bar, and an events area. The first floors will be open to the public offering a day spa.

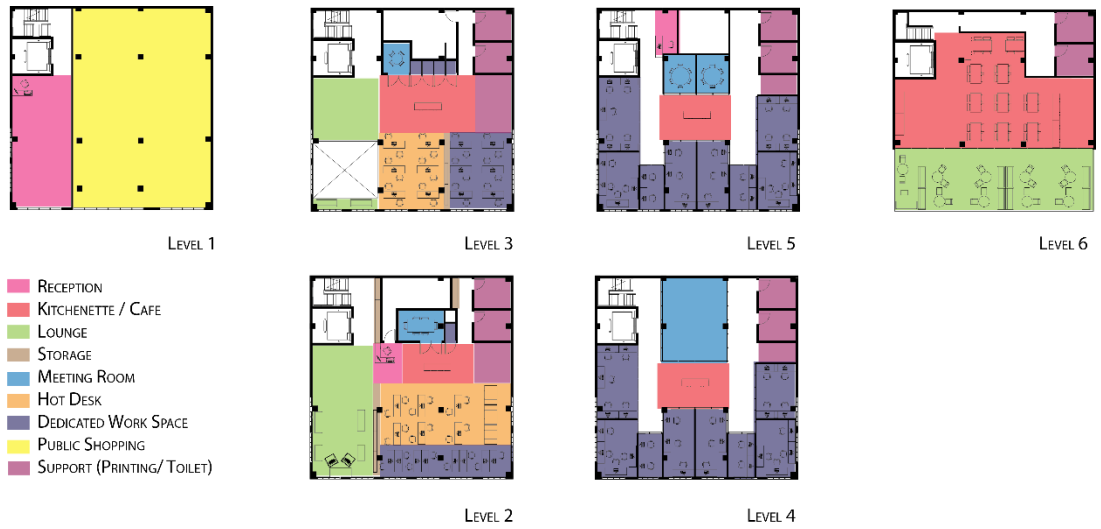


Figure 4. 3 Hive Program Plan

Each floor has large windows to let in maximum light and water stations. There is a sun terrace for collaboration or casual meetings. The hive also has storage lockers for their members to store their work overnight, and a post box so that members can use the Hive as their business address.

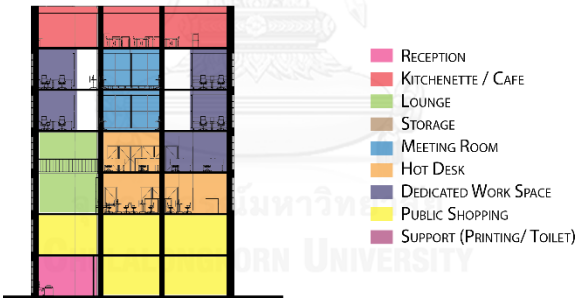


Figure 4. 4 Hive Program Plan

4.5.5 Assessment in Thailand:

The central location of the office is attractive to freelance and creative workers. The place's marketability is increased by the nearby restaurants and the rooftop garden. User reviews always mention the kind and upbeat staff who seem to enchant potential members.

4.6 International Case Study- Ynno Workplace

4.6.1 Summary:

Ynno asked Sprik to create a home base rather than a conventional office since most of

4.6.2 Location:

The Netharlands.

4.6.3 Target User:

Largely transient consulting firm.

4.6.4 Building:

The workspace is designed to facilitate the networking lifestyle of the consulting firm. Rather than having dedicated workspaces, the firm emphasizes touchdown stations and an entirely open floor plan.

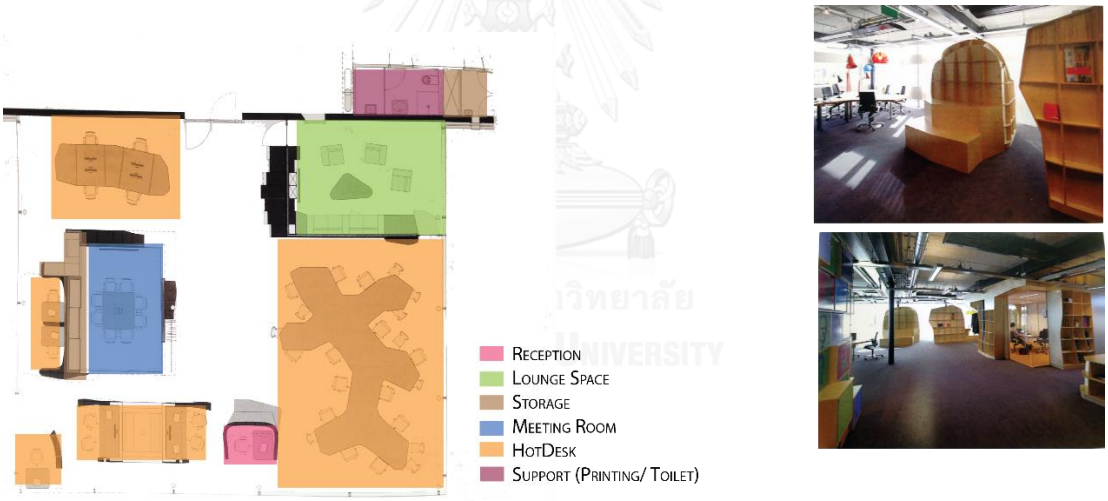


Figure 4. 5 Ynno Program Plan

4.6.4 Assessment:

The Ynno workplace shows how the programming of a workspace can impact the work done in the space. The open plan facilitates easy communication amongst the members, and gives a sense of identity to the largely transient workforce. From this it can be concluded that attempting to create a similar workplace on a larger scale, a sense of identity and connectivity should be maintained.

4.7 International Case Study- Hakhuodo

4.7.1 Summary:

Hakuhodo is one of Japan's largest advertising firms. This project is a joint venture with TBWA to repurpose an old bowling alley as a new office space.

4.7.2 Location:

Tokyo, Japan.

Target User:

A dedicated office space developed for TBWA and Hakhuodo.

4.7.3 Building:

The space was broken up along the lanes and the floor above removed to create a double-height space.

Figure 4. 6 Hakhuodo Program Plan

Because the bowling alley was a column free space, the resulting plan was given a powerful visual rhythm. The circulation and lounge spaces re-create the dynamic of the bowling alley and give a small oasis for relaxation in the large office area.

4.7.4 Assessment:

This case study is significant because it shows that a co-working space doesn't need to be a small affair amongst several starter companies. While simultaneously demonstrating a dissemination of both informal and formal meeting spaces in the office.

Case Study Conclusion

Though co-working and collaborative workspaces are internationally prevalent they have yet to make a very strong presence in Bangkok. Rentable offices in Bangkok seem to be split into two categories. The more traditional large office towers with traditional leases and rents, and co-working spaces targeting smaller businesses and venture projects in Bangkok.

All of the companies studied are located within 20 minutes walking distance of a public transportation station, suggesting that the continued success of office towers should be within a kilometer of a public transit station.

The development of co-working offices on a larger scale in Bangkok has potential as there is a large number of SMEs, freelance expats, and foreign investors from ASEAN. The key to attracting these tenants lies within a centrally located office that has the capability of making one feel as though they are in a relaxed, secluded environment while maintaining a connection to the urban fabric.

CHAPTER V INTERVIEWS

5.1 Objectives

After consulting various literature reviews and evaluating office space usage in Bangkok, two types of interviews were conducted to verify initial conclusions about office practices and user perceptions:

1. Expert Interview
2. Office Worker Survey Interview

In-person interview method was used for expert interviews. Two experts were interviewed, each offering a different perspective on the office design process.

The first interview was with, Khun Ek Buranakul (2014). He is the managing partner of Peoplespace Consulting (Thailand). Khun Buranakul works with companies on efficiency in workplace design. His interview was highly informative in consulting the client perspective in designing the office.

The second interview was with Khun Chakrapan Pawangkrat (2014), a director at Jones Lang LaSalle (JLL). Khun Pawangkrat works in property and asset management. His interview covered the property owner and developers point of view in developing and continued management of the office.

For the office worker interview, a blind survey method was employed to gain understanding of the end user's perception of the spaces and the ways they work. Noting, from the interview with Khun Buranakul that the users' perceptions are not necessarily congruent with the actual use of space. This perspective is important for the design of this project to create a space that is attractive for the people who would use a highly transient office space.

5.2 Survey Content

There were two different questionnaires for the two types of interviews conducted. The professional survey was comprised of more open ended questions, and addressed the design and implementation of office spaces. The office worker survey was a set of multiple choice questions tied to the six architectural influence

categories previously addressed in the literature review. A total of 21 questions were asked as follows:

1. Ways of Working –4 questions
2. Places of work –6 questions
3. Technology in the Workplace –2 questions
4. Working Culture –4 questions
5. Existing and Available Communication Technology –3 questions
6. Climate –2 questions

The sample surveys, and a summary of survey results can be found in the appendix. Note that not all survey respondents answered all questions asked, so the final survey result summary is expressed as a percentage against the number of answers received per question asked for those questions answered. See table 5.1, 5.2, 5.3, and 5.4 for result highlights from the office worker surveys.

Survey Question	Results	Architectural Influence
1. Do you do you work best in a(n)….? คุณเชอบทำงานในสถานที่แบบไหน Choices a. Formal Enviornment eg Closed office ก. ออฟฟิศที่มีประตูปิดแบบมิดชิด (office that is entirely closed) b. Flexible Work Space eg Open office ข. ออฟฟิศที่เปลี่ยนได้ตามความจำเป็น (office that can change based on your needs) c. Relaxed Enviornment eg Starbucks ค. สถานที่ที่มีความผ่อนคลายไปในตัว คล้ายๆ Starbucks	 Percentages 30% 50% 20%	 Places of Work
2. How much time do you spend at your desk every day? คุณนั่งทำงานที่โต๊ะวันละกี่ชั่วโมง Choices a. 6-8 hours ก. 6-8 ชั่วโมง b. 4-6 hours ข. 4-6 ชั่วโมง. c. less than 4 hours ค. น้อยกว่า 4 ชั่วโมง	 Percentages 60% 30% 10%	 Places of Work
3. How much time do you spend working by yourself at your desk every day? คุณใช้เวลาทำงานตามลำพังที่โต๊ะทำงานของคุณวันละกี่ชั่วโมง Choices a. 6-8 hours ก. 6-8 ชั่วโมง b. 4-6 hours ข. 4-6 ชั่วโมง. c. less than 4 hours ค. น้อยกว่า 4 ชั่วโมง	 Percentages 40% 20% 40%	 Ways of Working
4. How much storage do you need for paperwork? คุณต้องใช้ที่เก็บเอกสารมากน้อยเท่าไหร่ Choices a. Small filing cabinet ก. ใช้ตู้เก็บเอกสารแบบเล็กก็พอ b. Lots of Storage ข. ต้องใช้ตู้เก็บเอกสารแบบใหญ่หลายๆใบ c. I work almost entirely digitally ค. ฉันใช้คอมพิวเตอร์/เก็บแบบดิจิทัล	 Percentages 40% 10% 50%	 Ways of Working
5. Would you prefer to work closer to home? คุณเอยากทำงานใกล้บ้านขึ้นหรือไม่ Choices a. Yes . ก. อยาก b. No ข. ไม่อยาก c. As long as there is public transit doesn't matter ค. ไม่เป็นไรถ้าที่ทำงานสะดวกกับการใช้รถไฟฟ้า	 Percentages 80% 0% 20%	 Places of Work
6. Would you prefer to work closer to public transportation? คุณเอยากมีสถานที่ทำงานที่ใกล้ท่ารถไฟฟ้า Choices a. Yes ก. จริง b. No ข. ไม่จริง	 Percentages 100% 0%	 Places of Work

Table 5. 1 Blind Survey Result Summary

Survey Question	Results	Architectural Influence
7. How much of your work is done on the computer? (Including normal e.mails) คุณใช้คอมพิวเตอร์ในการทำงานมากน้อยแค่ไหน Multiple Choice	Percentages	Existing and Available Communication Technology
a. 0% - 30% ก. **0% - 30%**	0%	
b. 40%- 60%. ข. **40%- 60%.**	10%	
c. 60% - 75% ค. **60% - 75%**	0%	
d. more than 75% ง. มากกว่า **75%**	90%	
8. What kind of technology do you use for work? คุณใช้เทคโนโลยีแบบไหนในการทำงาน Choices - Pick all that apply	Percentages	Technology in the Workplace
a. Desktop ก. คอมพิวเตอร์เดสก์ทอป	0%	
b. Laptop ข. แลปท็อป	70%	
c. Tablet ค. แท็บเล็ต	30%	
d. Smartphone ง. สมาร์ท	60%	
e. Cloud storage	60%	
f. Network Storage	5%	
9. Does your office provide a laptop or smartphone for work? ที่ทำงานซื้อแล็บท็อปกับสมาร์ทโฟนไว้ให้คุณทำงานหรือไม่ Choices - Pick all that apply	Percentages	Existing and Available Communication Technology
a. Yes. Laptop ก. ให้แล็บท็อป	10%	
b. Yes. Smartphone ข. ให้สมาร์ทโฟน	0%	
c. Yes, both. ค. ให้ทั้งสองอย่าง	0%	
d. No ง. ไม่ได้ซื้อให้ใช้	90%	
10. How often do you use teleconferences or video conferences? คุณต้องประชุมผ่านโทรศัพท์หรือวิดีโอบ่อยแค่ไหน Choices	Percentages	Existing and Available Communication Technology
a. Not at all. ก. ไม่ต้องใช้	0%	
b. Once a month. ข. เดือนละครั้ง	0%	
c. 2-3 times a month ค. เดือนละ 2-3ครั้ง.	50%	
d. Weekly ง. ทุกอาทิตย์	50%	
11. On average how often do you use meeting rooms? ตามธรรมดาคุณใช้ห้องประชุมมากน้อยแค่ไหน Choices	Percentages	Working Culture
a. Once a week. ก. อาทิตย์ละครั้ง	0%	
b. Once a day. ข. วันละครั้ง	10%	
c. Several Times a day. ค. หลายครั้งต่อวัน	0%	

Table 5. 2 Blind Survey Result Summary

Survey Question	Results	Architectural Influence
12. On average what are the usual size of your meetings? ส่วนมากจะมีกี่คนที่จะเข้าประชุมกับคุณ Choices a. 2-3 people ก. 2-3คน b. 5-10 people ข. 5-10 คน c. 10+ people ค. มากกว่า 10 คน	Percentages 0% 0% 10%	Working Culture
13. For small groups do you prefer having meetings in formal meeting rooms or in relaxed environments eg Starbucks or hotel lobbies. สำหรับการประชุมที่น้อยคน คุณชอบใช้ห้องประชุมเฉพาะหรือใช้สถานที่ที่มีความผ่อนคลายในตัวเช่น Starbucks หรือล็อบบี้ของโรงแรม Choices a. Formal meeting rooms ก. ห้องประชุมเฉพาะ b. Relaxed environments ข. สถานทีทีมีความผ่อนคลายในตัว	Percentages 0% 50%	Working Culture
14. On average how often do you discuss work with co-workers in group settings? ตามธรรมดาคุณเจับกลุ่มเพื่อคุยเรื่องงานกับเพื่อนที่ทำงานบ่อยแค่ไหน Choices a. Once a week. ก. อาทิตย์ละครั้ง b. Once a day. ข. วันละครั้ง c. Several Times a day. ค. หลายครั้งต่อวัน	Percentages 0% 0% 0%	Working Culture
15. Do you find it difficult to concentrate when co-workers are on the phone? เวลาเพื่อนงานของคุณเคยโทรทัพท์ คุณเจะเสียสมาธิในการทำงานหรือไม่ Choices a. Yes. ก. รู้สึกเสียสมาธิ b. No. ข. ไม่เสียสมาธิ c. They use a different area when they make phone calls ค. เขาจะใช้ที่อื่นคุยโทรทัพท์	Percentages 0% 0% 0%	Ways of Working
16. Are there recreational group spaces? ที่ทำงานคุณมีสถานที่สำหรับให้พนักงานใช้เวลาผ่อนคลายโดยเฉพาะหรือไม่ Ex: Kitchen, Gym, Library, TV/Game room, Outdoor Relaxing areas... Choices a. Yes. ก. มี b. No. ข. ไม่มี c. No, but I would like some ค. ไม่มีแต่อยากให้มี	Percentages 0% 10% 0%	Places of Work
17. What kind of recreational spaces would you like? คุณเอยากใด้สถานที่ผ่อนคลายแบบไหน Choices - Pick all that apply Ktichen เช่น ครัว Gym โรงยิม Library ห้องสมุด Outdoor Relaxing Areas สวนร่มให้พักผ่อนหรือเดินเล่น Shopping ช้อปปิ้ง Other	Percentages 40% 40% 40% 80% 70% 10%	Places of Work

Table 5. 3 Blind Survey Result Summary

Survey Question	Results	Architectural Influence
18. Do you prefer natural light or electric? คุณชอบแสงธรรมชาติหรือแสงไฟฟ้า Choices a. Natural. ก. แสงธรรมชาติ b. Electric ข. แสงไฟฟ้า c. Depends on the time of day. ค. แล้วแต่เวลาของวัน	 Percentages 0% 0% 40%	 Climate * 100% of all answered
19. Do you often change the area that you work in? คุณต้องใช้สถานที่ต่างๆทำงานบ่อยแค่ไหนEx: Designated work station; Group area, Meeting space, Touch Down areas... Choices a. I stay at my desk all day. ก. ฉันอยู่ที่โต๊ะของฉันตลอดวัน b. I change a few times. ข. ฉันก็มีเปลี่ยนบ้าง c. I am always on the move. ค. ฉันเปลี่ยนที่บ่อย	 Percentages 40% 0% 0%	 Ways of Working * 100% of all answered
20. Are you in control of turning on and off the light space in your work space? คุณสามารถเปิดและปิดไฟในที่ทำงานของตัวเองได้ไหม Choices a. Yes. ก. ได้ b. No. ข. ไม่ได้ c. No but I don't care ค. ไม่ได้และก็ไม่มีความจำเป็น d. No but I would like to ง. ไม่ได้แต่อยากจะให้เป็นไปได้	 Percentages 0% 0% 0% 20%	 Climate * 100% of all answered
21. Are you in control of changing the A/C throughout the day in your work space? คุณสามารถเปิดและปิดแอร์ในที่ทำงานของตัวเองได้ไหม Choices a. Yes. ก. ได้ b. No. ข. ไม่ได้ c. No but I don't care. ค. ไม่ได้และก็ไม่มีความจำเป็น d. No but I would like to. ง. ไม่ได้แต่อยากจะให้เป็นไปได้	 Percentages 0% 0% 0% 10%	 Technology in the Workplace * 100% of all answered

Table 5. 4 Blind Survey Result Summary

From the blind results survey, we can conclude that a flexible office spaces that offer amenities of recreational spaces and are located near public transportation further out from the city center are highly desirable.

Applying knowledge gained from the expert interviews, we learn that the space planning prior to the economic crisis in 2009 was focused on work/ life balance, while now we focus on cost savings to support corporate goals. ASEAN will bring more work to Thailand because Thailand has a lot of land available for

development as well as rent and labor costs still being cheap. Location and convenience of office buildings are the first things facility managers consider. As a supplement to head offices in the center of Bangkok, part time suburban hubs with metro will allow for campus lifestyle and be desirable as they offer cost effective office space and conveniences to workers. (Buranakul 2014)

Khun Pawangkrat emphasized the importance of common areas and amenities in the office buildings as a point of attraction. He stated that the materials used would define the type of client you would attract. More stately materials such as granite and marble would attract an older clientele, while lighter materials such as stainless steel and repurposed materials would act as a lure to generation Y and the millennials. From a property management standpoint, the largest cultural concern would be allowing 1m² space for a spirit house or *san pra pome.* The finalized location, however would be determined and blessed by monks. The proximity of a *talat* or other shopping spaces within the site would be the second most prevalent item culturally.

5.3 Survey Conclusion

Conclusions derived from the interviews point to the future of part time, flexible office spaces located near public transportation in the suburban hubs of Bangkok as a growth area for future offices to support continued corporate cost saving goals. These spaces can be an extension of the head offices and thus be highly connected both physically and technically via the metro-rail and advanced communication technology respectively. Skilled next generation workers who grew up with constant mobile communication of anywhere-anytime at the speed of now have also enjoyed the independence from traditional computer lab in schools and will be looking for similar accommodations in their work environment. Also important is the enhancement of the office environment with ease of access to shopping and recreational activities.

CHAPTER VI DESIGN PROPOSAL

Based on the literature review, interviews, and office space usage studies, the architectural requirements for designing a future office space in Bangkok can be evaluated by both qualitative and quantitative elements. These can be further grouped into the 6 architectural influenced used to evaluate the literature review.

The building type will target SMEs, independent foreign freelancers, as well as providing office space for the investors drawn to Bangkok with ASEAN accommodating startups with up to 26 employees. It will provide plug-and-play workspaces, allowing the SME's to concentrate on their businesses while they handle leases, security, and bandwidth. The office complex will function on a 24/7 time schedule, where the entire building is open from 7am -10 pm. For the other 9 hours only the first two floors will be open to the public, still offering hot-desk services and providing access to the shops, some office spaces, and a few meeting areas. This type of office complex will accommodate more fast-growing startups in one space than any other currently employed in Bangkok.

6.1 Spatial Programming

Qualitative Architectural Conclusions for high turnover transient office buildings:

Ways of Working

- More flexible workspace, without the need for a large desktop computer.
- Already more sharing/ less private spaces in the working environment.
- Employ an overall layout of 'large' centralized spaces broken up with smaller/ fragmented segregated spaces.
- Provide 'quiet zones' for focused work or 'phone booths' for conversations to help with effective concentrated work.
- Need spontaneous and structured meeting spaces to provide satisfaction with communication quality within office spaces.

Places of Work

- Build in the city outskirts along existing or mass transit lines that are being built
- Offer flexibility in types of office spaces: Transient, Short Term, and Long Term.
- Enable access to views for the workers.
- Lighting levels should vary to create a more active circulation
- Use a variation in volume to generate movement and visual rhythm of space

Technology in the Workplace

- Technology enables layering of multiple users in one workspace over a day instead of requiring dedicated space for each employee.
- An automated system started at the arrival occupants and ending at their departure most effective use of shading and lighting technology.

Working Culture

- Use multiple textures, furnishings, lighting in each space to make it less artificial.
- Allow for user influence: encourage writing on glass walls, moving furniture, façade influence

Existing and Available Communication Technology

- Should have a support staff for helping facilitate use of multi-media and other related IT affairs.
- Dedicated IT support space should be easily located for both transient and long-term users.
- Use a variety of sound-dampening materials to reduce the overall transmittance of sound in large work areas.

Climate

- Use smaller offices with user operable permeations in the façade.

Quantitative Architectural Conclusions for high turnover transient office buildings:

Ways of Working

- Within one working space the separation between coworkers should be no more than 25m

Places of work

- Should maintain about 4m² per dedicated work space, but have a much larger emphasis of the overall workspace dedicated towards shared spaces such as: meeting rooms, coffee/ café areas, lounge areas, storage spaces, and break areas.
- Average interiors: Floor to false ceiling-- 2.63m; Depth--12.6m; Window shading—tinted glazing; sill height—0.71m

Technology in the Workplace

- Space needed in 2014 is less than 2005 when desktops were standard issue because of the advancement of mobile technology such as laptops, tablets, smartphones, internet, and cloud storage.
- Reduce energy costs by powering only those areas in use

Working Culture

- Include a small temple for worship somewhere on the site.

Existing and Available Communication Technology

- Can infer a higher need for outlets in semi-transient spaces as well as need of dedicated space for a fast internet connection and a large server to support users

Climate

- Primary shading device (integrated into the façade should be separate from secondary shading devices (controlled by users)
- Use native trees with large canopies to shade cars and reduce the heat island effect
- Use permeable paving in parking areas to reduce runoff and attribute open space on ground floor.
- Veranda spaces (1.5m-2m) should be used as DSF to allow for appropriate shading and ventilation in between workspaces and the exterior of the building.

- Penetration of daylight: Minimum 300lx at 3.5m and 500lx 3m; Maximum North and south 8-8.5m; Maximum East and West 9.7-9.8m

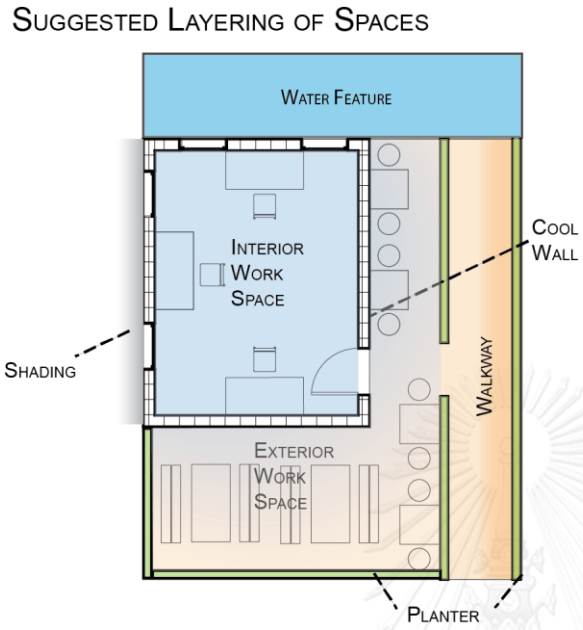


Figure 6. 1 Suggested Layering of Spaces

The layering of interior to exterior zones would aim to create a micro climate within with in the office complex. The enclosed work space is equipped with individual AC units, allowing the users to control the temperature as well as turn it off when they leave. The exterior work areas would be used for more casual meetings and interactions, chilled by their proximity to the enclosed work spaces through a cool wall, and cross wind temperatures lowered by the planters and the screen acting as a buffer zone.

6.2 Ways of Working

In the literature review, it was found that autonomous workers are more likely to want to control their own working environments. Thanks to mobile ways of working, the working environment is evolving; according to the survey, more than 50% work almost entirely digitally. The survey also found that while 40% of workers spend their days mainly at their desk, another 40% spend less than 4 hours a day on solitary work, spending a significant amount of time on collaborative work. The literature review found that frequent communication requires physical proximity of 25m, but ergonomics requires 4m² per dedicated workspace. For effective collaborative working environments, a mix of casual and formal spaces is needed.

6.2.1 Office Design

To accommodate flexibility in the working environment, transient, short term, and long term tenants would be accommodated by various memberships. Similar to Regus' hoteling concept, transient workers would be able to pay per day or for a part-time membership. Short term members can pay for their workspace per month, and long term would be able to renew membership per year or even engage in a traditional 3-5 year contract.

The design of the individual offices were based on the 4m² minimum per dedicated workspace and included office circulation. Three different office sizes for SME's companies having 5-6, 10-13, or 20-26 people. The smallest module 56m², the medium size office at 133m², and the largest office 227m². As inspired from Ynno Workplace's facilities catering to their transient workforce, the interiors would be fitted for a more interactive and collaborative ways of working. Clients can choose between open plan and team office spaces, and each office would be equipped with individual air conditioning units, and operable windows to let the tenants control their workspace. Following Wisdom's example, despite some offices being located in the center of the floor plate, there is still an opportunity for views due to the courtyards between the dedicated workspaces. The total of different office types for rent is 12. Three different sizes with two different ways of working. (See Figure 6.2 and 6.3)

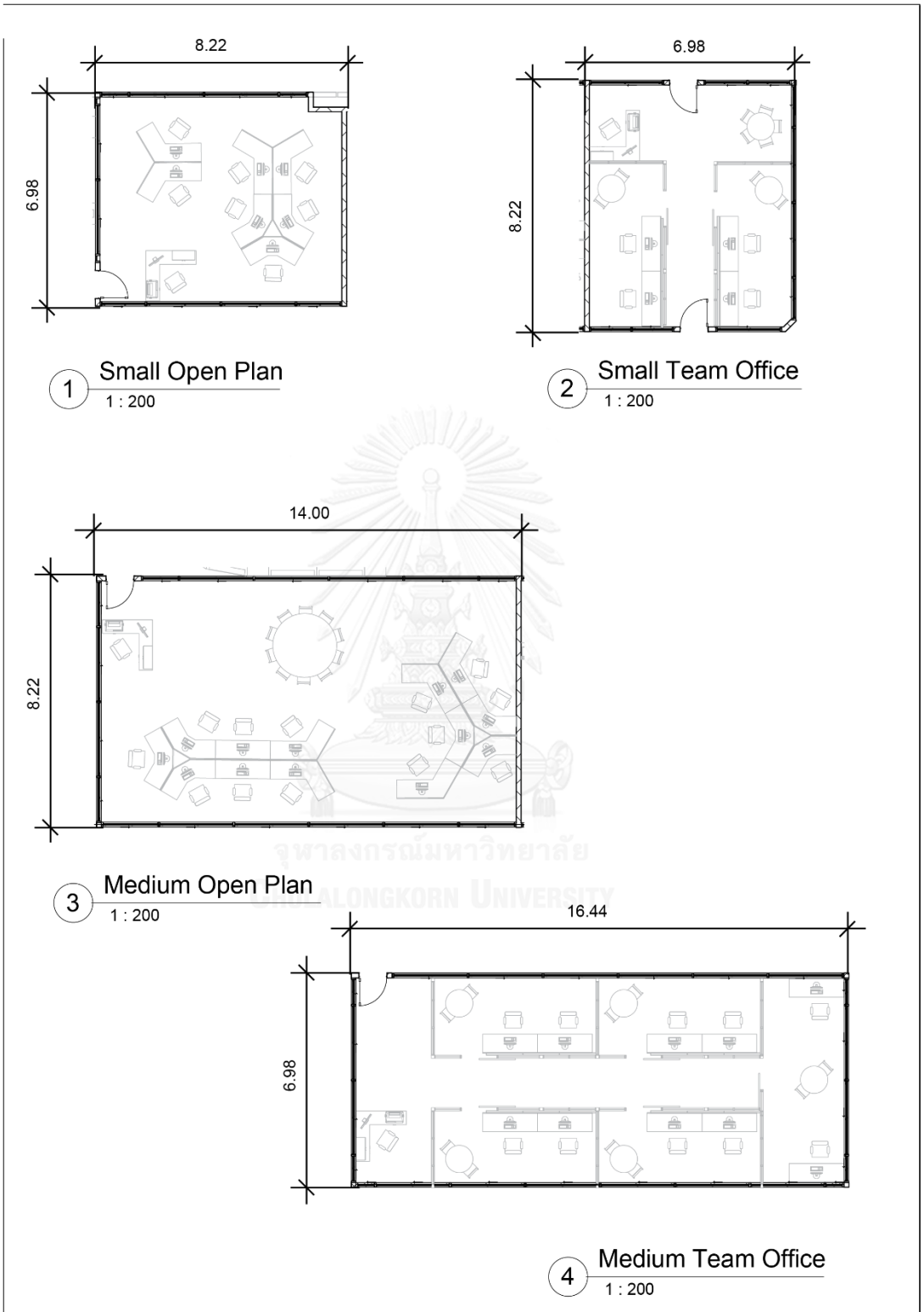
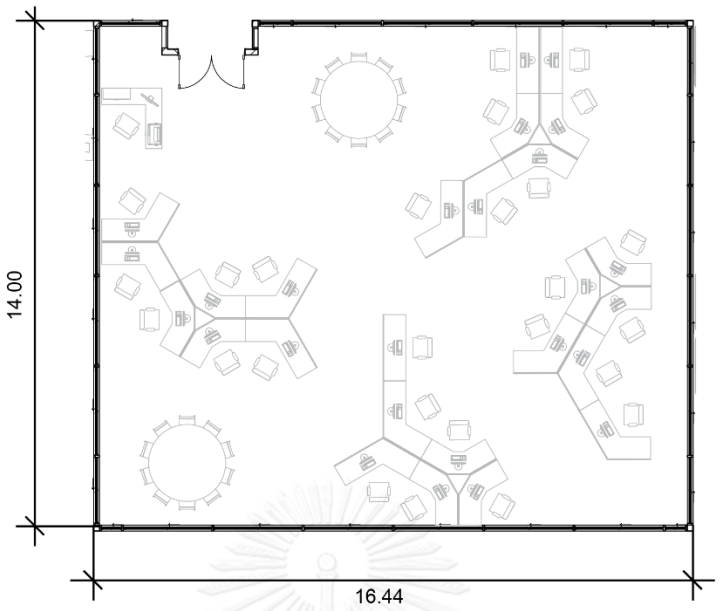
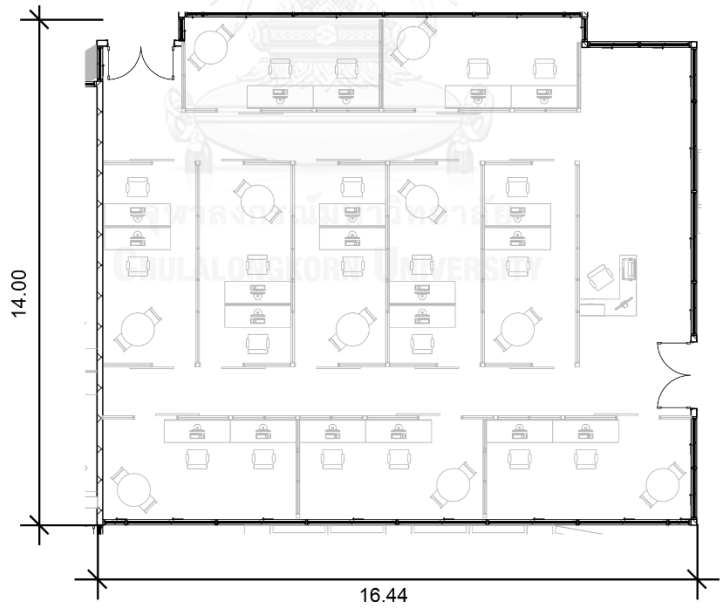


Figure 6. 2 Small and Medium Office Layouts



1 Large_OpenPlan
1 : 200



2 Large_TeamOffice
1 : 200

Owner Project Name	Author Checker	Office Spaces Cont.	Date Scale	Issue Date 1 : 200

Figure 6. 3 Large Office Space Layout

The space between two workers in the same office should be no larger than 25m for frequent interactions and adequate communication among the members in an office. To ensure that the distance between two workers is no greater than 25m in a designated office the largest office dimension is 16.44m.

Meeting rooms, and transient workspaces would be separate from the dedicated office spaces, and available for reservation at the reception. (See Figure 6.5) This will create a more active working environment and reduce dedicated spaces within the office going unused for long periods of time. Automatic lighting and programmable cooling would be used throughout the building. The system would start half an hour before a scheduled meeting and motions sensors would shut the lighting and cooling systems off after the users have left the room.

The areas between each of the rooms act as exterior courtyards for circulation, the perimeter will be lined with plants to cool the south-west wind that blows across the site. Inspired by the inter-business relationships at HUBBAH, the exterior courtyards also act as casual meeting and lounge spaces and allow for visual connections not only on each floor, but to the surrounding buildings as well. There are various types of courtyard spaces to appeal to different types of work. (See Figure 6.6)

Despite its small size, Peoplespace offered three different relaxing community spaces. Following their example, the designed office complex offers three different casual workspaces. Reading areas allow for small groups of people to chat in semi-private spaces. Transient work areas have high desks and

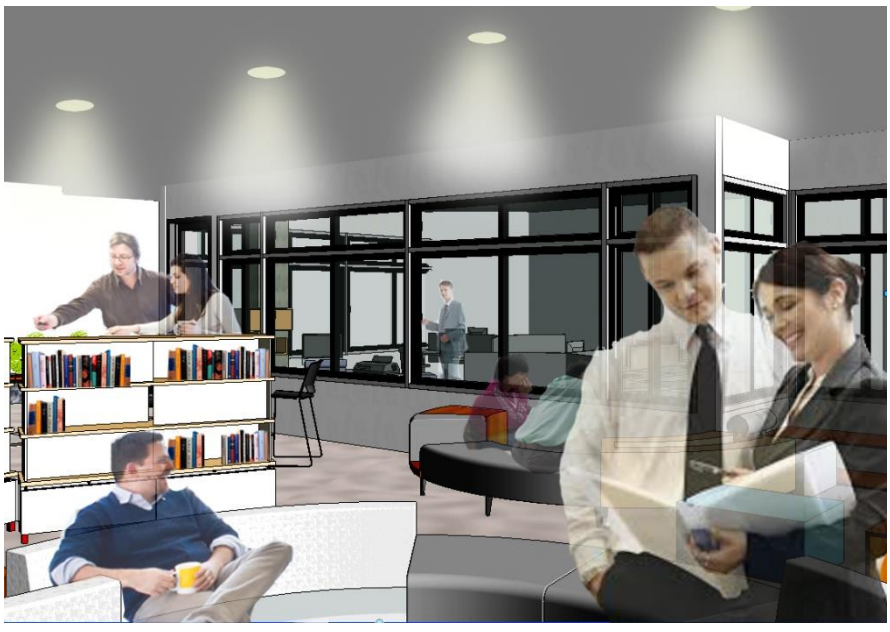
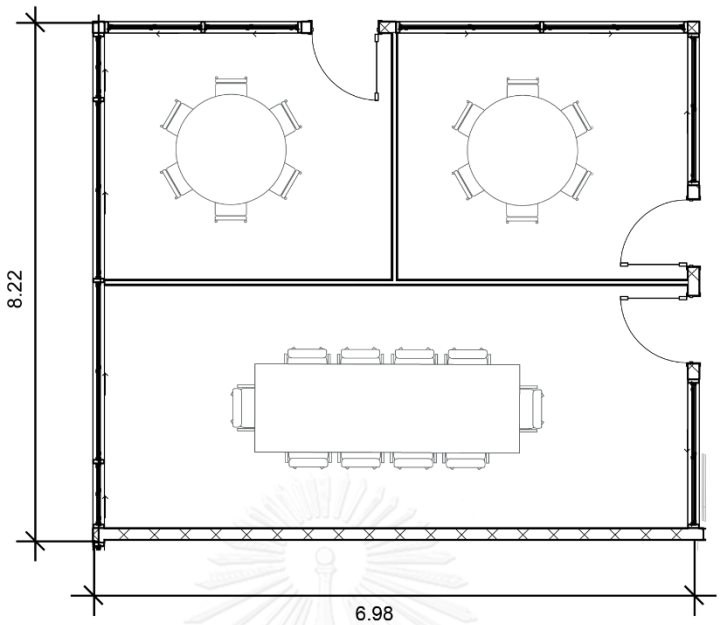
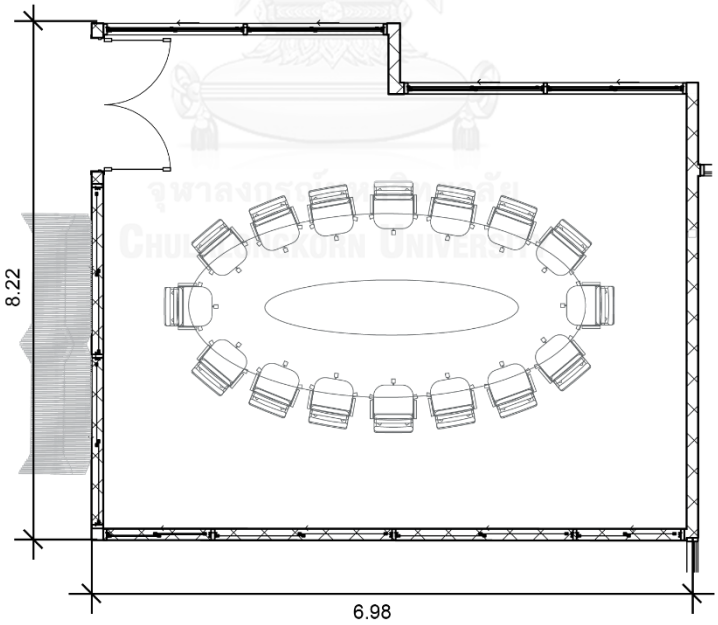


Figure 6. 4 Office Reading and Casual Meeting Area

stools for touchdown stations, and lounge furniture for casual gatherings. The casual meeting areas provide an alternative semi-private space for larger groups to discuss around a coffee table.



1 Small and Medium Meeting Rooms
1 : 100



2 Large Meeting Room
1 : 100

Owner Project Name	Author Checker	Meeting Rooms	Date Scale	Issue Date 1 : 100

Figure 6. 5 Formal Meeting Spaces

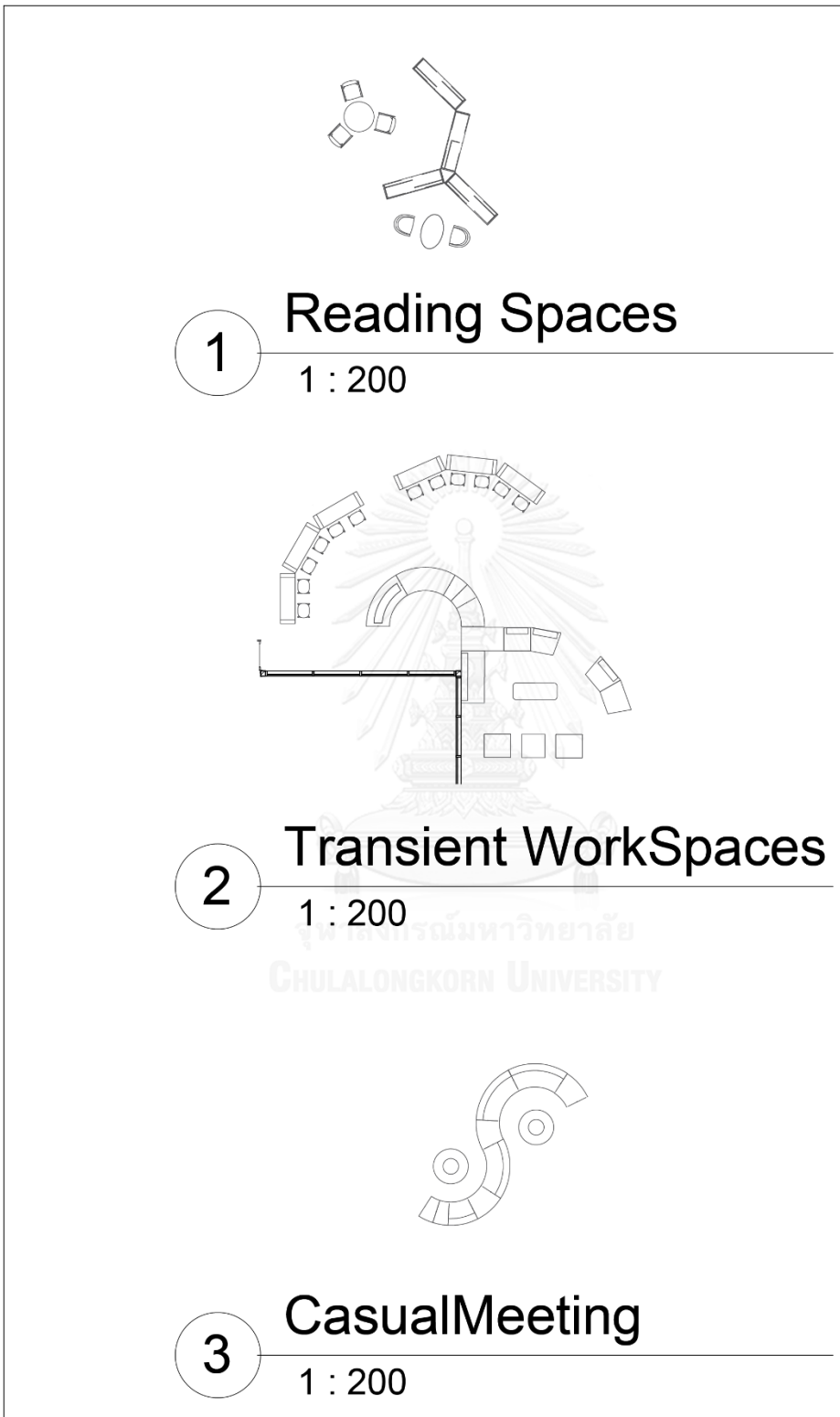


Figure 6. 6 Casual Work Spaces

6.3 Places of Work

As evaluated from the literature review and its application to Thailand, building higher office tower blocks in the city center increases the problem of urban congestion in Bangkok. Developers should instead look towards new urban hubs centered around public transportation stations. The office complex should also be near a residential area, and have a range of amenities to support living and working in the immediate area. In addition, if possible, the complex should be located no farther than 800 meters from a public transit station in order for it to maintain its urban connectivity. Though, as noted by Khun Pawangkrat (2014) due to the climate of Bangkok, most people feel that more than 200 meters is too far of a distance to walk.

6.3.1 Site Selection Considerations and Restrictions

Following Regus' example, the site selection was made along the existing BTS lines in the suburban zone of Bangkok. Though it may be more financially beneficial to develop along the planned BTS lines, due to the regulations in Bangkok, there is no guarantee as to when the line may actually be completed, resulting in loss of potential profits after the building is initially completed.

The Bangkok Zoning map and chart were used to determine the land usage and set up initial parameters for the design of the office complex on site. (Figure 6.7 and 6.8) To help determine the applicability a rough massing of three different office sizes based on the literature review recommendations was used. The small office to accommodate 5 people at 56m², the medium office module to accommodate 10 people at 113m². And finally the large office for 20 people at 227m².

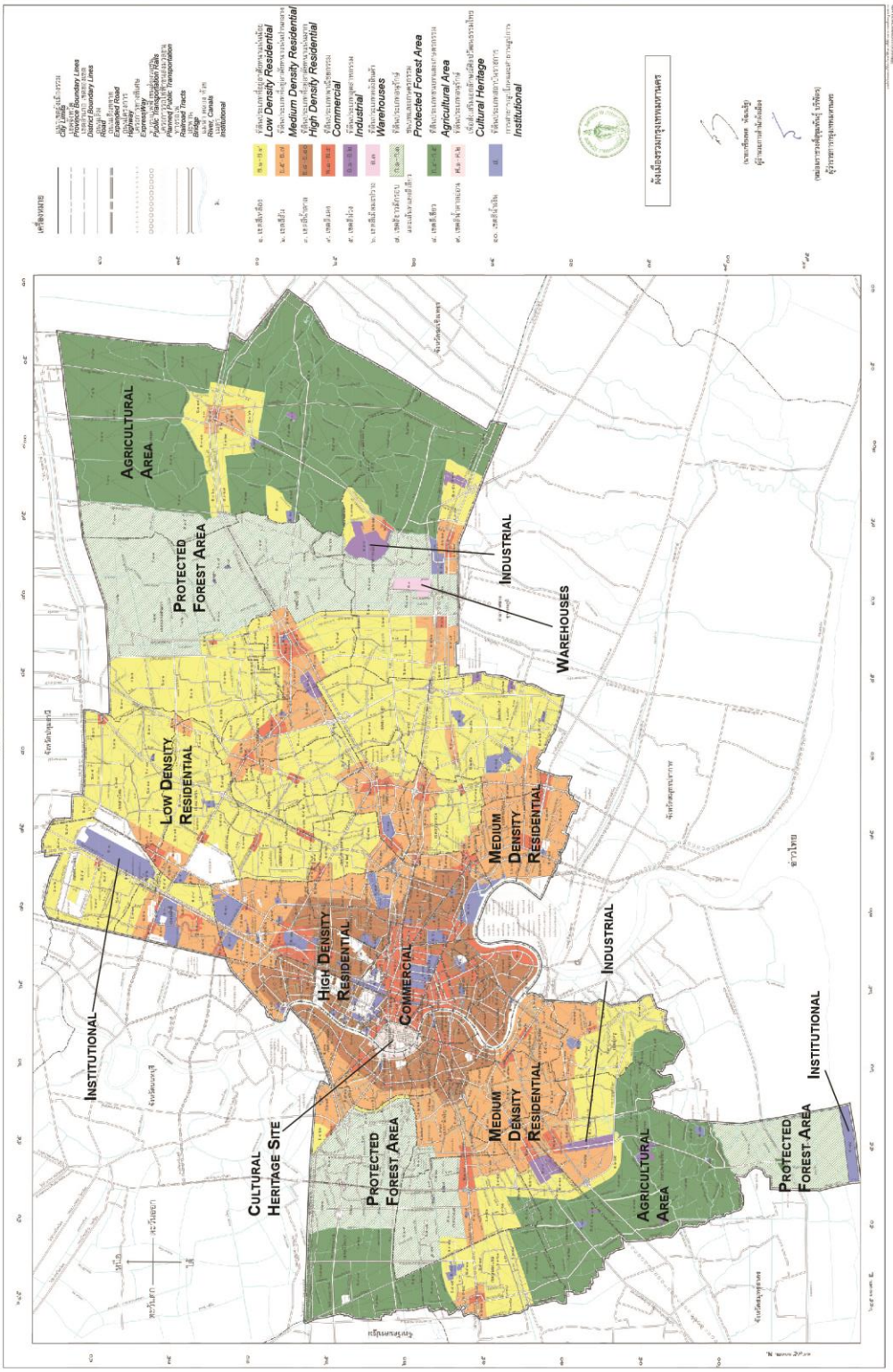


Figure 6. 7 Bangkok Zoning Map

สรุปข้อกำหนดการใช้ประโยชน์ที่ดินตามกฎกระทรวงให้ใช้บังคับผังเมืองรวมกรุงเทพมหานคร พ.ศ. 2556

การใช้ประโยชน์ที่ดินประเภท	ย1	ย2	ย3	ย4	ย5	ย6	ย7	ย8	ย9	ย10	พ1	พ2	พ3	พ4	พ5	อ1	อ2	อ3	ก1	ก2	ก3	ก4	ก5	ศ1	ศ2
ที่ดินว่างเปล่า																									
ที่อยู่อาศัยประเภทบ้านเดี่ยว	x																		x	x	x	x			
ที่อยู่อาศัยประเภทบ้านแถว	x	1																	x	x	x	x			
ที่อยู่อาศัยประเภทห้องแถว ตึกแถว	x	2																	x	x	x	x			
ที่อยู่อาศัยประเภทอาคารอยู่อาศัยรวม พื้นที่ไม่เกิน 1,000 ตารางเมตร	x	2																	x	x	x	x	4		
ที่อยู่อาศัยประเภทอาคารอยู่อาศัยรวม พื้นที่ไม่เกิน 2,000 ตารางเมตร	x	x	3															x	x	x	x	x	x	x	x
ที่อยู่อาศัยประเภทอาคารอยู่อาศัยรวม พื้นที่ไม่เกิน 5,000 ตารางเมตร	x	x	3	1*															x	x	x	x	x	x	x
ที่อยู่อาศัยประเภทอาคารอยู่อาศัยรวม พื้นที่ไม่เกิน 10,000 ตารางเมตร	x	x	3	1*							x	2	2			x	x	x	x	x	x	x	x	x	x
ที่อยู่อาศัยประเภทอาคารอยู่อาศัยรวม พื้นที่ไม่เกิน 10,000 ตารางเมตร	x	x	x	x	3	3	3				x	3	3			x	x	x	x	x	x	x	x	x	x
พาณิชยกรรมประเภทห้องแถว ตึกแถว	x	2	1																x	x	x	x			
พาณิชยกรรมพื้นที่ไม่เกิน 100 ตารางเมตร																									
พาณิชยกรรมพื้นที่ไม่เกิน 300 ตารางเมตร	x	2																	2	2	2	2			
พาณิชยกรรมพื้นที่ไม่เกิน 500 ตารางเมตร	x	3	2													2	x	x	x	x	x	3	2		
พาณิชยกรรมพื้นที่ไม่เกิน 1,000 ตารางเมตร	x	x	3													3	x	x	x	x	x	3			
พาณิชยกรรมพื้นที่ไม่เกิน 2,000 ตารางเมตร	x	x	x	2												x	x	x	x	x	x	x	x	x	2
พาณิชยกรรมพื้นที่ไม่เกิน 5,000 ตารางเมตร	x	x	x	x	2											x	x	x	x	x	x	x	x	x	x
พาณิชยกรรมพื้นที่ไม่เกิน 10,000 ตารางเมตร	x	x	x	x	3	3	2	2	1	1	2	2	1			x	x	x	x	x	x	x	x	x	x
พาณิชยกรรมพื้นที่เกิน 10,000 ตารางเมตร	x	x	x	x	x	x	3	3	2	2	x	3	3	2	2	x	x	x	x	x	x	x	x	x	x
สำนักงานประกอบกิจการเล็กน้อย ตึกแถว	x	2	1																x	x	x	x			
สำนักงานพื้นที่ไม่เกิน 100 ตารางเมตร																									
สำนักงานพื้นที่ไม่เกิน 300 ตารางเมตร	x	2																	x	x	x	x	1		
สำนักงานพื้นที่ไม่เกิน 500 ตารางเมตร	x	x	2	1	1													x	x	x	x	x	x		
สำนักงานพื้นที่ไม่เกิน 1,000 ตารางเมตร	x	x	x	2	1											x	x	x	x	x	x	x	x		
สำนักงานพื้นที่ไม่เกิน 2,000 ตารางเมตร	x	x	x	x	x	2	2	1								x	x	x	x	x	x	x	x	x	
สำนักงานพื้นที่ไม่เกิน 5,000 ตารางเมตร	x	x	x	x	x	3	2	2								x	x	x	x	x	x	x	x	x	
สำนักงานพื้นที่ไม่เกิน 10,000 ตารางเมตร	x	x	x	x	x	x	2	3			2	2	2			x	x	x	x	x	x	x	x	x	2
สำนักงานพื้นที่เกิน 10,000 ตารางเมตร	x	x	x	x	x	x	x	x	2	1	x	3	3	2	1	x	x	x	x	x	x	x	x	x	x
โรงแรมไม่เกิน 50 ห้อง	x	2	2	2												x	x	x	x	x	x	x	x		
โรงแรมไม่เกิน 80 ห้อง	x	3	3	3	2	2	2	2								x	x	x	x	x	x	x	x		
โรงแรมเกิน 80 ห้อง	x	x	x	x	3	3	2	2	1	1	2	2	2	2	1	x	x	x	x	x	x	x	x	x	x
คลังสินค้าพื้นที่ไม่เกิน 1,000 ตารางเมตร	1	1	1	1	1	1	1	1								x	x	x	1	1	1	1	1	1	1
คลังสินค้าพื้นที่ไม่เกิน 2,500 ตารางเมตร	x	x	2	2	2	2	2	2	1	1	2	2	1	1	1	x	x	x	x	x	x	2	2	x	x
คลังสินค้าพื้นที่ไม่เกิน 5,000 ตารางเมตร	x	x	3	3	3	3	3	x	x	x	3	3	3	x	x	x	x	x	x	x	x	3	3	x	x
คลังสินค้าพื้นที่เกิน 5,000 ตารางเมตร	x	x	3	3	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	3	3	x	x
คลังน้ำมันเชื้อเพลิง/สถานีบริการน้ำมันเชื้อเพลิงเพื่อการจำหน่าย	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	3	x	x	x
สถานีบำรุงรักษาทางหลวง	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	x	x
สถานีขนส่งผู้โดยสาร/สถานีรับส่งผู้โดยสารประจำทาง/ท่าอากาศยาน	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11
สถานีขนส่งสินค้า/ที่ทำการไปรษณีย์โทรเลข	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	3	x	x	x
สถานีตำรวจ/ที่ทำการรักษาความสงบเรียบร้อย	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	x	1	1	1	1	1	1	x	x
หอบังคับการ/ที่ทำการหน่วยงานป้องกันและบรรเทาสาธารณภัย	x	x	3	3	3	3	3	3	2	2	3	2	3	2	2	x	x	x	x	x	x	x	x	x	x
สถานีดับเพลิง	x	x	x	x	x	x	x	x								x	x	x	x	x	x	x	x	x	x
โรงฆ่าสัตว์	x	x	x	3	3	3	3	3								x	x	x	x	x	x	x	x	x	x
สวนสนุก	x	x	3	3	3	3	3	3	3	3	3	3	3	3	3	x	x	x	x	x	x	3	3	x	x
สถานแสดงสัตว์	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x		x	x	x
สนามกีฬากลางแจ้ง	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x		x	x	x
สนามแข่งม้า	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x		x	x	x
สนามยิงปืน	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x		x	x	x
หรวดสัตว์	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	3	x	x	x
สถานสงเคราะห์หรือรับเลี้ยงสัตว์					x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x			x	x
โรงงานประเภทพืชและสัตว์	x	x	3	3	3	3	3	3	3	3	3	3	3	x	x	3	3	3	x	x	x	x	3	x	x
โรงงานที่เกิน 100 แรงม้า แต่ไม่เกิน 500 แรงม้า	x	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	x	x	x	3	3	x	x
โรงงานที่เกิน 500 แรงม้า	x	x	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	x	x	x	3	3	x	x
โรงงานที่เกิน 500 แรงม้า	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	3	3	3	x	x	x	3	3	x	x
หน่วยงานของกรุงเทพมหานคร (ขึ้นตรง)	x	x	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	x	x	10	10	x	x
โรงฆ่าสัตว์/โรงชำแหละ	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x		x	x		x	x	x
โรงไฟฟ้าบริษัทสาธารณูปการ	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x		x	x			x	x
การเลี้ยงสัตว์เพื่อการค้า	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x				x	x
การเพาะเลี้ยงสัตว์น้ำเค็ม/น้ำกร่อย	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x		4	x	x	x
สถานีประกอบกิจการ	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	x	x	x	x	2	x	x	2	x	x
สถานที่เก็บ/ลานรับฝากสิ่งของ/ที่ตากวัสดุส่งขึ้นรถ	x	x	x	x	3	3	3	3	3	3	3	3	3	3	3				x	x	x	3	3	x	x
การรื้อถอน/เก็บชิ้นส่วนเครื่องจักรกลเก่า	x	x	x	2	2	2	2	x	x	x	2	2	x	x	x				x	x	x		x	x	x
การขุดดิน/ถมดิน/ปรับพื้นที่ว่างเกิน 100 ตารางเมตร (เป็นบางกรณี)	x	2	2	2	2	2	2	x	x	x	x	x	x	x	x			x	2	x	2	2	2	x	x
การดำรงสัตว์ป่าอนุรักษ์	x	6	6	6	x	x	x	x	x	x	x	x	x	x	x	6	6	6	x	x	x	6	6	x	x
การสกัดทรัพยากรธรณี	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	5	5	5	5	x	x	5	x	x	x
ฌาปนสถาน/สถานปฏิบัติธรรม	5	5	5	5	5	5	5	/	/	/	/	/	/	/	/	5	5	5	5	x	x			/	/
สถานศึกษาระดับต่ำกว่าอุดมศึกษา																x	x		6	6					
สถานศึกษาระดับอุดมศึกษา/อาจารย์ที่พักอาศัย	x	x	x	x	2	2	2	2	2	2	2	2	2	2	2	x	x	x	x	x	x	x	x	2	2
สถานพยาบาล																5	5	6		6					
สถานสงเคราะห์หรือรับเลี้ยงคนชรา																x	x	x							
สถานสงเคราะห์หรือรับเลี้ยงคนพิการ																x	x	x							
ป้ายโฆษณา	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	x	4	4	4	x	x
ที่พักอาศัยชั่วคราวสำหรับคนจน	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10			10	10
อัตราส่วนพื้นที่อาคารรวมแต่ละชั้นต่อที่ดิน – FAR [7] (ร้อย 1)	1	1.5	2.5	3	4	4.5	5	6	7	8	5	6	7	8	10	2	1.5	1	0.5	1	0.5	1	1	3	4
อัตราส่วนพื้นที่ว่างต่อพื้นที่อาคารรวม – OSR [8] (ร้อยละ)	40	20	12.5	10	7.5	6.5	6	5	4.5	4	6	5	4.5	4	3	15	20	40	100	40	100	40	40	10	7.5
ที่ว่างด้านหน้าอาคาร (เมตร) [9]	2	2 [*]																	2	2	2	2	2		
ที่ว่างหลังห้องอาคาร (เมตร) [10]	2	1																	1	1	1	1	1		
ที่ว่างด้านข้างอาคาร (เมตร) [9]	2	2																	2	2	2	2	2		
ระยะแปลงที่ดินต่ำสุดไปโครงการจัดสรร (ด้านกว้าง)	100	50 [*]																	1000	100	1000	100			
หรวดสูงสุด (แปลง)	12	12																	12	12	12	12	12		

เงื่อนไข
X = ไม่อนุญาต
1* = เมื่อปลั๊งผู้รับผลกระทบมีเขตทางไม่น้อยกว่า 10 ม./หรือผู้ใช้ระยะ ≤ 500 ม. จากสถานีรถไฟฟ้าขนส่งมวลชน
1 = เมื่อปลั๊งผู้รับผลกระทบมีเขตทางไม่น้อยกว่า 12 ม./หรือผู้ใช้ระยะ ≤ 500 ม. จากสถานีรถไฟฟ้าขนส่งมวลชน
2 = เมื่อปลั๊งผู้รับผลกระทบมีเขตทางไม่น้อยกว่า 16 ม./หรือผู้ใช้ระยะ ≤ 500 ม. จากสถานีรถไฟฟ้าขนส่งมวลชน
3 = เมื่อปลั๊งผู้รับผลกระทบมีเขตทางไม่น้อยกว่า 30 ม./หรือผู้ใช้ระยะ ≤ 500 ม. จากสถานีรถไฟฟ้าขนส่งมวลชน
4 = เมื่อปลั๊งผู้รับผลกระทบมีเขตทางไม่น้อยกว่า 40 ม./หรือผู้ใช้ระยะ ≤ 500 ม. จากสถานีรถไฟฟ้าขนส่งมวลชน
5 = เมื่อปลั๊งความเดือดร้อนเนื่องจากการจราจร
6 = เมื่อปลั๊งการใช้ประโยชน์ที่ดินตามกฎกระทรวงนี้ ก่อให้เกิดผลกระทบต่อการจราจรและการคมนาคมขนส่ง
7 = เมื่อปลั๊งการใช้ประโยชน์ที่ดินตามกฎกระทรวงนี้ ก่อให้เกิดผลกระทบต่อการจราจรและการคมนาคมขนส่ง
8 = เมื่อปลั๊งการใช้ประโยชน์ที่ดินตามกฎกระทรวงนี้ ก่อให้เกิดผลกระทบต่อการจราจรและการคมนาคมขนส่ง
9 = เมื่อปลั๊งการใช้ประโยชน์ที่ดินตามกฎกระทรวงนี้ ก่อให้เกิดผลกระทบต่อการจราจรและการคมนาคมขนส่ง
10 = เมื่อปลั๊งการใช้ประโยชน์ที่ดินตามกฎกระทรวงนี้ ก่อให้เกิดผลกระทบต่อการจราจรและการคมนาคมขนส่ง

(ก) FAR (Floor Area Ratio) "อัตราส่วนพื้นที่อาคารรวมต่อพื้นที่ดิน" หมายความว่า อัตราส่วนพื้นที่อาคารรวมทุกชั้นของอาคารทุกหลังที่ตั้งอยู่ในที่ดินแปลงเดียวกันต่อพื้นที่ของที่ดินแปลงนั้น ทั้งนี้ ไม่รวมพื้นที่ของอาคารที่จอดรถยนต์ในอาคารหรือในที่ดินแปลงเดียวกันที่ได้รับการยกเว้นไม่นับรวมเป็นพื้นที่อาคารตามกฎกระทรวงว่าด้วยการยกเว้นการนับพื้นที่อาคารบางส่วนในการคำนวณพื้นที่อาคารเพื่อการคำนวณอัตราส่วนพื้นที่อาคารต่อพื้นที่ดิน

(ข) OSR (Open Space Ratio) "อัตราส่วนของที่ว่างต่อพื้นที่อาคารรวม" หมายความว่า อัตราส่วนของที่ว่างซึ่งปราศจากสิ่งปกคลุมต่อพื้นที่อาคารรวมทุกชั้นของอาคารทุกหลังที่ตั้งอยู่ในที่ดินแปลงเดียวกัน

(ค) ระยะห่างของอาคาร ไม่ใช้บังคับกับอาคารที่มีขนาดแปลงที่ดินน้อยกว่าหรือเท่ากับ 40 ตร.ว. หรือที่ดินแปลงแม่ที่แบ่งแยกแปลงย่อยตามกฎกระทรวงให้บังคับ

(ง) ที่ว่างแนวข้างและแนวหลัง ให้มีระยะห่างไม่น้อยกว่า 6 ม.

(จ) ที่ว่างแนวข้างและแนวหลัง ให้มีระยะห่างไม่น้อยกว่า 2 ม. ตร.ว.

หมายเหตุ ตารางสรุปนี้ได้จัดทำขึ้นเพื่อวัตถุประสงค์ในการสรุปสาระสำคัญของกฎกระทรวงให้ใช้บังคับผังเมืองรวมกรุงเทพมหานคร พ.ศ. 2556 ซึ่งมีวัตถุประสงค์เพื่อวางและกำหนดมาตรการสำหรับใช้เป็นหลักในการพิจารณาอนุญาตการใช้ประโยชน์ที่ดินตามกฎกระทรวงดังกล่าว หากมีความจำเป็นต้องมีการใช้ประโยชน์ที่ดินที่ขัดหรือแย้งกับกฎกระทรวงดังกล่าว ให้ยื่นคำขอเพื่อขออนุญาตตามกฎกระทรวงฉบับนี้ ทั้งนี้ ให้เป็นไปตามกฎกระทรวงว่าด้วยหลักเกณฑ์และวิธีการในการขออนุญาตการใช้ประโยชน์ที่ดินตามกฎกระทรวงผังเมืองรวมกรุงเทพมหานคร พ.ศ. 2556 ข้อกฎหมายที่เกี่ยวข้อง ได้แก่ กฎกระทรวงผังเมืองรวมกรุงเทพมหานคร พ.ศ. 2556 ประกาศในราชกิจจานุเบกษา เล่ม ๑๓๐ ตอนที่ ๔๑ ก ลงวันที่ ๑๖ พฤษภาคม ๒๕๕๖

Figure 6. 8 Bangkok Zoning Chart

The areas surrounding the three final stations on the light green line, falling in a medium density zone, were considered to determine an appropriate site location.

6.3.1.1 Bang Chak

Bang Chak has several amenities in the area and is a promising location for a suburban office complex due to its many surrounding residential developments. (Figure 6.9) The potential undeveloped site lies on a soi a few hundred meters off of the main road at the Bang Chak BTS stop.

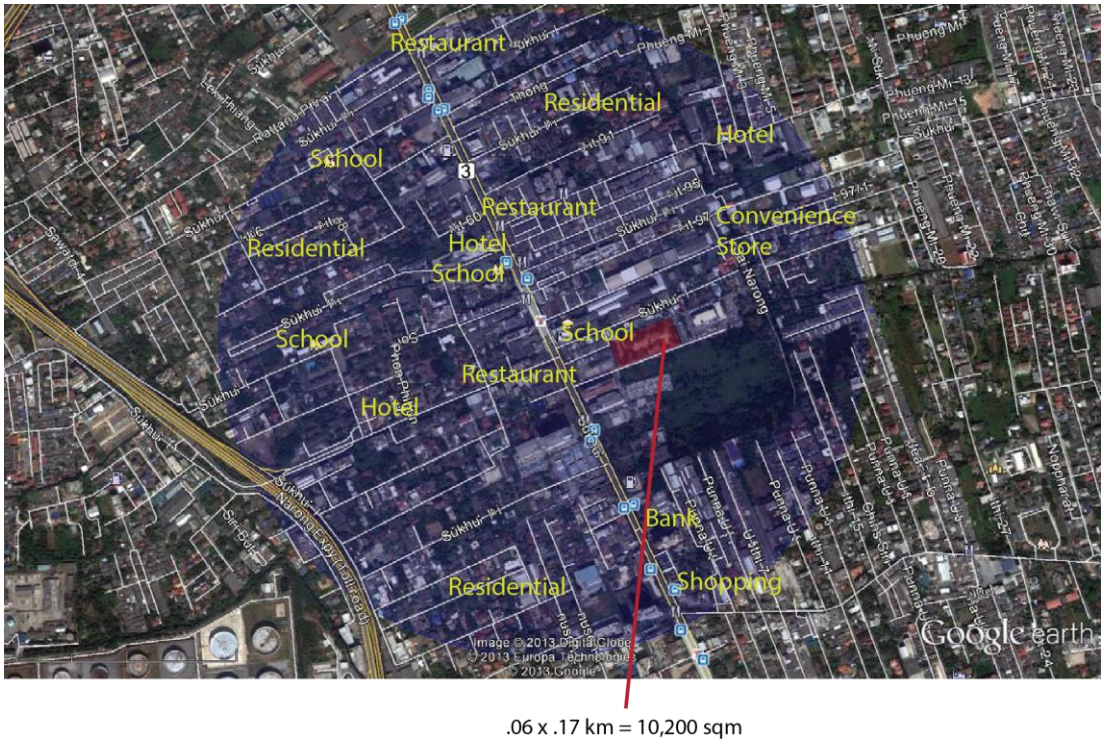


Figure 6. 9 Bang Chak Site Proposal

The soi along the site is 12m wide, accommodating two way traffic. The Yor 6 zone regulations state that it is illegal to create any office structure larger than 1,000 m² off of a road less than 16m wide. Traditionally, on an office site 50% of the total FAR is attributed to parking. International Building Code (2009) defines this ratio as 60m² of office space to 1 parking space. On this site, with the construction restrictions, it is impossible to build a parking garage. It is important therefore, to calculate the total number of parking spaces accommodated within the site before

actually constructing the building, to arrive at the total office space constructible on the site. In addition, no building may be closer than 3m to its neighbor. (Table 6.1)

BANG CHAK
FAR5 OSR6
TOTAL SITE AREA 7,592.83 M²

FAR = TOTAL M²/ TOTAL PROPERTY
5 = TOTAL M²/ 7,592.83 M²
TOTAL M² = 5(7,592.83M²)
= 37,964.15 M²

SMALL MODULE	56
MEDIUM MODULE	113
LARGE MODULE	227

TRADITIONALLY
50% PARKING → 18,982.075M²
1 SPACE/ 60M² → 316 SPACES

MUST HAVE LESS THAN 1,000M²/ BUILDING
SO, THIS MEANS THAT A PARKING GARAGE ON SITE IS NOT FEASABLE.

PARKING APPLIED: 72 SPACES
CAN BUILD 4,320 M² OFFICE SPACE

POSSIBLE TO BUILD
77 SMALL OFFICES OR
38 MEDIUM OFFICES OR
19 LARGE OFFICES

Table 6. 1 Bang Chak Zoning Calculations

The legal restrictions of the site, a smaller, and more fragmented type of office would be built. A similar building type could be achieved by converting residential homes to offices as observed in workspaces such as HUBBA and would not be able to accommodate more than the initial conception of SME companies.

6.3.1.2 Udom Suk

A similar empty site in the Udom Suk area was considered. (Figure 6.10) The site, however was 4,000 m² smaller than the first, and similarly located off of a 12m soi. As such, falling in the Yor 6 zones and adhering the same legal restrictions resulted in the following calculations. (Table 6.2)

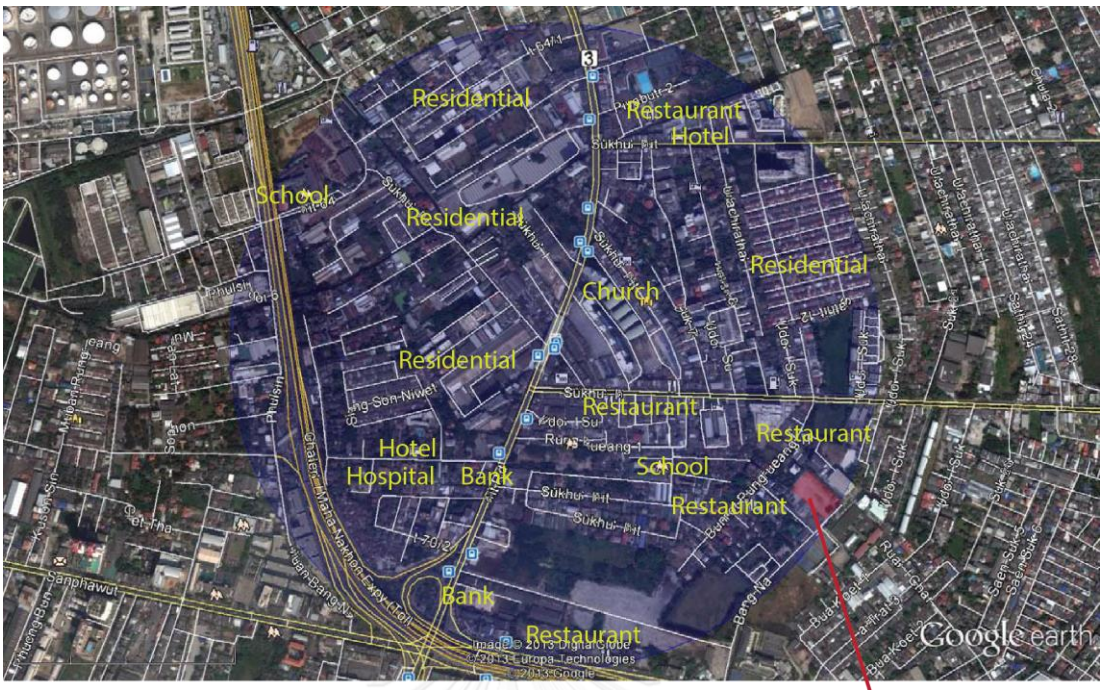


Figure 6. 10 Udom Suk Site Proposal

UDOM SUK

FAR5 OSR6

TOTAL SITE AREA 5,424.8 M²

FAR = TOTAL M²/ TOTAL PROP
5 = TOTAL M²/ 5,424.8 M²
TOTAL M² = 5(5,424.8 M²)
= 27,124 M²

SMALL MODULE	56
MEDIUM MODULE	113
LARGE MODULE	227

TRADITIONALLY
50% PARKING → 13,562 M²
1 SPACE/ 60M² → 226 SPACES

MUST HAVE LESS THAN 1,000M²/ BUILDING
SO, THIS MEANS THAT A PARKING GARAGE ON SITE IS NOT FEASABLE.

PARKING APPLIED: 44 SPACES
CAN BUILD 2,640 M² OFFICE SPACE

POSSIBLE TO BUILD
47 SMALL OFFICES OR
23 MEDIUM OFFICES OR
11 LARGE OFFICES

Table 6. 2 Udom Suk Zoning Calculations

The smaller, fragmented office building was already being addressed elsewhere, and so this site was also determined unsuitable for the project.

6.3.1.3 Bearing

The final site is located at the end of the light green BTS line, and near the border of Bangkok. The initial selection was an abandoned lot located within 200 meters of the BTS station. The lot was 6,840m2 bordering a 12m soi just off of the main road. The site's location is on the edge of Bangkok. (See Figure 6.11)

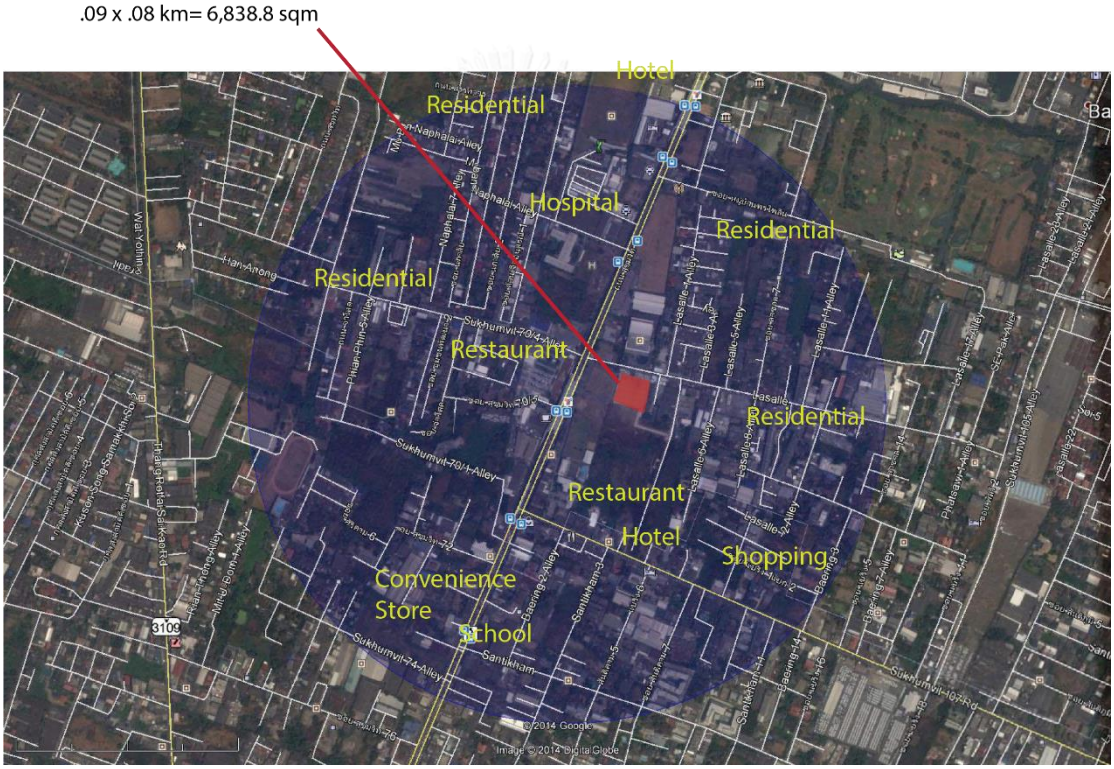


Figure 6. 11 Bearing Site Proposal

BEARING

FAR5 OSR6

TOTAL SITE AREA 6,838.8 M²

FAR = TOTAL M²/ TOTAL PROP
5 = TOTAL M²/ 6,838.8 M²
TOTAL M² = 5(6,838.8M²)
= 34,194 M²

SMALL MODULE	56
MEDIUM MODULE	113
LARGE MODULE	227

TRADITIONALLY
50% PARKING → 17,097 M²
1 SPACE/ 60M² → 285 SPACES

MUST HAVE LESS THAN 1,000M²/ BUILDING
SO, THIS MEANS THAT A PARKING GARAGE ON SITE IS NOT FEASABLE.

PARKING APPLIED: 54 SPACES
CAN BUILD 3,240 M² OFFICE SPACE

POSSIBLE TO BUILD
57 SMALL OFFICES OR
28 MEDIUM OFFICES OR
14 LARGE OFFICES

Table 6. 3 Bearing Zoning Calculations

6.3.2 Site Selection

The proximity of the lot to the Bearing BTS station made this selection the most attractive of the three surveyed but, due to Bangkok Zoning regulations, the smaller office complex design would prevail. As such, the initial site selection was expanded to the adjacent green space bordering the BTS. (Figure 6.12)

Figure 6. 12 Bearing Site Expansion

The site expansion changed the building regulations and the applicable zoning laws from being a small office building to a special-large building type as defined by Thailand's Ministerial Regulations 33 where each floor is equal to or greater than 10,000m². (Figure 6.13)

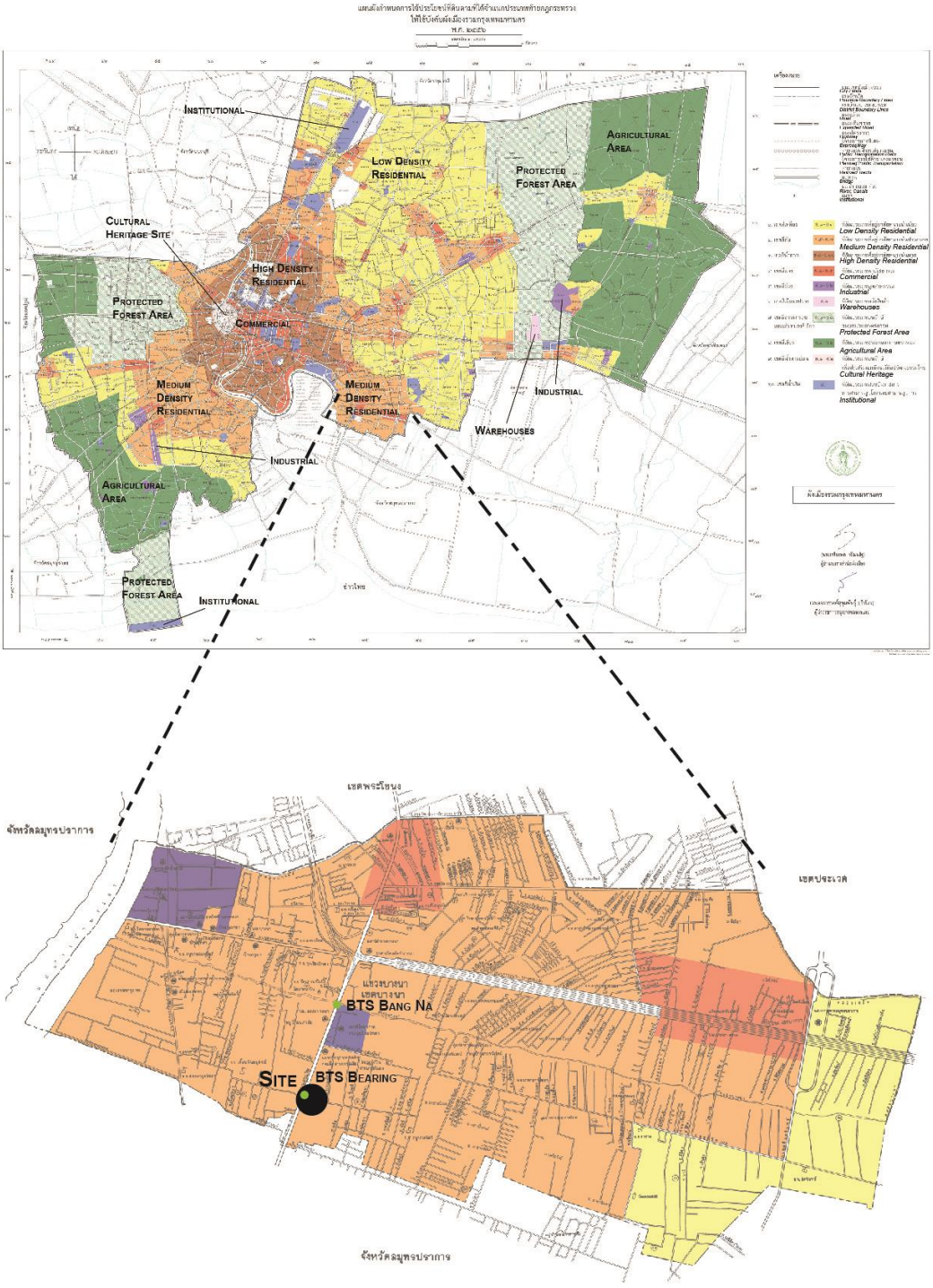
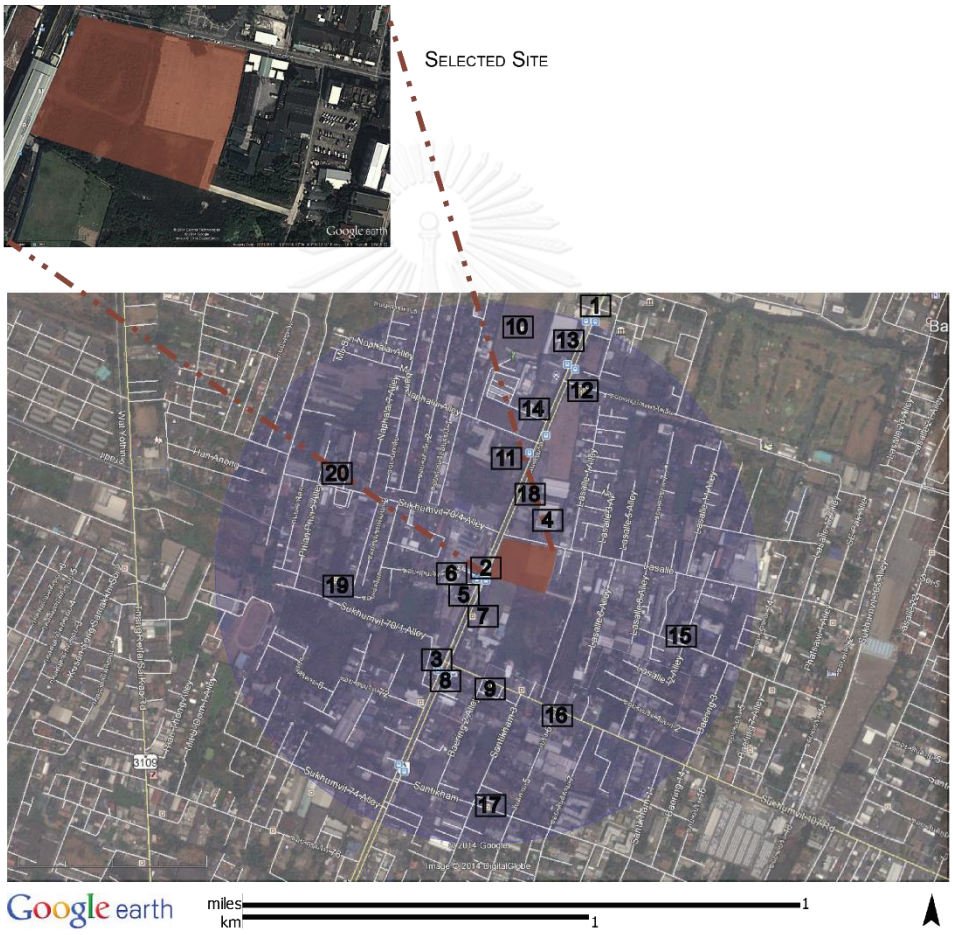


Figure 6. 13 Bangkok Province Map

A more thorough investigation of the amenities surrounding the site was conducted once the site selection had been finalized. Because this is primarily a residential area of Bangkok there are several schools, a few grocery and convenience stores. Because the BTS Station is so new, there are also several established car dealerships in this area to cater to the needs of the large population with limited access to public transit. What there doesn't seem to be in the immediate vicinity of the BTS is a place for recreation or white collar work. (Figure 6.14)



1	BTS Bang Na	11	Manarom Hospital
2	BTS Bearing	12	Radio Station 2 Bang Na
3	St. Andrews International School	13	Like Inn Hotel
4	Center Point Entertainment	14	Toyota Showroom
5	Essco	15	C.L. Foods Co.
6	Rabika Coffee	16	The Monmanee Hotel
7	Sweet Hours	17	Travel Agency
8	7-eleven	18	Car Dealership
9	Java	19	Dentist
10	Golf Course	20	Painpin Anusorn School

Figure 6. 14 Amenities Surrounding Site

The expanded site is now bordered by a road that is 22m wide, accommodating 6 lanes of two way traffic, and a 12m wide road that allows two way traffic. Traditionally there is 50% parking on an office site, however, due to sustainable building trends and its connection with the BTS, I decided to reduce the designed parking to 25% of the total FAR. International Building Code (2009) defines this ratio as 60m² of office space to 1 parking space. Similarly the ADA building codes (2010) require 1 space for every 50 parking spaces supplied. As motorcycles are a prevalent vehicle type for personal use in Thailand, 1 motorcycle parking space for every 30 parking spaces within the parking garage was used. The new site calculations can be seen in table 6.4.

BEARING

FAR5 OSR6

TOTAL SITE AREA 21, 301.5 M²

FAR = TOTAL M²/ TOTAL PROP
5 = TOTAL M²/ 21, 301.5 M²
TOTAL M² = 5(21, 301.5 M²)
= 106,552.42 M²

SMALL MODULE	56
MEDIUM MODULE	113
LARGE MODULE	227

TRADITIONALLY
50% PARKING → 53, 276.2 M²
1 SPACE/ 60 M² → 888 SPACES
ADA 1 SPACE/ 50 → 9 SPACES
MOTORCYCLE 1 SPACE/ 30 → 15 SPACES

REDUCE PARKING
25% PARKING → 26,638.1 M²
1 SPACE/ 60 M² → 444 SPACES
ADA 1 SPACE/ 50 → 9 SPACES
MOTORCYCLE 1 SPACE/ 30 → 15 SPACES

Table 6. 4 Expanded Site Calculations

The Building Control Act of 1979 in Thailand defines the setbacks for property to be 3m from the property line. Additionally, the NFPA 101- Life Safety Code (2009)

requires a further setback with adequate space for a fire truck. It states that the *"land that is used for "high rise building" or "special large building" with the combined area of more than 30,000 m² must have one side of the perimeter with 12m adjacent to the public roadway. Such public roadway must not have less than 18m wide right of way...special large building must provide a road with the automobile traffic surface not less than 6m in width for adequate fire truck access"* (Figure 6.15)

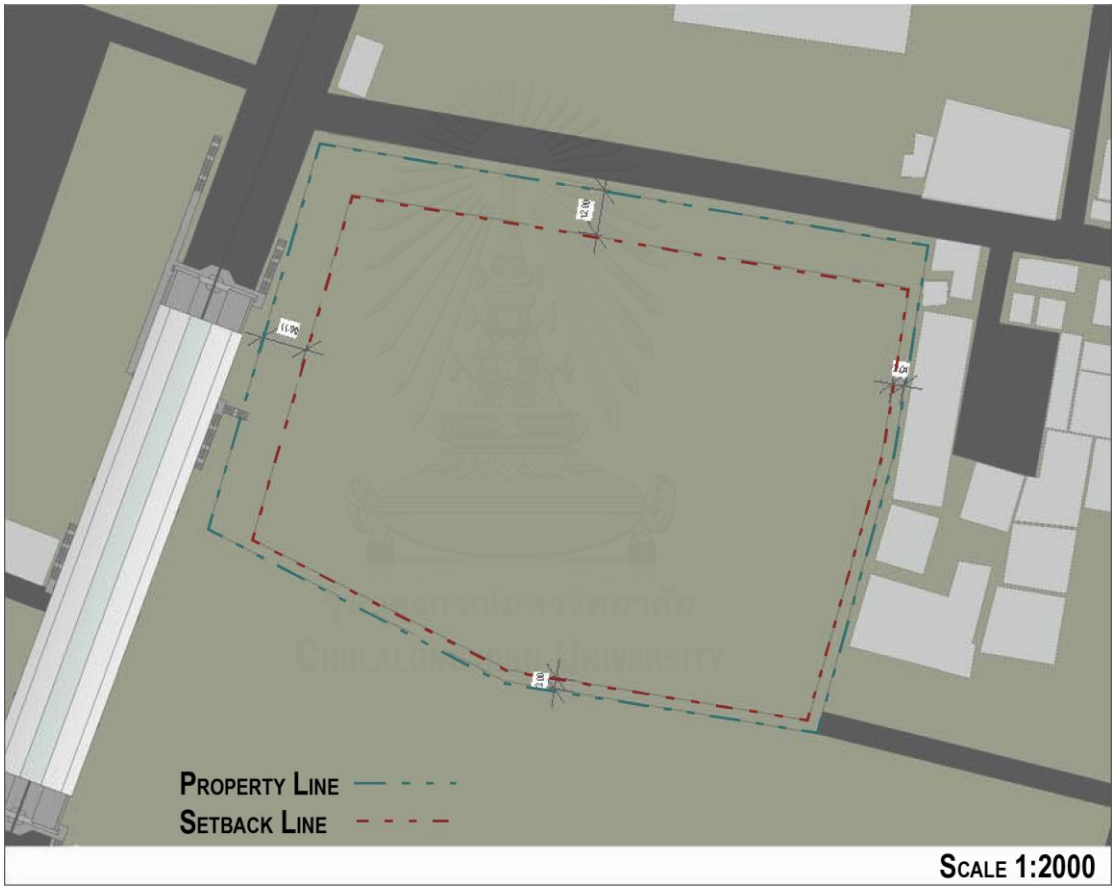


Figure 6. 15 Property Setbacks

6.3.2.1 Design Proposal

From the literature review, and an evaluation of different building standards I came up with a traditional space planning percentages in the office, as well as potential for the future space planning percentages. (Comparison table can be found in the appendix.) The proposed space planning percentages were calculated based

on the various spatial relationships in an office. Where ‘Rooms’ refers to shared spaces such as meeting areas, community lounges, and event spaces. ‘Office Rooms’ refers to the dedicated office space leased by one company. Circulation refers to the public circulation of an office, and parking is calculated based on the combination of the rooms, office rooms and circulation. See table 6.5.

Traditional Space Planning			Proposed Space Planning		
	sqm	Percentage		sqm	Percentage
Rooms	2,131 sqm	20%	Rooms	4,795 sqm	30%
Office Rooms	5,860 sqm	55%	Office Rooms	6,393 sqm	40%
Circulation (25-30%	2,664 sqm	25%	Circulation (25-30%	4,795 sqm	30%
Parking	10,655 sqm	50% of Interior	Parking	5,328 sqm	25% of Interior
Total of....	21,310 sqm	100%	Total of....	21,310 sqm	100%

Table 6. 5 Building Percentages

Using this percentage chart, and applying it to the quantitative and qualitative architectural requirements concluded from the literature review, I derived the program summary for a high turnover office building in Bangkok. (See table 6.6)

Program Summary

Area	Qty	SqM	Total SqM	Quality of Space
Tennant Office Spaces				
Small	76	56	4256	Accommodate 5 people
Medium	78	113	8814	Accommodate 10 people
Large	76	227	17252	Accommodate 20 people
Total Offices	230		30322	
Incubator Spaces				
Workstations	195	4.5	877.5	Open; Semi-Transient
Touch Down Stations	205	3.5	717.5	Open; High Traffic Transient Spaces
Total Stations	400		1595	
Collaboration Spaces				
Large Conference Room	99	56	5544	Seating for 16-18 people
Medium Conference Room	98	28	2744	Seating for 8-10 people
Small Conference Rooms	92	14	1288	Seating for 4-6 people
Sub-Total	289		9576	
Shared Spaces				
Community Lounge Space	211	55	11605	reprieve/ spontaneious gathering
Event Space	10	55	550	combined with another function
Café/ Coffee Shop	6	186	1116	
Resource Library	6	186	1116	
Sub-Total			14387	
Site Support				
Reception	4	30	120	Combined with main entry
Active Storage	4	100	400	Lockers/ Temporary Storage
Passive Storage	2	50	100	
Server/IT Storage	4	186	744	Cold Room
Printing/ Fax Station	4	50	200	Office services: mail, copy, supplies
Bathroom	129	2.59	334.11	Mens and Womens
Lavatories	79	0.22	17.38	Can be combined with regular w/c
Maintanance Room	8	20.5	164	At least one/ floor Stairs/Lift/ Closet
Staff Lounge	2	113	226	Staff space
Retail	30	60.88	1826.4	
Sub-Total			4131.89	
Total Built Area			83,985.89	
Circulation @ 30%		23,974.00		
Total USF				
Access & Egress				
Bike Storage	2	25	50	
Motorcycle Parking	18	5.4	97.2	
Parking	420	12.5	5250	Permiable
ADA Parking	9	22.6	203.4	
Spirit House	1	1	1	Designated on Site
Trash	3	3	9	Accessable by street
Car Circulation	3	2364	7092	Service Rds/ Parking Circulation
Public Space			9915.71	Exterior/ Talat/Retail
Sub-Total (25% interior)			22618.31	
Total Site			106,604.20	

Table 6. 6 Program Summary

6.3.2.2 Building Mass Development

In terms of developing a building mass, the goal for this project was to develop a complex that would recuperate as much of the green space that was absorbed into the site as possible, while allowing for a centrally located *talat* for the locals to enjoy during the day. To that end, the primary pedestrian path through the site would be best cutting from the street corner, to the back of the site and secondary circulation would split the site horizontally and vertically in the center of the width and the length of the site. (See figure 6.16)

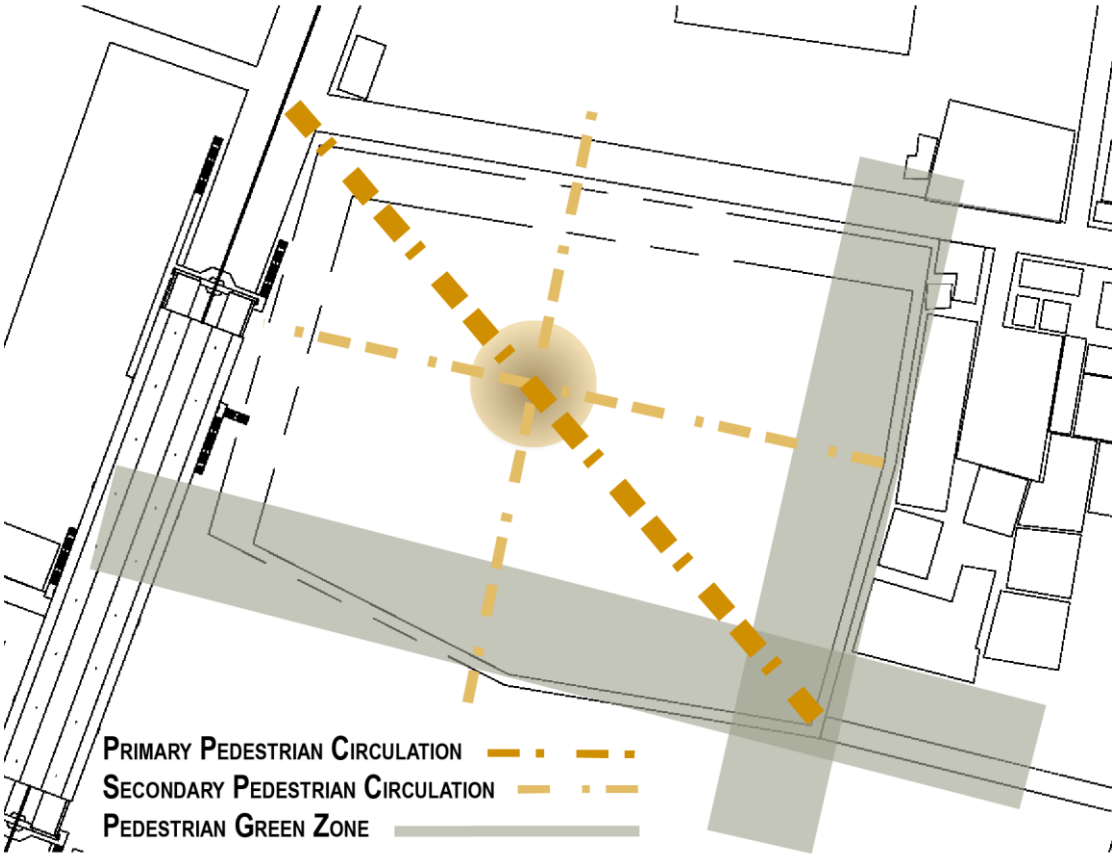


Figure 6. 16 Axis of Site Circulation in Developing Building Mass

Several potential building masses were considered for the office complex, but the one that resonated the most with the project can be seen in figure 6.12. The three separate buildings surrounding an interior courtyard that would act as an event space or the *talat* would draw people in, while the digitized floor plates of the

buildings would be reminiscent of the technology that has made transient office work possible.

6.3.2.3 User Site Approach

6.3.2.3.1 Personal Vehicle

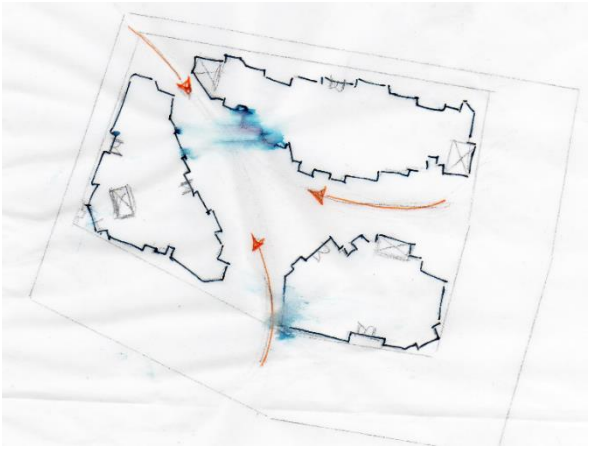


Figure 6. 17 Inspirational Mass Drawing

The Thailand Ministerial Regulation 33 defines the resulting building as a high rise building as the occupiable space is higher than 23m. A high rise, and special large building are required to provide a 6m automobile traffic surface for fire truck access; and according to the International Code Council (2009) on-site parking is also required.

A 6m wide, one-way road surrounds the perimeter of the site and leads into a parking garage. Figure 6.18 shows the access to the site by personal Automobile, as well as the fire truck access to the site. The underground parking garage is 2 levels, accommodating a total of 16 ADA stalls, 15 motorcycle stalls, and 533 normal parking stalls. (Figure 6.19, figure 6.20) According to the NFPA- 101 (Association 2009), stairs leading to an enclosed egress path on the ground level must not be further than 60m apart.

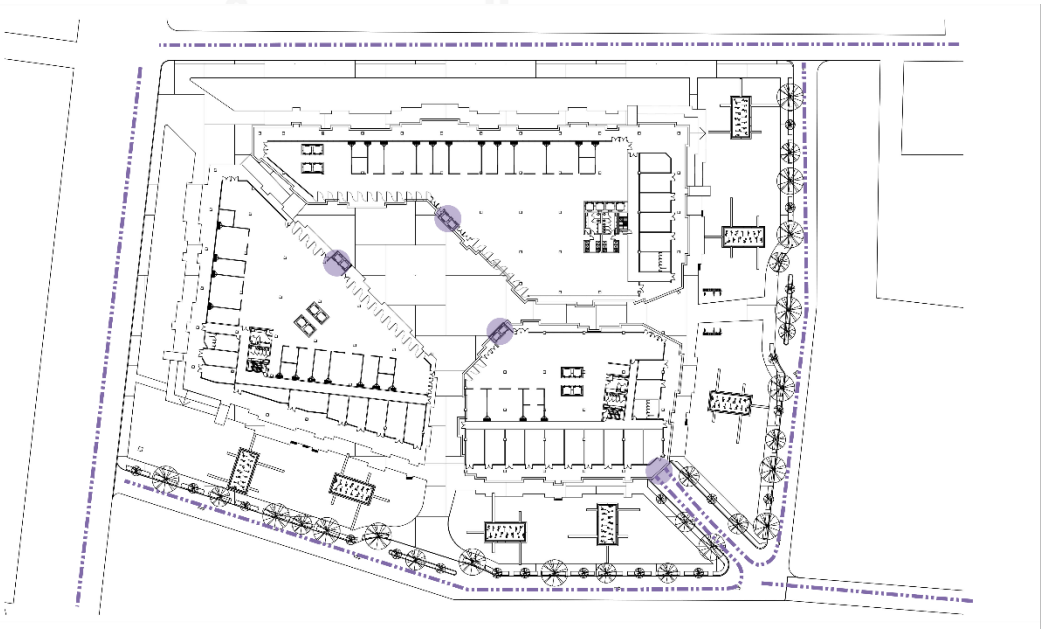


Figure 6. 18 Personal Automobile Approach to the Site

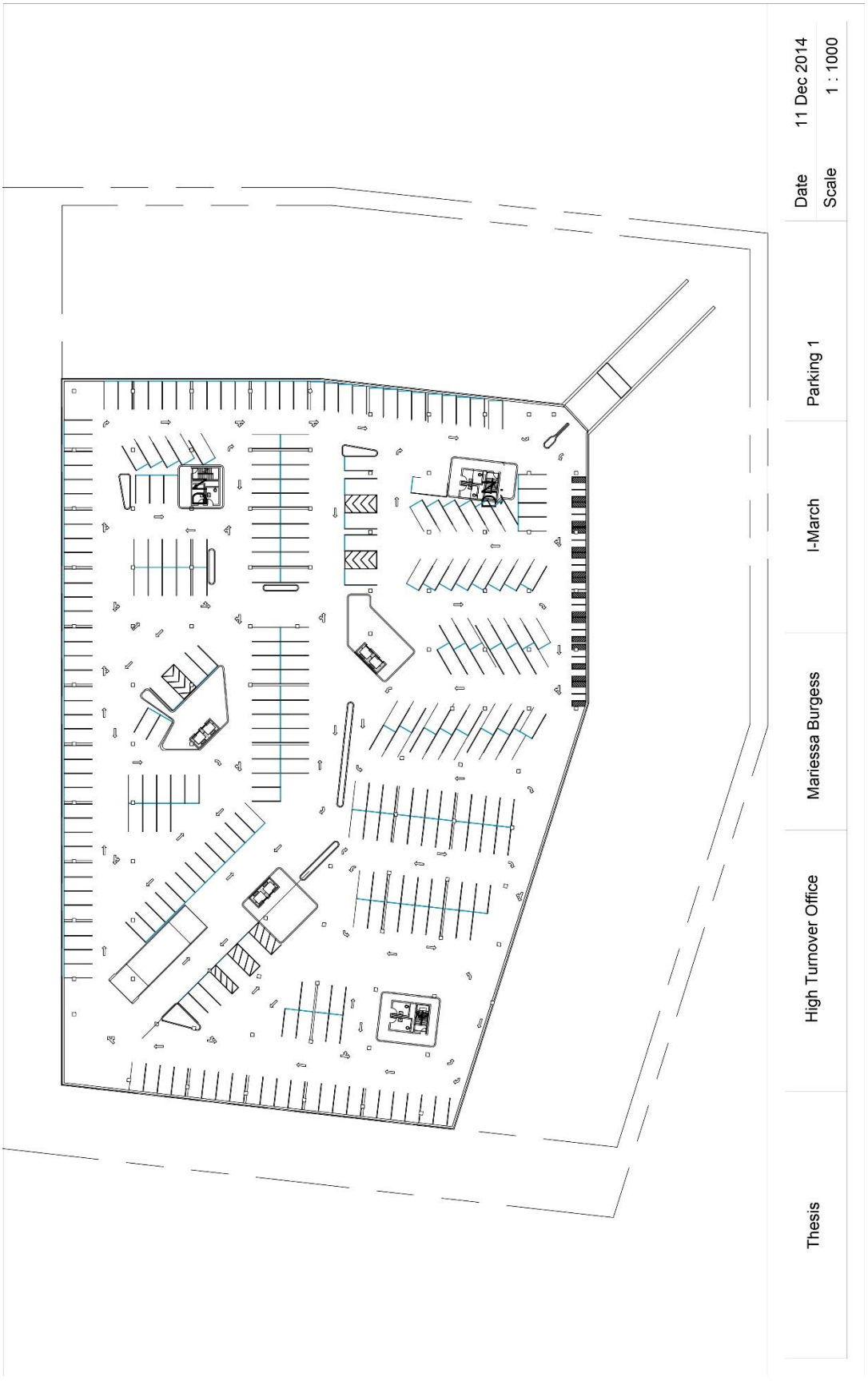


Figure 6. 19 Parking

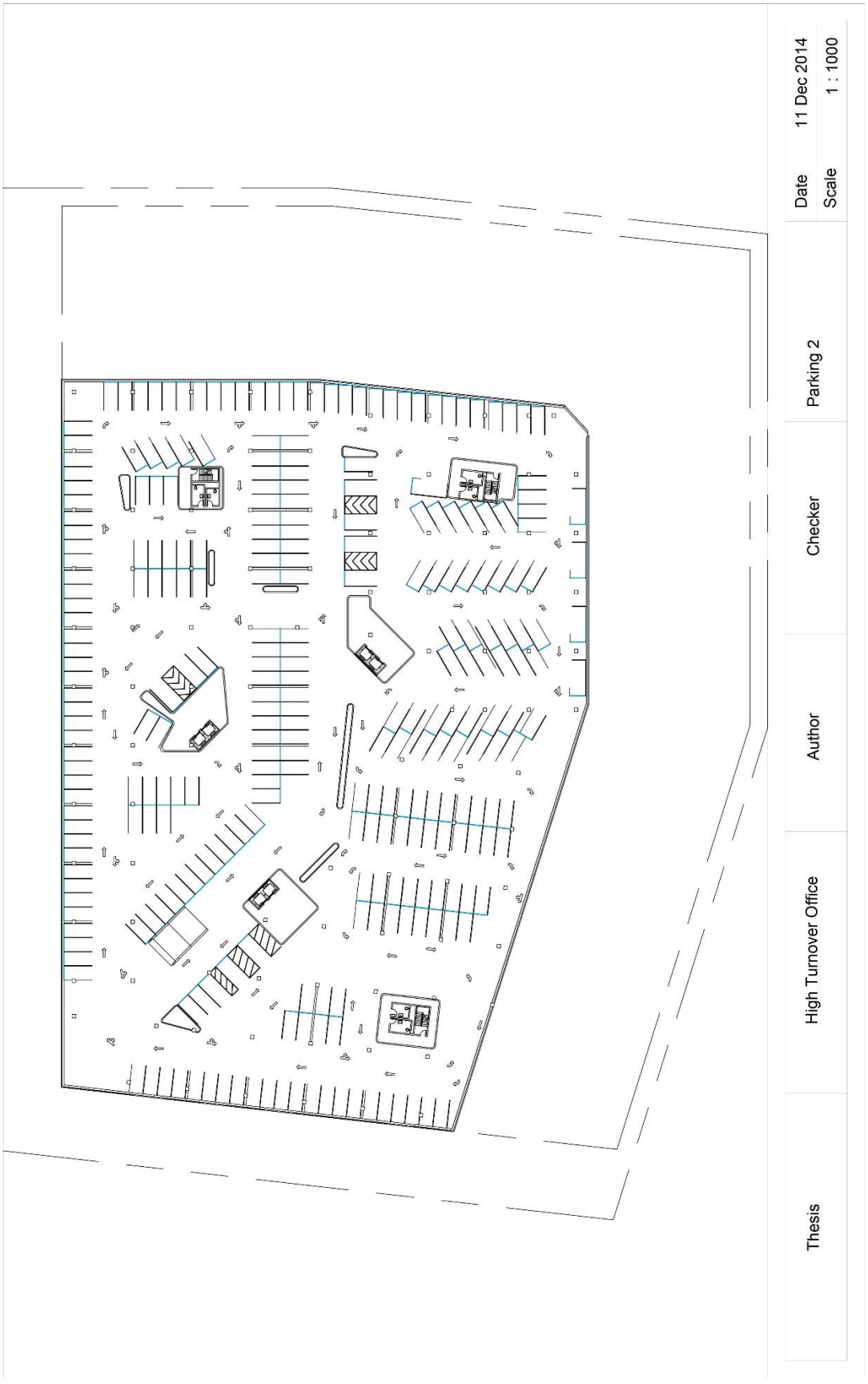


Figure 6. 20 Parking 2

6.3.2.3.2 Taxi Drop-Off

A primary mode of transportation in Bangkok is by Taxi, motorcycle Taxi, and Tuk-Tuk. To accommodate these types of users the automobile access is modified to enable passenger drop-off without greatly impeding the primary vehicular circulation was employed. (Figure 6.21)

Figure 6. 21 Taxi Approach to the Site

6.3.2.3.3 Bus Arrival

A bus station is situated along the main road of the site, and a pedestrian entrance path was employed to give immediate access to the site. (Figure 6.22)

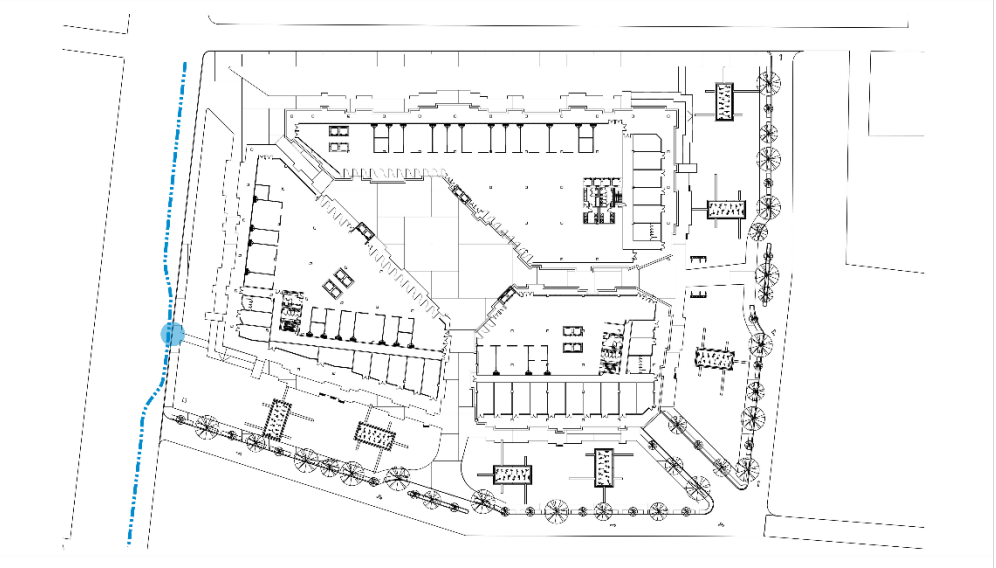


Figure 6. 22 Bus Approach to the Site

6.3.2.3.4 BTS Pedestrians

Pedestrians arriving by the BTS have access to the site three different ways. The first, and most immediate is by the connection to the BTS station itself on the second floor. (Figure 6.23) They are also able to descend the stairs of the BTS and access the site by either the green strip bordering the site, or the main axis towards the *talat* at the center of the three buildings. This center courtyard can also be appropriated as an event space for the office complex.

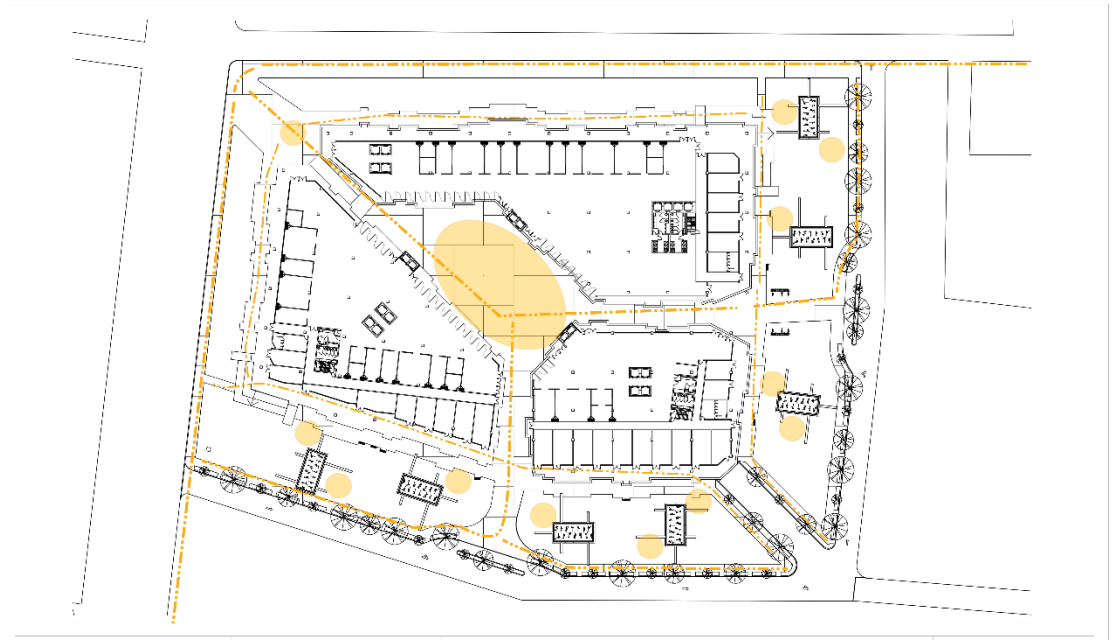


Figure 6. 23 Pedestrian Interaction with the Site

6.3.2.3.5 Bicycle

Bicycles as a mode of transportation were a consideration as well in developing the project. Due to its suburban location, and the high density of residential housing people may prefer to bike to work, so access and showers for the cyclists were provided on the first floor. (Figure 6.24)

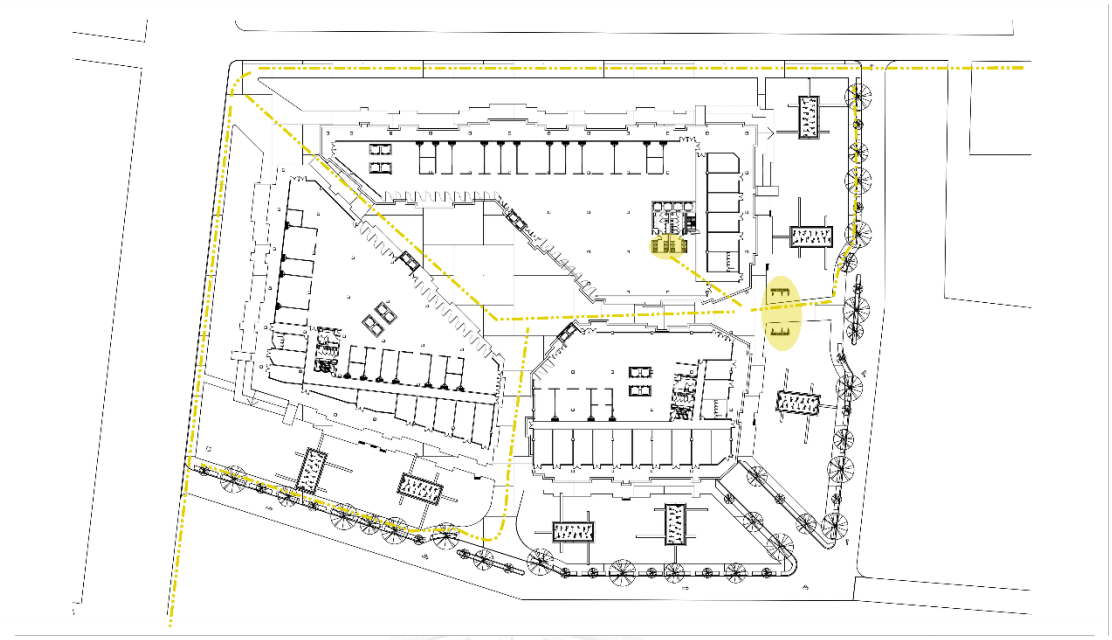


Figure 6. 24 Cyclist Approach to the Site

6.4 Technology in the Work place

Mobile technology has caused social changes that have incited changes in the work place. According to the survey, 70% of workers use laptops, and 60% use smartphones and cloud storage. These changes however have created their own set of problems, such as adequate power outlets for various devices, and adequate bandwidth. Literature review has suggested a shift in the tenant expectations towards an office complex that is accessible 24 hours a day, as some workers do now need a permanent workstation in the office. Due do the influx of the most powerful technology work has shifted towards group interactions, and technology has enabled workers to use the same space over different time periods.

Generation Y and Millennials are more open to alternative working hours, so there is potential of layering workers in the same space throughout the day as long as the office provides the opportunity to work 24 hours a day. (Figure 6.25)

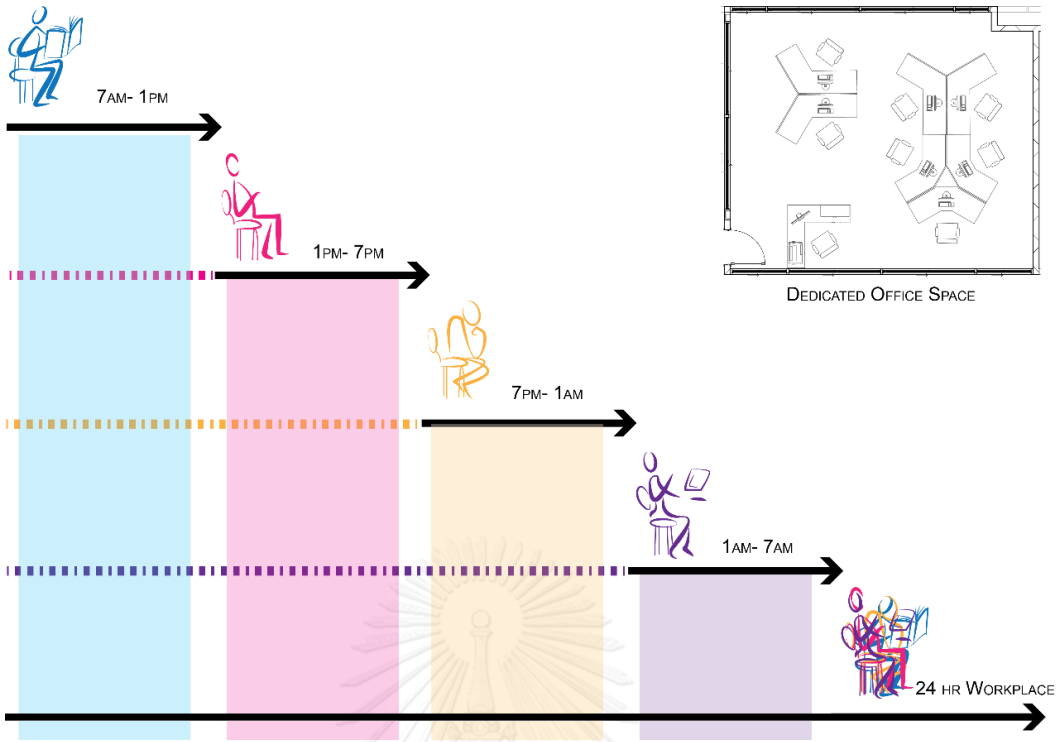


Figure 6. 25 Layering of Workers in Work Space

Technology has transformed the working mindset to an anytime/anywhere workplace. Accordingly, the proposed design facilitates both mobile technology with the in-floor outlets, and the ability to reserve space to work as you need it. The office complex offers local server rooms to support 3,400 users through wireless connection.

6.5 Working Culture

The literature review advocates creating happiness through creating a friendly atmosphere improves the quality of work. The survey revealed that 70% of workers prefer a shopping area in or near the workplace, and 80% would like an outdoor relaxing area. This consumerist culture is compounded as the hours spent working has begun to spill over into time that was originally for leisure. In the professional interview with Khun Pawangkrat, he stated the most important cultural aspect of an office was the spirit house.

6.5.1 Spirit House

The spirit house or *san pra pome's* 1m² dedicated space is located in the south-western corner of the site. This location is suggested for two reasons. It along the main road and just at the foot of the stairs to the BTS giving high visibility. The second reason is it is at the entrance to the main wooded area of the open space on the site. This is meant to lend tranquility to users who walk through the urban park for recreation or to access the office complex. (Figure 6.26)

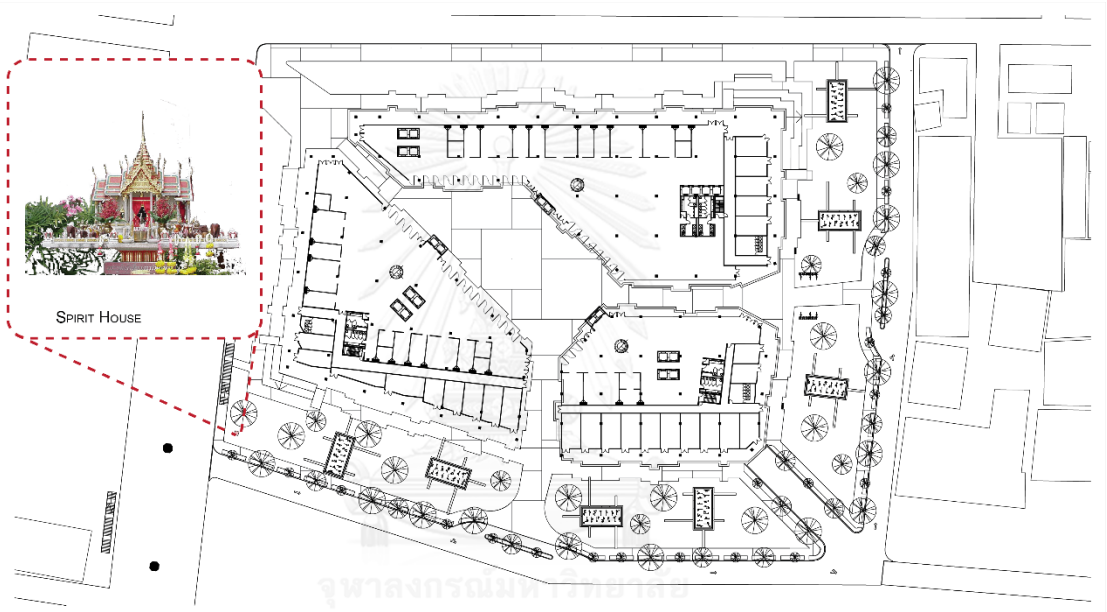


Figure 6. 26 Location of Spirit House on the site

6.5.2 Shopping

One of the most prevalent pastimes in Thailand is shopping. There are no large shopping malls in the immediate area, so keeping workers on site during work-breaks to encourage fast returns to the office. The site is designed to accommodate different types of shopping as well as different types of working.

The first type is a rented shop space on the main circulation floors, the ground and second floor. The rented shop houses are no smaller than 35m² and the largest topping out at 63m², but the average shop size is 45m². See figures 6.27 & 6.28.

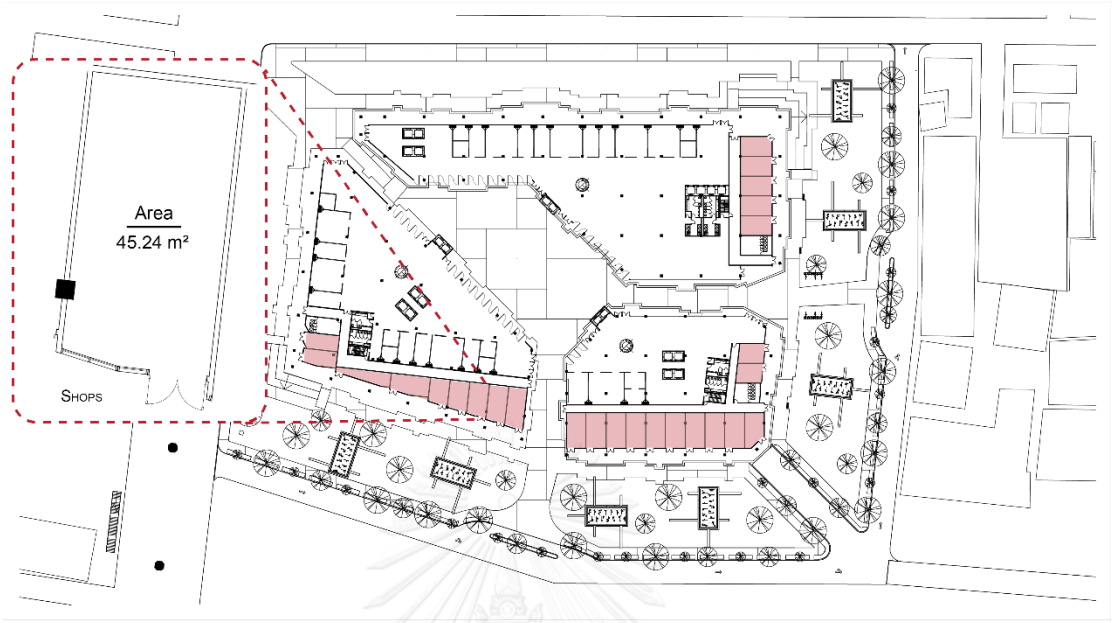


Figure 6. 27 Shops on the 1st floor.

Figure 6. 28 Shops on 2nd floor.

The second type of shopping space that is provided on the site is a *talat* that is semi-permanent. See figure 6.29. The courtyard is able to accommodate 48 different vendors with circulation. The talat in the center of the three building will

act as a social nucleus for not only the office complex, but the surrounding neighborhoods as well.

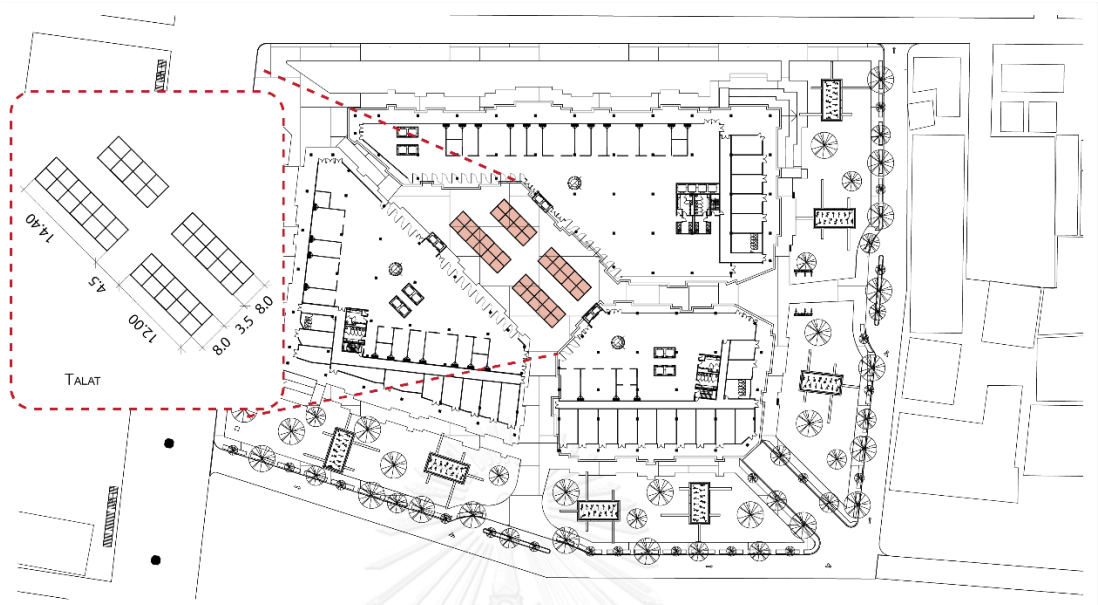


Figure 6. 29 Talat Spatial Planning

Figure 6. 30 Courtyard as Talat

The Hive case study appropriates the dining area for event spaces, and also opens part of the building to the public. In a similar manner, the space traditionally

attributed to the market can be reclaimed for events and the three buildings focus on the courtyard. (Figure 6.31)

Figure 6. 31 Event Circulation

6.6 Existing and Available Communication Technology

Mobile devices are at the fingertips of Thai people as they rapidly assimilate new technology. More than 75% of work is done on the computer in the office according to the survey. In order to accommodate the large number of mobile devices in the work space the building design needed to address the problem of access to power sources and sufficient bandwidth.

To facilitate the renting of offices, and aid in user multi-media problems the reception desk needed to be centrally located in each of the buildings. For visibility, a reception area was placed on the ground floor, in front of the main elevators and entrances. (Figure 6.32)

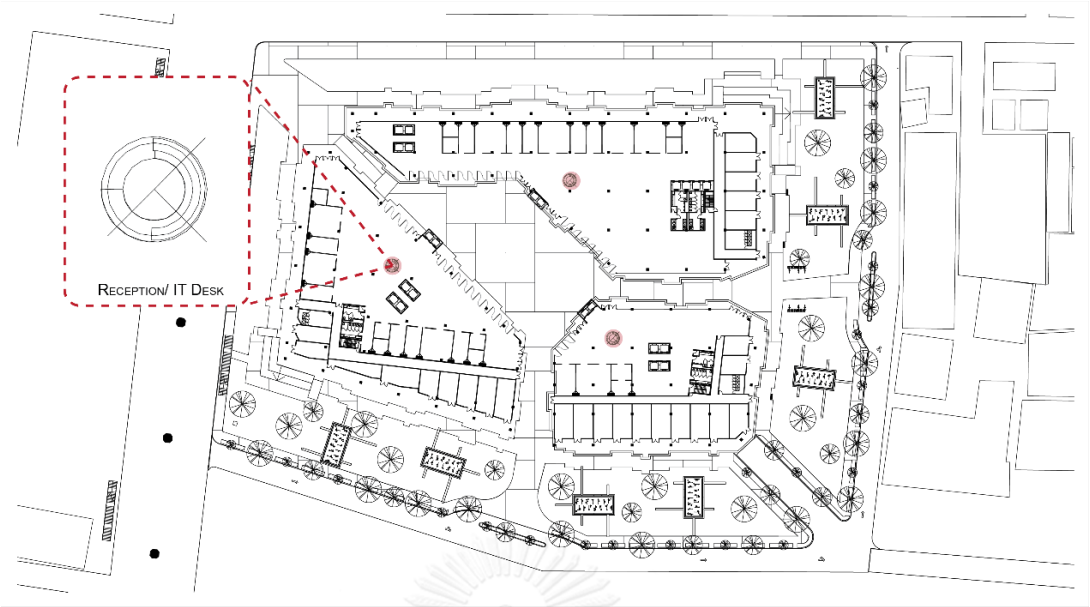


Figure 6. 32 Reception Desk

To support the wireless needs and maintain a secure connection, for the office complex each building has a server room in the staff lounge. (Figure 6.33)

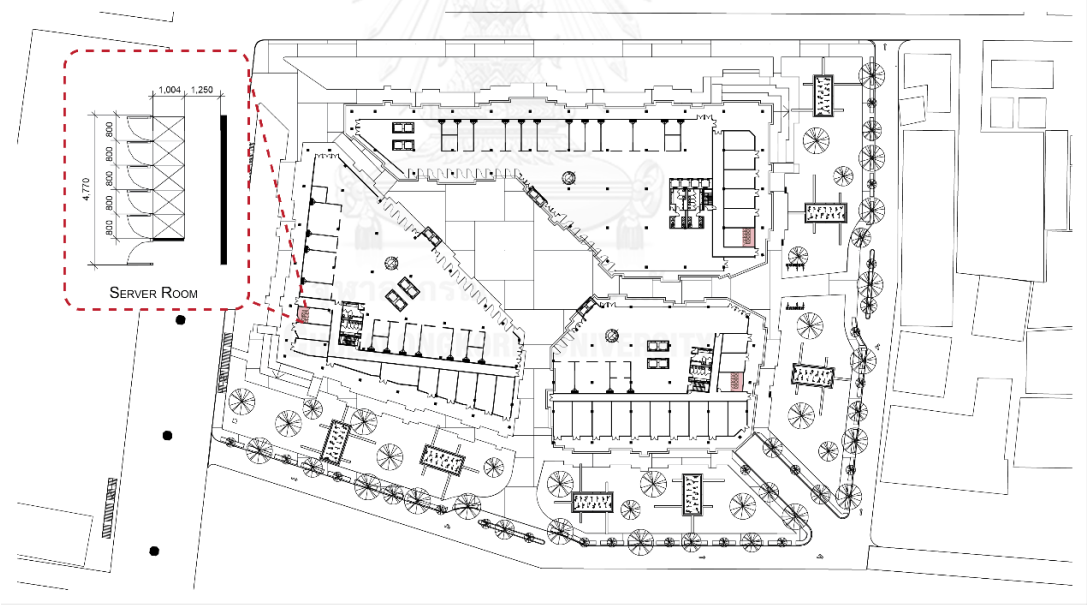


Figure 6. 33 Server Room

Outlets are in ever increasing demand as we move towards more mobile technology. Inspired by HUBBAH's building wide wifi capabilities, the concept was employed in the design and expanded upon by designing so that power can also be accessed anywhere in the office complex. Thus the building has outlets imbeded in the floor in a 1.5m diameter. (Figure 6.34)

Figure 6. 34 Example of Outlet Array Levels 4, 7, & 10

6.7 Climate

Due to Bangkok's hot and humid climate, it is necessary to provide adequate shading for the work environment, as well as consider the large amounts of rain during rainy season to avoid flooding. Should these considerations not be integrated into the design, energy costs can be very high to create a comfortable working environment. 100% of the workers surveyed would like to be able to control the air-conditioning in their own workspace to suit their preferences. And 80% would like outdoor spaces to relax and conduct casual meetings.

6.7.1 Façade Study and Development

Around the perimeter of the building is a veranda no less than 2m deep to act as a DSF and circulation. To further break down the building block, I used three different floor plate shapes for each building. The variation in perimeter on each floor, and the variation of different floor plates stacked on top of one another provides shading for the floors underneath them.

The initial distance for the variation in plate shapes was based on the depth of a bench (0.35m) to provide seating on the perimeter of the veranda. Creating a lounge space within the façade. The variation can be seen in the lighting study of figure 6.35. The shading provided by such shallow variations did not provide suitable impact for the façade. The distance was increased by adding a planter behind the

bench with a width of 0.45, resulting in a variation total of 0.80m. The shading study can be seen in the lighting study of figure 6.36. The addition of a planter behind the benches increased the impact of the façade, while simultaneously providing space for plants to cool the air crossing the site, aiming to reduce the heat load for the building.

The final lighting study for the façade can be seen in figure 6.37. Where the setback of 2m circulation was included so the protrusion of the floor plates can be adequately assessed. The resulting mass combined with the program summary caused the initial building conceived at only 4 stories height to 12 stories. Massing studies for the programming can be seen in figure 6.38 and figure 6.39. The first proposed stacking the same floor plate and program for 3 stories and then changing to the next floor plate and layout. The second alternated each of the three as the building ascended. The alternating plans further disjointed the façade of the building, emphasizing the digital nature of the inspiration.

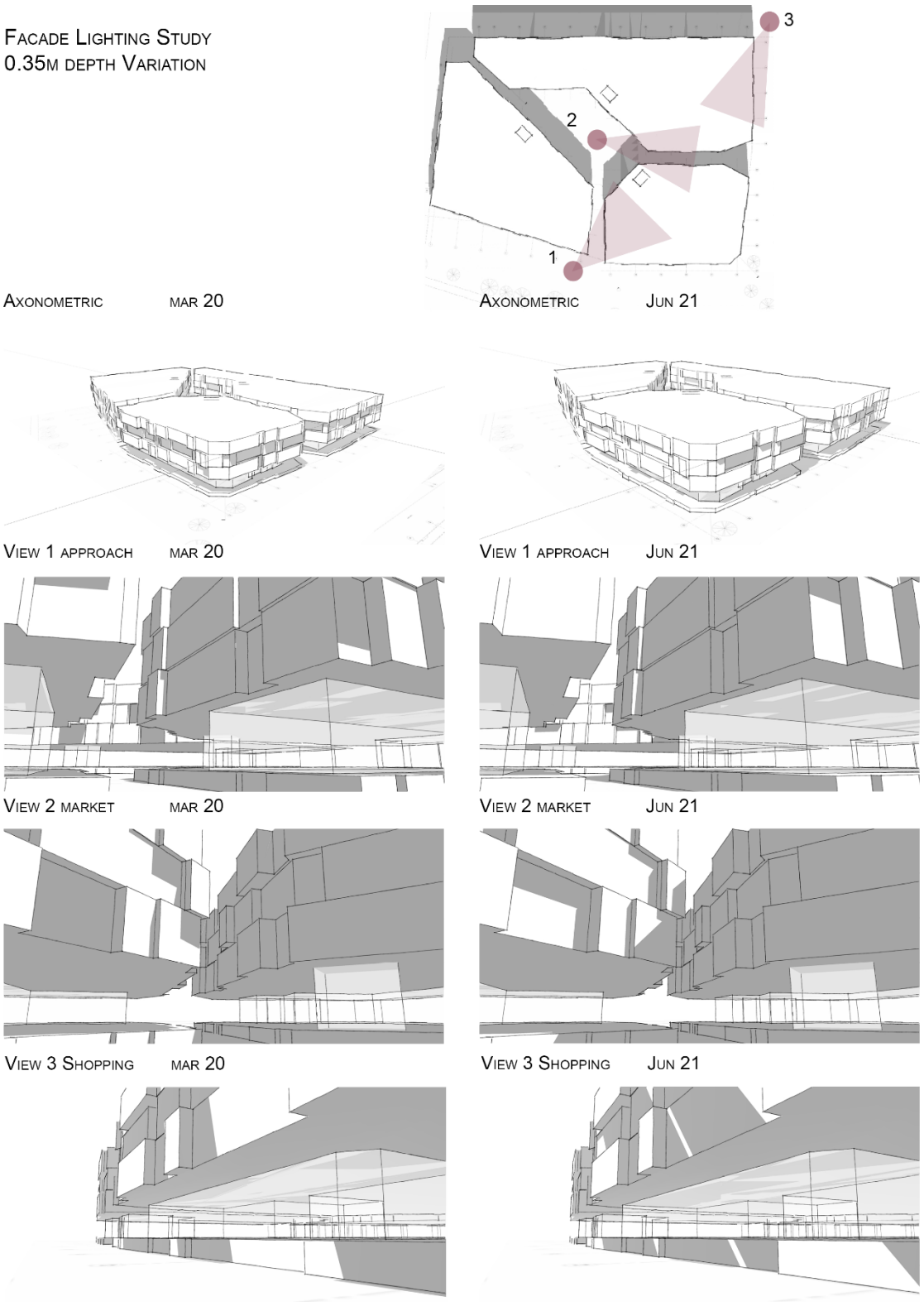


Figure 6. 35 Façade Lighting Study 0.35m

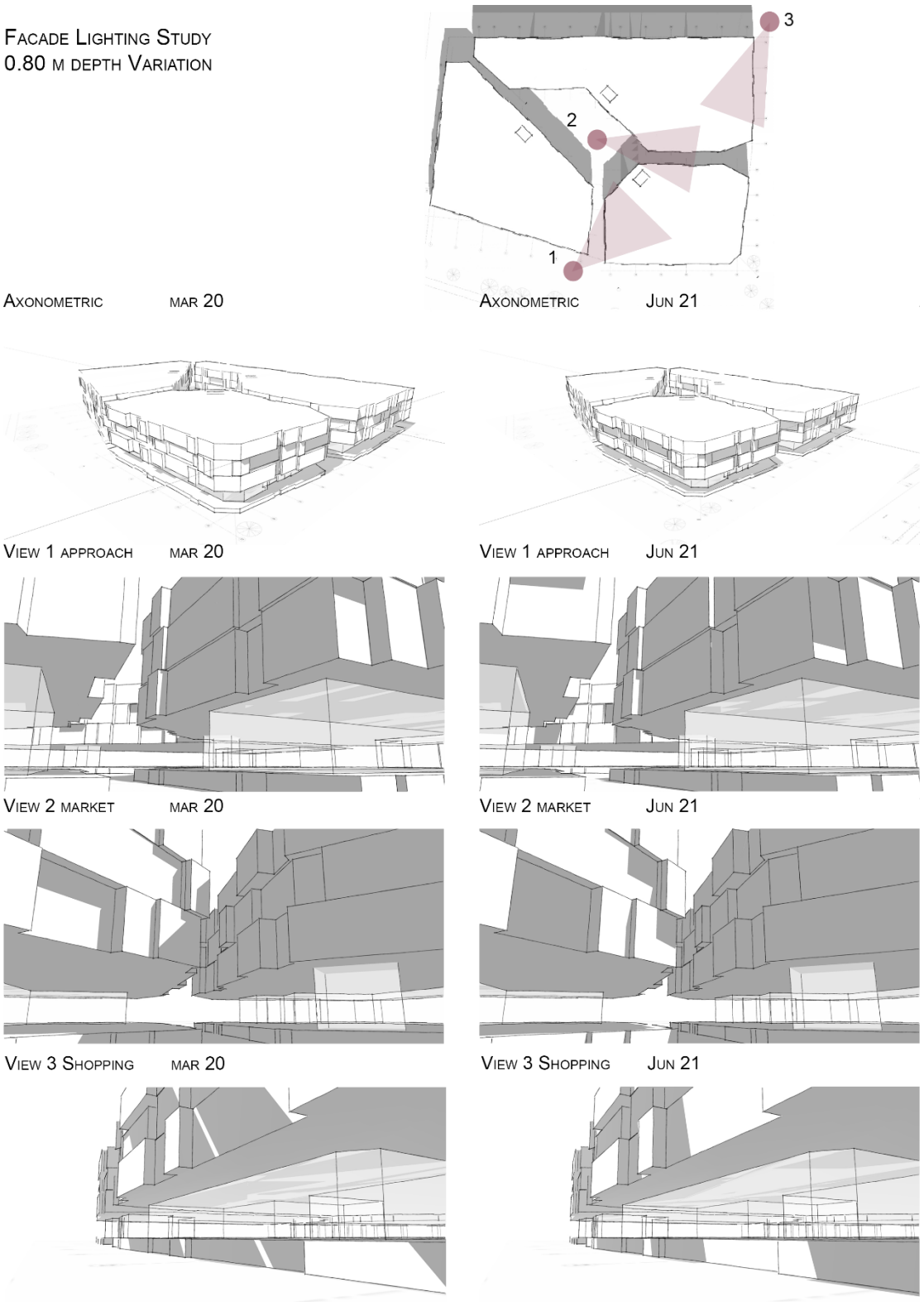


Figure 6. 36 Façade Lighting Study 0.80m

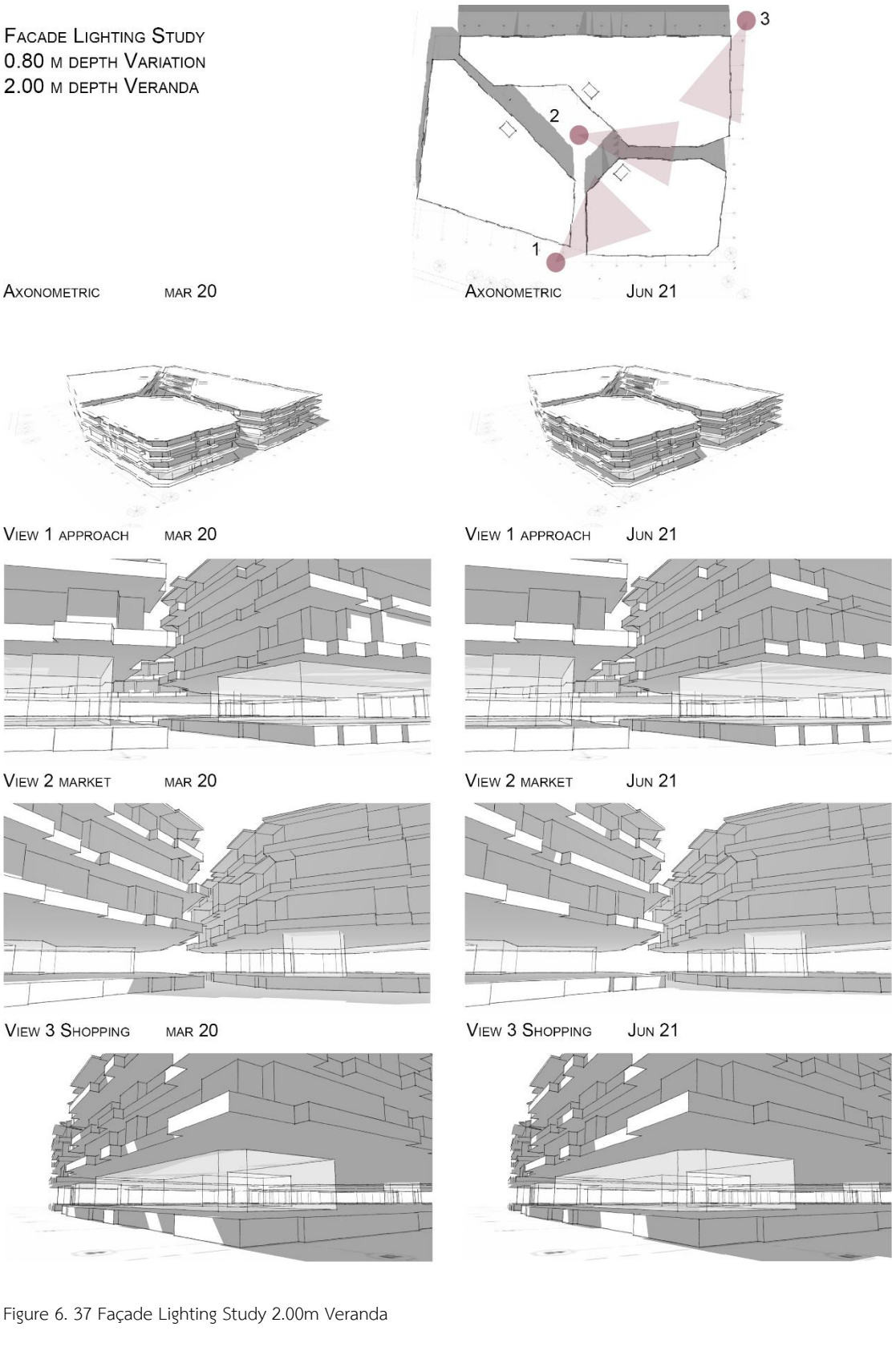


Figure 6. 37 Façade Lighting Study 2.00m Veranda

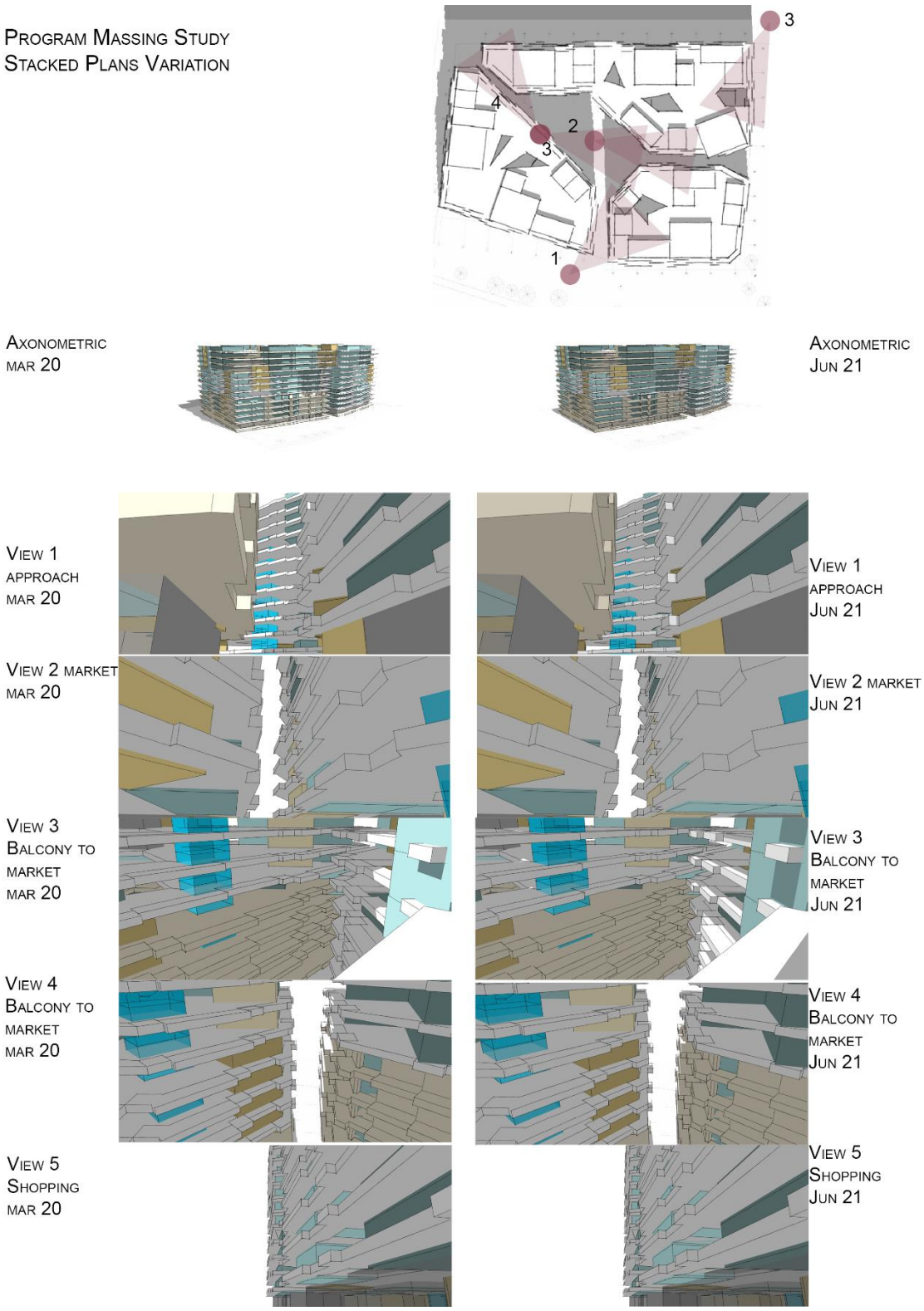


Figure 6. 38 Stacked Program Mass

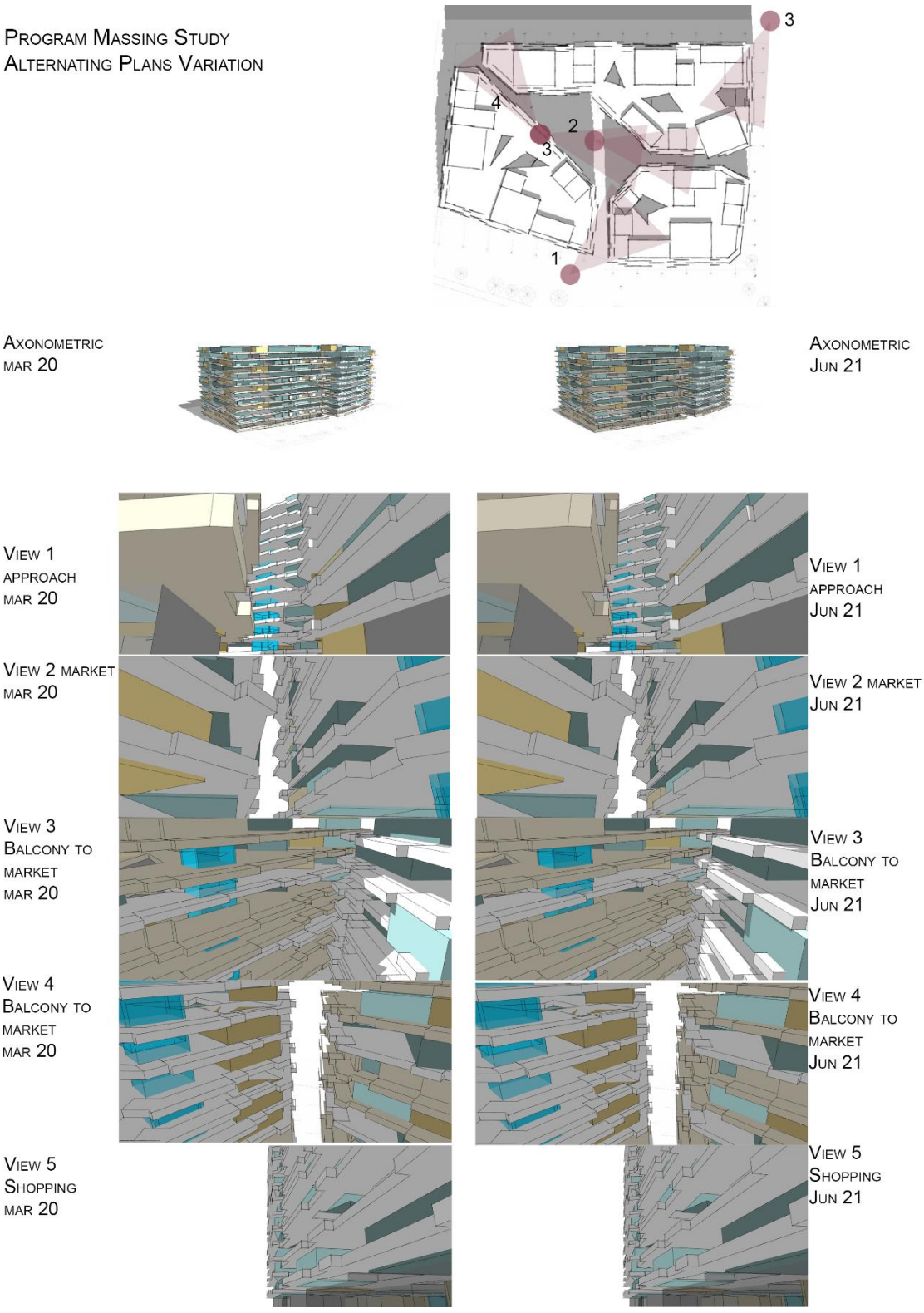


Figure 6. 39 Alternating Program Mass

The screen for the façade was inspired by the paneling in classic Thai houses. Framing the herringbone pattern of the paneling and enlarging the scheme with bamboo composite provides a shading system grounded in Thai culture. (Figure 6.40) The double skin façade implementation and interaction with the building mass as well as the integrated seating can be seen in figures 6.41, 6.42, and 6.43.

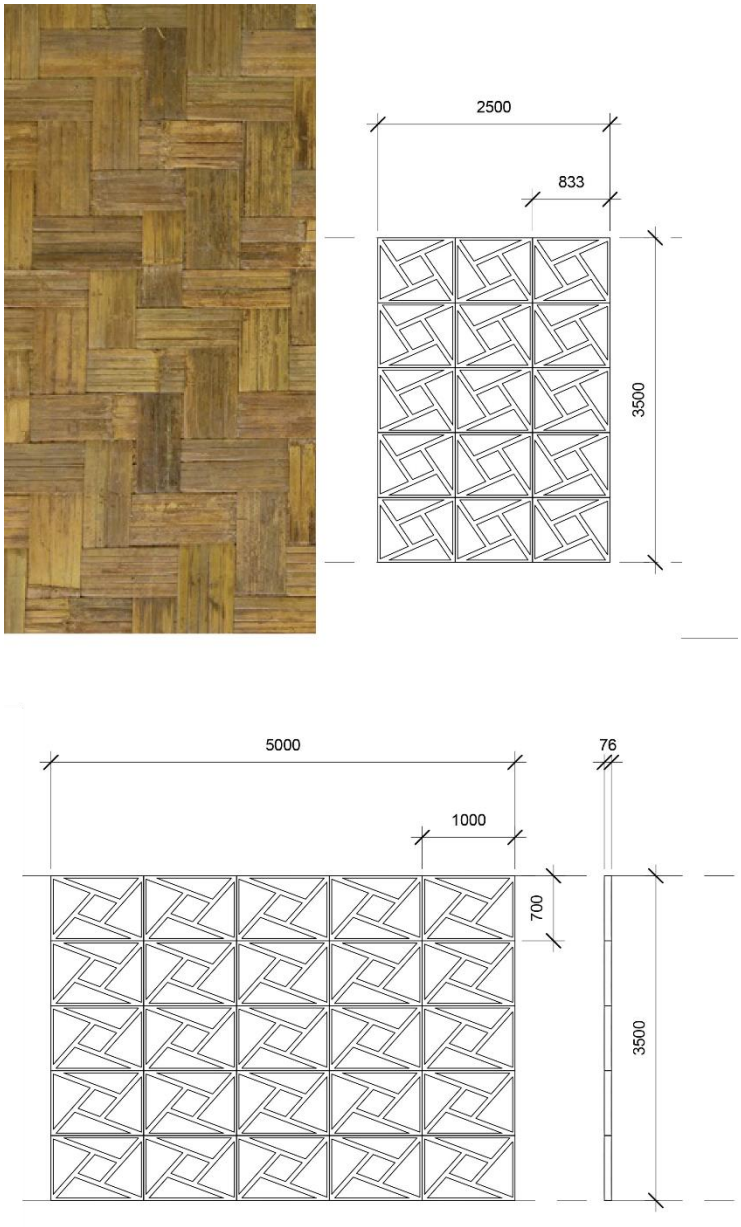


Figure 6. 40 Screen Design Inspiration

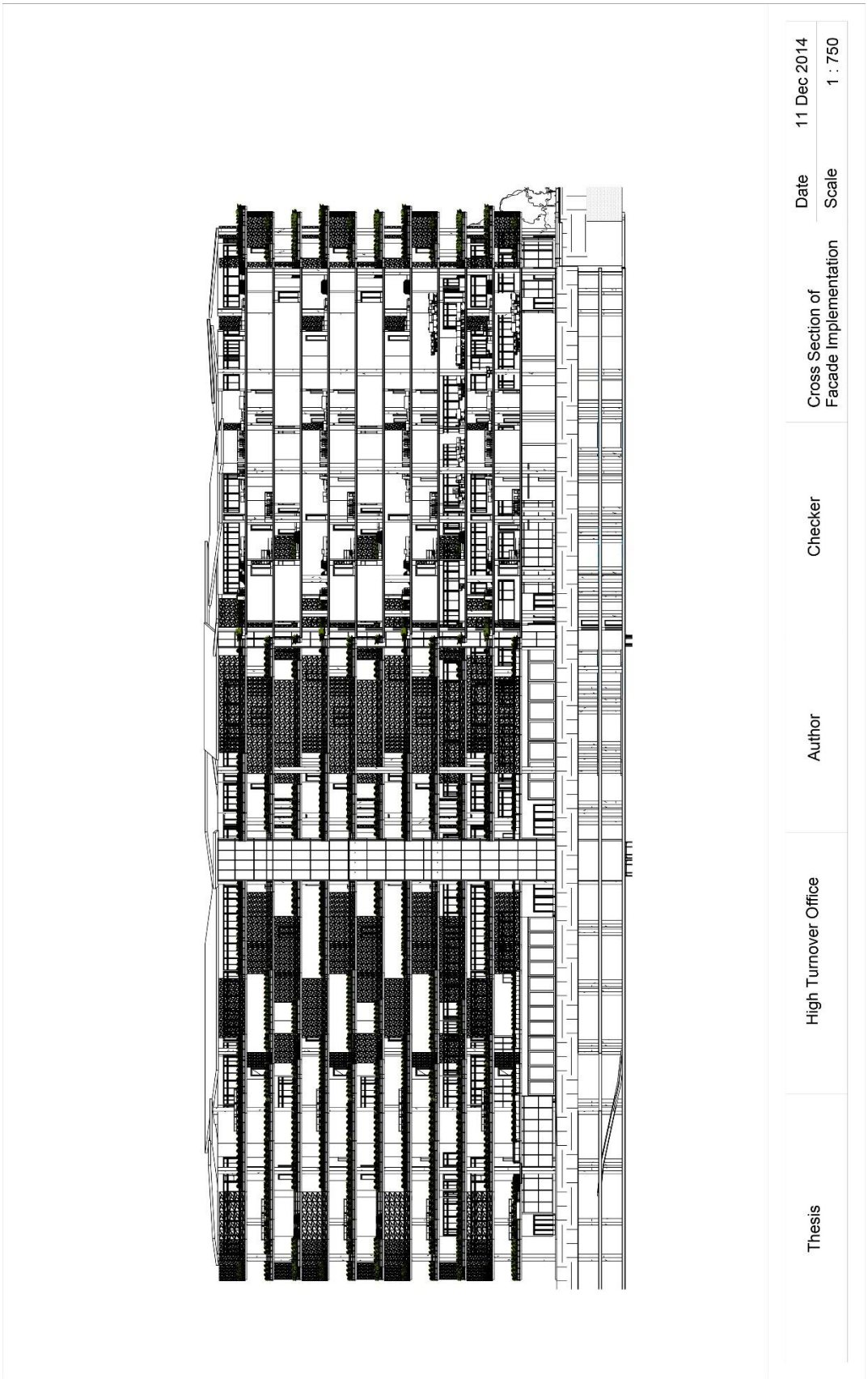


Figure 6. 41 Cross Section of Facade implementation on Site

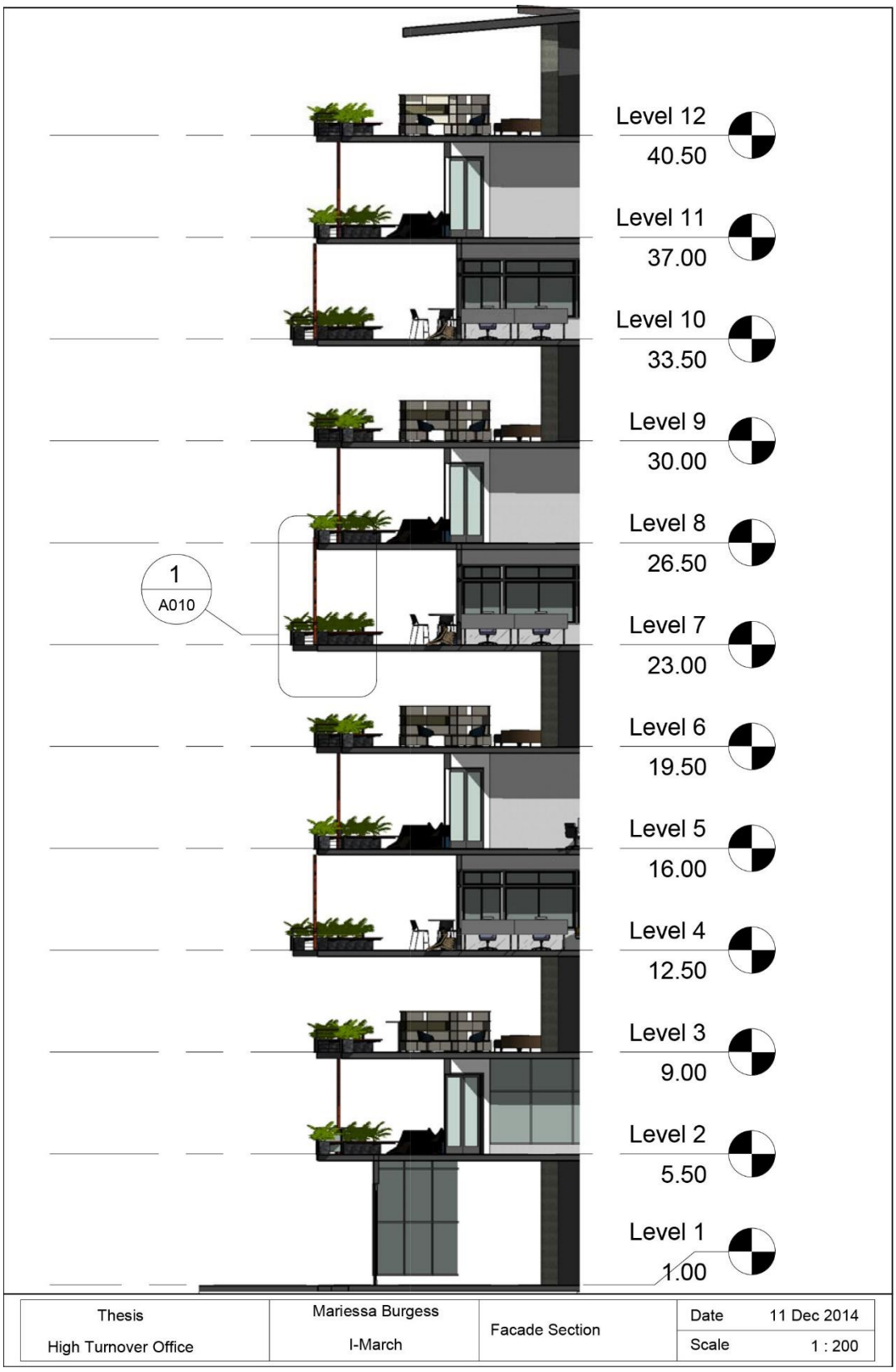


Figure 6. 42 Facade Section

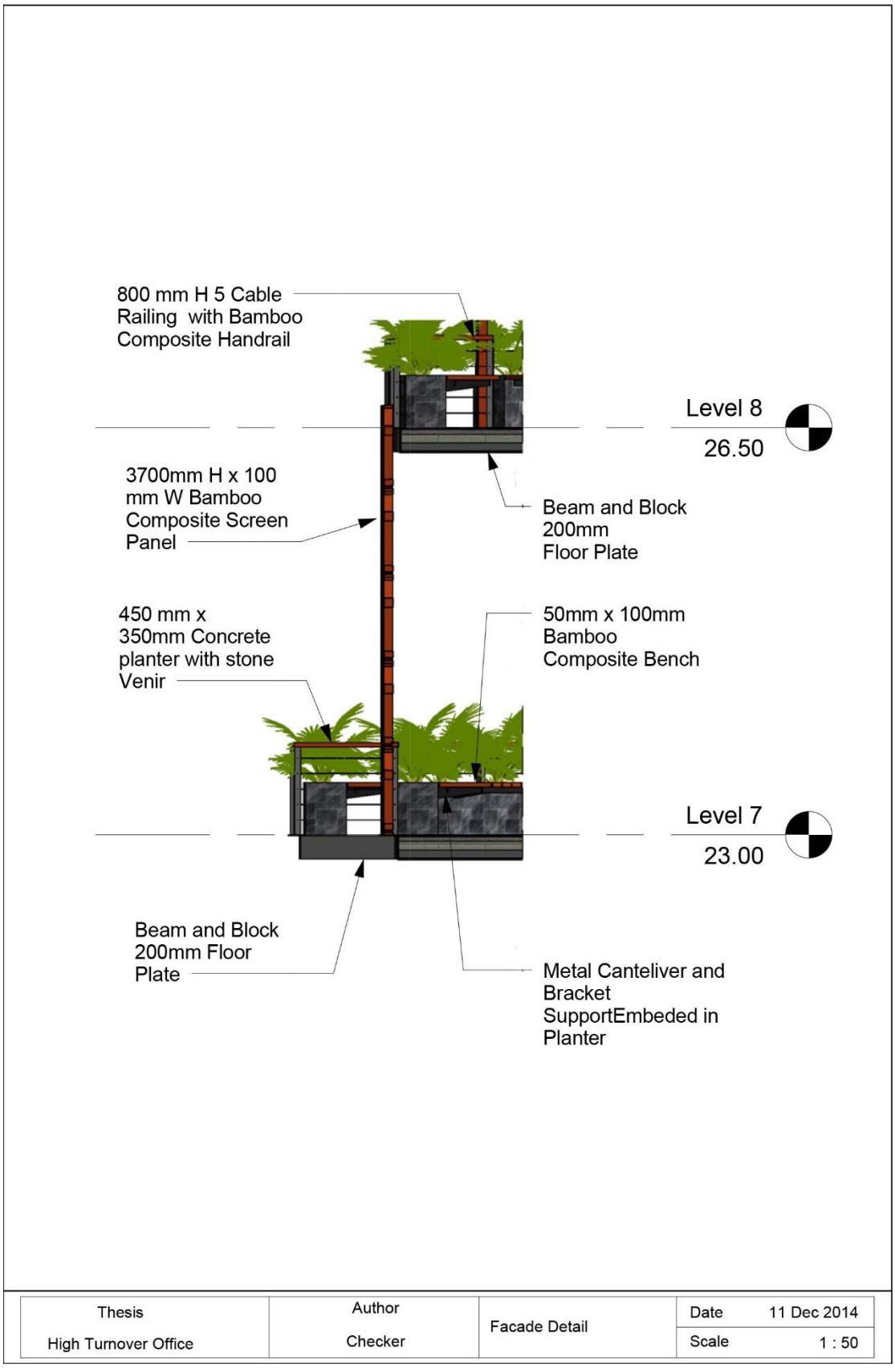


Figure 6. 43 Facade Detail

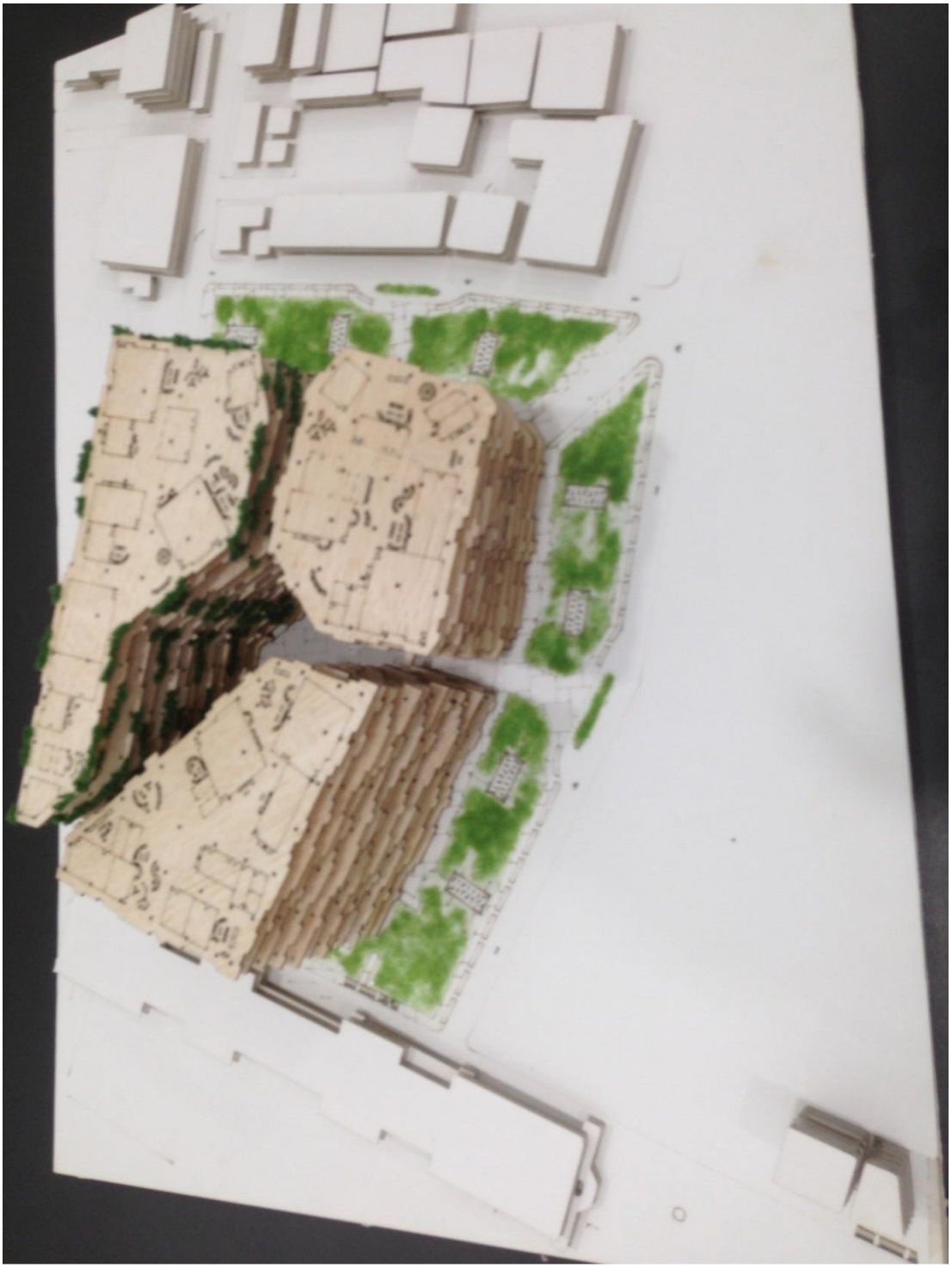


Figure 6. 44 Site Model 1:500

Figure 6.44 shows the site model from an aerial perspective to demonstrate the context of the building in comparison to the BTS and the surrounding buildings.

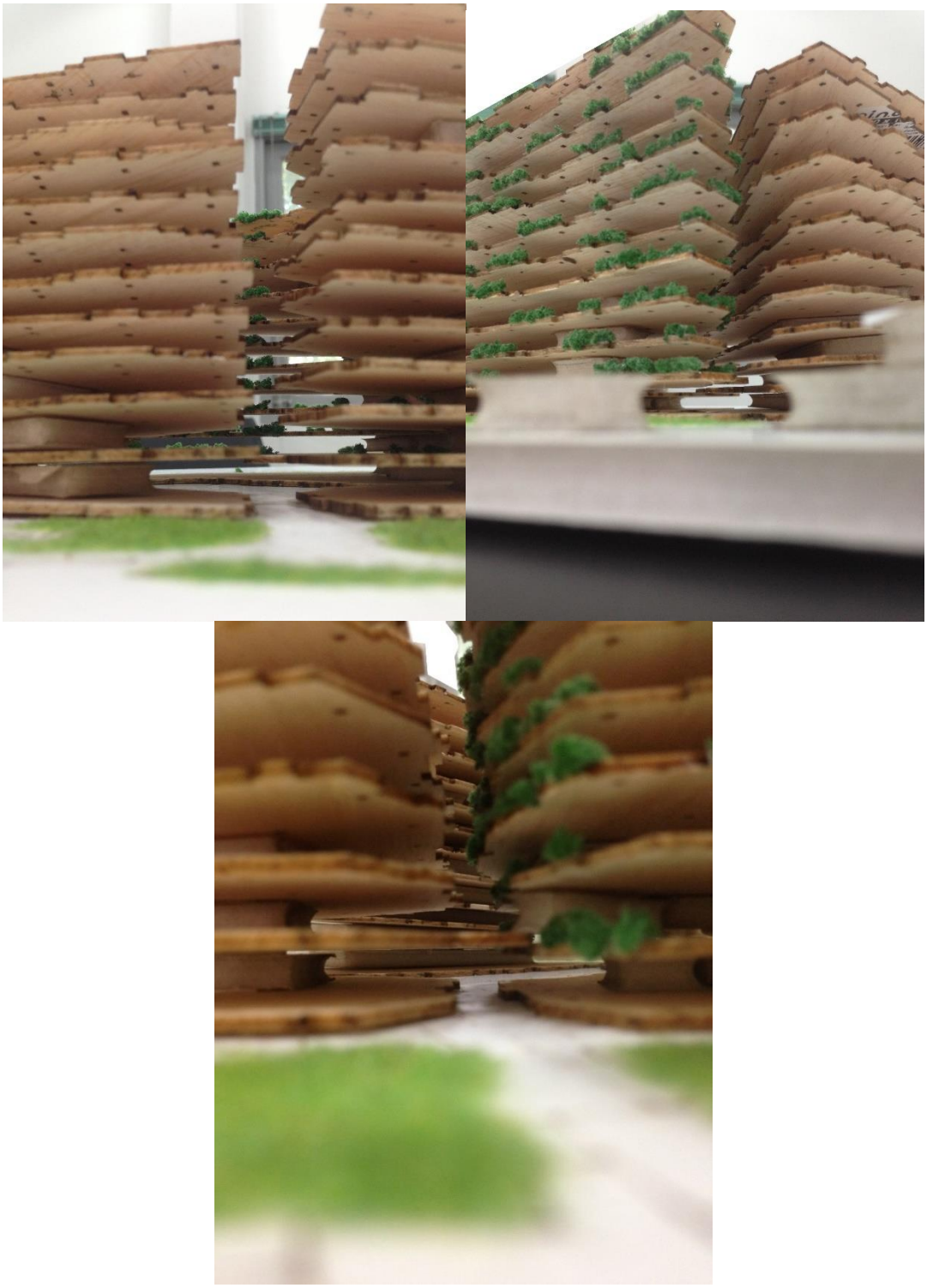


Figure 6. 45 Approach to the Talat on the site from three entrances.

The photos featured in figure 6.45 are to show the perspective of the end user as they approach the *talat*. The three pictures show the three different entrances to the courtyard from the perimeter of the building.

Figure 6. 46 Large Section Model 1:100

A large section model was done of the second building to demonstrate the different spaces between floors in the office building.

Figure 6. 47 Large Section Model

From this point of view it is possible to see the layering of the screen and the office space, as well as the shaded exterior courtyards.

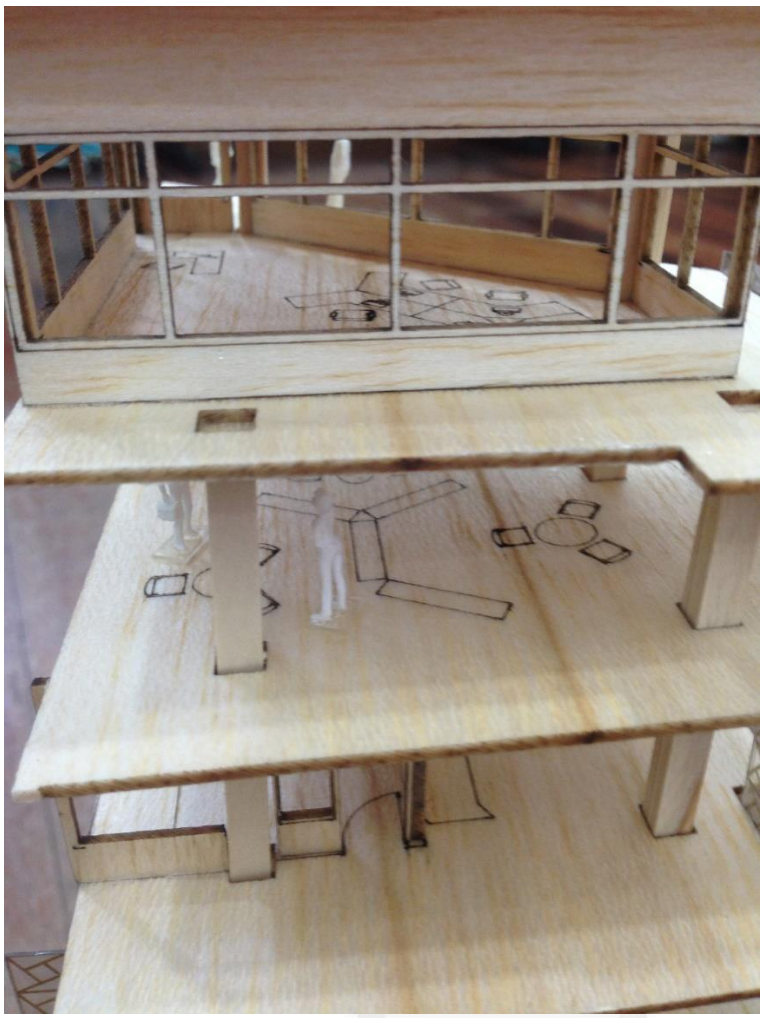


Figure 6. 48 Large Section Model 1:100

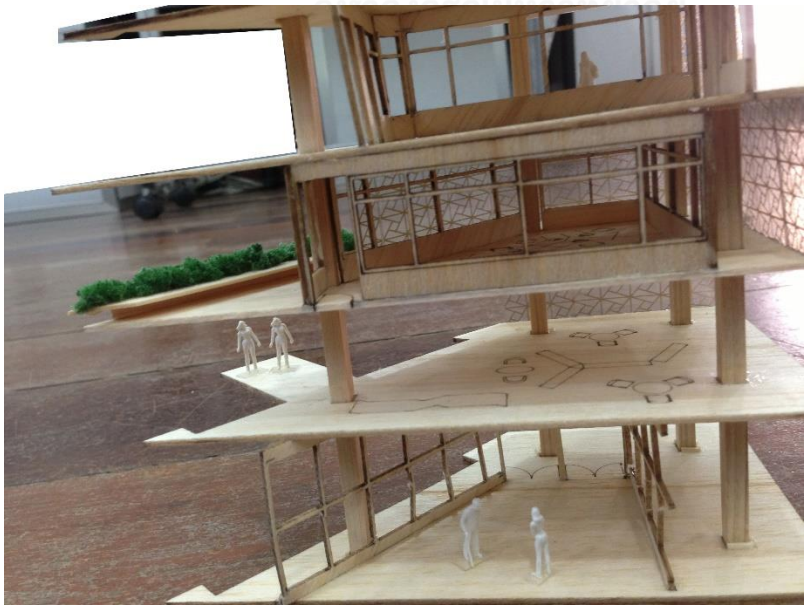


Figure 6. 49 Large Section Model 1:100

The large section model demonstrates the relationship between floors. The screen and seating area around the perimeter is better understood in this model through its interaction with the scaled people. This model also illustrates the enclosed offices and the more open meeting areas.

6.7.2 Site Open Space

The case study of Hakhuodo, and the user survey inspired an oasis for relaxation surrounding the large office complex. Thailand Ministerial Regulation 33—Section 6 requires an open space for commercial buildings that are not less than 10% of land area. This open space must not have roof or covering structures. One of the initial goals of the building design was to maintain as much open space on the ground level as possible. The landscape place is designed for leisure as well as to benefit the built environment.

Bangkok was founded on the flood plain of the Chaopraya River, flooding concerns are prevalent in the outlying districts of the city are a concern every rainy season. One of the most common practices to avoid flooding is to build 1m above street level. This does not negate the rainfall on site, but is a defense against other runoff entering the building. The green space helps recuperate the appropriated green space next to the initial site selection, the large amount of landscaping will help to reduce the runoff from the site during the rainy season.

The green strip has several large ponds and a lot of landscaping to act as a repository for water during the rainy season, and absorb rain. The hardscape on the ground level is permeable so that water can be absorbed into the soil beneath instead of creating runoff. (See figure 6.50 and 6.51)

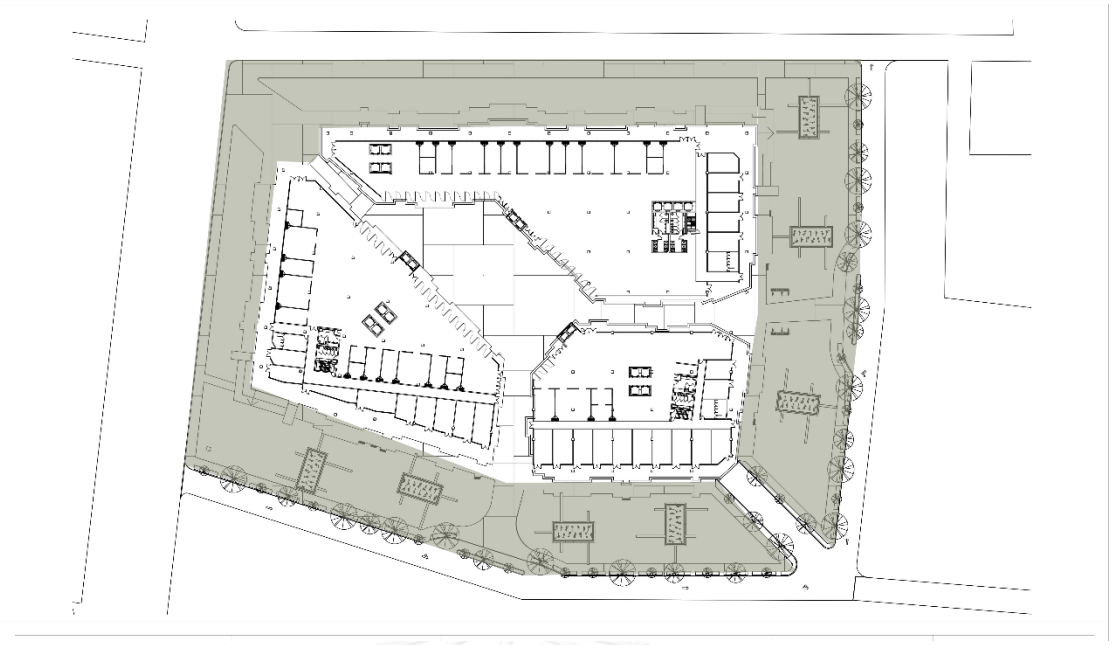


Figure 6. 50 Green Strip

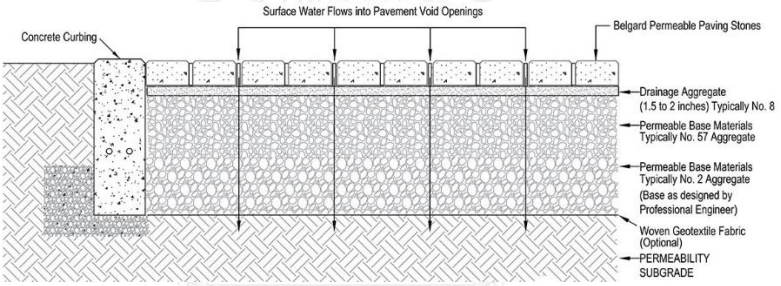


Figure 6. 51 Permeable Pavement Detail

During the summer the green strip provides natural shading, and the ponds provide ambient cooling. Plants used in the green strip should all be native to Thailand so that they are able to withstand the hot temperatures in the summer, as well as the deluge of rain fall during the rainy season. (See Appendix)

For trees bordering the street a Cassia tree or Blackwood tree would be most appropriate. Growing to a maximum height of 20m, both are able to tolerate the smog that comes from being planted so close to the street, and are hearty despite less than favorable conditions. Their canopy spread is also beneficial to shade the sidewalk as well as part of the street. In contrast, larger trees such as the Bengal Almond or the Siamese Rosewood, growing to a maximum height of 30m would be better placed in towards the center of the green space, as their expansive root systems could potentially disturb the pavement, and need abundant space.

Rather than a carpet of grass, clustering small shrubs and evergreens around the walking path to add to the plant life in the green strip is preferable. Small (0.5m-1m), quick growing evergreens such as the Hooded Dwarf Elephant ear, the Spider Lily, Tannia, or Fancy Leaved Caladium bordering the path. With taller (1.5m-3m) Dwarf Thailand Lady Palm, Dwarf Date Palm, Caricature Plant, and Gardenia Crape Jasmine behind. Varying the plants throughout the green strip lends a more lush feeling to the area, and by having evergreens with color such as the Caricature plant, Gardenia crape jasmine, and Tannia will break up the varying shades of green.

Should a carpet of grass be necessary, an indigenous perennial grass such as zoysia is recommended for planting. This turf grass is easily maintained in the hot climate of Bangkok where other Asian varieties would wilt if they were not tended in the cooler mountains of the north.

CHAPTER VII ARCHITECTURE THESIS CONCLUSION

This paper studied the potential of an office complex emphasizing community work processes and technology. Mobile technology encouraged a redesign of the office to take advantage of the freedom to choose where and when work is done. The workspaces are designed to be easily reconfigurable, and adapt to short term renters and changing work processes. The design supports a hoteling concept to take advantage of a more flexible tenant schedule. The site's suburban location near rapid transit offers a viable alternative to congested downtown locations, furthering the decentralization of work in Bangkok.

The design employs the layering of spaces from interior to exterior zones to create microclimates within the office building. This layering also moves from public to private community zones, where the building interacts with the cityscape by providing an urban park, and shopping on the first and second floors. The designed office complex attempted to integrate mobile technology and increase spaces for group work processes.

7.1 Ways of Working

Work is gravitating towards more group work processes, and digital storage has reduced the need for physical storage. Survey respondent's shows 90% of workers use small or no physical storage, and 70% prefer flex or relaxing work space. The building design provides for highly configurable flex and relaxing workspaces, as well as formal meeting spaces.

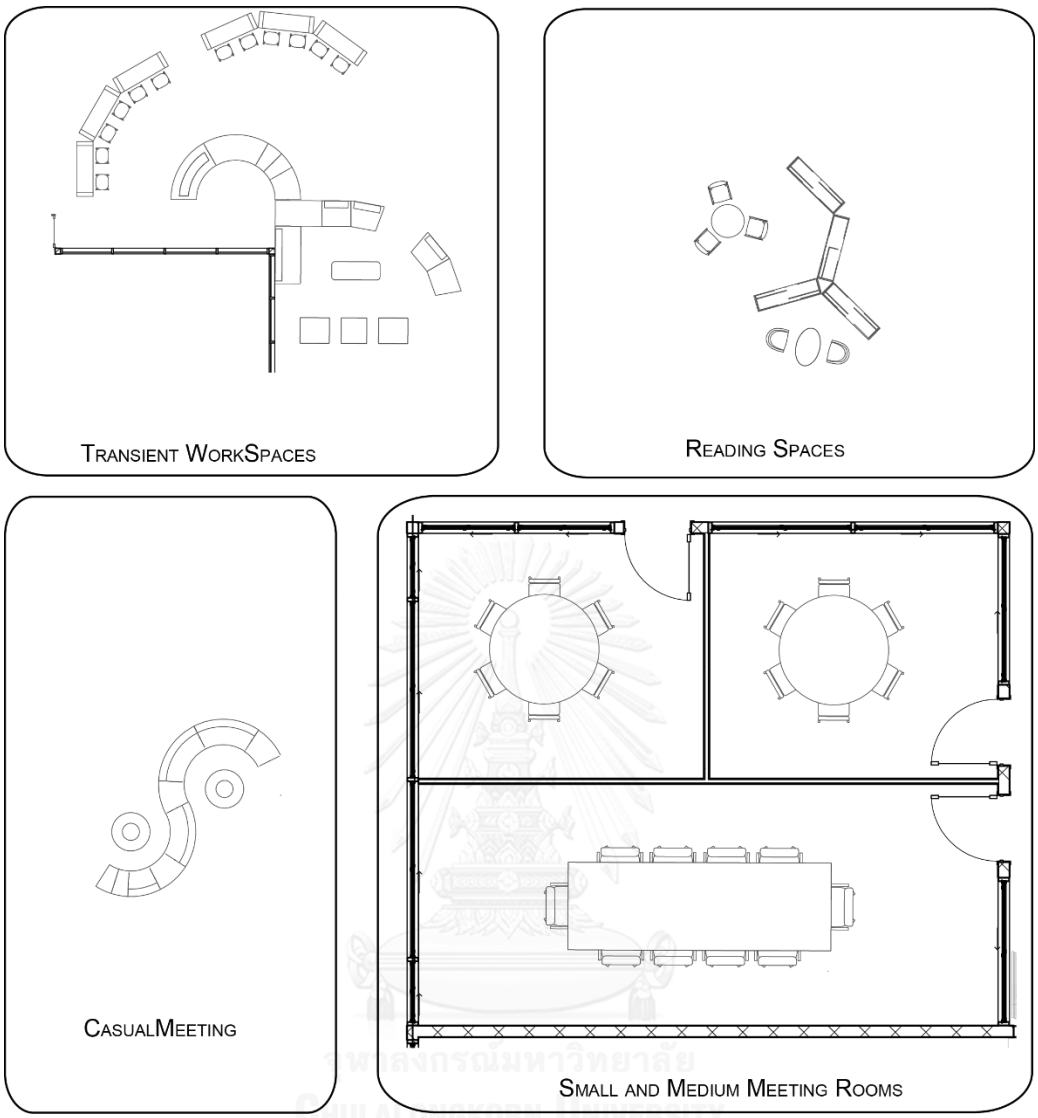


Figure 7. 1 Casual and Formal Meeting Spaces

The less formal meeting spaces are part of the exterior courtyards that make up the space between the offices. The courtyard spaces can be categorized into reading areas, transient work areas, and casual meeting areas to provide alternative working and meeting environments. Formal meeting spaces are available for reservation at the reception desk, and also come in three different sizes for 6, 10, or 16 people.

The office complex offers three different office sizes (56m², 133m², and 227m²) to accommodate small startups to medium size companies, in two different office layout options focusing on collaborative work processes. The office can be re-

configured to a team or open plan at the time of rental, or upon request. To facilitate the importance of collaborative working, and communication among workers the largest distance between workers in a rented office space is 16.44m encouraging frequent interactions.

The office is designed to support a hoteling concept, which accommodates short term rentals and requires the space to be highly reconfigurable. Flexibility of the workspace is achieved through in-floor electrical outlets spaced 1.5m apart throughout the dedicated and transient workspaces. By providing the end users with a space for dedicated work tasks, casual encounters and formal meetings and the end user engages the work environment best suited for the task at hand.

7.2 Places of Work

Expected users would be freelance workers, SME's and foreign ASEAN investors. 100% of people surveyed prefer to work close to public transportation, with 80% preferring to work closer to home. The design took into consideration a site location in close proximity to the BTS. Due to the climate, Thai people consider more than 200m from BTS to the office to be quite far. There are various potential sites along the existing BTS and planned line that are located within 200m of the BTS. The Bearing site location enables the office complex to be connected to the Bearing BTS station on the second floor, and the furthest point of the site is 180m from the station.

Figure 7. 2 Site Selection

70% of those surveyed would also like access to shopping and dining. In addition to on site shopping and dining, the selected location is within two blocks of a 7-eleven, a coffee house, and the hospital. The benefit of this site selection is the reduction in social cost lost during the long commutes from the suburbs to city

center, as well as addressing the workers desire to be close to a mode of rapid transit and have access to shopping.

7.3 Technology in the Workplace

Current communication technology enables investors from other countries to set up small business ventures without a high initial cost, to test out a fluctuating market; while developers will be able to rent out space required rather than projected space needed.

Mobile technology allows the developer and the business owner occupying the space to take advantage of the time not spent in the office as well as without. Technology enables us to layer several people in the same office space over a work day, further encouraging the development of a 24 hr office environment. The designed office complex allows for end users to rent the space that they need during the time they need through a hoteling reservation system, as well as at the reception desk.

With personal computers and personal devices, office workers are highly connected. 90% of the office worker spends more than 75% of their time working on the computer; 70% using laptops and 60% uses tablets and smartphones. This requires a high speed connection to the internet. The building design offers local server rooms as well as high speed wireless and fiber optic cables to connect to the internet supporting up to 3,400 users all at one time.

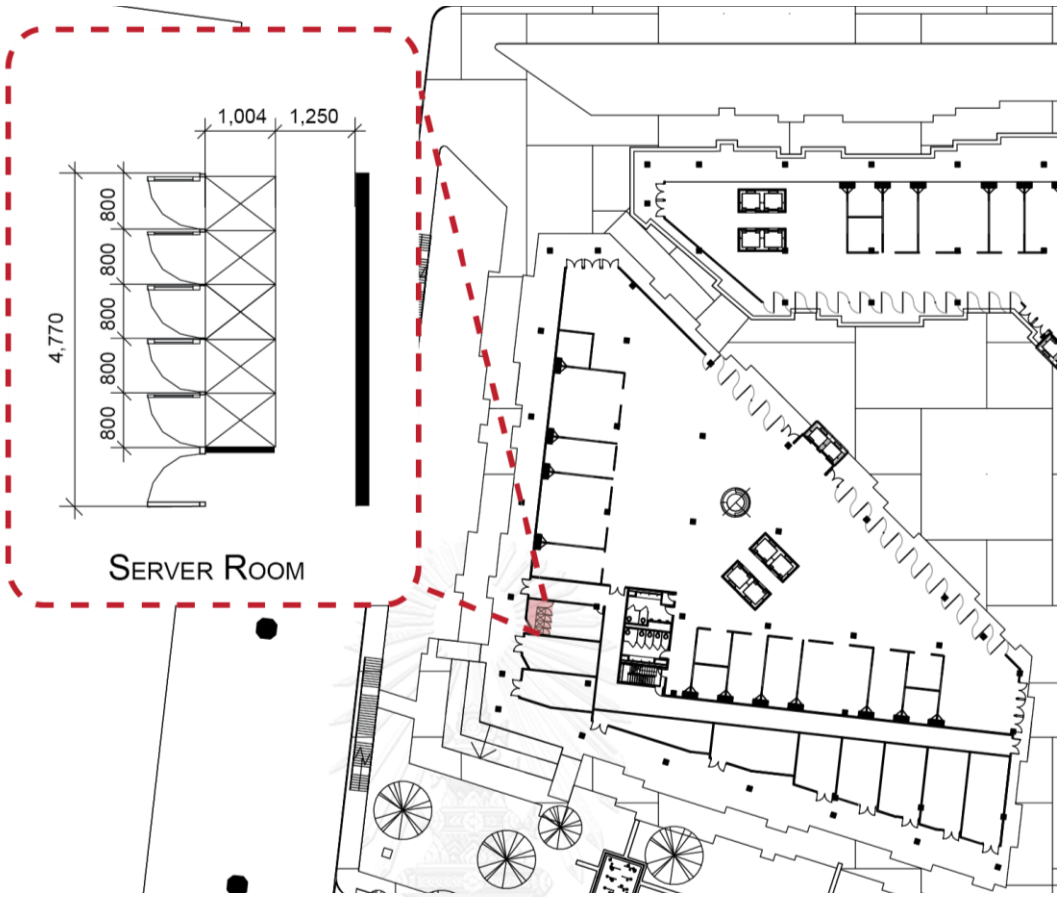


Figure 7. 3 Server Room Building 1

7.4 Working Culture

Religion and shopping are integral to the daily lives of Thai people. The desire to access a place of worship is addressed through the spirit house. The spirit house is located in the south-western corner of the site for the high visibility the location offers, as well as at the entrance of the open space of the site.

70% of the people surveyed said they would like access to shopping. Typical Thai's use their 'coffee breaks' to leave the building to shop. At the very least the workers will exit the building for lunch and buy small things on their way back to work. To address this unique cultural behavior an area for shopping was essential.

Though there is access to some shopping near the site; the location of the office complex is in an area without a large shopping plaza in the immediate vicinity. As such, it was important to include a commercial aspect in the office complex. In

Thailand, it is common practice to have some coffee shops, a convenience store, and perhaps a restaurant in the community spaces of the office. Since most offices complexes are located near city center, this is sufficient for the workers. Their other commercial needs can be addressed by walking a short distance to a mall. The site near the Bearing BTS does not have a mega-mall however, so shopping was included as part of the office complex.

Shopping is broken up into both informal and formal shopping areas. Where the formal boarders the first two high circulation floors. Anticipated formal shops would not only be café's and restaurants, but would include pharmacy's like Boots or Watsons, clothing stores, electronics, print shops, and a stationary store.

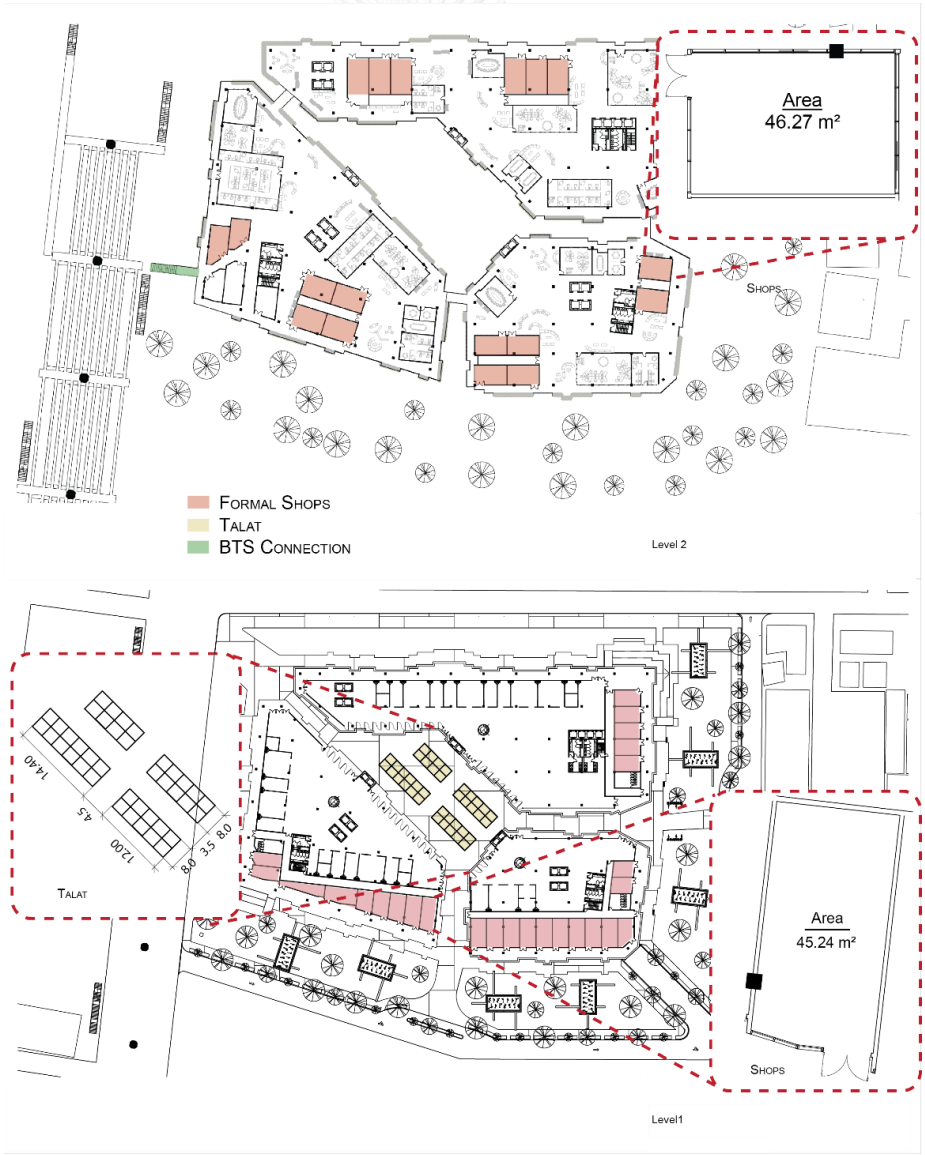


Figure 7. 4 Formal and Informal Shopping on Site

The informal *talat* is in the center courtyard of the building complex, and acts as the central anchor for pedestrian circulation through the building complex. The exterior public space on site accommodates a *talat* in order to provide recreational space and stress relief to the workers. The *talat* and the ground floor of the office complex can be appropriated to become an event space between all three buildings.

According to Khun Buranakul, the conveniences available in the office building is one of the main items considered by the facility managers when selecting a new office complex for their workers. The benefit of this design is the ability to simulate the convenience afforded to downtown office workers to the suburban office complex.

7.5 Existing and Available Communication Technology

More than 75% of work is done on the computer in the office, and often smaller companies have people use their personal computers. In traditional offices the power outlets are in the walls, limiting the potential office configurations and any in-floor outlets for the office tend to be limited to the center of the conference rooms.

The designed office complex provides in-floor power, internet, and data outlets at 1.5m apart throughout every floor of the office complex. The unique design of having an array of in-floor power outlets throughout the entire floor provides true flexibility of work for office configurations without tying access to power and office equipment to a given wall.

Figure 7. 5 Outlet Array Example Level 4, 7, & 10 Building 3

Additionally, the in-floor power outlets provides the added benefit of making the space easily reconfigurable. This then allows for highly customizable space to better support short term rentals and the hoteling office practices.

The support for IT services is located at the reception desk on the first floor of each building to readily assist users with their IT and telecommunications needs.

7.6 Climate

A DSF method is employed in the design to shade the individual offices while providing an auxiliary circulation and lounge areas along the perimeter of the buildings. Integrated in the façade of the office complex is a screen and bench with space for shrubs like Spider Lilly's behind the bench. The benefit of heat reduction is derived from the plants which acts to cool the south-westerly wind.

Figure 7. 6 Building Section Model Screen Callout

Figure 7. 7 Exterior Courtyard Spaces

The spaces between the offices act as exterior courtyards facilitating casual interactions and circulation through the office complex. Exterior workspaces are shaded to reduce the temperature and provide shelter during the rainy seasons. Building with the tropical climate in mind, the cost of running and maintaining a building while the building is not at full capacity will be reduced.

A hot and rainy climate is the norm in Bangkok; 100% of the workers surveyed would like the ability to personally control the air conditioning and windows of their work space depending on the time of day, heat, and humidity. The design of the interior offices provides individual air-conditioning units instead of a central air-conditioning system; as well as operable windows and shading devices to allow the users control the climate of the work space while in use. In this way, the users are able to control their own office climate to suit their preferences. Thus the design provides higher satisfaction for the work environment.

7.7 Suggestions for Further Study

Office design is one of the most studied types of design in architecture. The only conclusion for the continued popularity of office study is that the way people work is constantly evolving due to the changing fabric of society and the evolution of technology used in our everyday life. Flexible office space is going to continue to gain in popularity, and is already being used internationally. However, the key difference of having power in the floor is a unique feature of this building design, and should accommodate any office needs for many decades to come.

To further the study it would be beneficial if the building was run through an environmental analysis program to test the efficiency of the building design. Additional design analysis could be made of the power consumption to see if any supplementary benefits can be gained through sustainable practices.

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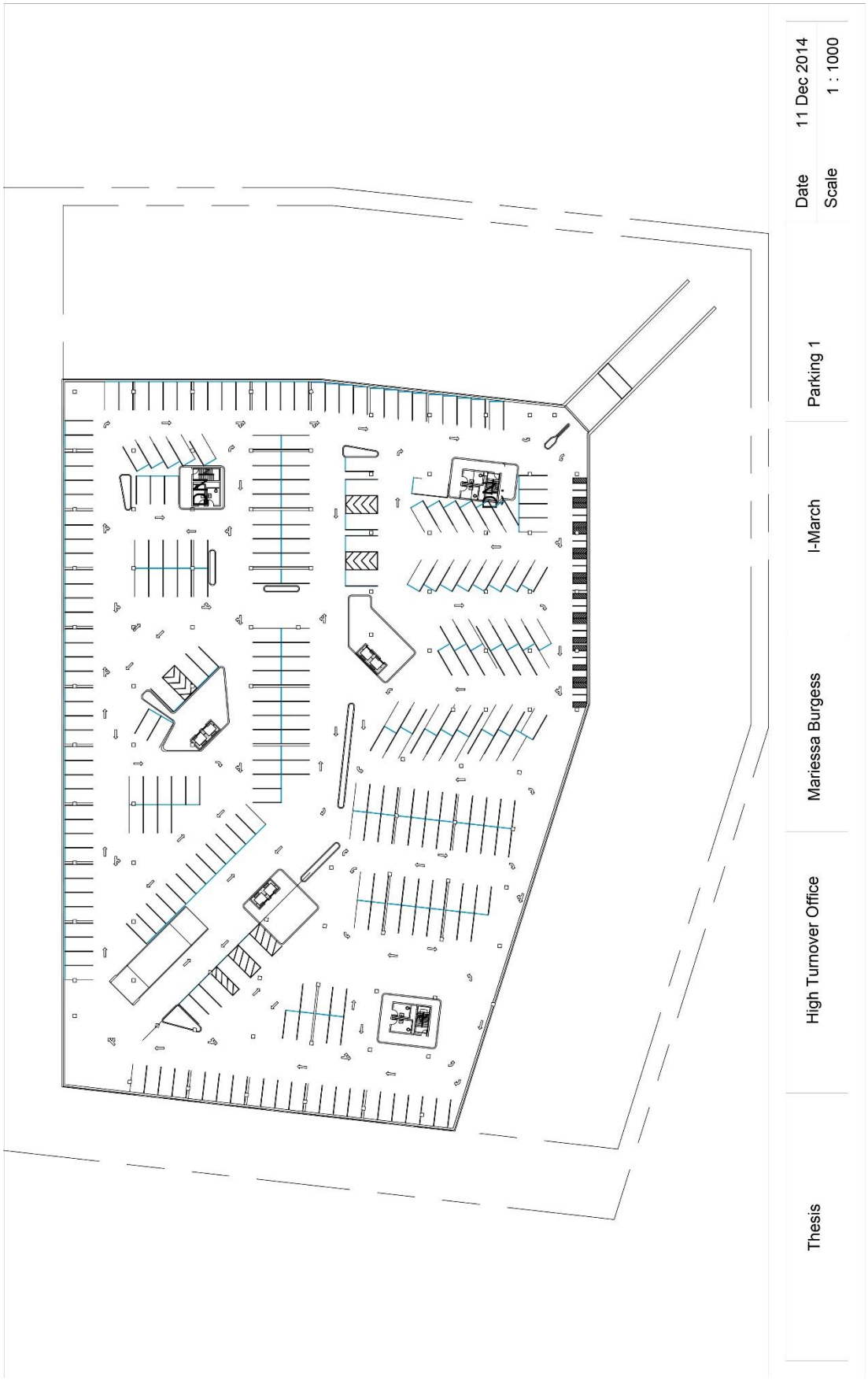

Thesis

High Turnover Office

Mariessa Burgess

I-March

Parking 1

Date 11 Dec 2014

Scale 1 : 1000


Parking 2
Checker
Author
High Turnover Office
Thesis
Date 11 Dec 2014
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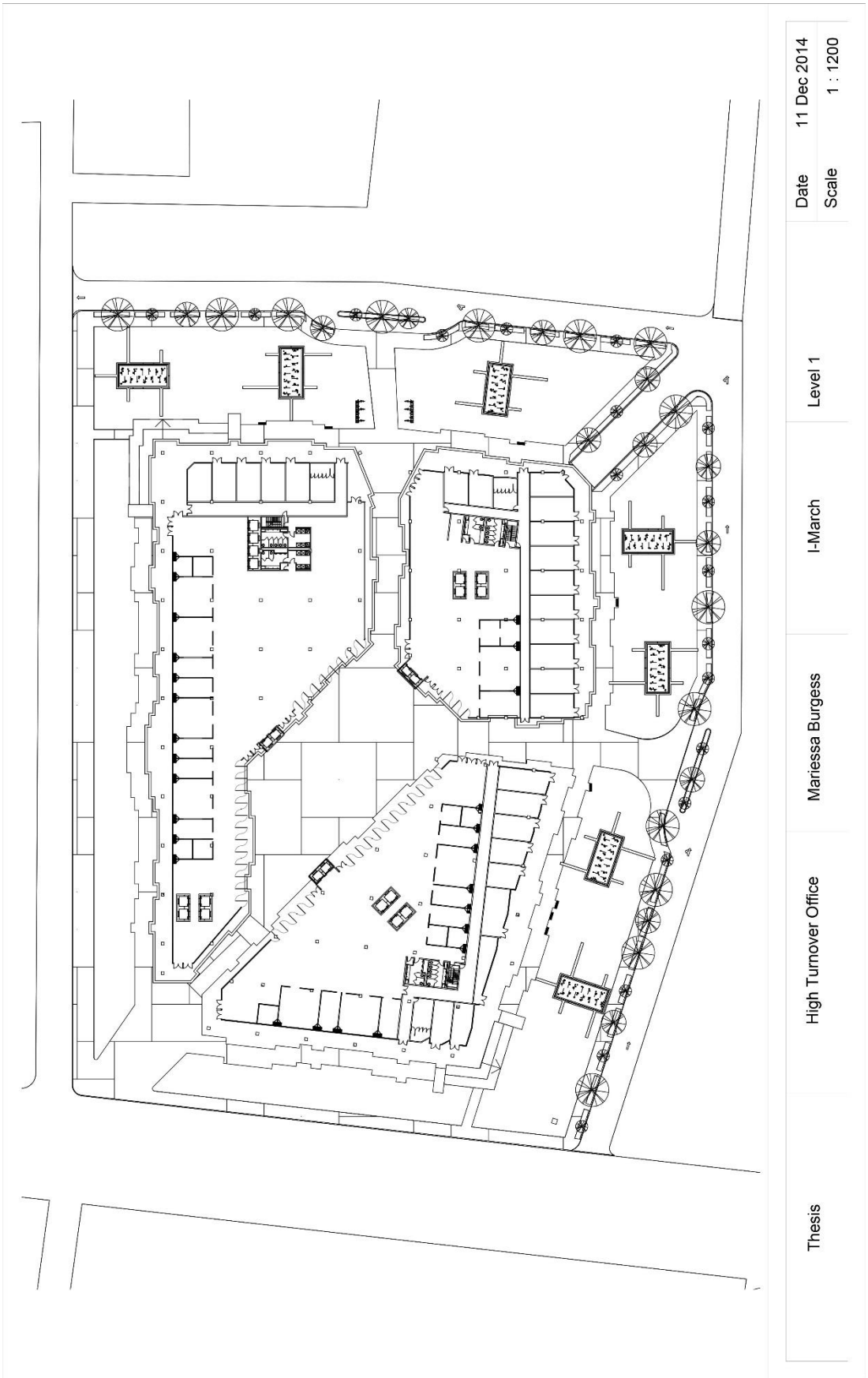
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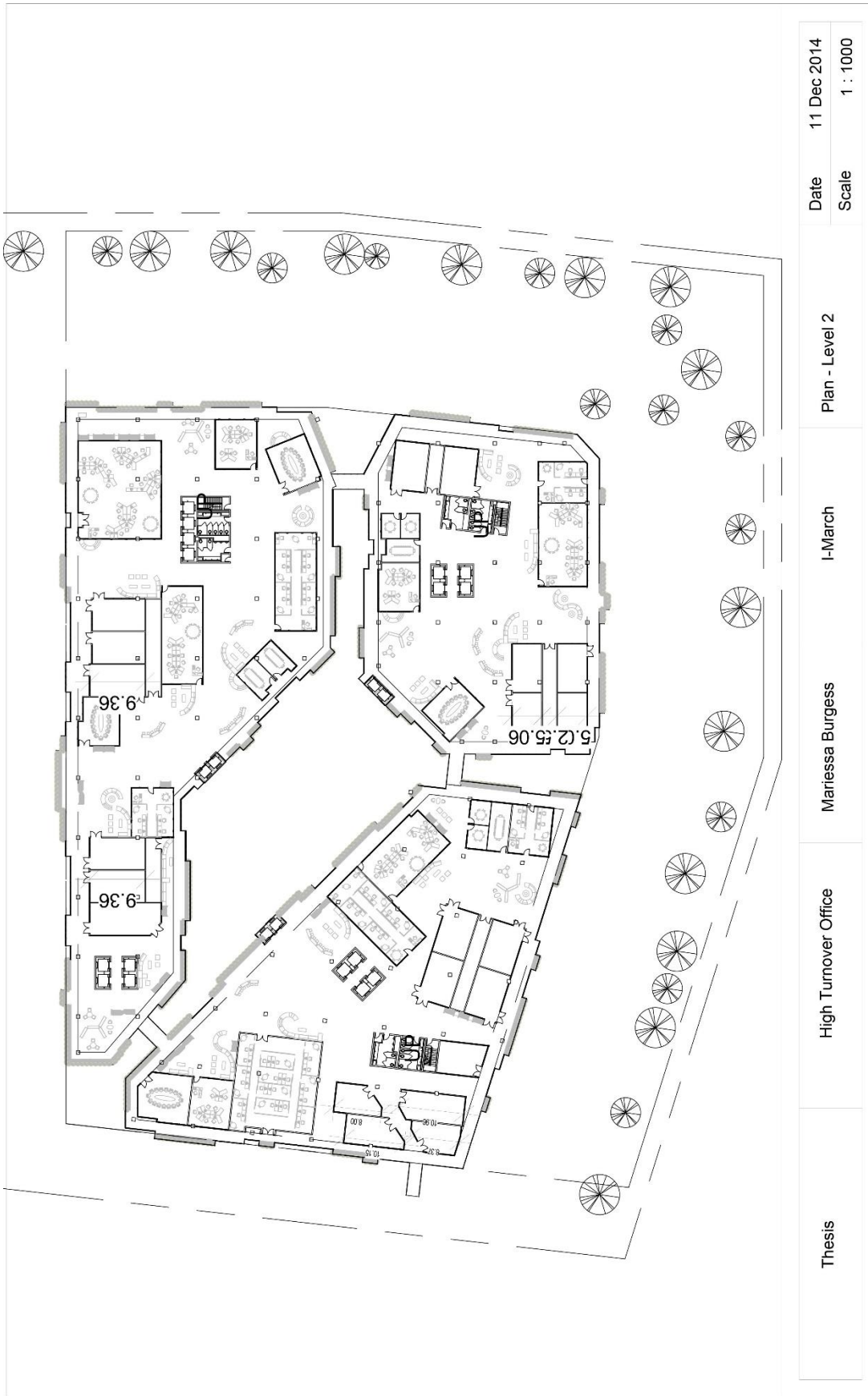
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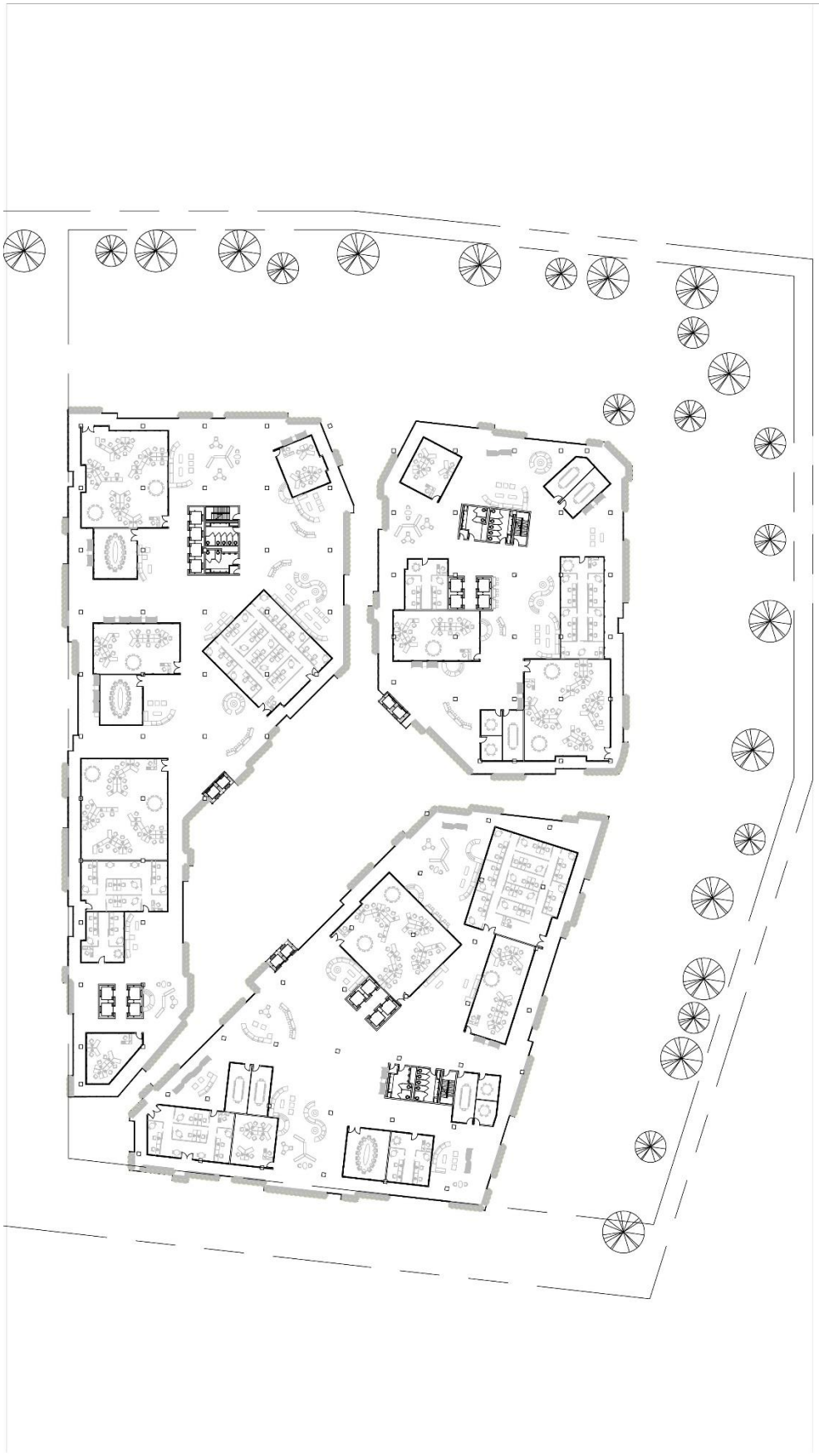

Thesis

High Turnover Office

Mariessa Burgess

I-March

Level 3, 6, 9, & 12

Date 11 Dec 2014

Scale 1 : 1000

Thesis

High Turnover Office

Mariessa Burgess

I-March

Level 4, 7, & 10

Date 11 Dec 2014

Scale 1 : 1000

Thesis

High Turnover Office

Mariessa Burgess

I-March

Level 5, 8, & 11

Date 11 Dec 2014

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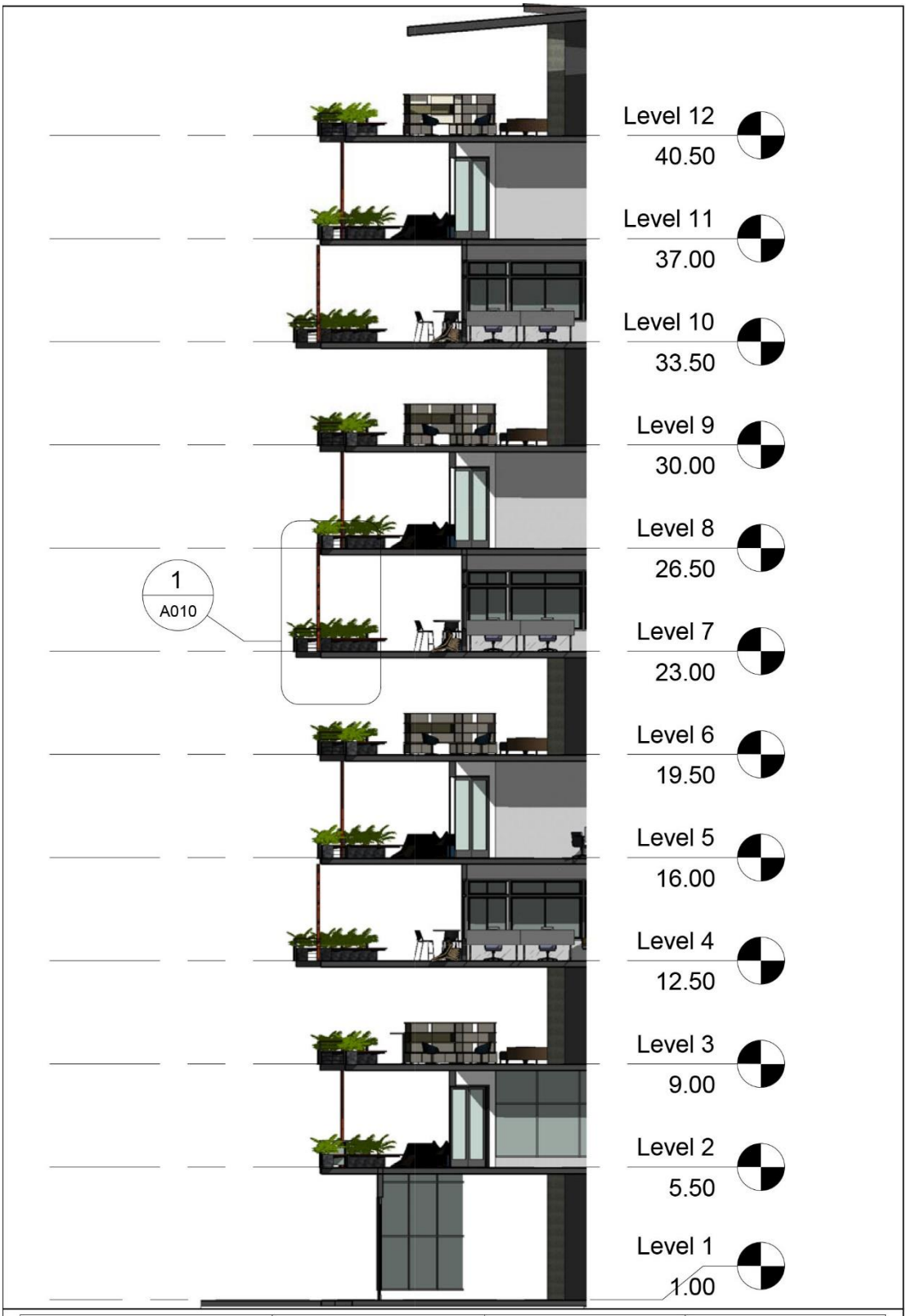
Thesis	High Turnover Office	Author	Checker	Cross Section of Facade Implementation	Date	11 Dec 2014
					Scale	1 : 750



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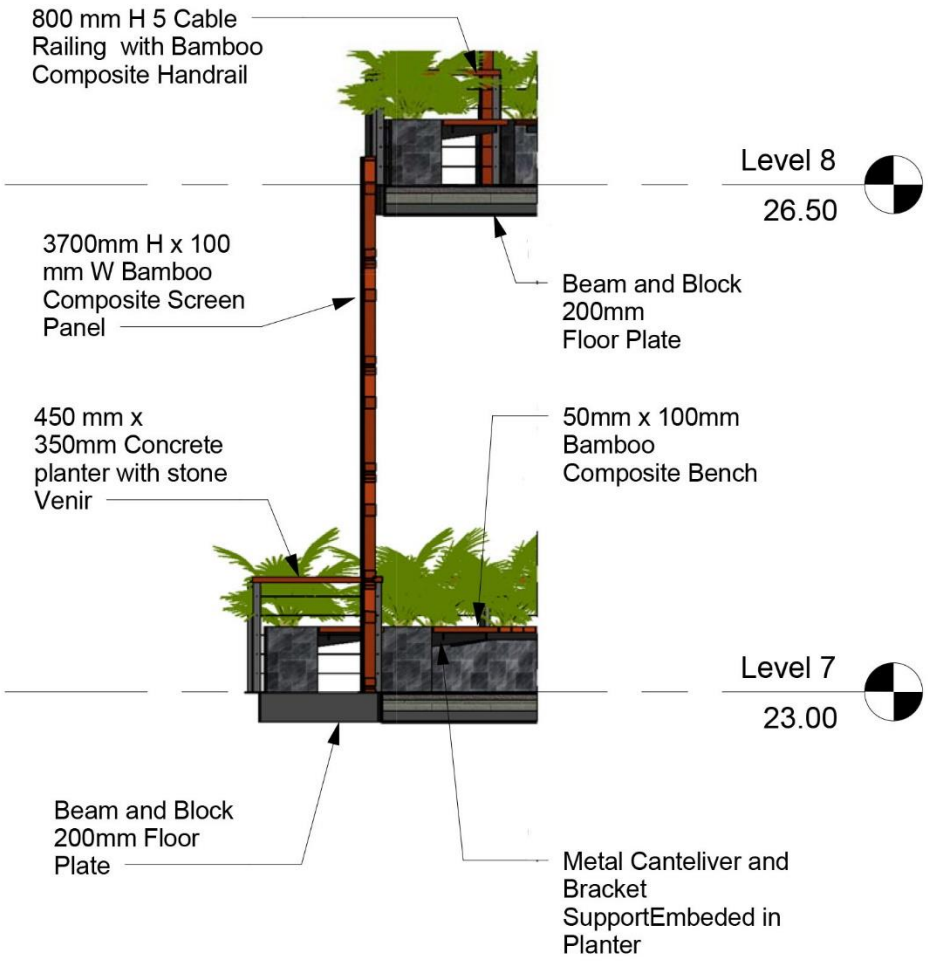

Thesis High Turnover Office	Author Checker	Facade Detail	Date 11 Dec 2014 Scale 1 : 50

Figure 7. 8 Site Axonometric

Figure 7. 9 Site Axonometric rom BTS

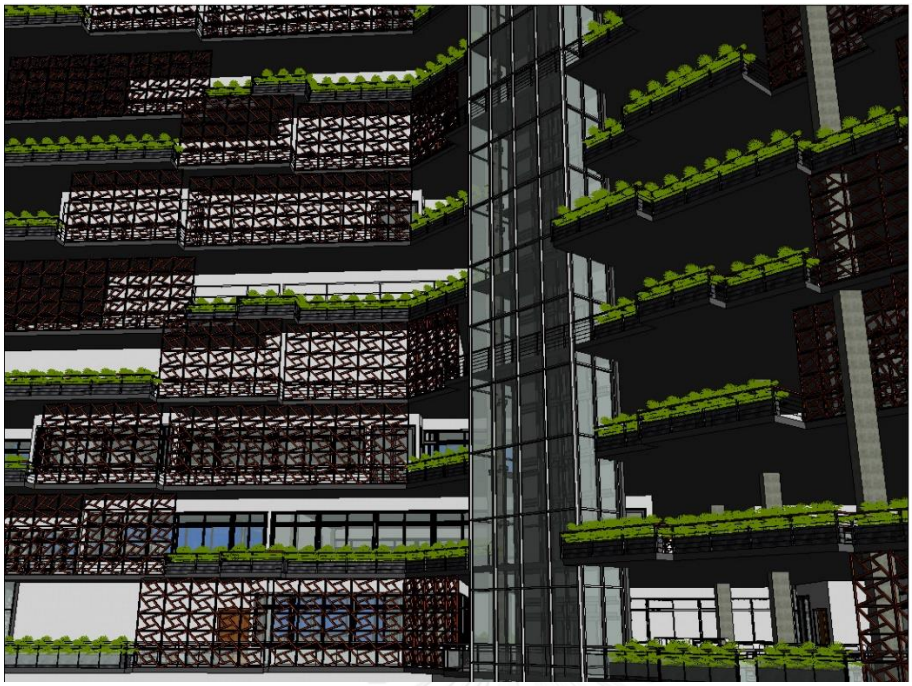

Figure 7. 10 View of Glass Elevators from the Talat

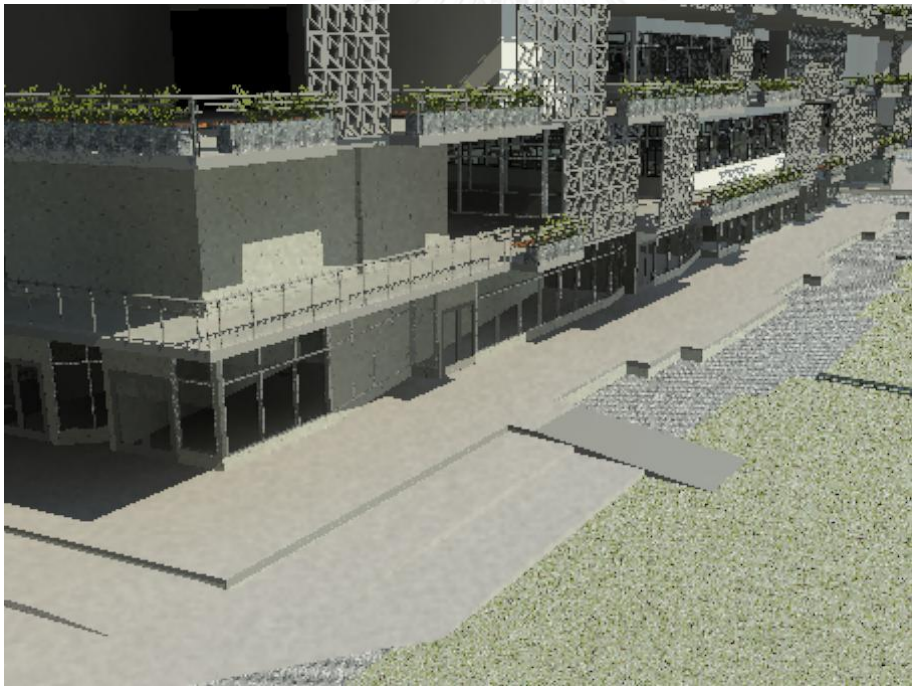

Figure 7. 11 View of the Office Complex from the BTS

Figure 7. 12 Shadows of the Screen around the Veranda

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APPENDIX

Professional Survey:

Working Environment

1. Are offices with the ability of personalization and spatial flexibility more appealing than completely built-out spaces?
2. Is communication more effective in open spaces such as courtyards and open plan workstations than in closed spaces and individual offices?
3. What size/ kind of businesses rent an office? Are the usually already established or do you have new companies as well?
4. Do you feel that the proximity of the work place to home affects the marketability of the office?

Technology

1. Have technological advances affected the way that offices are used?
2. Do you find that increase of personal technology in the workforce has altered the expectations of the work space?
3. Is there a higher likely hood of providing portable work devices rather than stationary computers?
4. Do smart phones, tablets, and laptops influence the workforce towards a more decentralized work environment?
5. Are you finding that virtual workplaces are becoming more prevalent? Or do physical offices still play a significant role in creating a sense of community?

Meeting and Communication

1. What are the ratios of spontaneous to structured meeting areas in an office building?
2. Are workers more satisfied when an acoustical separation is possible? Or when they are aware of their co-workers?

Views

1. Does the natural lighting of a space and the views from the office increase its market value?

2. Do offices with volumetric differences (heights and widths of spaces) create a more stimulating work environment than a skyscraper open floor plate?
3. Do people want to personally control lighting systems or do they prefer automated systems?
4. Is day lighting and personal control over space important to customers?

Interpersonal Relations- Social

1. Are there foreign investors? If so, where and what kind of offices do they look for?
2. How has ASEAN influenced the office market? How will it influence the market in the future?

Performance of Space

1. Are open plans the go to for office build outs?

Office Worker Survey:

Working Environment
สภาพแวดล้อมที่ทำงาน

1. Do you do you work best in a(n)….?
คุณชอบทำงานในสถานที่แบบไหน
a. Formal Enviornment eg Closed office
ก. ออฟฟิศที่มีประตูปิดแบบมิดชิด (office that is entirely closed)
b. Flexible Work Space eg Open office
ข. ออฟฟิศที่เปลี่ยนได้ตามความจำเป็น (office that can change based on your needs)
c. Relaxed Enviornment eg Starbucks
ค. สถานที่ที่มีความผ่อนคลายไปในตัว คล้ายๆ Starbucks

2. How much time do you spend at your desk every day?
คุณนั่งทำงานที่โต๊ะวันละกี่ชั่วโมง
a. 6-8 hours b. 4-6 hours c. less than 4 hours
ก. 6-8 ชั่วโมง ข. 4-6 ชั่วโมง. ค. น้อยกว่า 4 ชั่วโมง

3. How much time do you spend working by yourself at your desk every day?
คุณใช้เวลาทำงานตามลำพังที่โต๊ะทำงานของคุณวันละกี่ชั่วโมง
a. 6-8 hours b. 4-6 hours c. less than 4 hours
ก. 6-8 ชั่วโมง ข. 4-6 ชั่วโมง. ค. น้อยกว่า 4 ชั่วโมง

4. How much storage do you need for paperwork?
คุณต้องใช้ที่เก็บเอกสารมากน้อยเท่าไหร่
a. Small filing cabinet b. Lots of Storage c. I work almost entirely digitally.
ก. ใช้ตู้เก็บเอกสารแบบเล็กก็พอ ข. ต้องใช้ตู้เก็บเอกสารแบบใหญ่หลายๆใบ ค. ฉันใช้คอมพิวเตอร์/เก็บแบบดิจิทัล

5. Would you prefer to work closer to home?
คุณอยากทำงานใกล้บ้านขึ้นหรือไม่
a. Yes b. No c. As long as there is public transit doesn't matter.
ก. อยาก ข. ไม่อยาก ค. ไม่เป็นไรถ้าที่ทำงานสะดวกกับการใช้รถไฟฟ้า

6. Would you prefer to work closer to public transportation?
คุณอยากมีสถานที่ทำงานที่ใกล้ท่ารถไฟฟ้า
a. Yes b. No
ก. จริง ข. ไม่จริง

Technology
เทคโนโลยี

1. How much of your work is done on the computer? (Including normal e.mails)
คุณใช้คอมพิวเตอร์ในการทำงานมากน้อยแค่ไหน
a. 0% - 30% b. 40%- 60%. c. 60% - 75% d. more than 75%
ก. 0% - 30% ข. 40%- 60%. ค. 60% - 75% ง. มากกว่า 75%

2. What kind of technology do you use for work? (Circle all that apply)
คุณใช้เทคโนโลยีแบบไหนในการทำงาน
a. Desktop b. Laptop c. Tablet d. Smartphone e. Cloud storage f. Network Storage
ก. คอมพิวเตอร์เดสก์ทอป ข. แลปท็อป ค. แท็บเล็ต ง. สมาร์ทโฟน จ. Cloud storage ฉ. Network Storage

3. Does your office provide a laptop or smartphone for work?
ที่ทำงานซื้อแล็บท็อปกับสมาร์ทโฟนไว้ให้คุณทำงานหรือไม่

a. Yes. Laptop ก. ให้แล็บท็อป
b. Yes. Smartphone ข. ให้สมาร์ทโฟน
c. Yes, both. ค. ให้ทั้งสองอย่าง
d. No ง. ไม่ได้ซื้อให้ใช้

4. How often do you use teleconferences or video conferences?
คุณต้องประชุมผ่านโทรศัพท์หรือวิดีโอบ่อยแค่ไหน

a. Not at all. ก. ไม่ต้องใช้
b. Once a month. ข. เดือนละครั้ง
c. 2-3 times a month ค. เดือนละ 2-3ครั้ง.
d. Weekly ง. ทุกอาทิตย์

Meeting and Communication
การประชุมแบะการสื่อสาร

1. On average how often do you use meeting rooms?
ตามธรรมดาคุณใช้ห้องประชุมมากน้อยแค่ไหน

a. Once a week. ก. อาทิตย์ละครั้ง
b. Once a day. ข. วันละครั้ง
c. Several Times a day. ค. หลายครั้งต่อวัน

2. On average what are the usual size of your meetings?
ส่วนมากจะมีกี่คนที่จะเข้าประชุมกับคุณ

a. 2-3 people ก. 2-3คน
b. 5-10 people ข. 5-10 คน
c.10+ people ค. มากกว่า 10 คน

3. For small groups do you prefer having meetings in formal meeting rooms or in relaxed environments eg Starbucks or hotel lobbies?
สำหรับการประชุมที่น้อยคน คุณชอบใช้ห้องประชุมเฉพาะหรือใช้สถานที่ที่มีความผ่อนคลายในตัวเช่น Starbucks หรือล็อบบี้ของโรงแรม

a. Formal meeting rooms ก. ห้องประชุมเฉพาะ
b. Relaxed environments ข. สถานที่ที่มีความผ่อนคลายในตัว

4. On average how often do you discuss work with co-workers in group settings?
ตามธรรมดาคุณจับกลุ่มเพื่อคุยเรื่องงานกับเพื่อนที่ทำงานบ่อยแค่ไหน

a. Once a week. ก. อาทิตย์ละครั้ง
b. Once a day. ข. วันละครั้ง
c. Several Times a day. ค. หลายครั้งต่อวัน

5. Do you find it difficult to concentrate when co-workers are on the phone?
5. เวลาเพื่อนงานของคุณคุยโทรทัพท์ คุณจะเสียสมาธิในการทำงานหรือไม่

a. Yes. ก. รู้สึกเสียสมาธิ
b. No. ข. ไม่เสียสมาธิ
c. They use a different area when they make phone calls ค. เขาจะใช้ที่อื่นคุยโทรทัพท์

6. Are there recreational group spaces?
ที่ทำงานคุณมีสถานที่สำหรับให้พนักงานใช้เวลาผ่อนคลายโดยเฉพาะหรือไม่

Ex: Kitchen, Gym, Library, TV/Game room, Outdoor Relaxing areas.
เช่น ครัว, โรงยิม, ห้องสมุด, ห้องดูทีวีหรือให้เล่นเกมส์, สวนร่มให้พักผ่อนหรือเดินเล่น

a. Yes. ก. มี
b. No. ข. ไม่มี
c. No, but I would like some. ค. ไม่มีแต่อยากให้มี

7. What kind of recreational spaces would you like?
คุณอยากได้สถานที่ผ่อนคลายแบบไหน

_____

Performance of Space
ประสิทธิภาพของที่ทำงาน

1. Do you prefer natural light or electric?
คุณชอบแสงธรรมชาติหรือแสงไฟฟ้า

a. Natural. b. Electric c. Depends on the time of day.
ก. แสงธรรมชาติ ข. แสงไฟฟ้า ค. แล้วแต่เวลาของวัน

2. Do you often change the area that you work in?
คุณต้องใช้สถานที่ต่างๆทำงานบ่อยแค่ไหน

Ex: Designated work station; Group area, Meeting space, Touch Down areas.
เช่น โต๊ะของตัวเอง; ที่รวมของแผนก; ห้องประชุม; ห้องสำรอง

a. I stay at my desk all day. b. I change a few times. c. I am always on the move.
ก. ฉันอยู่ที่โต๊ะของฉันตลอดวัน ข. ฉันก็มีเปลี่ยนบ้าง ค. ฉันเปลี่ยนที่บ่อย

3. Are you in control of turning on and off the light space in your work space?
คุณสามารถเปิดและปิดไฟในที่ทำงานของตัวเองได้ไหม

a. Yes. b. No. c. No but I don't care d. No but I would like to
ก. ได้ ข. ไม่ได้ ค. ไม่ได้และก็ไม่มีความจำเป็น ง. ไม่ได้แต่อยากจะให้เป็นไปได้

4. Are you in control of changing the A/C throughout the day in your work space?
คุณสามารถเปิดและปิดแอร์ในที่ทำงานของตัวเองได้ไหม

a. Yes. b. No. c. No but I don't care. d. No but I would like to.
ก. ได้ ข. ไม่ได้ ค. ไม่ได้และก็ไม่มีความจำเป็น ง. ไม่ได้แต่อยากจะให้เป็นไปได้

Table of Standards					
	Neufert 3rd Edition 1970	Tomorrow's Office 1997	Office Space Standards and Guidelines PWS 2012	GSA Workspace Utilization Survey 2011	Office Space Planning Guidelines 2012
Separated Office	8 sqm - 10 sqm				17.80 sqm
Open Plan Office	12 sqm - 15 sqm				5.95 sqm- 8.9sqm
Group Office (per person)	18.00 sqm				
1-5 ppl			22.00 sqm		
6-10 ppl			20.00 sqm		
11-20 ppl			18.60 sqm		
21-40 ppl			18.60 sqm		
40 up ppl			18.00 sqm		
Combined Office					
Secretary	6.70 sqm		7.40 sqm	5.95 sqm	
TouchDown			3.90 sqm		5.90 sqm
Office Employee	4.50 sqm		7.40 sqm	7.43 sqm	
Dept Manager	9.30 sqm		9.30 sqm	18.50 sqm	
Director	13.40 sqm		9.30 sqm	23.23 sqm	
Assistant VP	18.50 sqm		13.9 sqm	27.80 sqm	
VP	28.00 sqm		22.5 sqm	27.80 sqm	
Computer Co. / Telecommunication					
Meetings Office (10ppl) E		6.80 sqm			
Salesman's office Workstation E		4.6 sqm		6.04 sqm	
Secretarial/Admin (2 ppl) O		9.30 sqm		6.04 sqm	
Other O		4.60 sqm			

	Neufert 3rd Edition 1970	Tomorrow's Office 1997	Office Space Standards and Guidelines PWS 2012	GSA Workspace Utilization Survey 2011	Office Space Planning Guidelines 2012
Cluster (4ppl) O		30.00 sqm			
Phonebooth E		2.20 sqm	5.20 sqm		2.23 sqm
Breakout Area (6ppl) O		10.00 sqm			5.90 sqm
Management Co/ Consulting					
Temporary Staff O		5.60 sqm		3.70 sqm	
Permanent Staff O		7.0 sqm		3.70 sqm	
Principal Managers O		9.30 sqm		3.70 sqm	
Prartners E		13.90 sqm		3.70 sqm	
Auxillary Support Spaces					
Reception		28.00 sqm	S 4.2 sqm M 8.6sqm L 13.4		8.90 sqm
Kitchen/Pantry		14.00 sqm			1.86 sqm
Theater (75-100)		93.00 sqm			
Group Room					
2-4 ppl		9.30 sqm	9.30 sqm		8.90 sqm
6- 8 ppl		14.00 sqm	13.90 sqm		17.84 sqm
10-12 ppl		23.00 sqm	26.00 sqm		
25 ppl-30ppl		35.00 sqm	55.70 sqm		
Storage and/or WorkCenter		14.00 sqm	13.9 sqm		

Picture	Plant Name	Height/ Shade	Plant Requirements	Potential Problems	Placement
	Bengal Almond / หูกวาง (hu kwang)	Grows 25 to 30 m high and because of the huge crown it is a good source of shade.	Full sun and requires average watering.	It should be planted in abundant space to other trees / plants and / or buildings / pools / walls	Parking Lot
	The Siamese Rosewood Tree / พะยูง (Phayung)	Grows 20 to 30 m high	Full sun and requires average watering.	It should be planted in abundant space to other trees / plants and / or buildings / pools / walls	Parking Lot
	Cassia Tree / ราชพฤกษ์ (rachapruek)	Grows 10 to 20 m high with fast growth	Full sun on well drained soil; relatively drought tolerant	It will tolerate light brief frost, but can get damaged if frost persists. It can be subject to mildew or leaf spot, especially during the second half of the growing season.	Parking Lot
	Blackwood Tree	Grows 4 to 15 m high	It tolerates drought, poor drainage, any soil, salt air, gusty, steady or cold winds if grown in open, fog, smog, temperature extremes, sun, or shade.	Invasive species. Its use as a street tree is being phased out in some locales because of the damage it often causes to pavements and underground plumbing.	Parking Lot

Picture	Plant Name	Height/ Shade	Plant Requirements	Potential Problems	Placement
	Coral Creeper/ พวงชมพู (Puang chomp-pu)	Grows 9 to 12 m in length, is a vigorous perennial climber	Full to moderate sun with moderate to regular water	Too much food causes vigorous vegetative growth at the expense of flowering. Propagation can be done by seeds, layers, stem cuttings or from division of the roots.	Trellis
	Garlic Vine / กระเทียมเถา (gra tiam tau)	Low-maintenance, the lush trumpet-shaped flowers are in clusters with up to 25 flowers arranged several times on the vines	Full to moderate sun with dry to moderate water	The growth is slow, therefore the vines should preferably not to be pruned. The flower development is greatly reduced and there are no new branches after cutting.	Trellis
	Chinese Honey Suckle / เล็บมือนางดอกซ้อน (Leb muo nang dog son)	Can be up to 8m long	Full to moderate sun with regular water	In some countries the plant is considered invasive and is not desirable. Grows quickly and can overgrow other plants if not careful	Trellis
	Common Dischidia / เดป (Dep)	Climbers that grow up to several meters in fibrous substrates.	Bright Location but no direct sun with moderate water	They are now cultivated and sold commercially, but are still relatively rare.	

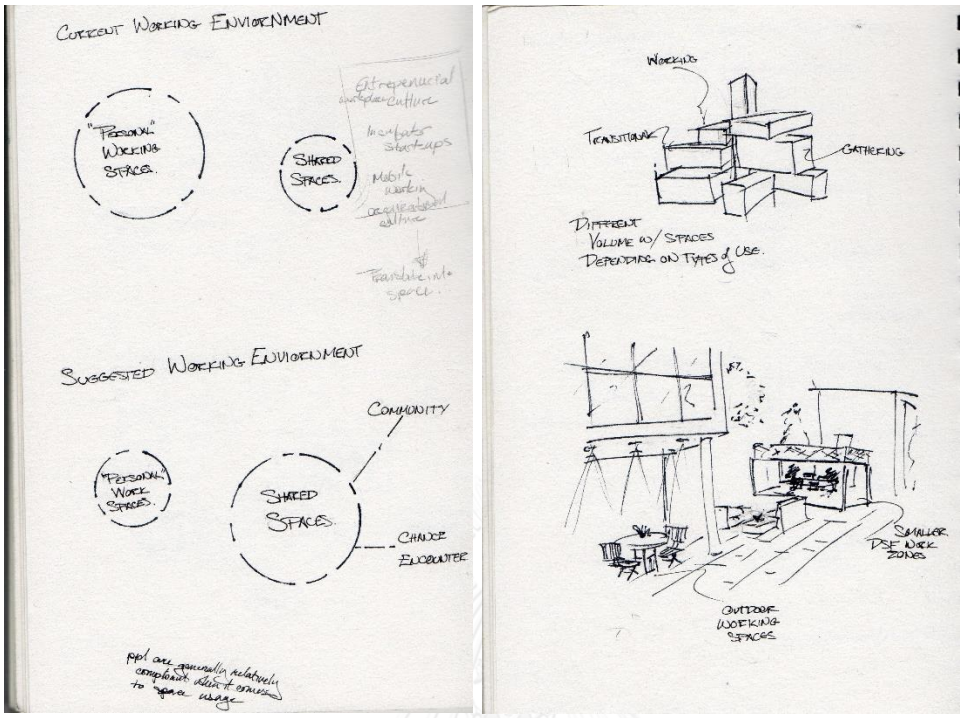
Thailand Appropriate Plantlife

Picture	Plant Name	Height/ Shade	Plant Requirements	Potential Problems	Placement
	Lipstick Palm / หมากแดง (Mark Daeng)	Grows up to 16 m feather palm	Full sun with moderate water ultra tropical, salt tolerant plant.	Very cold-sensitive plant	Bordering Walkways
	Lettuce Tree	Grows 4 to 7 m categorized as a foliage tree or a large shrub	Good in any light. The plant grows well in any soil, but being a littoral plant it shows preference for sandy soil	Being a costal tree it does not thrive as well on land as it does on the cost.	Bordering Walkways
	Elephant Ear / กระดาษเขียว (gradaad kiau)	Grows up to 4 m, low matianance.	Likes Bright Shade or Partial Shade, prefers moist soil with regular to ample watering	Tolerates no waterlogging, sun burns leaves	Planting beds or potted plant
	Umbrella Plant / กกลังกา (kok lang kaa)	An evergreen, perennial and grass-like plant with up to 2 m long stalks.	Full to moderate sun with ample water.	Due to the high demand for water *Cyperus alternifolius* do best in water edges and in fishponds (should be planted in a container before you put it in the Pond, use gravel or sand as a substrate).	

Picture	Plant Name	Height/ Shade	Plant Requirements	Potential Problems	Placement
	Dwarf Thailand Lady Palm / จั๋งนิ้วมือ (jang new moue)	Small evergreen palm, which is rarely larger than 1.50 m high	Partial shade to shady place, regular watering, but the soil can be dry out between watering.		Planting beds or potted plant
	Dwarf Date Palm / ปาล์มสิบสองปันนา (palm sib song pan na)	Slow growing and rarely grows more than of 2 meters tall.	Good in any light, regular watering	expansive crown the palm has a dominant effect and should therefore not be placed too close to other plants.	Planting beds or potted plant
	Caricature Plant / ใบนากชมพู (bai nag chompuu)	Grows quickly up to 1 to 2 m high	Full to moderate sun and ample water.	If it is pruned too low, the individual branches are bare from below. Then you should replace the old plants with new cuttings.	Planting beds or potted plant
	Gardenia Crape Jasmine / พุดศุภโชค (pud sup schok)	Grows 0.3 to 3 m high	Full to moderate sun with regular water.	Only shade causes the leaves to turn brown and flower formation does not occur. Must avoid waterlogging.	Planting beds or potted plant

Picture	Plant Name	Height/ Shade	Plant Requirements	Potential Problems	Placement
	Hooded Dwarf Elephant Ear / วานนางกวัก (wan nang kwuang)	Grows 1 m high by 1 m wide.	Good in any light with regular to ample water.		Planting beds or potted plant
	Tannia / ถุงเงินถุงทอง (tung ngön tung tong)	Grows quickly 0.5 to 1.5 m high.	Prefers partial shade but tolearant of full sun., and abundant water.	Needs well drained soil, and must be careful of over watering.	Planting beds or potted plant
	Fancy Leaved Caladium / บอนสีอิเหนา (bon si niau)	Grows about 0.8 m tall with stunningly beautiful color combinations.	Prefers shade and regular watering	Cannot tolerate full sun, and waterlogging should be avoided.	Planting beds or potted plant
	Spider Lily / พลับพลึงดินเป็ด (plap plüng tien)	Fast Growing to about 1m high	Full sun or partial shading, with regular water	Blooms only last one day, and the soil should not be permited to dry out.	Planting beds or potted plant

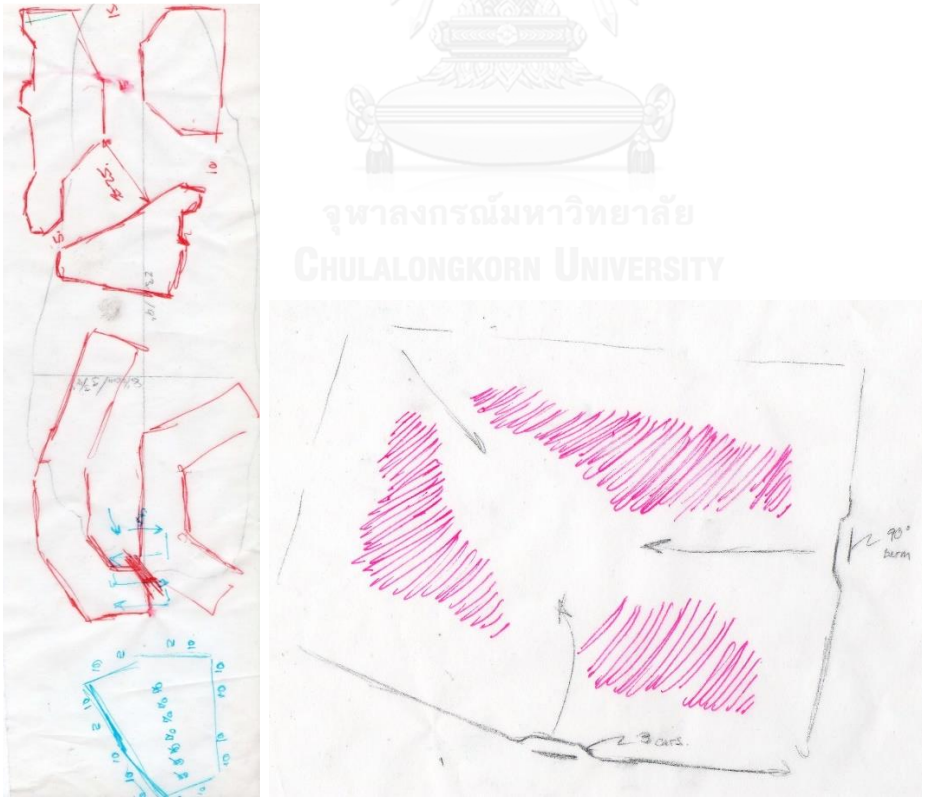
Development Sketches



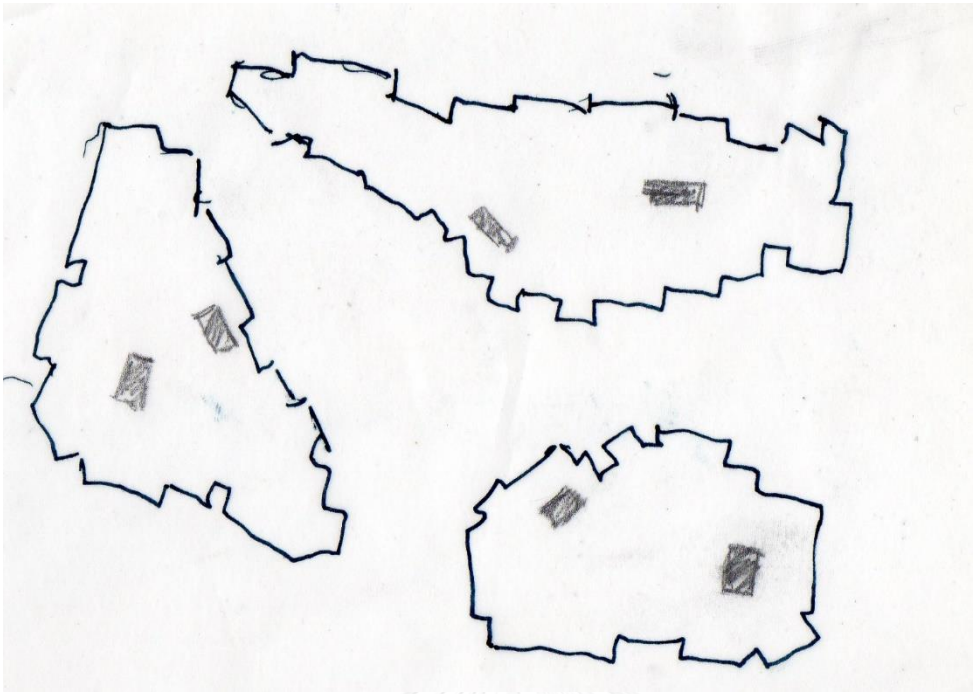
Current and suggested working environments/ Massing and distribution of spaces.

Initial site concept

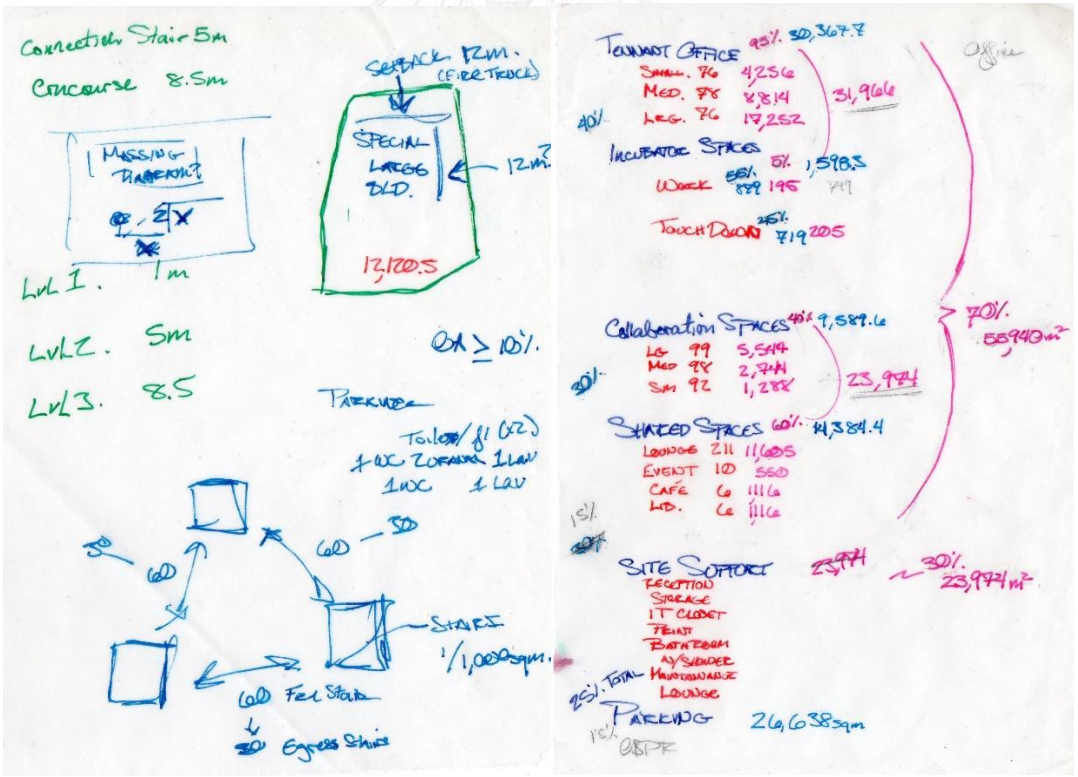
Building footprint development sketches.



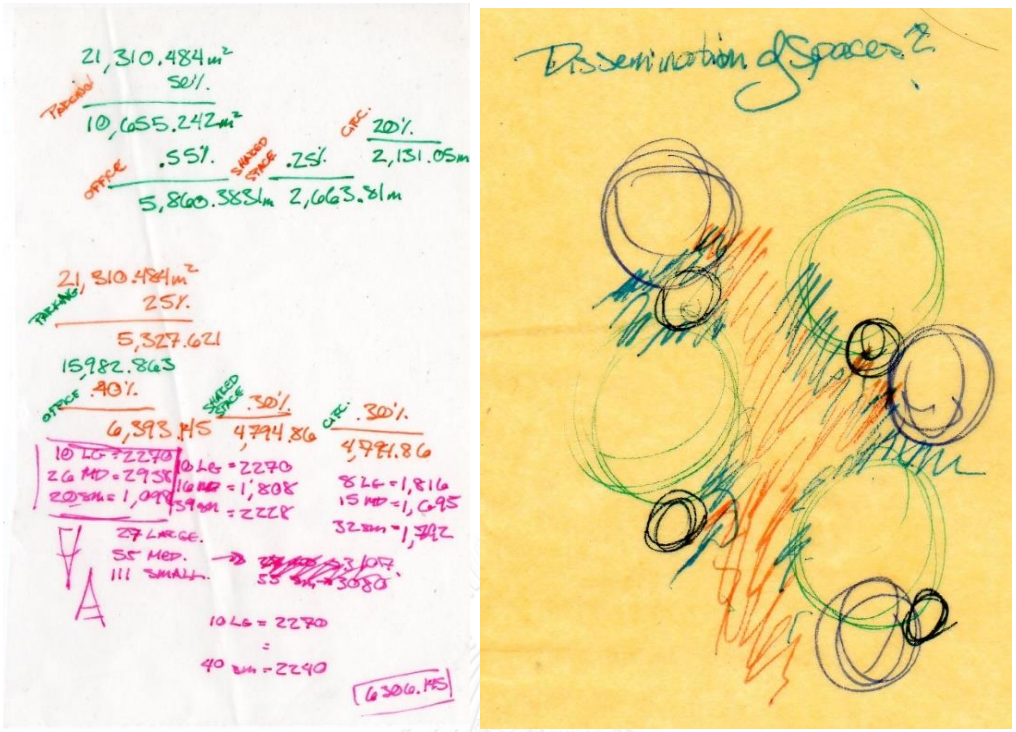
Dimensioning doids between building mass.



Building footprint and core placement concept.

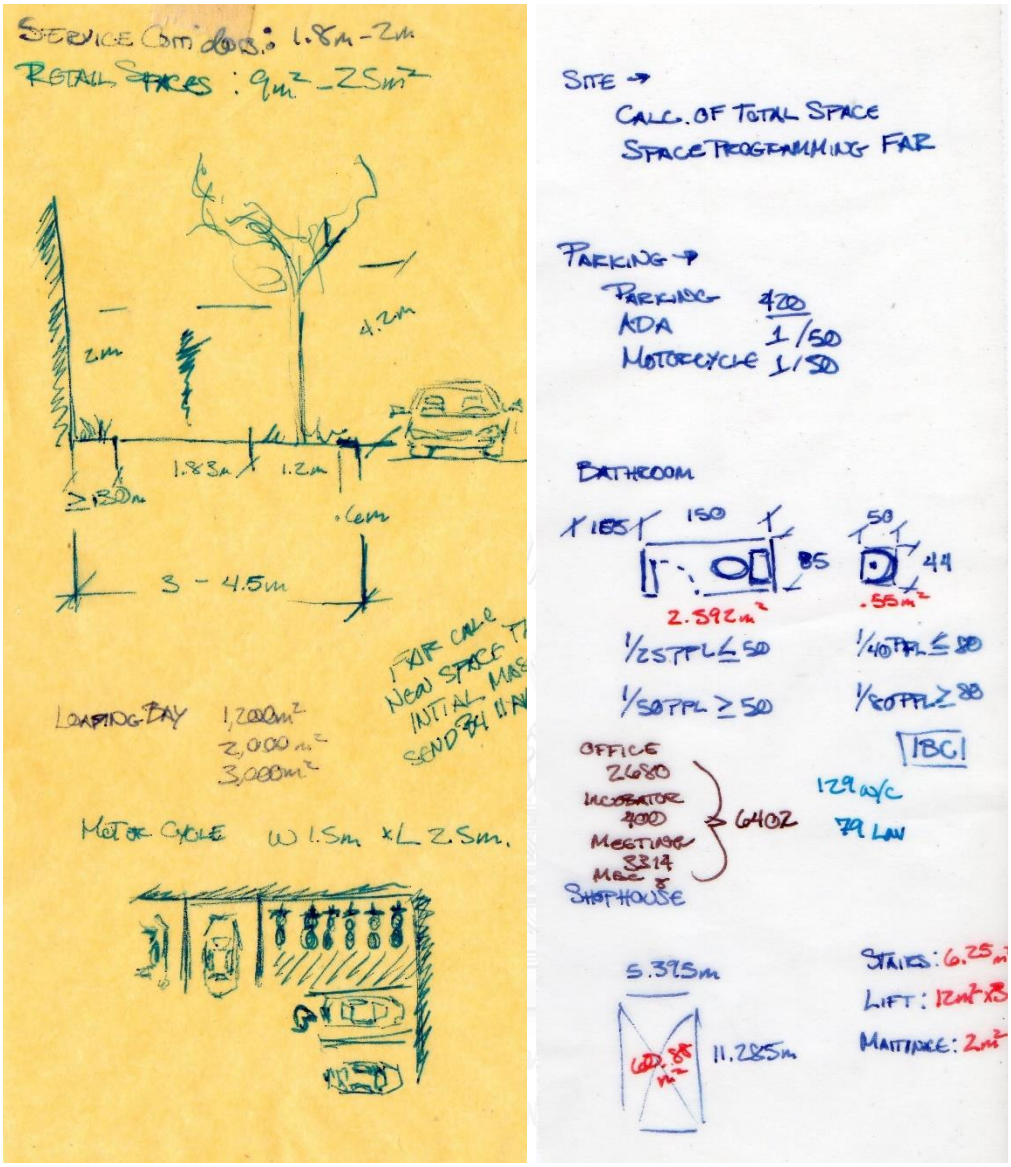


Site regulation dimensions/ Distribution of the spacial programming calculations.

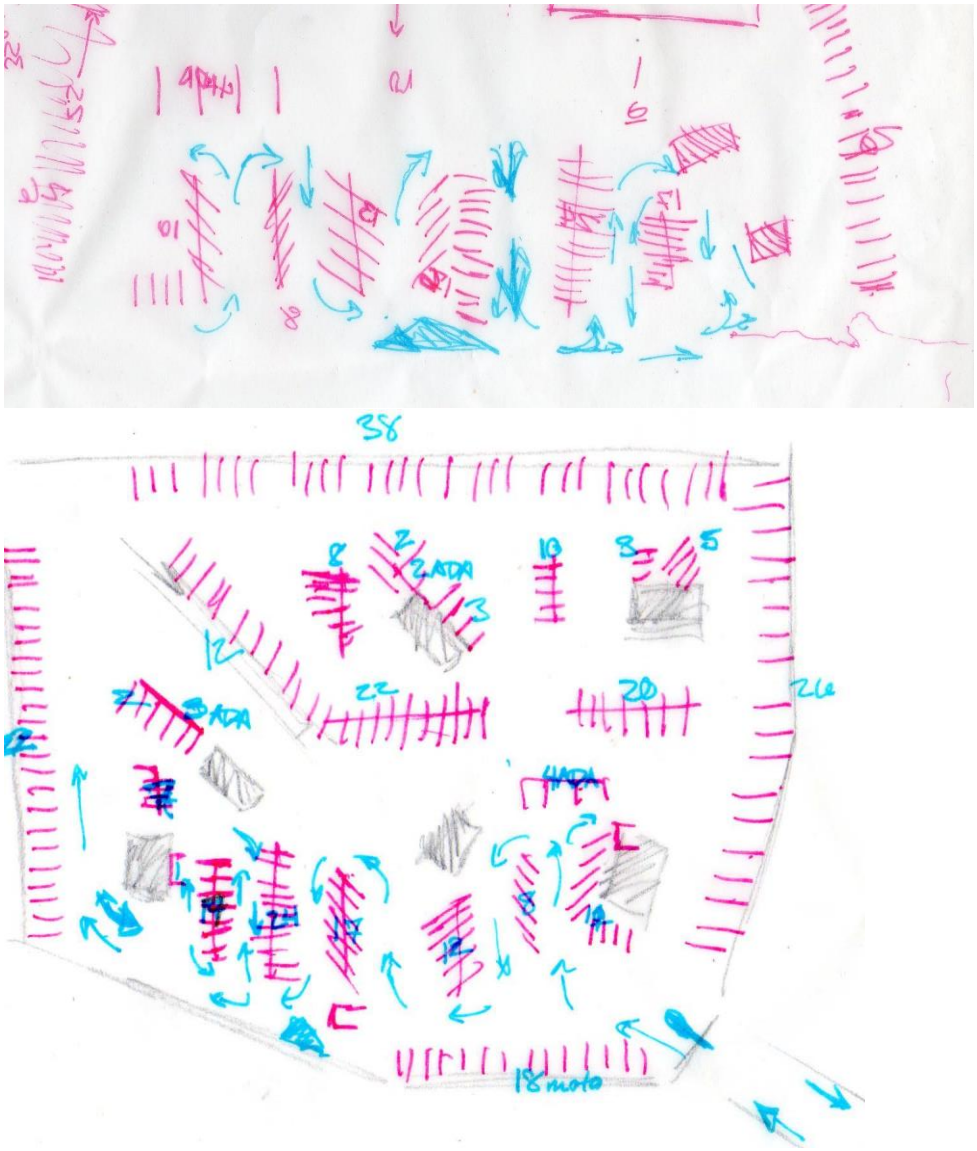


Program ratio distribution/ Dissemination of Private: Casual: Transient spaces

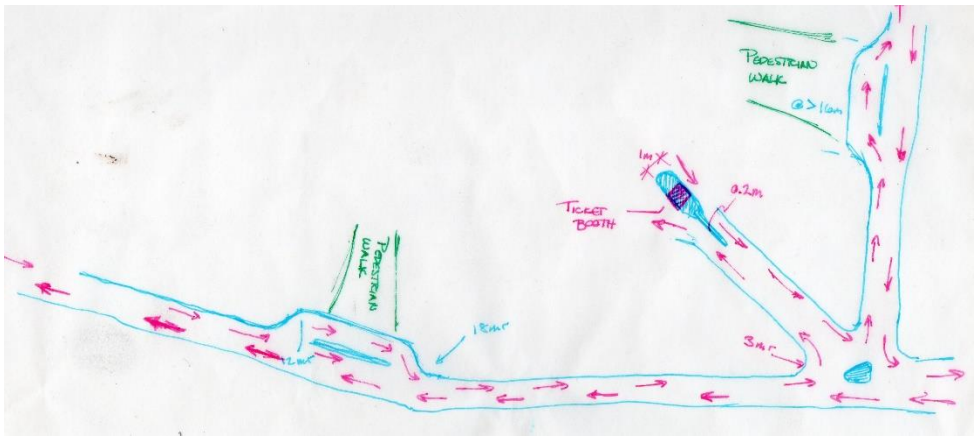
Current traffic direction on site/ Diagram of sidewalk regulations



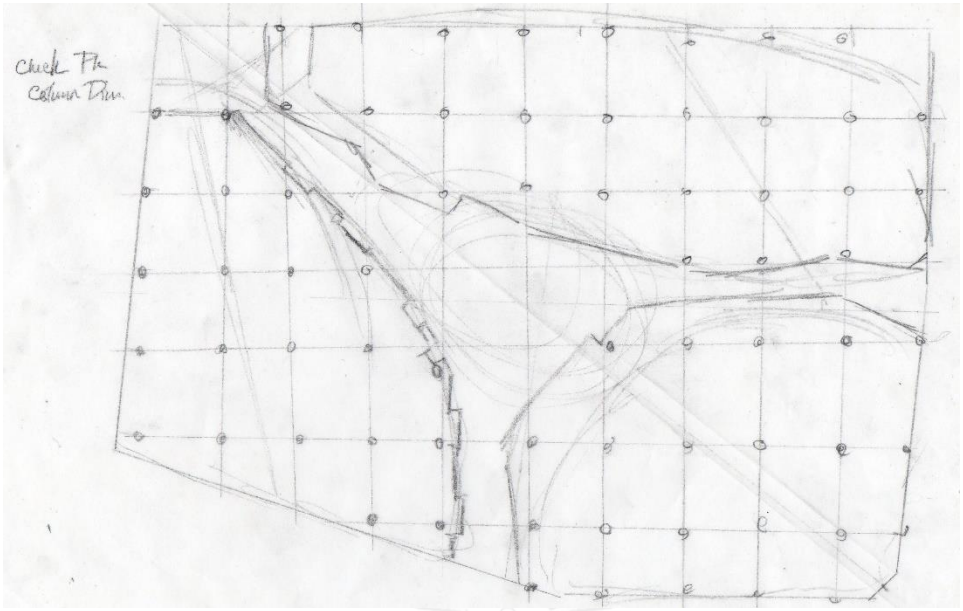
Curb and parking space dimensions/ Calculations and dimensions for parking, bathroom, shophouses



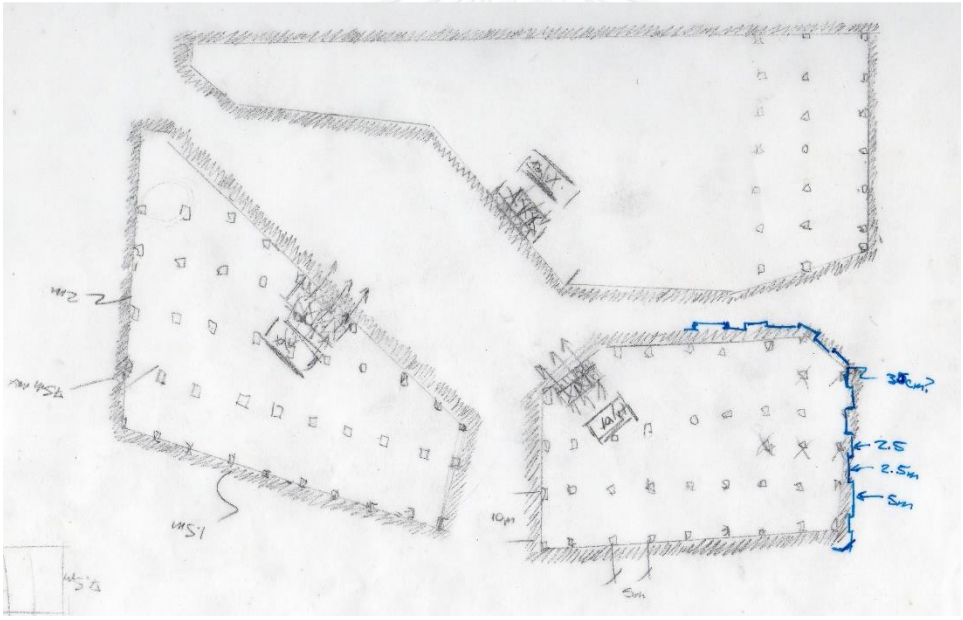
Parking garage spaces and circulation



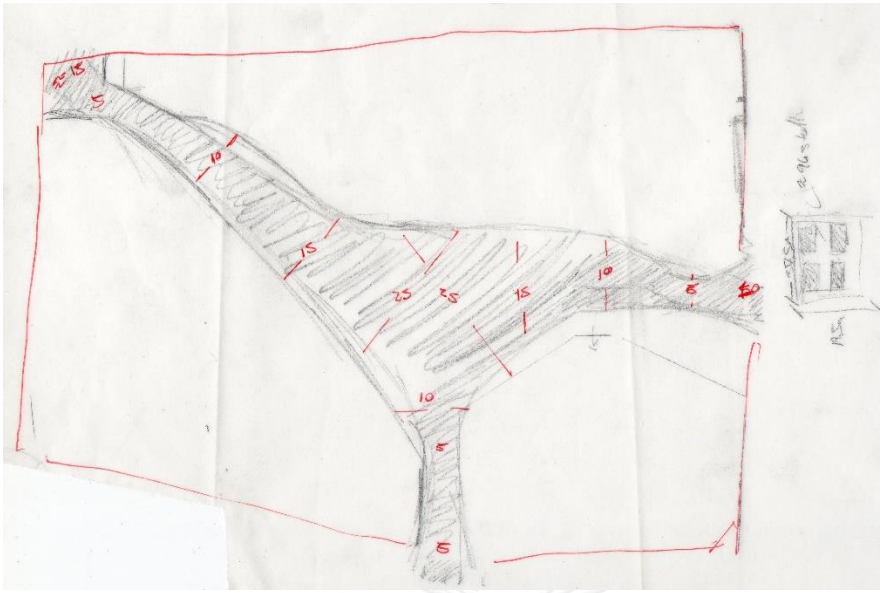
Vehicle circulation around site



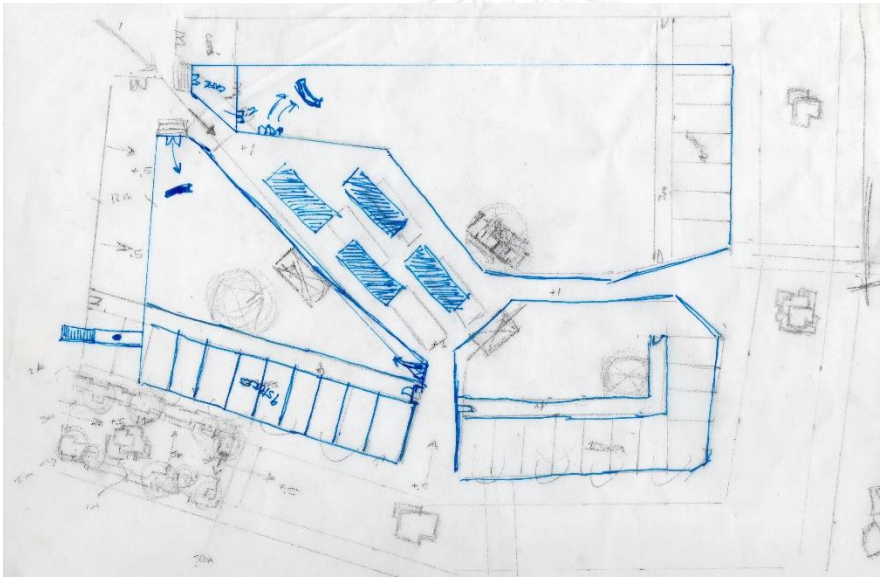
Site wide column grid



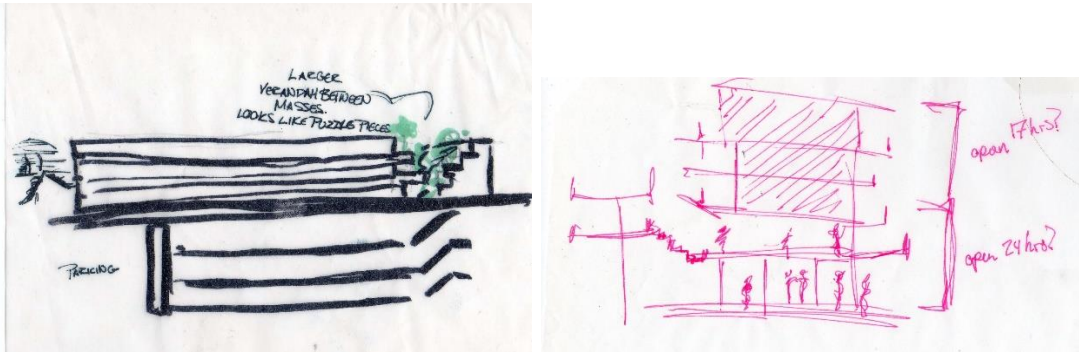
Column grid with 2m veranda, building core, and initial depth of façade variation



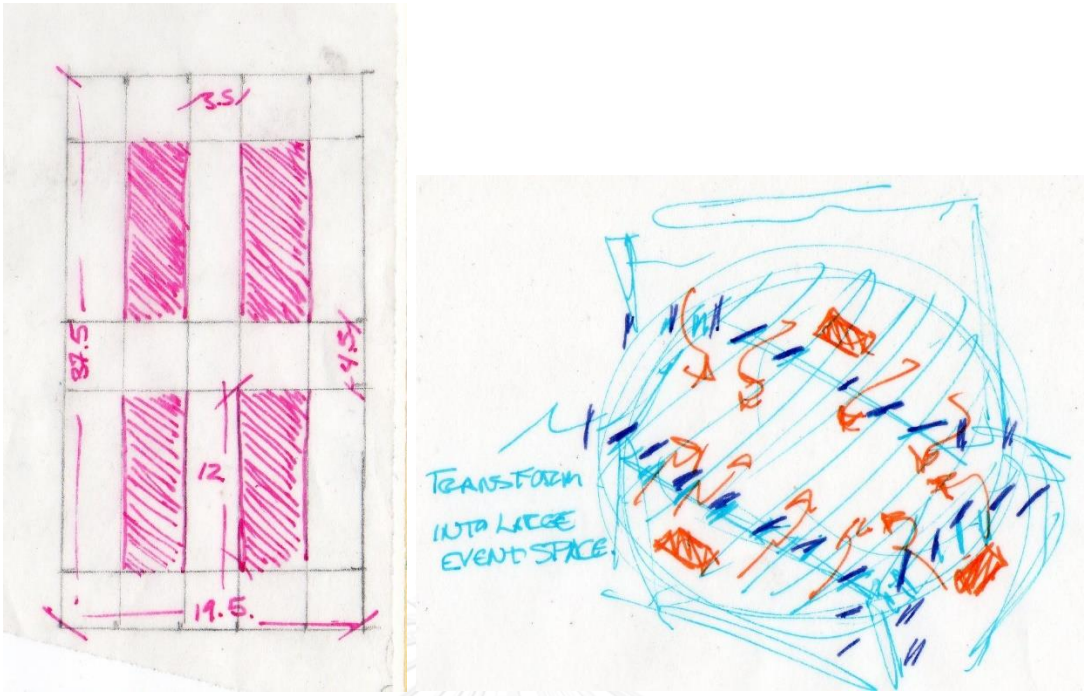
Void dimension between the building



Dimensioning of the center to account for *talat.* Initial placement of shops, reception, entrances, service corridors, and park area.



Concept section of building mass./ Section of space usage over 24hrs.



Market stall dimensions and circulation/ Diagram of market transforming to event space.

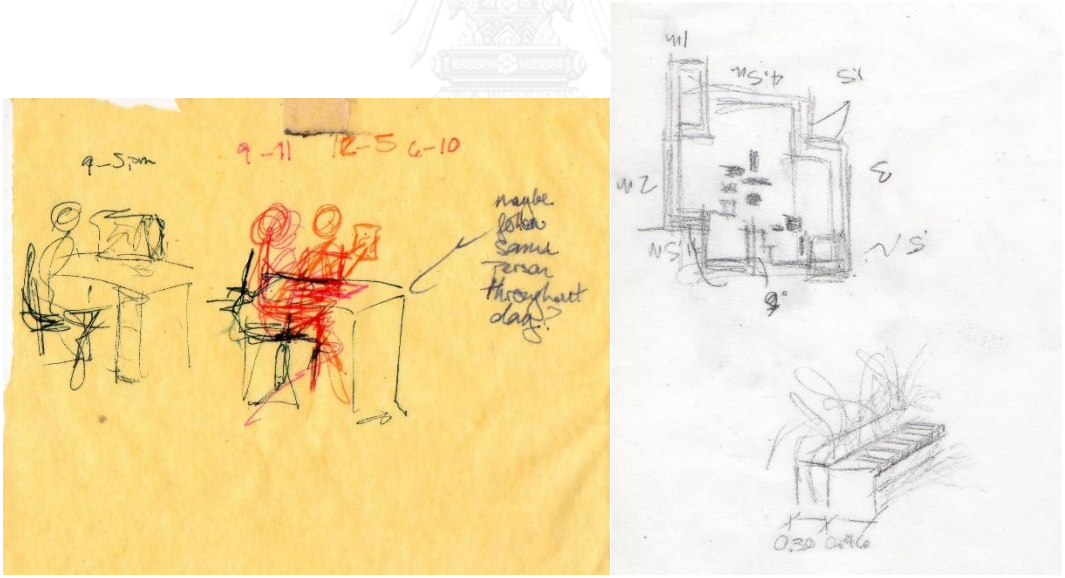
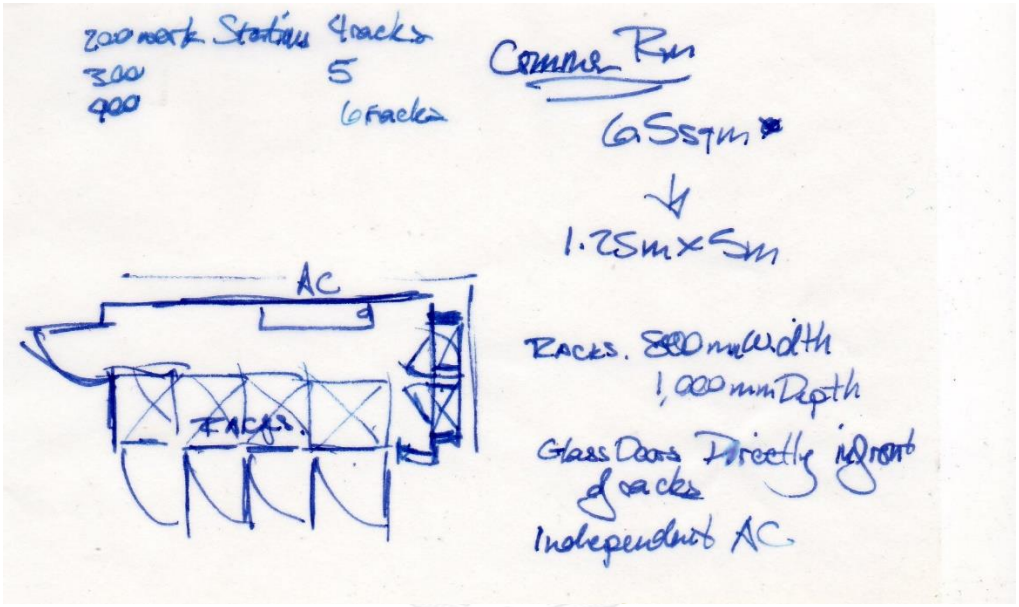
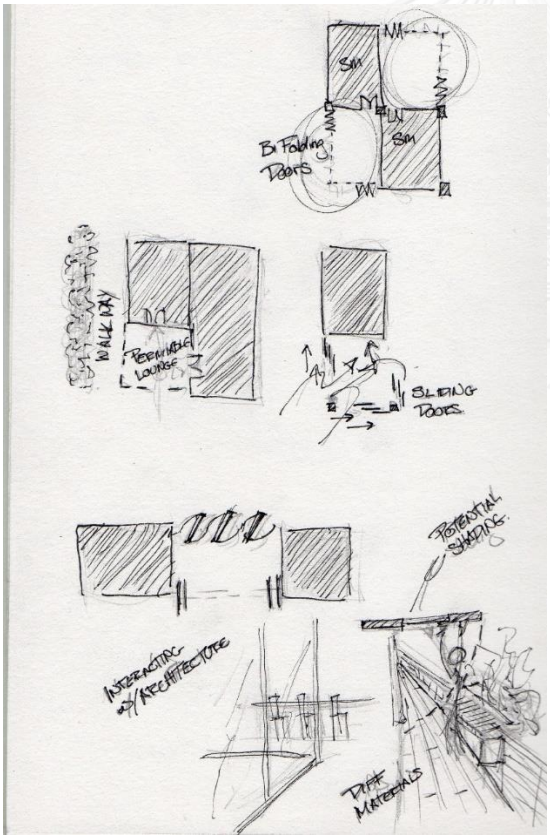


Diagram of layering of people in space/ Park bench with planter and water fountain concepts.



Server area dimensions and reqirements.



Study of various door swings for transient spaces.

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