TOKYO VOIDS: EXTENDING TOKYO'S PUBLIC REALM THROUGH IT'S FORGOTTEN VOIDS

by Emad Tarek Tubeileh

Despite global population growth, Japan's population is experiencing a decrease in population, contractions in part due to low birth rates, aging majority, and high life expectancy. As such, 10% of homes in Japan lay abandoned, urban voids largely ignored, juxtaposed to the dense vertical presence of the megacity. Traditional urban development prioritizes development of urban spaces into profitable assets. Factoring Tokyo's increasing voids, new strategy must be developed, one that reevaluates the network of these spaces and realigns the values of urban development, defining the place in which such interventions mold the urban fabric. The strategies in which this thesis aims to leverage the emergence of Tokyo's voids begin by creating a set of conditions which categorize the Tokyo's complex urban landscape, planting ephemeral seeds weaving together through urban actuators throughout the city. Through this interweaving, relationships between the voids and the city being to converse, creating a new network of alternate pathways, re-stitching the fading sense of place into the forgotten spaces. If successful, the strategies developed for contemporary Tokyo can serve as a foundation for a likewise system of strategies and interventions that can be applied to the changing urban fabrics of cities throughout the world.

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A Thesis

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Table of Contents

List of Figures

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Lets begin.

Abstract

Despite the upwards trajectory of global population growth, Japan's population is experiencing a decrease in population, contracting in part due to its low birth rates, aging majority, and high life expectancy. As a result, 1 out of every 10 homes in Japan lay abandoned, urban voids largely ignored by the millions walking past them as they sit juxtaposing the dense vertical presence of the megacity. Traditional urban development strategies witnessed throughout all the major cities portend to prioritize rapid development of urban spaces to maximize the value of urban real estate. Such solutions are no longer viable in the context of contemporary Tokyo due to its contracting population shifts. A new strategy must be developed, one that is capable of reevaluating the network of these spaces and realigning the values of urban development, and defining the place in which such interventions mold the urban fabric.

This thesis aims to leverage the emergence of Tokyo's urban voids in an attempt to inject a revitalized sense of vitality into the Ghost City. The strategies in which this thesis aims to do so begins by creating a framework; a set of conditions and definitions which categorize the complex nature of Tokyo's urban landscape and planting ephemeral seeds which are then woven together with an intermixing of urban actuators to other seeds throughout the city. Through this interweaving, relationships begin to converse with the city and with the voids themselves, creating a new network of alternate pathways which will stitch together the fading sense of place back into the forgotten spaces of the city. If successful, the strategies developed for contemporary Tokyo can serve as a foundation for a likewise system of strategies and interventions that can be applied to the changing urban fabrics of cities throughout the world

Chapter 1
Project Description and Key Terms

Thesis Question:
How can an architectural design in a contracting megacity respond to the increasing voids within its urban fabric to extend the public realm?

The proposal for this thesis originates in the concern surrounding the global population. As humanity continues to propel to new emergent states, the systems that support our growth will have an equal and opposite reaction. The convergence of humanity to urban environments, which this proposal refers to as *cities*, is a necessary step towards battling the concerns and mitigating the negative effects of *urban sprawl*, which relates to humanity's ongoing expansion across the world, laying claim to Earth's habitable space and transforming it into a model of low-density, auto-dependent development. Not only is humanity's convergence to these urban city's vital, but the concurrent act of increasing the *density* of those cities is also a necessary step, wherein density is referring to the number of inhabitants in a given area. The densification of inhabitants in an urban form generates opportune moments in architectural design. Many such cities do exist today, referred to as *Megacities*. Megacities describe those urban settings that inhabit more than 10 million inhabitants. One of the characteristics of megacities is their achieving a level of density referred to as *hyperdensity*, defined though a minimum of 30 housing units per acre. Such level of density is sufficient for the support and application of mass public transportation and rely on the infrastructural support of *megastructures*, a means of structural formation originating in Post-war era of Utopian visions of the 21st Century. Megastructures are defined as massive scaled- permanent infrastructure which has the capability of carrying public services, as well as house smaller, more transient services and built forms based on necessity. Derivative of the megastructure is the megaform, differing from the megastructure in its continuity across the urban landscape, defined as the form giving potential of horizontal urban fabric that is capable of affecting a topographical transformation to the urban landscape, itself becoming a continuation of the urban topography.

Despite the global population rise, Japan exists as an outlier. Japan is in the midst of a population contraction; within the next few decades, Japan is expected to lose one-third of its population, roughly 40 million inhabitants. The rapid contractions in population creates a phenomenon called Akiya, which translates to Ghost Houses. The Japanese Akiya are houses that sit abandoned and unwanted. Today, more than 10% of all buildings in Japan are Akiya. In urban contexts, the Akiya enter a lifecycle where when demolished, it becomes an urban void. Urban voids are the unused, leftover spaces found in a city fabric. These voids can take many shapes and forms. As the number of voids increase within the city, it beacons opportunity for design. Rather than reintroduce commercial development into the void, this thesis proposal argues for a different approach, one that utilizes the voids to reengage the public realm. By reintroducing green space, urban agriculture, cultural centers, and community centers into the voids, we can create a new architectural language throughout the city of Tokyo.

Keywords:
City, Urban, Urban Sprawl, Density, Megacity, Hyperdensity, Megastructure, Megaform, Population, Akiya, Void, Parks, Urban Agriculture

Chapter 2:
Literature Review

The Realities of Population Growth and Urban Density

Over the past 200 years, we have seen the global population rise at exponential rates. Between 1820 and 1920, the population doubled from just under 1 billion inhabitants to 1.86 billion. In the subsequent century, the population ballooned by almost 6 billion, elevating the total global population to 7.74 billion in 2019. The population is estimated to continue to rise in such fashion; according to a study conducted at Oxford University's Martin School, the human population is expected to reach 9.74 billion by 2050[1]. Throughout the duration of that time, we witness the emergence of great cities and the economic advantages that come with them, brought on and catalyzed by technological improvements stemming from the Industrial Revolution. Despite the widespread suburbanization, The United Nations Department of Economic and Social affairs found that 54% of the global population live in urban settings today, and by the middle of the century, that number is expected to climb to 68%[2] as more and more people migrate to cities in search of economic opportunity.

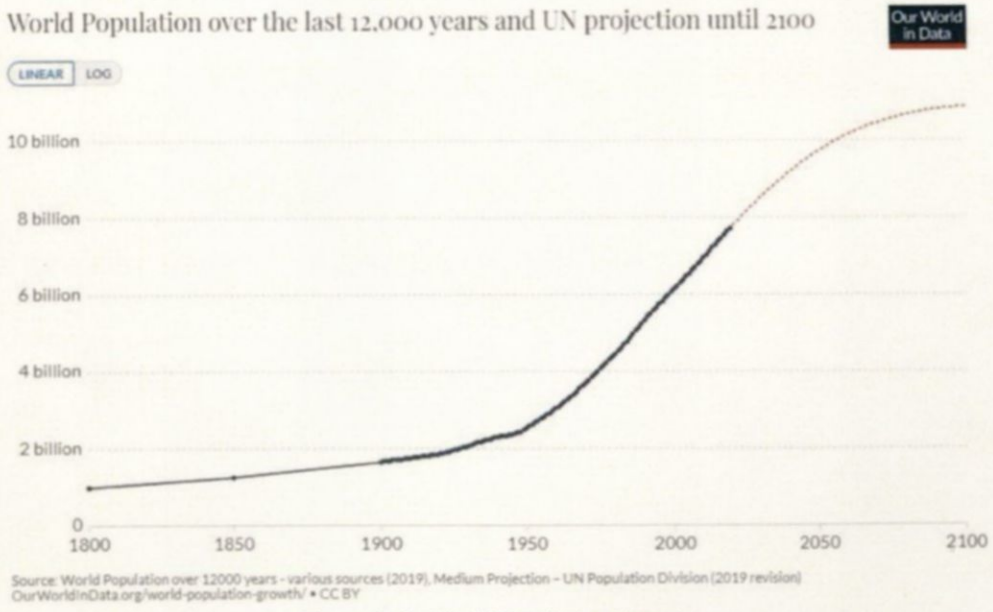

Figure 2. 1 - World Population Growth

[1] Max Roser , Hannah Ritchie, and Esteban Ortiza-Ospina. "World Population Growth" *Our World in Data.*
[2] United Nations. "68% of the World Population Projected to Live in Urban Areas by 2050"

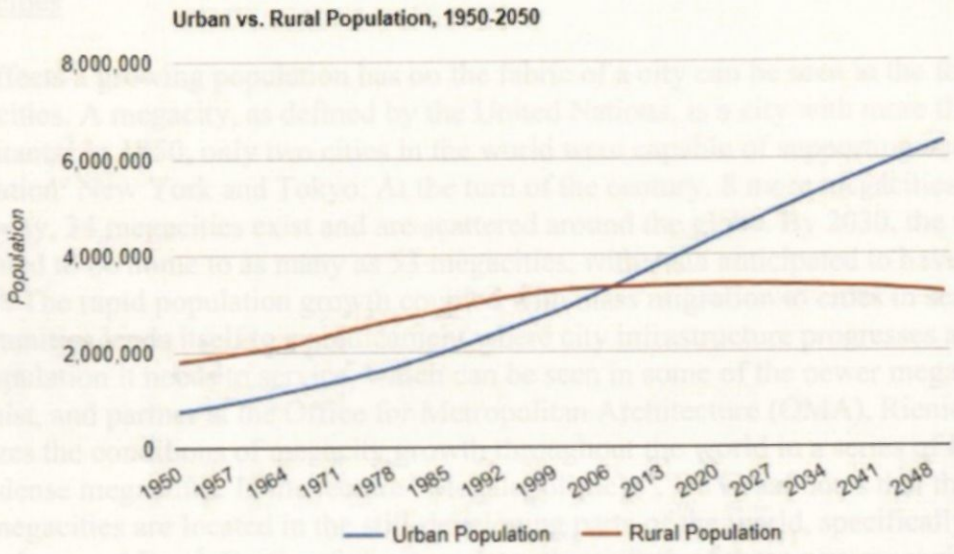

Figure 2. 2 - Urban Population Growth

Megacities

The effects a growing population has on the fabric of a city can be seen in the formation of Megacities. A megacity, as defined by the United Nations, is a city with more than 10 million inhabitants[3] In 1950, only two cities in the world were capable of supporting such a large population: New York and Tokyo. At the turn of the century, 8 more megacities came to fruition, and today, 34 megacities exist and are scattered around the globe. By 2030, the world is estimated to be home to as many as 53 megacities, with Asia anticipated to have 30 of those alone[4]. The rapid population growth coupled with mass migration to cities in search of better opportunities lends itself to a predicament where city infrastructure progresses at lower rates than the population it needs to service, which can be seen in some of the newer megacities. Architect, Urbanist, and partner at the Office for Metropolitan Architecture (OMA), Rienier De Graaf analyzes the conditions of megacity growth throughout the world in a series of lectures on hyperdense megacities. In the lecture "Megalopoli(tic)s", De Graaf notes that the majority of new megacities are located in the still-developing parts of the world, specifically in the southern hemisphere and East[5]. De Graaf also correlates the growth of these new megacities as having inverse reactions to their GDP, as those with the lowest GDP are accelerating in their growth the fastest. These conditions give way to a unique form of urban development where necessary accommodations arise through their necessity without a sense of proper planning. This is apparent in Lagos, Nigeria, which saw an explosion in population growth, rising from 1.4 million in 1970 to 21 million today. The boom in population growth rose much faster than the city's infrastructure, operating on an infrastructure designed to accommodate 10% of its current population.

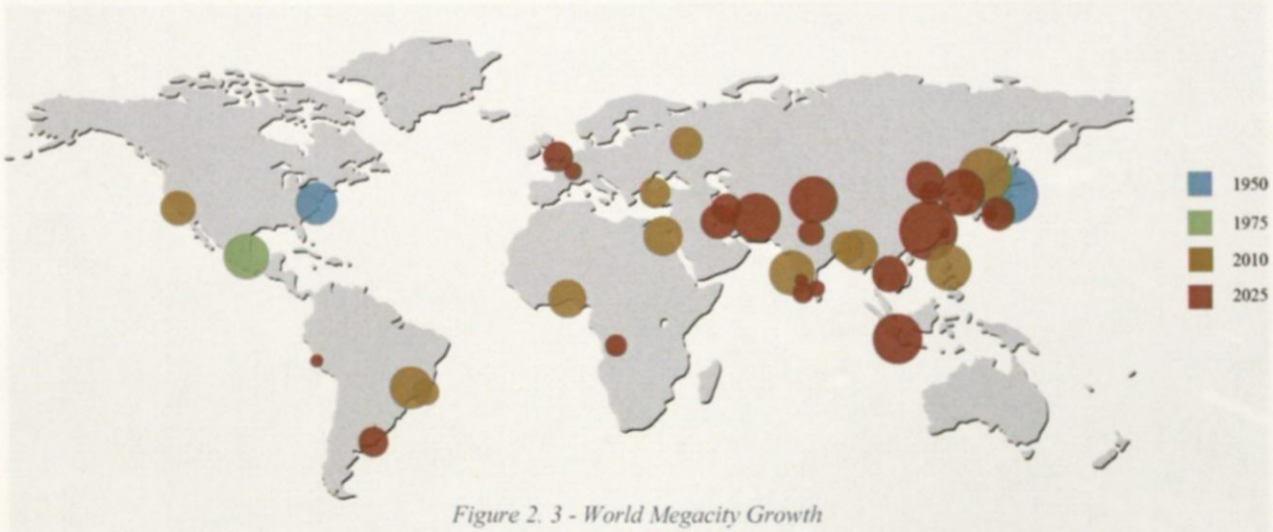

Figure 2. 3 - World Megacity Growth

[3] Appleton, Sarah, ed. "the Age of Megacities". National Geographic Society.
[4] Bret Boyd and Joseph Kosper. "Urbanization and the Mass Movement of People to Cities".
[5] De Graaf, Rienier. "Megalopoli(tic)s". *London School of Economics – Urban Age*

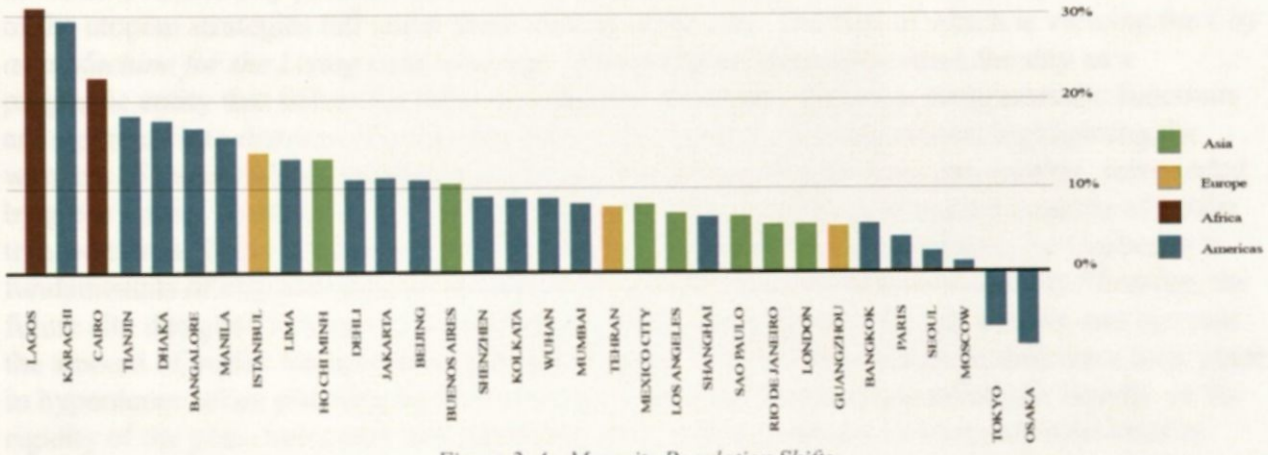

Figure 2. 4 - Megacity Population Shifts

Figure 2. 5 - Lagos Congestion

Utopia: Approached

Throughout history, architects and urban planners have expressed their ideal city of the future. Each iteration differs from the other on multiple levels. Yet all of which can be reduced to how the architects and city planners envision the city; how it functions; how it portrays itself. Many of the utopian strategies fall under these visions of the city. The first of which is viewing the *City as a Machine for the Living (and working)*. This group of ideologies views the city as a pragmatic entity that strives for order and rigidity. To boost efficiency, programmatic functions are separated into districts. Viewscapes depict tall, vertical, identical towers highlighting the wonders of industrialized building technology, spaced equidistant from one another, surrounded by green space. These cities are interconnected through complex overlapping systems of public transportation. These ideologies can be seen in Le Corbusier's Ville Radieuse. Le Corbusier's fundamentals of city planning, as laid out in his text *The City of Tomorrow and its Planning*, the future city designed to house an increased population must densify the city centers and increase the amount of public transportation and green spaces[6] .While these fundamentals have their place in hyperdense urban planning on their own, Le Corbusier's application relied too heavily on the rigidity of the plan. Symmetry and standardization, while practical, removes all individuality which makes cities so complex, and inhibits unplanned—yet potentially necessary—growth.

Figure 2. 6 - Ville Radieuse, Le Corbusier

Another way architects and planners envisioned their utopian dream is by viewing the *City as an Organism*. In stark contrast to viewing the city as a machine for the living, this school of thought made widely popular by the Japanese Metabolist movement, characterizes the city as a living organism. They architectural forms take on smaller, more personal scale and like living organic matter, are capable of ceaseless transformation. Metabolist architecture expresses the organic

[6] Corbusier, Le. *The City of Tomorrow and Its Planning*. pp. 102

growth not through addition, but through complete reorganization as they grow in complexity. Founded in Japan by a young group of architects including Kiyonori Kikutake, Kisho Kurowaka, Fumihiko Maki, and Noboru Kawazoe, influenced greatly by Kenzo Tange. Today, Metabolism maintain its relevancy through the works of Japanese architects such as Atelier Bow Wow, whose later work with Pet Architecture and Void Architecture place more focus on the forgotten spaces in urban settings and using the allotted space to its fullest advantage. The most famous example of Metabolist architecture is the Nakagin Capsule Tower designed by Kisho Kurowaka in Tokyo, Japan. The iconic symbol of the Metabolist movement houses miniature capsules connected through a core spine, allowing the capsules to be added and removed based on necessity[7].

[7] Sveiven, Megan. "AD Classics: Nakagin Capsule Tower / Kisho Kurokawa"

Megastructures and Megaforms in Megacities

One of the most iconic elements used in design in megacities are Megastructures. Megastructures are defined by Reyner Banham in his book *Megastructure: Urban Futures of the Recent Past* as an over-scaled, colossal, multi-unit architectural mass[8]. Megastructures are characterized by upscaled, permanent infrastructure that supports and houses smaller, more transient building forms, commonly modular and repetitive in nature. Megastructures are designed to densify the urban fabric, allowing for the integration of juxtaposing programs and spaces, offering a solution to the limitation's cities experience in infrastructure growth that can parallel urban densification by guiding urban growth through organic expansion. While many architectural historians will credit the earliest iterations of megastructures to Le Corbusier in his composition of Roq et Rob, megastructures were made iconic through the Metabolism movement of 20th century, showcased in works such as Kenzo Tange's Boston Harbor and 1960 Plan for Tokyo. Similar by distinctly unique from the megastructure is the megaform. Coined by Kenneth Frampton, megaforms are defined as the form-giving potential of horizontal urban forms creating topographical transformations of the urban landscape[9]. Megaforms differ from megastructures in that capability; megaforms maintain a sense of continuity to the urban fabric and landscape as opposed to juxtaposing it. Megaforms may contain within them megastructures yet megastructures are not always considered megaforms. Kenzo Tange's 1960 Plan for Tokyo is an example which constitutes both a megastructure and a megaform, as the form stretches across the Tokyo Bay providing modular housing units attached to a megastructure element.

[8] Reyner Banham and Todd Gannon. *Megastructure: Urban Futures of the Recent Past*
[9] Frampton, Kenneth. *Megaform as Urban Landscape*

Cities in the Sky

The densification of cities proves itself challenging from many standpoints. One of the most common of which is the space in which cities have to grow. Outward expansion of hyperdense cities ranges from the difficult to the impossible. Due to these territorial limitations, architects and city planners have long since shifted focus to designing vertically. Vertically focused design in urban settings has numerous advantages. In his book A Country of Cities: A Manifesto for an Urban America, Vishaan Chakrabarti argues for the vertical skyscrapers that maximize the Floor to Area ratio of development sites to minimize the footprint of buildings and provide more green space for the inhabitants of the city[10]. Chakrabarti makes the claim that at densities of 30 housing units per acre, the entire world population can live in Texas, leaving the rest of the worlds natural landscape free for agricultural production and natural systems to occur. While there are ideologies such as Chakrabarti's that are grounded in the realities of today's world, some concepts take a more radical approach to freeing city growth from the limitations of its land. Yona Friedman, known for his principles of Mobile Architecture, designed the Ville Spatiale, a conceptual city design calling for elevated city spaces suspended above the existing urban fabric. The spaces above the city were fully customizable by the inhabitants themselves, positioning them throughout the structure as they see fit[11] .Friedman's plans for Ville Spatiale share similarities to Constant Nieuwenhuys's New Babylon, a likewise city elevated above the existing fabric. Constant's vision of the utopian city included elevated platforms containing various programmatic elements in a multi-layered orientation. Constant employed the use of rhizomatic geometry to create links in the sky in which the city grew and connected. Constant's vision of New Babylon relied on the notions of technological innovations in labor automation, wherein cultural lifestyles shift from a focus on labor to a leisure and nomadic lifestyle. This very reason is one of the few preventing Constant's work from being realized. (Cite).

[10] Chakrabarti, Vishaan. *A Country of Cities: A Manifesto for an Urban America*
[11] "Ville Spatiale" www.yonafriedman.nl

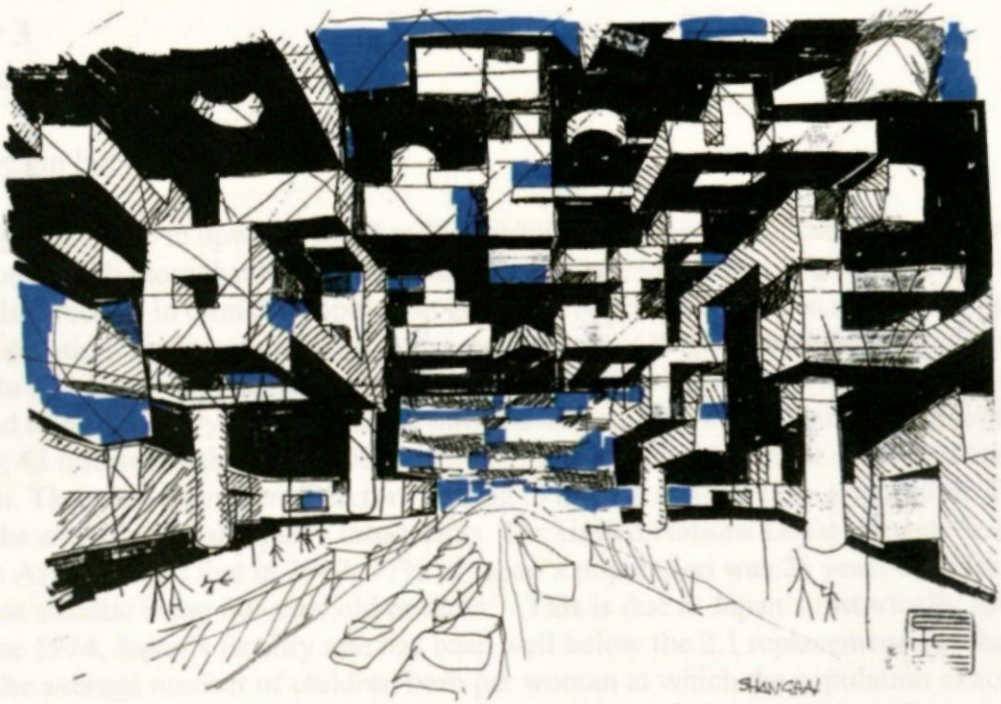

Figure 2. 7 - Ville Spatiale, Yona Friedman

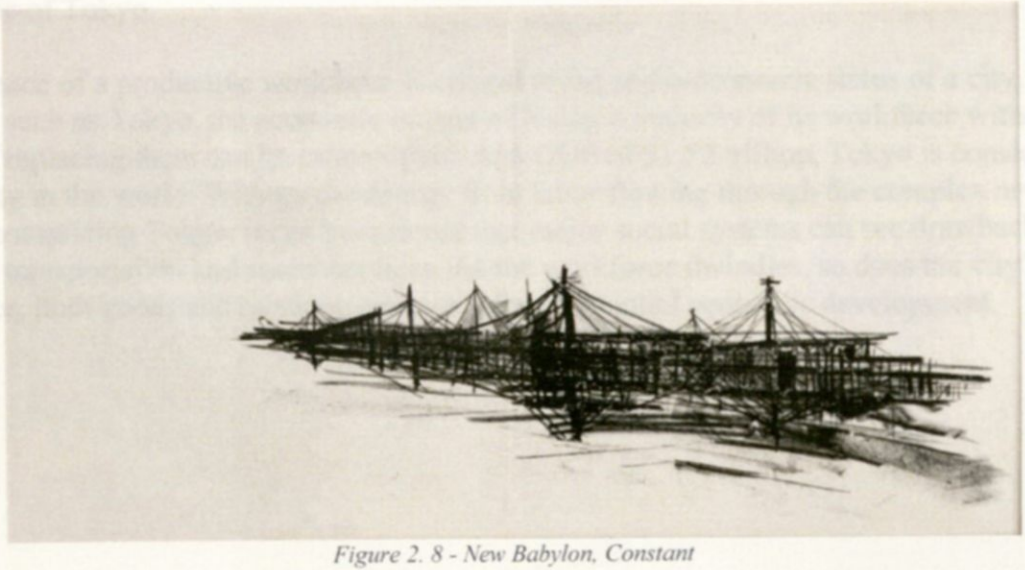

Figure 2. 8 - New Babylon, Constant

Chapter 3
The Tokyo Dilemma

Fluctuations in Population

Tokyo, Japan is home to upwards of 37 million inhabitants. It is one of the largest metropolis's existing today with more than 6,500 inhabitants per square kilometer. While the world trends in an upwards direction in terms of population growth, Tokyo is expected to see an inverse reaction in their population. Japan's population is in a rapid decline. While the world's population is expected to rise, Japan's population is expected to fall. With 127 million inhabitants today, Japan is expected to lose roughly 6 million more inhabitants by 2030, 21 million by 2050, and a staggering 43 million by the year 2100[12] , a loss of nearly one-third of the country's entire population. There are a number of factors leading to this dynamic shift in population. The first of which is the average age of Japan's inhabitants. The United Nations Department of Social and Economic Affairs found that in 2017, 77% of Japan's population was 25 years or older, with 33% of that statistic being 60 years old or older[12]. This is due to Japan's historically low birth rates. Since 1974, Japan's fertility rate has been well below the 2.1 replacement threshold, which signifies the average number of children born per woman at which the population exactly replaces itself from one generation to its successor. Decreasing from 1.83 in 1974 to 1.42 in 2018, this downward trend signifies that in the near future, Japan's population will continue to age and retire, creating a void in where Japan's workforce used to be[12]. As of 2017, Japan's support ratio, which is defined as the number of able workers per retiree, is the lowest recorded ratio in the world at 2.1 workers per retiree[12]. These low numbers will have an impact on the very fabric of Tokyo.

The presence of a productive workforce is critical to the socio-economic status of a city. For a megacity such as Tokyo, the economic impact of losing a majority of its workforce without a means of replacing them can be catastrophic. At a GDP of $1.52 trillion, Tokyo is considered the richest city in the world. Without the energy from labor flowing through the complex network of systems comprising Tokyo, it can be inferred that major social systems can see drawbacks, such as public transportation and social services. As the workforce dwindles, so does the city's ability to produce, both goods and services, necessary for substantial economic development.

[12] UN, "World Population Prospects". 2017

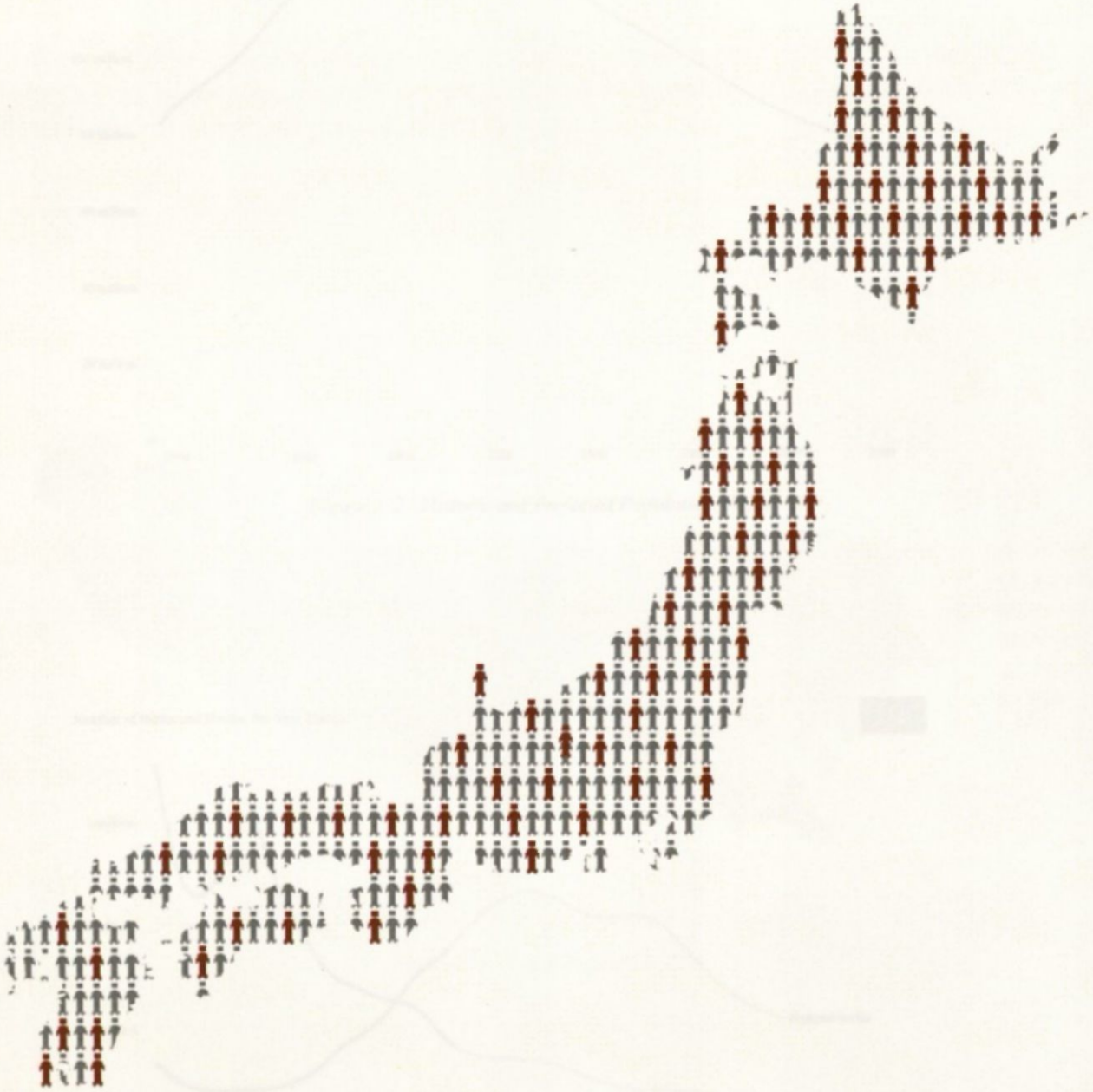

Figure 3. 1 - Japan Population Loss

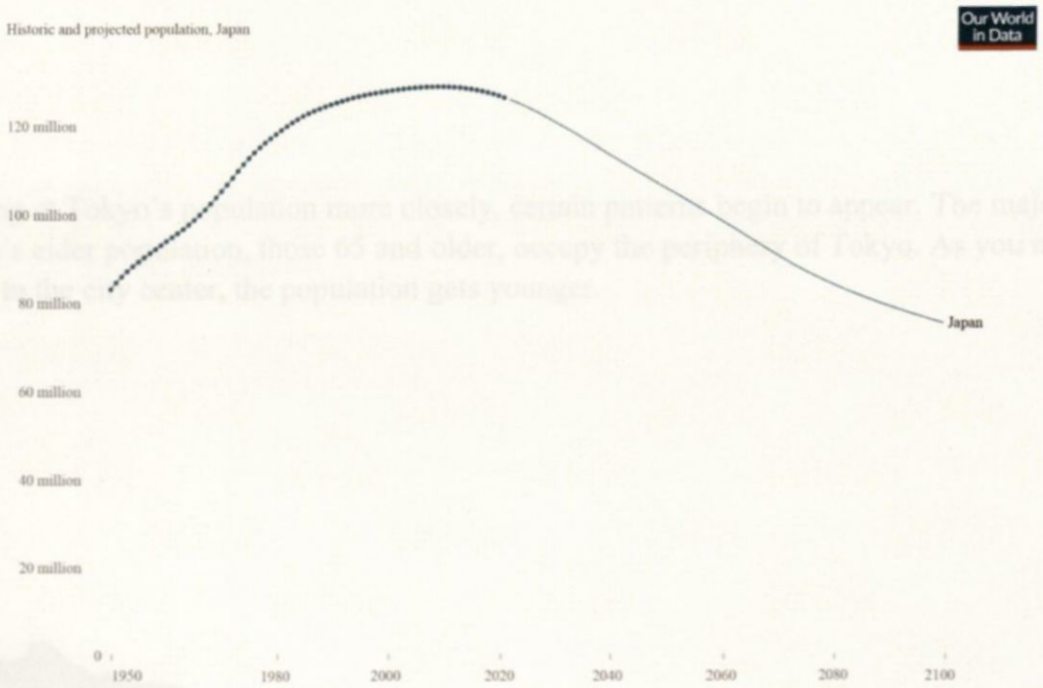

Figure 3. 2 - Historic and Projected Population, Japan

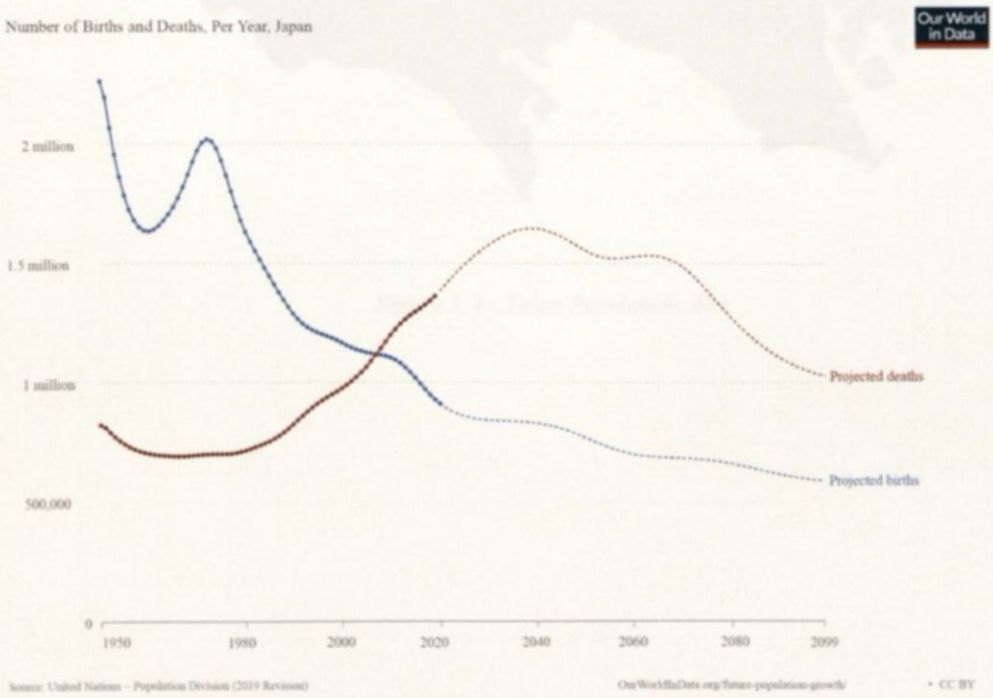

Figure 3. 3 - Number of Birth and Deaths per Year, Japan

Looking at Tokyo's population more closely, certain patterns begin to appear. The majority of Tokyo's elder population, those 65 and older, occupy the periphery of Tokyo. As you move closer to the city center, the population gets younger.

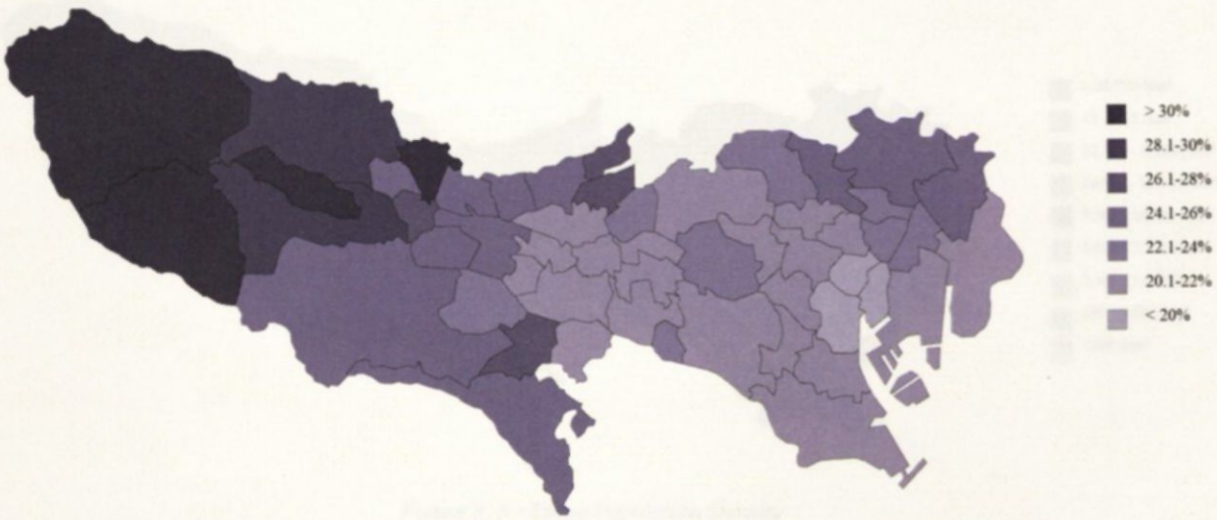

Figure 3. 4 - Tokyo Population, 65+

As the older generation inhabit the areas furthest away from Tokyo's city center, they also inhabit the areas with the lowest Population Density. In Tokyo alone, we see fluctuations in population density, ranging from less than 500 inhabitants per square kilometer to densities greater than 20,000 inhabitants.

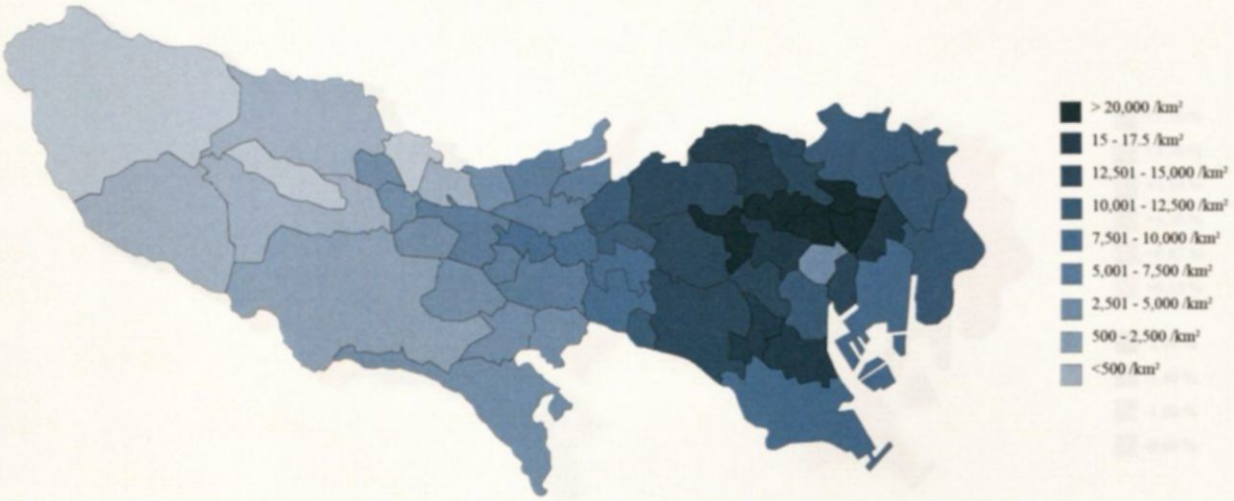

Figure 3. 5 - Tokyo Population Density

In terms of Tokyo's internal population shifts, we see a pattern of movement of inhabitants within its city limits. Data shows that a growing majority of inhabitants are moving away from the periphery of the city towards the city center, with a concentration of newer inhabitants into the direct center of the city.

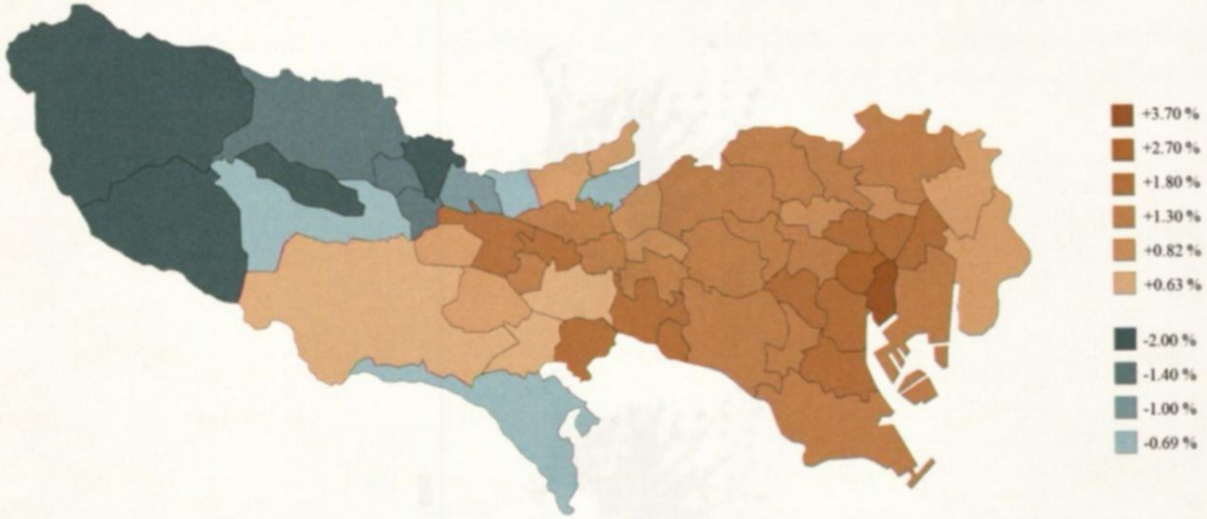

Figure 3. 6 - Tokyo Population Shifts

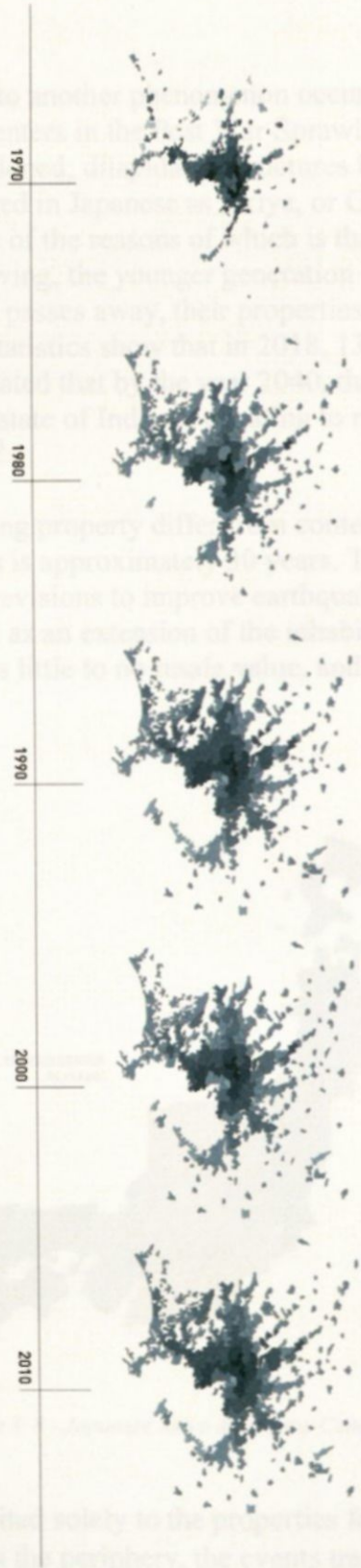

Figure 3. 7 - Historic Sprawl, Tokyo

Akiya

The Aging population lends itself to another phenomenon occurring in Japan. As the elderly population in Japan fled the city centers in the Post War Sprawl, many family homes on the outskirts of urban centers sit abandoned; dilapidated structures left abandoned and unwanted. These abandoned homes are referred in Japanese as Akiya, or Ghost Houses. The number of Akiya in Japan are on the rise, one of the reasons of which is that while the past generation revered the solitude of suburban living, the younger generation is eager to return to the city center, and as the older generation passes away, their properties remain as an echo of a time that once was. Japanese Government statistics show that in 2018, 13.6% of all properties in the entire country were akiya, and it is estimated that by the year 2040, the total net area of akiya will be equivalent to the land mass of the state of Indiana, equating to roughly 36,000 square miles of continuous abandoned properties[13]

Japanese cultural norms surrounding property differ from contemporary norms. In Japan, the average lifespan of built structures is approximately 30 years. This is due to a variety of factors, including repeated building code revisions to improve earthquake resilience[14]. In fact, in Japanese culture, the home is seen as an extension of the inhabitant, and as a person moves from a home or dies, the house itself has little to no resale value, and usually demolished as the land it sits on is more valuable.

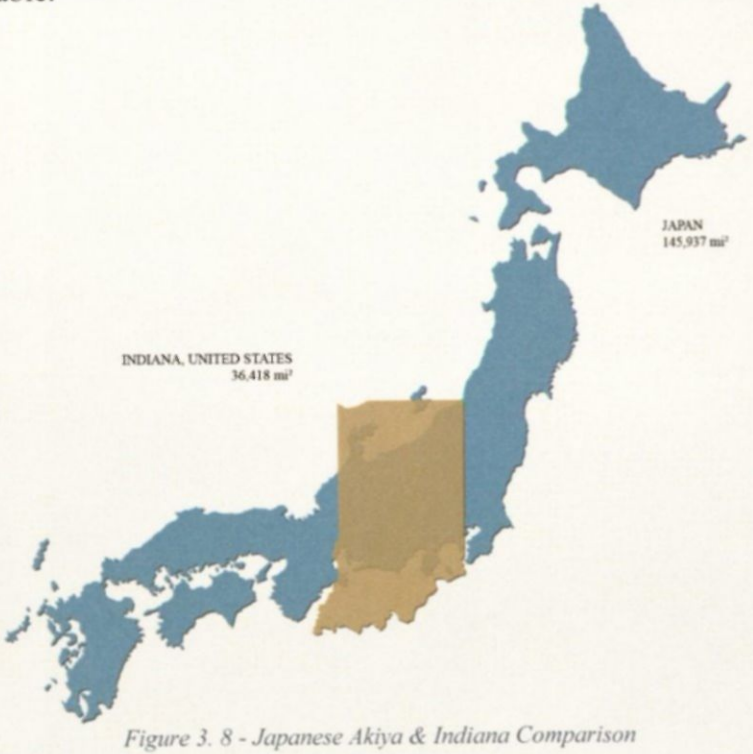

Figure 3. 8 - Japanese Akiya & Indiana Comparison

The akiya phenomenon is not limited solely to the properties found on the outskirts of cities. While it may be more prevalent at the periphery, the events translate into the urban fabric. Cities

[13] UN, "World Population Prospects". 2017

[14] Berg. *Raze, Rebuild, Repeat: Why Japan Knocks Down Its Houses After 30 Years*

experience the abandonment of buildings as well, yet in the case of cities, the akiya represent a phase in the lifecycle of urban lots. After a building becomes abandoned, it is demolished in order to reuse the valuable land to accommodate a different programmatic insertion. This is where the akiya become voids, empty spaces juxtaposing the dense vertical presence of the city. The standard for urban development throughout the globe value real estate in highly dense urban settings based on the profitability potential of the site; commercial real estate monopolizes the scarce land, acquiring what it can in with a goal of monetary return. More often than not, a building is demolished only for another shop to open in its place, rarely do we see the voids allocated to the public realm. The city remains in a cycle of renewal, perpetually privatizing the spaces which make up the urban fabric.

Figure 3. 9 - Suburban Akiya. Tokyo, Japan

Figure 3. 10 - Suburban Akiya. Tokyo Japan

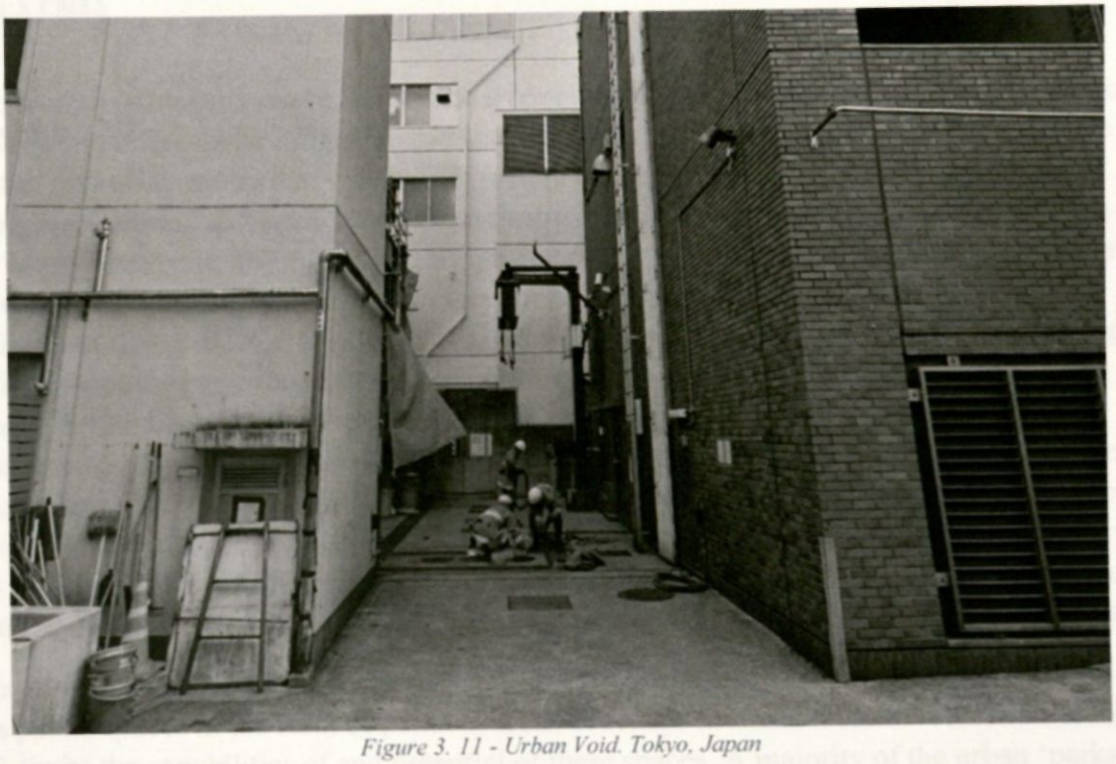

Figure 3. 11 - Urban Void. Tokyo, Japan

Figure 3. 12 - Urban Void. Tokyo, Japan

Tokyo's Parks

Tokyo's urban landscape can be defined as a concrete jungle; a seemingly endless expanse of built form stretching as far as the eye can see. Throughout the complexities of the city, once can expect to find an abundance of whatever it is they desire in close proximity. Tokyo's contemporary zoning dictates a canvased mixed-use designation, ensuring opportunity for a wide range of programmatic insertions. Yet, the scarcest programmatic element in the city are parks. The availability for green space is necessary for promoting health and wellbeing for the inhabitants of dense cities. It creates a break from the steel and glass, and injects the calming qualities of greenery into the lives of everyday travelers. In 1956, Tokyo's Urban Parks Act dictated a methodical distribution of urban parks. The goal of this legislation is to ensure a minimum area of open space for all of Tokyo's inhabitants. Under the Urban Parks Act, one medium sized park and four small parks are designated per square kilometer, with the capability for expansion should the population rise. Tokyo's urban parks, however, served another purpose. Parks in Tokyo's primary function is to serve as evacuation space in the event of earthquakes. It was not until the 1970's did the government begin installing play equipment into their parks.

The Japanese attitude towards parks can be seen as egregiously utilitarian. Japanese society views public spaces in the form of parks as areas of refuge first and areas of recreation second, which limits the capabilities of and potential of these spaces. A majority of the urban 'parks' found scattered throughout the city are merely a continuation of the urban fabric, populated sparingly with recreational equipment. It is not until recently where contemporary design began utilizing building rooftops to include gardens and areas of recreation and relaxation. Coupled with the low birth rates Japan has been experiencing, the need for parks that serve as places of recreation have decreased exponentially. [15]

[15] Jonas, Rahmann. *Tokyo Void*

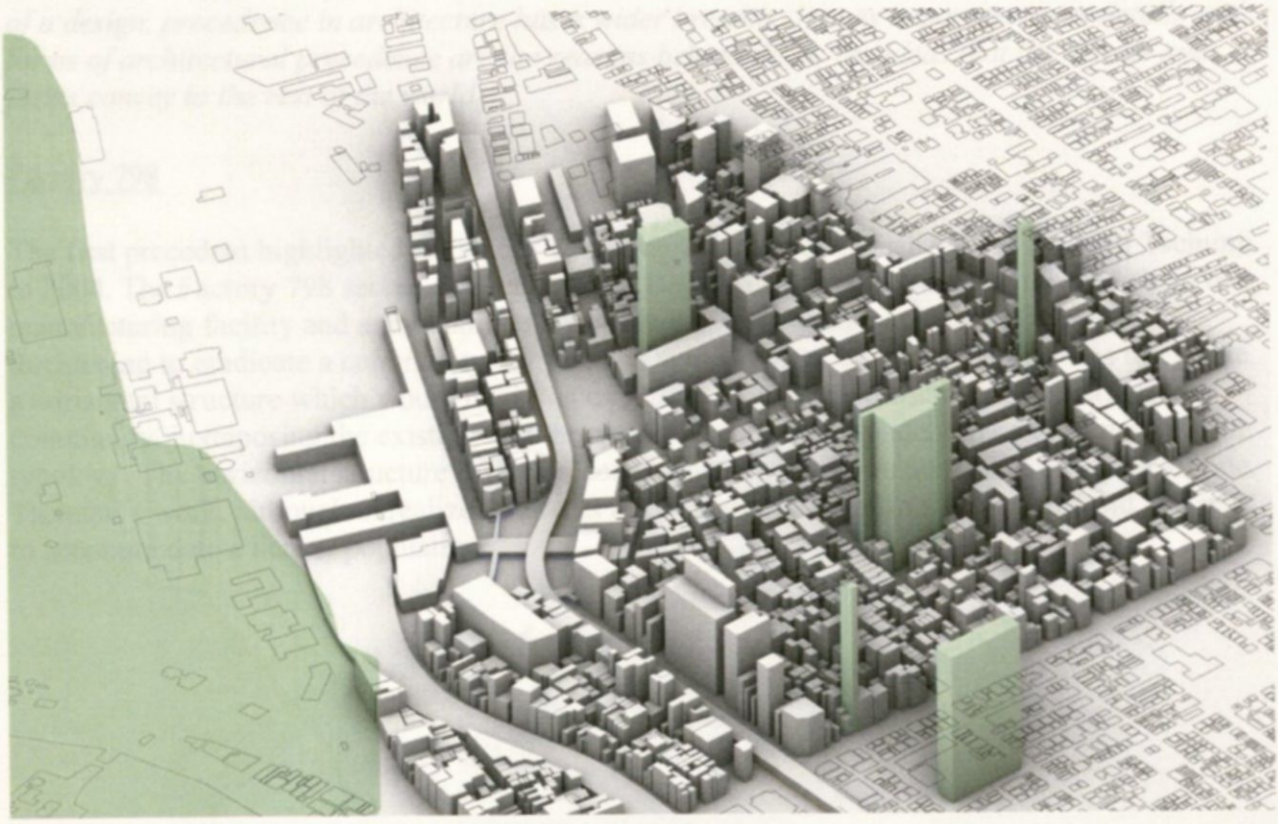

Figure 3. 13 - Urban Green Space. Taito, Japan

Chapter 4
Precedents

The field of architecture, like many others, relies on historical precedent to act as the backdrop which propels design to new and exciting emergences. The precedence that is architectural works is not limited solely to its forms. While some precedence chooses to focus on such aspects of a design, precedence in architecture has a wider breadth. Just as important as its details and forms of architectural precedence are the reasons behind them; the ideas that the details and forms convey to the rest of the world.

Factory 798

The first precedent highlighted is Factory 798 designed (yet never realized) by Bernard Tschumi in 2004. The Factory 798 served as a response to Beijing developers wishing to demolish an old manufacturing facility and artist community in favor of high-density residential towers, threatening to eradicate a community out of existence. Tschumi's design solution was to elevate a horizontal structure which would house an estimated 10,000 people above the existing community, juxtaposing the existing and the new, yet working in tandem to create a new unique typology. The horizontal structure offered a coexistence of two communities in the space of one. Tschumi's work, although unrealized, reflects the importance of assimilation of the old and new to accommodate a denser population[16].

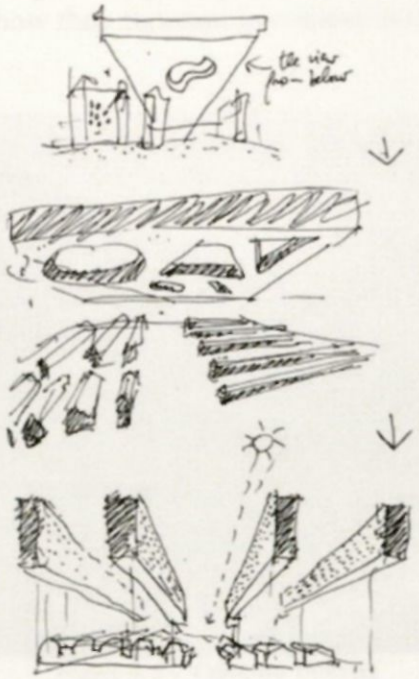

Figure 4. 1 - Bernard Tschumi's Factory 798

[16] Tschumi, Bernard. Bernard Tschumi Architects. www.tschumi.com/projects/20

Made in Tokyo

Published in 2001 by the Japanese architecture firm Atelier Bow Wow, *Made in Tokyo* is a guide book cataloging and highlighting the already existing typology unique to Tokyo. The buildings depicted in the guide book are what Atelier Bow Wow calls Da-me Architecture, or 'No-Good Architecture'; buildings that reflect the stubborn honesty of the urban conditions in which it resides. These buildings are void of any aesthetic design elements, focused solely on fulfilling the programmatic requirements needed. These buildings come in an array of complex configurations, paradoxically combining uncommon programmatic elements together in an effort to fit into the limited space of Tokyo's dense urban fabric. Most of these unique pairings include a form of infrastructure, as those are seen as void spaces yet unclaimed by cutthroat development. Some of these pairings include affordable housing tucked underneath an elevated highway, or public parks on top of sewage treatment plants. The creative combinations depicted throughout the book showcase the opportunities that can arise despite the limited space.

Another important factor to note about Made in Tokyo is the method in which Atelier Bow Wow cataloged the buildings in Tokyo. Through a series of On/Off guidelines, the architects scoured the urban landscape in search of the unique typological combinations. The did this by following the flows of people and infrastructure and analyzing the adjacency of nearby programs. Then they used graphical representation including images to give context, orthographical sketches to reduce the noise, and figure ground maps to determine its relationship in the city to nearby buildings. After which they gave the buildings nicknames best describing their main characteristics. The methods used provide great precedence on taking a step back and seeing the buildings for what they are and how they function in context to its adjacent programs[17].

Figure 4. 2 - 'Centipede Housing'

[17] Momoyo Kaijima, Juroda Junzo, and Yoshiharu Tsukamoto. *Made in Tokyo*

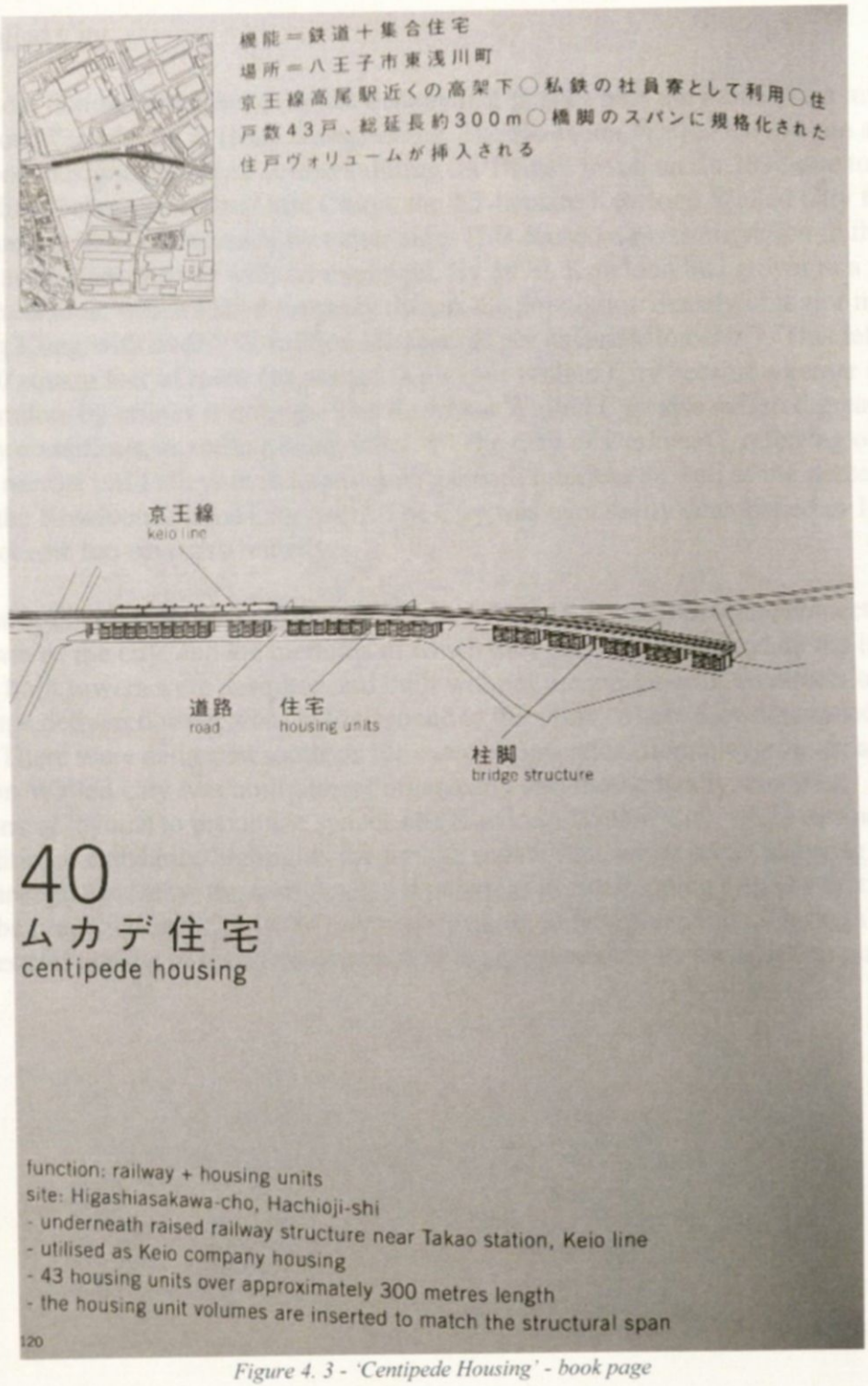

Figure 4. 3 - 'Centipede Housing' - book page

Kowloon Walled City

One of the most famous examples of urban density that pushes past the limits of its infrastructure is the Kowloon Walled City in Hong Kong, China. The Kowloon Walled City began as a military outpost designed to house soldiers during the British Invasion. In 1898 due to a diplomatic glitch between England and China, the 2.7-hectare Kowloon Walled City fell into no-man's land, unregulated or overseen by either side. This caused a mass migration to the Kowloon Walled City as markets thrived without oversight. By 1990, Kowloon had grown to a population of 50,000 inhabitants, which scaled properly dwarfs the population density of major megacities such as Hong Kong with over 1.92 million inhabitants per square kilometer[18]. This left an average of 40 square feet of room per person. Kowloon Walled City became a center for illegal activity, overtaken by crimes and drugs. The Kowloon Walled City also suffered greatly through its unsanitary conditions, as well as being labeled "The City of Darkness", referring on multiple levels to the narrow unlit alleys uses to navigate the dark interiors as well as the perceived presence of the Kowloon Walled City itself. The City was eventually demolished in 1993 as conditions became too severe to remedy.

What is most fascinating about the Kowloon Walled City, in an architectural perspective, is the organic growth of the city, and the methods in which they used to accommodate the inhabitants. The densely built towers were designed and built without the guidance of architects or engineers. Electric pumps delivered water from belowground to the roofs, where they descended to the inhabitants. There were dedicated rooftops for exercise and relaxation, playgrounds and schools. The Kowloon Walled City was built almost organically and methodically; complex configurations of layouts to maximize space. The Kowloon Walled City, while deemed a failure through traditional standards, highlights the unique capabilities when urban planning is facilitated through necessity; the complex amalgamation of overlapping systems that defines a city cannot be predicted in the sense of what is necessary at any given time. Through organic growth, cities can expand in specified parameters to accommodate its increased population.

[18] Routley, Nick. "This Fascinating City Within Hong Kong was Lawless for Decades". *Visual Capitalist.*

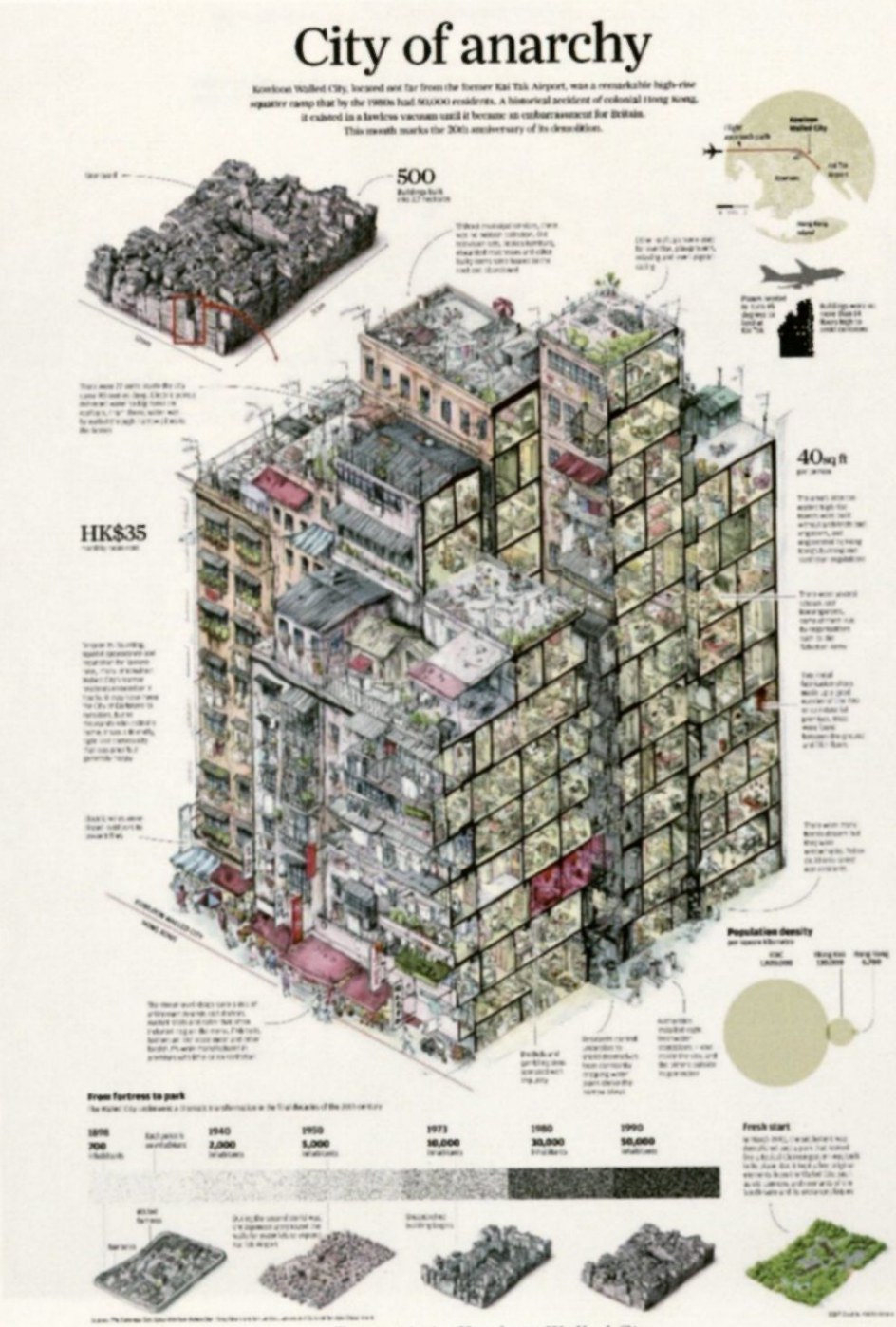

Figure 4. 4 - Kowloon Walled City

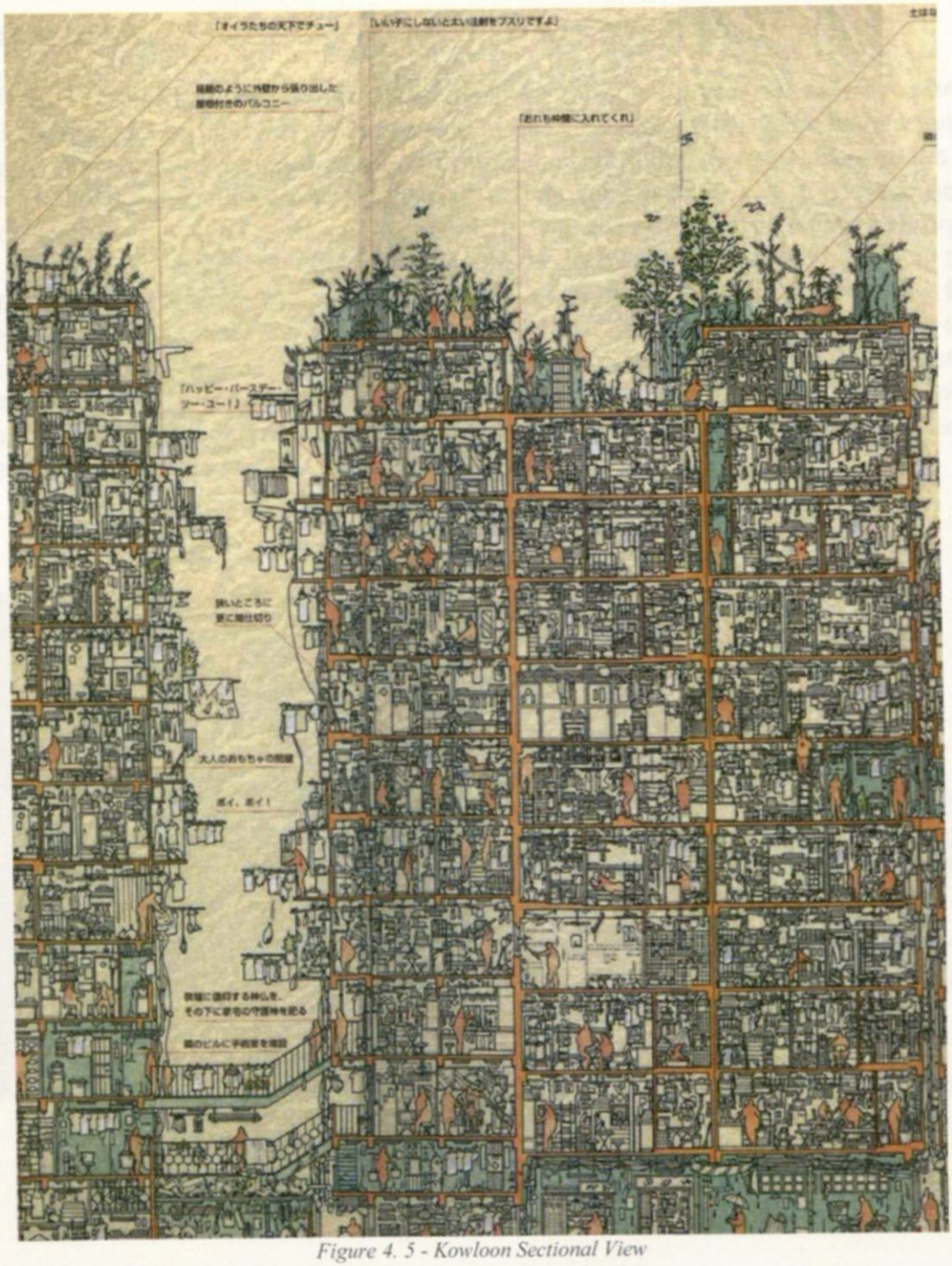

Figure 4. 5 - Kowloon Sectional View

1960 Plan for Tokyo

Kenzo Tange's 1960 Plan for Tokyo is one of the more important precedents of the research proposal. Tange's concept for the transformation of Tokyo's urban fabric to be better equipped at handling an increased population focused on shifting the centripetal system established in Tokyo with a linear development that promoted the flow and movement of the city. It also focused on uniting the infrastructural necessities of the megacity with the urban fabric, creating an organic unity in the shape of a megaform structure spanning the 18 kilometers across Tokyo Bay that incorporates a suspended highway system and reorganizing residential blocks emanating from it. This project is important because I believe Tange's application of reorganizational space coupled with the megaform-megastructure connecting the city though its linear flows is the closest rendition to a utopian ideology that can weave itself into the typology that is unique to Tokyo's urban fabric. It is not as much an artistic notion of a utopian city but a practical application that can potentially be realized[19]

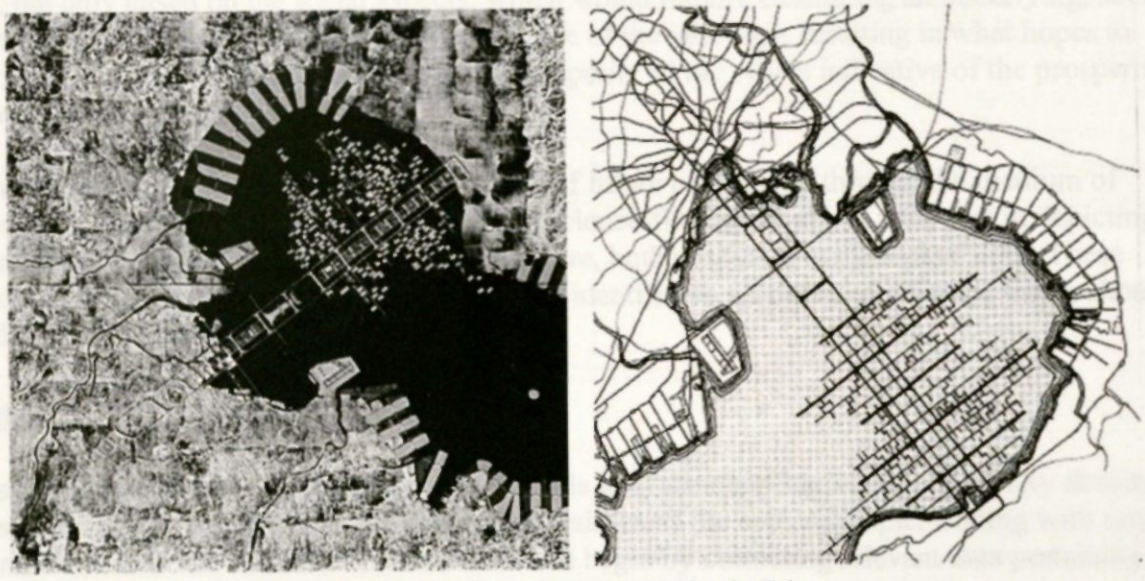

Figure 4. 6 - Kenzo Tange's 1960 Plan for Tokyo

[19] Lin, Zhongjie. "Urban Structure for the Expanding Metropolis: Kenzo Tange's 1960 Plan for Tokyo". *Journal of Architectural and Planning Research*

Chapter 5
Methodology

The order and methods in which one conducts their research is tantamount to the desired outcomes of the research question set forth. For the research proposal at hand, they are categorized in 4 methods that focus will work together to take the broad scope of research and, through a nonlinear, parallel progression path, channel the information and analysis to a complex, singular point. The research methodology employed in this proposal include Literary Discourse Analysis, Graphical Quantitative Data Analysis, and Programmatic Mass Prototyping.

Method 1: Literary Discourse Analysis

The design of cities is a long-standing pillar in architectural discourse. Architects with varying backgrounds and visions of the future city are not outspoken on what they believe to be the perfect city; their utopia. This method, which begins in the preliminary research phase of the proposal, aims to research the different ways in which architects and theorists view the perfect city, not only based on the social aspects, which would require examining an underlying, social, political, and economic factors that sit at the core of the ideology, resulting in what hopes to become a deeper understanding on how the prosperity of the city is indicative of the prosperity of its inhabitants.

This method will also investigate the narrative of future city design through the medium of science fiction. Movies, television shows, and science-fiction novels do their part in depicting their own interpretations of the cities of our future, both utopian and dystopian alike. These illustrations of future cities generate a distinctly identifiable narrative of what the future should hold in terms of urban design.

Method 2: Graphic Quantitative Data Analysis

This method, in contrast to the first method, deals with the quantitative aspects of city density. This method is an objective endeavor into the realities of the research topic, dealing with raw, quantifiable data and statistics. This method will begin by collecting relevant data pertaining to Tokyo, which includes, but is not limited to:

- The density of the city and its historic population densities
- The size of the city in comparison to its density
- The relationships of zones of high and low density
- The infrastructure of the city and its efficiency
- The efficiency of public transportation in the dense areas of a city
- The average proximity of public services and living necessities to dense housing developments
- The social and economic status of the city's inhabitants
- The wellness of the city's inhabitants

This method of research is vital for its ability to grasp the realities of the conditions we are researching. It will aid in understanding the necessities that must be included in the project rather than designing something ill-suited in context. The outcomes of this method will provide quantifiable information about the city. When presented side by side with the analysis drawn from the Literary Discourse Analysis, one can begin to distinguish factors that aid or inhibit the proper growth of the city and the wellness of its inhabitants.

The results found through this method will be displayed graphically, superimposed over plan views of the city. By overlaying this data over Tokyo's grid, the expected results will show the patterns in the data as attractors in a network, highlighting the connections and hotspots that will determine the location of the design, as well as guide its direction.

Method 3: Programmatic Mass Prototyping

This next method of research focuses on the relationships between the programmatic elements in the proposed site location. Due to the limited space in Tokyo, and the hyperdense nature of the design proposal, the way the different programmatic elements will interact with each other critical to the success of the intervention. With the number of programmatic elements that will be included in the proposal, including Housing, Business / Retail, Infrastructure, and Green Space, there are various spatial combinations that can be achieved. This method will employ both two-dimensional diagrammatic analysis of programs superimposed on the site, as well as three dimensional forms that can be arranged in different variations and combinations to find the one combination that expresses the function of each programmatic element while promoting the others as parts a whole.

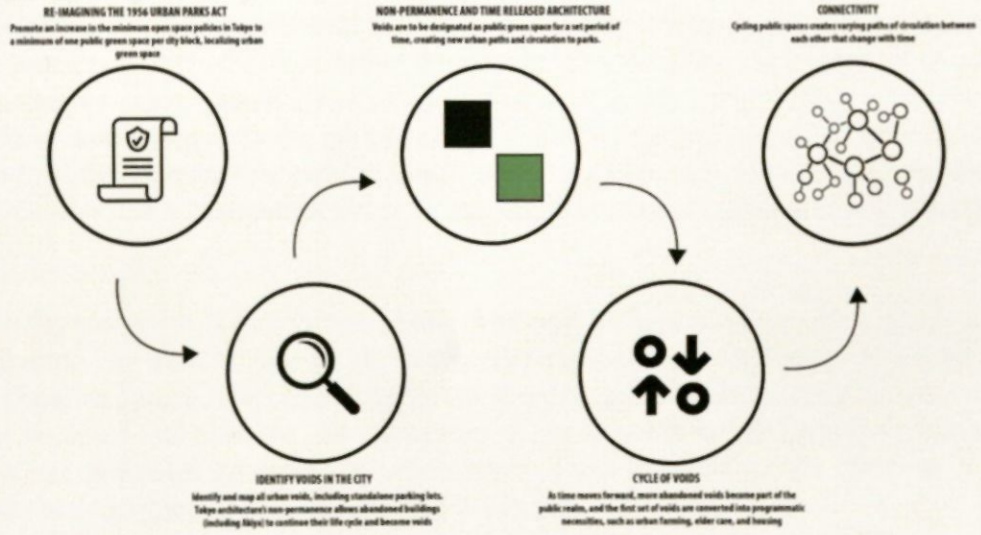

Figure 5. 1 - Methodology Diagram

Chapter 6
Context

When it comes to designing in a hyperdense megacity, I believe the context in which it is designed exists on a multi-faceted plane, one with different contextual elements overlapping each other in complex configurations. Due to the large number of inhabitants spread across the entirety of the city's socio-economic spectrum, and the sheer size of the city itself, the context of the design intervention must convey significance not only to the people it will service—which increases the complexity of any design as well as alters the degree of resonance of any contextual decision—but also to the overall context of the city itself, cementing its sense of *place* among the urban fabric.

For a city such as Tokyo, Japan, which is labeled as one of the largest cities in the world, in both population and size, the context in which the proposal stands (()). Tokyo, like many cities, has been a subject to urban sprawl, where the city's core inhabitants are moving to the outskirts of the city into single family homes. The main context of the proposed design would be to unite the fabric of the city, whether from within the dense core itself, or within close proximity to it. Yet the issue arises with the actual scale of Tokyo. In the context of the city of Tokyo as a whole, any intervention that actually 'intervenes' to provide better conditions to the city's inhabitants, addresses the issues of designing for an increase in population, and improving the existing urban fabric in the context of *all the inhabitants* is closer to wishful thinking than reality. A megaform structure stretching across urban landscape, uniting the city as one? Not likely. Therefore, in that case, localizing the focus of the proposal to certain area, such as the Tokyo Bay, in relation to the density of the area surrounding it, akin to Kenzo Tange's Plan for Tokyo, would serve beneficial in creating the narrative in which the context of the proposal rests, rather than generalizing its context to the entirety of Tokyo.

Chapter 7
Program

For any architectural design, the program is an essential part of the design process. Architecture should take into account the desired functions of a space, or lack thereof, as it solidifies the relationship between the built form and its use. For designing in a hyper-dense megacity such as Tokyo, the program(s) are a vital part of the process. Because of the limitations of space and the number of densely populated people it aims to service, the built design must house more than one program, functioning on more than one level. Some of those programs include:

- Housing
- Business / Retail (Markets)
- Infrastructure (Transportation)
- Public Green Space

Housing is a critical program for my design intervention. Part of the problem with designing in a hyper-dense megacity is being able to *house* the influx of inhabitants. With the limitations of space in the city, the overall size of the housing units will most likely be on the smaller side. I believe housing is a private function, I do not believe that the interior spaces are to be shared with other programs and functions on an individual level, so the allocated space for housing should remain locked to that specific program. Although, the overall form of the housing units can lend itself to other programs. Structural forms can become part of a system, functioning as a complex multifaceted entity. such as an undercarriage for a bridge or overhead park. This will allow more creativity in the architectural design through superimposing/overlaying these aspects in the confines of the already limited space, and seeing what happens.

Business is an important programmatic element that will be incorporated into the space. Because of the high-density nature of Tokyo, there is value in providing the inhabitants with necessities they may need in a closer proximity. Placing a market program in the design can allow the intervention to sustain not only the people living in the housing element, but also those surrounding, as the intervention itself is aimed at unifying the city. By bringing people from the outside in, this creates a destination point, promoting movement patterns *to* and *through* the design.

This is also the case with Public Green Space. Through various studies, green space and being in nature in general has positive effects on a person's happiness and wellbeing. In the context of a densified 'concrete jungle' where housing is, on average, smaller and more confined, open green space must be taken into account. As a program, green space is rather simpler to implement than others, as it can span over structures or below them; it is a function whose form can be manipulated to reflect the spaces on which it is placed.

Infrastructure such as transportation plays an integral role in the function of a city as a whole. Mass public transport, specifically, facilitates the movement of the people throughout a city, while eliminating some of the congestion through personal transport. the integration of public transportation programs through the design will create a new level of complexity through the interlocked functions of a given space. Two separate programs, such as mass transport (train

lines) and markets, can coexist in the same space buy designing it to not favor any certain program, but allowing the programs to give and take when the need to. A good example of this is the Maeklong Railway Market in Bangkok, Thailand. The markets occupy the space by expanding their shops over a rail line, and retract them when a train rolls through, leaving mere inches of spaces between the train and the stands. This cohabitation of the two programs can allow for maximum usage of limited space.

In order to take advantage of the methods of circulation throughout the city, my selected site needed to contain or be adjacent to a means of public transportation. Tokyo houses a plethora of methods for public transportation, laying claim to one of the most extensive networks of urban movement found inside a Megacity. More than 7.5 million daily commuters take advantage of Tokyo's 289 stations, ensuring close proximity to public transportation throughout the city[20]. In a city as densely populated as Tokyo, public transport hubs act not only as a means of traveling between destinations, but also as a space, dispensing the energy of movement and community from the occupants. Public transport hubs act as fixed points in a shifting plane.

Figure 7. 1 - Train passing through Maeklong Market.

Although, I believe that what is more important that the program elements themselves, in designing in a densely populated urban setting, is how those programs and functions interact with each other in the limited space provided. Can more than one program occupy a space, yet behave independently from one another? The proposed design intervention will focus on juxtaposing programs coexisting in the same space, differentiated and independent, yet feeding off one another. The programs can be differentiated in different methods, whether cyclical in nature, or as a result of a specific action or event.

[20] Tokyo Underground Networks

Chapter 8
The Intervention

Site Selection

The site chosen for my intervention is located in Taito, Tokyo, Japan. Taito is one of Tokyo's 23 Special Wards, jurisdictions similar to American Counties in terms of municipal and governmental services. Taito spans 3.9 square miles, and is located directly adjacent and North-East of Tokyo's Central Ward. In 2020, Taito housed an estimated 186,272 inhabitants. Over 3.9 square miles, Taito's population density ratio was 47,763 inhabitants per square mile. Compared to United States Counties, Taito would be second only to New York County, with a population density ratio of 70,828 inhabitants per square mile, beating Kings County (NY) by 5,000 additional inhabitants per square mile.

The proposed site is situated near the center of Taito. Its size is 0.3 square miles. Located within the proposed site are numerous methods of transportation. Located in the North West corner of the proposed site is Ueno Station. Established in 1883, Ueno Station is utilized by local commuters and long-distance commuters alike. With 10 active rail lines, Ueno Station is smaller than a typical Tokyo Metro hub. In 2020, Ueno Station was ranked 8th in Tokyo for number of daily commuters, with an estimated average of over 130,000 commuters per day[21]. Located withing Ueno Station are a variety of commercial shops including retail, cafes, and dining. Ueno Station also holds cultural significance. Famous Japanese poet Ishikkawa Takuboku used Ueno Station as inspiration for one of his poems, signified by a memorial plaque located in the north eastern portion of the station. Ishikawa Takuboku wrote:

I feel nostalgic with the accent of my hometown.
I go to a crowded station to hear it.

The proposed site also holds cultural significance. Directly adjacent to Ueno Station is Ueno Park. Ueno Park was originally part of the Keniji Temple, one of the city's largest temples. Historically, Ueno park's grounds was a family temple dating back to the Edo period, belonging to the ruling Tokugawa clan[22]. Today, Ueno Park is home to a concentration of Tokyo's cultural nodes. Located within its walls, Ueno Park contains The Keisei Ueno Muesum, The Nation Science Museum, The Tokyo National Museum, The Tokyo Metropolitan Art Museum, The Ueno Zoo, The Shitamachi Museum, alongside Shinobazu Pond and a number of shrines. As it pertains to the efficacy of my thesis proposal, it is important to note that Ueno Park, while a cultural destination and one that can be used as an anchor to bridge to in any design proposal, closes to the public before the business day has come to an end, effectively limiting the number of people that can access it.

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[21] Tokyo Metro, *Passenger Ratings*
[22] Japan-Guide, *Ueno Park*

Japan

Size:	140,775 mi^2
Population:	125.8 million
Density:	899 per mi^2
% Urban	**:** 91.8%

Figure 8. 1 - Japan

Greater Tokyo Area

Size:	5,200 mi^2
Population:	38.1 million
Density:	7,326 mi^2

Figure 8. 2 - Greater Tokyo Area

Tokyo Prefecture

Size: 847 mi^2
Population: 13.96 million
Density: 16,481 per mi^2

Figure 8. 3 - Toyko, Japan

Taito Ward

Size: 3.9 mi^2
Population: 186,276
Density: 47,763 per mi^2

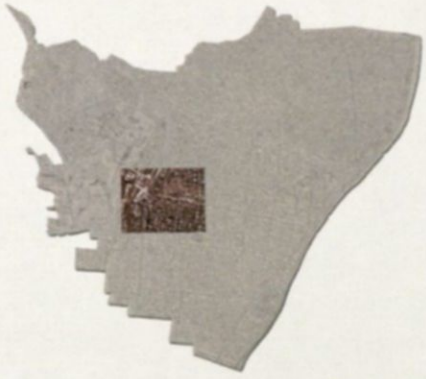


Figure 8. 4 - Taito, Tokyo, Japan

Figure 8. 5 - Proposed Site

Figure 8. 6 - Taito Green Space

Figure 8. 7 - Taito Cultural Nodes

As passenger trains enter and exit Ueno Station, they do so through the use of and elevated rail line. Tokyo, like many other hyperdense megacities around the world, is accustomed to utilizing space in effective ways to mitigate the fact that everything is so densely packed together. And unlike many other hyperdense cities—and cities in general—Tokyo utilizes its real estate by employing two means of movement throughout the city elevated from the ground level. Ueno Station is connected to the Ueno-Tokyo Rail Line, an elevated rail line occupying the space above the street. Coasting 30 feet in the air, the Ueno-Tokyo Rail line runs throughout the city, creating a different perspective of the city for passengers and inhabitants of the buildings that sit adjacent to the rail. The other elevated pathway is the Ueno Line, an elevated Toll Highway. Just as it was in the case of the elevated rail line, the Ueno Line takes an alternative route through the city as passengers traverse the urban landscape on two separate levels. As per Japanese contemporary urban development, space is used as efficiently as possible in order to maximize its inherent potential. In the case of the Ueno Line, the space underneath the elevated highways is no exemption. The negative space usually left dormant beneath the structure of a highway is occupied by commercial retail stores and housing. This method of design efficiency is an example of Atelier Bow-Wow's theories of Da Me Architecture.

Figure 8. 8 - Taito Elevated Pathways

UENO-TOKYO LINE | RAIL LINE

UENO LINE | TOLL HIGHWAY

Figure 8. 9 - Taito Elevated Pathways

Chapter 9
The Voids

As the fluctuations in population occur, Japan will see an increase in the amount of Akiya. Despite the comparatively steady population in Tokyo compared to its periphery, Tokyo's urban landscape is still witness to its effects. My proposed site contains 94 individual voids. Some large and some small; some a perfect rectangular shape, and some misshaped to conform to its surroundings. The first step in comprehending these voids is to group them into distinct categories. Inspired by the catalog of Da Me Architecture featured in Atelier Bow-Wow's Made in Tokyo, I began by looking at these voids through their size. The voids were divided into three size categories:

- Small Voids: less than 500 square feet
- Medium Voids: Between 500 – 4,000 square feet
- Large Voids: Greater than 4,000 square feet

I then began looking at different characteristics found within each void. While each individual site is unique in respects to its form, its surroundings, and its presence in the city, I consolidated the list of characteristics defined by form to:

- Low Surrounding building density
- Hight Surrounding building density
- Mixed Surrounding building density
- Standard Form
- Irregular Form
- Single threshold
- Passthrough Sites
- Corner Sites

To compile this information, I created a data matrix defining each of the 94 voids located in my proposed site. Through this information I found that the majority of the voids fell under the category of Small Voids (less than 500 square feet). Only 7 of the 94 voids located on my proposed site belonged to the Large Voids (greater than 4,000 square feet) category. I also found that while Tokyo is viewed as having a vertical presence in terms of surrounding building height, the majority of the voids are situated in areas with either a Low surrounding building density or a mixed surrounding building density. Spatially, I found that the voids that were surrounded by high building density are more concentrated in areas with close proximity to public transportation.

After displaying the gathered information as a dataset, I began to visually diagram these spaces. By using the void size categories as the basis for my diagrams, I created a form matrix, visually representing the possibilities in form for each type of void I may encounter.

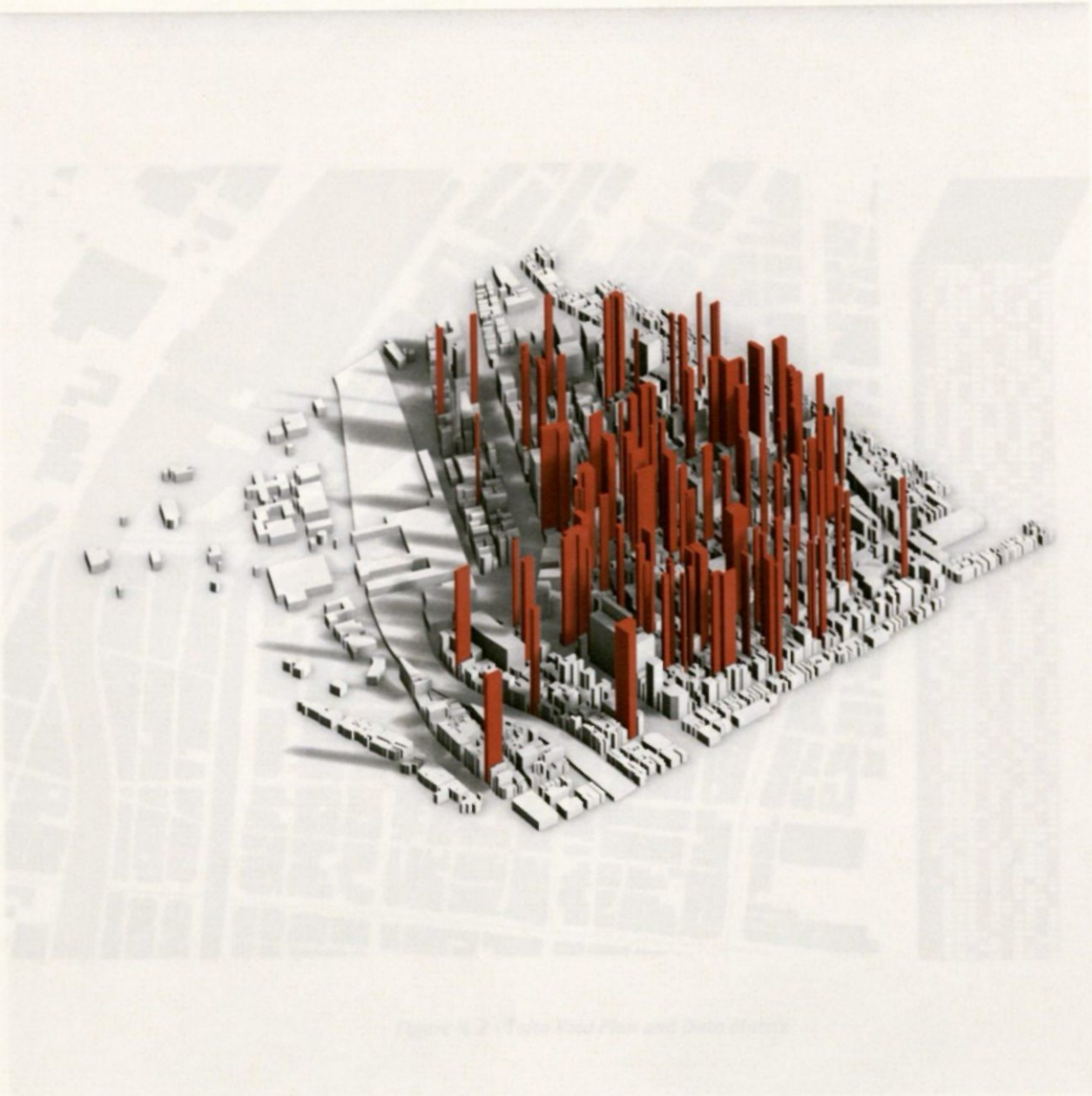
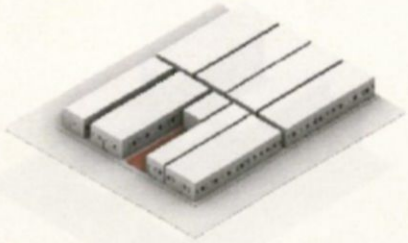
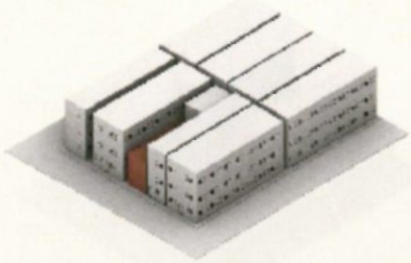


Figure 9. 1 - Taito Voids

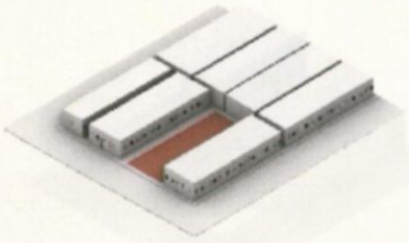
Figure 9. 2 - Taito Void Plan and Data Matrix



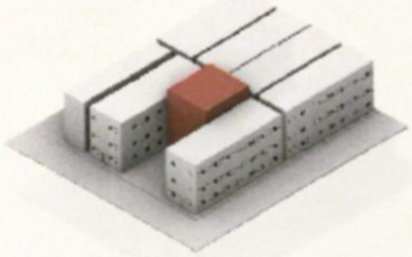
Small Void x Low Density



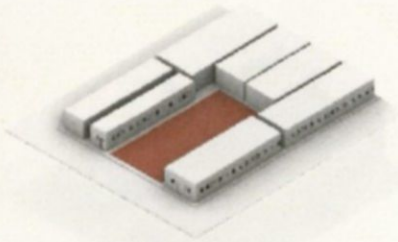
Small Void x High Density



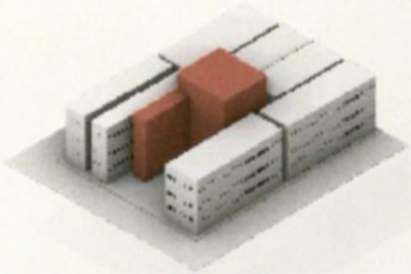
Medium Void x Low Density



Medium Void x High Density

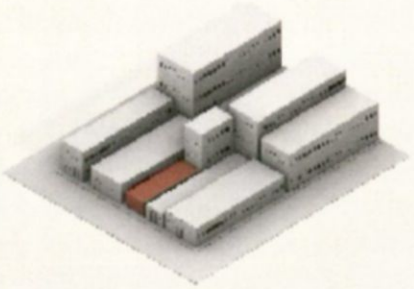


Large Void x Low Density

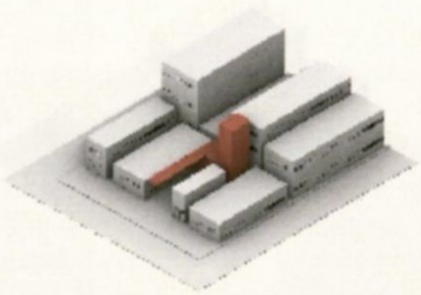


Large Void x High Density

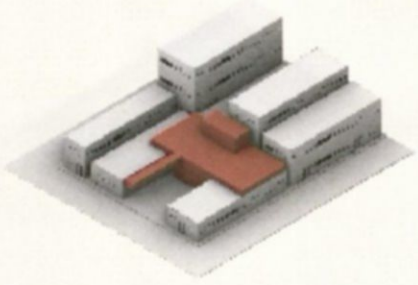
Figure 9. 3 - Taito Form Matrix



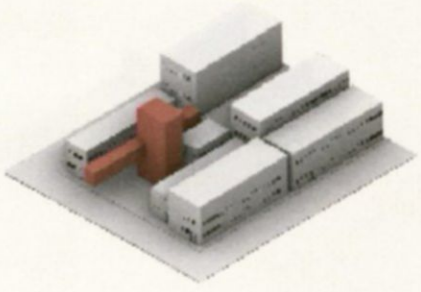
Small Void x Mixed Density



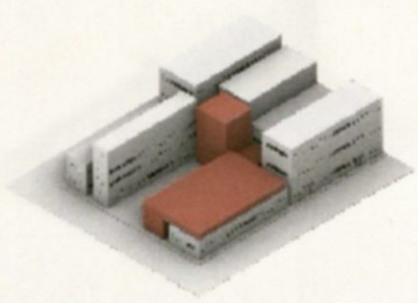
Small Void x Irregular Form



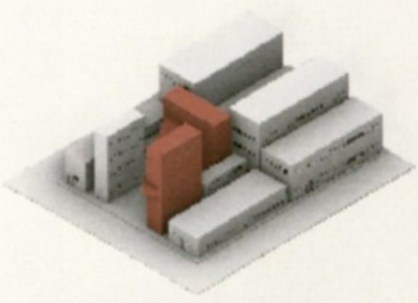
Medium Void x Mixed Density



Medium Void x Irregular Form

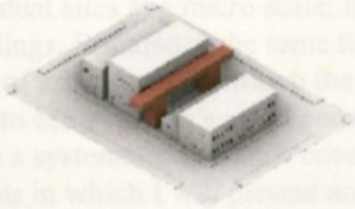


Large Void x Mixed Density



Large Void x Irregular Form

Figure 9. 4 - Taito Form Matrix



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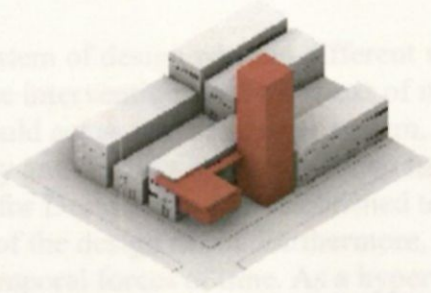
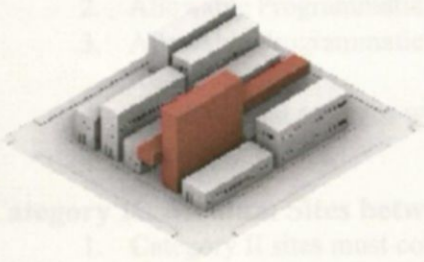
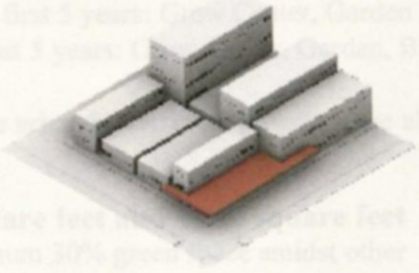


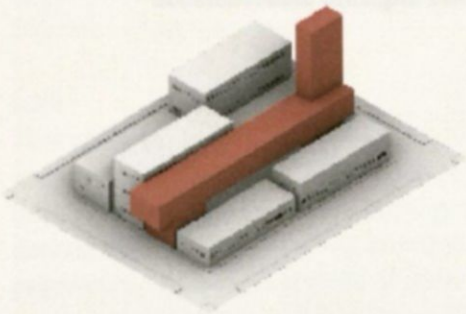
Small Void x Irregular Form



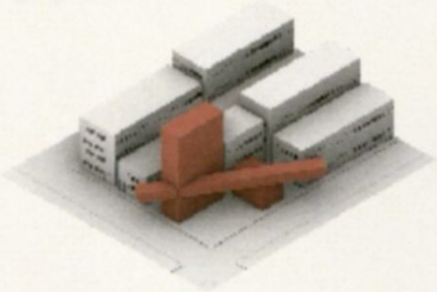
Medium Void x Mixed Density



Medium Void x Irregular Form



Large Void x Mixed Density



Large Void x Irregular Form

Figure 9. 5 - Taito Form Matrix

Conditions for Design

For my design philosophy, it is my goal to create a system of design wherein different voids act as individual sites at a micro scale; immediate-intimate interventions in the context of its surroundings. But also at the same time, the voids should act as part of a larger system, creating a network of urban voids in which the public can occupy and traverse across the urban landscape. In order to achieve this, a set of conditions, or 'Rules for Design" must be established to maintain a systematic approach covering the entirety of the design intent. Furthermore, the set of conditions in which I will present are subject to the temporal forces of time. As a hyperdense megacity with an average building lifespan of only 30 years, it can be inferred that as time progresses, the number of spaces that will enter the Void Cycle will increase over time. This method of "Time Release Architecture" dictates that design interventions occur through the use of space over time. The Conditions for Time Release Architecture are as follows:

Category I: Small Sites less than 500 square feet "Pocket Parks"

1. All Sites in this category must spend 5 years as green space, directly serving the intimate community.
2. Allowable Programmatic Insertions in first 5 years: Grow Center, Garden
3. Allowable Programmatic Insertions post 5 years: Grow Center, Garden, Bar, Tea Room
4. If a new Void emerges within the same urban block, more programs are allotted for insertion: Dining

Category II: Medium Sites between 500 square feet and 4,000 square feet

1. Category II sites must contain a minimum 30% green space amidst other programmatic insertions
2. Category II sites can accommodate all programmatic insertions: Grow Center, Garden, Park, Housing, Commercial, Dining

Category III: Large Sites greater than 4,000 square feet

1. Category III sites must contain a minimum 30% green space
2. Category III sites can accommodate all programs: Grow Center, Garden, Park, Housing, Commercial, Dining
3. Category III sites will act as nodes for Pathway Connections. Interventions must accommodate multiple connections converging on the site.

Programmatic Analysis

For my proposed design interventions, I analyzed the city in terms of its programmatic needs. I found that the most absent program that can be inserted to invoke a meaningful design intervention is Green Space. The goal for this project has been to extend the public realm through the use of Tokyo's urban voids, and by extending the public realm through the incorporation of green space as a primary programmatic insertion, we are able to infill an experience counter to the surrounding urban environment.

The main programmatic insertions are divided into subcategories:

1. **Open**
   This category focuses on the use of open spaces. Uncovered and open to the public, these spaces are defined as open air urban gardens and pubic parks. By incorporating these programs, this ensures a level of community interaction with the proposed interventions

2. **Grow**
   This category of programmatic insertion pertains to the cultural aspects of Japanese agriculture. By inserting enclosed Grow Centers and public gardens, the sites become more than a place of leisure and relaxation. This insertion allows for the sites to generate a sense of community and growth. Grow centers will service the people within the community, offering alternative means of purchasing produce and creating new networks of agriculture.

3. **Live**
   This category deals with the housing element of my intervention. The notion of population fluctuations infers that the population will experience periods of decrease as well as periods of increase. When the population experience periods of increase, Housing programs can be inserted into the voids, increasing the housing opportunities in the megacity.

4. **Shop**

This programmatic insertion focuses on inserting commercial programs. The type of commercial programs I wish to include are centered toward the community experience rather than those focused on profitability. The programs that will be inserted consist of Dining, such as local restaurants and cafes, Bars, and Tea rooms. Also, another variety of commercial insertions contain markets where the produce grown on site can be sold directly to the consumer, bypassing the commercial middle man and ensuring fresh and local produce

5. **Mech**

This programmatic insertion is directly related to the Open and Grow insertions. In urban Aeroponics and Hydroponics, there needs to be adequate planning for water filtration systems and water reservoirs. This subcategory of programmatic insertion is used wherever vertical urban gardening occurs

Kit of Parts

My design intent was driven by my thesis's notions of non-permanence. The urban fabric of Tokyo is a complex amalgamation of constantly shifting dynamics, and designing an intervention that runs counter to such notions is ill suited for my design proposal. The voids found within Tokyo's fabric are temporal in nature. Because of that, my design approach needed to mimic the temporality.

As such, my design approach focuses on a 'Kit of Parts'. In theory, each programmatic 'module' will be devised of components generated from a catalog of parts. This method not only provides the opportunity for interchangeability, but also streamlines the construction process.

The programmatic modules I designed follow such design guidelines. Each module consists of a structural brace spanning three consecutive 'bays", enveloped by either infilled walls or infilled glass curtain panels, depending on the programmatic element being inserted. Also, each program comes with its own façade, installed on the exterior surfaces of the module, this allows for architectural methods of wayfinding, as pedestrians would be able to identify favored programs within a proposed site. The modules will be inserted into a structural frame, a cartesian grid-like lattice structural system that acts as the megastructure of the design, creating the only element of permanence in the voids. As time flows, the programmatic elements inserted into the megastructure frame can be replaced with other programs. The structural framing can also expand vertically as more programs are inserted in the future.

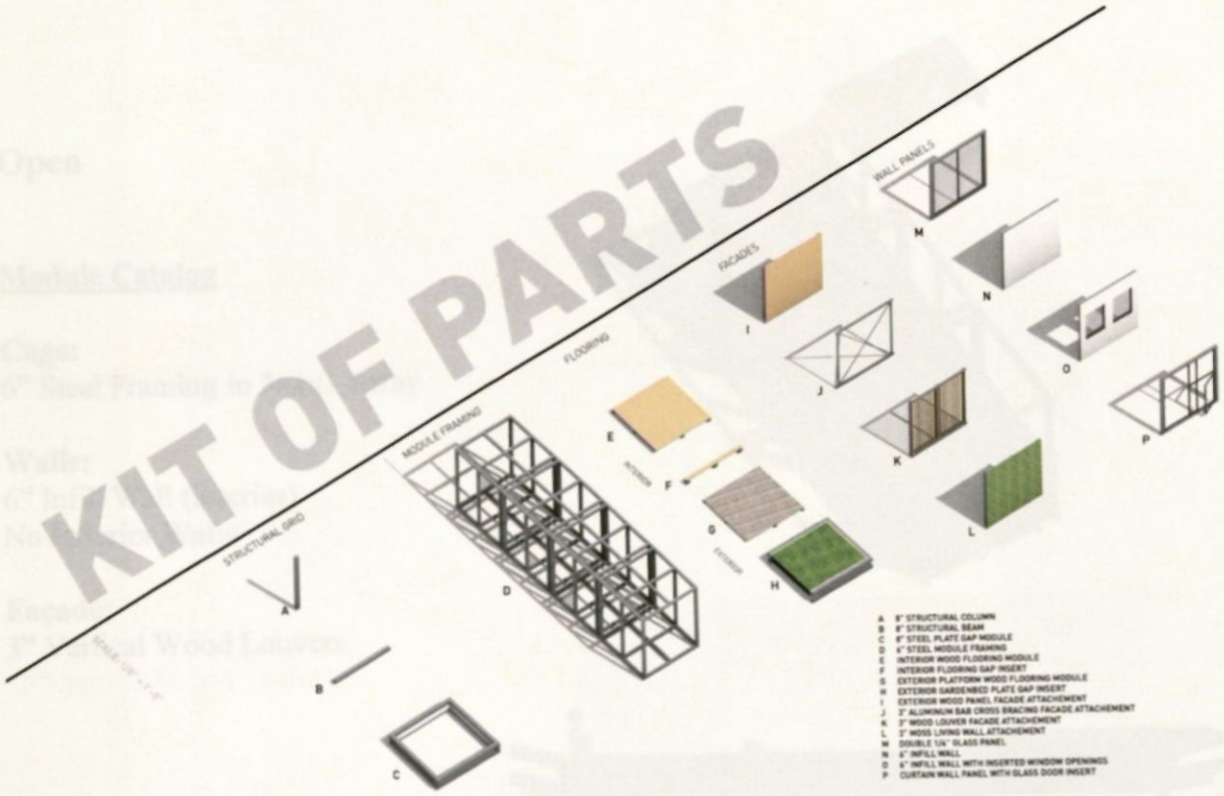


Figure 9. 6 - Kit of Parts

Open

Module Catalog

Cage:
6" Steel Framing in 3x1x1 Array

Walls:
6" Infill Wall (interior)
No Exterior Walls

Façade:
3" Vertical Wood Louvers

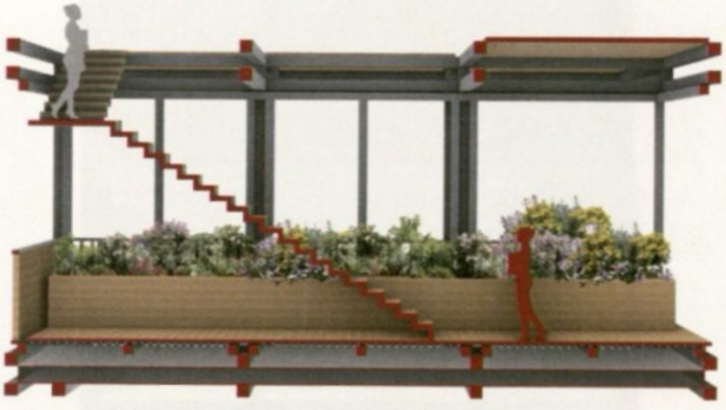


Figure 9. 7 - Open Design

Grow

Module Catalog

Cage
6" Steel Framing in 3x1x2 Array

Walls:
6" Infill Wall
Double ¼" Glass Panel

Façade:
4" Vertical Wood Cladding
3" Vertical Wood Louvers

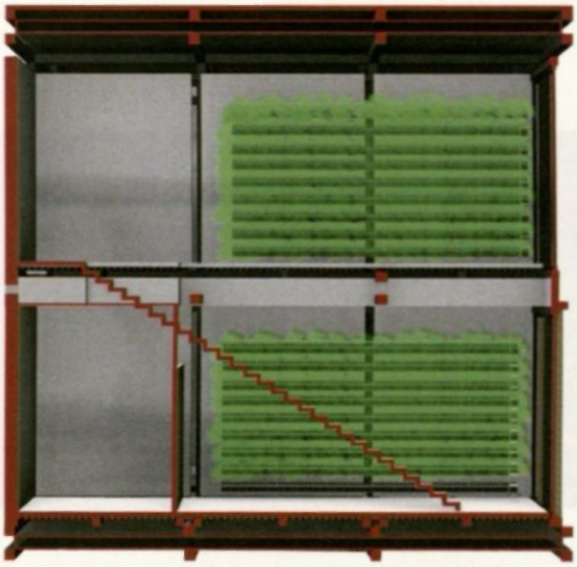
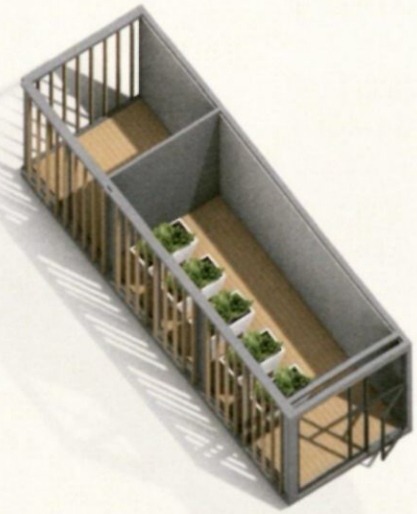


Figure 9. 8 - Grow Design 1

Grow



Module Catalog

Cage:
6" Steel Framing in 3x1x2 Array

Walls:
6" Infill Wall
Double ¼" Glass Panel

Façade:
4" Vertical Wood Cladding
3" Vertical Wood louvers

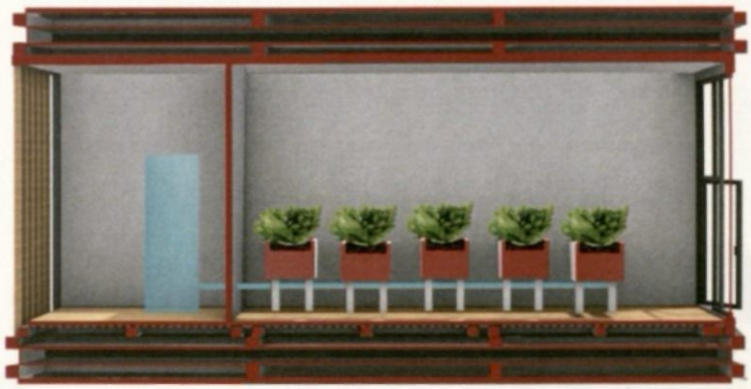


Figure 9. 9 - Grow Design 2

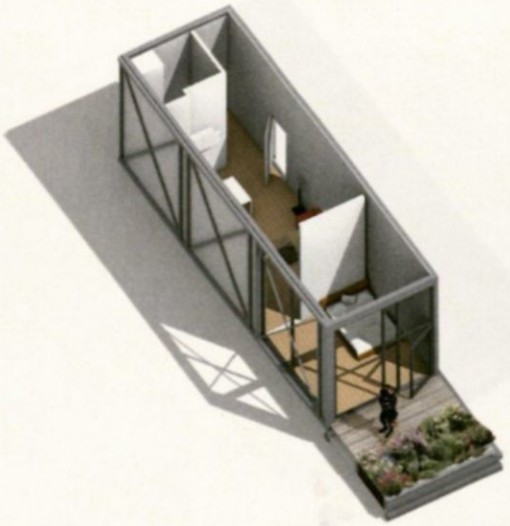
Live

Module Catalog

Cage:
6" Steel Framing in 3x1x1 Array
1 bay balcony addition

Walls:
6" Infill wall
Double ¼" Glass Panel
Curtain Panel with Door Insert

Façade:
2" Steel Bar Cross Bracing



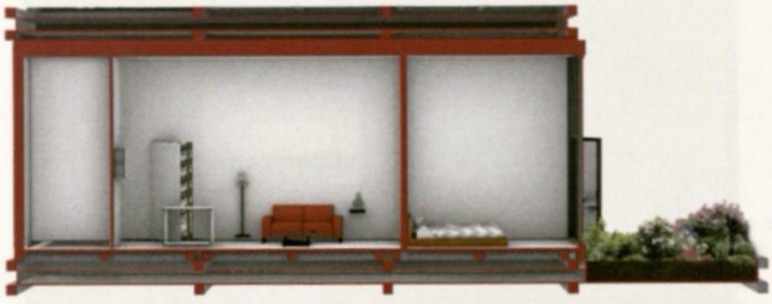
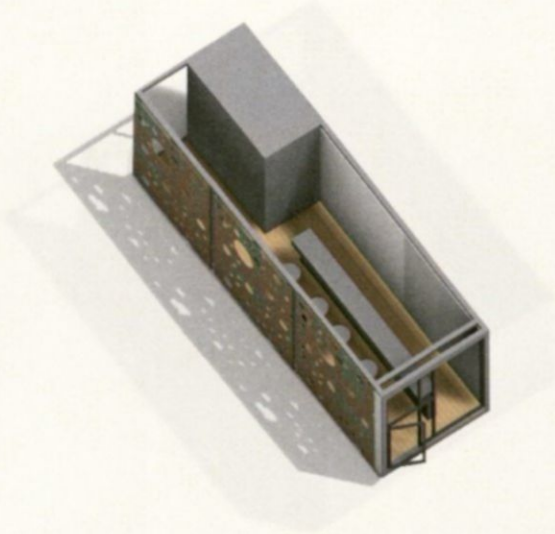


Figure 9. 10 - Live Design

Shop

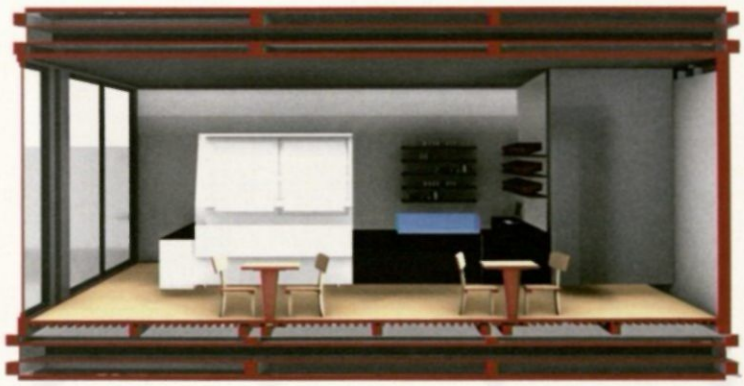


Module Catalog

Cage:
6" Steel Framing in 3x1x1 Array

Walls:
6" Infill Wall
Double ¼" Glass Panel
Curtain Panel with Door Insert

¼" Perforated Aluminum
Panel



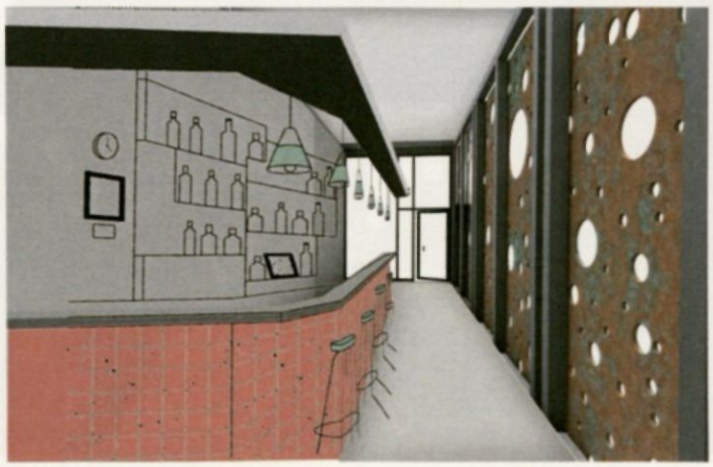
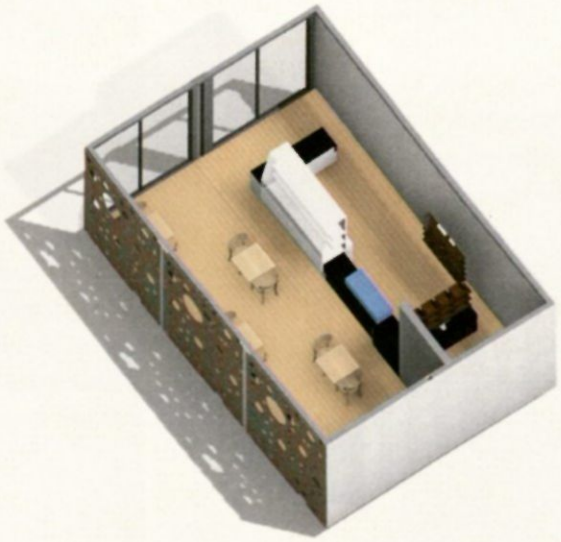


Figure 9. 11 - Shop Design 1

Shop

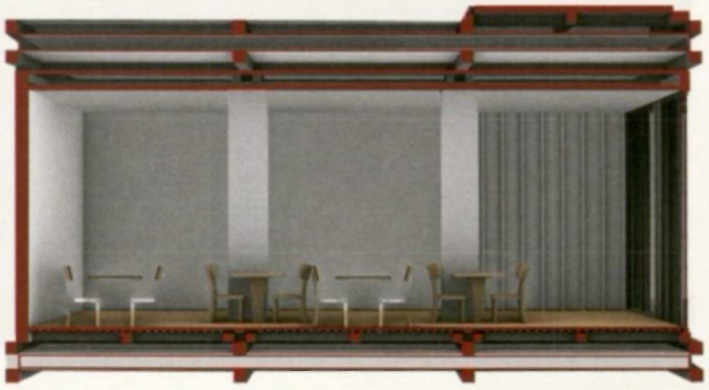


Module Catalog

Cage:
6" Steel Framing in 3x2x1 Array

Walls:
6" Infill Walls
Double ¼" Glass Panel
Curtain Panel with Door Insert

Façade:
¼" Perforated Aluminum Panel



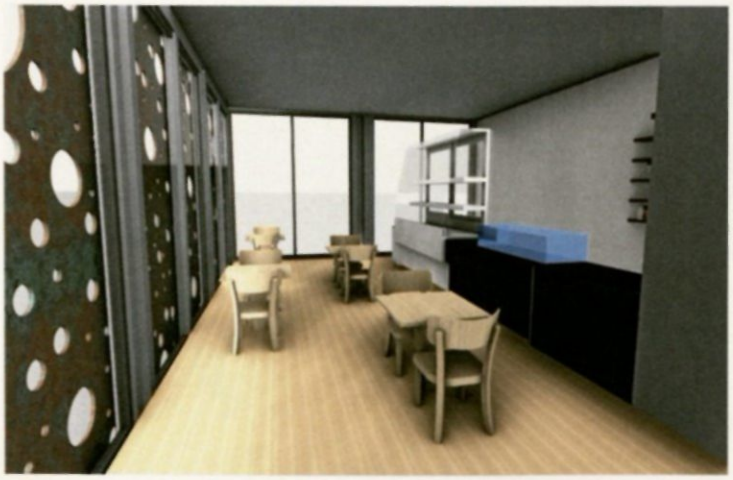
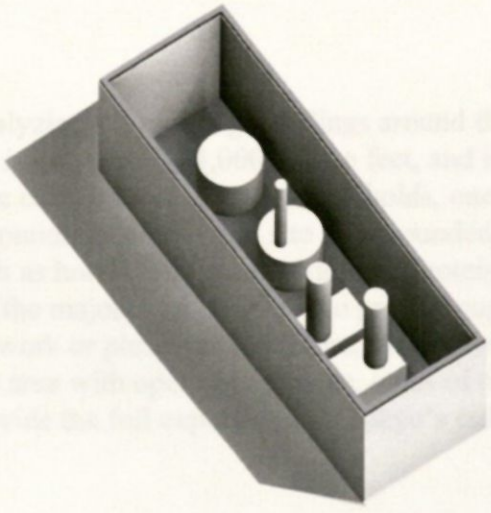


Figure 9. 12 - Shop Design 2

Mech

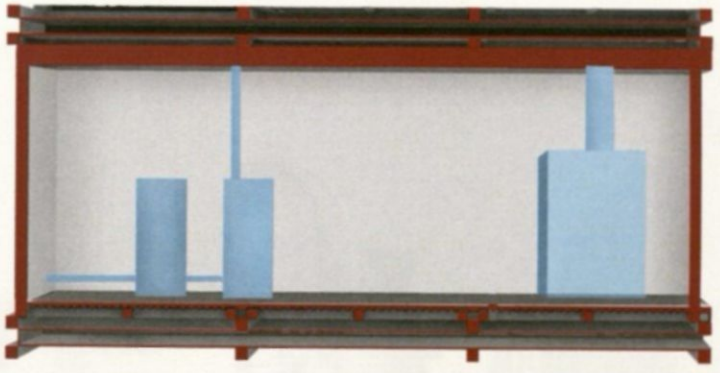


Module Catalog

Cage:
6" Steel Framing in 3x1x1 Array

Walls:
6" Infill Walls

Façade:
White Vinyl Siding



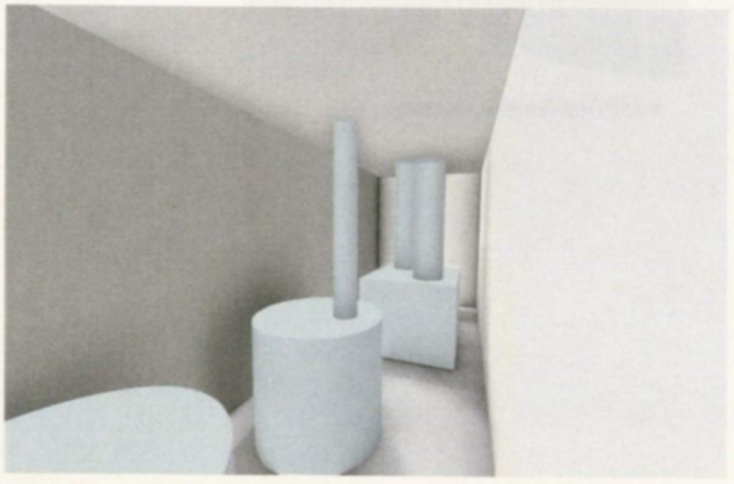


Figure 9. 13 - Mech Design

Design Implementation

Site #56

The design process for this site began by analyzing the existing buildings around the site. The site falls under Category III, which means it is greater than 4,000 square feet, and is capable of consolidated multiple paths of entry. The site contains two separate thresholds, one of which sits perpendicular to the Ueno Line. For the surrounding context, the site is surrounded predominately by Hospitality programs, such as hotels. The concentration of hotels around the immediate vicinity of Site #56 suggests that the majority of people who pass through that area are those who are visiting Tokyo, either for work or pleasure. Therefore, the proposed design intervention should service the people in the area with open green space, areas of relaxation and reflection, and services and amenities to provide the full experience of Tokyo's cultural complexities.

Figure 9. 15 - Site Analysis

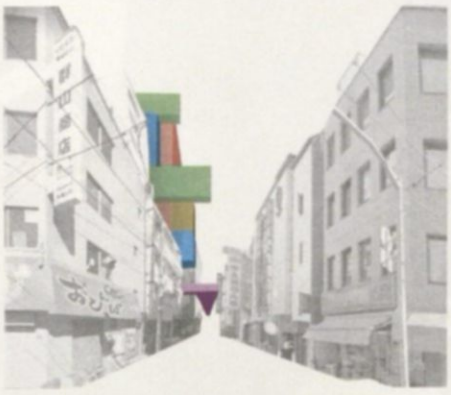


Figure 9. 14 - Conceptual Massing Collage

Site #56

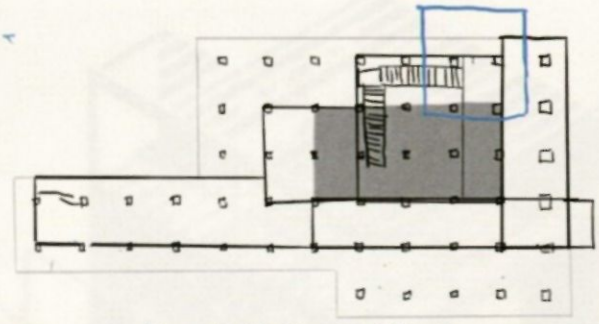


Figure 9. 16 - Structural Sketch

Figure 9. 17 - Site #56 Site Perspective

Site #56

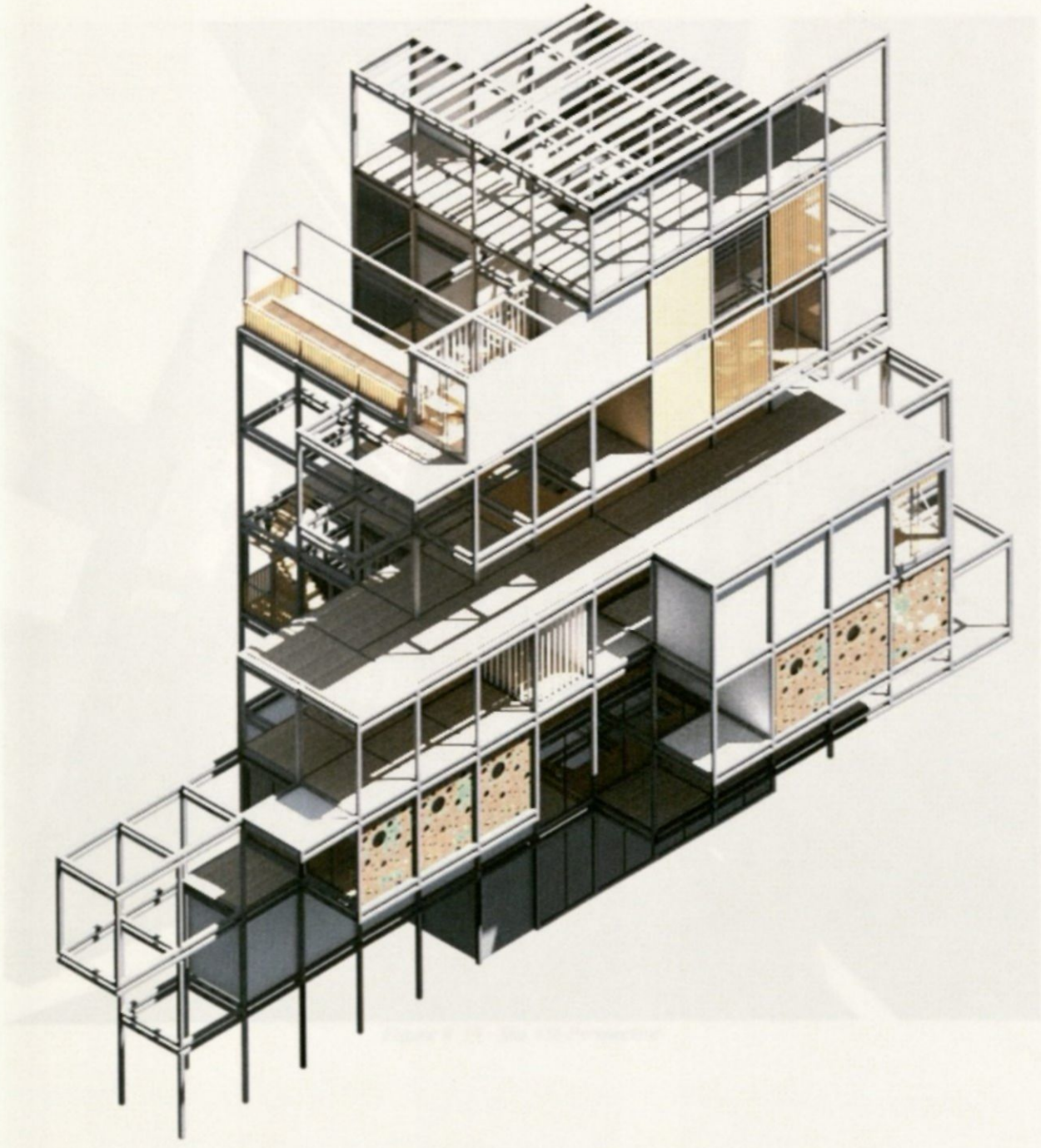


Figure 9. 18 - Site #56 Design Axonometric

Site #56

Figure 9. 19 - Site #56 Perspective

Site #56

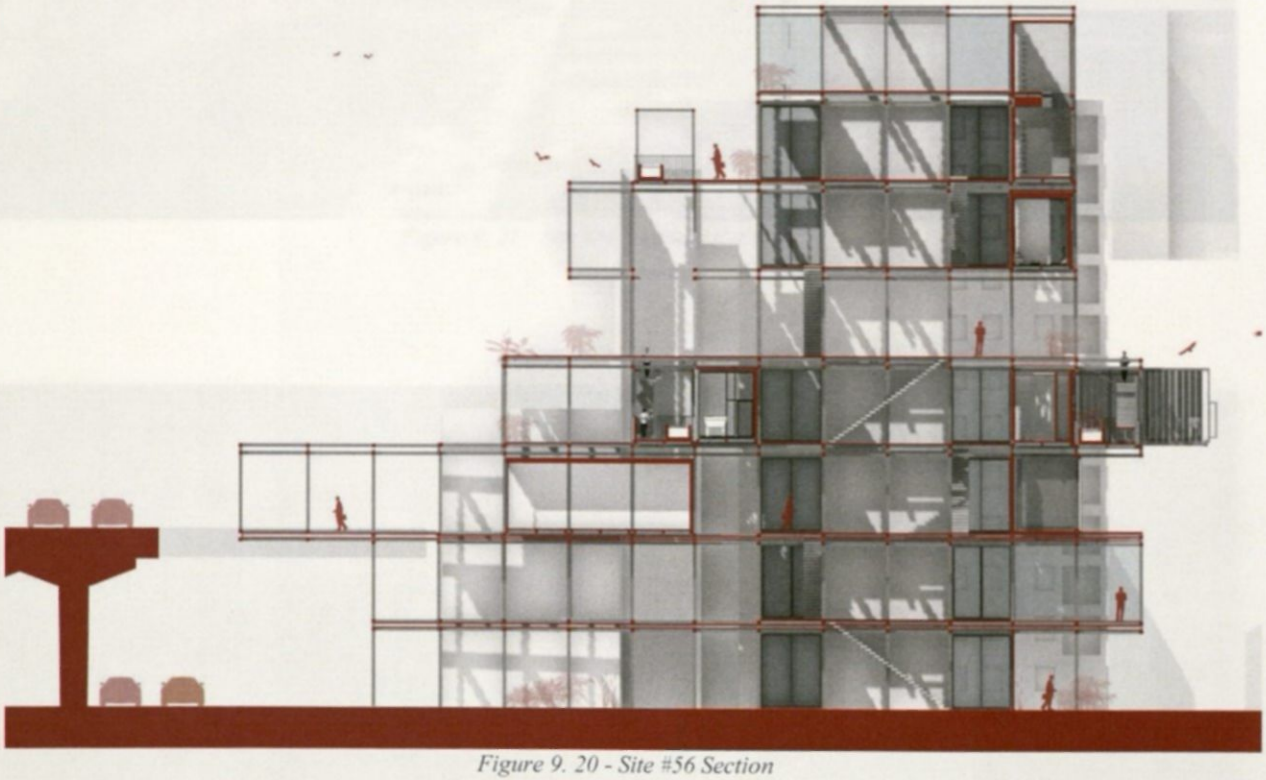


Figure 9. 20 - Site #56 Section

Figure 9. 21 - Site #56 Pathway Perspective

Figure 9. 22 - Site #56 Street Level Perspective

Site #33

Site 33 is a site under Category III. It is an irregular shaped void on a busy corner adjacent to the Ueno Train Station. Foot traffic is moderately busy, as pedestrians walk past the site to the local attractions. Site #33 is situated in an area of the site surrounded by various programs. restaurants, bars, office buildings, manufacturing studio, textile warehouse, auto shop, and train station are a few of the amenities located within the vicinity. Therefore, the design approach is to maintain as much Green Space and parks as possible. The goal is to create a center for which the various industrial workers, office workers, and commuters can pause before continuing on their journey. In the Southeastern corner, you see a continuation of the void as it passes between two buildings. This pathway is the connection point between Site #33 and the elevated pedestrian pathways.

Figure 9. 23 - Site #33 Site Perspective

Site #33

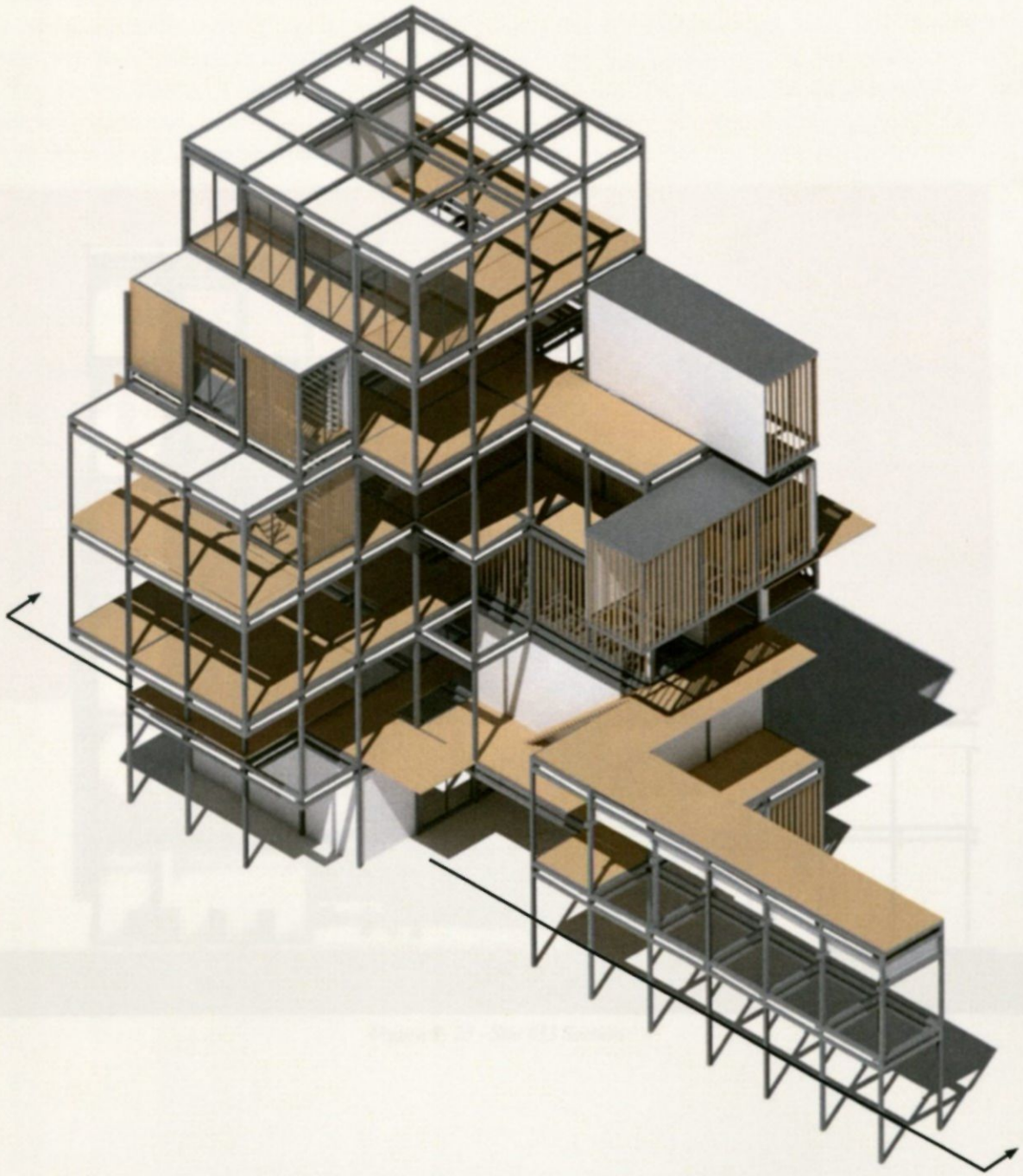


Figure 9. 24 - Site #33 Design Axonometric

Site #33

Figure 9. 25 - Site #33 Section

Pathways

The notion of using elevated pathways for movement throughout the city astounded me. It is a vague feeling, one that I have not experienced and can only chase a predicted sensation. To be traveling on a plane we are unfamiliar with, viewing the city from a varying perspective. Yet, there was more to be desired. As unique as the Ueno Line and Ueno-Tokyo Rail Line are, they are reserved for methods of transportation where the *experience* of traversing that space isn't a deciding factor. Rather, I envision the precious space lifted above the ground be designed for the people to experience. I envision a maze of elevated pedestrian pathways branching across Tokyo, leaving the noise and traffic of the megacity on the ground level. Such expansive networks I foresee have no precedent. A few cities have become open to the idea of raising pedestrians from the street level and creating elevated pathways. In New York City, the Highline has changed the urban landscape. Formerly a service line transporting commercial and industrial goods in the early 1930's, the elevated train line lay decommissioned for over 20 years before being acquired and transformed into an elevated park.

The voids found within Tokyo's urban fabric have the capability, with meaningful intervention, to bring positive change to the people who use it. Individually, the numerous voids work independently, each localized and intimate within its community. I began to ask myself, what can these voids do together? Are the voids capable of conversing with each other? What kind of relationships would arise?

The goal with the elevated pathways is to offer pedestrians in Tokyo an alternative means of movement throughout the city. Using the voids as nodes of connection, the Elevated pathway has the capability of covering the entire city.

Figure 9. 26 - Pathway Connections

Figure 9. 27 - Pathway Connections, Category III Voids Only

Figure 9. 28 - Pathway Connections, Clusters

At the early stages of the design phase, I envisioned the elevated pathway to take the form of a rhizomatic membrane snaking throughout the city. One continuous pathway branching over the streets and between buildings using the voids as nodes, connecting paths to each other. The main issue with this design is that the pathway takes no regard for its presence over the street level. By branching each void with its neighbor, the structural heaviness associated with the pathway does more harm than good. I then began looking at different means of connecting the voids. I prepared a series of Voronoi Diagrams to illustrate the connections between the voids. First, I highlighted the Category III sites showing the spatial relationship between each one. Here, we were able to infer a sense of trajectory alongside the public transport lines. Then, I created another diagram showing the average density of each void 'zone' extrapolated from the nearby building heights. Through analysis, a pattern of density which travels perpendicular to the Ueno line appears, with nodes of higher density to the NW corner of the site.

Figure 9. 29 - Elevated Pathway Design Concept

Figure 9. 30 - Elevated Pathway Concept Perspective

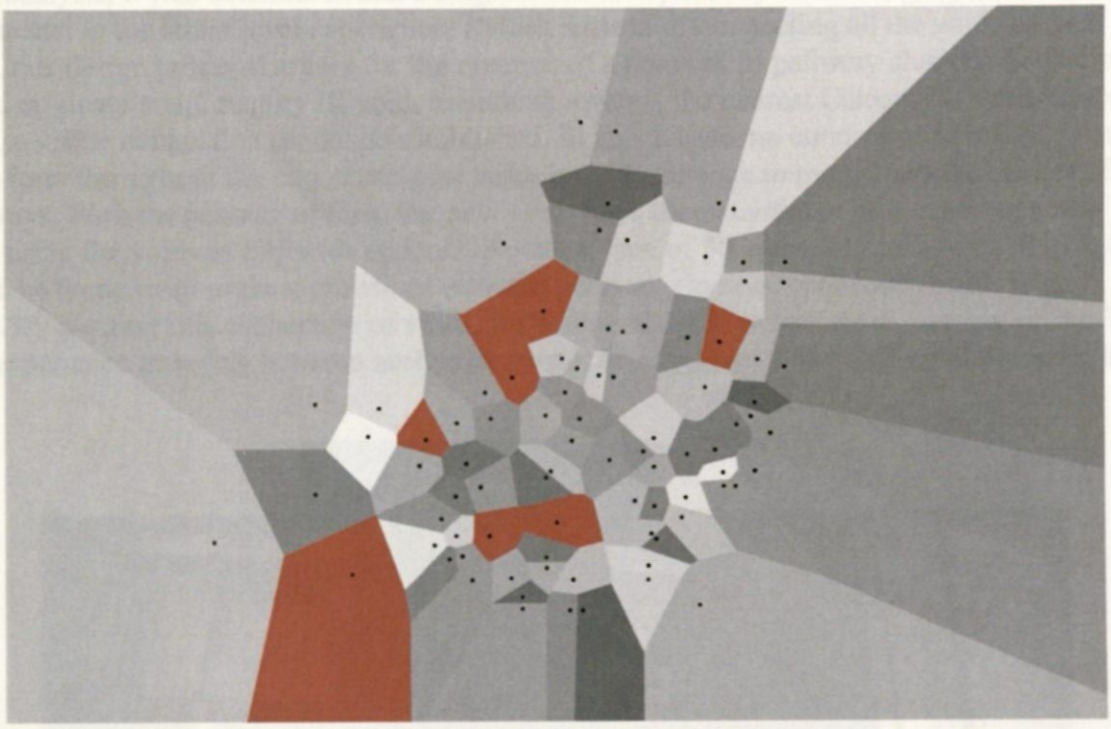


Figure 9. 31 - Voronoi Diagram - Large Voids

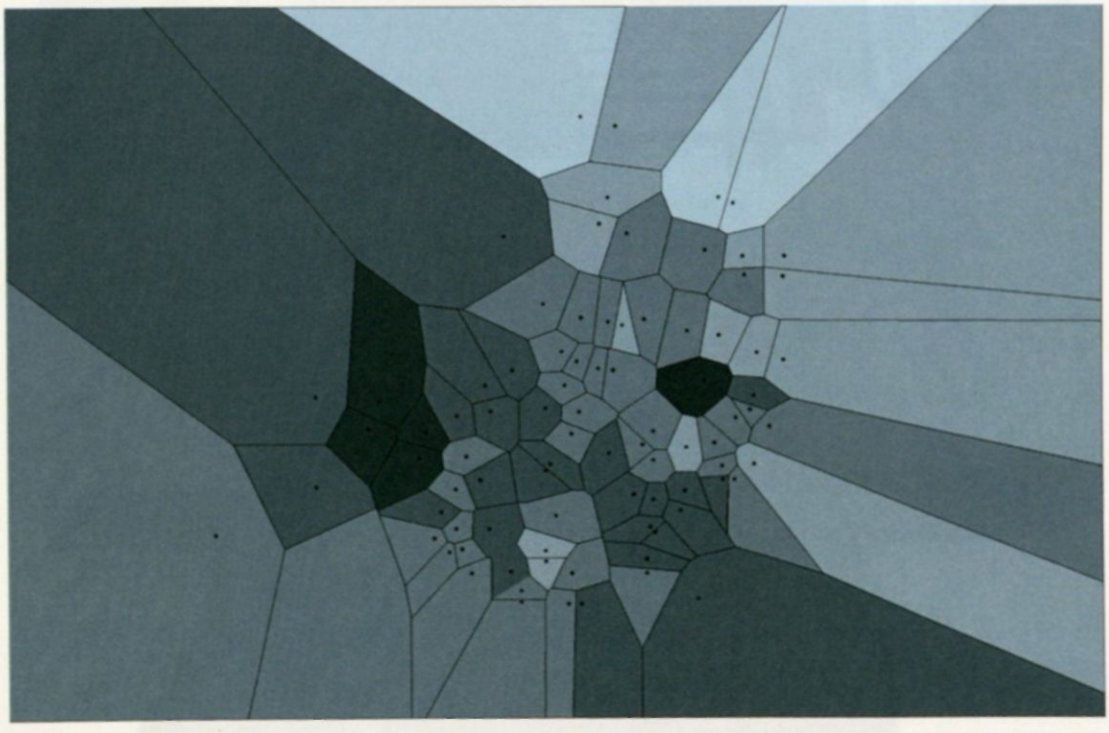


Figure 9. 32 - Voronoi Diagram - Surrounding Density

After analysis, it was determined that a singular elevated pathway connecting the voids would be detrimental to the street level experience. Rather, instead of connecting all the voids to each other, this design proposal argues for the creation of a network of pathway clusters. Each cluster would originate at a Category III void, branching towards the nearest Category II void. In some cases, a viable connection cannot be established. In which case, no connection is made. As new voids form throughout the city, those new voids have the change to merge into the cluster of pathways. With the passage of time, the new voids have the potential to join, creating a new cycle using the voids as city wide anchors. Across a span of 50 years, the entire city of Tokyo would be home to an organic growth of elevated pathway clusters, connection voids to each other. By creating this connection of voids, it allows each void to operate as a single entity. The user experience traveling between each void creates an alternate understanding of presence in the city.

Figure 9. 33 - Pathway Concept Collage

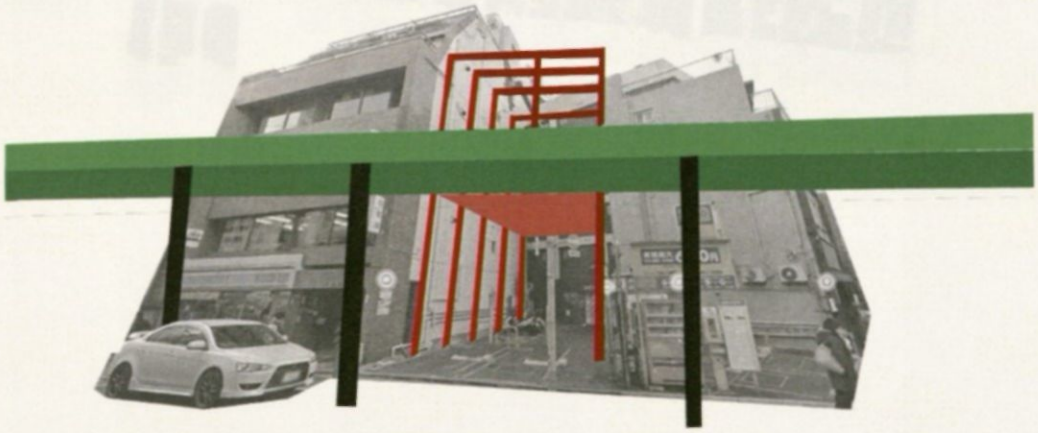


Figure 9. 34 - Pathway Concept Collage 2

Figure 9. 35 - Pathway Current Plan

Figure 9. 36 - Pathway 5 Year Plan

Figure 9. 37 - Pathway 10 Year Plan

Figure 9. 38 - Pathway 20 Year Plan

Figure 9. 39 - Pathway 25 Year Plan

Figure 9. 40 - Pathway 50 Year Plan

Chapter 10
Reflections

Stream of consciousness

Looking back at this thesis, there are many routes this thesis can take, and each one of them being detailed enough to stand as their own individual thesis. The goal of this thesis, ultimately, was to design a grand gesture; a form encompassing the urban landscape of Tokyo and, over time, transforming it into something new entirely. To begin, I often find myself catching up to my ambition. Tokyo is such a massive city. The scale of Tokyo, to this day, is sometimes incomprehensible to me. I have tried a few times over the past year to visit Tokyo; to walk its streets, to eat its food, to ingest its culture and soak in the energy of 38 million people. I feel if I have been able to have that experience, I might have been able to more accurately capture the energy of Tokyo into my design. Even though I feel proud of where I got and what I achieved, the end result of my thesis did not reflect the dream I have had since the beginning of last Summer. My thesis contained two main components: the modularity of the void insertions, and the connectivity of the voids through pathways. Each one of those components has enough depth to focus on entirely and disregard the other. The pathways, in my opinion, was the most exciting aspect of my thesis. It contained all the necessary details to remain grounded in reality, but it also had this abstract nature to it. It felt more theoretical in nature and design, an imprint of a Utopian future. Despite that, I found myself putting more into the design of the modular Kit of parts.

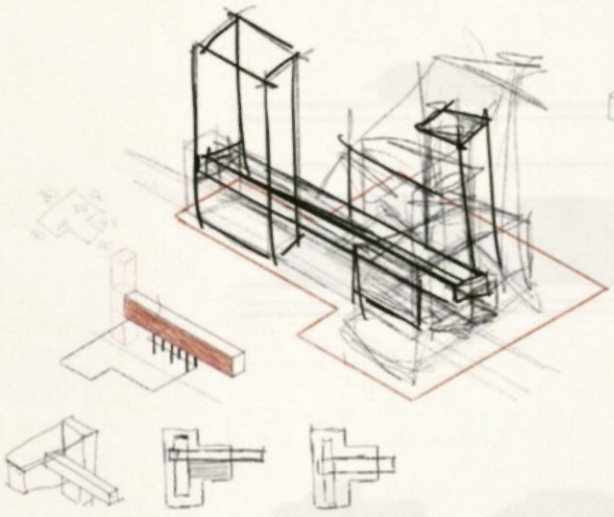
When looking at the different venues I only partially explored, there are a few that would have strengthened the intended proposal. First, the implementation of urban agriculture. The art of vertical growing, aeroponics, and hydroponics is a growing field, and there are certain design elements that come with designing for such programs that I did not take into consideration. In a future revision, I would like to spend more time looking into how to design for urban farming.

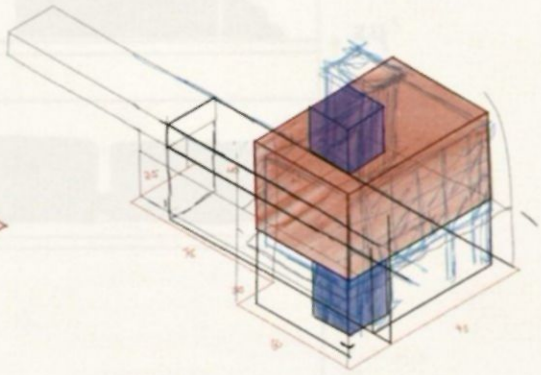
Another avenue I would dedicate more time to would be the pathways. During the initial design process, the function of the elevated pedestrian pathways was to double as an elevated garden. In order for that to happen, the pathways themselves must be able to support the growth of the vegetation above. The Highline in New York has done excellent work in designing pathways that can accommodate the growth of plants and vegetation above ground.

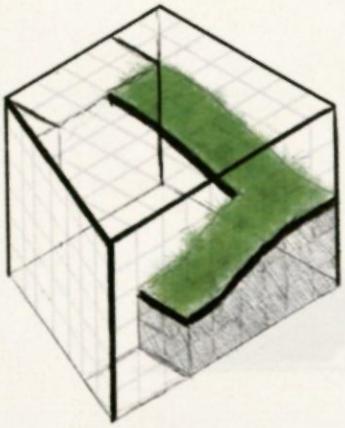
While we are discussing the pathways, had I had more time to work, I would have allocated more energy in modeling the pathways. As of now, the pathways remain an abstract concept. Due to multiple design iterations, the previously modeled pathway doesn't conform to the new structural framing of the voids, and is therefore negligible.

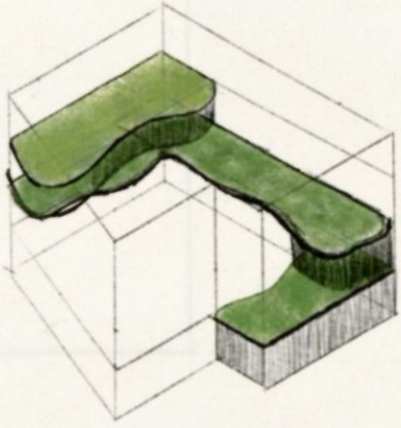
Appendix A
Design Process Images

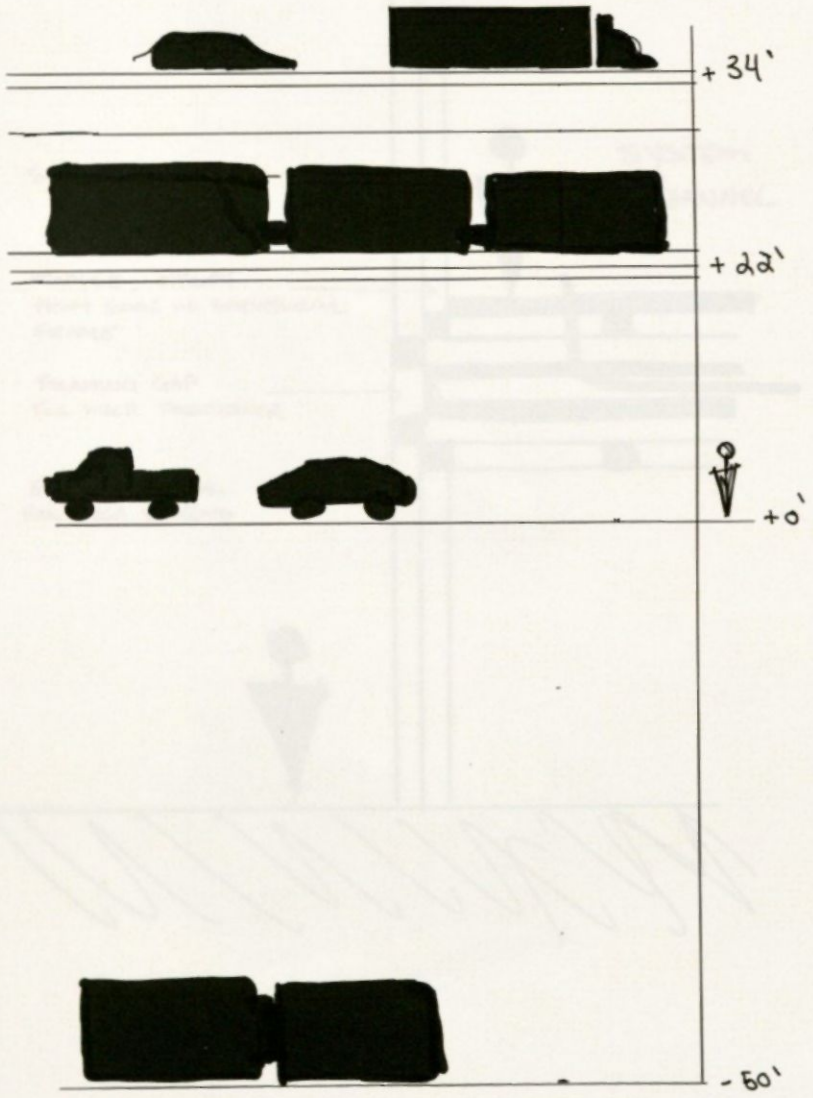
This Appendix is a collection of sketches, images, and unused design iterations from the entirety of the design process

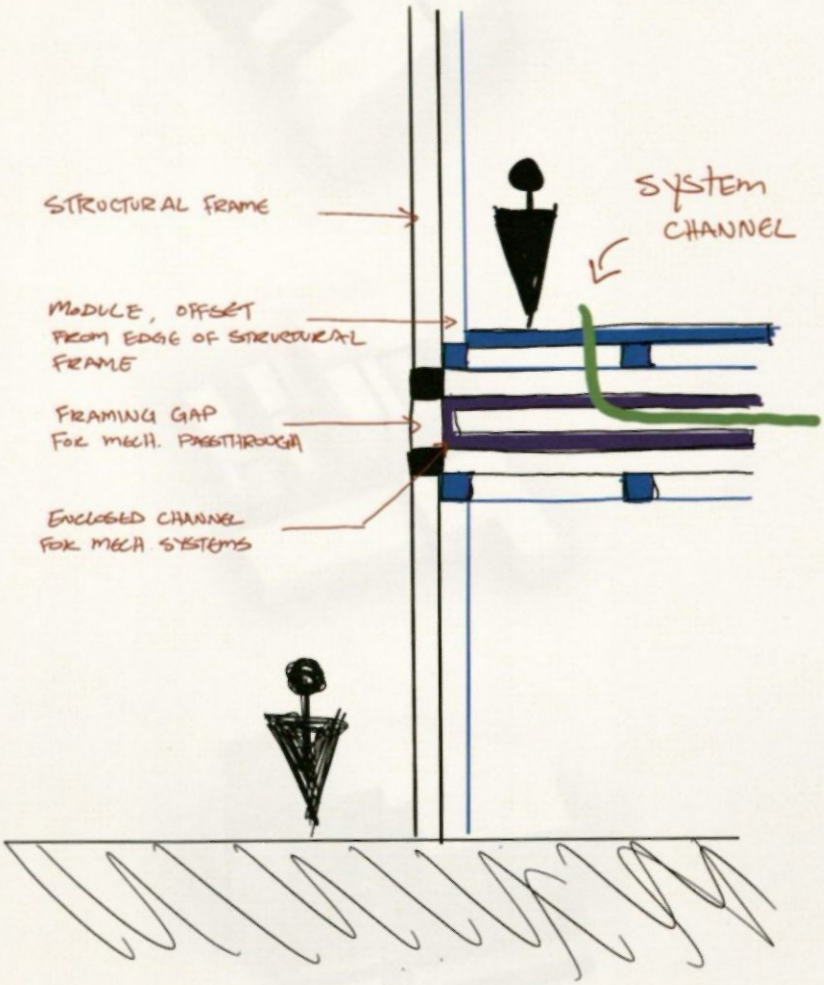


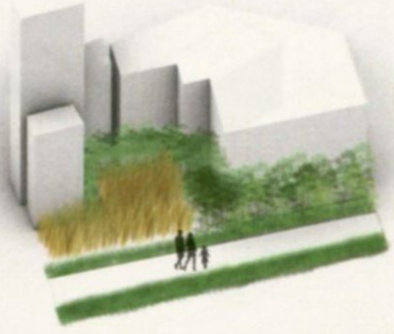


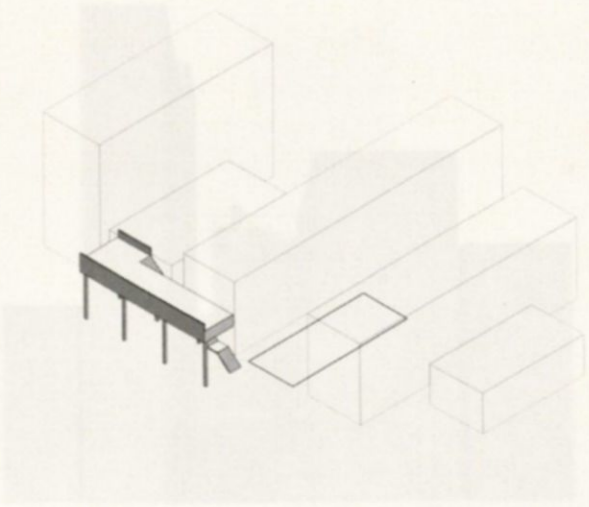


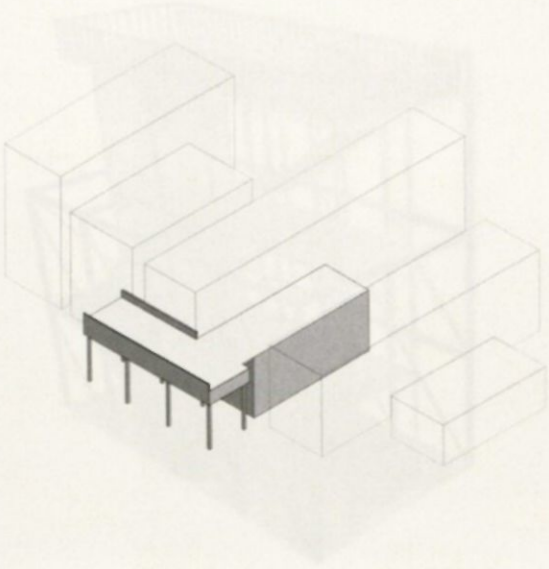


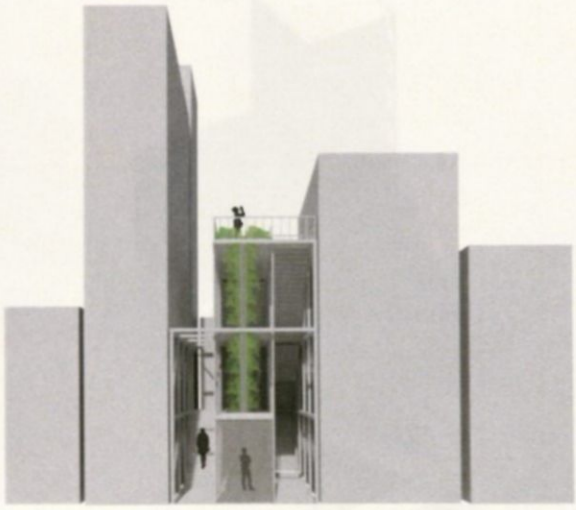

+ 34'
+ 22'
+ 0'
- 50'

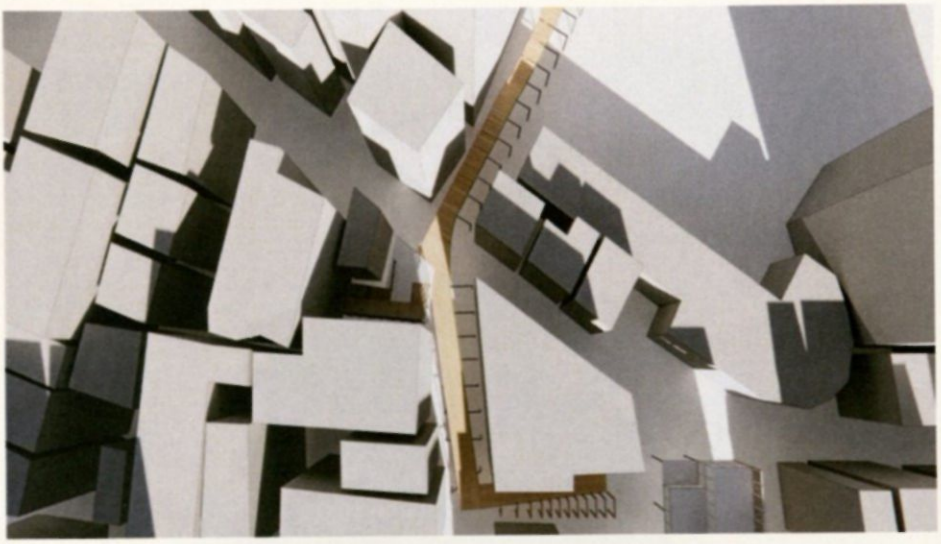

STRUCTURAL FRAME
SYSTEM CHANNEL
MODULE, OFFSET FROM EDGE OF STRUCTURAL FRAME
FRAMING GAP FOR MECH. PASSTHROUGH
ENCLOSED CHANNEL FOR MECH SYSTEMS

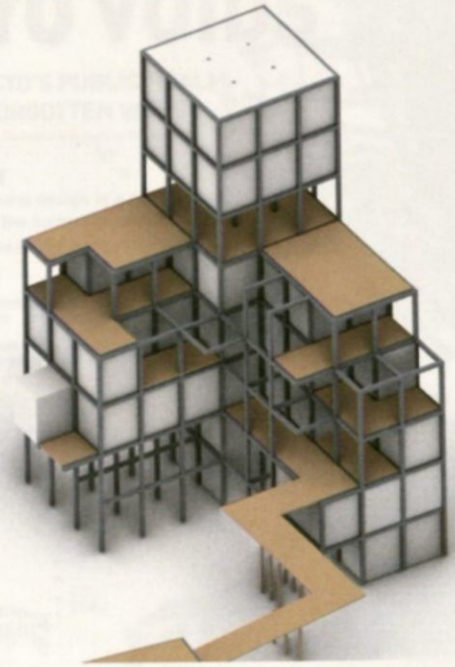


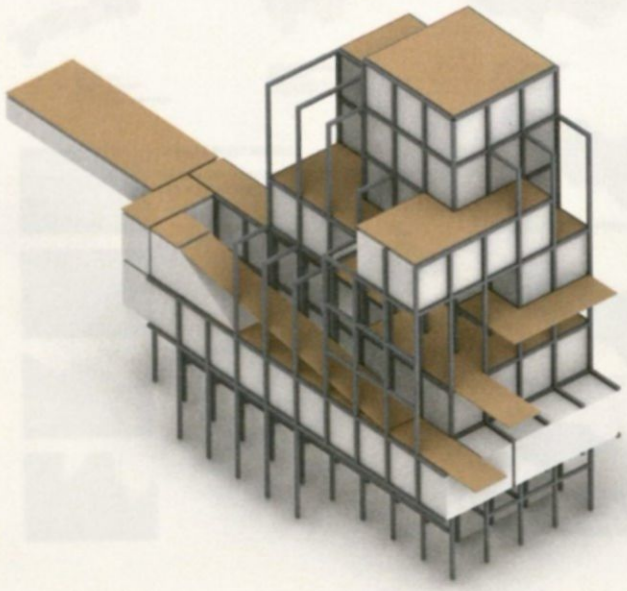




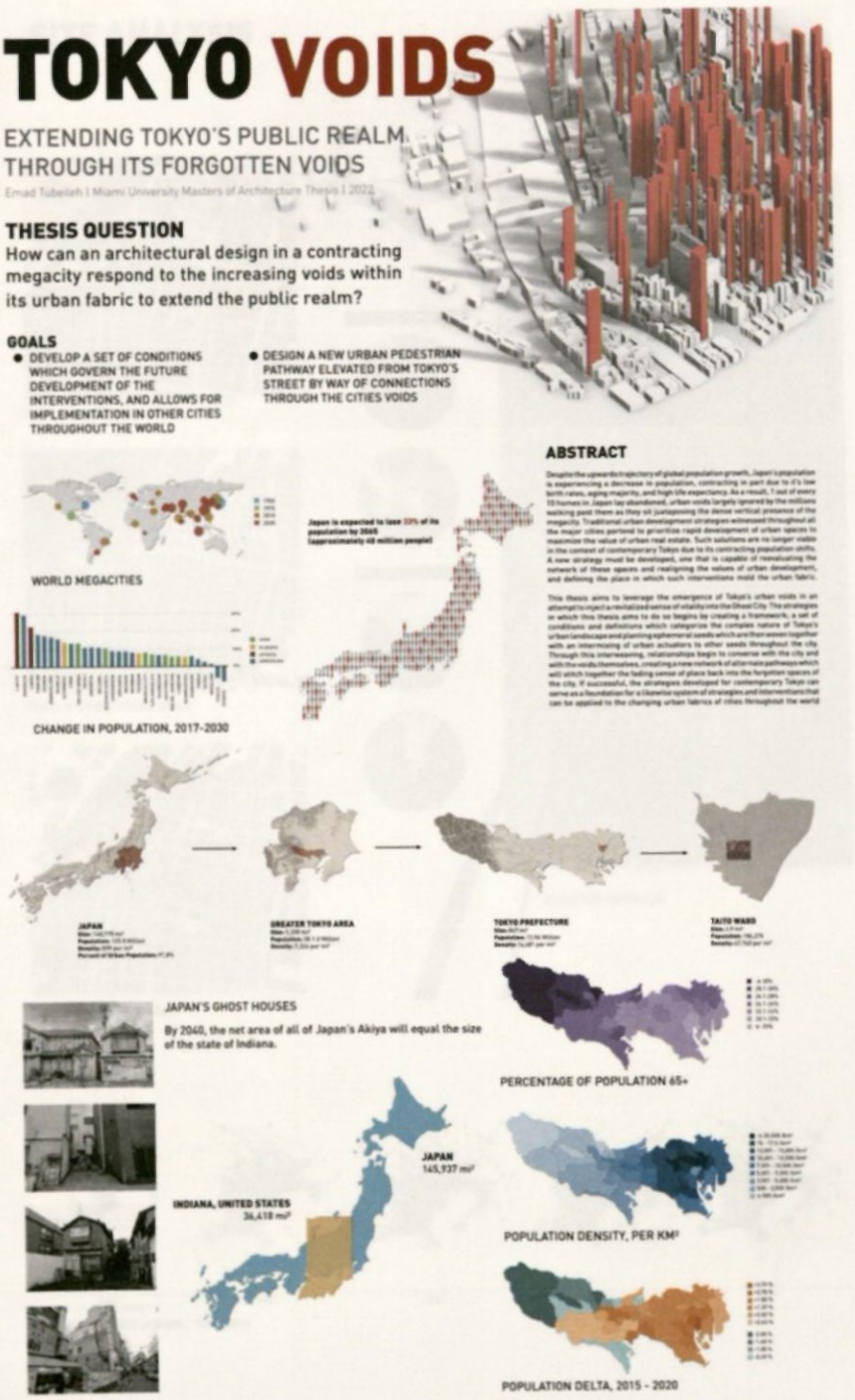








Appendix B
Thesis Defense Presentation

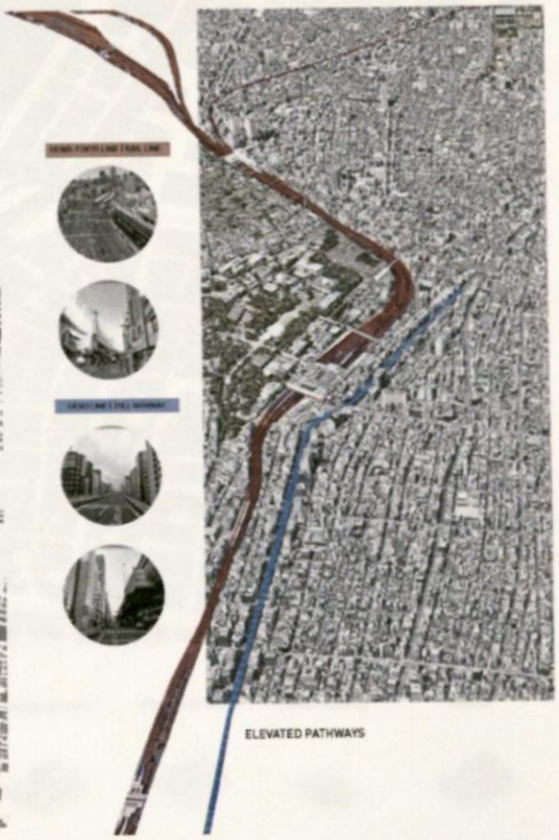


SITE ANALYSIS

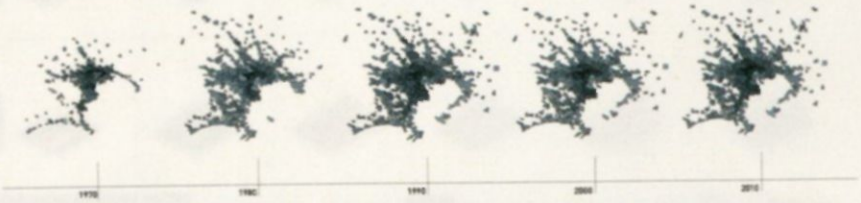
TAITO - POINTS OF INTEREST

TAITO - PARKS / GREEN SPACE

TAITO - CULTURAL NODES



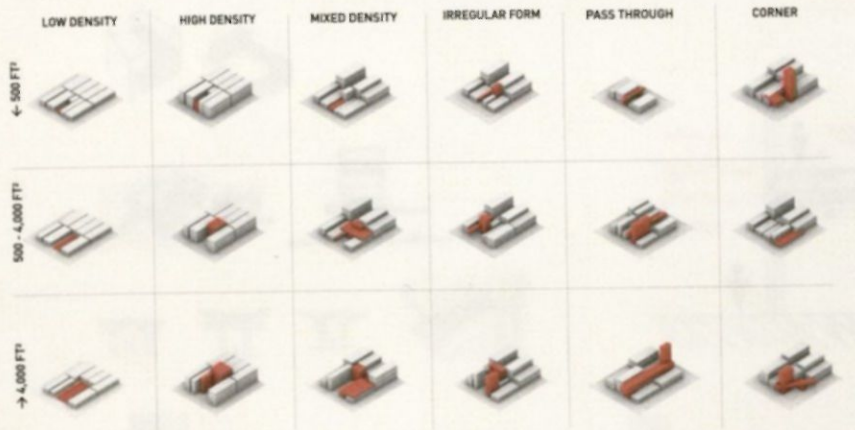
ELEVATED PATHWAYS



TOKYO HISTORIC SPRAWL, 1970 - 2010

DESIGN STRATEGIES

VOID SITE PLAN



VOID FORM DIAGRAM MATRIX

VOID SITE PLAN

VOID DATA MATRIX

PROGRAMS

CONDITIONS FOR "TIME RELEASED ARCHITECTURE"

CATEGORY I: SITES LESS THAN 500 SQFT, "POCKET PARKS"

1. All sites in this category must spent 5 years as green space, directly serving the intimate community.
2. Allowable Programs (2 Max) : **Grow Center, Garden, Bar, Tea Room.**
3. If a new void emerges, more programs become available: **Dining, House**

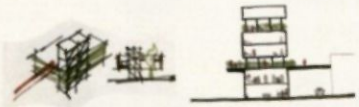
CATEGOREY II : SITES BETWEEN 1,000-4,000 SQFT

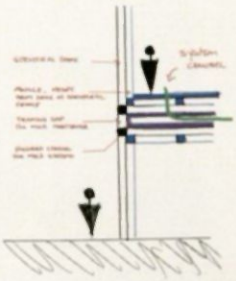
1. Categorey II sites can accomodate all programs
2. A minimum 40% Grow and Public garden

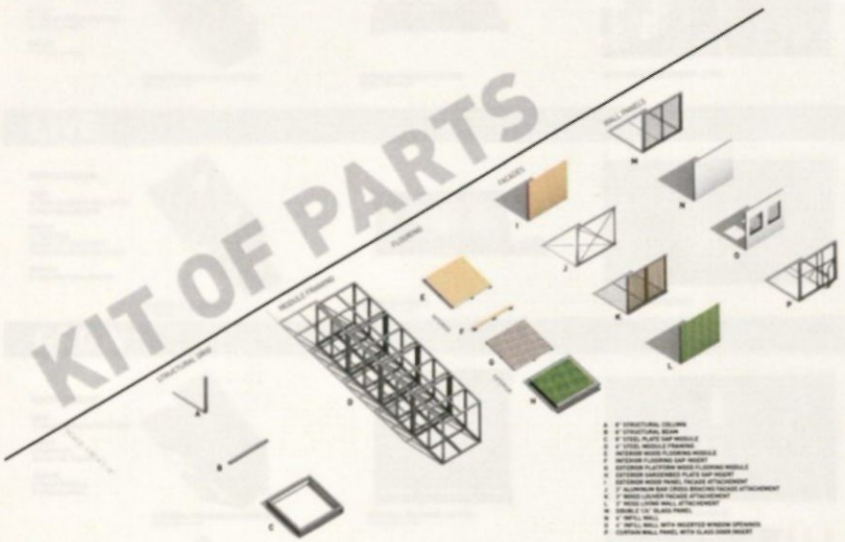
CATEGORY II : SITES LARGER THAN 4,000 SQFT

1. Category III sites can accomodate all programs
2. A minimum 30% Grow and Public Garden
3. Nodes for Pathway Connections: Must be able to accept multiple connections

DESIGN PROCESS






KIT OF PARTS

MODULES

OPEN

OUTDOOR GARDEN AXONOMETRIC

OUTDOOR GARDEN SECTION

OUTDOOR GARDEN PERSPECTIVE

LIVE

HOUSING AXONOMETRIC

HOUSING SECTION

HOUSING PERSPECTIVE

GROW

VERTICAL GROWING AXONOMETRIC

VERTICAL GROWING SECTION

VERTICAL GROWING PERSPECTIVE

STANDARD GROWING AXONOMETRIC

STANDARD GROWING SECTION

STANDARD GROWING PERSPECTIVE

SHOP

STANDARD SHOP AXONOMETRIC

STANDARD SHOP SECTION

STANDARD SHOP PERSPECTIVE

VERTICAL GROWING AXONOMETRIC

VERTICAL GROWING SECTION

VERTICAL GROWING PERSPECTIVE

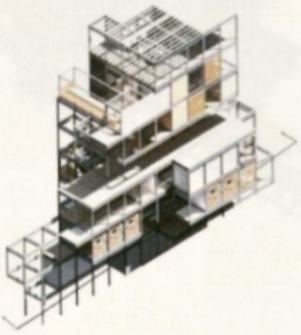
MECH

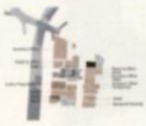
MECHANICAL AXONOMETRIC

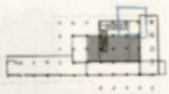
MECHANICAL SECTION

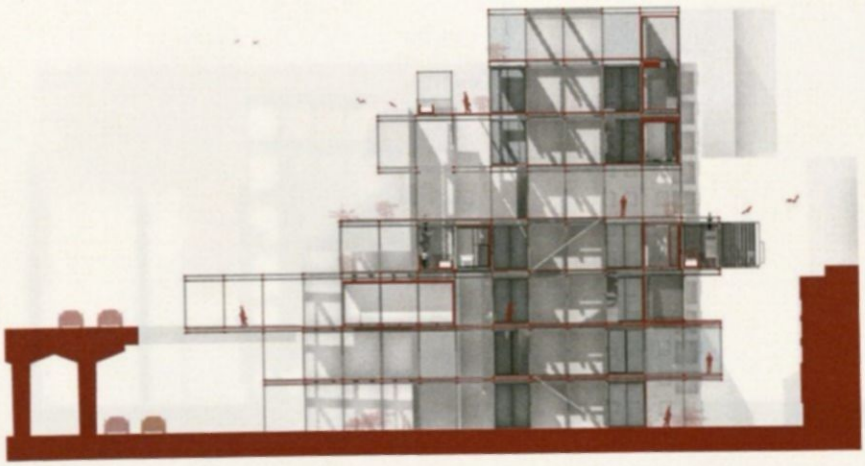
MECHANICAL PERSPECTIVE

SITE #56

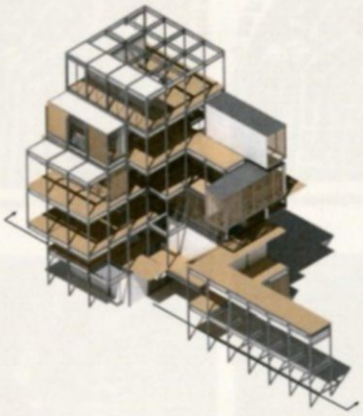


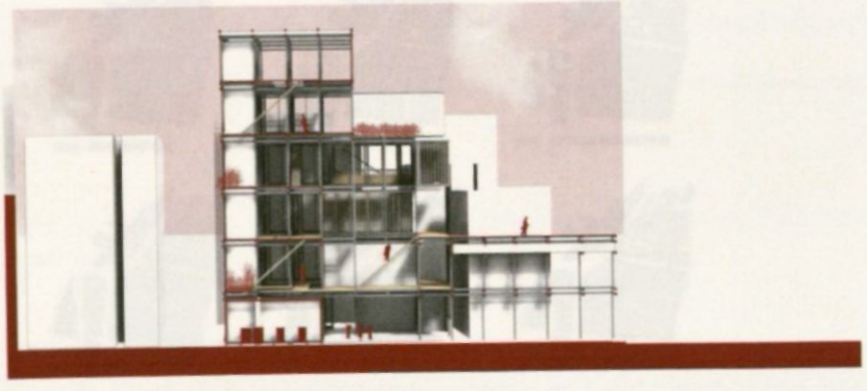






SITE #33





PATHWAYS

CONNECTIONS THROUGH CLOSEST PROXIMITY

LARGE VOID CONNECTIONS

CONNECTIONS TO CLOSEST LARGE VOID

LARGE VOID VORONOI DIAGRAM

DENSITY VORONOI DIAGRAM, BASED ON SURROUNDING BUILDING EXTRAPOLATION

STANDARD VORONOI DIAGRAM

2022 - CURRRENT DAY

2027 - 5 YEAR PROJECTION

2032 - 10 YEAR PROJECTION

2042 - 20 YEAR PROJECTION

2047 - 25 YEAR PROJECTION

2072 - 50 YEAR PROJECTION

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