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I, Jing Dai, hereby submit this original work as part of the requirements for the degree of Master of Architecture in Architecture.

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Urban density in the future- Life around the clock: an urban vision for 2050

Student's name: Jing Dai

This work and its defense approved by:

Committee chair: Udo Greinacher, M.Arch.

Committee member: Vincent Sansalone, M.Arch.
Urban Density In The Future:

Life around clock: an urban vision of year 2050

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Jing Dai

B.A Shenzhen University, China
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Committee Chair: Udo Greinacher
Vincent F.Sansalone
ABSTRACT

The rapid development and expansion of city scale and population causes a series of problems when it comes to urbanism and resources. Spatial use, sharing space, vertical urbanism, multileveled density and other methods are the majority of researches focusing on solving problems such as uneven distribution of building density, irrationality of land-use and low use efficiency. In year 2050, the population will be doubled and more than 70% will end up living in cities. The proposal for a multi-level city together with a phased lifestyle will solve the city’s overcrowding and contribute to a more efficient use of urban space. Improvements in daylight technology will allow residents to live and work around the clock in three shifts. The triple time occupancy schedule will make space use more efficient. Meanwhile this will enable residents to share some of the home’s functions such as spaces for food preparation, hygiene, and hospitality. The design solves the problem of uneven urban growth and high, unsustainable, densities that will be the norm in the near future.
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Research

Chapter 1: Background and Goal: The Contest of Chinese Cities in the Next 50 Years

With the fast social development and rapid technological progress, the tendency of urbanization is a fraught proposition that belongs to futurology. Scarcity of materials, water, land, air and high population are the first negative connections people have when thinking about the year 2050. During the past fifteen years, the world population has increased from six billion to seven billion. Behind the seemingly stable increase rate hides a series of great changes: 75% of population increase came from Asia and Africa.\(^1\) High quality urbanization is becoming the main current of the contest for the next fifty years while cities, which play roles as the center of administration and functions, have replaced countries during global competition and innovation.

Chinese city development in global perspective for the year 2050 is based on science, technology and social development. The current world built by surrounding environment, technology and society is creative but there are always ups and downs. Nowadays, we are reaching a turning point that connects the past with the future and retroverspectives are needed.

Increased population, traffic congestion, industrial transformation, huge housing demand, and others are involved into the challenging version of 2050 Chinese society. Chinese population could reach up to 1,348,056,000\(^2\) and over a billion people will end up living in cities. The following diagrams indicate the continually accelerating population growth worldwide. Urban density is a grim tendency that we need to take positive steps to hold back and make the future sustainable.

\(^1\) Kuang, Xiaoming, and Jieling Che. "Urban World, the Contest of the next Fifteen Years." *Urban Wisdom Advancing with China*, March 1, 2015, 32.

Chapter 2: Research / urban density in the future

What will be the living space of individuals in the city with high density in the future? Will the living space turn back to a hive when the requirement of housing is increasing? Can architects have the buildings become more energy efficient by using diversified architectural methods, and therefore slowing down the resource consumption of the city? There is a painting named *Visionary City* from famous 19th century American artist William R Leigh. It is the first impression that made me start to consider the fantasies about the ideal form of urban density in the future. In the painting, the artist shows the future of the city, which consists of skyscrapers and three-dimensional traffic system. The common public and urban infrastructures are inserted into different floors of the skyscraper, while major transport routes and overpass-bridges are among different buildings at different levels. Therefore, all of them closely become a three-dimensional architecture and urban network. Then, I was inspired by several science fiction films, such as *The Fifth Element* from Luc Besson, and *Blade Runner* from Hampton Fancher. In those movies, the urban future was designed to be a construction community combined with megastructure in three-dimensional space. Fantasy arises from the human instinct to seek out knowledge and is an expression of humanity’s uncommon imagination. Huge vertical city seems to be a good way to solve the future urban development with density problems and meet public demand, but it lacks of communication in the horizontal space. These two inspirations are good starts to think about urban density in the future and become my interest during the architectural study.

Whenever we mention “high-density” during urban developing, the public will immediately relate it to problems and tensions. Words such as crowded, constrained and compacted have been occupied on news, world conferences and the architecture field. Over the years, the mass media’s rendering of the dream low-density life as the paradise with sunshine, fresh air, and greenery has pushed the prejudice further. But the undeniable truth is that in every corner of the world the densification exacerbates continuously. While most people accept the truth of high density
passively, some architects and urban planners take density study as challenges bravely and make it become the muse of creation. Seeking for solutions to resolve conflicts with positive attitude has become the main interest in this thesis. If we admit “densification” of urban development is the tendency for the future, we need to discover the art of living with the density.3

Under the rapid expansion of city scale and the inevitable concentration of population, high density in urban areas brought great impulse and influence to human life because of population, transportation, and environment changes. Unavoidable, density has become a popular issue that is under all kinds of long discussion. The capacity of the land, the uneven distribution of building density, irrationality of land-use and low use efficiency are some typical problems when facing density problems. How can we accommodate maximum amount of people? How to improve the quality of community recreational space and express the characteristics and charms of city life in the compact city? How to make sure people get enough amenities, sunlight and ventilation? Inside the high-density city nowadays, the truth is that city transportation is on the edge of paralysis, air pollution is getting more serious, the space between public and construction is over-crowded and the quality of space doesn’t meet the requirement of desirable living environment. However, high density doesn’t need to be related equally to a negative attitude. The advantages of convenience, high-efficiency, intensive resource, and diversified life could seldom been enjoyed for people in low density. To most architects, taking the compact city and its high-density surroundings as a precondition will be a necessary practice in the career life.

“Cities have never contained so many, nor so large a proportion of the human race. Between 1950 and 1990, the population of the world’s cities increased ten-fold, soaring from 200 million to more than 2 billion. The future of civilization will be

determined by its cities and in its cities.” This is what Richard Rogers described for the rapid population growth and his compliment of the significant value of city in civilization. Taking China for example, for all the time, China is proud of its large population, vast territory and abundant resources. However, in contemporary society, urbanization has presented a serious challenge. According to data provided by China's Development Research Center of the State Council, China will add more than 106 million urban populations by 2010 and the number will increase to 551 million by 2050. By 2030, China will add more new city-dwellers than the entire U. S. population. All in all, after 40 years, it is really hard to imagine that population and urban capacity will be doubled. For some cities in China, the manufacturers and society are much closer to the saturation point. The high living cost and lack of space force people to live in the suburbs and spend hours in transportation to work in city. People will need double time to queue to get into the cinema, even harder to find a parking lot and have to bear more noises and pollution.

With the population and livable area data, MVRDV finds the calculations of urban density. The crazy number shows that every four days the planet needs a city that could contain one million populations. Even in European and American developed countries with low population density, density in major central city also accelerates recently. But for China and most Asian countries with high populations, due to constraints as increasing population and limited livable space, there is no choice but to accept the truth that compact city space and development currently is the only way.

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Chapter 3: Narrative Essay

The following four literature reviews will mainly talk about four aspects: American density (Culture of Congestion in America), Hong Kong density (Culture of Congestion in Asia), sustainability compact city, KM3 model (a 3d city model provided by MVRDV).

*Delirious New York* is an architectural fiction Rem Koolhaas writes about American density in metropolitan areas. A total recall and sorting of the fast modernization of New York by the end of World War II is provided in this book. Koolhass directly presents his opinion that congestion is the culture of the 20th century. Through the subheading: *A Retroactive Manifesto for Manhattan*, he tries to go beyond the traditional architecture category theory and ways of thinking. He takes Manhattan, which has always been ignored by orthodoxy, as a blueprint to study American skyscrapers and the modern culture it presents. The author proves that this city, which is based on technological progress and speculative capital, has perfectly interpreted the beauty of the modern city and culture. *Delirious New York* is a milestone. The book starts with sufficient theory and followed by abundant practical experience.

Koolhaas thinks congestion is the energy of Manhattan, a world under considerable traffic congestion at any time. Why could not Le Corbusier conquer Manhattan? It is because he removed congestion from his urban form. This kind of congestion, in an area that disconnects from reality, forces the metropolis to grow up into a world built on human desire. Skyscrapers in Manhattan are the carrier of the Culture of Congestion. From Waldorf—Astoria hotel to Empire State Building and Downtown Athletic Club, the book demonstrates the progress of how skyscrapers have been conquered by diverse social culture.

High density in material sense does not contain all meaning of the Culture of Congestion. In fact, according to Koolhaas, Culture of Congestion means a

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congestion of content rather than congestion of objects. That’s why he considers The Downtown Athletic Club as instrument of the Culture of Congestion. The Downtown Athletic Club is a skyscraper that stands on the bank of the Hudson River, the southern tip of Manhattan.\textsuperscript{8} Large abstract patterns of glass and brick make its exterior inscrutable and almost indistinguishable from the conventional Skyscrapers around it.\textsuperscript{9} But it actually is one of the skyscrapers in town that contains the richest content. All the content is actually related with sport or, to be more precise, action of human body, including squash, billiards, boxing, swimming, golf, spa, supporting dining and accommodation. Different content piles up and get their spaces in just one skyscraper. The building is used as a Constructivist Social Condenser: a machine to generate and intensify desirable forms of human intercourse.\textsuperscript{10} It piles up and combines different or even totally opposite lifestyles and formed a unique urban Culture of Congestion. In a specific building, this Culture of Congestion has Definitive Instability.\textsuperscript{11}

\textit{Cities For A Small Planet} is a book talking about city and architecture culture by Richard Rogers, who is a leader of the compact city. The author shows his opinion from the book’s name that the planet is small and the city needs to efficiently use their resources. The concept of Sustainable Urban Form that is provided through this book makes people have a new knowledge of sustainable Urban Form in 1998 and it makes me understand that the urban development is not only satisfied at the material level, but also at the spiritual level and has a more rational use. Sir Crispin Tickell considers this book, as a message of hope while the author shows how the equitable - above all, compact - city is pluralist and integrated, diverse and coherent.\textsuperscript{12} Richard Rogers tries to expound respectively from culture, transportation, architecture, environment and other aspects to describe the elements his ideal city should have:

opening in the cultural field, compactness on transportation, artistry on architecture and energy saving on environment.

First of all, Richard Rogers tells us that in the future the city should remain more open-minded public space for people living in urban areas to communicate. The disappearance of ‘open-minded’ public space is not simply a cause for regret; it can generate dire social consequences launching a spiral of decline. Indeed, the modern city is now growing towards a secret and closed direction. People stayed in their own space and seldom interact with others. The progress of humanity comes from the collision of ideas. High-density development makes this even worse because more and more public space is occupied. Planning more public space could at least remind people of the significance of communication. Secondly, the urban transportation network could be more compact. Richard Rogers believes the future network could focus more on non-motorized vehicle or even just the pedestrian system. The thought could be too ideal that there may be a better explanation. The city could be take part into small blocks and each of them have full functions so that for daily life people could take activities inside the block in order to decrease the pollution caused by traffic. Thirdly, Richard Rogers also mentions that the modern city now lacks artistry. Economic profit is in the dominant position among construction under the rapid development. The city becomes a concrete forest with air and water pollutions and lack of green space and people beg for fresh air. In the short-term, people may benefit from the rapid single development but in long-term, the bad influence on future generations is hundred times the benefit for now. Fourthly, the author discusses that ideal architecture should be sustainable, energy-efficient, green and could meet most out of the human demand. It is very necessary to take energy efficiency renovations on buildings as the buildings take 50% of city resources. There is a metaphor that even ants could decide the suitable size, characteristic and function well for their city and human should learn from them to develop Concentrated and multi-center innovative city. The result should be, in

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Richard Rogers’s words, a dense and multi-centered city, a city of overlapping activity, an ecological city, a city of easy contact, an equitable city, an open city, and not least a beautiful city in which art, architecture and landscape can move and satisfy the human spirit.\textsuperscript{14}

From \textit{Invisible Logic : Hong Kong, as Asian Culture of Congestion}, here are two points which differ Hong Kong from any other metropolis in the world: Hyper density and Asian characteristic. This research which takes Hong Kong as case study, focus on the city under the high-density condition. It is neither a personal emotional expression of the city, nor the official report from the government or the urban planners. It is the deep insight of the city from the open architectural view on the scheme of “Asian Congestion Culture”, which is represented by the Hong Kong city mode. The Manhattanism, which has been concluded in the book \textit{Delirious New York} that is mentioned above, has continuously influenced the world’s metropolitan mode until now. However, the high-density culture in Hong Kong influenced by the oriental tradition, the mixed regime and its economical harbor essence reveals highly difference from the Manhattan mode. The book describes Hong Kong in seven aspects: self identification in the consuming society, high density living, sheer urbanism, ambiguity in the public realm, informal elements, maximum efficiency and border conditions.\textsuperscript{15} The first three chapters describe Hong Kong’s consuming society and character of high-density condition. From the fourth to fifth chapter is about the public space and informal space in the city, which can be easily ignored but pervasive. The sixth chapter shows how this city works effectively through its advanced infrastructure construction. The last chapter describes various kinds of border condition in Hong Kong.

There is no other city in history like Hong Kong, which paradoxically combines the mediocre architecture and complex urbanism together. The book considers the city to be alive and it could think, behave, and mutate in its own logic, while balancing all

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\textsuperscript{15} Zhang, Weiping. \textit{Yin Xing Luo Ji: Invisible Logic : Hong Kong, as Asian Culture of Congestion}. 1 Ban. ed. Nanjing: Dong Nan Da Xue Chu Ban She, 2009.
the powers, benefits and ideas through its self-adjusting system. The research is supposed to uncover the hidden logic and wisdom from the city itself. Under the extreme condition, Hong Kong has already generated the urbanism of how to deal with the obstacles in high density. The real value of Hong Kong’s city exists in the potential providing a possible urban theory: The oriental extreme urbanism. The high-density city is often considered being related to poor environment, overcrowding, lack of resources, and crime breeding, according to some western scholars. But compared to a crowded Asian city, high-density complex unit mode has become the only selection in the downtown area. There is another interesting point about ambiguity in public realm talking about how “public” can public space be.

As a Globalization supporter, MVRDV writes a book about intensity named KM3 in 2005 that discusses several ideal worlds, which is based on the data analysis with a logical and rational design process. By analyzing the global climate change, increasing immigration, resource consumption, energy production and other areas, this book makes bold assumptions to new method of spatial capacity, allocation and morphology. Also MVRDV provides the possible solutions for the relationship between city and architecture over these problems. During the progress of solving problems, MVRDV has gradually formed the basic concept of future urbanism. There should be a new urban morphology that can afford the high-density situation and bring more new possibilities, meanwhile, it can meet all the human demands and combine all the desires. Under the contemporary space and physical resources, this new city form could increase the space capacity at the three-dimensional level. KM3 means that the unit km2 is no longer suitable that used to describe cities while the new city development should use km3 as a new unit.

During urban design, the analysis method that MVRDV uses reflects the characteristics and advantages of era of information. They name the method as datascape that every item obeys to strict logical data. The method is by analyzing a vast amount of data related in contemporary architecture and urban planning to create

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the space, and converted quantifiable reality into physical space form. MVRDV uses this method for the study of urban density and explores the possible morphology and variation of urban planning and architecture. This method is also being used in the study of regional planning and global resource planning. In a word, the process of the method is by analyzing the data from reality lift and turn it into landscape. Datatown is a representative example of the datasacpe method. Under the situation of globalization and the scale expansion, MVRDV imagine a city only based on the data with no limit of ideology and topography. Intensity of which are 1,477 people per square kilometers, there is a population of 236 million live on a 160,000 square kilometers land. MVRDV divides this city into six parts; space required for each part is in detail calculated. For example, each habitation unit will contain 2.43 persons while each unit is 126 square meters, 2.8 meters in height, so a total space of living space of 43,448,531,280 cubic meters.\textsuperscript{17} If everything gathers inside a 3.5 cubic kilometers cube, when this is evenly spread out, there will be a ten-floors building which base covers an area of 20 meters by 10 meters and 28 meters high. Greening part is arranged on each floor to form a vertical garden city. This solution meets the requirements of the density as long as advantages in the suburbs. Through similar calculation, MVRDV gives the form of other parts of a megacity with the help of computer. KM3 is the first step to solve the density problem, but it definitely cannot be the best final solution. A real city should have more on the social, mental and cultural aspect.

\textsuperscript{17} Fortmeyer, Russell. \textit{KM3 MVRDV: Excursions on Capacities}. Barcelona: Actar, 2005.
Chapter 4: A Phased Lifestyle/ The Triple-Time-Occupancy

With those tough density problems, it seems like the better way to change the situation is to change the lifestyle to make the space more efficient. Currently, most people stick to the same schedule: wake up at 7 am, work at 9 am, work ends at 5 pm, and sleep at 11pm. The offices, schools, shopping malls, and restaurants are empty at night but extremely busy in the daytime. In the year 2050, there will be up to triple population to use the same space. Is there any possibility that the use of these spaces be more efficient? Could people be able to work at night without physical and psychological uncomfortable? A phased lifestyle will solve the city’s overcrowding and contribute to a more efficient use of urban space. It is called the triple time occupancy that people have three shifts schedule for working time, entertainment time, and relaxation time.

The benefit of the triple-time occupancy could make the infrastructures and other spaces full of use all day, whether daytime or nighttime. With the same space, it will afford more people compared to the current condition. The diagram indicates that the infrastructures, schools and co-working spaces could even be less than before but there needs more living space for more and more coming people. Currently, central business districts lack living space due to high land values. People take hours to go to work because of horrible
transportation condition. But those CBD areas have rich infrastructures to support daily life. Therefore, the city could have enough space for the increasing population by keeping current buildings but only adding living space.

![Figure 05. Comparison of current lifestyle and future lifestyle (Source: Author)](image)

Over the city like cloud, between city like connections and under city are three ways to add living space in highly saturated areas.

![Figure 06. Diagram of adding living space (Source: Author)](image)

![Figure 07. Above city precedent/Sky Cloud](image)


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Figure 08. Between city precedent/Daekwon Park

Figure 09. Underground part precedent NYC/RAAD STUDIO
Improvements in daylight technology will allow residents to live and work around the clock in three shifts. This will enable them to share some of the home’s functions.

By recording a person’s time spent on home functions in a typical day, it is obvious that people spend less time in spaces for food preparation, hygiene, and hospitality. Because of the three shifts, people could have different scheduled times for those functions. For example, A group could have breakfast time at 4am, B group at 12 pm and C group at 9 pm. Therefore, they have a chance to stagger cooking hours and kitchen and dining areas can be shared.

Figure 10. Left: time spend on home function. Right: sharing living mode under three shift (Source: Author)

Figure 11. Communication relationship (Source: Author)
Smart home systems could also help to increasing the livability and make every space efficient. There are several elements: revolving door, closest delivery, collapsible toilet, shower, and smart kitchen management. An artificial intelligence similar as Siri could help residents. For example, people don’t need a huge closet to see clearly every clothes where it is. A 1/4-size closet with the artificial intelligence system could show the clothes that the user would like to dress up today on screen and deliver the cloth in front of you. Another example is collapsible toilet or bathtub. When the user doesn’t need to use the bathtub or toilet, they can be put into the wall so they don’t occupy spaces.

Figure 12. Smart Home System (Source: Author)

With all the associated systems and sharing space, the new floor plan could be only around 400 square feet instead of the traditional floor plan of 672 square feet. It will decrease the living space and cost so that more and more people could afford to live in CBD. But residents still have everything they need and wont feel repressed.
Chapter 5: Precedent Citations

There will be two initial precedents in China and Amsterdam discussed in this thesis, one is WoZoCo in Netherlands from MVRDV and another one is Linked Hybrid in Beijing from Stephen Holl.

WoZoCo is a 7,500 m² gallery-type circulation elderly apartment built by MVRDV in 1994. This project is a low-cost public housing for old people in Amsterdam who live alone. As the rapid increasing population density and less public green space, the city is losing one of the most valuable qualities. The project WoZoCo is part of the plan of increasing density and constructed residential area in city and it is a successful case of density experience.

The client wanted 100 units in the site, but due to the Dutch law, the story height of the elder residential building are severely restricted and because of some other limitations, the maximum acceptable units could only be 87. At the first meeting, a half joking solution whereby the houses that would not fit inside the gallery block were glued to the outer side of the volume drew attention. To solve this conflict, MVRDV has a creative idea under many limitations that they overhang the extra 13 units on the rest 87 ones northward so that those 13 units just occupy the air, not the ground. Even though cantilever structures are common, but in this case with large scale, this is an amazing innovation. And all the rooms could enjoy daylight. In this design, each unit has different landscapes and ground space is as much as possible open and filled with green space, so that it makes this project as a typical example under high density.

Figure 13. Picture of WoZoCo

Figure 14. Picture of WoZoCo
**Linked Hybrid Beijing** is a 220,000 m² project designed by Steven Holl with 750 apartments, public green space, commercial zones, hotel, cinema, kindergarten, school and underground parking in Beijing, China in 2003. The aim is to counter the current privatized urban developments in China by creating a new twenty-first century porous urban space, inviting and open to the public from every side.\(^{19}\) Geo-thermal wells (655 at 100 meters deep) provide *Linked Hybrid* with cooling in summer and heating in winter, and make it one of the largest green residential projects in the world.\(^{20}\) Here, a strong urban fabric is weaved on the ground as well as on the upper floors where a new public space is implemented within a ring that bridges all the towers together. In this small city, no building is an island.\(^{21}\)

As a high-density congregate housing, Steven Holl calls the project an “open city within a city.” The open passages for all people including residents and visitors in the ground level has the spatial characteristics of a traditional lower level city street in a high-density city. The closed space scale encourages people to join activities such as shopping, dining and entertainment. Open roof terraces offer a quiet green space under high-density stress. A multi-functional series of sky bridges from the 12th to the 18th floor link each tower together and create a continuous public space in the air. Along the sky-loop, there is a swimming pool, gym, coffee, gallery and cinema. So the architect hopes the public sky-loop and the base-loop will constantly generate random relationships. They will function as social condensers resulting in a special experience of city life to both residents and visitors.\(^{22}\)

\(^{19,20,21}\) “MOMA Linked Hybrid Beijing.” 北京当代

\(^{22}\) “MOMA Linked Hybrid Beijing.” 北京当代
Figure 15. Picture of Linked Hybrid

Figure 16. Picture of Linked Hybrid
Chapter 6: Research Summary

From the literature review and precedents, architects are trying to figure out an adjustable building method under high-density urban area. Meanwhile it is obviously that if the society keeps the current lifestyle, the city couldn’t afford the increasing population. Therefore, the exploration of the adjustable form with a phased lifestyle will be the main purpose of this thesis study.

Holland architects research on this have a relatively earlier beginning than others and now they have already gained some achievements. MVRDV’s exploration on high-density study is a good start while their creative ideas comes from the stress of high-density and by using them in real projects, architects gains more experience. The CCTV Headquarters designed by Rem Koolhaas, just like his early project Villa Dall'Ava, tries to seek usable space in the air under high-density conditions in order to leave the scarce ground space to the city and find out fun of density and pleasure of congestion. It is a positive attitude towards the situation of high-density urban fabric. If Rem Koolhaas’s experience of high-density in Beijing is not in extraordinary high-density situation, then Hong Kong really is the extreme representative. Rem Koolhaas finds out the fun culture of congestion because of Delirious New York and Hong Kong architects find out the wisdom of architecture because of extreme high-density.

In the practice of high-density in Hong Kong, the traditional two-dimensional architecture method is almost no longer available. Whether urban public space or architecture transportation space can be built or connected in a three-dimensional multi-level area. Sometimes, it is hard to find the main entrance and lobby for users because they are put into different level in public space. Traditional building functions are also being replaced by multi-functions. For example, a mega structure in Hong Kong has several commercial levels on the ground, parking space in the middle, and high-rise residential building on the top, sometimes there is even a middle school between them. Hybrids, coexist, sheer urbanism and ambiguity in the public realm are the characteristics that architects use under the extreme high-density
Unfortunately, there are not many related researches on triple time occupancy so that there are not enough references to provide strong support.

In order to learn from the high-density experience in Holland and Hong Kong and practice the strategy guarantee the maximization and optimization of the land use under the limited objective condition, therefore, it could solve the problems such as the uneven distribution of building density, irrationality of land-use and low use efficiency. We will choose a small-scale district in a developing city with high density, and under the triple time occupancy schedule, try to present advanced urbanism and constructions in pursuit of expanding the size of the building capacity and functional capacity under limited conditions in three-dimensional space. As a result of our productions, we can explore the possibility of development with the tripled time shifts schedule to solve the problems that uneven growth brings under high density in the future.

There are still several unclear areas to make the design under high-density surroundings as precondition. Seems like there is still a problem how to improve the quality of living recreational space and the way to express the characteristics and charms of city life under high-density condition. As is mentioned before in this thesis, a real city should have more on the social, mental and cultural aspect. Living community is an important part of urban culture and neighborhood recreation is the most important thing related to residential area in urban life. But the current situation is that people focus more on how to put more population into the building instead of considering the neighborhood recreation space. How to balance the relationship between those two things will be discussed in the design.
Site & Conditions

Chapter 1: Site Location

The site is in the center of Shenzhen CBD. Shenzhen is a major city in the south of Southern China’s Guangdong Province, situated immediately north of Hong Kong Special Administrative Region.

![Shenzhen Location Map](image)

Figure 17. Location of Shenzhen

Shenzhen’s modern cityscape is the result of the vibrant economy made possible by rapid foreign investment since the institution of the policy of “reform and opening” establishment of the SEZ in late 1979, before which it was only a small village.23

Shenzhen Excellence Century Center is a pearl of Shenzhen CBD.

![Shenzhen CBD Surrounding Map](image)

Figure 18. Shenzhen CBD surrounding (Source: Author and Google earth)

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Surrounded by lots of high-density offices, shopping malls and other commercial infrastructures, this area is an extremely high-density area and needs a well-developed urban complex as soon as possible. The housing price and the traffic pressure in this area are extremely higher than any other places in Shenzhen. This area has more and more population moving in and the lack of supporting facilities must be built and improved.

Figure 19. Overview of Shenzhen CBD

Figure 20. Picture of Shenzhen Excellence Century Center
Chapter 2: Current Natural Conditions

(Information is from "Instruction to Applicants and Design Brief." *International Consultation on the Urban Green Valley Landscape Planning and Design for the CBD of Shenzhen North Railway Station.*)

This area has a mild subtropical climate. The weather is generally mild with plenty of sunshine and rain. The main climate features are as follows:

- The annual precipitation averages at around 1,667 mm, with maximum 2,832 mm and minimum 761 mm. The maximum daily precipitation was 257.3 mm. The annual precipitation is in uneven distribution, 80% of which is delivered from April to September.

- The annual average temperature is 22 degrees Celsius, with extreme temperature having ranged from 0.2 degrees Celsius to 38.7 degrees Celsius.

- The annual relative humidity is 79%.

- The wind blows from NEE and NNE in the year; in summer, it blows from southeast and southwest; the annual average wind speed is 2.6 meters per second; the typhoons in summer and autumn are the main natural disasters; the annual average landfalls of typhoons is 4.8 time; 1.6 times with severe damage, most of which occurs from July to September with the strongest wind speed more than 40 meters per second.

![Wind rose plot for Shenzhen](http://www.chinabaike.com/t/31251/2014/0420/2102831.html).

Figure 21 Wind rose plot for Shenzhen
Chapter 3: Full Client / Culture essay with graphics

In modern metropolitan city under high density, the role of landmarks is more and more important. It is not only because the height could improve land use efficiency, but also by using its specific characteristics to make it highly recognizable and become the “name card”.

The client is Shenzhen Huanggang Industrial Holdings Company Limited. In order to carry out the unified arrangements by the Municipal Committee and Government for accelerating the development and construction of the 13 key areas, to build the CBD of Shenzhen in high standard, the key area construction plan of “one Core, one Center, and one Network” will be implemented. “One core” is the Business Core Zone of Shenzhen Central District; “one Center” is the Cultural and Consumer Center of Convention & Exhibition Center Station; and “one Network” is the Urban Green Valley.\textsuperscript{24} The goal is not only a carrier to demonstrate the natural landscape of the New District, but also an important engine for the area’s development. Moreover, it has great influence on the building of high-quality urban environment for Shenzhen North Railway Station area, by being the core place for public activities and inheriting the urban culture, as well as the basis for ecological safety layout to ensure the area’s sustainable development.

Urban complex, which is also named HOPSCA(Pronounced Hao-bu-si-ka), is a neologism used in real estate advertisement in Chinese context. It has been defined as a integration of hotels, office, ecological park, shopping centers, convention, apartments into a multi-functional, modern and comprehensive city-dimensional spaces.\textsuperscript{25} Many commercial mixed-use developments in China now use this word to symbolize their project as a fashion and international one, which in fact is a Made-In-China. It is also an important part that almost has fully functional of a modern city so that it is called mini city within a city. It has two forms: single and

\textsuperscript{24} "Instruction to Applicants and Design Brief." \textit{International Consultation on the Urban Green Valley Landscape Planning and Design for the CBD of Shenzhen North Railway Station.}

combination. Combination form will be discussed during this paper because it is better in economical, professional and practical aspects compared with single form under high density. It combines office, residents, commerce and other single places and use corridors or other ways to connect each other in order to get a new form of urban complex. HOPSCA has many characteristics such as continuity of spaces, high space accessibility, high density, intensiveness, utility, compound function, mixed land-use, efficient internal and external transport and high appreciation potential. Moreover, one of the main benefits that HOPSCA brings to China's urban development is that they help control urban sprawl and focus economic activity.  

Design Objectives include several goals. First, the urban complex needs to drive the regional development and drive the continuous development of Shenzhen North Railway Station area. Second, it needs to guarantee the Ecological Safety Pattern. Pay respect to the ecological basis, guarantee the ecological safety pattern, and practice the urban ecological construction idea by compressive ecological design methods (such as green architecture, clean energy, low-impact development, and effective resources consumption, etc.) and build the CBD of Shenzhen into a demonstration area with harmonious development between the nature and the city. Third, in order to activate the urban public vitality, adhere to the design concept of human, construct spatial nodes suitable for activities, build up successive and safe slow traffic system, provide the local residence with places for abundant activities, and inspire the city’s vitality; meanwhile, provide a convenient and comfortable rest area for the passengers of the North Station. Last but not least, to demonstrate the natural and cultural features. Cultivate the natural and ecological features, historical and cultural characters and modern public arts of Futian New District, and fully use those features in the design to demonstrate its unique connotation and features for the CBD of Shenzhen.  


27 "Instruction to Applicants and Design Brief." International Consultation on the Urban Green
Chapter 4: Site Strategies

The design goals will be providing an urban complex with the function of living and related spaces in the central of a high-density area. In Shenzhen, there are several completed projects similar such as UpperHills and cocopark. UpperHills is a successful urban complex with new industries, apartments, hotels, and commercial businesses. Ecology is introduced into the program and using three-dimensional traffic network and commercial activities to make comfortable multi functional spaces. Learning from them and using the specific site characteristic and data, the goal will be trying to find out the best form of the urban complex, which is suitable for the development of urban density in the future under the three time shifts.

Figure 22 Picture of UpperHills
Project Details

Inspiration

Cloud Citizen, a proposal for a new high-rise typology by Urban Future Organization and CR-Design has been jointly awarded the highest prize in the Shenzhen Bay Super City Masterplan Competition. Their futuristic design features a singular mega building complex that aims to create a hyper dense urban center that gives back to the environment.28

Cloud Citizen, however, proposes a radically different typology for this new urban center. The plan also includes features to make the design more ecologically viable. Thus, Cloud Citizen functions as a “continuous metropolis” with public spaces suspended in the air and integrated into the structure itself. The enormous scale of the structure is broken down into smaller units to create a variety of spaces to serve public, commercial, and cultural programs. Each public space connects to a large park that acts as a green network for the city and aims to promote healthy and more sustainable

lifestyles. The following sketches show how the main ideas of this thesis work very well in the cities.

Figure 24 Sketches of adding living space in cities (Source: Author)

When it turns to the picked area, the living spaces are added above, between and under the four buildings of Shenzhen Excellence Century Center. There are also public connections with the living spaces and nearby infrastructures. There is a park connect the bottom living space with a nearby elementary school. Also several air corridor connections with nearby co-working spaces. Transportation networks are among the livings spaces with different levels.

Figure 25 Overview of project (Source: Author)

Figure 26 Section of underground part (Source: Author)

For the detailed living unit, the floor plan is 380 square feet each. Every three units which contains A, B, and C group people share a green open garden with man-made natural environment, a public transportation hub, and a mini public communication center. The mini-public communication center includes functions as pick up station, collapsed gym equipment and co-working space. The pick up station is used to pick up packages, grocery, books and other needs ordering from smart home system. The gym equipment is hidden on the wall and can be pulled out if needed. If resident make an appointment with the smart home system, he can also use the room as private conference room or co-working space near home.

Figure 27 Floor plan and rendering of living unit (Source: Author)

All in all, the living zone is flexible with the smart home management system. People no longer feel like living in a closed cold hive without knowing who their neighbors are. Residents have more opportunities to know different neighbors are and won’t feel isolated in the huge, high-density city.
Conclusion

Even though there are not many researches or projects to support the phased lifestyle, but it is a good try to work with multi-level city with futuristic technology to solve the density and population problems. The formulation carries Utopian concept and some limitation, but by taking Shenzhen in China as a typical compact city with high density surroundings as precondition, using the phases lifestyle to make into the real model and test it. As a result of our productions, it can explore the possibility of development in three-dimensional space to increase efficiency of space use and afford the increasing population.
Appendix A: Expanded Annotated Thesis

Bibliography

Resources:

About density and terms: These articles explain the authors’ thoughts of density from different countries in the world: Hongkong, New York and San Francisco.


About three dimensional city and KM3 from MVRDV: These articles introduce the theory of MVRDV’s KM3 model. Datascape is the special research method which basis on the statistical data and form images by software packages and computers.


Thoughts about advantages and disadvantages about city life under high density:
