

Aging in Place Within the Community in Singapore



The Lim Ngah Boon, 72, lives alone and has fallen three times in his Tanjong Pagar flat in the last two years. An alert system brought him staff aid each time.

Seniors living alone may rise to 83,000 by 2030



Aging in Place within the Community in Singapore

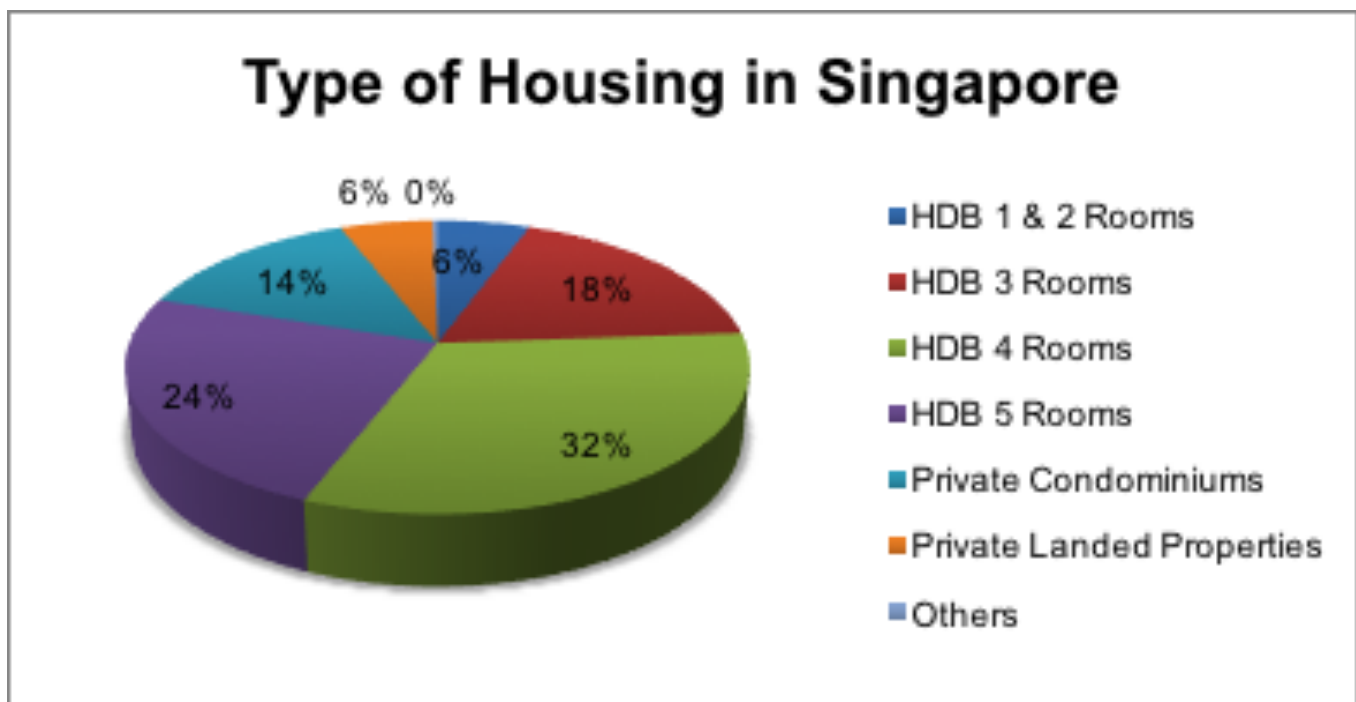
Bee Khim Ong

Thesis Paper

Introduction and Cultural Context:

Public Housing and Density

Singapore is a small country with only 718kmsq (277mlsq, similar size to Charlotte, North Carolina),¹ of land with a population density of 5.54 million people in 2015.² There are 3.9 million are resident (with only 3.38 million are citizens and 0.53 million are permanent residents) and 1.63 million are non-residents (foreign workers from every industries).³ More than 80.1% of residents stay in public housing⁴. Our family resided in a tight public housing area of 68sqm (731sqft), with two bedrooms, one bathroom, living room and a kitchen. My dad was the sole breadwinner, working in a tin factory. My parents had to rent out one of the bedroom to couples to make ends meet. By doing that, we were left with an even smaller space for our family and I had to sleep in the living room.



General Household Survey 2015

Reverence for Elders

“Filial piety” is a virtue of respect for one’s elders, parents, and ancestors. Filial piety is an integral part of the Singapore culture and in the Southeast Asian region. I grew up treating elders with respect and taking care of them is my duty. Throughout my childhood, we had to stay at my grandma’s place after school daily, so that my mum can look after our sickly grandma and us simultaneously. We returned home late at night. I grew up observing how my parents cared for my grandma, took her to the doctors, cleaned her, cooked and shouldered the domestic chores. As a result, filial piety is ingrained in me. I want to use this thesis as an opportunity to design housing for elderly members to give them a space to live a meaningful life and with dignity.

Contemporary Economic Challenges to Filial Piety

For families caring for elders in this modern -day in Singapore financial stress is a significant challenge to the cultural sustainability of filial piety. The national total fertility rate has declined to 1.25 births per female in 2014.⁵ At the same time, life expectancy has increased. The result is an unsustainable increase in the cost per child responsible for the care of an aging parent. Not only are there fewer productively employed family members to support their aging parents, but also their parents are living longer and require more medical assistance. For example each resident aged 65 years and over is supported by 5.7 residents aged 20-64 years in 2015, compare with support ratio of 13.5 in 1970. How does the drop in fertility rate challenge us in keeping our core value in filial piety? The following figure demonstrates the cost effect of change in family structure, using a genogram.

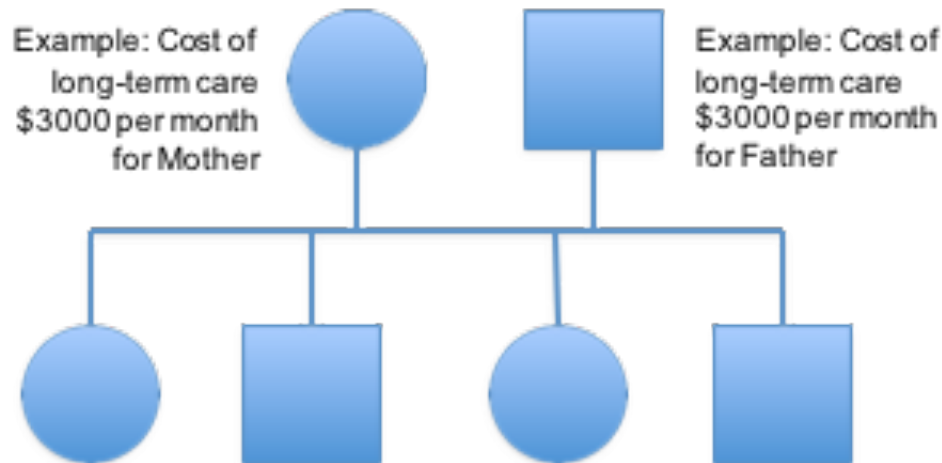


Figure 1: A family with 4 children supporting 2 parents

Example: Total cost of long-term care for both parents is \$6000 per month. Total cost is divided equally by 4 children, each child needs to contribute \$1500 each.

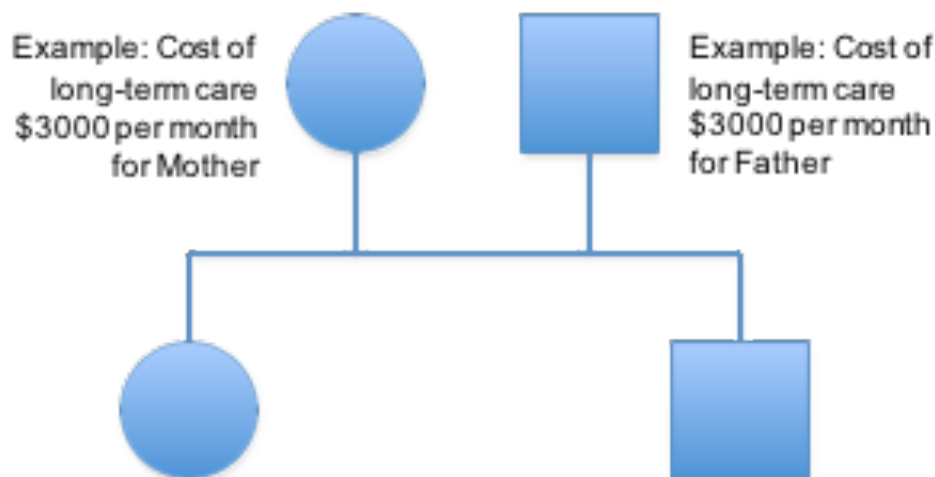


Figure 2: A family with 2 children supporting 2 parents

Example: Total cost of long-term care for both parents is \$6000 per month. Total cost is divided equally by 2 children, each child needs to contribute \$3000 each.

Architectural Challenge:

The aim of my thesis is to consider what it means to live a meaningful life and a life of dignity as one ages. I seek to answer the question: how does space impact the quality of life and cultural context for elderly Singaporeans? To address this question, my thesis will focus on aging in place within the dense residential community of Singapore.

The Problem:

In this section, I will present some of the physical and cognitive challenges faced by an elder residing in Singapore.

Challenges of Aging

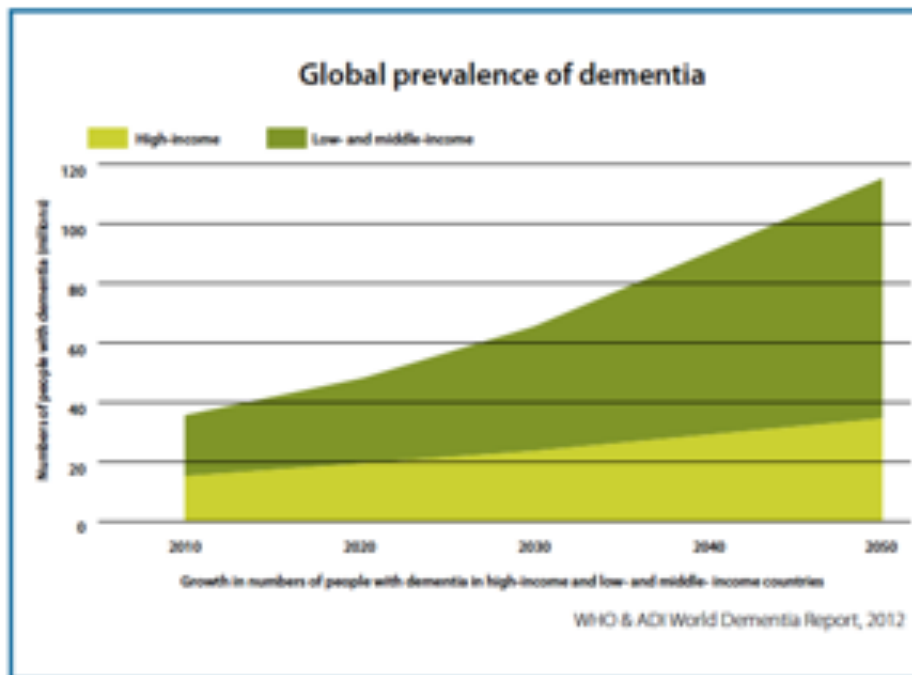
o Sensory Impairment (sight and hearing)

As one ages, loss of sight and hearing are the most common medical conditions. The World Health Organization (WHO) reported that older adults account for 65% of all distant vision impairment, 82% blindness and 50% hearing loss.⁶

o Fall risk and mobility

In the same report outlining incidence of sight and hearing issues, the WHO indicates that 1 in every 3 individuals who fall sustains moderate to severe injuries, and moderate injuries limit certain level of mobility, functional independence and confidence. Furthermore, severe injuries can cause significant loss of health and independence, resulting in hospitalizations, disability and even death.⁷

58% of all people with dementia lived in LMIC in 2010, and that proportion will grow to 71% by 2050.



Presentation by Sheung-Tak Cheng, Hong Kong Institute of Education (WHO Data).

Figure 3: Global prevalence of dementia

o Cognitive decline (dementia)

The WHO also reports that dementia impacts 35 million people worldwide. By 2050, this medical condition is projected to reach 100 million people. In 2010, the estimated cost of dementia worldwide was US\$600 billion (see Figure 3 below).⁸

Overview of Existing Acute, Long-term Care in Singapore

On its website, the Singapore Ministry of Health categorizes the intermediate and long term care (ILTC) services in three classifications:

1. Home Based Services

Home Based Services comprise home medical care, home nursing care, palliative home care, meals-on-wheels, escort/ transport services and home personal care.

2. Center Based Services

Center Based Services consist of community rehabilitation services, dementia day care services and social day care services.

3. Residential ILTC Services

Residential ILTC Services comprise community hospitals, chronic sick hospitals, nursing homes, inpatient hospice care, sheltered home for ex- mentally ill and respite care.¹⁰

According to a Straits Times article, dated on July 31 2016, Singapore nursing home models "need to balance benefits, cost." According to the Straits Times, the Singapore Ministry of Health is expanding in order to provide greater diversity of living and care options for elderly persons and to explore new models of care. The reason given for such expansion is to provide elderly persons with greater independence and autonomy. In the same article, the Singapore Ministry of Health was reported to have spent \$360 million on the nursing home sector in 2015 and is projected to spend another \$1.1 billion to increase nursing home capacity by another 5000 beds by 2020.¹¹ In another report by the World Health Organization, based on Canadian data, a day spent in hospital bed cost seven times as much as a day in a nursing home and eighteen times as much as a day spent in home and community-based care.¹²

It is evident that the costs of long-term care such as nursing home care is significantly higher than the cost of care in a home and community-base care. Evidence suggests that community and home based care could reduce cost and, at the same time, improve the level of care. Community and home-based care also provides the elderly person with greater autonomy to make decisions regarding their health and daily living.¹³

Given this evidence, I believe community and home-based care is the most appropriate way to move forward for the future of the growing aging population in Singapore.

Financing of Long-term Care

Most Singaporeans purchase several types of personal insurance from government and/or private sources:

- 1) life insurance that provides a payout upon death or permanent disabilities,
- 2) accident insurance that provides benefits to individuals in the event of a serious accident,
- 3) critical illness insurance that provides payment upon diagnosis of any one of the thirty critical illness, and investment insurance that provides a guaranteed return on the principle after certain number of years of investment. At this time there is no insurance plan providing coverage for long-term elderly care.

In addition to the insurance policy options listed above, the Central Provident Fund (CPF) provides benefits to the citizens of Singapore. The CPF is a form of compulsory comprehensive savings plan for Singaporeans and permanent residents and is intended primarily to fund retirement, housing needs, and healthcare. Not unlike the programs administered by the Social Security Administration on behalf of the United States government, the CPF is set up by the Singapore government to help its citizens prepare for retirement. Everyone in the workforce must contribute a percentage of their salary into the CPF. Similarly, employer contributions to the CPF are required on behalf of the employee. Figure 4 illustrates the CPF contribution rates for both private sector and public sector employees in 2016.

Table A1. Contribution rates from 1 January 2016 for private sector employees and public sector non-pensionable employees being:

- Singapore Citizen
- SPR from the third year of obtaining SPR status
- SPR during the first two years of obtaining SPR status but who has jointly applied with employer to contribute at full employer-full employee rates

Employee's age (years)	Contribution Rates from 1 Jan 2016 (for monthly wages \geq \$750)		
	By Employer (% of wage)	By Employee (% of wage)	Total (% of wage)
55 and below	17	20	37
Above 55 to 60	13	13	26
Above 60 to 65	9	7.5	16.5
Above 65	7.5	5	12.5

The CPF contribution rates for employees earning monthly wages of <\$750 are found in the [CPF Contribution Rates Table](#).

Figure 4: Contribution rates from January 2016 for private sector employees and public sector employees¹⁴

Each Singaporean's account CPF is divided into three categories: Ordinary, Special and Medisave (See Figure 5 below). The Ordinary account is used to buy public housing from the Housing Development Board (HDB), along with insurance, educational loans, and personal investment. The special account is reserved for needs once in advanced age, and investment in retirement. The Medisave portion of the account is utilized for hospitalization expenses and approved medical insurance (Medishield). More detailed information can be found on CPF website for various schemes that the Singapore government has implemented. (<https://www.cpf.gov.sg/Members/AboutUs/about-us-info/cpf-overview>).

Table C1. Allocation rates from 1 January 2016 for private sector employees and public sector non-pensionable employees

Employee's age (years)	Allocation Rates from 1 Jan 2016 (for monthly wages ≥ \$750)		
	Ordinary Account (% of wage)	Special Account (% of wage)	Medisave Account (% of wage)
35 and below	23	6	8
Above 35 to 45	21	7	9
Above 45 to 50	19	8	10
Above 50 to 55	15	11.5	10.5
Above 55 to 60	12	3.5	10.5
Above 60 to 65	3.5	2.5	10.5
Above 65	1	1	10.5

To determine CPF allocation in terms of 'ratio of contribution' for all employees including those earning monthly wages of <\$750, refer to the [CPF allocation rates expressed as ratios of contribution](#).

Figure 5: Allocation rates for January 2016 for private sector employees and public sector employees¹⁵.

Impact on the Built Environment

According to the working paper, "Long-term care of older persons in Singapore" (Kim, Wai, and Low, 2015), the authors raised a list of "Issues in the current provision of long-term care and measures by the Government to address them"¹⁶. Kim, Wai, and Low identify a number of issues that are relevant to my approach to aging in place in Singapore:

- o There is a lack of integration between ministries and/or government agencies that provide care and service to elderly patients. In order to provide comprehensive care, it is important for primary care services to be individual-centered rather than hospital-centred. This will ensure services provide continuous and coordinated care, engaging all relevant services. Services should also be community-based so as to provide a more considerate and inclusive structure that considers the older person's personal, familial and culture capacities and environment¹⁷.
- o There is also a lack of options available to older persons that make it possible to live independently in Singapore. Presently, there are no assisted living facilities or 'retirement villages' in Singapore for elderly who need some help with daily living but do not yet require a concentrated level of care provided in a nursing home.¹⁸

Global Age-friendly Cities: A Guide (World Health Organization, 2007, pp. 9) suggests eight distinct focus areas that are necessary to improve accessibility livability for aging urban populations:

- 1) outdoor spaces and building,
- 2) transportation,
- 3) housing,
- 4) social participation,
- 5) respect and social inclusion,
- 6) civic participation and employment,
- 7) communication and information, and
- 8) community support and health services.¹⁹

In order to hone in on these eight focus areas, my thesis work will elaborate on the following program areas within the built environment: public spaces, transportation spaces, housing, and spaces which provide community support and health services. It is my firm belief that when thoughtfully and sensitively designed, these spaces will inevitably succeed in providing the other, softer focus areas included in the WHO's age-friendly guidelines. Civic participation, employment and/or meaningful engagement, social participation, social inclusion, and respect – along with the reinforcement of cultural practices regarding filial piety and deference to elders – are part and parcel with the built environment. consideration areas due to my limitation as a designer and some areas like social participation will fall in place when my design goals are achieved.

Design Parameters:

Site Selection

In response to the research findings and for accessibility purposes, the project site must include or be proximate to the following components:

1. a highly concentrated elderly population;
2. accessible public transportation to promote individual independence and mobility; and
3. youth education facility(ies) and a child care center(s) to sustain multi-generational living and enhance opportunities for meaningful engagement.

It is anticipated that the project type will be an interpretation of a mixed-use urban high-rise building and site that provides housing and outdoor spaces, as well as accessible retail services, restaurants, community support agencies (such as non-profit and grassroots organizations, club and social groups, etc.), and public healthcare-related services for the residents. Just as the project is intended to assist its tenant in long term, sustainable connections to the community, so will the building and site support the community's sustainable future by incorporating energy-conscious and eco-friendly materials and technologies, such as solar power, automated waste collection systems to manage organic and recyclable waste, water-harvesting systems, etc.

Public spaces

In order to design a safe and easily navigated age-friendly public spaces, I will incorporate into my work elements such as visibly clear environmental graphics and other communication devices using contrasting color, appropriate lighting and material selections to assist elderly residents with poor eyesight. I anticipate the use of elements such as themed wall murals depicting life of the city and neighborhood in order to not only promote art and heritage, but also be a helpful device for elderly residents with dementia. Outdoor spaces will include appropriate sheltered space, furniture, tactile pavement that makes use of ramps and hand rails to encourage activity and social engagement.

Exterior spaces will also provide sheltered connections to way to other key community locations and support spaces such as public restroom facilities. At various levels there will be tenant access to sky gardens with variety of plant species to create a healthful, biodiverse environment and help to reduce both the urban heat effect and noise. Other outdoor public spaces for recreational activities such swimming pool, spa pools, courts, walking/jogging track will be provided as well. To encourage intergenerational and community interaction, the building/site will also will have access to event spaces, local retailers, restaurants, community support, and public healthcare services.

Transportation

The building and site design will include a parking bay for people with disabilities, and provide sheltered drop-off and pick-up points for residents. A key element of the design will include sheltered connections to public bus stop(s) and nearby MRT station(s).

Housing

While the building and site design will focus on the needs of its elderly residents, the intent of this design is to provide universal design that will provide desirable high-rise housing for multi-generational families, and single persons (of all ages). The residential units will offer more options for layouts that provide a mix of units that include elderly friendly studio apartments, three-, four- and five-room flats in one block, and the opportunity to paired units so that families may that connect units with elderly-friendly apartments for supported, yet independent living.

Community support and healthcare services

It will be important to integrate community support (e.g., non-profit and grassroots organizations, clubs, and social groups etc.) with residential and other support spaces to enhance aging in place, community and family bonding, and promote active aging. Healthcare services, provided as a continuum of care, can be made available the elderly residents in the form of assisted living or skilled nursing care if the needs arise while allowing them to continue to live within the familiar neighborhood and community. Elderly residents can conveniently participate in therapy and/or other treatments or take part in community events in the activity center in the immediate area.

Related Works:

There are a number of good references that share similar goals and guidelines as my thesis work, all built on substantive evidence supporting those goals. As noted above, a primary source (quoted above), *Global Age-friendly Cities: A Guide*, by the World Health Organization (WHO), outlines eight topic areas that may be used as a guide to design age-friendly cities. When applied to the smaller scale of site and building, these topic areas are equally compelling. Other key components are reinforced by "Age friendly NYC" published by The City of New York Office of The Mayor. A report from World Health Organization, "WHO Global Forum on Innovations for Ageing Population", provides useful information about trends in innovation for aging and health (e.g., e-health, robotics, m-health, mitigating cognitive decline, etc.) that offers insight into tackling the daily challenges of the elderly. Similarly, "Imagine Tomorrow-Report on the Second WHO global Forum on Innovation for Ageing Population" by World Health Organization highlights innovations to enable aging in place by focusing on what it refers to as the "five Ps: People, Person-centered services, Place, Products, and Policies."

Conclusion:

In conclusion, there are many challenges and issues when designing for an urban aging population, including social, familial, and cultural contexts (affected by shifting demographics, birth rates, life expectancy, etc.) financial considerations, even the physical challenges of aging (deterioration of sight, hearing, mobility, etc.) The built environment, particularly those program spaces that revolve around the use of public space, transportation spaces, housing, and spaces that provide community support and health services can significantly improve the quality of life for community members of all ages. By designing a thoughtful approach to a mixed-use high-rise building and site in Singapore, I propose to provide appropriate and flexible housing for intergenerational families, access to a continuum of health care services for elderly residents, direct links to outdoor and other public spaces for recreation and community events and activities, retail and restaurant choices, and protected pathways to public transportation that connect residents to other parts of the city.

It is my firm belief that when thoughtfully and sensitively designed, these spaces will inevitably succeed in providing the other, softer, more nuanced community amenities such as thriving civic participation, social participation, a more inclusive and respectful climate, and meaningful engagement in the community and in society.

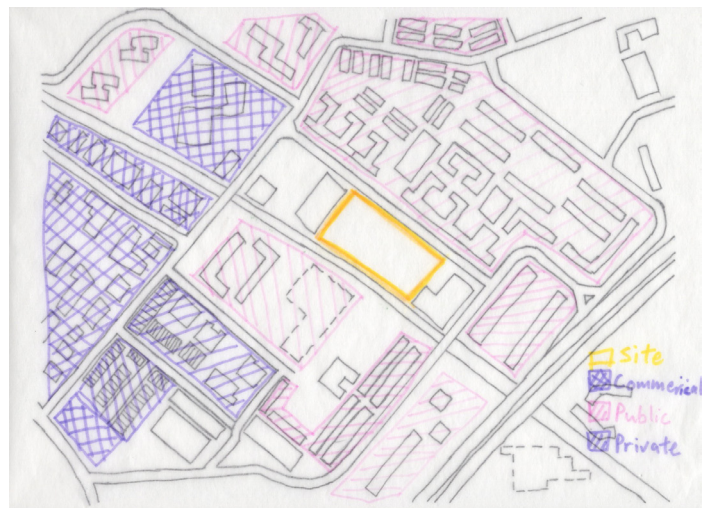
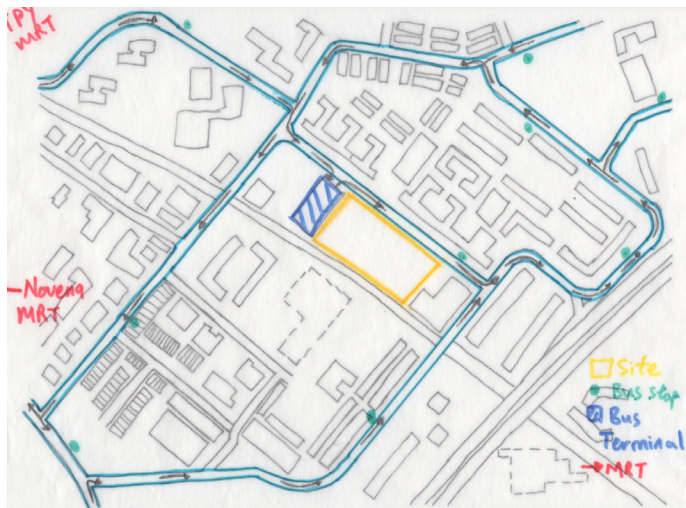
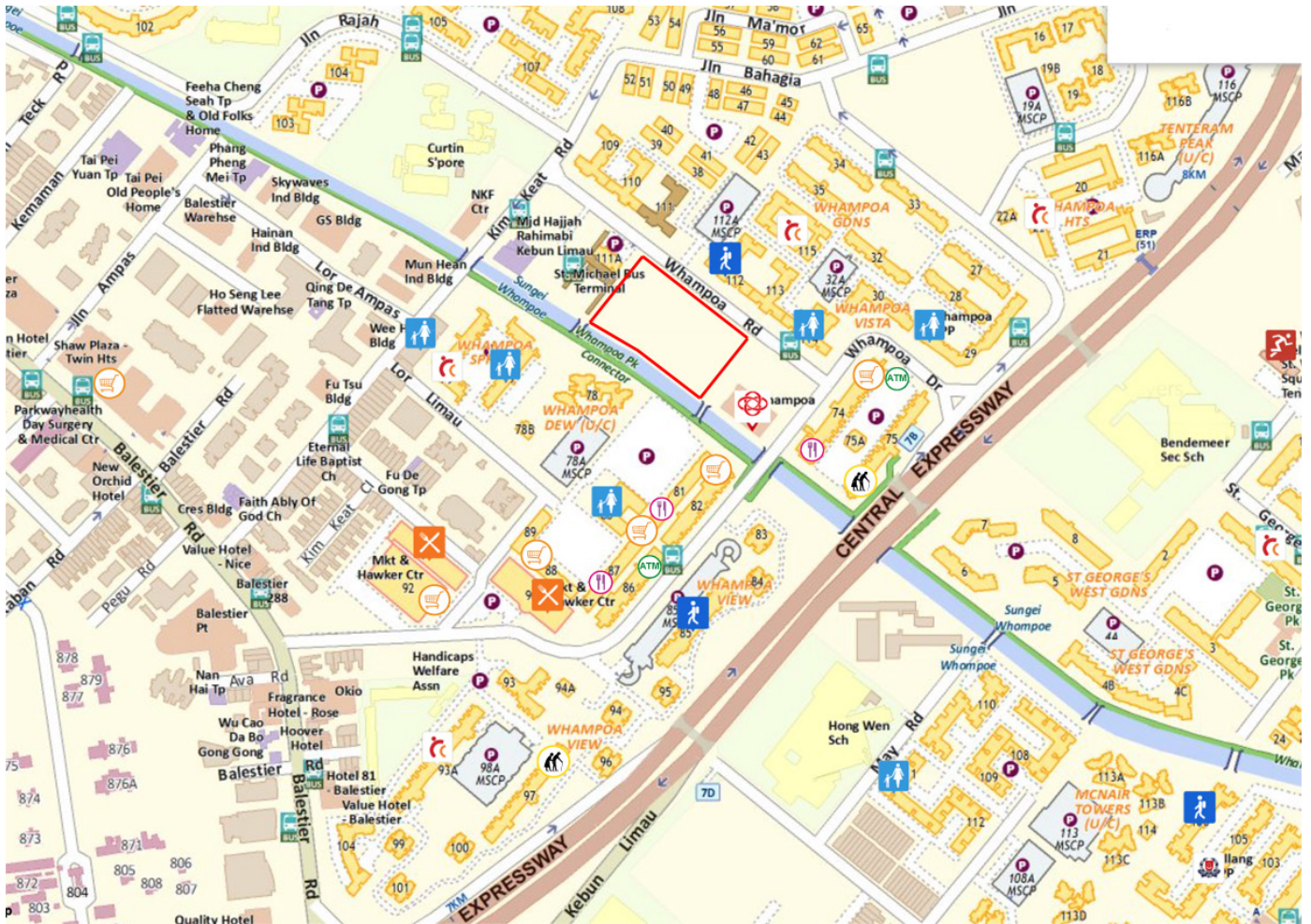
Site Analysis

Site Name: Whampoa

Site Area: 116,733 sqft

Location: Central Singapore

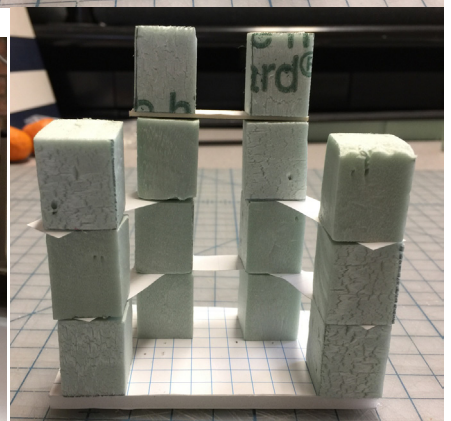
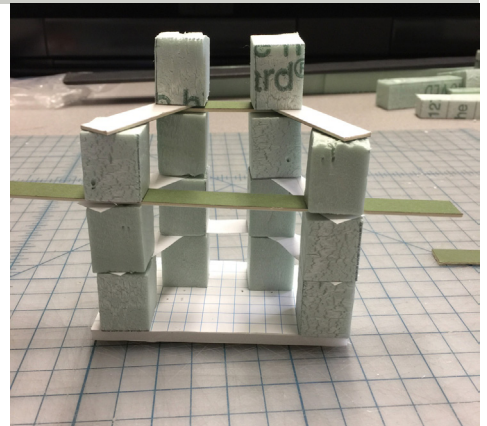
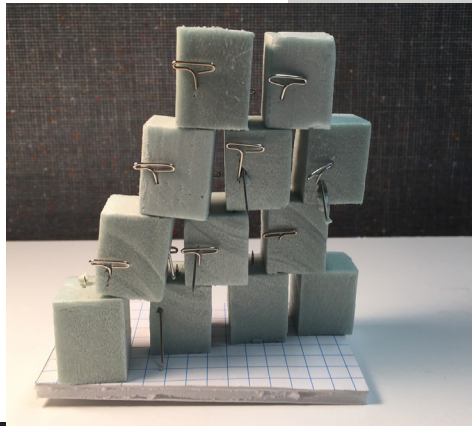
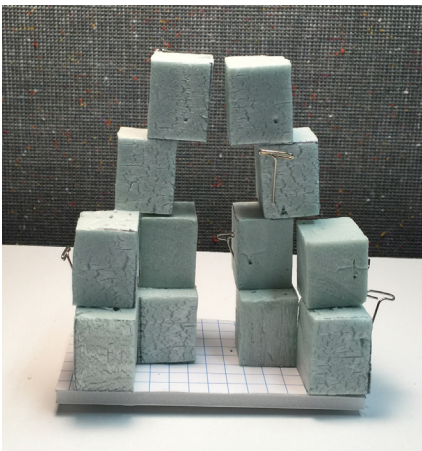
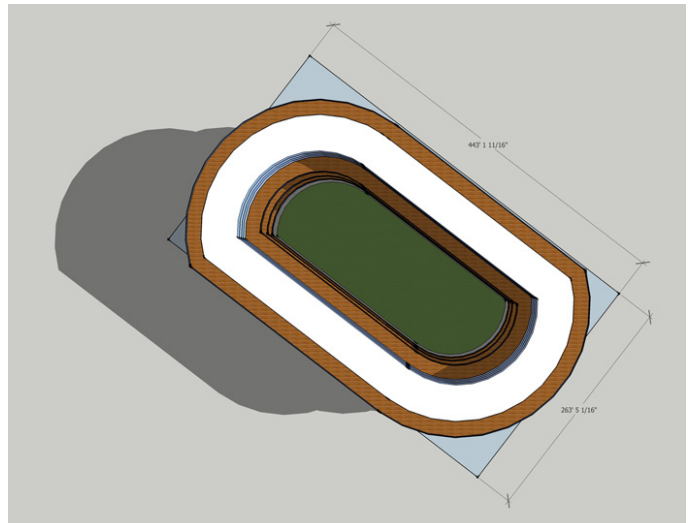
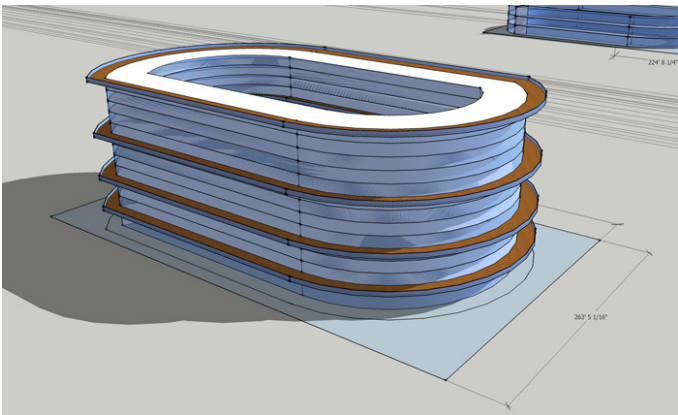
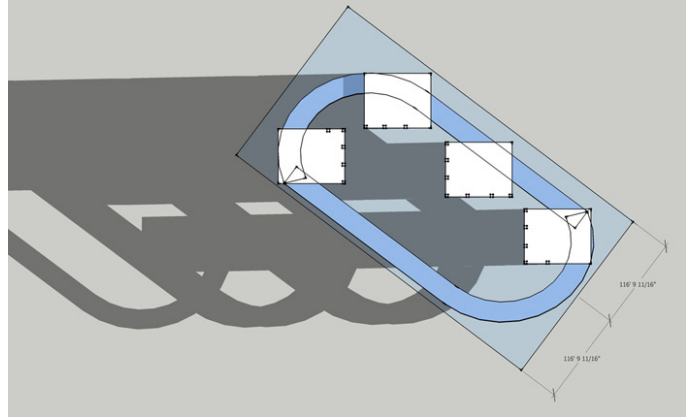
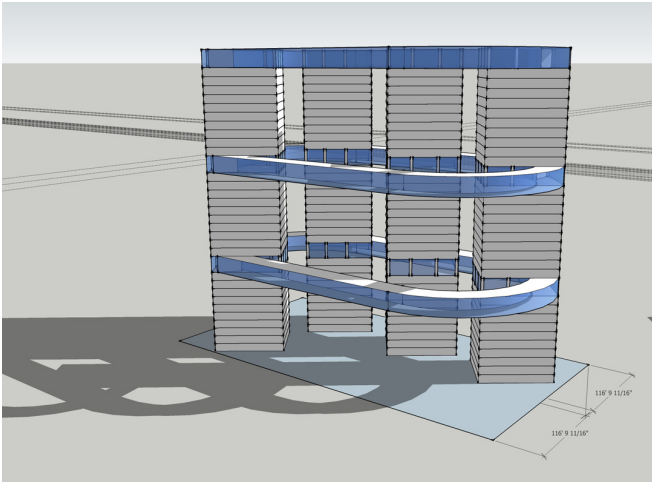
Climate: All year round tropical wet climate, no dry or cold season, year-round rainfall, annual mean temperature is 80.1°F



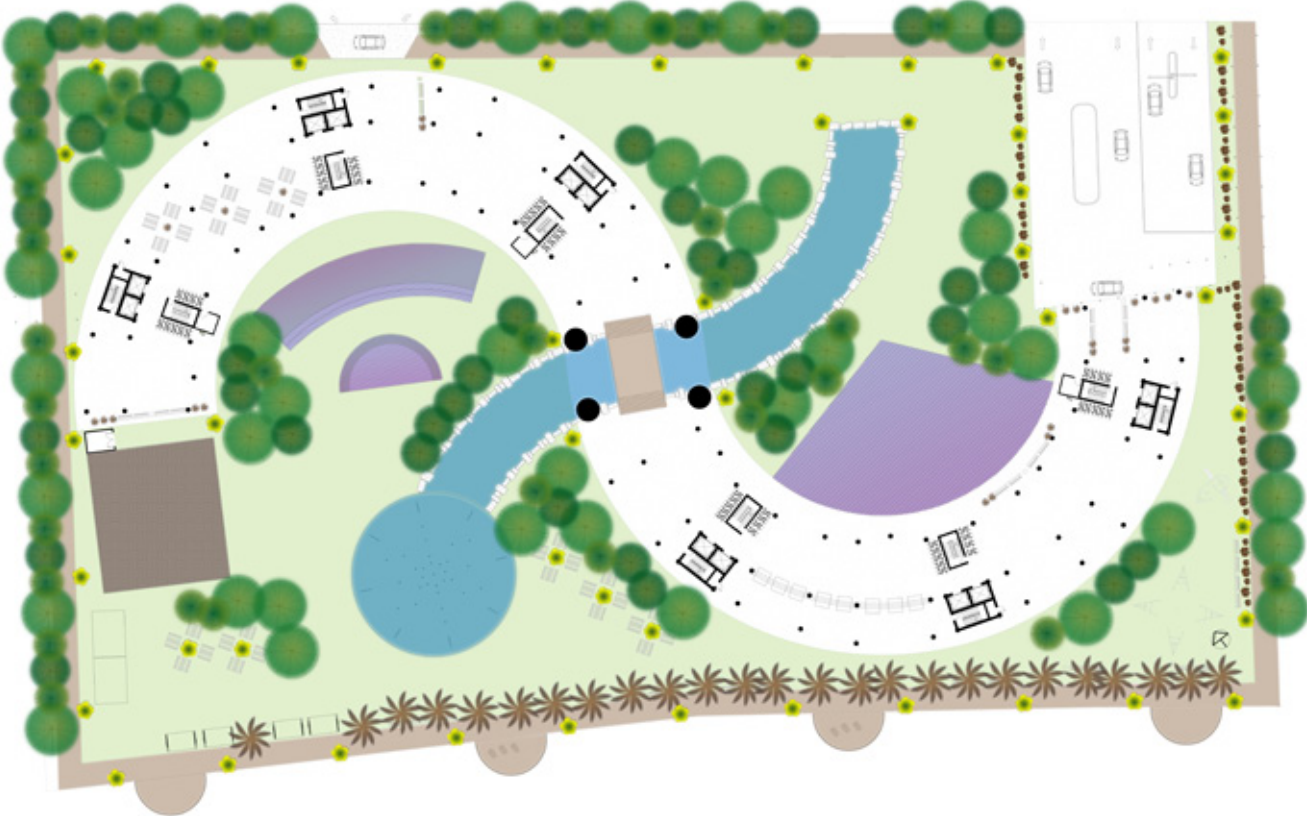
Site Photos



Massing Process

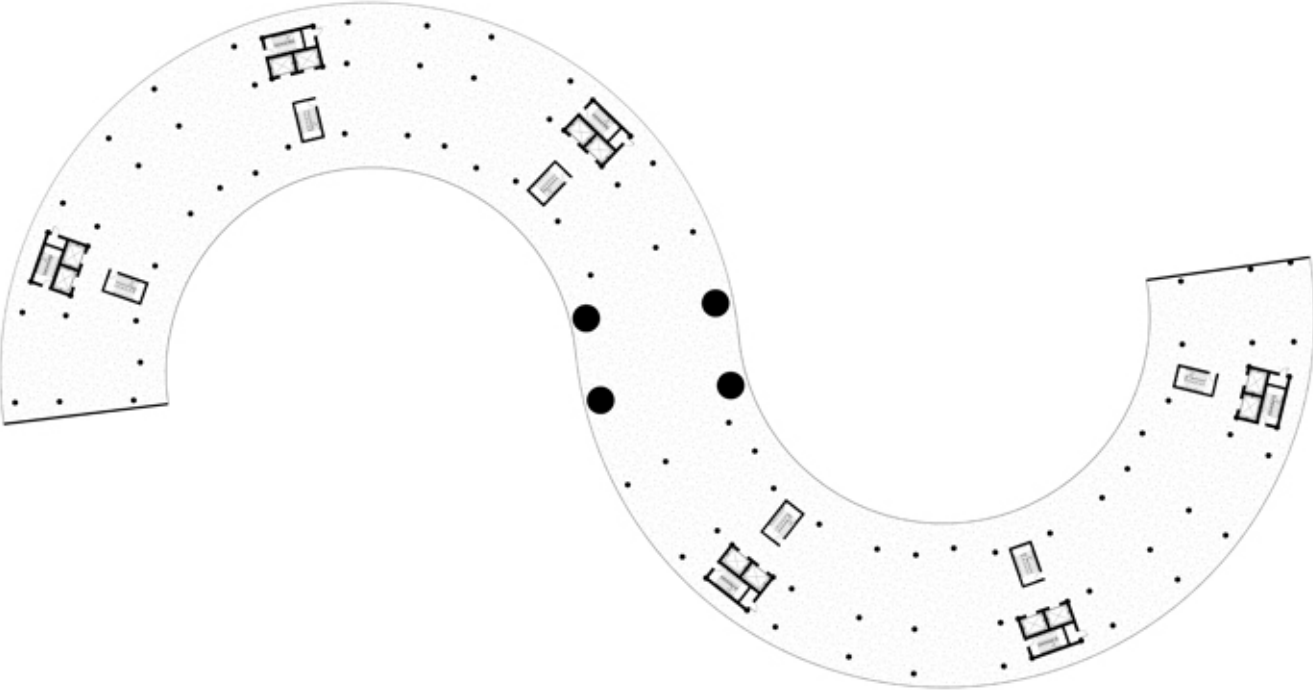


Plan, Section and Elevation



© 2012
TWP-70P

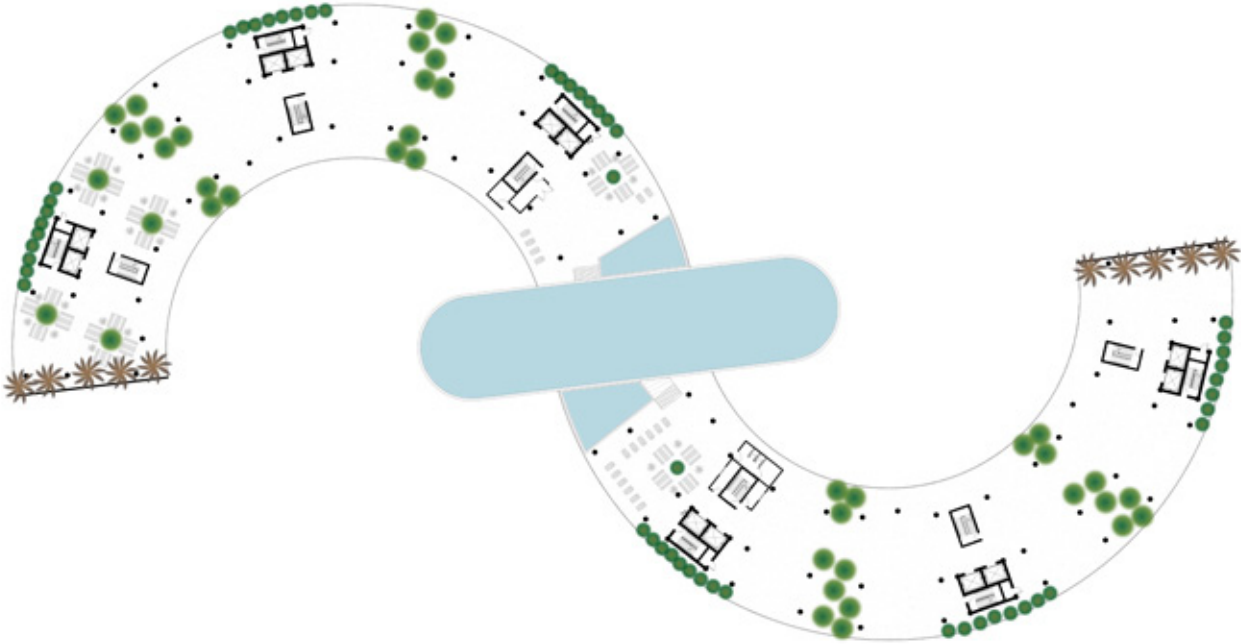
Ground Level Plan



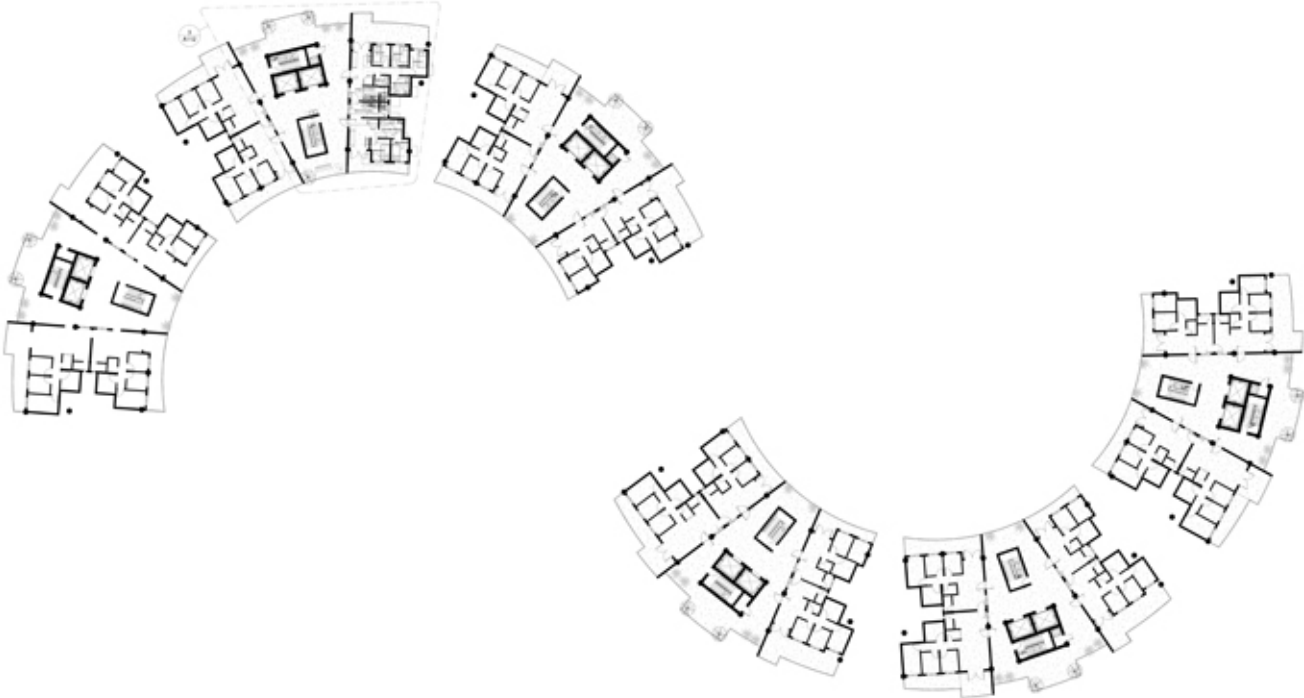
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3rd Level Plan

Plan, Section and Elevation



5th Level Plan



6th to 23rd level plan

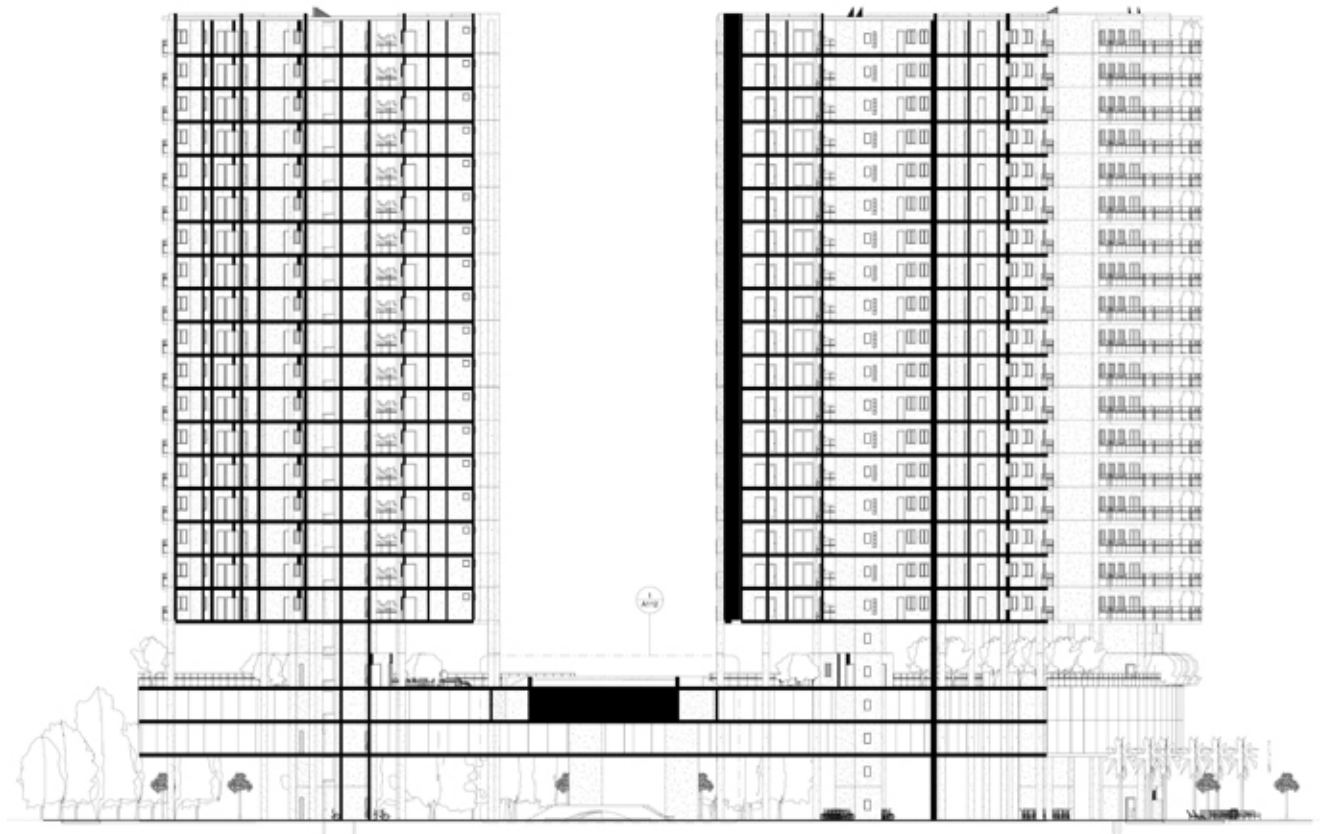
Plan, Section and Elevation



③ Level 23 - Callout 1
1/4" = 1'-0"

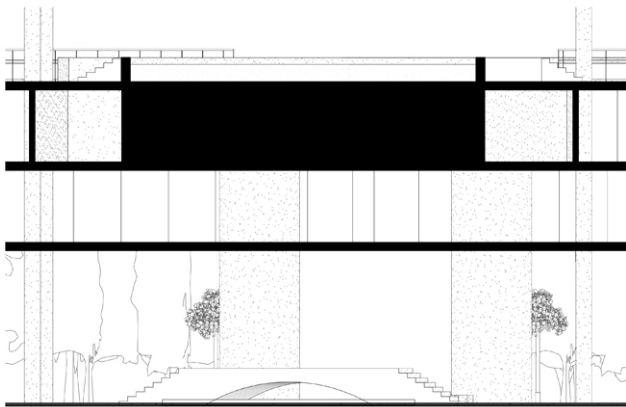
Unit floor plan

Plan, Section and Elevation



2 Section 4
1/16" = 1'-0"

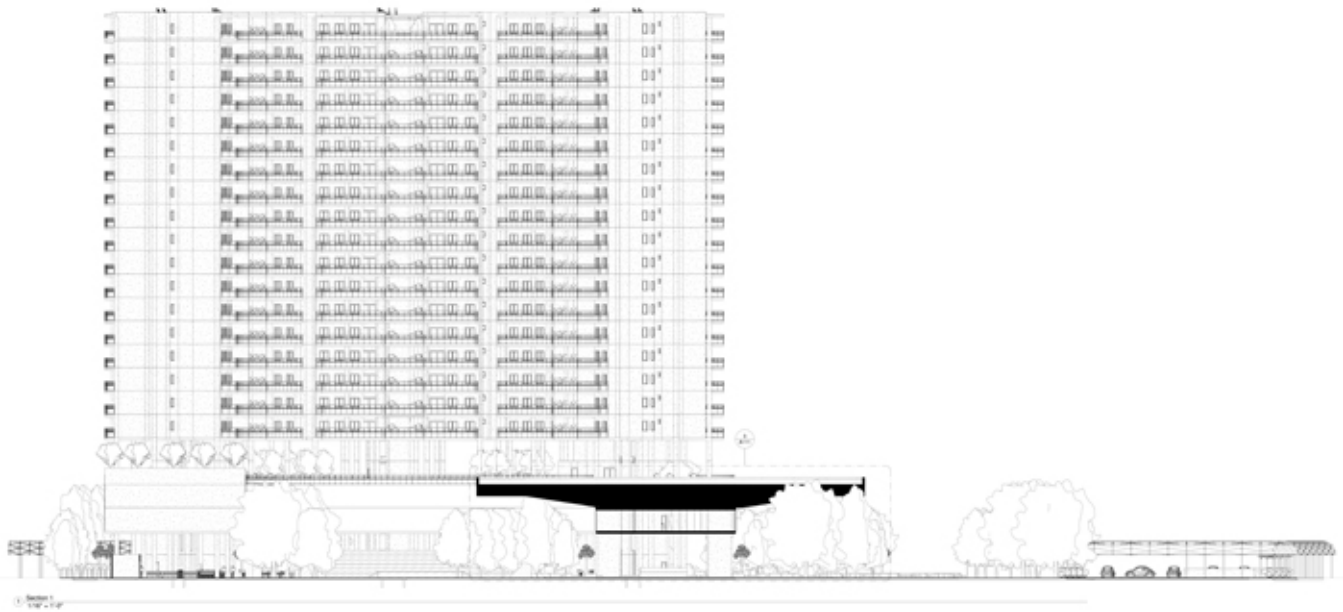
Section



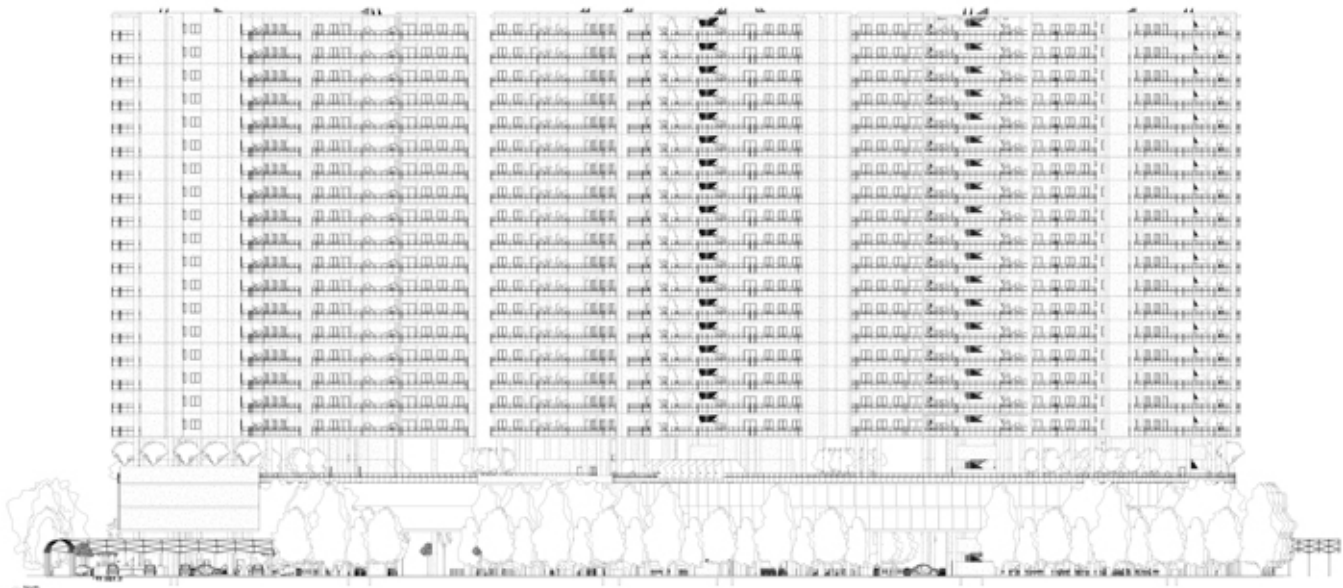
1 Section 4 - Callout 1
1/8" = 1'-0"

Section call out

Plan, Section and Elevation

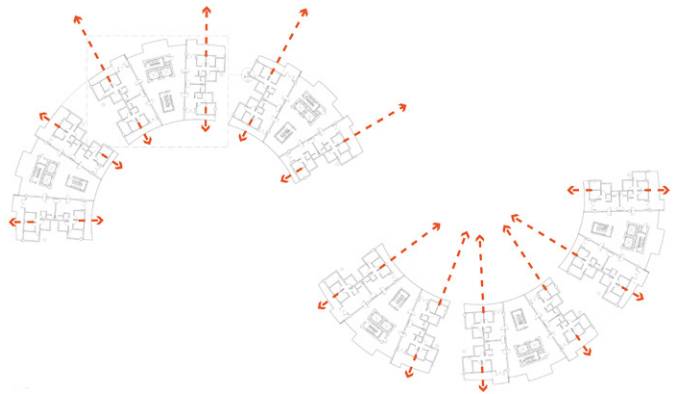
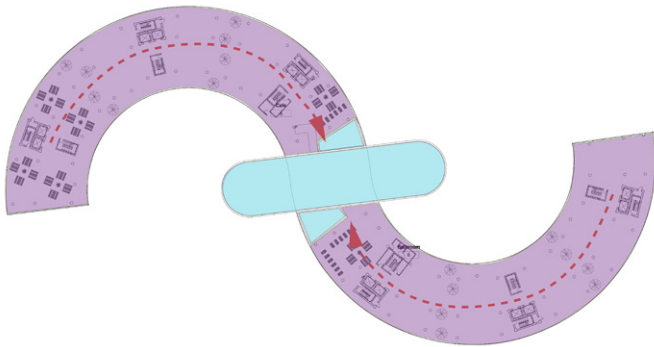
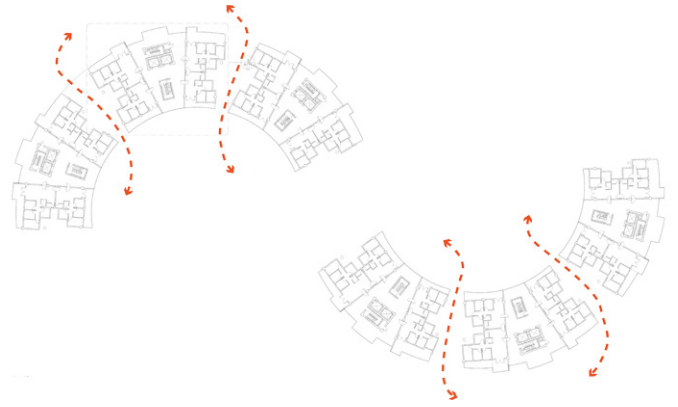
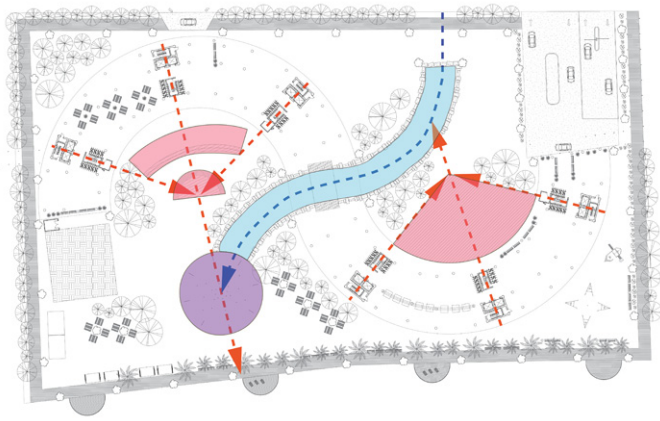


Section



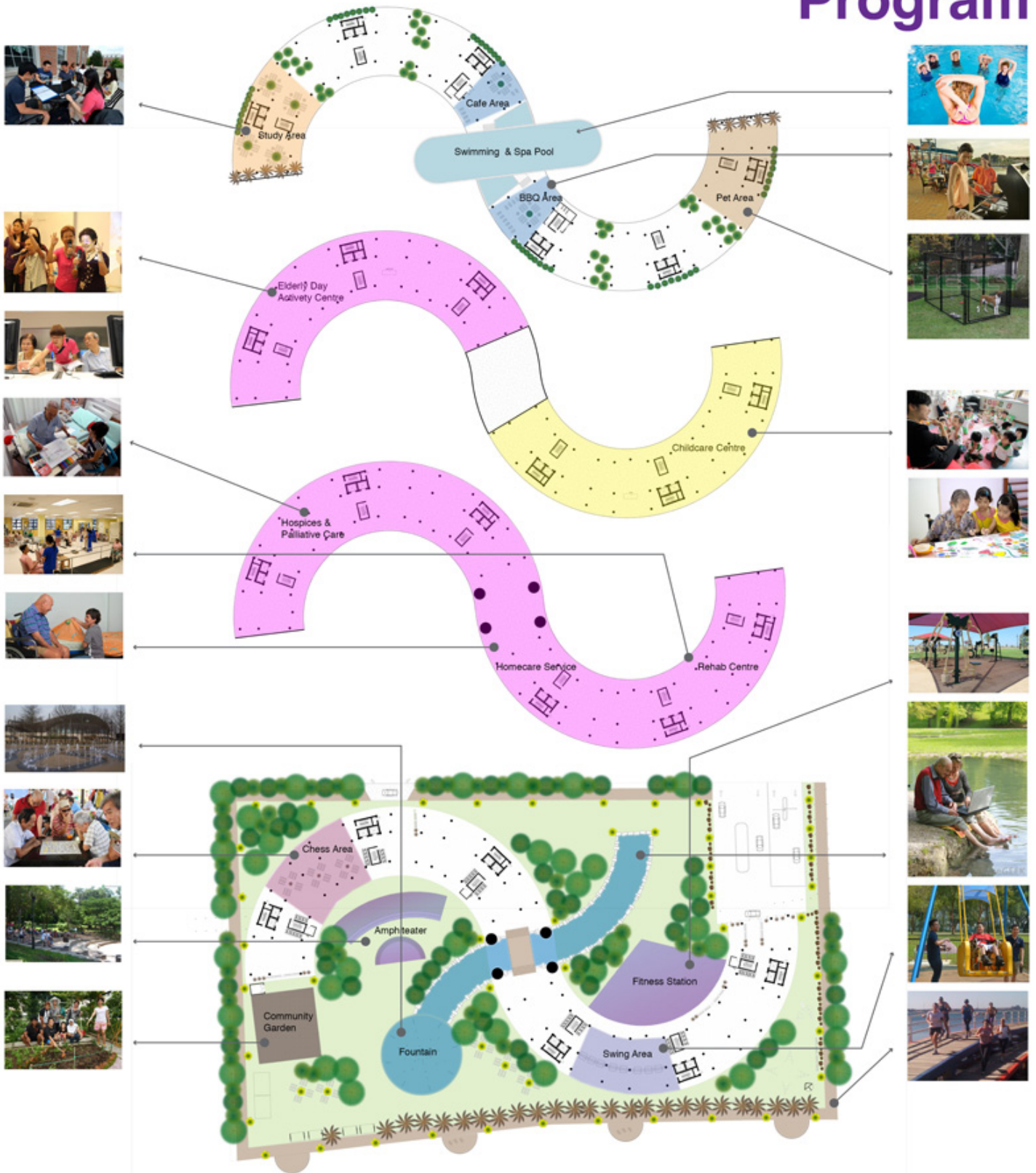
North Elevation

Diagrams



Program

Program



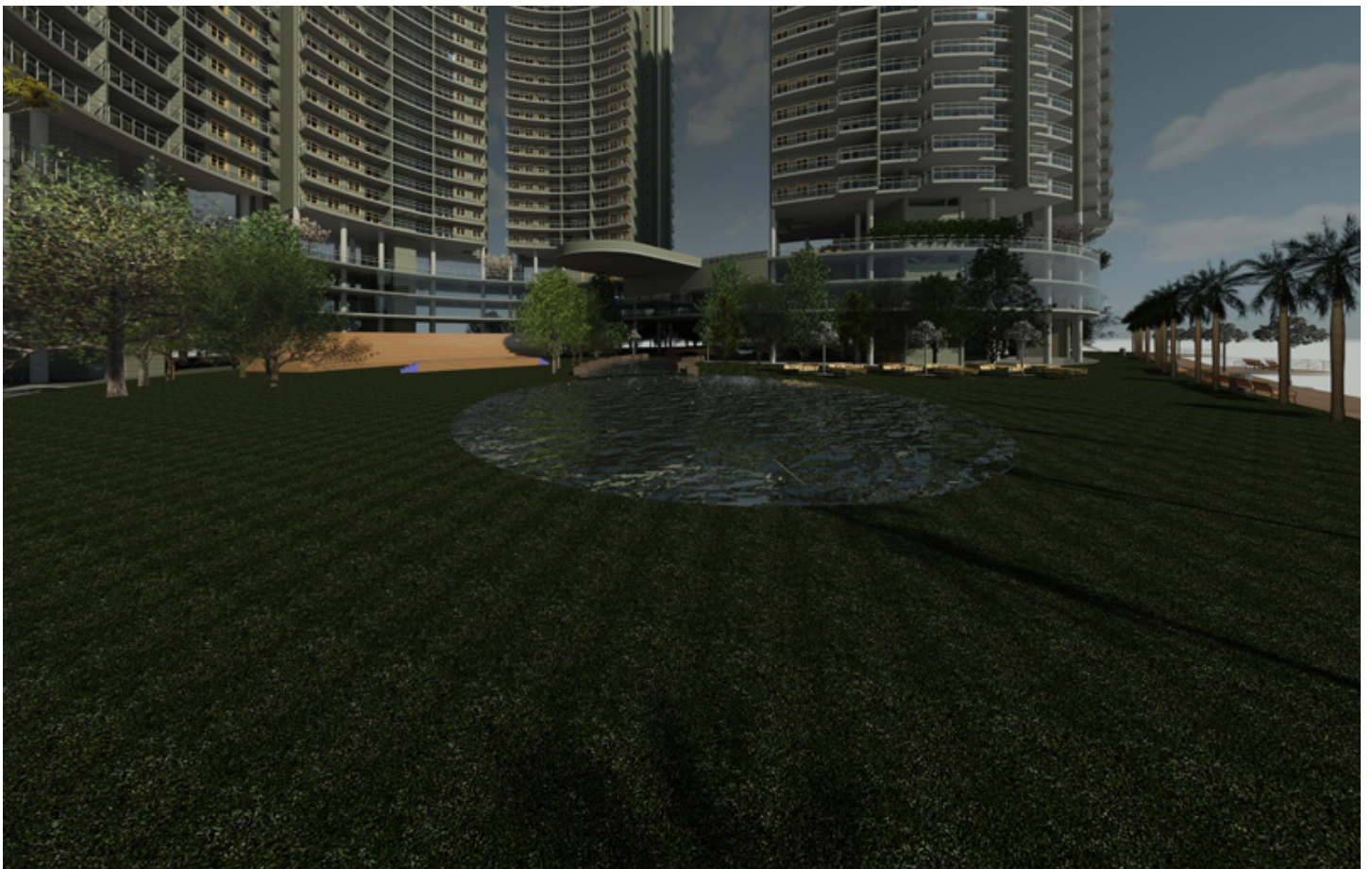
Rendering



Rendering



Rendering



Addendum

It has been a great journey throughout the 3 semesters, from writing the thesis to the design concept. I am so grateful for wonderful committee members, Craig (chair), Katherine (reader), Murali (reader), John Becker, Dick, Diane (thesis professor) and my peers. Without them I will not have made it.

I have always been passionate about social issues and it would be natural to pick this as my topic. Issues of elderly is so broad and I was unsure which direction to take; should I consider elderly village, co-housing for elderly, nursing home, etc.? During my first meeting with Katherine, we chatted about social issues of elderly, she suggested the idea of aging in place, which I was unaware of. I got so excited and dove in and started re-searching it. She also helped shape my written thesis paper and fine tune it.

I picked three sites (Ang Mo Kio, Marine Parade and Whampoa) in Singapore and ran analysis of the different demographic, transportation, amenity in the community, household income, education, living arrangement, mobility, and religion in each site and compared them. Based on the demographic of higher elderly population, lower household income and amenity, we decided on Whampoa.

I had learnt from John Becker about site analysis. We look at location plan, neighborhood context, size, zoning, natural and manmade features, climate, sensory, figure ground, aerial photos, historical documentation, site demographic and circulation. We came out with a series of hand-sketches and lay over them with trace to study each site. This process helped me to understand the site better and know the needs within the community.

I was not good at connecting everything together, I tend to think of each area individually. My professor and committee members guided me through this process. I spent a good amount of time thinking about the relationship between the site, the community, and the elderly issues and how they connect to each other. I started experimenting with the massing using all kinds of media and they didn't match each other in scale and it was difficult to pin down anything. Finally, I decided to use Revit to print it to scale, then use trace to overlay and develop my ideas, and this worked well with me and my committee members.

I wanted to keep the green space on the ground level for the community, so I lifted the building 20 feet off the ground and created a podium to house the different elderly services and childcare center. In order to create more community space, I lifted the residential building off the podium and created a pool area at the roof of the podium.

Due to the density of the site, most residential blocks are very near to each other and in some blocks, you could look into each other's kitchen or living room. After many attempts, I finally came out with a solution to design the podium in an S-shape and place the residential blocks along the podium shape. In this arrangement, every residential block will get a different view of the surrounding, enjoy certain amount of sunlight and wind. Learning from case study of residential housing, I designed 2 units beside each other with a joining door; one unit for the elderly and the other unit for their adult children's family. This allowed the adult children to walk over and check in on their elderly parents easily, at the same time giving each other their own space.

The other important area which I spent time on is the ground level landscape, which ties everything together. Through this process, I have developed different levels of community engagement and circulation, where the elderly and the community can connect.

I feel that I have met the goal of my thesis by designing a joint unit for multi-generation living, different levels of community engagement space with elderly friendly features and incorporated elderly services and childcare center within the building. This whole process has helped me grow as a graduate student and future career.

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