AN ARCHITECTURE FOR ALTERING URBAN INHABITANT'S CURRENT RELATIONSHIP WITH AGRICULTURE

Integrating architecture, agriculture and urban inhabitants in the 21st. century urban landscape

by

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Emily Patterson

AN ARCHITECTURE FOR REDEFINING TORONTO'S FOOD SYSTEM

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ABSTRACT

As an alternative approach to production and distribution practices, the facility was designed to challenge the way urban inhabitants interact with agriculture within the city landscape. The architectural component of urban agriculture is strongly lacking; various social, environmental, and economic issues prevent growing practices from scaling up within the city. The ever increasing volume of food transported into the city on a daily basis needs to be re-conceptualized and paired with an architectural approach that fosters year round growing practices. A new way of thinking about where and how to grow food, as well as an alternative to distributing food throughout the densely populated urban landscape is crucial. By introducing a highly productive growing facility into an area of the city which has high land values, placed in a central dense location without ideal conditions for growing, the design intends to present a new way of thinking about where and how to grow and move food throughout the city. The intent is to expose contemporary production practices, provide engagement with various growing techniques and make such a place accessible within a densely populated urban environment.

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INTRODUCTION
ARCHITECTURE + AGRICULTURE + URBAN INHABITANTS 1.0

This thesis focuses on using architecture as a vehicle to alter the current relationships urban inhabitants have with agriculture.

The current relationship is one of disconnect. The twenty first century city landscape has removed nearly all visible food production processes (planting, harvesting, preparation, distribution), resulting in an absence of knowledge and awareness for the amount of energy and effort required to get food from a place of production to consumption. The energy demands of the production of food are rendered nearly invisible to the average consumer. The transportation and distribution which occurs prior to produce arrival in markets is immense, with emissions and fossil fuel depletion occurring at every stage of a plant's development.

The benefits associated with exposing, providing engagement with and easy access to agricultural production practices span far beyond the environmental discourse of the city. There is an abundance of "social benefits of urban agriculture which reach beyond local food miles and food security and encompass youth economic development and education" (Veenhuizen, 2007). The social, economic, and environmental discourses of the city all have the potential to strengthen with the introduction of agricultural production processes; yet, the existing urban landscape has generated significant barriers, challenging the wide spread implementation of urban agricultural practices.

All stages of the agricultural production process must emerge within the city landscape, as "food production, processing and consumption together constitute perhaps the most basic aspect of resilience for human communities" (Veenhuizen, 2007).

In order to answer the questions: how can architecture alter urban inhabitants current relationship with agriculture, it is critical to first attempt to understand the discourse of food in the contemporary city. The lack of agricultural practices and apparent processes of food production within cities has caused negatives affects on the body, earth and planetary survival. The disconnect between places of production and consumption can be seen as one of the major issues of the design of the city. These functions must occur in closer proximity to one another in order to generate significant change regarding how the Earth's resources are consumed. Numerous barriers exist which prevent/challenge the inception of urban agricultural practices into the current built fabric of the city; therefore, it is essential to consider alternative approaches to growing food within the city. Current partnering of agriculture and architecture within the city of Toronto require reconceptualizing; the hope is that the current paradigm towards food in the architectural discourse will improve.

By analyzing food's relationship with various discourses central to a modern, urban city within the western world, strategies and tactics will emerge which will influence the approach taken towards the design response. Understanding the relationships between food and the social, environmental, economic discourses of the city will aid in altering the current relationship urban inhabitants have with agriculture.

FOOD AND URBAN INHABITANTS

1.1

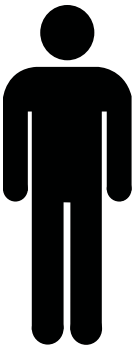
"As animals of nature and creatures of social comfort, our life in cities deprives us of the evolutionary instinct and beneficial trait that working together on the land can offer. Away from the very nature that supplies us with food, and the relaxing ambrosia of natural distractions, we seem only to tend to survival in the city" (Leung, 2013).

Basic survival is dependent on the provisions of shelter, food and clothing; yet, the modern, western world has produced cities which are highly segregated from places of production of such primitive needs. With technological advancements priorities have shifted from merely surviving to that of increasing profit, power and production. In recent times the "homo urbanus has ... delegated his quality of life to technology and consumerism, degrading the once more prominent role of nature" (Gil, 2013). Nature, and specifically food systems require greater prominence and should be placed more centrally within the discourse of the modern city. Considering, "there is nothing in human life and culture that is not touched in someway by food" (McAdam, 2012), it is evident that there is reason for concern.

The current urban condition has resulted from man's desire to 'satisfy his comfort'. As a result, "cities actively harm the physical environment and thereby make the entire region less able to sustain life" (Blassingame, 1998). Outsourcing is common practice and urban inhabitants have become highly unaware of the origin of most food they consume, clothes they wear, or materials within which they reside. Nowadays, it is far easier for mankind to purchase necessities, than to attempt to produce them. The entire concept of 'basic human needs' has become highly distorted and subject to global location. The technological dependency of the western world has made it nearly impossible to consider experiencing life while receiving only basic human needs. As society evolves, there must be some notion of returning focus to the natural environment.

Introducing natural systems into the urban environment contributes to improving urbanite's overall quality of life. All aspects of life are improved, as "it provides environmental services such as the purification of air and water, and limits noise pollution" (Gil, 2013). In addition to environmental improvements, the inception of nature into the city "encourages social interaction among neighbors, and can increase both physical and mental health, enriching urban life with emotions and meaning" (Gil, 2013). Growing food in the city must demand greater attention, as such practices satisfy requirements of sustaining life on the planet. Everyone is subject to basic human needs, and it is an unfortunate reality that urban inhabitants are becoming increasingly disconnected from the process associated with getting food from a place of production to consumption.

By introducing food production to the urban public realm and interior architectural spaces, great improvements and transformations will occur. The various processes of food production are noted for being "a key dimension in place-making, the strengthening of bonds between residents and the landscape that sustain them" (Veenhuizen, 2007). Its much more than just fuel for the body, it can be fuel for the community, used to strengthen relationship between members, as well as urban inhabitants connection to the environment.



Assumed consumption is that Torontonians consume vegetable comparable to the national average.

Fresh vegetable consumption ('06)		Toronto Population ('11)		City of Toronto Fresh vegetable consumption:
227 lb. / person / yr	×	2 615 060 people	=	593 618 620 lb. / year

Could Toronto Provide 10% of its fresh vegetable requirements from within its own boundaries? _ Rod MacRae

Figure 01: Torontonians vegetable consumption

Consumption Measures	Fair Earth-Share: 1 planet	World Average: 1.5 planets	High Consumption 3 planets
		per person	
Daily calorie supply	2,424	2,809	3,383
Meat consumption (kg / yr)	20	40	100
Living space (sq.m)	8	10	34
People / household	5	4	3
Home energy use gigajoules / yr.	8.4	12.6	33.5
Home energy use in kilowatt-hours / yr.	2,300	3,500	9,300
Motor vehicle ownership	0.004	0.1	0.5
Motor vehicle travel (km / yr.)	582	2,600	6,600
Air travel (km / yr.)	125	564	2,943
Carbon dioxide emissions (tons / yr.)	2	4	14
Life expectancy (yrs.)	66	67	79

CANADA

Getting to one-planet living
Jennie Moore, William Rees

Figure 02: Consumption Classification

FOOD AND THE CITY

CONCENTRATED DEVELOPMENT AND FOOD CONSUMPTION

In questioning what factors have the greatest influence over the world's current state, it is believed that "the root problem is the climatic explosion in numbers of the human species" (Blassingame, 1998). The population growth demands an unprecedented volume of resources within a confined area. The migratory patterns of this recent boom has been centered around urban areas and this shift from the rural to urban landscape has generated new conditions of concern for the 21st century. More people are living closer together, within cities; yet, the resources being consumed are traveling ever increasing distances to get from a place of production to consumption.

Food production and consumption have become two, isolated functions occurring at monumental distances apart from one another. This has given rise to the issue that the contemporary urban landscape is changing and requires additional functions to occur within the confines of the city. It is an unfortunate reality that "today, for most citizens of larger developed metropolises that link is invisible. The energy-hungry infrastructure associated with remote food production, transport and display is equally invisible" (Viljoen, Bohn, 2008). Out of sight, out of mind is no longer an acceptable state of being.

The local situation is such that "nearly 90% of Canada's population growth is concentrated in large metropolitan areas" (MacRae, 2010). With an ever increasing trend of population growth within and surrounding cities, it is evident that current practices regarding where food is produced, how it is distributed and where it is consumed will have to change. It is unfortunate that "so many aspects of our everyday lives are dependent on nature, yet remain removed from it ... nature can nurture in ways that space cannot" (Leung, 2013). The benefits associated with natural systems are not being realized to their full potential. Lackluster green space in the city and the whole notion of natural systems and agriculture in the city requires re-visioning as we enter the 21st century.

Many forces are acting against implementation of agricultural practices within the city; however, by resisting such adoption cities become vulnerable to such future concerns as fuel price increases and volatility, threats of food supply and health concerns of industrialized farm practices. (Veenhuizen, 2007).

Figure 03: Mega-region of Toronto, existing sprawl condition

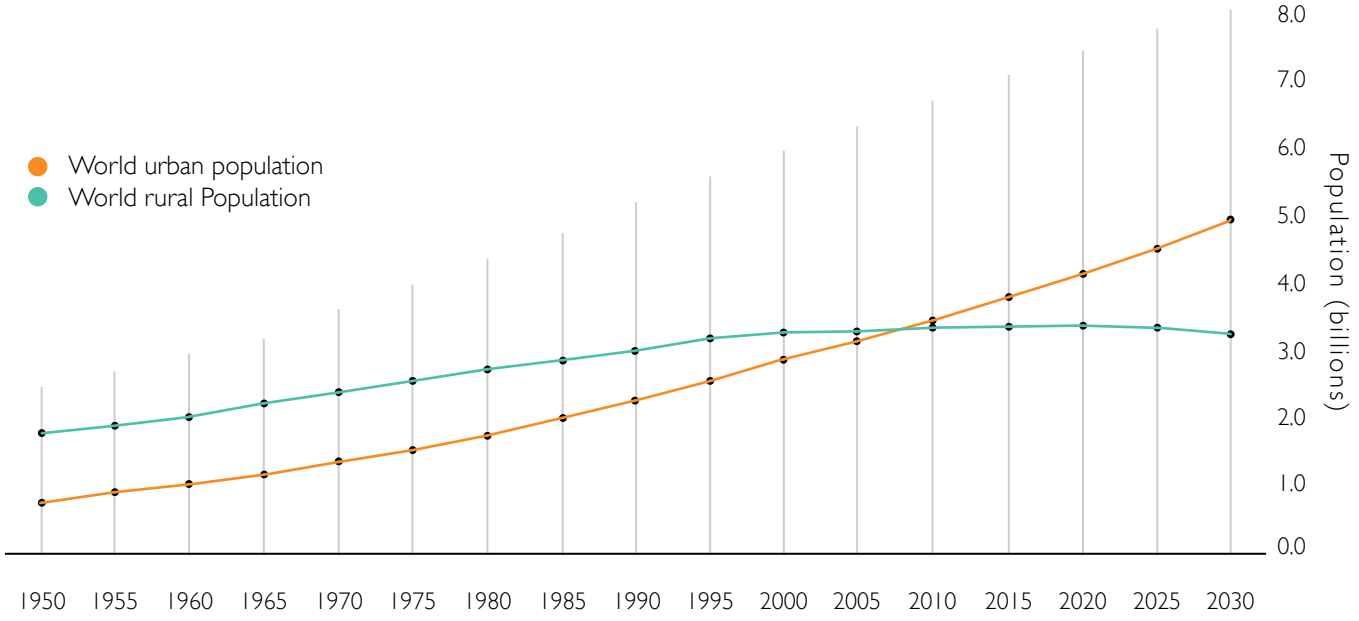


Figure 04: Urban - Rural Population of the world 1950 - 2030

FOOD AND THE BUILT FABRIC
BARRIERS OF IMPLEMENTATION

Food has played a large role in shaping the current city; however, "here in Canada we may struggle to find room in our newfangled urban lives for an old world concept like [agriculture] - particularly one that requires constant care and attention in a lifestyle that is riddled with distractions and competing interests" (McAdam, 2012). Agriculture struggles to find a place within the schedules of busy urban inhabitants, as well as within the physical space of the city. Many barriers can be identified which limit the widespread application of urban agriculture activities within the city of Toronto. Table 1.0 has a compiled list of issues identified by local urban agricultural experts which identify issues urban growers must face when implementing new urban agricultural initiatives, both on rooftops and the ground.

A number of categories have been generated which encapsulate all of the issues to be considered when implementing urban agricultural growing practices. The challenges cover issues in the realms of structural, functional and aesthetic, all issues within the capacity of the architectural discourse. In moving forward, it is critical to determine if traditional means of agriculture are desired. Considering what approach will yield most success, productive places enclosed within architectural spaces appear to eliminate a number of barriers. Having to mitigate all of the identified forces acting against urban agricultural inception, the approach to scaling up should look "to reshape what and how food is grown, moved and consumed" (Lang, 2010). Agriculture is a significantly old practice, and given the capabilities of current technology, there is much potential for such to be adopted into the agricultural discourse and urban landscape. Pairing agriculture with architecture has the potential to fit the unpredictability of the natural environment within the rigid confines of the structured, urban landscape. Bringing the function of production closer to a place of consumption redefines the presence of food within the 21st century built fabric.

Category	Barrier	Description	Application		Architectural Implications	Report identifying issue		
			Roof top	Land		MacRae	Nasr	Whitinghall
Access Barriers	Access	Daily access to rooftop required, not always practical given buildings may be vacant on weekends Growers need daily access to elevators / lifts to move produce and materials up / down	■		Stair / elevator, separate entrance Private elevator access	■	■	
Economic Barriers	Capacity of Rooftop	Load barring capacity of existing structure may require additional support	■		Increase structural capacity	■		■
Environmental Barriers	Compatibility with Adjacent Land Uses	Agricultural practices must be compatible with adjacent land uses, proximity might restrict locations		■	Land use / planning issue	■		
Equipment Barriers	Competition with development	Using high cost urban land for food production is a challenge		■	Land use / planning issue		■	
Infrastructure Barriers	Cost of installation and maintenance	Due to the fact that UA is a relatively new practice, initial start up costs are relatively high.	■	■	Compatibility w/ existing materials			■
Land Use / Planning Barriers	Drainage system	High initial costs required for installation. Rooftop drainage system must coordinate with host building.	■	■	Drainage system, to hook up w/ exist.			■
Legal Barriers	Equipment	Lack of basic tools and equipment for cultivation, planting and harvesting	■	■	Structure required for storage		■	
Structural Barriers	Fencing	Lack of enclosure exposes growers to possibility of theft, also required on rooftops for liability issues	■	■	Fencing structure required		■	
	Hydro Corridors	Official plan does not permit agriculture practices in hydro corridor spaces		■	Land use / planning issue	■		
	Insurance / Liability issues	Coverage for growers using rooftops will be needed. Liability issues for growers using rented land.	■	■	Policy / planning issue		■	
	Land Inventory	Land inventory of plots available for agricultural practices currently does not exist.	■	■	Land use / planning issue			
	Land Taxation	Land is being taxed at a high rate, discouraging urban growers from implementing practice		■	Policy / planning issue	■		
	Leasing Agreements	No formal leasing agreements between landlords/land owners and growers currently exist	■	■	Policy / planning issue			■
	Power	Support functions require power - lighting, ventilation, record keeping, harvesting in dark	■	■	Bringing power to site		■	
	Soil Quality Issues	Remediated landscapes will require new soil to be delivered to site Means of enriching the soil required		■	Material selection, maintenance, weight of medium	■		
	Short Term Access to Land	Ensuring long term access requires changes to be made to policies and bylaws		■	Land use / planning issue		■	
	Sanitation	Lack of washroom facilities	■	■	Facility structure required		■	
	Support Facilities	Lack of facilities available for food production, washing/preparing, canning, dehydrating	■	■	Facility structure required		■	
	Water Quality Issues	Lack of access to water and sanitation can limit or even preclude urban agriculture City / building hook up may be required		■	Integrate with building's utilities		■	■
	Zoning	Currently, only utility corridors contain any designation relating to agricultural practices Zoning the land for commercial food production will require policy changes	■	■	Land use / planning issue		■	

Table 01: Literature Review Summary. Barriers challenging the inception of Urban Agricultural Initiatives

FOOD AND EXPOSURE

CURRENT PARADIGM TOWARDS FOOD IN URBAN ARCHITECTURE

Food has a dominant presence in the architectural discourse. Nearly all typologies are designed with spaces which will foster food preparation tasks, as well as spaces for consumption. Places such as kitchen/dining areas, restaurants, grocery stores and the Ontario Food Terminal all have taken a similar approach regarding how the object of food flows from a place of production to consumption. The link between the two functions is vital, "cities and agriculture are inextricably linked, but today, for most citizens of larger developed metropolises that link is invisible" (Viljoen, Bohn, 2008). This invisibility is the result of a front of house / back of house approach which essentially conceals the processes of food's transformation from the public. Mainly for sanitary reasons, restaurants and grocery stores employ a system where produce is delivered and contained until requested or needed. The Ontario food terminal employs a completely different tactic, although yielding similar results, completely prohibits people from entering the property. Millions of pounds of food pass through this space each day and the public, even if desired, are not able enter this place. Such actions completely support the idea that our food processes are completely removed from the public eye. It is crucial for the public to become aware of all processes required to get food to a proper state for consumption. Figure 03 highlights how urban inhabitants current relationship with agricultural practices are focused on traveling to / from the market and personal storage, and are oblivious to earlier stages of food production.

Figure 05: Urban Inhabitant's current relationship with Agricultural Practices

Figure 06: Ontario Food Terminal

Figure 07: Toronto Restaurant

Figure 08: Grocery Store

RESPONDING TO FOOD + URBAN INHABITANTS
THROUGH DESIGN

The connection between urban inhabitants and food requires consideration if an architectural response is to be proposed which will alter their current relationship with agriculture. 'Urban inhabitants' is a vague term, spanning a variety of profiles. This thesis is focusing on:

the community member
- inhabitants residing in the community directly surrounding the site

the transit rider
- inhabitants riding on the Yonge Subway line and the Eglinton Metrolinx line

urbanites in transition
- inhabitants traveling through and/or by the site

These three profiles would have very different experiences with a place of agricultural production. The intent is that urban inhabitants would be exposed to, engage with and have easy access to the various processes of agricultural production. In doing so, users of the space would return focus to the natural environment, within a densely populated urban location. They would become part of the force altering how food is grown, moved and consumed within the city and would have greater awareness of the energy and effort required to get food from a state of production to consumption. With awareness of the impact their food choices make, the hope is that more sustainable measures will be taken regarding food selection.

Figure 09: Urban Inhabitant's

ENVIRONMENTAL DISCOURSE 1.2

By analyzing the environmental discourses of the modern and urban city, a greater awareness can be developed as to why urban inhabitants relationship with agriculture has evolved into a state of disconnect. The lack of natural systems within the urban environment has caused a physical separation between agriculture and urban inhabitants. Food is no longer produced and consumed in close proximity; therefore, the distribution portion of the production process has become pivotal. The impact of this stage of transportation is detrimental to the environment. The current model of importing millions of pounds of food into the city, on a daily basis cannot sustain indefinitely. Therefore, an alternate approach to the current model of food production and distribution is vital to ensuring high quality of life for urban inhabitants.

"Since food and farming account for at least 30% of worldwide greenhouse gas emissions, the high dependence on fossil fuels needs to be reduced. People need to connect again to the understanding of growing, preparing and cooking food, so that their fragility towards the dependency on the food system can be reduced" (Veenhuizen 2007)

ENVIRONMENTAL IMPACT
OF FOOD DISTRIBUTION

Food not only impacts the body, it also effects the state of the environment. Urban inhabitants must have a greater awareness of the fact that "25% of U.S. food transport greenhouse gas emissions are associated with delivery of food to consumers, and the situation may be more acute in Canada" (Nasr, MacRae, Kuhns, 2010). We have developed a highly unsustainable food production system which greatly contributes to environmental degradation and "the earth's weakening capacity to absorb greenhouse gases" (Assadourian, 2013). It is believed that methods of food production will experience a great shift in the coming years; most evident being, where food is to be grown.

Innovative approaches to sustainable food distribution within cities is crucial. Growing and distributing food within the confines of the city, utilizing public transportation, would considerably lessen the impact of current food importing practices. Introducing places of agricultural production in central locations, where locally grown food can be easily accessible and transported, would greatly alter the current approach of food distribution.

Canada has the capacity to produce an abundance of food within the confines of the nation. The biocapacity available per person far exceeds the world average. This begs the question, why is Canada's importing on the rise? Our food system is contributing to increasing our ecological footprint. As seen in figure 10, Canada far exceeds the world average for the number of global hectares (Gha) demanded / person, and within that "about 25% of U.S. food transport greenhouse gas emissions are associated with the delivery of food to consumers, and the situation may be more acute in Canada" (Nasr, 2010). This all contributes to the argument that our food system needs to shift from one of remote sourcing to local production.

Ecological Footprint per country / person 2008

This comparison includes all countries with populations greater than 1 million for which complete data are available (Global Footprint Network, 2011).

Key

- Built-up land
- Fishing
- Forest
- Grazing
- Cropland
- Carbon

Global Hectares (GHa)

Unit for measuring our demands on the Earth (ecological footprint) and the ability of the Earth to supply our demands (biocapacity). (Volunteer Compass)

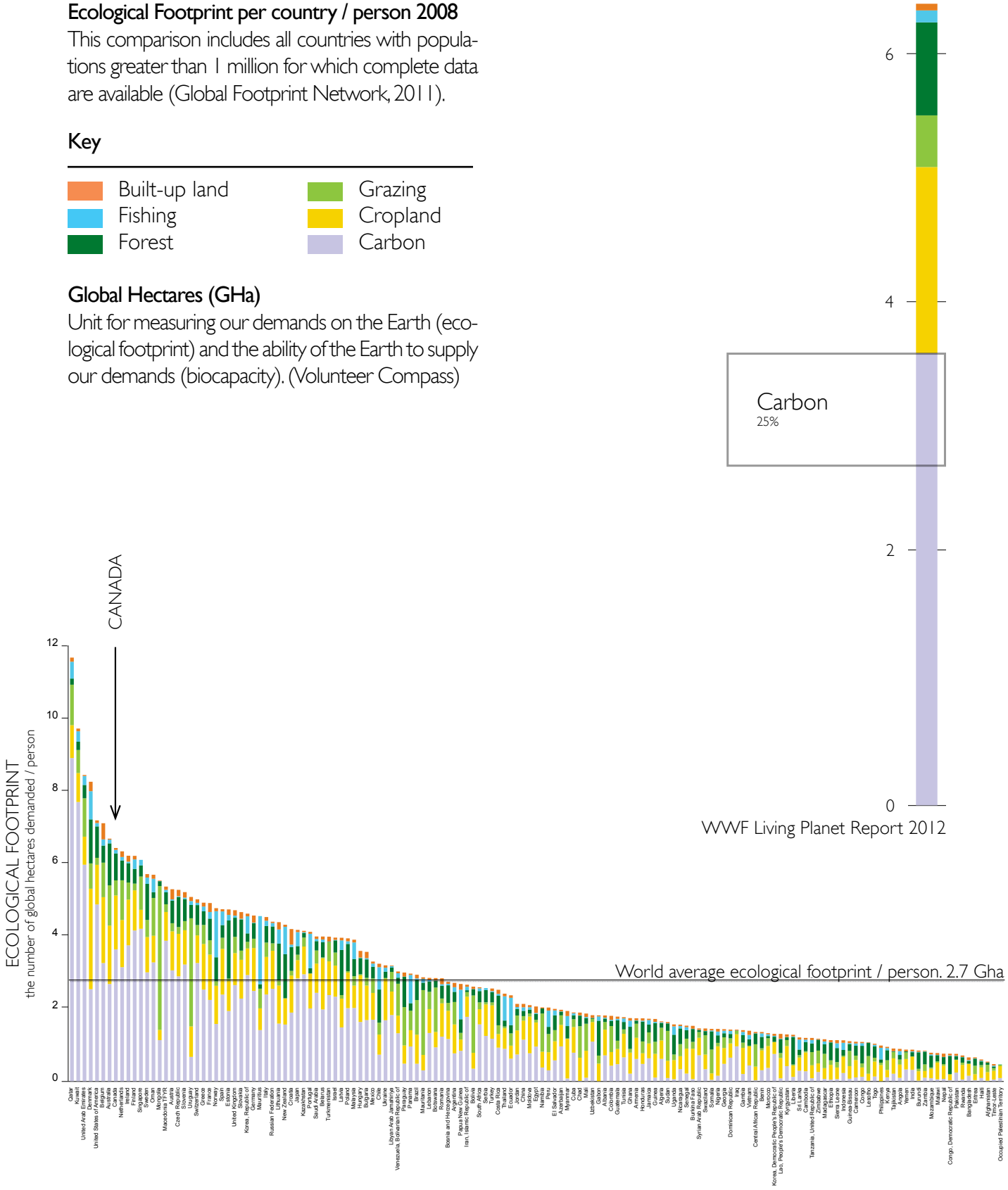


Figure 10: Ecological footprint per country / person, as of 2008

OVERINDULGING
ON THE ENVIRONMENT'S RESOURCES

Global trading practices have enabled nations to "demand more bio-capacity than they have available within their own borders. This means they are liquidating their national ecological wealth, relying through trade on the bio-capacity of others" (Moore, Rees, 2013). North America demands greatly exceed the bio-capacity available on the basis of a fair earth share. Canada, ranked 4th as having the greatest number of global hectares available / person, has created highly unsustainable importing practices.

Within the confines of Toronto, "the average imported food is traveling about 4500 km .... much of it by truck" (MacRae, 2010) (refer to figures 11, 12). The energy associated with this distribution practices of food is immense. When considering all of the energy required "for growing, watering, processing and transporting food, producing 1 cal of food cost us anywhere from a 7:1 - 10:1 ratio in energy consumed" (McAdam, 2012). Light must be shed on the severity of the problem, as such practices cannot sustain indefinitely. We are essentially "living on borrowed time in the world fueled by cheap oil and diminishing supplies of clean water and arable land" (McAdam, 2012).

The brief period between the years of 2005-2008 "has reinforced how the dominant 20th century productionist paradigm is running out of steam"(Lang, 2010); during this time that food prices steadily increased until rocketing in 2007. The relationship between people, agriculture and the planet has been entirely restructured, which can be seen through food importing practices. A shift has taken place from the local / national to continental / international. Seasonality is no longer a concept of concern as food can be imported from anywhere at any point throughout the year. The elimination of seasonality is a huge issue of concern; yet, people have become accustom to such luxuries. Year round supply fulfilling demands of the consumer can not sustain through current practices.

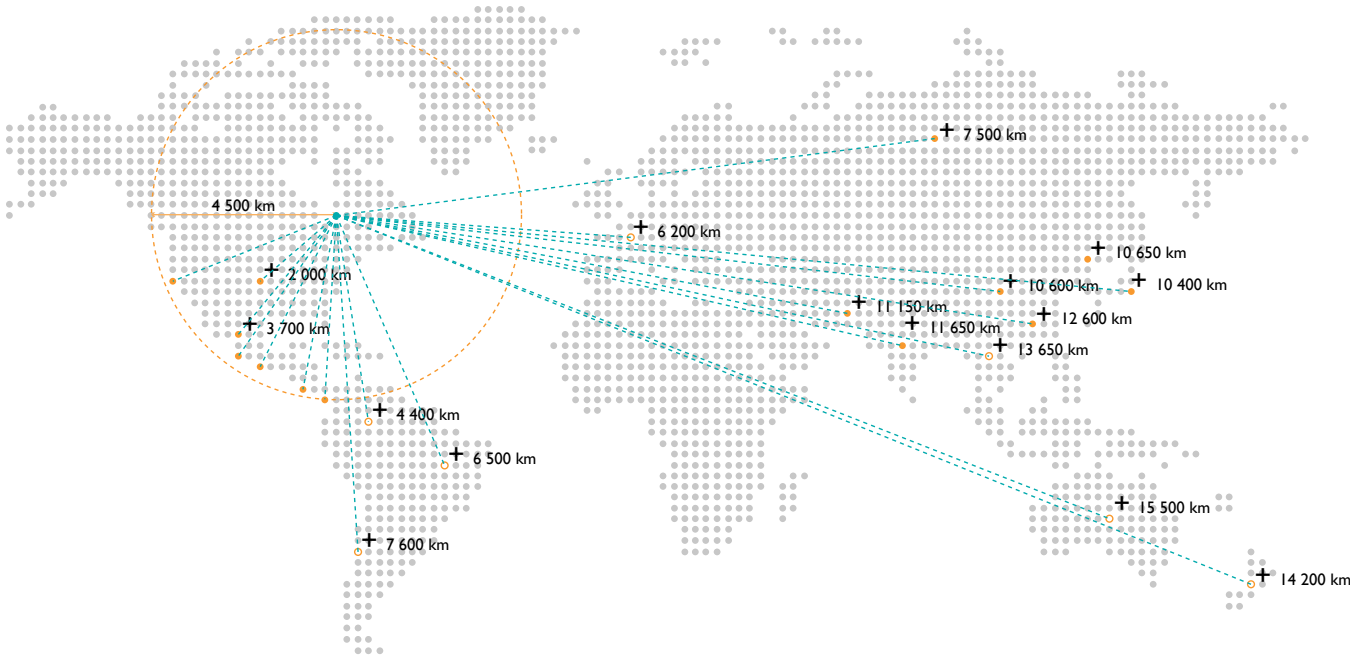
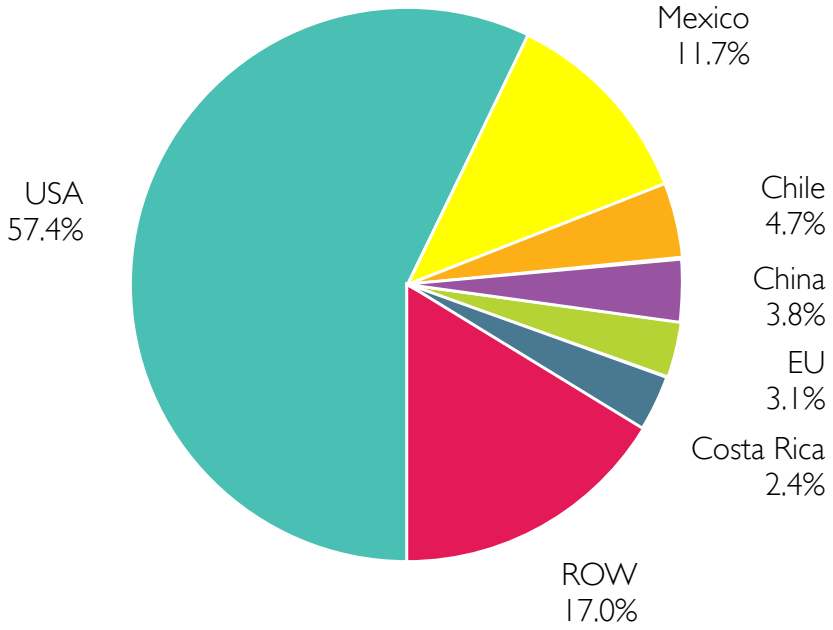


Figure 11: Canada's top 10 food trading partners, importing and exporting (2008)



Statistics Canada and AAFC calculations

Figure 12: Canadian Fresh and Processed Fruit and Vegetable Imports by Country of Origin (2010)

ENVIRONMENTAL EXPIRATION
OF INFINITE RESOURCES

It is believed that the coming years will be accompanied by fundamental issues of concern which will have great affect over the 21st century food system, such being climate change, water, biodiversity, energy / fossil fuels, population growth, wastes, land, soil, labor and dietary changes (Lang, 2010), which will all contribute to inhibiting the amount of food which will be available. These issue almost certainly cannot be addressed individually; they must be considered and handled in a collective and comprehensive manner in order to yield successful results. Action must be taken relatively soon, as "no more than one or a very few decades remain before the chance to avert the threats we now confront will be lost and the prospects for humanity immeasurably diminished" (Blassingame, 1998). It is unfortunate that economics, politics and power have all lead humanity to a highly unsustainable state of being. Yet it is individual choice which will determine how everyone will advance and overcome the destructive path we have been lead down. As a collective, we must make better choices because "the trajectory of city growth is downward and destructive - towards greater sprawl, sharper divisions between social groups, increased environmental damage, and further resource depletion" (Blassingame, 1998). Food production is connected to so many aspects of life and by pursuing / supporting urban agricultural practices, positive change will occur.

ENGAGING ENVIRONMENT
THROUGH ARCHITECTURE

There is very little "surprise that architectural discourse has taken a biological turn in recent years, the over-determined result of its own culpability in the degradation of the planetary environment" (Sorkin, 2013). Professionals are recognizing the need for alternative practices, as current approaches which address issues of food security have been disappointing. Sustainable design can be seen as an approach which is "loosing a sense of beauty and complexity, and the ability to respond to earth, giving way to mechanical sustainability devoid of human engagement" (Titman, 2013). Lack of engagement is a large issue which requires redesign. Urban inhabitants are becoming increasingly removed and disconnected from natural systems and agricultural practices, which translates into a lack of concern of the amount of energy and effort required for growing food. The 21st century is "an era of elevated environmental consciousness, [just as] no building can escape the consequences of its use of energy and materials, or of the wastes it produces" (Sorkin, 2013), no consumer should be able to escape the increasing amount of energy demanded to produce food through current practices.

RESPONDING TO THE ENVIRONMENTAL DISCOURSE
THROUGH DESIGN

Food has been a focal point as it has been identified as "a major factor in reducing a city's ecological footprint" (Viljoen, Bohn, 2008). A problem as complex as Toronto's food system requires an approach of different scales to erect change within the established city. As a whole, Toronto needs to develop a strategy where multiple places to grow food exist, and are in cohesion with one another. Year round growing strategies are essential as current seasonality limits growing potential to a fraction of the year. In order to develop system which can sustain throughout all seasons, architectural solutions are required.

APPROACH OF DIFFERENT SCALES
FOR AGRICULTURAL IMPLEMENTATION

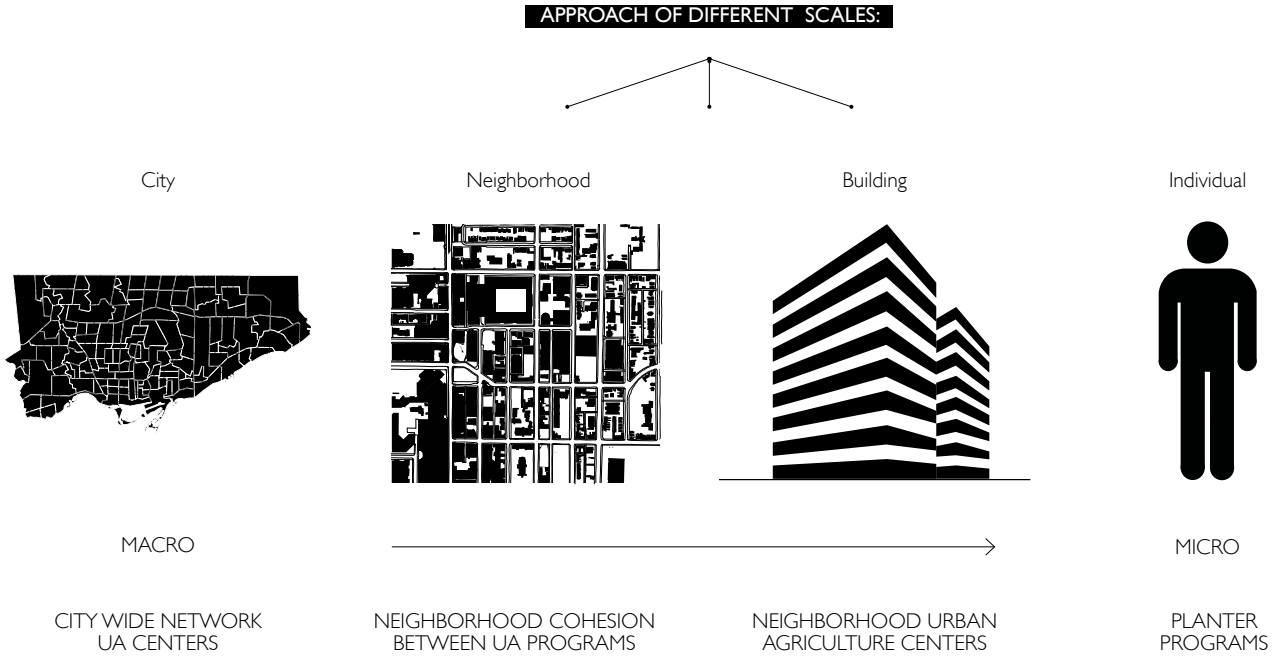


Figure 13: Approach of different scales of agricultural implementation

NEIGHBOURHOOD APPROACH

Through analyzing neighborhood initiatives, it is evident that not all areas regard and value urban agriculture equally. It is crucial for every neighborhood to have an appreciation for locally grown food. Alternate initiatives must be conceived which will appeal to all demographics throughout the city, enticing more than just low income, priority neighborhoods. By introducing contemporary agricultural practices, which use a high-tech approach to cultivation, the hope is that typical connotations associated with traditional agricultural approaches will be altered.

BUILDING APPROACH

Exposure which reveals the processes of agricultural practices must be introduced into various buildings throughout the urban landscape. Buildings designed to publicize innovative approaches to producing food within the urban environment allow residents to interact with and become better educated about agriculture and food processes. Demonstration areas are important, as they will allow for small scale interaction between alternative growing systems and urban inhabitants. The architecture of an agricultural typology should aim to foster social connectivity, agricultural productivity, and easy accessibility.

In responding to issues of the environmental discourse, it is evident that a place designed for agricultural production must truly become immersed within the various layers of the city, especially the layer of transit. To alter the current model of urban agriculture, easily accessible places of food production must be introduced throughout the city landscape. With current practices, it is impossible to select a site in an urban environment with desirable growing conditions, attached to the transit system and allocate to agricultural practices. Conditions for growing are mainly consistent throughout the city, as a lack of soil, space and light are prevalent throughout the dense, urban landscape. Therefore, spaces within the city which do not have environments that will foster agricultural production using traditional practices require alternative growing techniques. Locations in the city without an abundance of space, soil or light can be adapted to become productive landscapes. Interior growing practices, using hydroponic means of production will provide year round production capabilities while evading the environmental limitations of a Canadian climate.

Challenging the issue of distribution will have a great impact on the environmental discourse of the city. If agricultural production was implemented on a wide scale basis, less transportation would be required to deliver food to the city. Although local food production would result in a reduction of emissions, more energy will be required to create year round, idyllic growing conditions.

An architectural response containing a balance amongst experience and functionality is desired. The intent is to showcase the beauty and complexity of natural systems throughout the agricultural production process while producing desired volumes of crops.

SOCIAL DISCOURSE

1.3

Through investigating the social discourses of the modern, urban city a better understanding can be developed as to why urban inhabitants relationship with agriculture has evolved to it's current state. As well, a greater understanding will aid in generating an approach where urban inhabitant's relationship with agriculture can be altered through the apparatus of architecture. The lack of presence of agriculture and natural systems within the city has yielded places which are socially disconnected, increasing urban inhabitant's retreat indoors. As well the heightened demand for convenience aids in minimizing the urban population's desire to grow their own food.

In trying to strengthen and re-conceive urban inhabitants relationship with agriculture it's necessary to bring urban agricultural practices into the 21st century. The following will identify how urban inhabitants are lacking: places which foster social connection, the desire/time/effort to grow a portion of their own diet and the social skills to reconnect community members. Food and agricultural practices provide an answer to all of these scenarios. The current partnership of agriculture and architecture within the city of Toronto require reconceptualizing; the hope is that the current paradigm towards food in the architectural discourse will improve a satisfy society's current demands.

"UA also strongly supports social (human) resilience ... farms can become places of adaptive learning and civic engagement, as people of different ages, ethnicities, races and income levels come together to grow food, learn new gardening skills, encounter new foods or engage in problem-solving and collective action for the benefit of the garden and the gardeners" (Veenhuizen 2007).

LACK OF COMMUNITY ENGAGEMENT
PRODUCT OF HIGH DENSITY LIVING

"Can the socially vitalizing role of nature be brought back to our urban lives to re-nurture a sense of our human instinct and bring us closer to the otherwise ignored 'other' - neighbor, animal, plant or stranger" (Leung, 2013).

The concept of community within the urban landscape has been altered as "we now spend much of our free time indoors - clear evidence of the retreat into the private realm we pursue. This migration indoors is a new trend, alienating us from nature and from other human beings, yet it fulfills our desires of control, comfort and independency" (Gil, 2013). As we become increasingly separated from the natural environment, our connection with other urban inhabitants follows in a similar fashion. It is essential for places to be designed in the modern, urban landscape which fuse people and nature back together. By using the function of growing food, people are able to converge on common, public ground to discuss issues which everyone can relate to, no matter what ethnicity, age or gender.

Food is essential in every being's life and can already be credited with bringing people together for the purposes of consumption. However, the city lacks places which unite inhabitants to focus on the processes associated with growing food. Priority neighborhoods have proven that "the presence of nature in a city ... encourages social integration among neighbors" (Gil, 2013); yet, the lifestyles condo inhabitants have come to fashion do not often incorporate agricultural practices. Urban agriculture is a missing ingredient in the modern city, amongst the concrete / glass / steel, living systems must emerge.

SUBMERGED IN THE VIRTUAL
DISCONNECTED

In the western world, it is evident that an increased dependence on technological devices has emerged within the 21st century. As a result it is "reducing our capacity to interact with physical spaces or objects ... putting the landscape back into architecture in a pastoral way would allow us to do this" (Titman, 2013). Nature and agricultural practices passively stimulate the senses greater than that of any device.

LACK OF TIME / DESIRE TO GROW

"Here in Canada we may struggle to find room in our newfangled urban lives for an old world concept like this [agriculture] - particularly one that requires constant care and attention in a lifestyle that is riddled with distractions and competing interests" (McAdam, 2012)

Toronto is a city that is constantly on the move. It is understandable that people are under the assumption that urban agriculture required a considerable amount of time and effort invested to yield desirable results. However, the luxurious and convenient food system currently in place will not sustain. Alternative methods of food production are required in order to ensure people can continue to eat nutritious food products. The reality is that "climate created shortages, coupled with escalating populations, means that food will become less available even to the well off. We would all be wise to learn some food-growing skills to pad our menus" (McAdam, 2012). Somewhere in the not-so-distant future, growing food for personal consumption will become common practice. Everyone will have to make time, as "necessity (through hunger) is a powerful motivator, but food takes time to grow, and more important so do the food networks we may urgently need long before all of us are ready"(McAdam, 2012).

The lack of desire to grow food for personal consumption is evident in the placement of Toronto's urban agricultural initiatives. Community gardens are strategically placed in close proximity to and within low income and priority neighborhoods. The layout of these gardens supports the notion that people who have the money to buy food are less likely to participate in community garden initiatives. Through supporting urban agriculture, urban inhabitants are committing to improving environmental degradation. A paradigm shift is crucial as "this is a global, no-end-in-sight Victory Garden project that needs a global, community and individual commitment to protect and nurture our agriculture land, and to produce food in every precious spaces we have" (McAdam, 2012). No one should consider themselves able to escape the act of growing food for personal consumption. No matter what social class, everyone will be affected when the current food distribution system is interrupted.

It is an unfortunate reality that "the lack of value, monetary and cultural assigned to the job of growing food they keeps people off the farms" (McAdam, 2012). Farmers are responsible for feeding cities and providing people with a portion of their basic human needs; yet, the profession continues to be regarded as a poor man's practice.

RESPONDING TO THE SOCIAL DISCOURSE
THROUGH DESIGN

There are two aspects of the social discourse which are intended to be addressed architecturally.

First, the disconnect amongst urban inhabitants will be directly addressed through site design, program and circulation. Developing a place where the production of food is the focal point, allows people of every race, religion, gender and age to converge over a universal topic. Providing spaces which will foster connections amongst all types of urban inhabitants, community members, transit riders and urbanites in transition, will attempt to reconfigure the social disconnect seen throughout the modern, urban landscape.

Second, the issues urban inhabitants have with lack of time, space or resources to grow will be accommodated through the design of formal and informal growing spaces throughout the site; providing an opportunity for people to participate in short or long term involvement with agricultural practices. The intent is to provide the opportunity for people to engage with different stages of agricultural process through a variety of architectural techniques. By varying the levels of exposure and engagement to urban inhabitants, and placing the site in a central, highly accessible location, the intent is that people will become exposed to and aware of issues surrounding food production.

ECONOMIC DISCOURSE

1.4

Understanding the economic discourse of the city provides a much clearer reasoning as to why urban inhabitants relationship with agriculture has evolved to it's current state. Recognizing the powerful influence of the economy will shed light on why urban agriculture exist dominantly within low income / priority neighborhoods. A large part of this has to do with the term value.

Value, as the importance or usefulness of something, is not held in high regard when considering urban agriculture. Despite repeated calls over the last 20 years to expand food production in the city of Toronto, the government has responded only modestly. Urban agriculture successfully exists throughout various communities within the city on a small scale, independent basis. The presence of urban agriculture initiatives, can be credited to institutions and community organizations.

Public initiatives in central, desirable location are essential for altering the current relationship urban inhabitants have with agricultural practices. Such initiatives are in constant competition with economic endeavors, e.g. commercial and residential development, which yields considerably higher profit margins. The value associated with locally grown food and agricultural practices cannot be quantified, it carries far greater benefits than the monetary value calculated on a sq. ft. basis.

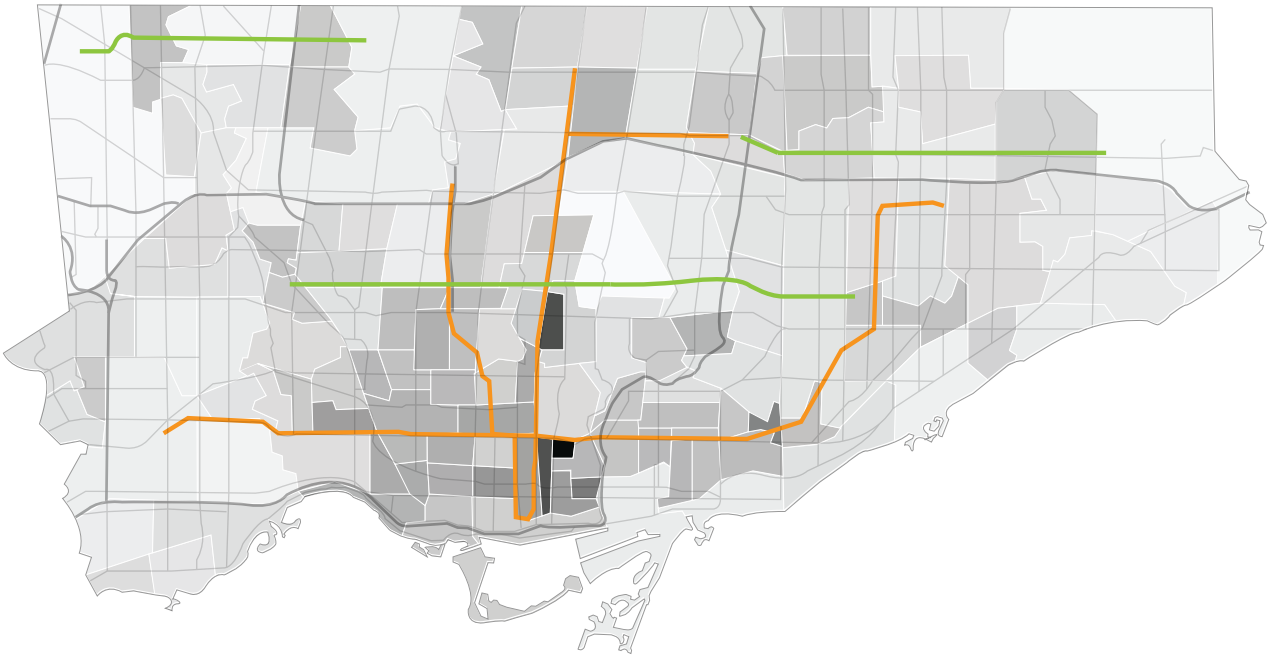


Figure 14: Map of Toronto, showing population density and location of public transit

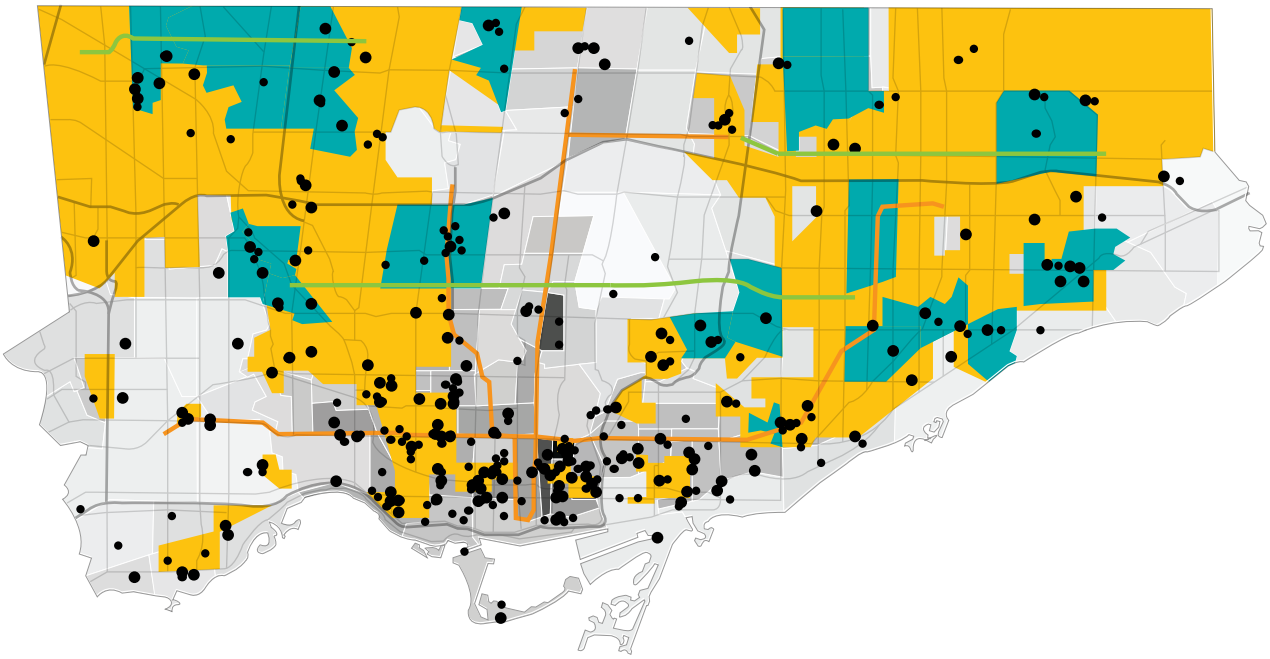


Figure 15: Map of Toronto, showing low income / priority neighborhoods, and UA + community gardens

LOW INCOME / PRIORITY NEIGHBOURHOOD
CONCENTRATION OF URBAN AGRICULTURE INITIATIVES

The lack of centrally located urban agriculture initiatives often renders them invisible to the city as a whole. Placement of successful urban agricultural initiatives remains immersed throughout the city on a small scale, independent basis. What is required to evoke change is central presence amongst all of the discourses of the city, social / economic / environmental, as well as being easily accessible by transit. In order for urban growers to obtain land they have to look beyond conspicuous sites, often selecting left over, oddly shaped parcels of land in order to make their operation feasible. Urban agriculture has a stigma attached to it, which renders it "an economically 'weaker' form of land use in urban development" (Veenhuizen 2007). In order to create change urban agriculture must acquire land where there are "a large number of urban stakeholders with competing interests ... and their views on local development differ widely" (Veenhuizen 2007). Implementing agricultural practices into urban centers is undoubtedly more difficult than that of traditional practices; yet, the need and potential for innovation is greater. This is the result of there being "a higher intensity of technical innovation, more diversity in farming types as well as new forms of organization and cooperation" (Veenhuizen 2007).

The economic discourse presents a huge challenge for agricultural practices to face, as they look to break into the market. However, urban places of agricultural production will present "innovation through intensification of urban and peri-urban horticultural systems, which can be described as maximizing output from minimal space" (Veenhuizen 2007). It is understood that a business strategy is necessary for comprehending the feasibility of this type of project in an urban setting. Therefore, a model focusing on "civic agriculture [which] comprises various forms of direct marketing, such as markets, community supported agriculture, or cooperative production and distribution, all of which closely connect food producers and consumers" (Veenhuizen 2007) will all be incorporated to ensure the practicality of the proposal.

Population Density:
- + 40 000
- 25 000
- 20 000
- 15 000
- 10 000
- 5 000
- 0

- Existing Subway Transit Lines
- Future Metrolinx Extensions
- Priority Neighborhoods
- Low Income Neighborhoods
- Urban Agriculture + Community Gardens

RESPONDING TO THE ECONOMIC DISCOURSE
THROUGH DESIGN

The economic discourse could be the largest barrier agricultural production processes face when looking to expand into urban locations. High price of land, competing interests, 'value' of land uses, are all issues raised when looking to incorporate agriculture into urban areas. Therefore, an architectural response which will adequately challenge the barriers presented will need to have significant volumes of production. Intensification is crucial, maximizing production per sq.ft. will be required in order to justify centrally locating an urban agricultural facility on high priced land. The design response will also contain a business model, outlining how the facility is to operate (food production, preparation, distribution and marketing), critical to determining the potential of the proposal.

AGRICULTURAL DISCOURSE

1.5

"Since agriculture began some 10,000 years ago, it has been shaped and spread almost exclusively by the farmers themselves, and for the most part without the help of scientific research or extension agencies. Farmers came up with the ideas, carried out experiments and arrived at their own conclusions. Innovation by farmers was the way forward: this local innovation, indeed, was the dynamic process that led to the development of farming traditions" (Veenhuizen, 2007).

IDENTIFYING THE NEED 1987

Our common future, as presented in 1987, was a defining element of environmental concern. Within this report numerous factors for a sustainable future were identified, including urban agriculture. The report critically analyzed the relationship between 'people, resources, environment and development' and brought attention to processes which were impeding the planet's ability to sustain or improve the current 'quality of life'. The 'Urban Challenge' presented figures demonstrating the unprecedented growth rates of cities and the resource requirements needed to sustain quality of life for current and future generations. This report identified 27 years ago, the challenge of sustaining food security within urban areas was to find a way to meet the demands of the inhabitants of the concentrated development. How the increasing population was to access resources required improvement; yet, the complexity of the global trading system has continued to increase. Today, great distances are traveled to get food from the farm to the table. The report specifically stated "food security required attention to questions of distribution" (Our Common Future, 1987), although acknowledged as problematic, food distribution has been practiced more intensively since initially stated in the Brundtland report. In addition to recognizing the problems of food distribution, the report identified urban agriculture as a practice which "could become an important component of urban development" (Our Common Future, 1987). Nearly thirty years later, it is questionable whether alternative agricultural practices have become mainstream, or if they remain as notable initiatives.

AGRICULTURAL EVOLUTION

In attempting to define and project the direction of urban agriculture in the 21st century, it is crucial to first understand how the practice of agriculture has evolved. Agriculture, was once a practice heavily anchored to socio-cultural factors of place; however, today in the western world it is common for people to be completely oblivious to the effort, energy and resources required to grow and distribute food for consumption. It is evident that today, agriculture has "rapidly developed, along with the processing of food, to become commoditized, industrialized and globalized within the last 50 years" (Maynard, Nault, 2005). The socio-cultural element is nearly invisible regarding the practices of cultivating food; yet it has been successfully retained in the act of consumption. Food as a means to represent people, places or traditions and to generate social gatherings has transformed. The work required prior to meal preparation is rendered nearly invisible in the modern, developed world. The constant demand for more food, more variety, extended seasonal availability has demanded higher yields from farmers. Fortunately, increased production has been possible as a result of technological advancements. The "introduction of the combustion engine and electricity for power, the advent of synthetic fertilizers and crop protection materials, and the non-stop arrival of new technologies" (Maynard, Nault, 2005) significantly altered practices of the traditional acts of husbandry. Although improvements have been made, in order to keep pace with the increasing population, while employing sustainable practices may be the greatest challenge facing the agricultural production.

TRADITIONAL - MODERN
AGRICULTURAL PRACTICES

Traditional agricultural methods of production have substantially progressed from their original practices some 10,000 years ago. With the steadily increasing global population the demand for food has equally expanded. With the aid of fertilizers, pesticides, GMOs and knowledge passed down over centuries farmers have been able to dramatically increase their yields and meet the demands. As we embark upon the 21st century, the social, economic and environmental conditions of the globe are changing and alternative practices must be conceived. In order to increase yields and meet the global food supply demands "farmers in urban settings are also involved in looking for new and creative ways to improve their farming and other productive activities, perhaps even more so than their rural counterparts on account of the specific conditions in urban settings" (Veenhuizen, 2007). Expanding into the city realm introduces a number of variables rural farmers are typically able to avoid. Innovative solutions are required as there is limited space for production, high competition for desirable land, lack of available resources, high volumes of inhabitants often unaware or uninterested in growing practices. Agriculture, as a function of architecture will have an increased occurrence in the 21st century urban landscape. It is inevitable that food production and consumption will occur in much closer proximity to one another in the coming future. Fossil fuel depletion will eventually bring a halt to the global trading practices that are in place. Essentially, "strategies need to be developed that focus on merging man made urbanization with nature" (Gil, 2013) as architecture has become highly removed from elements of the organic within the modern city.

Architecture of the modern urban landscape support an ambiguity of food's origin, energy and effort required to get food from a place of production to consumption. It is "acceptable for families to buy 100% of their food from supermarkets for their entire lives. We have no control over this food: we select from what has been chosen for us and we do so without knowing where the food is coming from, how long it has traveled, who has grown and handled it on our behalf and what risks are entitled and eating it" (McAdam, 2012). We are oblivious to the fuel we are putting into our bodies, entertaining idyllic scenarios of places of origin of such food. It is unfortunate; however, "we've been trained not to know where our food comes from" (McAdam, 2012). Every urban place of food: grocery stores, restaurants and food terminals, all encourage a front of house / back of house scenario. This layout prevents consumers from being exposed to the processes which are associated with getting food to an acceptable state for consumption. It is essential to once again pair practices of agriculture with architecture, as "urban agriculture can build community, green our urban spaces and improve food distribution in our cities" (McAdam 144). The benefits far outweigh the negative aspects of nature's presence within the city. Architecture can be used to "alleviate the mundaneness of urban life through the introduction of the absurdity of nature, which brings 'joy and laughter to the stressed worker" (Cannon, Gianvanni, 2013). Yet, the value attached to natural landscapes is immeasurable, and always falls short when pinned against the quantifiable profits of urban development.

URBAN / RURAL DIVIDE
CURRENT PRACTICES

"Homo urbanus seeks the excitement of the unknown and needs a certain degree of anarchy to stimulate him. How to combine the need of control with the desire of rebellion? Can the combination of city and wilderness bring together the rational and the unpredictable for the stimulation of people? The old idea of splitting rural and urban ecologies is not attractive in either environmental or social terms" (Gil, 2013).

The conceptual division of rural and urban landscapes has generate two distinctive approaches to designing with agriculture. The elements often associated within a rural landscape are: low-tech, romantic, body, landscape, poetic and spiritual; whereas, the urban is often associated with the elements of high-tech, rational, machine, building, practical and material. Bridging of this divide is required as all of the elements have the potential to be incorporated in a forward thinking vessel which supports the functions of agricultural practices within a densely populated urban landscape. In creating a sustainable future where food production and consumption occurs in closer proximity, a fundamental element of the approach should be "building differently-more in harmony with nature and the inclusion of the natural within the man made" (Blassingame, 1998). This approach should not be considered as bringing two opposing elements into the confines of a single space, rather it should embrace the duality of the natural and artificial and generate the interest of urban inhabitants.

EAST VS. WEST MENTALITY
CURRENT PRACTICES

It is important to consider the approach taken by the eastern world, regard the inception of natural systems. "The west perceives nature as a force to be overcome, to be controlled. The East precedes nature as a partner to be respected, to be accommodated" (Rudd, 2002). By accepting such an alternative approach to design, the outcome can become more centered around the complexity of the organic systems, and the architecture can be contained as a companion to such a system.

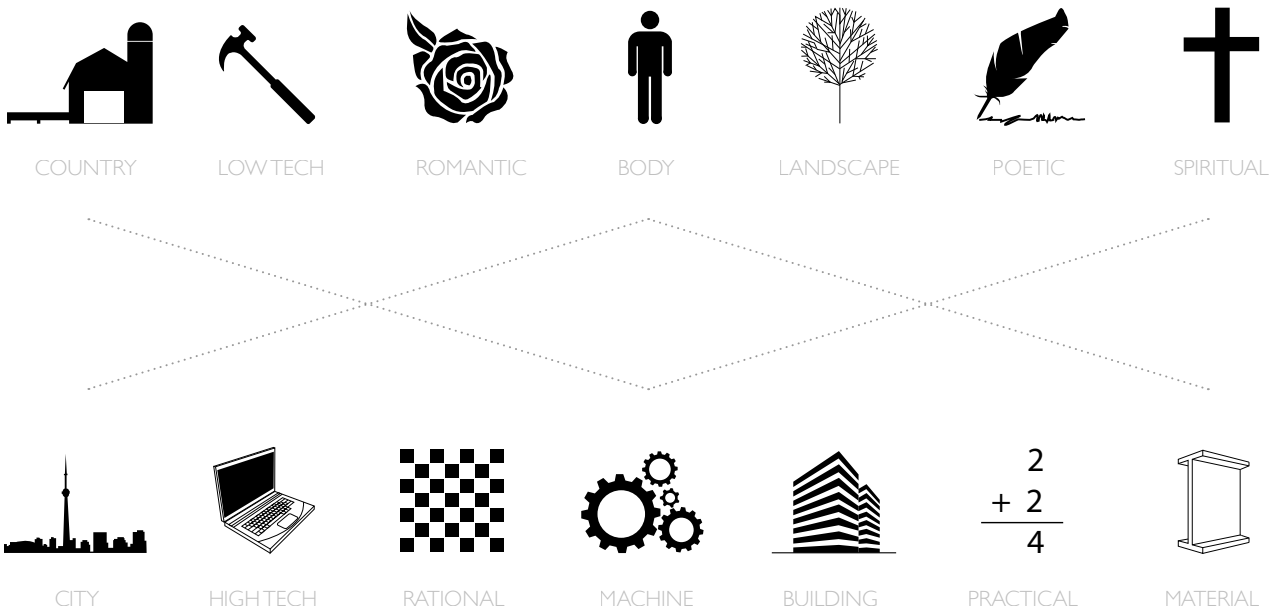


Figure 16: Conceptual Division of the rural and urban landscape

AGRICULTURAL CHALLENGES

The question surrounding agriculture is how to continue to increase yields on a planet which is subject to constant land degradation from an ever increasing population. In an attempt to satisfy environmental conservation, the food system's approach to distribution must be altered. Production and consumption must occur within closer proximity to one another in order to ensure a long term solution to food security. Given the fact that "by 2025 two thirds of humanity will live in cities" (MacRae, 2010), it is essential to design places of production within urban areas. By supplementing the volume of food imported globally, great environmental improvements will be seen. Less transportation directly translates into reduced production of carbon emissions. Alternative approaches to the traditionally land intensive, horizontal practice of agriculture must be explored in order to achieve closer proximity between where people live and where their food is grown.

URBAN AGRICULTURE'S IMPORTANCE

As much as current agricultural practices would like to disregard the "combines effects of climate change, peak oil, the recent food crisis, rapid urbanization, and continued population growth" (Veenhuizen,2007) the reality is that these factors "have the potential to undermine the resilience of our cities and ultimately render the current food system unsustainable" (Veenhuizen,2007). Introducing growing practices into the urban landscape is important because "cities are the magnets of consumption and their 'food-print' accounts for the bulk of greenhouse gas emissions" (Veenhuizen,2007). The environmental improvements which accompany the inception of urban agricultural practices requires greater consideration, as implementation would have the potential to also improve aspects of the city's social and economic discourses. Farming within the confines of a dense urban landscape supports social vibrancy, as such places can support "adaptive learning and civic engagement, as people of different ages, ethnicities, races and income levels come together to grow food, learn new gardening skills, encounter new foods or engage in problem-solving and collective action for the benefit of the garden and the gardeners" (Veenhuizen,2007). The monetary value associated with this type of development is unquantifiable. It is unquestionable that when compared to a leased space, urban agriculture generates less income on a sq.ft. basis; yet, the term value requires reconsideration as the contributions to the local economy, carbon sequestration and civic engagement all add to the city's merit and should be focused on, rather than profit generation.

AGRICULTURAL CONSIDERATION
AS A FUNCTION OF THE URBAN LANDSCAPE

Urban agriculture, typically understood as the simplistic act of growing food in the city. However, the application of farming in an urban setting impacts a wide range of discourses and networks. The connotations typically associated with urban agriculture need to be re-conceived as "the most important distinguishing character of urban agriculture is not so much its location ... but the fact that it is an integral part of the urban economic, social and ecological system" (Veenhuizen,2007). Numerous aspect of a community are transformed with the inception of urban agriculture resulting in both positive and negative impacts. Negative, often associated with human health risks, which can result from:

> "- contamination of crops ... as a result of irrigation with water from polluted streams and insufficiently treated wastewater or unhygienic handling of the products during transport, processing and marketing of fresh products,
> - spread of certain human diseases by mosquitoes and scavenging animals attracted by agricultural activities
> - contamination of crops due to prolonged intensive use of agrochemicals
> - contamination of soils and products with heavy metals due to traffic emissions and industrial effluents" (Veenhuizen,2007)

Current distribution practices undergo far greater exposure to toxins and chemicals, and urban growing should not be discarded due to the aforementioned. An abundance of positive features result from the adoption of urban agriculture into city landscapes. Numerous positive sustainable development includes "local economic development and food supply as well as recycling of wastes, urban greening, maintaining open green buffer zones, provisions of recreational services, social inclusion of disadvantaged groups etc." (Veenhuizen,2007).

REVIEW OF PROJECTS + PROPOSALS
AGRICULTURE + THE 21ST C. URBAN CONTEXT

2.0

Urban agriculture is strongly disproportionate when comparing architectural proposals with realized projects. A number of architectural firms have provided notable contributions to advancing and expanding the presence of agricultural practices within the architectural discourse; yet, many have yet to be realized. The various approaches of incorporating agricultural practices into the urban landscape proves that a wide variety of spaces and places have the potential to support growing practices. The question remains how these proposals are to transform into realized projects and become successfully functioning facilities, potentially recurring throughout the urban realm.

Figure 17:
PASONA 01
KONDODESIGNS
Tokyo, Japan
(2005)

Figure 18:
URBAN FARM
KONDODESIGNS
Tokyo, Japan
(2010)

Figure 19:
TRIDI
SOA
Paris, France
(2010)

Figure 20:
SUPER FARM
SOA
Paris, France
(2011)

Figure 21:
URBANANA
SOA
Paris, France
(2011)

Figure 22:
DONDAINES PARK
SOA
Quartier Euralille, Lille
(2012)

Figure 23:
URBAN BIOTOPE
Julien Deransy
Paris, France
(2012)

Figure 24:
ITALIAN PAVILION EXPO '15
PAOLO VENTURELLA
Milan, Italy
(2013)

AGRICULTURAL PROJECTS + PROPOSALS INTEGRATING AGRICULTURE + DESIGN 2.1

When attempting to grow in the city landscape, alternative approaches are required. How do you grow in a place where there is no soil? Often sites are entirely paved over and the natural elements are barely evident. The mentality of city steakholders is often that "agriculture is an economically 'weaker' form of land use in urban development, and therefore often exposed to manifold spatial or temporal restrictions" (Veenhuizen,2007). In order to alter not only the current conditions of the city landscape, but also the mentality of city residents and steakholders, it is crucial that innovative approaches are employed. Traditional farming is not a viable solution within the densely populated city; therefor, a productive and more resilient city must be conceived to direct the city towards a more sustainable future. Alternative solutions for both spaces where traditional farming practices occur, as well as methods of farming are required in order to feed future cities. Innovation and adoption are two essential elements of modern agriculture. Developing solutions specific to places and spaces available within the existing context, which "re-imagine the building and spaces within the city empowers designers to develop exciting and imaginative new proposals for what a future "productive" (and more resilient) city might look like" (Veenhuizen,2007). Altering something as complex as Toronto's food system seems nearly impossible when considering all of the stakeholders involved from various countries around the globe. An immense amount of food is imported daily to satisfy Toronto's diverse demands. By approaching wide scale implementation one neighborhood at a time, incorporating a number of productive landscapes throughout the city, the hope is that the local food movement will gain momentum and appear in a variety of demographic neighborhoods; expanding beyond the current concentration in low income and priority neighborhoods.

Figures 17 - 24 present a summary of the realized and proposed projects under review.

PASONA 01 | KONDODESIGNS

Tokyo, Japan (2005)

This project explores a hidden farmland, measuring nearly 1000m2 beneath the offices of the Otemachi headquarters. It was an inventive approach to farming in the city. The headquarters was essentially an advocator for urban agriculture, as it educated the building's employees as well as the surrounding public on underground farming technologies.

Urban agriculture was used as a vehicle to connecting the wider public, as the building provided a variety of educational opportunities for the community to attend, such as seminars lectures and relaxation space amongst the agriculture. The objective was to 'bring urban dwellers an opportunity to appreciate rural natures and importance of farmland and agricultural industries'. The building was a great success and was visited by over 70,000 people.

Figure 25:
Pasona 01 | Kondodesigns
Tokyo, japan (2005)

URBAN FARM | KONDODESIGNS

Tokyo, Japan (2010)

This project, a 215,000 sq.ft. office building in Japan, offers a unique symbiosis between agriculture and architecture. The building, houses various programmatic spaces, such as an auditorium, offices, cafeterias and a rooftop garden and a variety crop species throughout the interior spaces.

The flows within the building are such that the food is grown in the interior crop spaces and then used in the cafeterias, distributed to the workers. This process gives precedents to a direct farm to fork approach. The architecture creates a place which is inhabited by both crops and office workers; therefore, the temperature, humidity levels, air flows and so forth all must be suitable conditions for both plant growth and human inhabitants. The crops are grown using both traditional and hydroponic practices. HEFL, flourescent, LED lamps and an irrigation system are all utilized to create an environment which will foster adequate growing conditions.

Figure 26:
Urban Farm | Kondodesigns
Tokyo, Japan (2010)

TRIDI | SOA

Paris, France (2010)

The project proposes a 1600m2 footprint, for a large scale crop production facility within a dense urban area. The overall height of the tower is 300m; however, there are no floors dividing the space. Rather, there are a series of nets of variable densities, creating a labyrinthine network. The net system always an increase amount of light to penetrate through the building.

The technical structure houses alternative approaches to growing. The lack of soil or floors creates a singular structure with plant growth flourishing throughout the space. It showcases the complex networking which occurs inherently in nature. The search for light causes the plant forms to be molded in almost sculptural forms.

The tower would have little impact in the vitality of the community, as little employment would be generated at the site. The facility would be used more for the purposes of public contemplation. However, the productivity of the space is what is of interest. The site could have species which aid in pollinating the other vegetation within the city or a variety of additional agricultural functions.

Figure 27:
Project Proposal,
Tridi | Soa
Paris, France (2010)

SUPER FARM | SOA
Paris, France (2011)

The Super Farm project is an example of an intense farmers market. A fusion between greenhouse growing and a typical supermarket structure. This innovative approach, merging two functions which currently occurs thousands of mile apart, redefines food distribution system. By enclosing the greenhouse production, the intent is to provide a wide variety of produce on a year round basis, eliminating the need for outsourcing in off seasons.

The two spaces successfully complement each other. The greenhouses above contribute to providing the supermarket with produce, as well as natural light. The layering of growing beds above commercial shelf space reduces the footprint typically required for both to function independently.

Figure 28:
Project Proposal,
Super Farm | Soa
Paris, France (2011)

URBANANA | SOA
Paris, France (2011)

Urbanana is a unique proposal for a banana plantation situated within the urban context of Paris, France. The project attempts to redefine the traditional concept of urban agriculture, by growing numerous varieties of bananas typically not offered within the city due to distribution and ripening limitations. In addition to providing the fruit, the building exposes the public to the processes associated with growing. The transparent facade allows for maximum exposure of both sun and views into the building at the interior space overwhelmed with banana trees.

Bananas have become a crucial part of our diets. Their high demand requires a highly unsustainable distribution system, delivering a high volume of the fruit from the Caribbean to Europe. The approach of growing bananas local contributes to lowing the amount of carbon emissions and greenhouse gases typically produced by their delivery.

Although, an extensive amount of transparency is provided, artificial lighting is required to foster ideal conditions for banana growth. Six floors are dedicated to the growing processes, the ground floor is dedicated to the public, housing content, a research laboratory and an exhibition area. The overall project is an attempt to promote the practices of urban agriculture, reduce volume of emissions generated from the distribution process and weave nature back into the city landscape.

Figure 29:
Project Proposal,
Urbanana | Soa
Paris, France (2011)

DONDAINES PARK | SOA

Quartier Euralille, Lille (2012)

The park is strategically placed between the old and new portions of the city, divided both physically and psychologically. The proposed development attempts to merge the two through implementing urban agricultural practices and communal spaces focusing on agricultural practices. By implementing vegetation between the forms, a symbiosis is created between the built and the natural environments.

The positioning of the structure minimizes noise and pollution from the intersecting highway. As well, the presence of vegetation absorbs the pollution generated from the transportation through the site.

The programmatic distribution of spaces along the lining of the park allows people to flow through at their leisure, and become educated on agricultural practices.

The materiality applied to the structures is highly transparent, allowing an abundance of sunlight to flood throughout the space.

Figure 30:
Project Proposal,
Dondaines Park | Soa
Quartier Euralille,
Lille (2012)

CENTRE FOR THE URBAN BIOCOENOSIS BIOTOPE | JULIEN DERANSY

Paris, France (2012)

This facility was designed with the intent to showcase, research and expose various rare species of vegetation from around the world. The tropical gardens are contained within various greenhouse spaces throughout the site. The site is located in Paris, along the Canal de L'Ourcq.

The layout of the structure is the result of attempting to accommodate existing vehicular pathways. The resulting layout allows for a variety of greenhouses to be strategically positioned so that spatial qualities required by each climatic zone could be achieved, such as varying degrees of sun exposure.

Figure 31:
Project Proposal,
Centre For The Urban
Biocoenosis Biotope |
Julien Deransy
Paris, France (2012)

ITALIAN PAVILION EXPO 2015 | PAOLO VENTURELLA

Milan, Italy (2013)

This proposal is based on sustainable integration of food and renewable energies. Food is incorporated along the facade, and then carried into the greenhouse space at the top of the building. By providing interior space for cultivation, year round growing practices can be achieved. The covered interior space at grade is intended for events and exhibition.

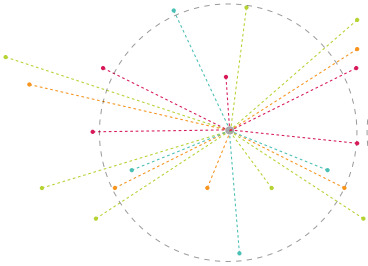
The form is generated by a series of shifting volumes, which create a terracing effect facing the south. The green wall aligning the north portion of the space creates a natural filter for both ventilation and light.

The facade contains a louver system with a gradient effect. From the south to north the louvers are adjusted to satisfy the direct to indirect lighting requirements. Along the louvers are a series of photo-voltaic panels which aid in generating renewable energy as they shift throughout the day to optimize solar radiation absorption.

The pavilion advocates for the pairing of architecture and nature through a sustainable design approach. On site food and renewable energy production embodies ideals of future urban facilities.

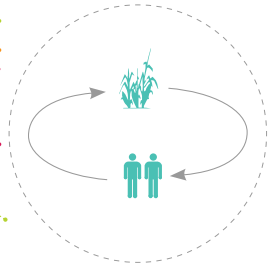
Figure 32:
Project Proposal,
Italian Pavilion Expo 2015 |
Paolo Venturella
Milan, Italy (2013)

01.



PASONA 01
KONDODESIGNS
Tokyo, Japan
(2005)

02.



URBAN FARM
KONDODESIGNS
Tokyo, Japan
(2010)

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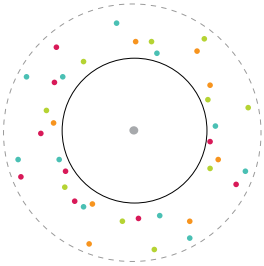

TRIDI
SOA
Paris, France
(2010)

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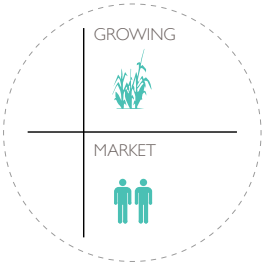


SUPER FARM
SOA
Paris, France
(2011)

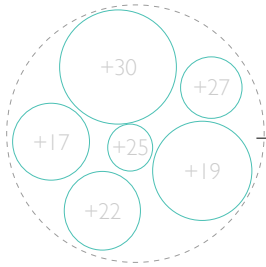
05.

URBANANA
SOA
Paris, France
(2011)

06.

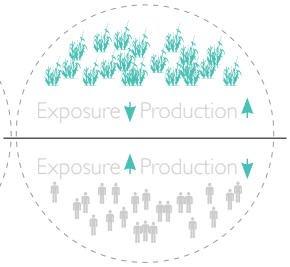
DONDAINES PARK
SOA
Quartier Euralille, Lille
(2012)

07.



URBAN BIOTOPE
Julien Deransy
Paris, France
(2012)

08.



ITALIAN PAVILION EXPO '15
PAOLO VENTURELLA
Milan, Italy
(2013)

COMMON CHARACTERISTICS
FROM PRECEDENTS

All of the architectural proposals which incorporated agricultural production provided various notable strategies. Their themes have been synthesized as follows (refer to figure 33).

01. Productive interior landscape

02. Interior closed-loop food process

03. Production facility to nourish the surrounding community

04. Maximizing alloted space

05. Merging agricultural space with the urban context

06. Material selection

07. Spatial conditioning

08. Public engagement with agriculture

The projects dealt with agricultural production in one of three ways.

01. Agricultural production as a public experience,
(as seen in: 04, 06, 08)

This approach created full contact between the general public and agricultural growing practices. These places were designed to foster engagement between the public and production by immersing people into spaces of crop production.

02. Agricultural production for public consumption,
(as seen in: 01, 02, 03, 04, 07)

This approach separated the general public from any physical engagement with the production process. It maximized visual connection, through physical separation and fostered spaces for observation of practices within the growing spaces.

03. Agricultural production for public demonstration,
(as seen in: 01, 05, 07, 08)

This approach allowed the public into designated portions of the facility, where there was limited engagement, but an elevated amount of knowledge gained about the process. Places of demonstration allow for the general public to be immersed within an environment similar to those of the productive areas, without entering the intensified growing spaces and risking crop contamination.

Figure 33: Strategies of proposed architectural project that incorporate agricultural production

Figure: 34
GOTHAM GREENS
Gowanus, Brooklyn, NY
20,000 sq.ft
(est. 2013)

Figure: 35
FARMED HERE
Bedford Park, Ill
90,000 sq.ft.
(est. 2013)

Figure: 36
LUFA FARMS
Montreal, QC 31,000 sq.ft.
(est. 2011)

Figure: 37
O'HARE AIRPORT
Chicago, Ill
26 growing towers
(est. 2011)

URBAN AGRICULTURE ARCHITECTURAL PROJECTS

2.2

All of the project proposals have merit, as innovative approaches are necessary in order to increase the presence of agricultural production within the urban landscape. All design proposals contribute to defining an approach suitable for a site within the local context. However, realized projects provide a stronger foundation for what is achievable within the local context. Here, an analysis of four existing urban agricultural production practices: Gotham greens, Farmed here, Lufa farms, and O'Hare airport (refer to figures 34-37).

These realized and functioning projects provide examples of productive spaces which are located in relatively close proximity to the city of Toronto. These projects have been analyzed to better understand the volumes which can be produced, methods of growing, power supply, and notable systems.

GOTHAM GREENS

Gowanus, Brooklyn, NY | 20,000 sq.ft | (est. 2013)

Location:	Rooftop of Whole Foods Market - Brooklyn
Volume produced:	200 tons / year
Type of produce:	leafy greens, tomatoes
Method of growing:	hydroponics
Power Supply System:	157kW combined heat and power plant 325kW solar PV system (in parking lot)
Notable Programs:	HFC-free commercial refrigeration system On site, rainwater collection
Intent of Project:	"to exhibits and educate the public regarding the latest technologies in local food production, sustainable energy, water conservation and re-use"

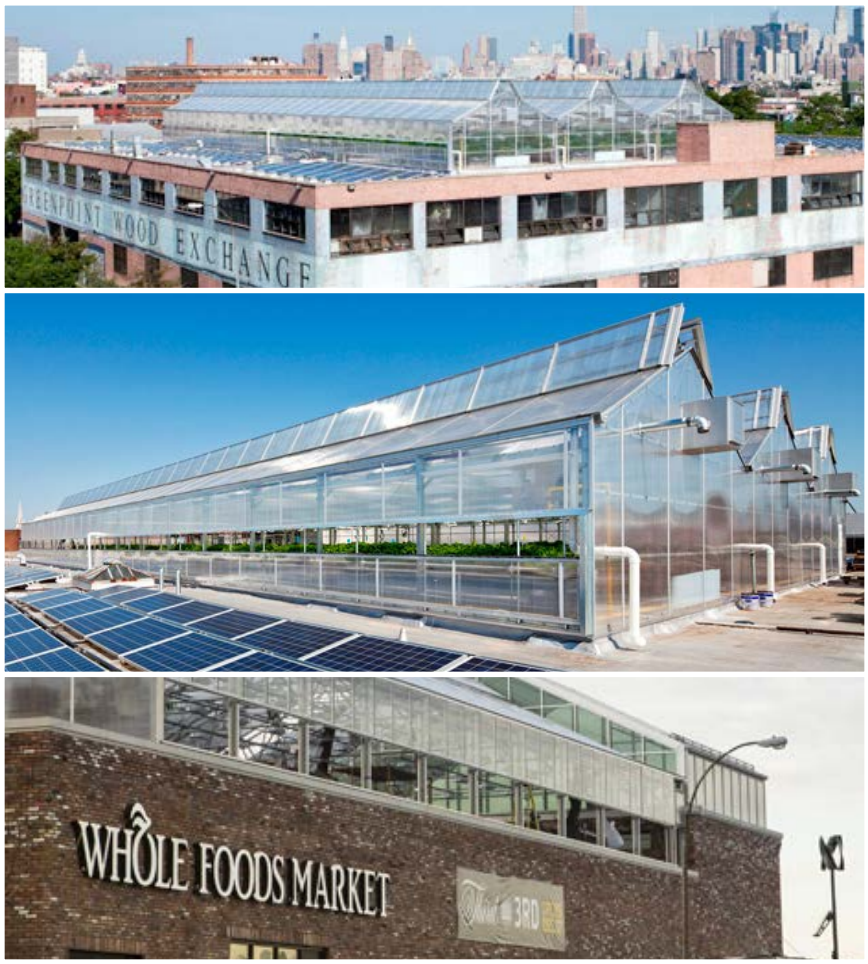


Figure 38:
Existing Project,
Gotham Greens
Gowanus, Brooklyn, Ny

FARMED HERE

Bedford Park, Ill | 90,000 sq.ft | (est. 2013)

Location:	formerly abandoned suburban Chicago warehouse
Volume produced:	250,000 - 300,000 lbs. / year (anticipated)
Type of produce:	basil, arugula, mints, other greens
Method of growing:	aquaponics, aeroponics, vertical stacking (6 shelves)
Power Supply System:	electricity
Notable Programs:	organic waste - to be distributed to other urban farms across Chicago
Intent of Project:	to produce "the freshest, healthiest and the most local greens in Chicago. Environmentally sustainable, socially wholesome, economically viable"

Figure 39:
Project Proposal,
Farmed Here
Bedford Park, Ill

LUFA FARMS

Montreal, QC | 31,000 sq.ft | (est. 2011)

Location:	above a three story industrial building
Type of produce:	lettuce, peppers, cucumbers, eggplant, tomatoes, basil, micro-greens, apples, cabbage, carrots, radishes, turnip, onions, garlic, potatoes, beets, artichokes, mushrooms, dill, Swiss chard, chives, herbs.
Method of growing:	hydroponics
Power Supply System:	heat from the building beneath natural gas heating system energy curtains (semi-transparent curtains, helps insulate the greenhouse and reduce heat loss)
Intent of Project:	to create a "city of rooftop farms and prove that this vision is both possible and economically viable, socially wholesome, economically viable"

Figure 40:
Existing Project,
Lufa Farms
Montreal, Qc

O'HARE AIRPORT

Chicago, Ill | 26 growing towers | (est. 2011)

Location:	O'Hare's airport terminal
Type of produce:	Swiss chard, sweet basil, purple basil, cilantro, dill, parsley, chives, lettuce, peppers, oregano, green beans, snow peas
Method of growing:	aeroponics, grow lights and reservoir pumps
Power Supply System:	electricity
Notable Programs:	in house food supply chain
Intent of Project:	to create an oasis within one of the busiest airports in north America.

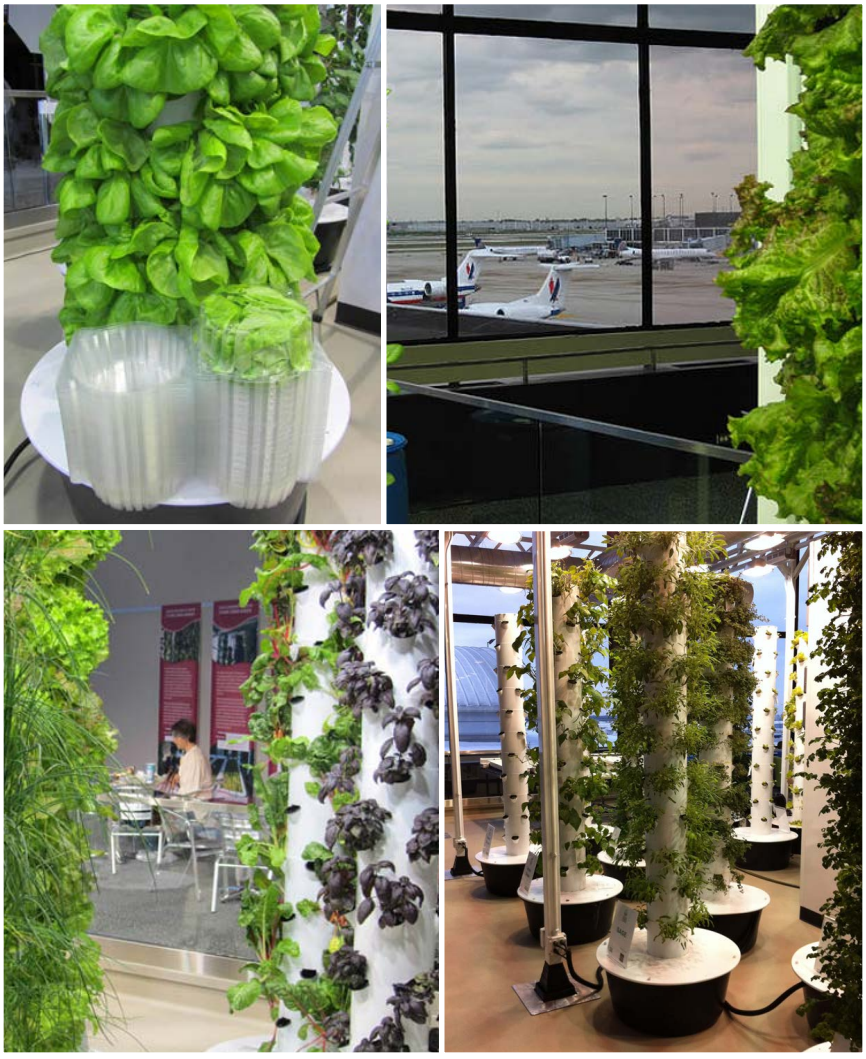


Figure 41:
Project Proposal,
O'HARE AIRPORT
Chicago, Ill

SUMMARY

These projects are in very early stages of production; therefore, it is unclear as to how much each can produce/year, profits made or the volume of energy and water used annually. What they provide are notable initiatives in a similar climate to that of Toronto.

What has been realized after analyzing existing places of urban agricultural practices, is that form is heavily influenced by the plant systems used to grow the produce. Depending on an active or passive system, how the production portion of the building will be designed depends on the agricultural methods of production.

It has been established in part 1 that intensified growing practices must be employed, in order to produced adequate volumes on a sq.ft. basis. As seen in the realized projects, a variety of growing techniques exist and will yield similar results. Modern agricultural production within an urban context must look to incorporate innovative techniques when trying to produce high volumes of crop, in areas which lack an abundance of space, light or soil.

ALTERNATIVE APPROACHES TO AGRICULTURE
AGRICULTURAL METHODS OF PRODUCTION 2.3

Horizontal growing practices have been in existence for thousands of years. The equipment used to cultivate, plant, and harvest the land has improved; however, the method has remained fairly unchanged. Given the migration of the rural population to urban centers, more people are living within close proximity to one another. Using current, horizontal growing practice local farming cannot satisfy the demands of the city. Greater volumes of food must travel further distances to supply millions of people within confined urban centers. Land value within the city and surrounding area is high; therefor, condensed growing practices are required.

The capabilities of current technologies are endless and can undoubtedly provide more efficient means of farming. Hydroponics, Aeroponics and Aquaponics are three established alternatives to traditional farming methods. The question remains whether yields would satisfy the demands of the urban population, or just aid in supplementing urban inhabitants diets with local produce. Either way, their presence would still make an impact. Less food required to be distributed thousands of miles from a place of production to consumption will definitely have a positive impact on the reduction of emissions released into the atmosphere.

AGRICULTURAL METHODS OF PRODUCTION
ALTERNATIVES TO TRADITIONAL PRACTICES

Hydroponics is an alternative approach to traditional farming methods, where crops are grown using some form of root suspension into water. This system is successful because it removes the element of soil, which causes difficulty when supplying the plants with essential nutrients. Plants are grown in an inert medium, which doesn't supply any nutrients to the plant, such as rockwool, perlite, vermiculite, coconut fiber, gravel, sand and more (Basic hydroponic systems and how they work, 2008). The nutrients are supplied by a controlled solution, made up of a combination of water and fertilizer. The solution is delivered to the plants on a controlled watering / feeding cycle, which is drastically different from traditional practices where crops are exposed to the elements and receives only what the weather permits. By exposing the roots, little restriction is created by soil and crops are able to uptake their food with little energy. By redirecting the energy required to suck up nutrients to be concentrated on plant growth and crop production, higher yields can be achieved. There are six basic hydroponic systems able to be employed, with hundreds of variations of each. The variety of approaches demonstrates that a hydroponics would work successfully in a large assortment of spaces. Designing a system, while utilizing the basic principles of hydroponics, can result in a variety of installations. Urban farming has the potential to become aesthetically pleasing and adaptable for any urban space, the limiting factor is the ambition of the urban inhabitant. With visual interest and low maintenance, there is no reason why urban agriculture should not be more widespread in the urban environment.

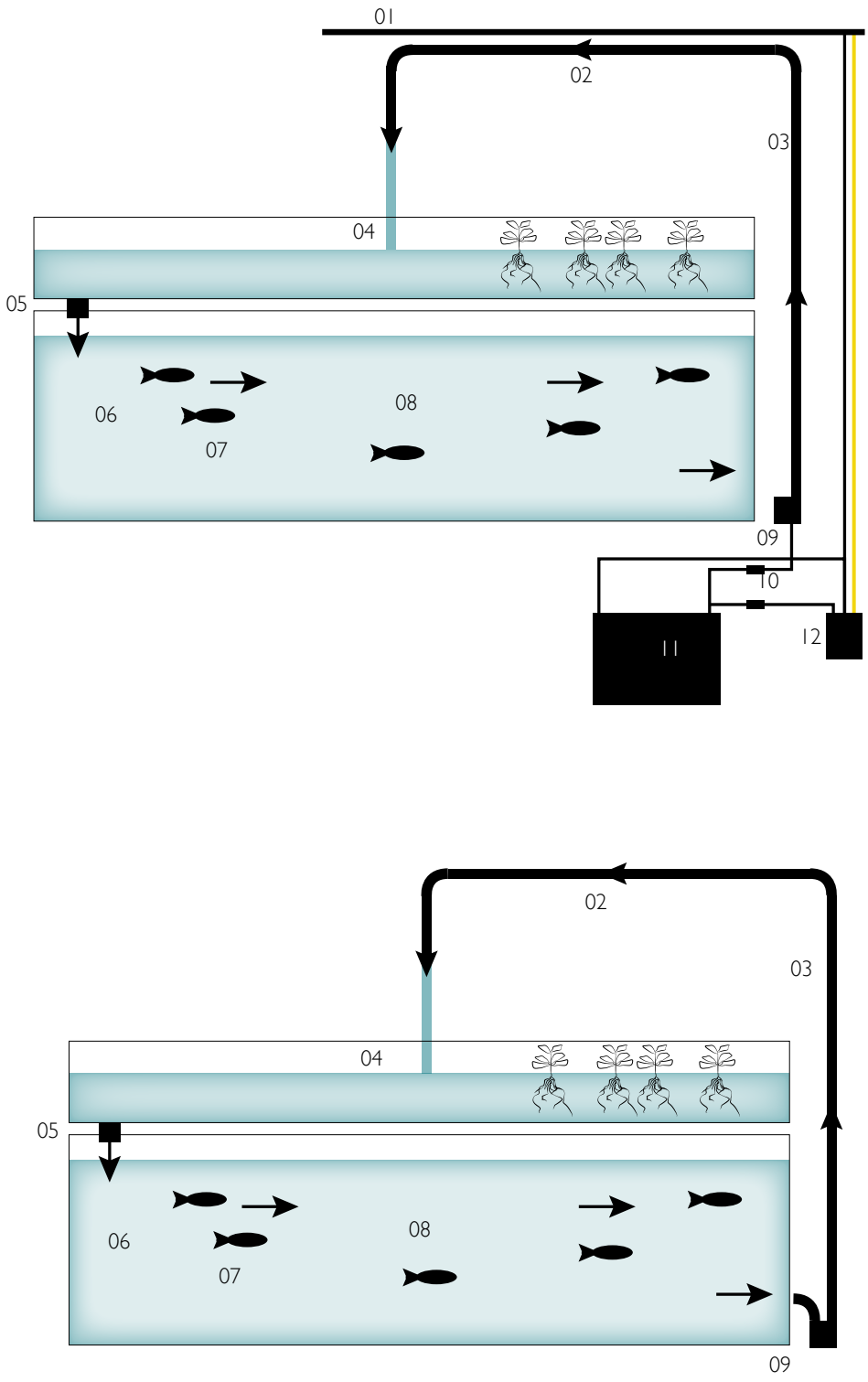
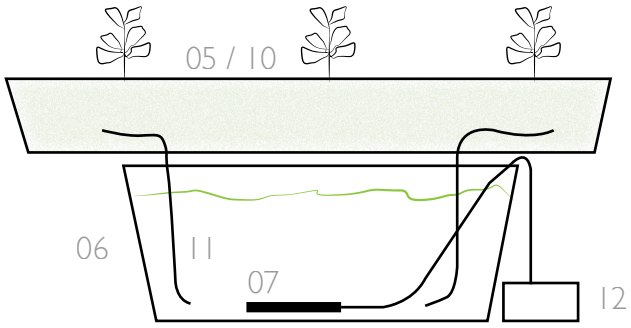


Figure 42: Diagram of aquaponic production equipment

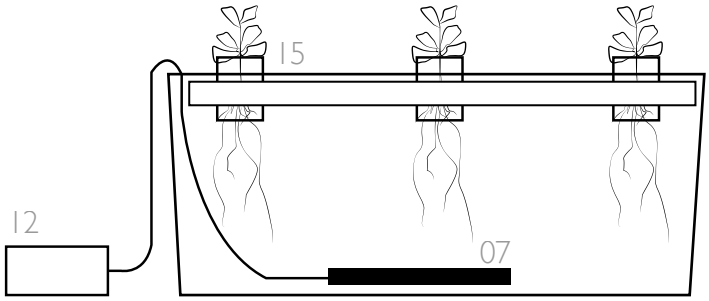
Aquaponics

This system cultivates both crops and aquatic animals simultaneously through a re-circulating system. Fish inhabit a large tank, which is slowly drained and filtered. In this filtering process, bacteria breaks down the toxic ammonia of fish waste into nitrogen, a crucial ingredient in plant growth. The water is then transported into the growing bed where the plants are located. Through the use of a wick system, water is fed to the plant's roots. The excess water is then drained back into the fish tank where the process is repeated. (Basic hydroponic systems and how they work, 2008)

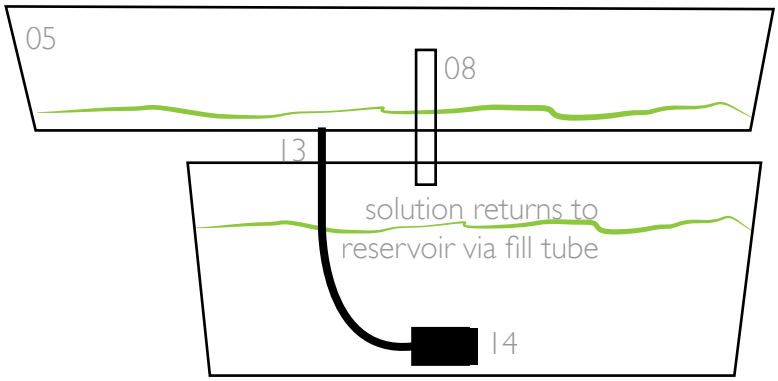
01 _ solar panel
02 _ thermocoupling
03 _ tubing 3/8"
04 _ porous media bed / filter
05 _ netted pot
06 _ aeration
07 _ large riverbed stones
08 _ fish tank
09 _ pump
10 _ fuses
11 _ battery 12 VDC
12 _ charge controller



Wick System



Water culture



EBB & Flow

Figure 43: Diagram of hydroponic production equipment

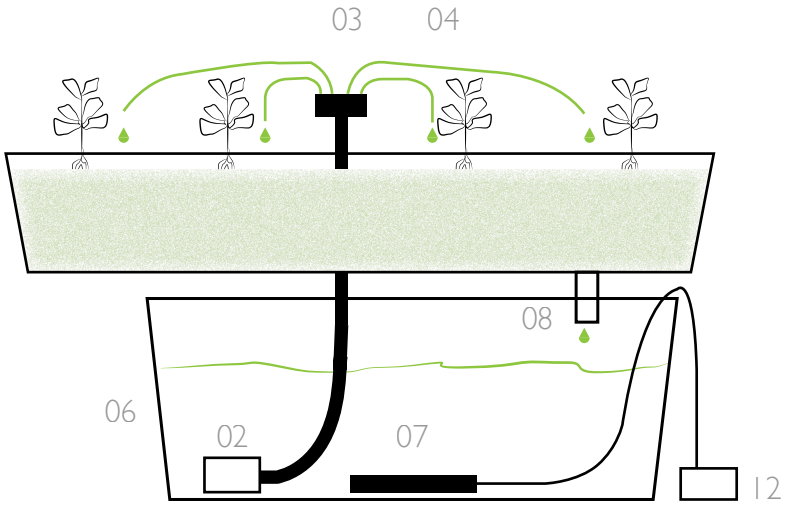
01 mist nozzle
02 nutrient pump
03 drip manifold
04 drip lines
05 grow tray
06 reservoir
07 air stone
08 overflow
09 air pump
10 growing medium
11 wick
12 air pump
13 fill / drain fitting
14 pump
15 floating platform w/ plants
16 nutrient return

Wick System _
is a passive hydroponic system where the nutrients are drawn through the growing medium from the water reservoir beneath by the means of a wick. There are many options with this method in regards to growing mediums; however, perlite, vermiculite, pro-mix and coconut fiber are the most popular selections. The limiting factor affecting the success of the system is the wick. Large plants may demand high amounts of water, using up the water and nutrients faster than can be supplied by the wick. (Basic hydroponic systems and how they work, 2008)

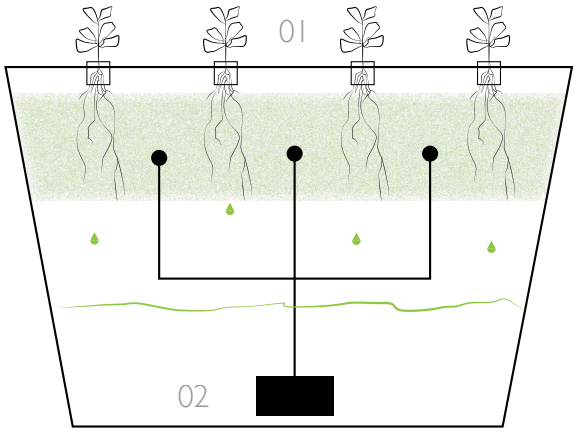
Water culture _
this system can be considered the simplest hydroponic system of all of the approaches and is best suited for growing lettuce, a fast growing, water loving plant. Unfortunately, very few other plants will do as well as lettuce does with this system. The system uses a styrofoam material which will float on top of the nutrient solution. An air pump supplies oxygen to the 'airstone' at the bottom of the solution. From there, bubbles will emerge and attach onto the roots of the crops, supplying them with oxygen.

This water culture system is ideal for demonstration purposes, to be used in places like classrooms, as it is very inexpensive to produce. As mentioned, fast growing plants like lettuce are ideal, and unfortunately large, long term plants would not have great success within this system. (Basic hydroponic systems and how they work, 2008)

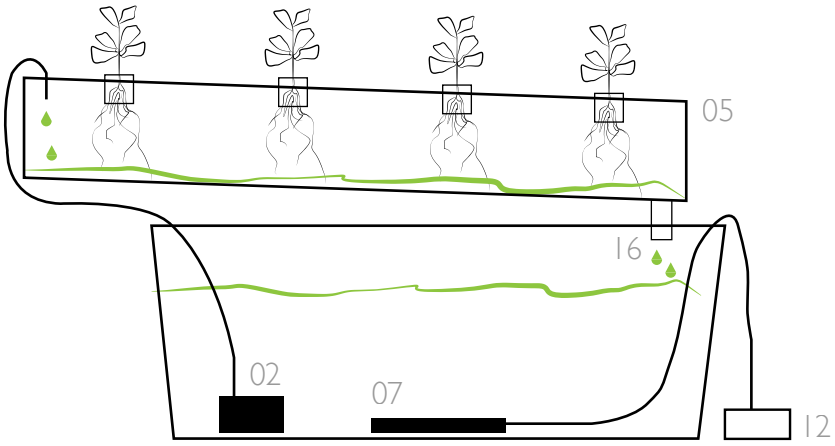
EBB & Flow _
This is an automated system, which uses a pump to temporarily flood the grow tray where plants are located, the excess water is then drained back into the reservoir beneath. The pump is connected to a timer, which continues this cycle numerous times throughout the day. The cycle is determined by a number of factors, such as type and size of the plant species, temperature and humidity of surrounding conditions and type of growing medium used. The types of medium suggested for usage are rockwool, vermiculite, coconut fibre or various soiless mixes. (Basic hydroponic systems and how they work, 2008)



Drip System



Aeroponic



Nutrient Film Technique (NFT)

Figure 43: Diagram of hydroponic production equipment (continued)

01 mist nozzle
02 nutrient pump
03 drip manifold
04 drip lines
05 grow tray
06 reservoir
07 air stone
08 overflow
09 air pump
10 growing medium
11 wick
12 air pump
13 fill / drain fitting
14 pump
15 floating platform w/ plants
16 nutrient return

Drip systems _
Considered to be one of the most popular hydroponic systems used throughout the world, the drip system employs a timed, pump operated system which controls the amount of nutrient solution released to the base of each plant. From there, two directions can be taken. The first, a recovery system (RS) which reuses excess solution. The second, a non recovery system (NRS) which inefficiently discards runoff. There are advantages to each system; however, for ease of maintenance the NRS is less demanding. Consistent pH levels are achieved as new solution is constantly being feed to the plants. whereas with a RS, because the solution is cycling through and being reused there is a much greater chance for fluctuation. (Basic hydroponic systems and how they work, 2008)

Nutrient Film Technique (NFT) _
This system is the most considered when thinking of hydroponic growing approaches. It employs a constant flow of nutrients to the plants without the use of a timer operated pump system. The nutrient travels in a closed loop, passing through the growing tray and returning to the reservoir. Typically, no growing medium is used with a NFT; however, each root is fed through a small, perforated plastic basket. One disadvantage is that this system requires a constant flow of nutrients, as roots are very prone to drying out when the solution is insufficiently delivered to the growing tray. (Basic hydroponic systems and how they work, 2008)

Aeroponic _
considered to be one of the most technologically advanced systems, aeroponics suspends the root of the plant through the encasing and receives periodic misting with nutrient solution. Every few minutes the roots are replenished with the solution, without constant misting the roots are susceptible to drying out, much like with the NFT system. The reason why this system is considered most high tech is because the timer requires a short cycle, which runs the pump for a few seconds every couple of minutes. (Basic hydroponic systems and how they work, 2008)

LOCAL CONDITION
TORONTO'S URBAN AGRICULTURE

3.0

URBAN AGRICULTURE

As long term, sustainability is continually challenged by rising prices of food and fuel, climate change, and water scarcity (Veenhuizen,2007), the 21st century city must look towards resiliency to ensure preservation of the environment. With the ever increasing urban concentration of residents cities are entering focus as they are "the magnets of consumption and their 'food-print' accounts for the bulk of greenhouse gas emissions" (Veenhuizen,2007). Although the approach of growing food in the city is seemingly ideal, there are many challenges faced as it demands a completely different approach to traditional agricultural methods.

The physical separation between places of food production and consumed is at an unprecedented high. Agriculture is no longer central to the layout of the city, but occurs thousands of miles from the places which it is consumed. Given the context of Toronto, "the average imported food is traveling about 4500 km, much of it by truck". Considering the volume of people within the confines of the city, as well as the volume of food consumed on a daily basis it is evident that re-evaluation is required regarding how people produce, transport, store and consume food, "for growing, watering, processing and transporting food, producing 1 cal of food cost us anywhere from a 7:1 - a 10:1 ratio in energy consumed" (McAdam, 2012). Given a 2000 calorie diet x 7 billion world population, current methods cannot sustain the growing population. Collaboration between the architectural and agricultural discourses is essential. Successful integration which will result in a "sustainable urban production systems, [requires] intensification (in a safe and ecological way) and a greater market orientation" (Veenhuizen,2007). The design of architectural places which will improve the current production, retail and distribution processes is essential to ensure the city's transformation towards resiliency. Agriculture is undoubtedly an architectural issue that will become ever more apparent as time progresses.

Architects are valuable, as they are able to coordinate, manage and conceive solutions; yet, architectural solutions to agricultural problems have yet to fully integrate within the city landscape. As seen in Toronto, an abundance of space has been identified; however, realizing this potential has yet to occur. Current popular solutions for introducing urban agriculture has been the addition of growing plots onto the existing built fabric, e.g. rooftop gardens; however, not all architects advocate for green roof construction. This addition has an abundance of ramifications to the structural, aesthetic and functional aspects of the built fabric. The architectural discourse should have a greater presence and concerned with the ramification associated with the application of agriculture to the city landscape; yet, within the city of Toronto currently initiatives remain in the hands of academics, community members and food policy council members.

TORONTO'S BARRIERS

PREVENTING WIDESCALE IMPLEMENTATION OF UA

In order to increase the presence of urban agriculture within the urban landscape, it is critical to first acknowledge the barriers preventing progression. Research highlighting the current challenges of urban agriculture within the city of Toronto have been identified in the following research papers, which were first introduced on page 9:

- Could Toronto provide 10% of its fresh vegetable requirements from within its own boundaries?
  MacRae, R., Gallant, E., Patel, S., Michalak, M., Bunch, M., Schaffner, S. (2010)
- Scaling up Urban Agriculture in Toronto: Building the Infrastructure
  Nasr, J., MacRae, R., Kuhn, J. (2010)
- The role of green roof technology in urban agriculture
  Whitinghall, L. (2011)

Figure _ summarizes the barriers and organizes them into the categories first introduced in part 1 of this thesis. By identifying the challenges, the hope is that these issues can be addressed through an architectural response. The city should become an environment which will enable humans to develop a new relationship with agriculture. The first step to achieving this, is uncovering what challenges and barriers UA's inception faces.

- Land use / planning barriers:
a. insurance / liability issues of rented and rooftop spaces
b. short term access to land
- Zoning, currently non-existent for commercial food production

- Lack of time / desire to grow
- Lack of engagement with agriculture
- Distracted w/ technology, and consumerism
- Lack of community connection

- High start up and maintenance costs
- Competition with development
- High land taxation
- No formal UA leasing agreements exist

-Exist. infrastructure barriers:
a. capacity of rooftop
b. drainage system
c. fencing / enclosures
d. power requirements
e. lack of support facilities
- soil quality issues
- water quality issues

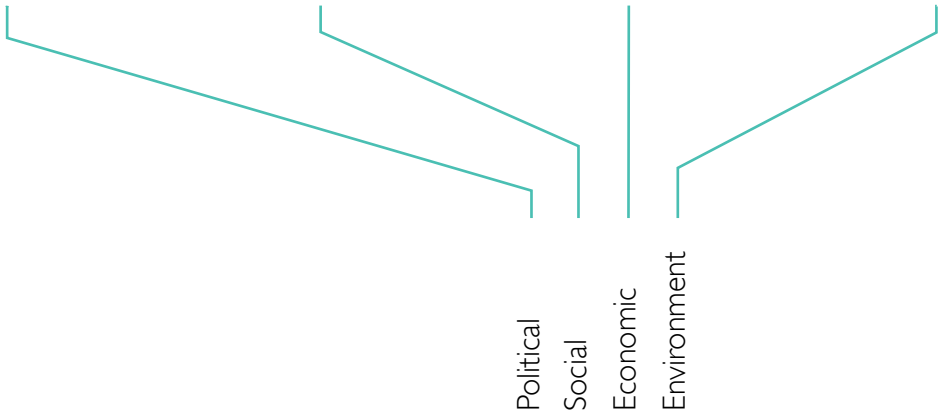


Figure 44: Barriers Preventing scaling up of urban agriculture in Toronto

TORONTO'S DENSITY

CHALLENGING THE INTRODUCTION OF UA

The challenge of introducing agricultural practices back into the landscape of the urban city requires adaptation of the man made environment. Adding agricultural functions to such a dense and developed city as Toronto requires innovation. There is a lack of agriculture production occurring within and directly surrounding the city of Toronto, due to the constant outward sprawl overtaking farmland; therefore, supporting the unsustainable importing practices.

Innovative approaches to food production are crucial as farmers and growers must continue to increase yields on a planet which is subject to constant land degradation from an ever increasing population. Alternative approaches to the traditionally land intensive, horizontal practice of agriculture must be explored.

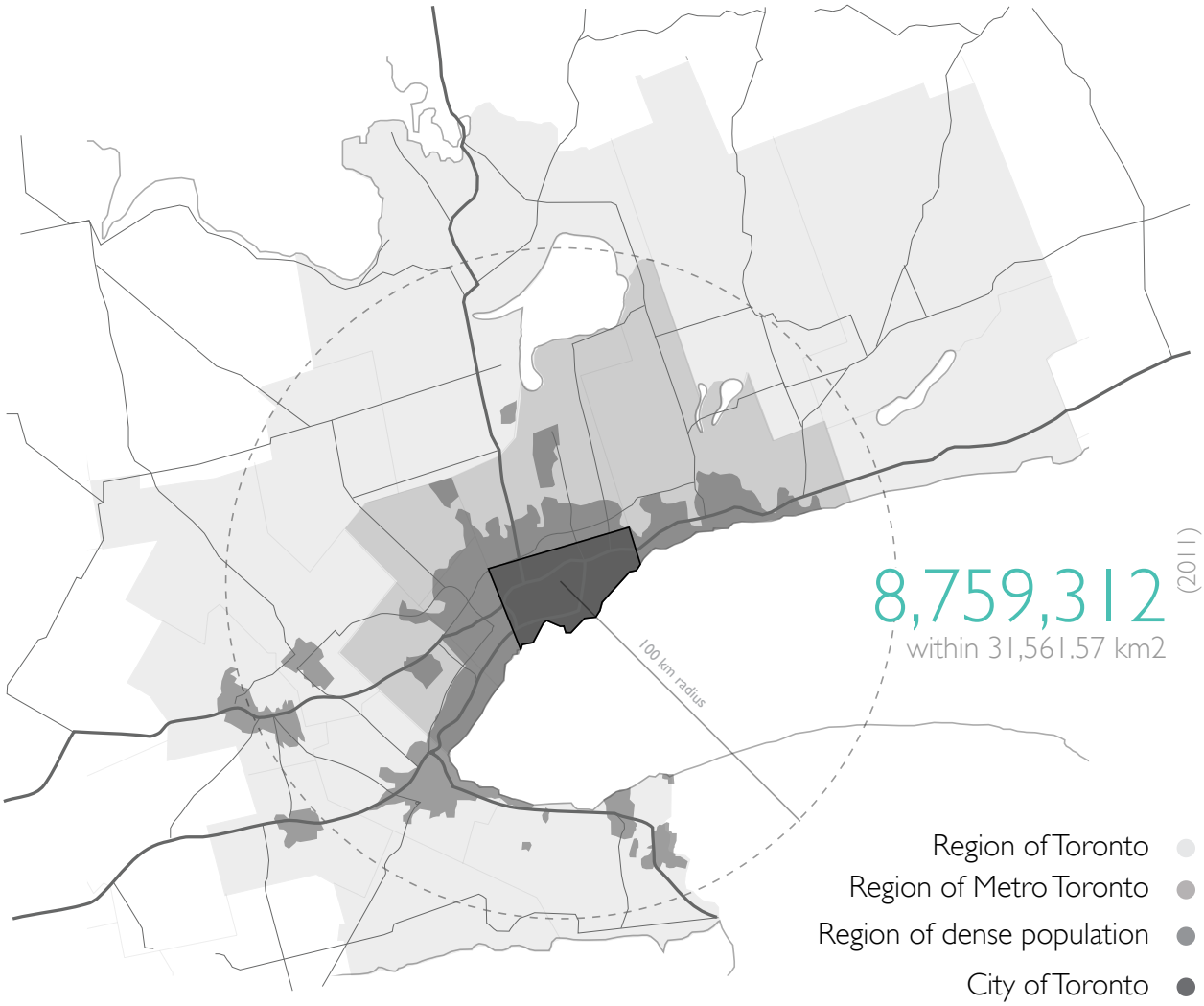


Figure 45: Map of Mega-region of Toronto, showing population within the surrounding region

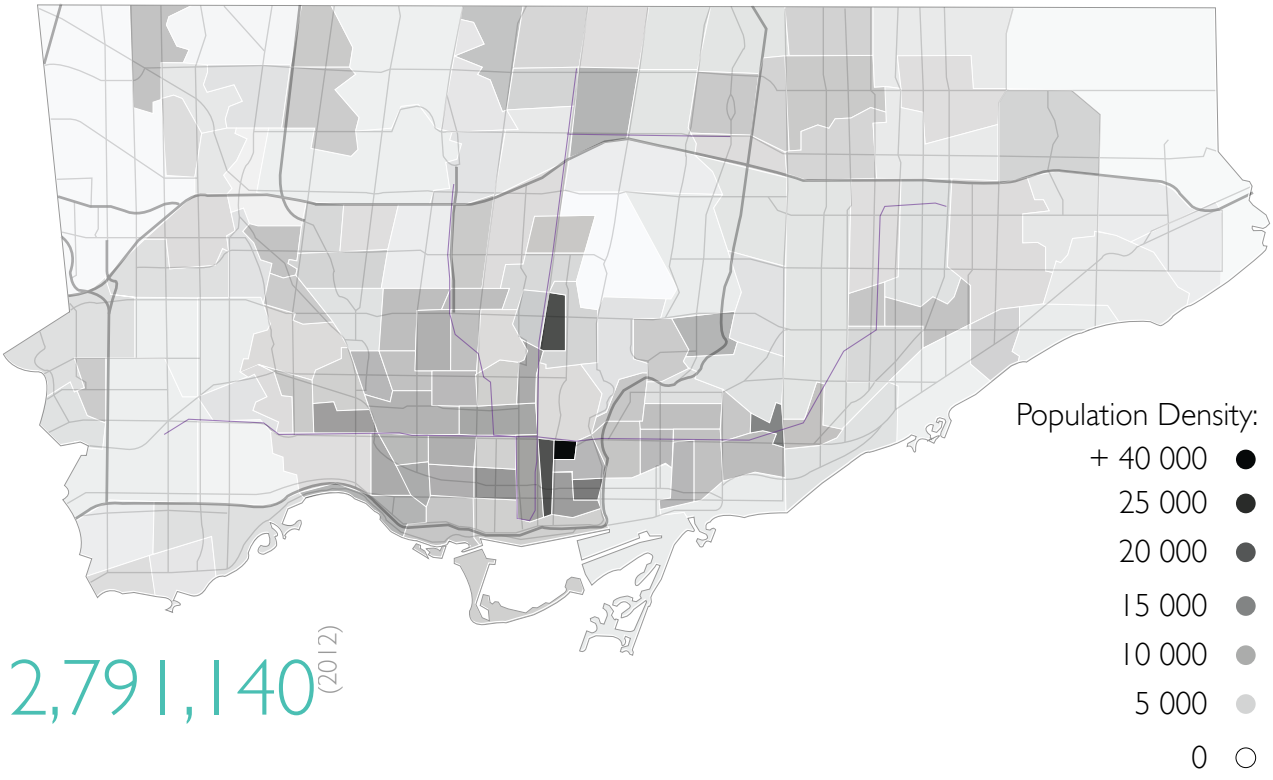


Figure 46: Map of Toronto, showing population density

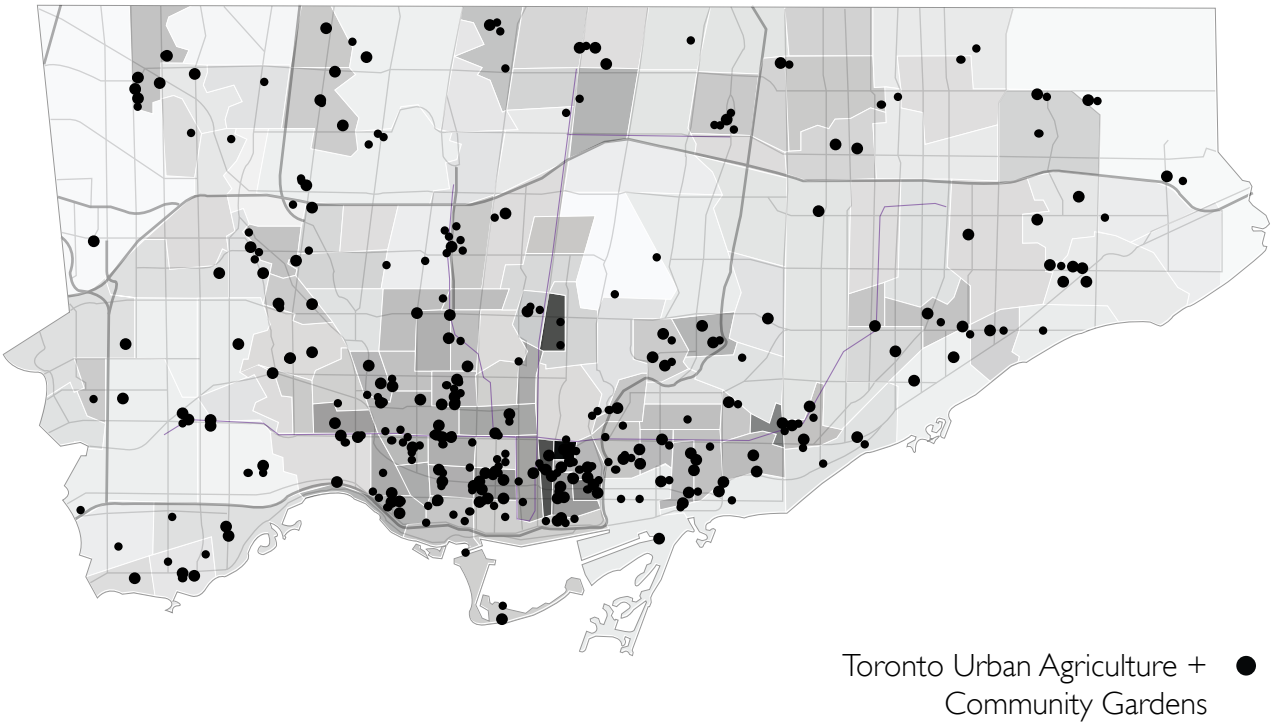


Figure 47: Map of Toronto, showing population density and UA / community garden locations

CURRENT PRACTICES

REVIEWING TORONTO'S URBAN AGRICULTURE INITIATIVES

Black Creek Community Farm

This urban agriculture initiative has the objectives of acting as a social justice leader, aspiring to provide a leadership model for surrounding communities. Black creek enables economic opportunities through hands on training and intergenerational learning experiences.

Downsview Park

The food program employed at Downsview Park attempts to be a thought and market leader in empowering all to make conscious food choices. The objectives of this program is to re-connect people with agricultural practices, by making it a common element in the urban environment.

Foodshare

Foodshare is a program that partners with community leaders, school programs and organizations within the city of Toronto to promote knowledge and access to healthy food produced in a sustainable manner. Their focus is working with under served communities and providing tools and expertise to build a 'just food system'.

Wychwood Barns / The Stop

In addition to being a cultural hub of activity, Wychwood Barns and The Stop provide urban agricultural practices to enhance food security. The objective of the stop is to increase access to healthy food in a manner that maintains dignity, while building healthy communities.

Figure 48: Toronto's notable Urban Agriculture initiatives, highlighting context

U of T's Sky Garden

Located at the university of Toronto, the sky garden is situated on top of the Galbraith building. The garden is a rooftop vegetable garden run by volunteers intended to showcase a light-weight model of growing. The rooftop hosts a variety of workshops which educate on the topic of urban agriculture. The system used to grow nearly 500 lbs of vegetables each season includes lightweight, semi-hydroponic containers using a drip irrigation system.

Rye's Home Grown

The Ryerson urban agriculture initiative looks to prioritize food sovereignty and responsible ecology. The aim is to create communities by building innovative environments where disciplines, not typically associated, can intersect and interact.

Riverdale Farms

Riverdale farms is situated along a wooded area, near the east end of Cabbagetown. The farm has been in existence for over 36 years, and attempts to represent a rural Ontario farm between 1880 and 1920.

Evergreen Brickworks

Garden groups have been created at Evergreen Brickworks to practice planting, growing, maintaining and harvesting the vegetable and herb gardens on site. In addition, volunteers are employed to manage the composting activities, green gardens and other food initiatives on site. The objective of the facility is to cultivate crops in addition to conversation regarding local, healthy food choices.

	Black Creek Community Farm	Downsview Park	Foodshare	Wychwood Barns / The Stop	UofT's Sky Garden	Rye's Home Grown	Riverdale Farm	Evergreen Brickworks
Objective:	To act as a social justice leader, which aspires to provide a leadership model for surrounding communities.	To re-connect people with agricultural practices, by making it a common element in the urban environment.	To provide tools and expertise to build a 'just food system'.	To increase access to healthy food in a manner that maintains dignity, while building healthy communities.	To showcase a lightweight model of production and provide a place for teaching urban agricultural practices.	To prioritize food sovereignty and responsible ecology by building innovative environments where disciplines, not typically associated, can interact.	To represent a rural Ont. farm which provides interaction and agricultural learning experiences to urban residents.	To cultivate crops in addition to conversation regarding local, healthy food choices.
Agriculture Type:	Productive, seven acre farm.	Productive growing spaces, Downsview park		Productive, urban growing spaces	Light weight, productive rooftop gardening	Urban demonstration gardens	Urban demonstration farm spaces	Demonstration, social gardening spaces
Architecture:	None.	Greenhouses.	None.	7,680 sq.ft. 'covered street' Renovated street-car repair facility.	Lightweight, semi-hydroponic containers and irrigation system	Container gardens, rooftop gardens, greenhouse	Renovated historic farm architecture (Victorian houses, barns, drive sheds)	Renovated industrial building, pavilion spaces
Program:	- Four season greenhouses - public gardens - poultry apiary - community composting - HOOP houses - Employment opportunities	- Toronto Bee-keepers Co-op. - Urban harvest greenhouse - Fresh City Farms' home base	Partnering with community leaders, school programs and organizations within the city of Toronto to promote knowledge and access to sustainable produced healthy food. - cooking - fresh produce - growing - school outreach	- sustainable food production / education center - greenhouses - sheltered garden - global roots garden - community oven - compost center	- 100 specialized semi-hydroponic containers	- edible gardens, various growing techniques - workshops, focusing on urban agriculture and aspects of the food system	- farmers markets - traditional bread workshops - community center - educational experiences	- children's garden - edible food 'mound' Koemer Gardens - food beds, (welcome court) - raised plant beds - container gardens

Figure 49: Toronto's notable Urban Agriculture initiatives, highlighting program and objectives

LACKING INTEGRATION
AGRICULTURE + ARCHITECTURE

"The review examples can establish the patterns, the tendencies, that find the group together and equally important provide the foil against which variations and uniqueness can be identified" (Rudd 4)

The architectural component of the agricultural initiatives is strongly lacking; yet, what these spaces provide are exemplary programs and functions occurring within such spaces. The variety of initiatives is notable, as there is no identical duplication between places. Each employ their own unique approach to bringing urban agriculture to the city environment. This is interesting to note, mainly because there is little duplications within the same fabric; therefore, identifying that every application requires unique consideration. No single formula should be generated, as places which support agriculture should be as unique as the neighborhoods in which they reside. With that said, it is difficult to consider the project as being a 'prototype' which can be introduced into any context, regardless of the social, economic or environmnetal conditions. In order to be successful, a productive growing facility must look to its context to inform scale of production, social programs, site design, and so forth.

The programs, which are all centered around growing practices can be categorized and noted for contributing to social, economic and environmental discourses. Their programmatic approaches are incorporated and modified to create a site specific place of urban agricultural production for the design response. The intent is to create a agricultural production facility which will have greater integration between agriculture and architecture. A balance between strong program and architecture is necessary to progress agriculture's presence within the modern, urban city.

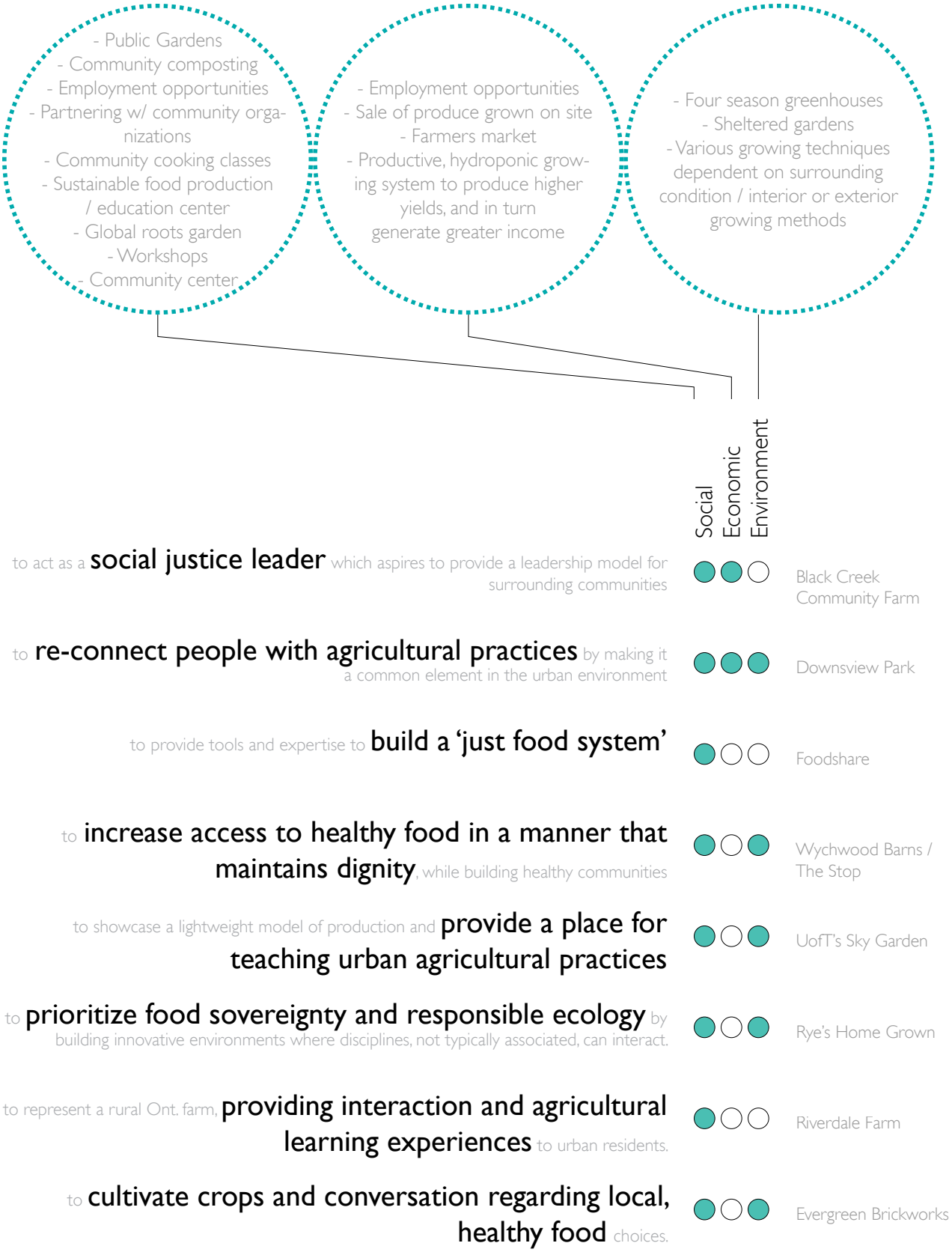


Figure 50: Highlighting the objectives and classifying the programs of the UA initiatives under review

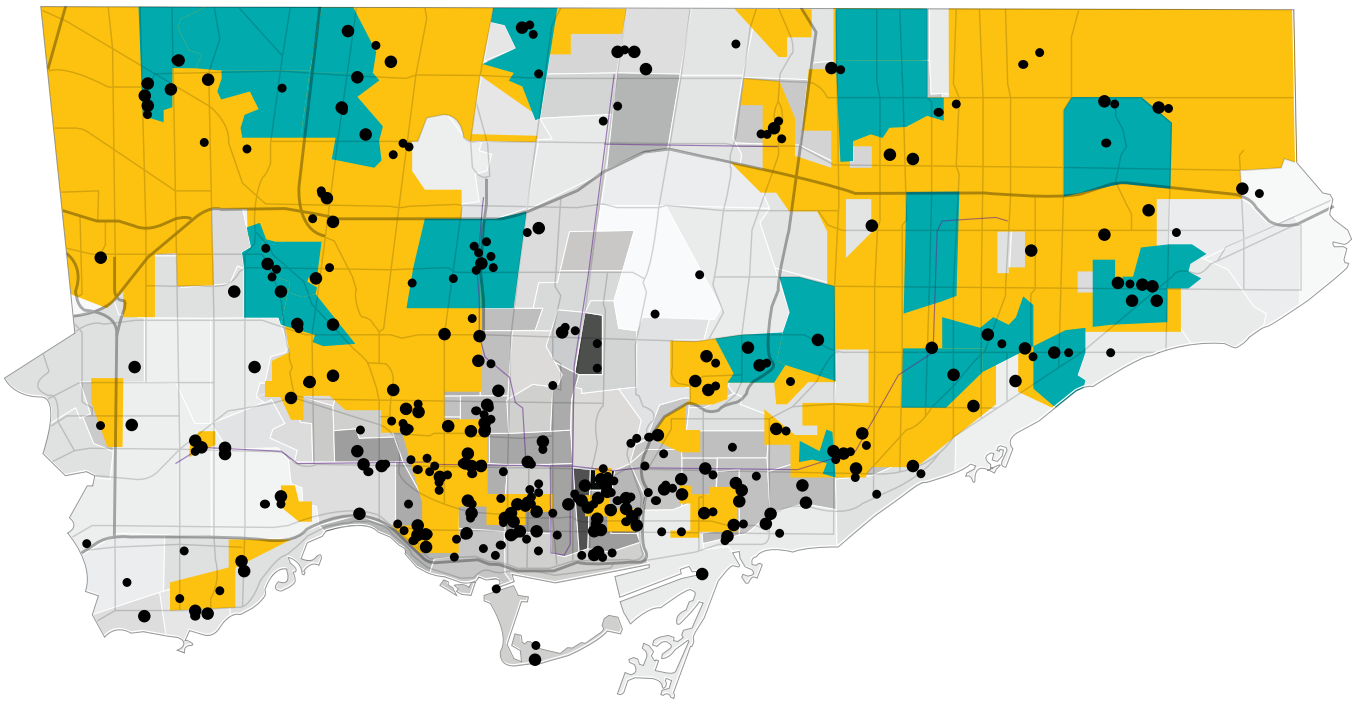


Figure 51: Map of Toronto, showing low income / priority neighborhoods, and UA + community gardens

Population Density:

- + 40 000
- 25 000
- 20 000
- 15 000
- 10 000
- 5 000
- 0

- Toronto Urban Agriculture + Community Gardens
- Priority Neighborhoods
- Low Income Neighborhoods

EXPANDING AGRICULTURE'S PRESENCE WITHIN THE CITY OF TORONTO

Eight urban agriculture initiatives have been identified which provide exemplary agricultural practices within the city of Toronto. Located throughout the confines of the city, situated amongst an array of densities these programs are being deployed in summer months and are thriving.

Although noteworthy, the initiatives remain centered around Toronto's priority and low income neighborhoods. Expansion beyond leftover, oddly shaped parcels of land in undesirable areas of the city would ensure greater exposure to the general public.

Addressing accessibility, and situating urban agricultural production processes within high density areas of the city, and along transit lines will generate desired results. In order to alter the current relationship urban inhabitants have with agriculture, moves must be made which will re-conceive how and where agriculture is to be produced within the city.

DESIGN APPROACH
PROJECT RESPONSE

4.0

ENGAGING WITH TORONTO'S DISCOURSES
SOCIAL / ECONOMIC / ENVIRONMENTAL

Engaging with Toronto's social, economic and environmental discourses and implementing a place of agricultural production within the city landscape requires innovation. If an architectural response is to alter the current relationship urban inhabitants have with agriculture it must diverge from traditional practices. As discussed in part one, there are a wide variety of issues preventing the implementation of an agricultural production facility in a central location within the dense urban landscape. Strategies responding to the discourses, which are to be embedded within the project are found on page 92 (design principles). Responses, which have informed the strategies are as follows:

RESPONDING TO THE SOCIAL DISCOURSE
THROUGH DESIGN

The social issues identified in part one included: the disconnect amongst urban inhabitants, and the lack of time, desire, or resources to grow. These issues exists among all profiles of urban inhabitants. The strategies implemented to address such issues include articulation of program, circulation and site design. Program, to provide a variety of spaces on site which foster social interaction; this includes community kitchens, community growing beds, resource centre and a hydroponic demonstration area. Through providing spaces which will facilitate gathering of people and the exchanging of information and ideas, the hope is that people will bond over the universal interest of food. Site circulation, will aid in reconnecting people as growing beds are intertwined with public spaces surrounding the site, blending of public and productive spaces will aid in generating conversation, allowing the public to bond over food production. Site design, through situating productive spaces alongside public spaces, allowing exposure into the typically concealed area of food production will allow people to come together and converse over innovative approaches to food production.

RESPONDING TO THE ENVIRONMENTAL DISCOURSE
THROUGH DESIGN

In order to use architecture to alter the current relationship urban inhabitants have with food, and respond to the environmental discourse, innovation in site selection is required. Selecting a place within the city which does not allow for traditional means of agricultural production to occur, but will support hydroponic growing opens up greater possibilities for selecting desirable sites. Growing both above, and below grade will maximize on site production potential, as well, connections to underground transit systems can be made. The city environment would change if places without soil, an abundance of space or light were transformed to sustain indoor food production. Transporting food throughout the city using transit will provide a more sustainable method of distribution, having a direct impact on the environmental discourse.

RESPONDING TO THE ECONOMIC DISCOURSE
THROUGH DESIGN

The current relationship urban inhabitants have with agriculture is almost non existent prior to the market. Urban agriculture initiatives occupy parcels of land outside areas of high exposure, where land values are low. In order to change the current condition within the economic discourse, a high tech. facility of agricultural production must be positioned on land of high value, in an area which is easily accessible by transit, and situated among high density living. This will alter urban inhabitant's current relationship with agriculture as it will place agricultural right in front of the publics eyes, on real estate typically reserved for high valued investments. Altering where food production is placed within the city will alter how food is perceived.

DESIGN PRINCIPLES
ARCHITECTURAL RESPONSE

From the research conducted, investigating how architecture can alter urban inhabitants current relationship with agriculture, three themes have emerged which will inform the design decisions of the project response. The importance of these themes became apparent through precedent research, analysis of current local initiatives, as well in generating an approach which will impact the social, environment and economic discourses of the city. The objective is to alter the current relationship, which is one of disconnect between consumers and agricultural production. Therefore, the design principles are intended to create spaces which will change how agricultural production processes are viewed within the city landscape.

Expose:
To provide urban inhabitants with visual exposure to all stages of the agricultural production process.

Engage
To provide urban inhabitants with opportunities for engaging with all stages of the agricultural production process.

Access
To provide urban inhabitants with access to retail spaces where food produced on site can be purchased, from both transit and street level

DESIGN PRINCIPLES
AGRICULTURAL RESPONSE

As seen in part two, there are a number of strategic ways agriculture can be incorporated into an architectural proposal, which will enhance the relationship urban inhabitants have with food production. These approaches have generated three categories of engagement, described as follows.

Agricultural production as a public experience, this approach created full contact between the general public and agricultural growing practices. These places were designed to foster engagement between the public and production by immersing people into spaces of crop production.

Agricultural production for public consumption, This approach separated the general public from any physical engagement with the production process. It maximized visual connection, through physical separation and fostered spaces for observation of practices within the growing spaces.

Agricultural production for public demonstration, This approach allowed the public into designated portions of the facility, where there was limited engagement, but an elevated amount of knowledge gained about the process. Places of demonstration allow for the general public to be immersed within an environment similar to those of the productive areas, without entering the intensified growing spaces and risking crop contamination.

PROGRAM PROPOSAL
ARCHITECTURAL RESPONSE

Toronto's urban agricultural initiatives provide a strong foundation for determining what types of programs to implement which will foster a strong connection to the surrounding community. Note, because the scale of operation is to be much larger than that of any existing initiative in Toronto, a greater emphasis is to be place on the retail portion of the facility.

Open to the General Public
- Public Gardens - Interior and Exterior growing
- Hydroponic Demonstration Area
- Community Kitchen
- Resource Centre
- Formal / Informal Gathering Areas
- Food Market
- Food Cafe
- CSA pickup areas
- Rooftop Gathering Area

Separated from the General Public
- Intensified Growing areas
- Crop Preparation Areas (Sorting, Washing, Cutting, Packaging)
- Distribution Circulation Areas
- Refrigerated Food Storage

CONTEXT
YONGE + EGLINTON, TORONTO ONTARIO

5.0

SITE SELECTION
TORONTO, ONTARIO

Placing agricultural production processes in central, desirable location are essential for altering the current relationship urban inhabitants have with agriculture. Currently, such initiatives are in constant competition with highly profitable development. The value associated with locally grown food and agricultural practices cannot be quantified, it carries far greater benefits than the monetary value calculated on a sq. ft. basis.

When analyzing where to situate an agricultural production facility within the city of Toronto, many factors were considered. First, the statement is intended to be ground breaking, innovative and bold; therefore, an unconventional site is desired. Second, an area in the city which is easy to access, preferably situated along the transit line, that will generate the greatest volume of traffic through the site on a daily basis and impact the social discourse. Third, the site is to be considered prime real estate, directly responding to and altering the current connotations surrounding agricultural production within the city. Fourth, the site is to be placed at a location where there currently lacks presence of agricultural practices, altering the environmental discourse.

Site selection would be greatly restricted if traditional methods of agricultural production were to be employed. However, as discussed in part two, given that Toronto is situated in a Canadian climate, with a limited growing season, alternative production practices are to be employed. Therefore, issues of lack of soil, light, space are not an issue for the site selection process.

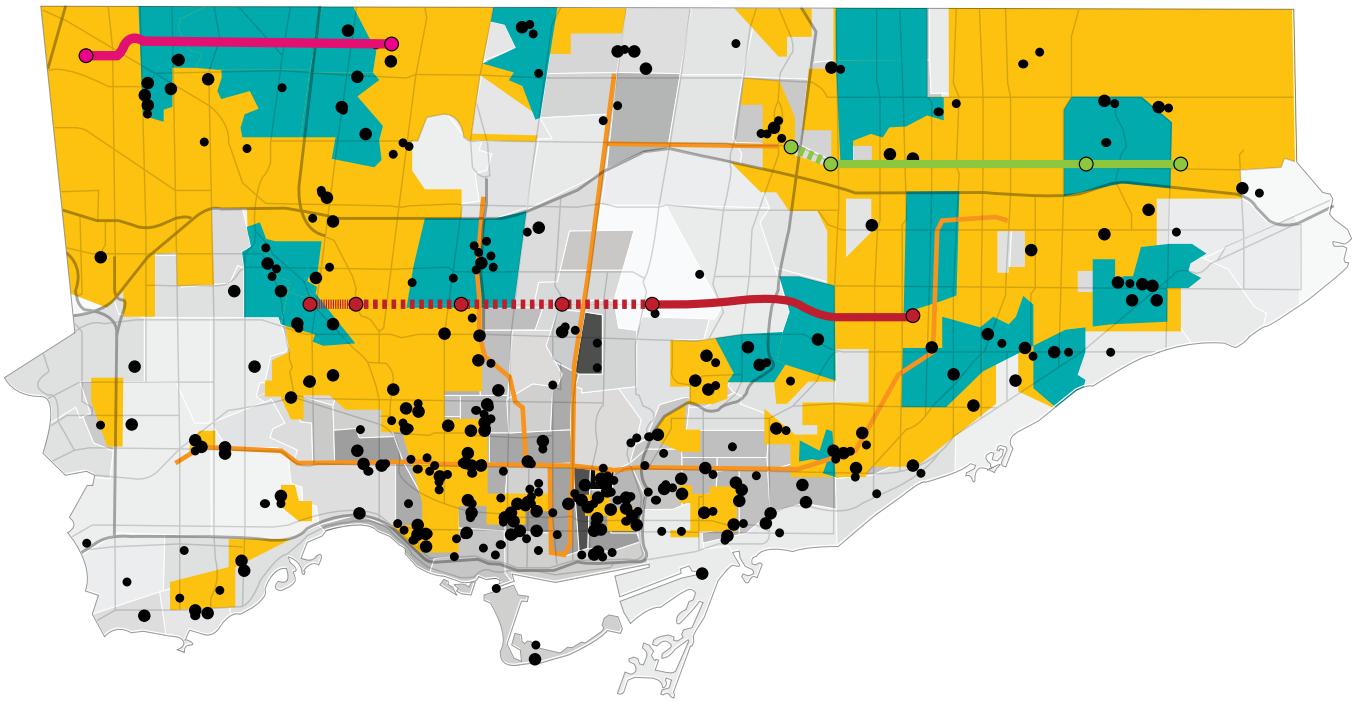


Figure 52: Map of Toronto, showing population density, low income / priority neighborhoods, existing subway lines, proposed metrolinx lines, and existing UA + community gardens

Population Density:

- + 40 000
- 25 000
- 20 000
- 15 000
- 10 000
- 5 000
- 0

- Toronto Urban Agriculture + Community Gardens
- Priority Neighborhoods
- Low Income Neighborhoods

- Finch West LRT
- Sheppard East LRT
- Eglinton Crosstown LRT

- at grade
- tunneled
- elevated

SITE SELECTION
YONGE + EGLINTON

The site selected for the architectural response is that of Yonge and Eglinton. The situation provides an opportunity to explore how a densely populated location within the urban landscape could support agricultural production processes, and how the food produced could be distributed throughout the city, with the aid of the neighboring transit system.

Figure 54: Figure Ground map surrounding Yonge + Eglinton site

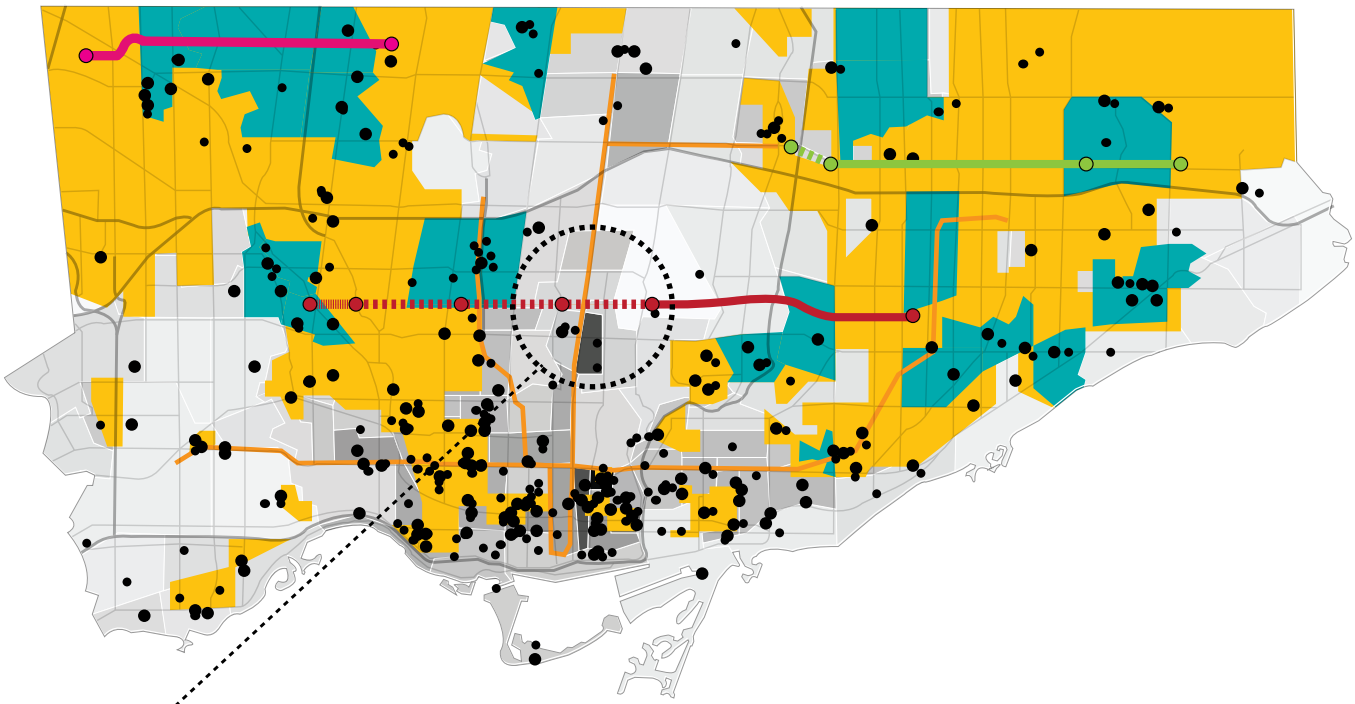


Figure 53: Map of Toronto, showing population density, low income / priority neighborhoods, existing subway lines, proposed metrolinx lines, and existing UA + community gardens

Population Density:

- + 40 000
- 25 000
- 20 000
- 15 000
- 10 000
- 5 000
- 0

- Toronto Urban Agriculture + Community Gardens
- Priority Neighborhoods
- Low Income Neighborhoods

- Finch West LRT
- Sheppard East LRT
- Eglinton Crosstown LRT

- at grade
- tunneled
- elevated

Figure 55: Figure Ground map of site's location along Eglinton Avenue

MIXED USE AREA
YONGE + EGLINTON

The context directly surrounding the site has: residential, commercial residential and utility and transport uses. As well as underground pathway which links the transit system to the Yonge/Eglinton Centre. Within this underground pathway, there is lots of potential for expansion and connection to the site. The existing path could benefit from the introduction of additional congestion relief points as well as access to ample public space.

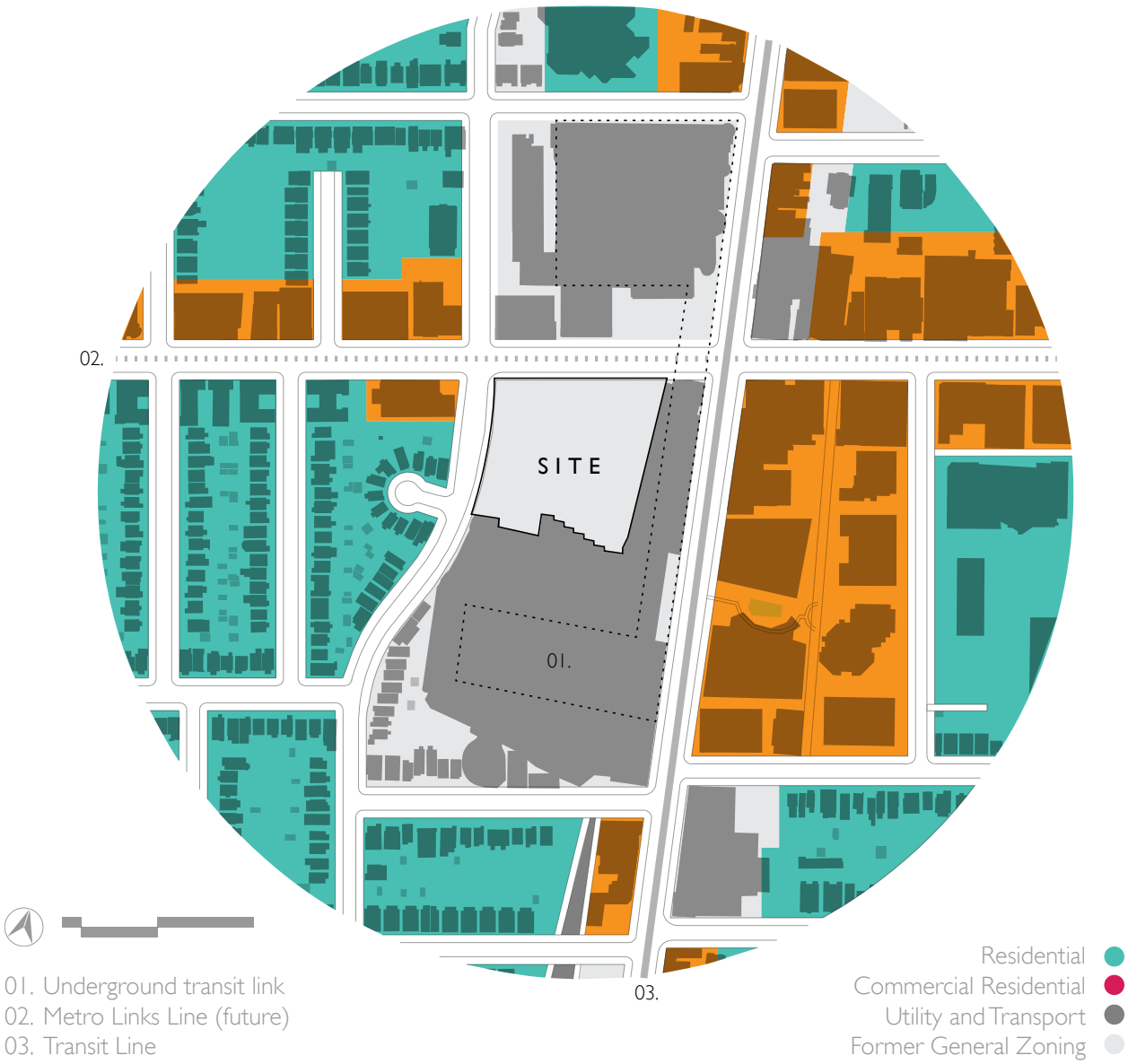


Figure 56: Map identifying zoning of area surrounding site of Yonge + Eglinton

Figure 57: Identifying 'Green Line' initiative along Eglinton Avenue

ENVIRONMENTAL CONDITION
YONGE + EGLINTON

The site is central to the Yonge+Eglinton and Mount Pleasant neighborhoods. Currently this area is under review and is generating proposals for a design called 'Midtown Moves'. The goals include:

- providing spaces for the community to come together
- create a uniquely rich public realm
- improve existing parks and make new ones

The development comity has proposed creating a 'Green Line' along Eglinton Avenue. Adding green spaces along this portion of midtown would be complemented by the addition of an agricultural facility central to this location, giving the initiative a strong presence near the corner of Yonge + Eglinton.

Figure 58: Photograph of site, taken from NW corner

Figure 59: Highlighting the development activity surrounding the site

ECONOMIC CONDITION
YONGE + EGLINTON

The demographics of the Yonge Eglinton neighbourhood, North Toronto, are greatly different from that of a typical urban agricultural site within the city of Toronto. The social, economic and environmental elements identified all greatly diverge from the traditional neighborhoods in which urban agriculture has traditionally been introduced.

Future intensification, west along Eglinton and the introduction of the Metrolinks line, will also aid in generating traffic and increasing exposure. Four stories below grade the line will be introduced along the site, creating potential for underground exposure and connection to the growing practices occurring on site. Note the current subway is located two stories below grade.

SOCIAL CONDITION
YONGE + EGLINTON

The site was selected, as it has the potential to expose a high volume of traffic to agricultural practices within the city. Thousands would have the opportunity to be in contact with modern growing practices, as nearly 20,000 people end their trip at the Yonge / Eglinton station and 14,000 depart from the station each morning. These figures do not include the countless individuals who ride the train along the Yonge transit line who would pass by the site on a daily basis. The Yonge Eglinton Centre, directly north of the site can aid in generating traffic, as it is currently a destination point itself.

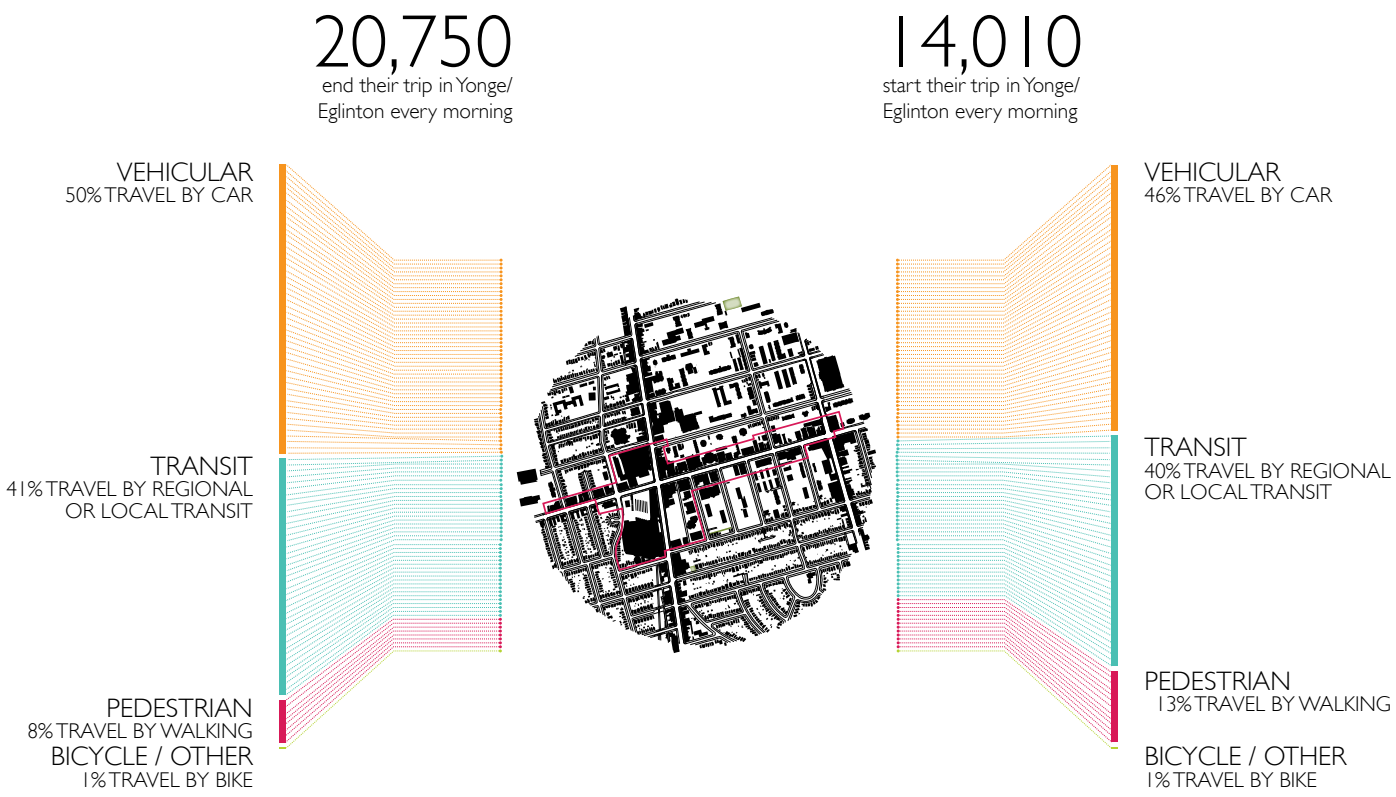


Figure 60: Showing volume of traffic passing through the Yonge + Eglinton site on a daily basis

SOCIAL CONDITION

YONGE + EGLINTON DEMOGRAPHICS

The demographics of the Yonge Eglinton neighborhood are greatly different from that of a typical urban agricultural site within the city of Toronto. The social, economic and environmental elements identified all greatly diverge from the traditional neighborhoods in which urban agriculture has traditionally been introduced.

Understanding the demographics of the surrounding community it crucial to ensure proper design response it developed. Considering the large volume of single occupants, living in residents elevated higher than five stories can potentially translate into ample public space throughout the site. As well, the lack of permanence could translate into flexible programs allowing people to participate at their leisure, which could have great success.

DIVERSITY

41%
young single immigrants

HIGH INCOME
Toronto avg. $69,740
(stats can)

76,749
>5 stories

HIGH DENSITY LIVING
lifestyle of urban residents

104.5
residents / hectare

11%
single family

1%
row house

17%
<5 stories

66%
>5 stories

SINGLE HOUSEHOLDS
Toronto avg. 23.7%
(stats can)

56%
single occupant

HIGH EMPLOYMENT
GTA avg. 9.5 jobs / hectare
(stats can)

83.6
jobs / hectare

LACK OF PERMANENCE

76%
rent

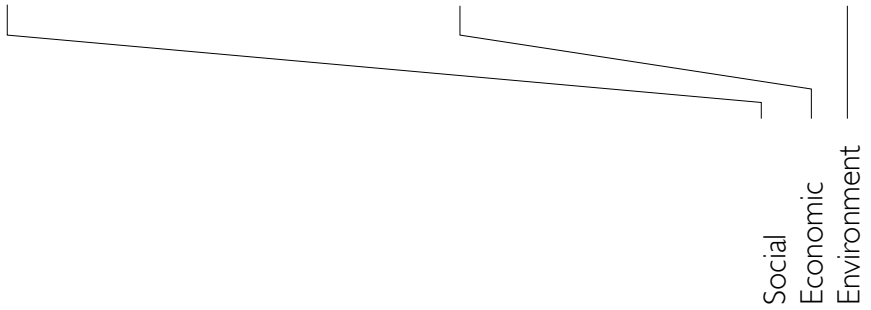


Figure 61: Demographics of Yonge + Eglinton

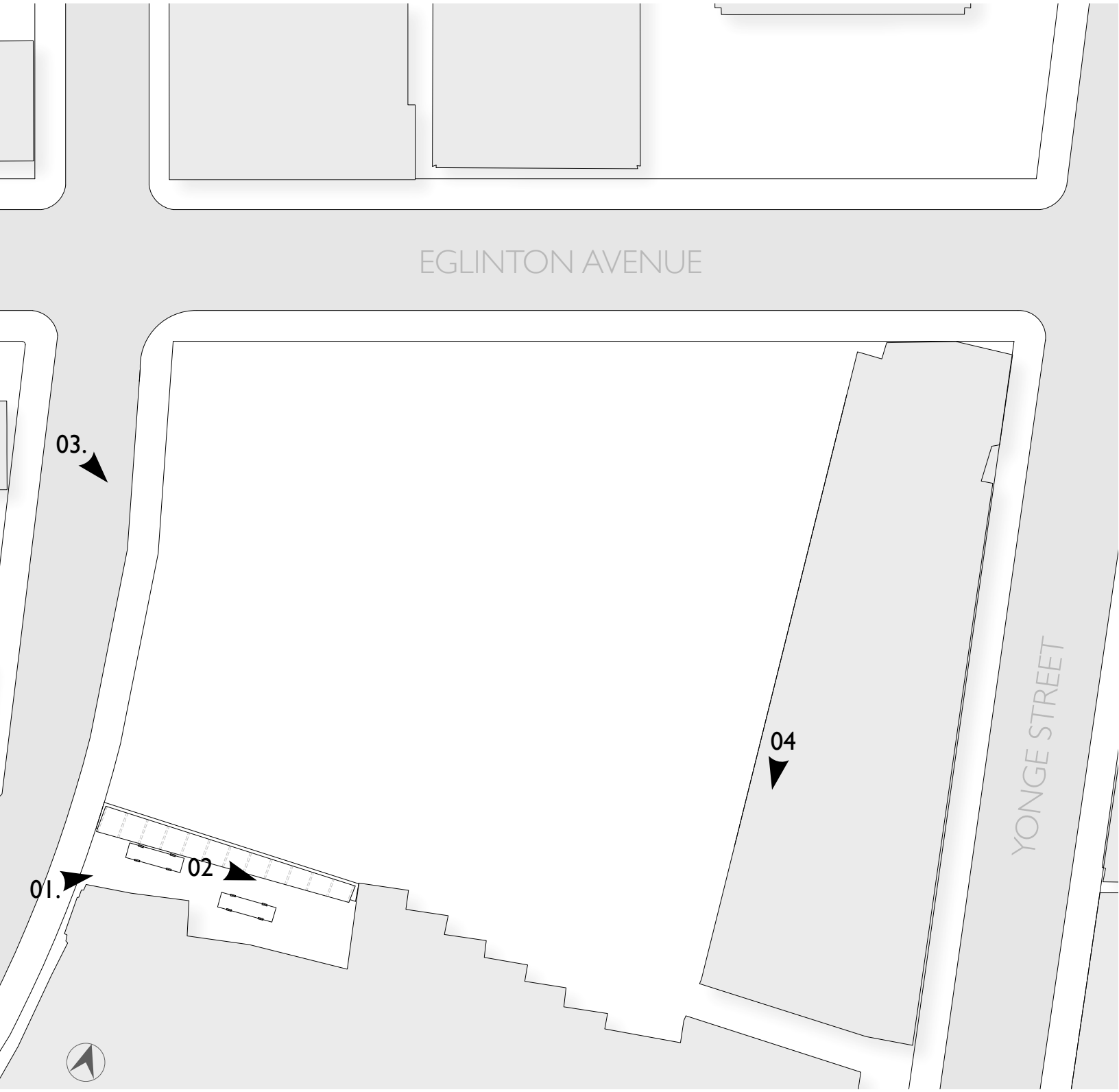
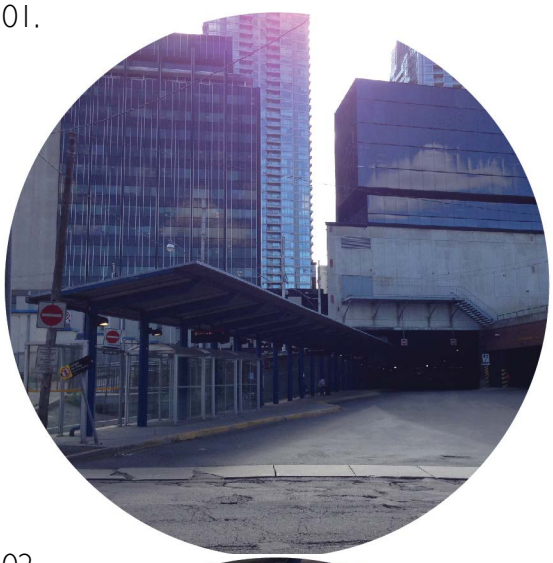


Figure 62: Site plan, outlining angle of view of photograph

TRANSIT
TTC BUS STATION

01.



02.

03.

TRANSIT
TTC SUBWAY

04.

Figure 63: Photo documentation of existing site

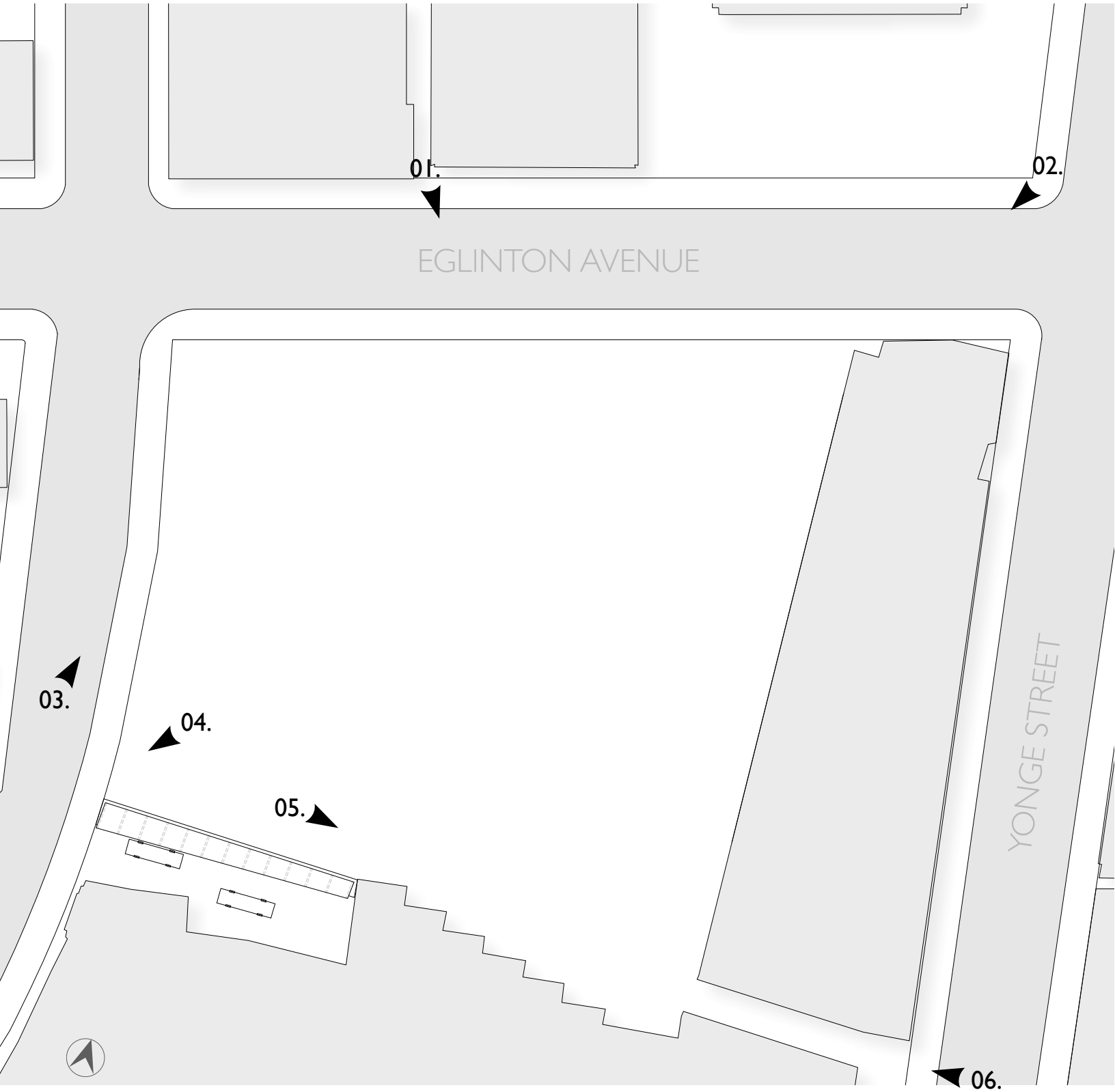


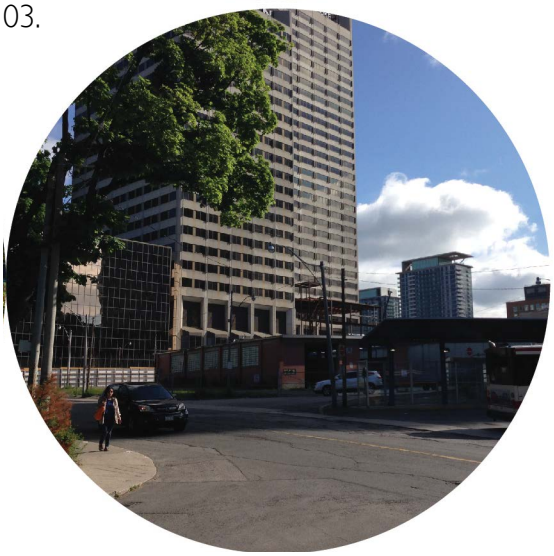
Figure 64: Site plan, outlining angle of view of photograph

STREET VIEWS

01.

02.

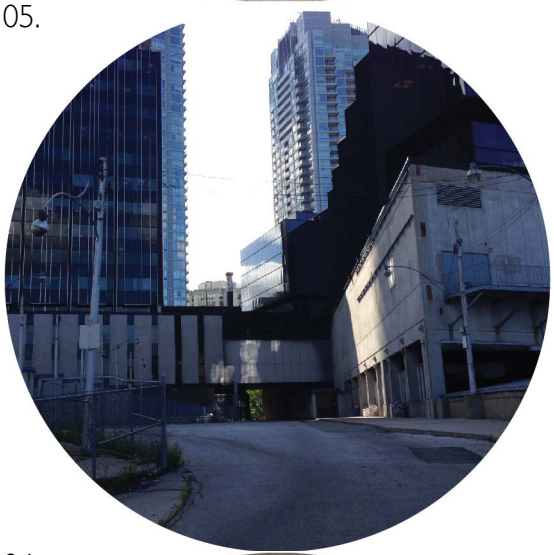
03.



NEIGHBORHOOD LINKAGES
DUPLEX - YONGE

04.

05.



06.

Figure 65: Photo documentation of existing site (continued)

FUTURE TRANSIT CONDITION
YONGE + EGLINTON

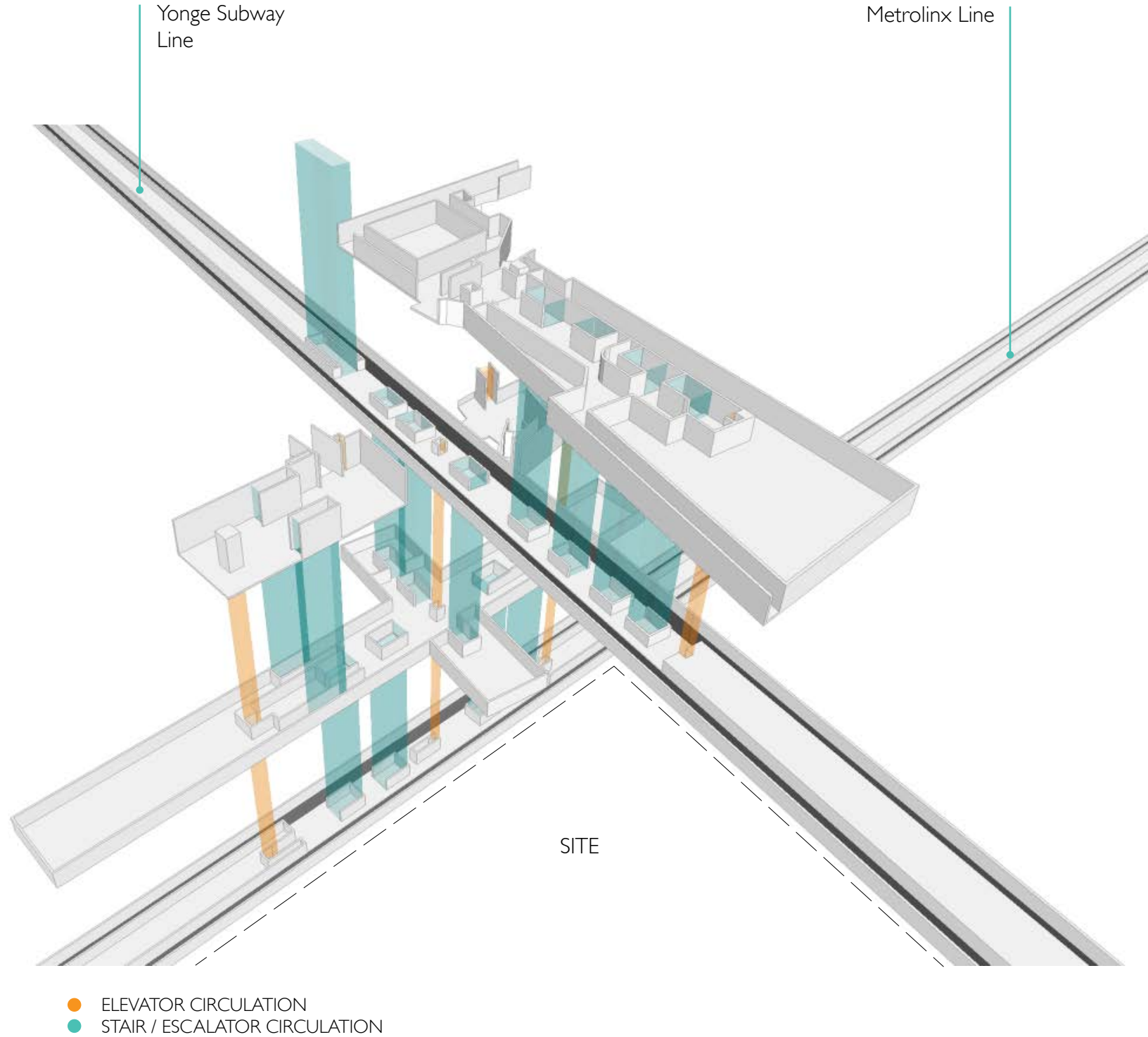


Figure 66: Future transit condition at Yonge + Eglinton, highlighting circulation

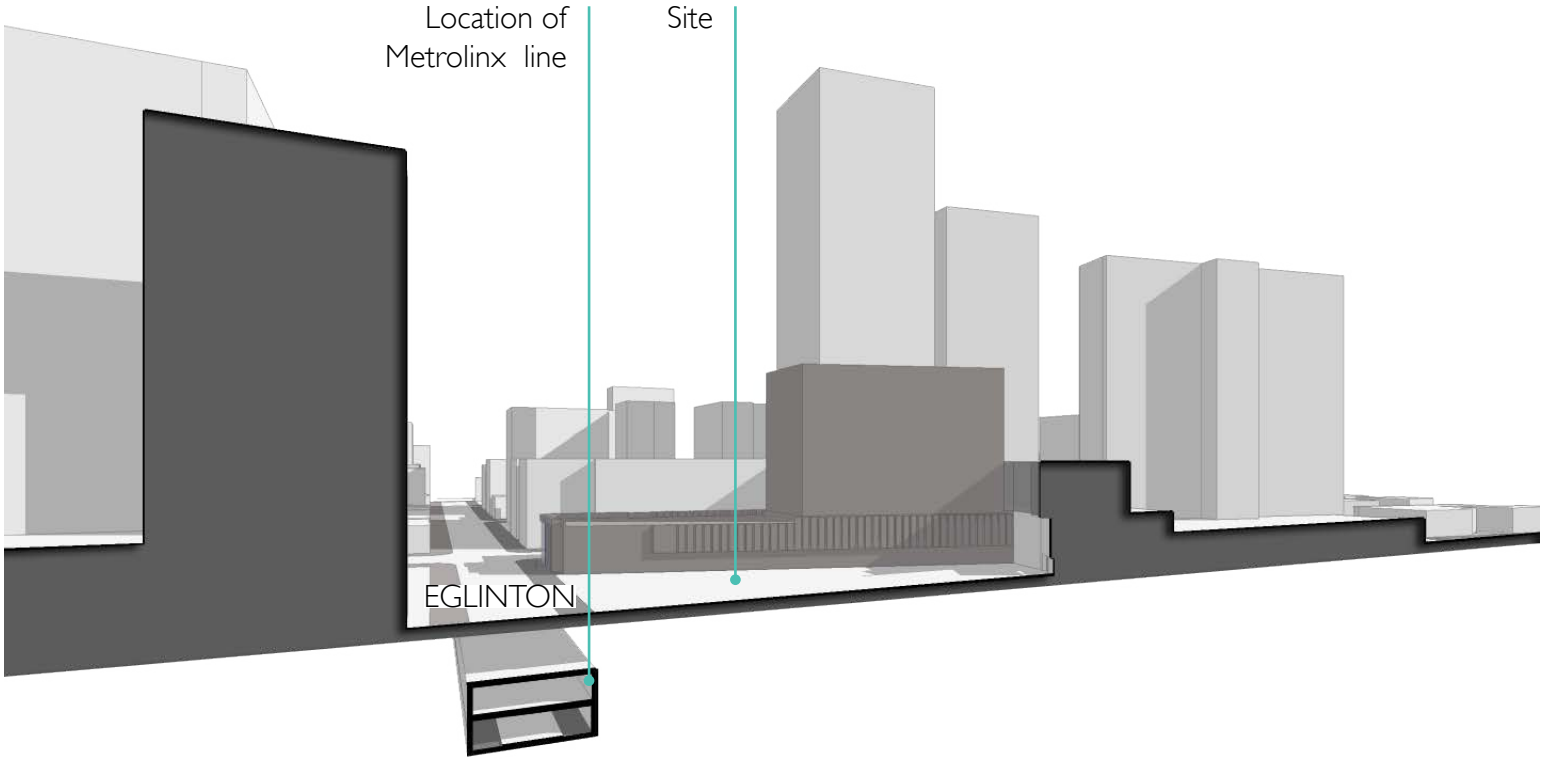


Figure 48: Future transit condition at Yonge + Eglinton, highlighting location of Metrolinx line

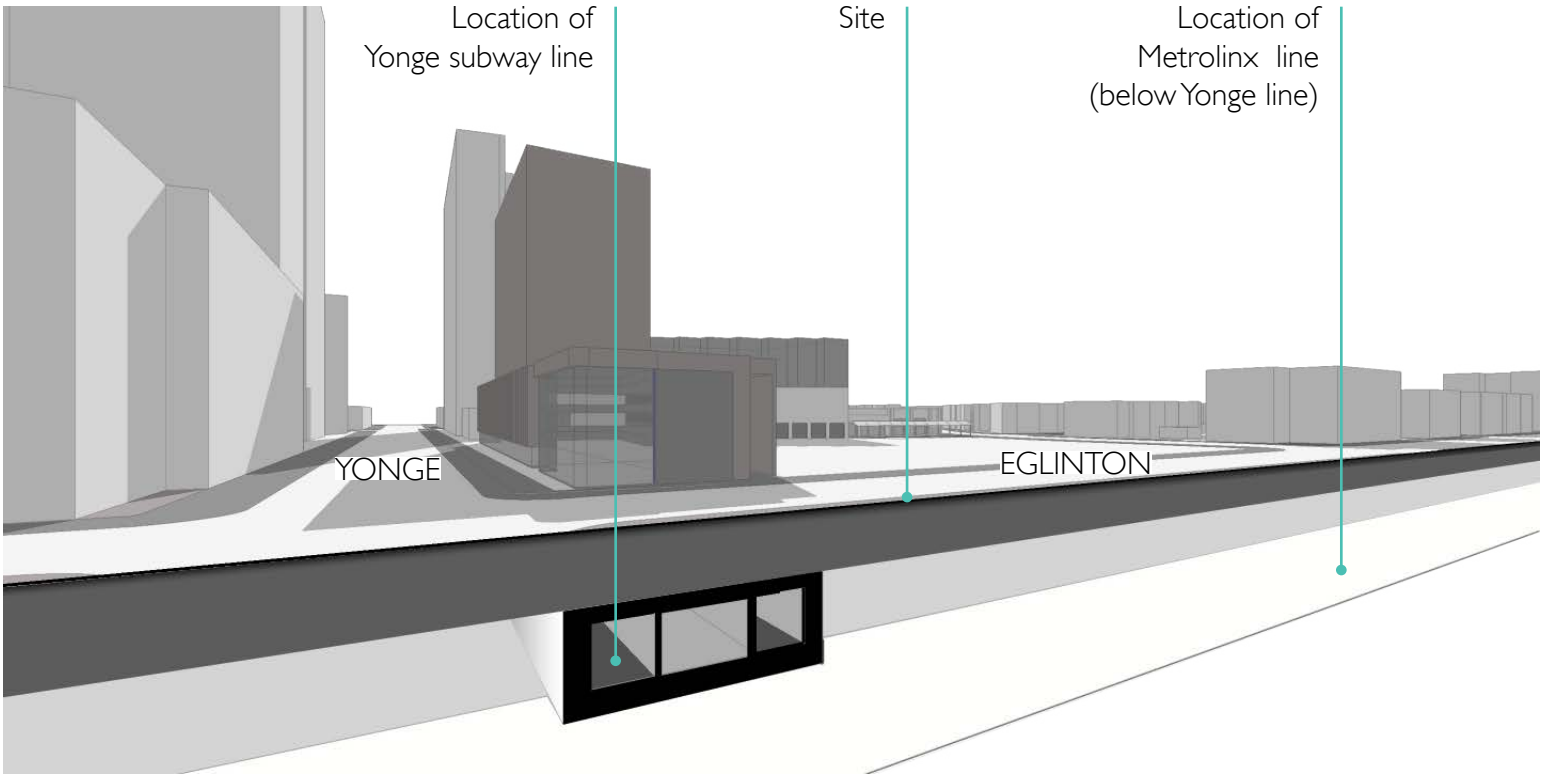
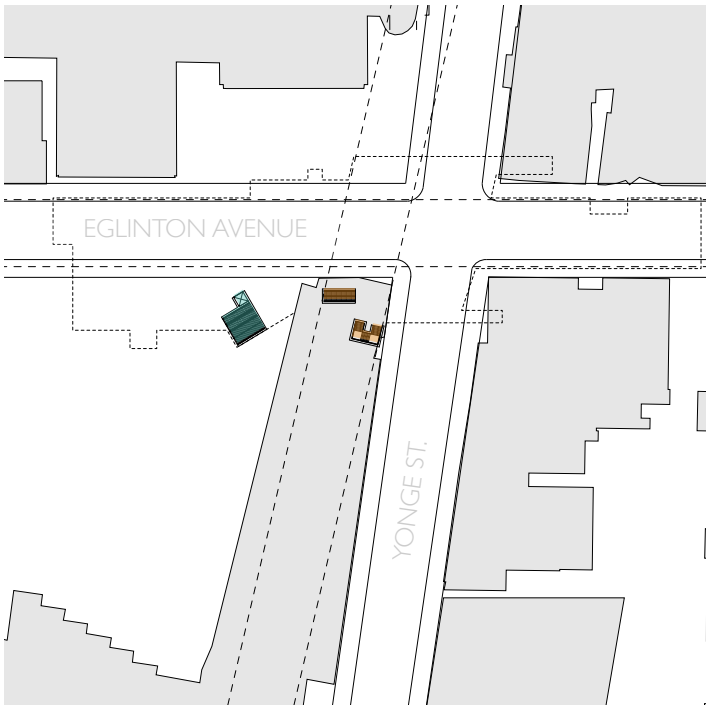
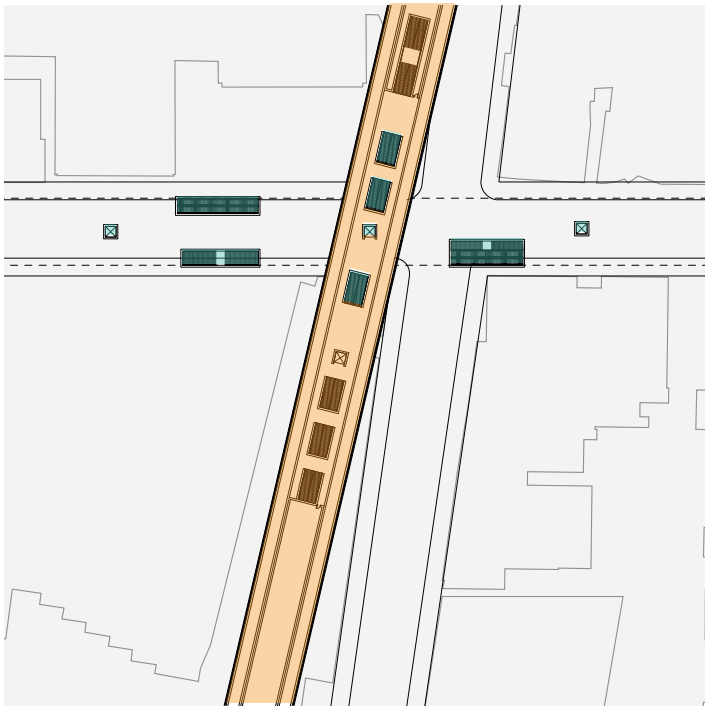


Figure 67: Future transit condition at Yonge + Eglinton, highlighting location of Yonge line

FUTURE TRANSIT CONDITION
YONGE + EGLINTON



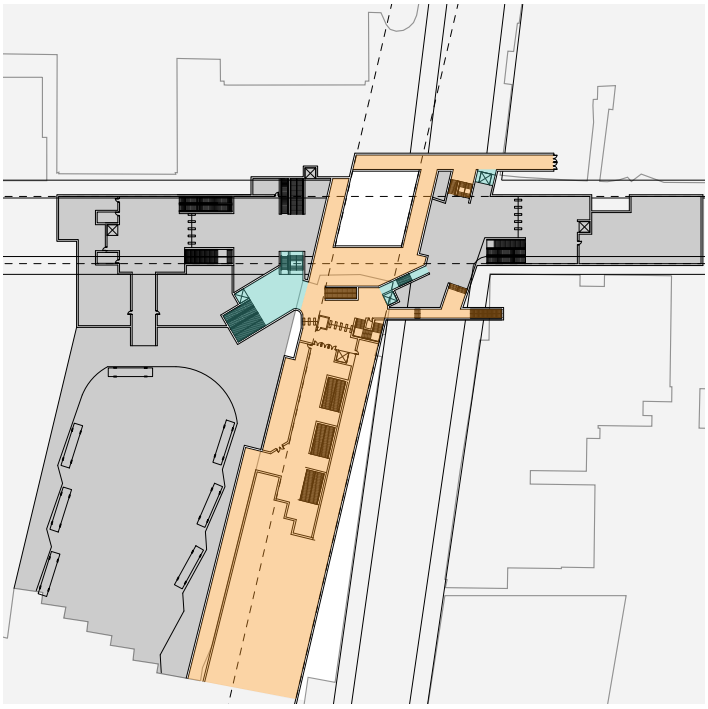
GROUND FLOOR



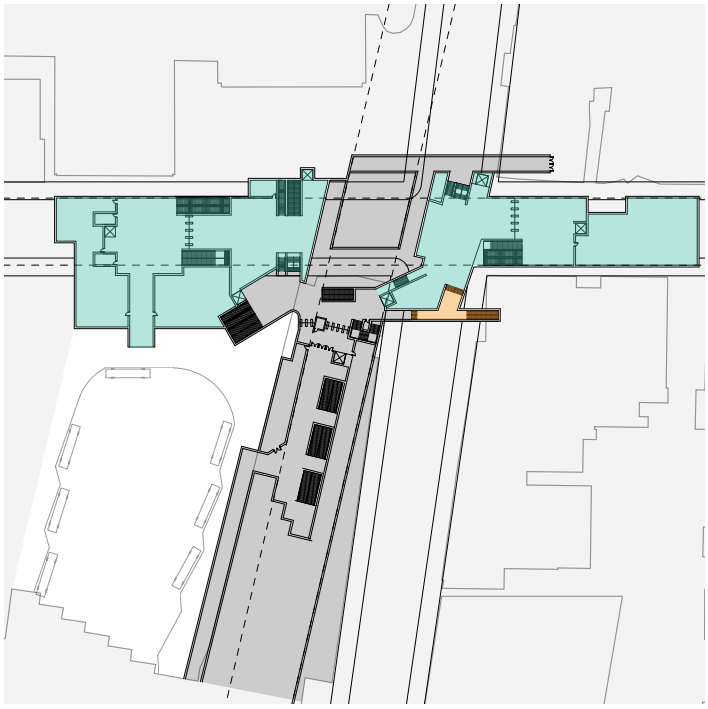
LOWER LEVEL 3
(1/2 LEVEL BELOW LL02)

(right) Figure 68 :
Existing and proposed
transit condition for
Yonge + Eglinton

EXISTING
PROPOSED METROLINX

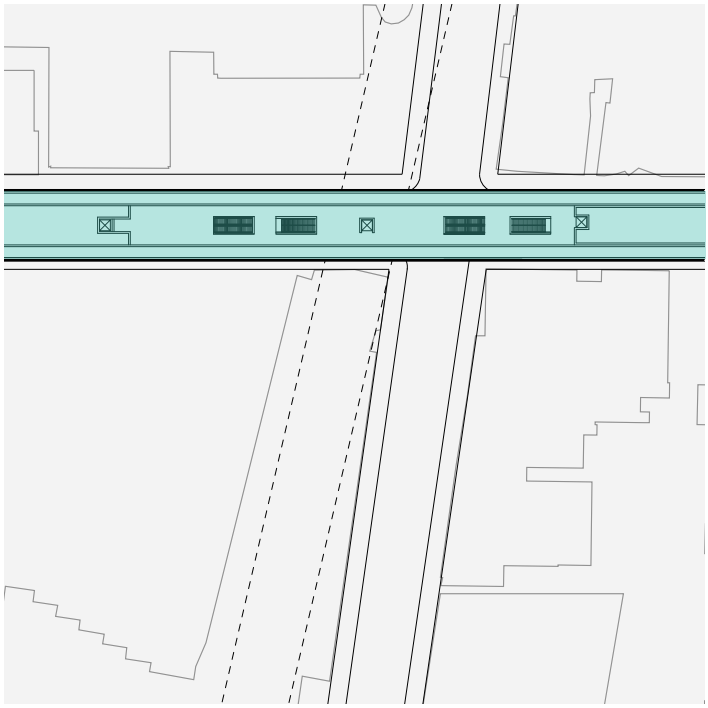


LOWER LEVEL 01



LOWER LEVEL 2
(UPPER CONCOURSE 1/2 LEVEL BELOW LL01)

LOWER LEVEL 04
(LOWER CONCOURSE)



LOWER LEVEL 05

EXISTING SUBWAY PLANS + PROPOSED METROLINX LINE

WITH IDENTIFICATION OF PROPOSED SITE

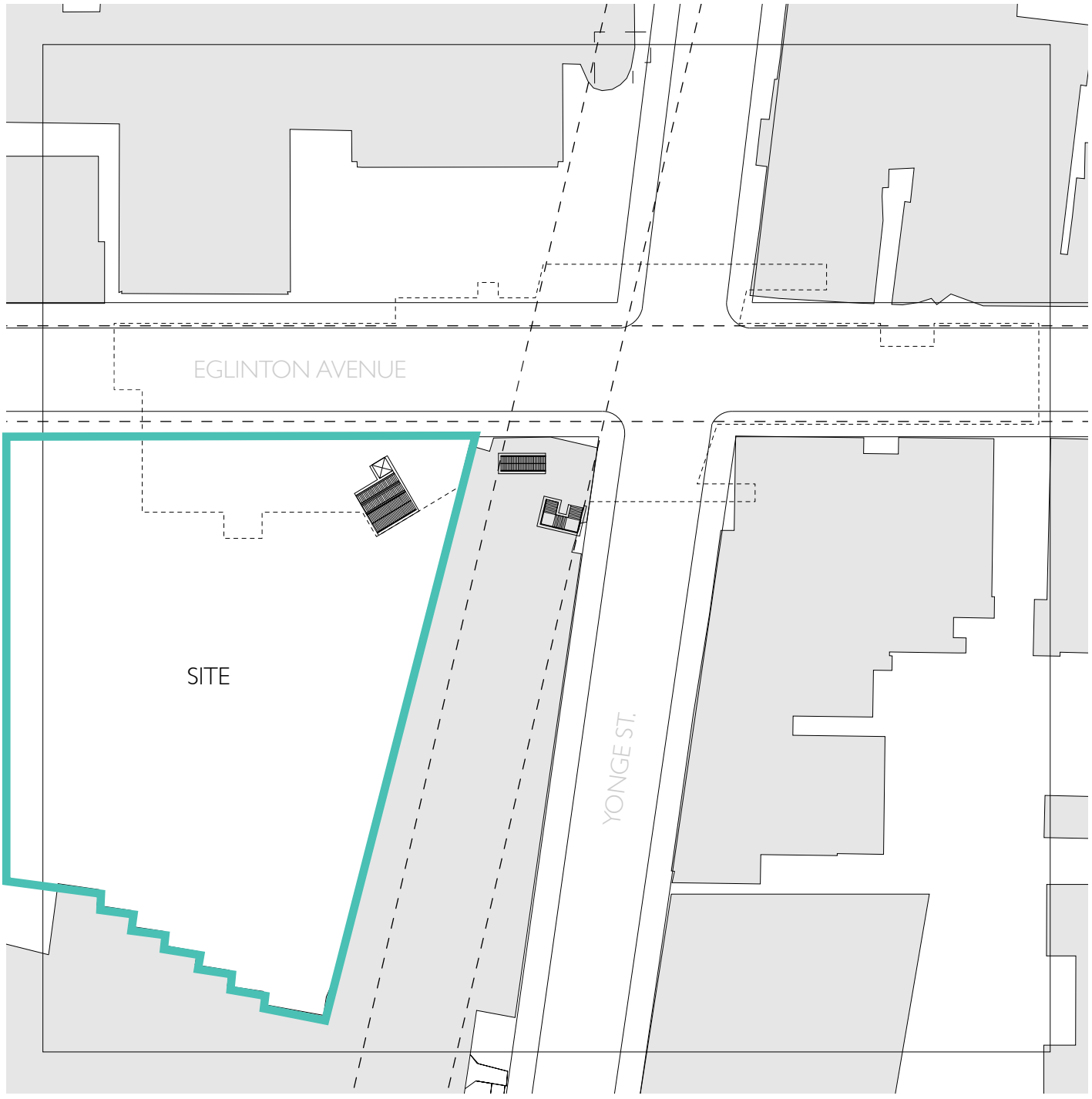
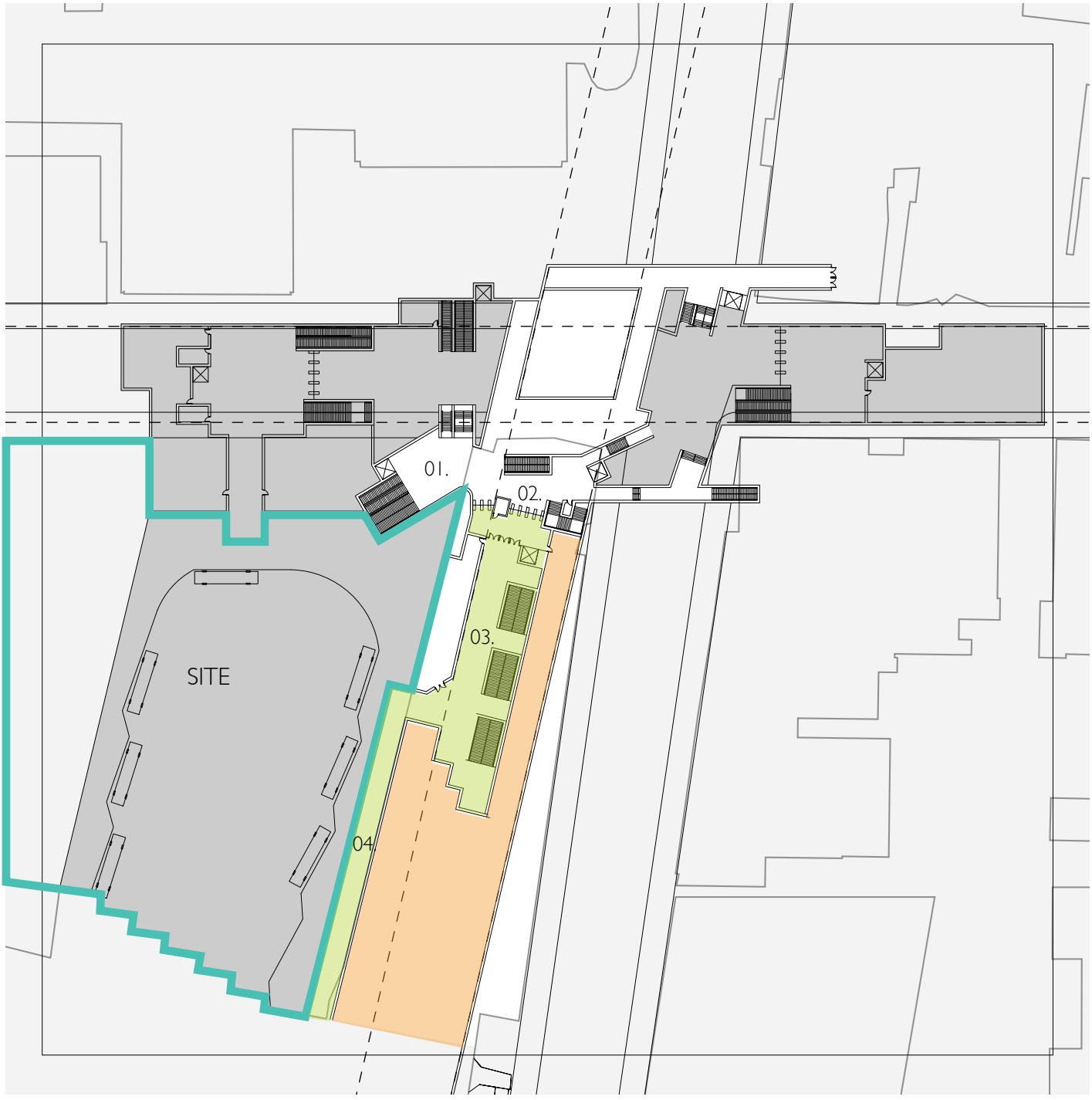


Figure 69: Future transit condition at Yonge + Eglinton, Ground Floor



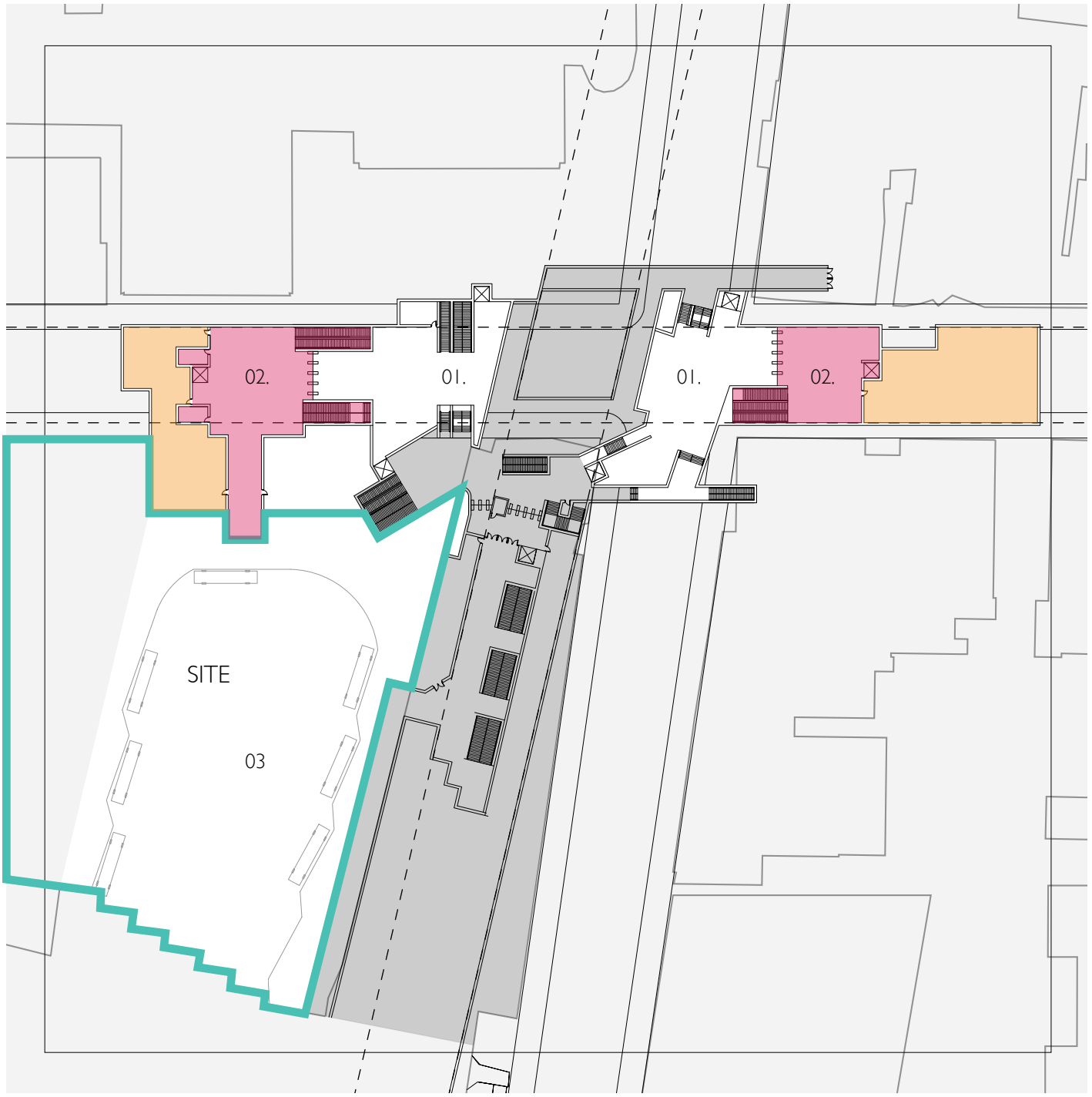
LOWER LEVEL 1

ACCESS FROM STREET EGLINTON AVENUE 01
FARE PAYING AREA 02
ACCESS TO YONGE SUBWAY 03
ACCESS TO TTC BUS STATION 04

Figure 70: Future transit condition at Yonge + Eglinton, Lower Level 1

EXISTING SUBWAY PLANS + PROPOSED METROLINX LINE

WITH IDENTIFICATION OF PROPOSED SITE



- TTC SUBWAY + BUS ACCESS
- METROLINX CROSSTOWN ACCESS
- SUBWAY TRACKS
- SERVICE
- PROPOSED SITE

LOWER LEVEL 2
(UPPER CONCOURSE 1/2 LEVEL BELOW LL01)

ACCESS FROM STREET EGLINTON AVENUE 01
ACCESS TO METROLINX LINE + PROPOSED BUS EXPANSION AREA 02
PROPOSED BUS EXPANSION AREA 03

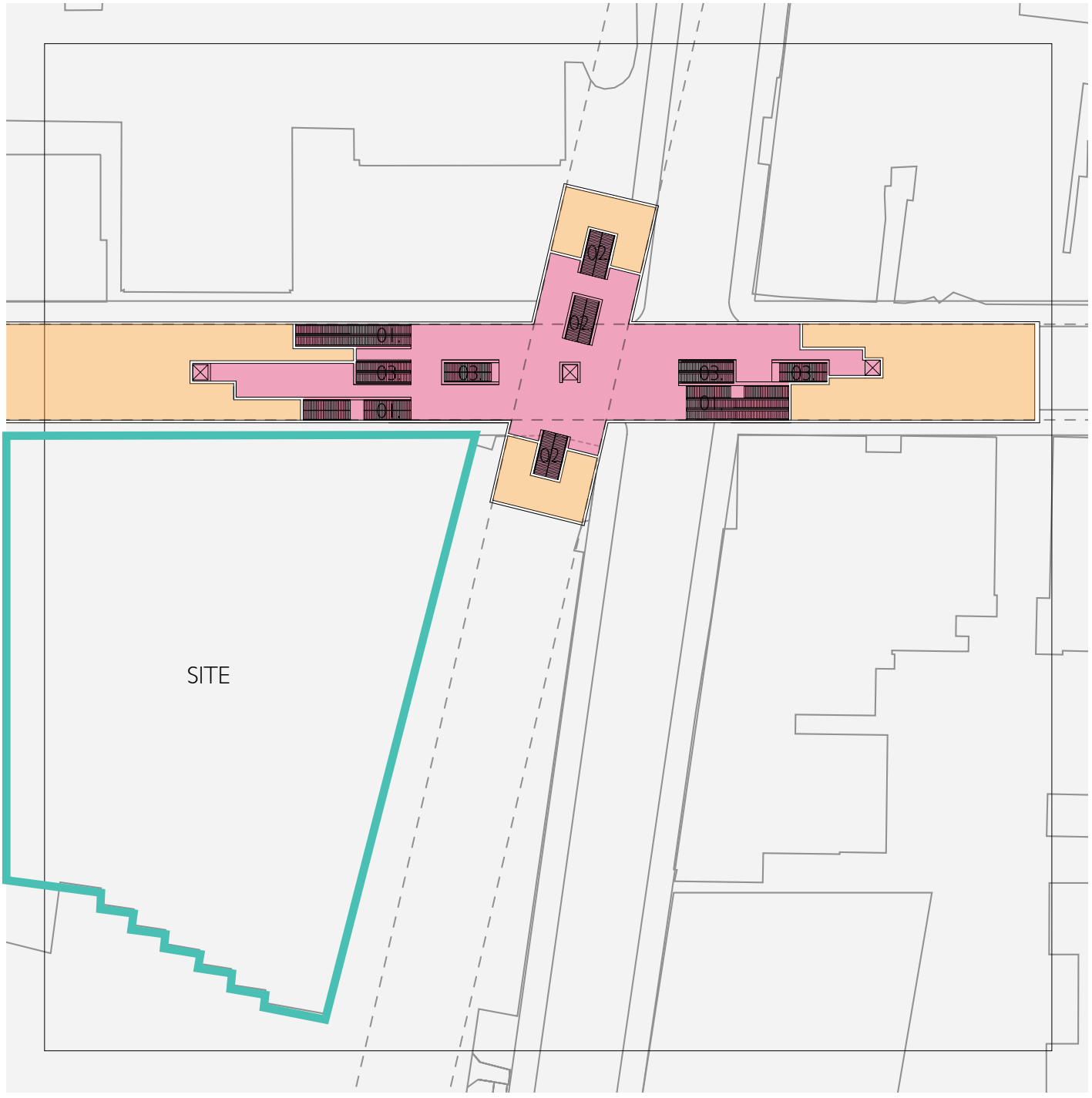
Figure 71: Future transit condition at Yonge + Eglinton, Lower Level 2

LOWER LEVEL 3

ACCESS FROM UPPER CONCOURSE 01
ACCESS FROM YONGE SUBWAY ACCESS LEVEL 02
ACCESS TO LOWER CONCOURSE 03

Figure 72: Future transit condition at Yonge + Eglinton, Lower Level 3

EXISTING SUBWAY PLANS + PROPOSED METROLINX LINE
WITH IDENTIFICATION OF PROPOSED SITE



LOWER LEVEL 04
(LOWER CONCOURSE)

- TTC SUBWAY + BUS ACCESS
- METROLINX CROSSTOWN ACCESS
- SUBWAY TRACKS
- SERVICE
- PROPOSED SITE

ACCESS FROM UPPER CONCOURSE 01
ACCESS FROM YONGE SUBWAY PLATFORM 02
ACCESS TO METROLINX PLATFORM 03

Figure 73: Future transit condition at Yonge + Eglinton, Lower Level 4

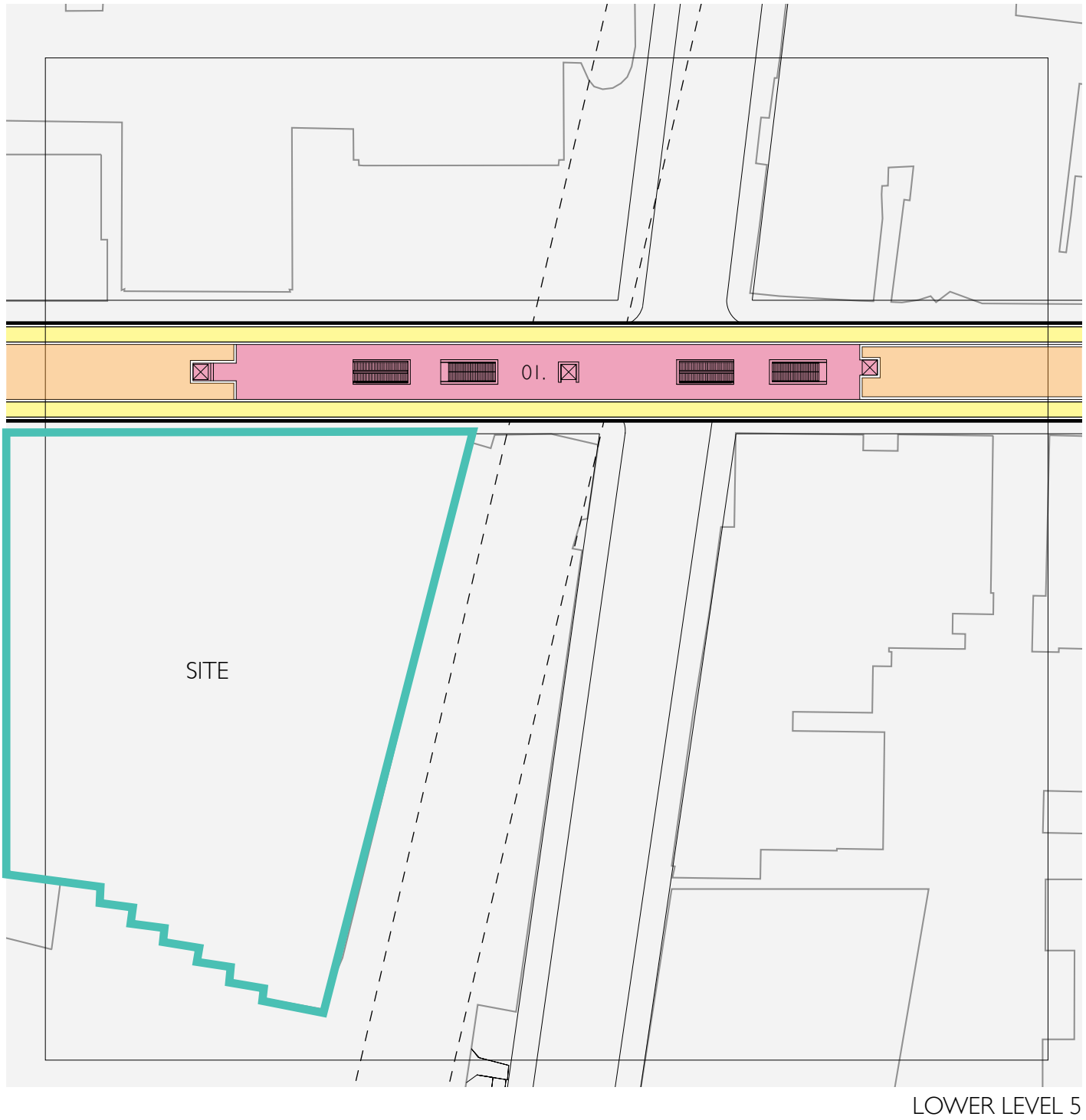


Figure 74: Future transit condition at Yonge + Eglinton, Lower Level 5

SHADOW STUDY
EXISTING CONDITIONS OF YONGE + EGLINTON

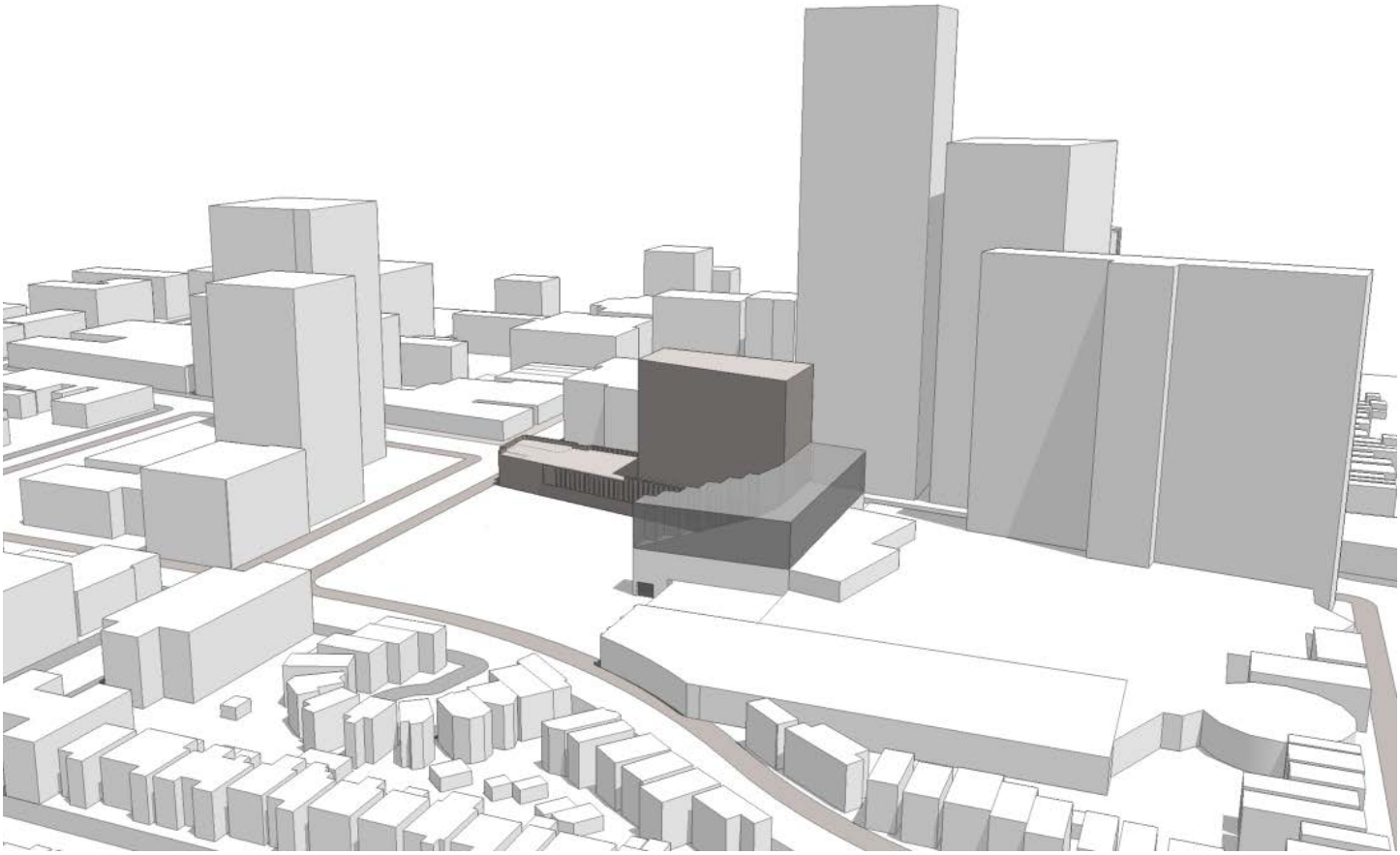
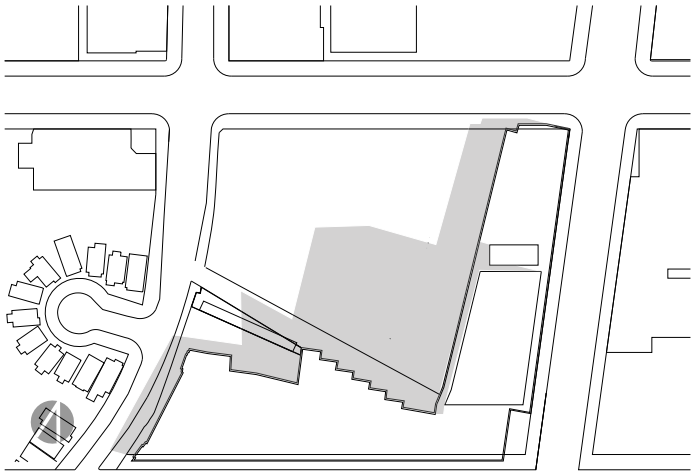
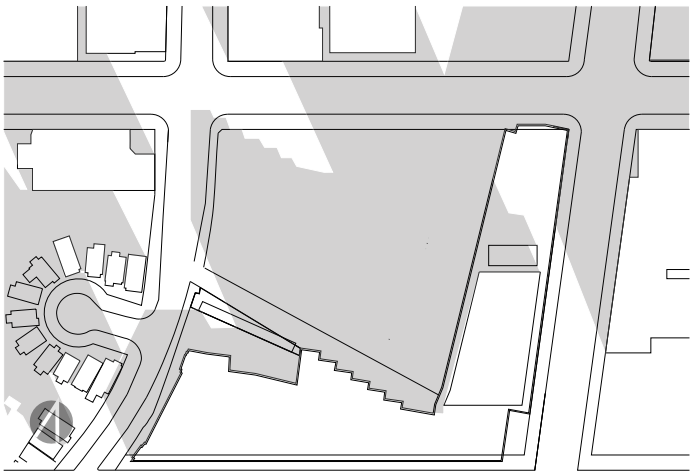


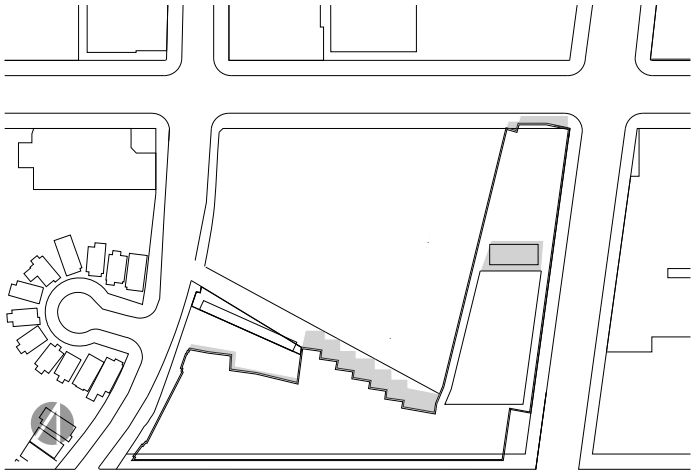
Figure 75: Axonometric view from SW corner of site



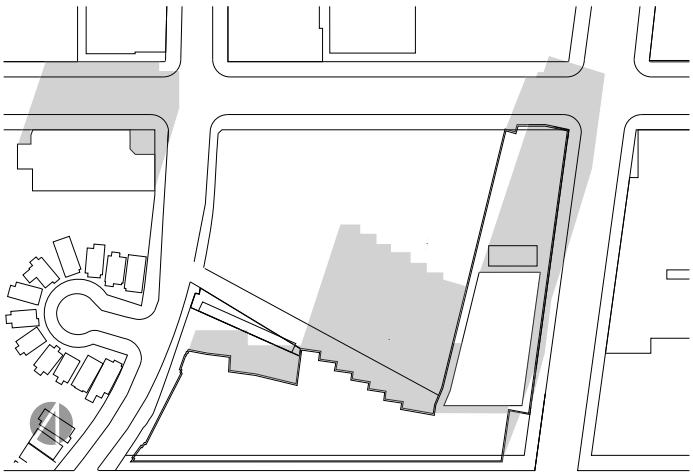
June 21 _ 8 am



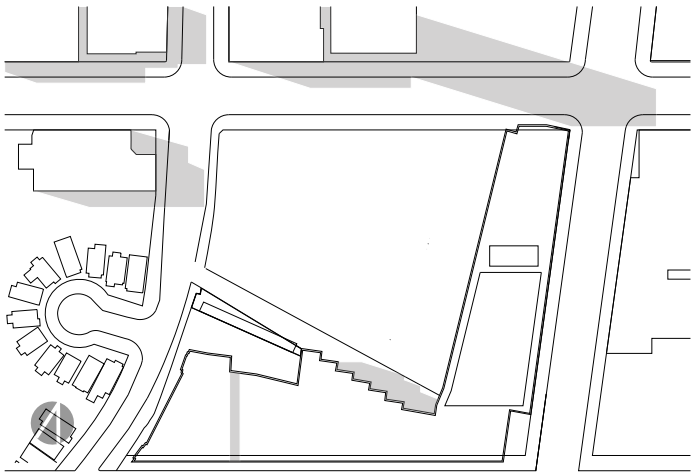
Dec. 21 _ 9 am



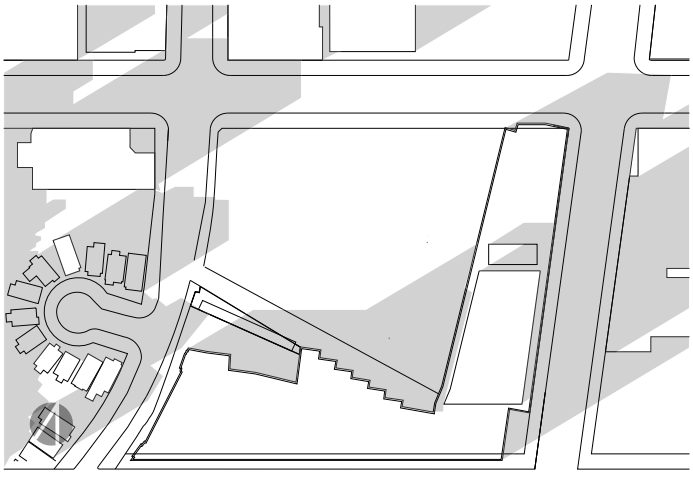
June 21 _ 12 pm



Dec. 21 _ 12 pm



June 21 _ 4 pm



Dec. 21 _ 3 pm

Figure 76: shadow study, existing condition, Yonge + Eglinton

RESPONDING TO URBAN INHABITANTS
DESIGNING FOR DIFFERENT PROFILES

Different profiles of urban inhabitants will engage with a place for agricultural production differently. Therefore, it is important to identify a variety of profiles and address the relationship each will have with the place of agricultural production.

Transit rider, this profile will have a stronger engagement with the facility if it is easily accessible within transit hubs. Spaces for purchasing food grown within this place for agricultural production need to be accessible within 'fare paid zones' to provide greater convenience to riders. Given the nature of the subway being primarily underground, if riders are to have a visual connection with the agricultural production, it will have to be done underground. Thousands of people pass by the site on a daily basis, underground, using the subway system. With the addition of the metrolinx line, an even greater volume of people could be exposed to growing, if a portion is to exist underground.

Community member, within the dense urban landscape, there will be an abundance of residents surrounding the place of agricultural production. This profile will have stronger engagement with the programs offered at the site, as they will potentially utilized the place numerous times throughout the year. Access to a market and CSA pickup above grade is necessary, as this could be a place where the surrounding community purchases their produce.

Urbanite in transition, vehicular and pedestrian traffic passing by and through the site will have a different experience as well. Their engagement with the site will be mainly above ground and outside the facility. Therefore, engagement at grade with growing practices and views into the intensive agricultural production areas are important for this profile to have engagement and exposure with growing practices.

It is crucial that the architecture allows for these three profiles to have engagement and exposure with the agricultural production; however, the growing environment requires sterilization to minimize the chances of being exposed to diseases which will infect the crop. Physical separation between urban inhabitants and areas of intensified agricultural production are unavoidable. Therefore, the architecture must provide an innovative approach to visual engagement through physical separation of the two spaces.

PROGRAM PLACEMENT

APPROACH

The approach to program placement was the result of attempting to generate spaces which embodied the project's design objectives, providing exposure, engagement and access.

Access, situating the access point to the Yonge subway and Metrolinx line in the north east portion of the site ensured easy access to the proposed transit hub development.

Exposure, by giving the growing tower street frontage the site attempts to bring an agricultural presence to Eglinton Ave. Given the orientation of the tower, the South East, to North West portions of the facade are to be concealed from direct solar exposure. This prevents visual exposure into the tower; however, the North East corner condition, as well as the level at grade is to be fully transparent to allow the general public views of the intensive agricultural production happening within.

Engage: by creating essentially two forms on the site, and dedicating the central area to the public realm, the intent is to engage with the pedestrian circulation along the Eglinton Ave.. The position is intended to aid in achieving the goals of the Midtown Moves initiative, as mentioned in part six,

- providing spaces for the community to come together
- create a uniquely rich public realm
- improve existing parks and make new ones

This productive park is brought into the center of the site, and allows urban inhabitants to physically engage with the cultivation of food as well as providing an innovative approach to green space within the city. The 'Green Line' is engaged in a number of ways on site; first, through the linear productive park, second, the intensified agricultural practices happening within the tower visually extends the greening vertically along the facade of the tower, third, the rooftops of the base of the tower carry the green initiative up to the existing under utilized rooftop of the neighboring building to expand the extents the site's public space.

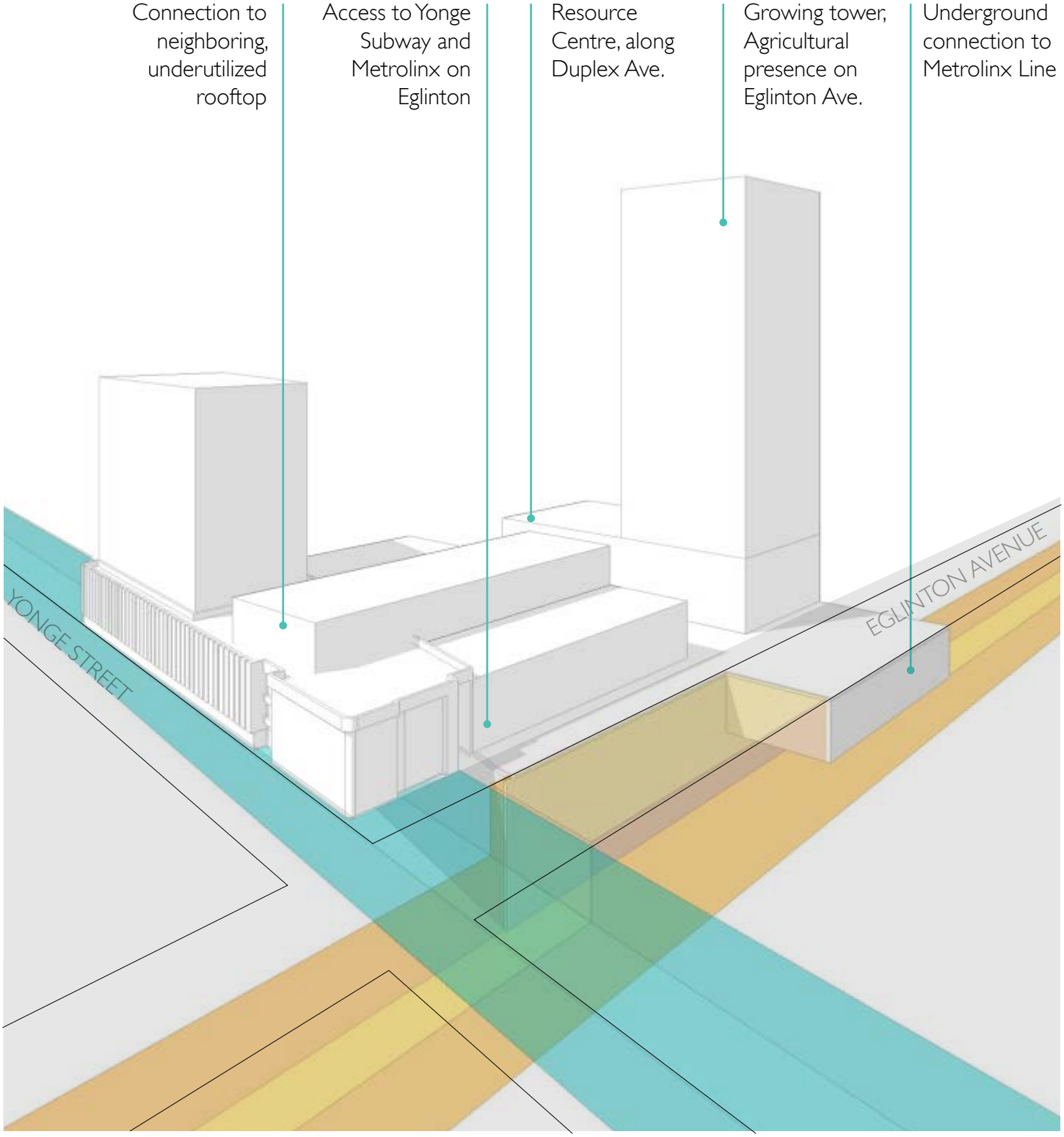


Figure 77: Diagram highlighting approach to program placement

PROJECT
URBAN AGRICULTURAL PRODUCTION FACILITY

6.0

APPLICATION
DESIGN PRINCIPLES

To provide urban inhabitants with visual exposure to all stages of the agricultural production process.

To provide urban inhabitants with opportunities for engaging with all stages of the agricultural production process.

To provide urban inhabitants with access to retail spaces where food produced on site can be purchased, from both transit and street level

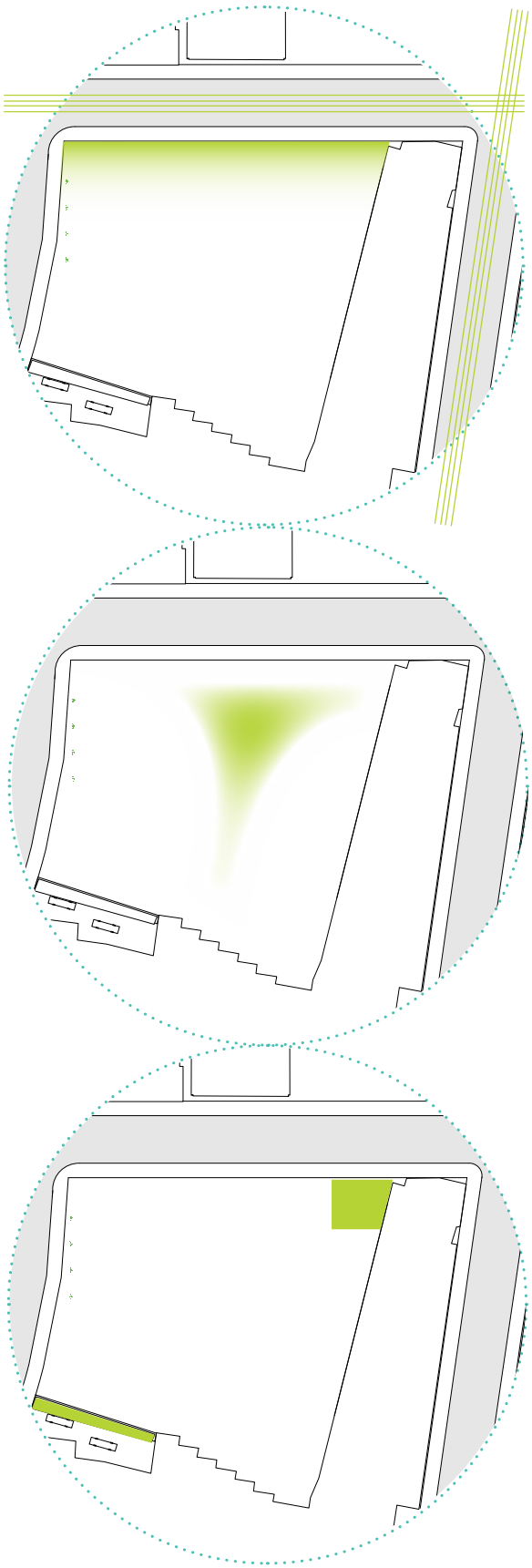
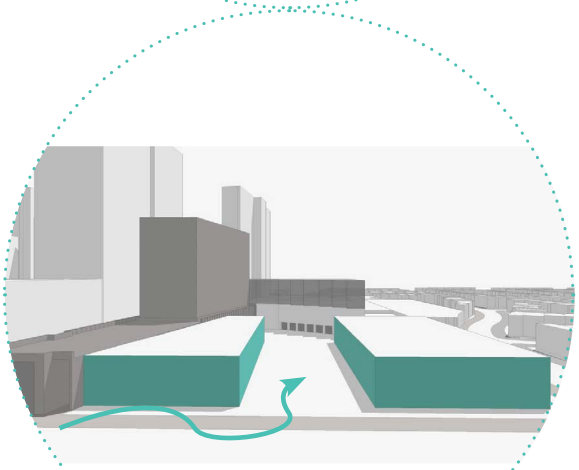
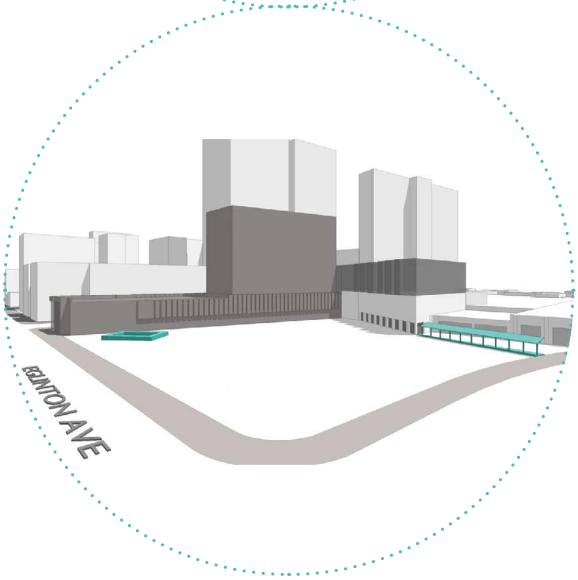


Figure 78: Application of design principles on site

Vertical presence alone Eglinton Ave.



Dividing the building and bringing people through the centre of the site. Fully exposing the operations within the spaces



Providing access to both subway and bus transit stations, to be incorporated within the building.

Figure 79: Application of design principles manifested through form

APPLICATION

DESIGN PRINCIPLES

01 Connecting to neighboring underutilized rooftop

02 Exterior Urban Agriculture programming, to connect to Eglinton Ave.

03 Resource centre along Duplex Ave.

04 Growing tower, agricultural presence on Eglinton Ave.

05 High visibility of production space within the tower

06 Access to Yonge Subway and Metrolinx on Eglinton Ave.

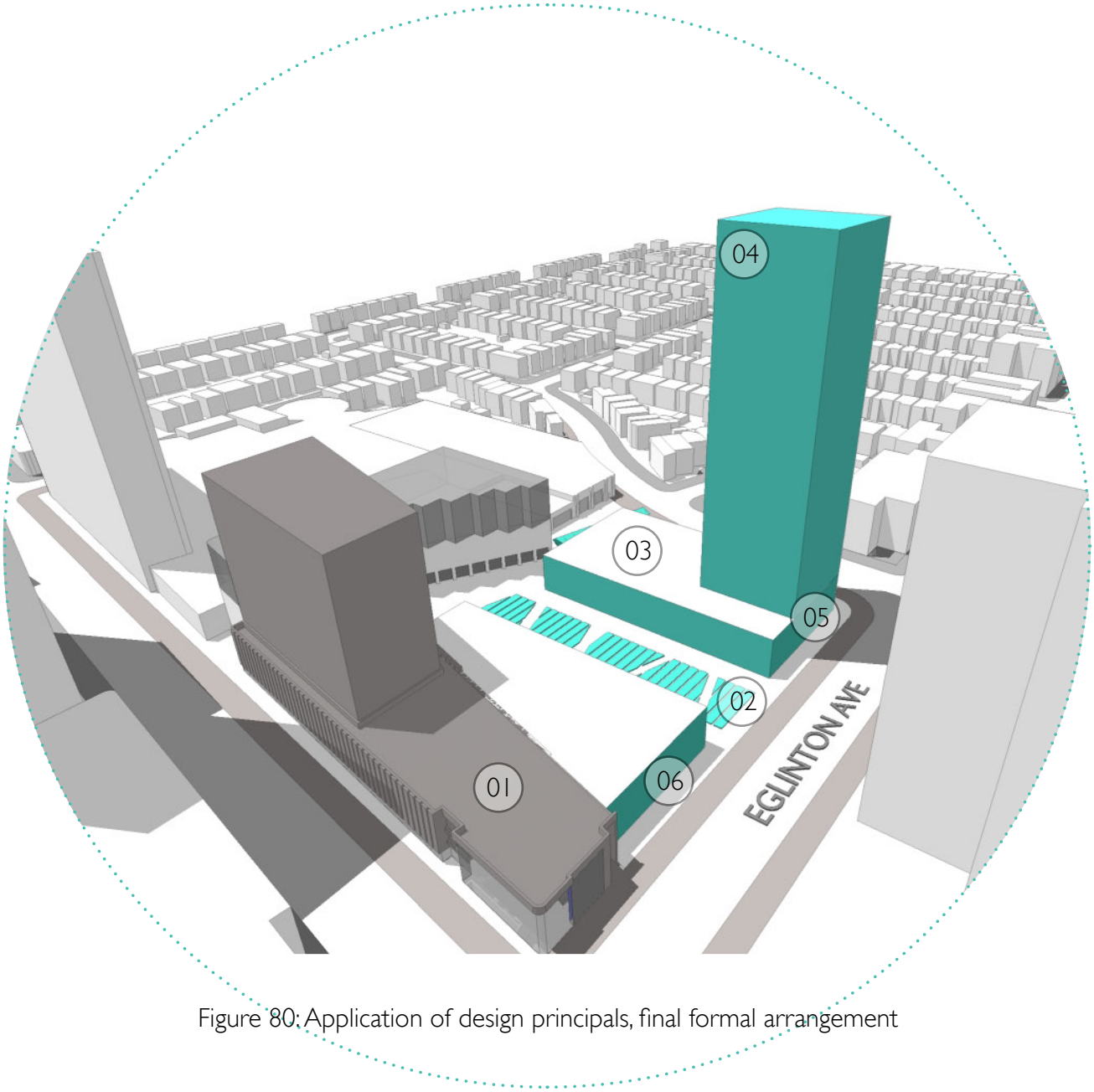


Figure 80: Application of design principals, final formal arrangement

01 Exposing the agricultural production within the tower, vertically extending the green line

02 Positioning Growing beds through the centre of the site, extending the green line and transforming the public realm into a productive public space

03 Expanding green space, utilizing neighboring rooftop for a productive extension to the public space

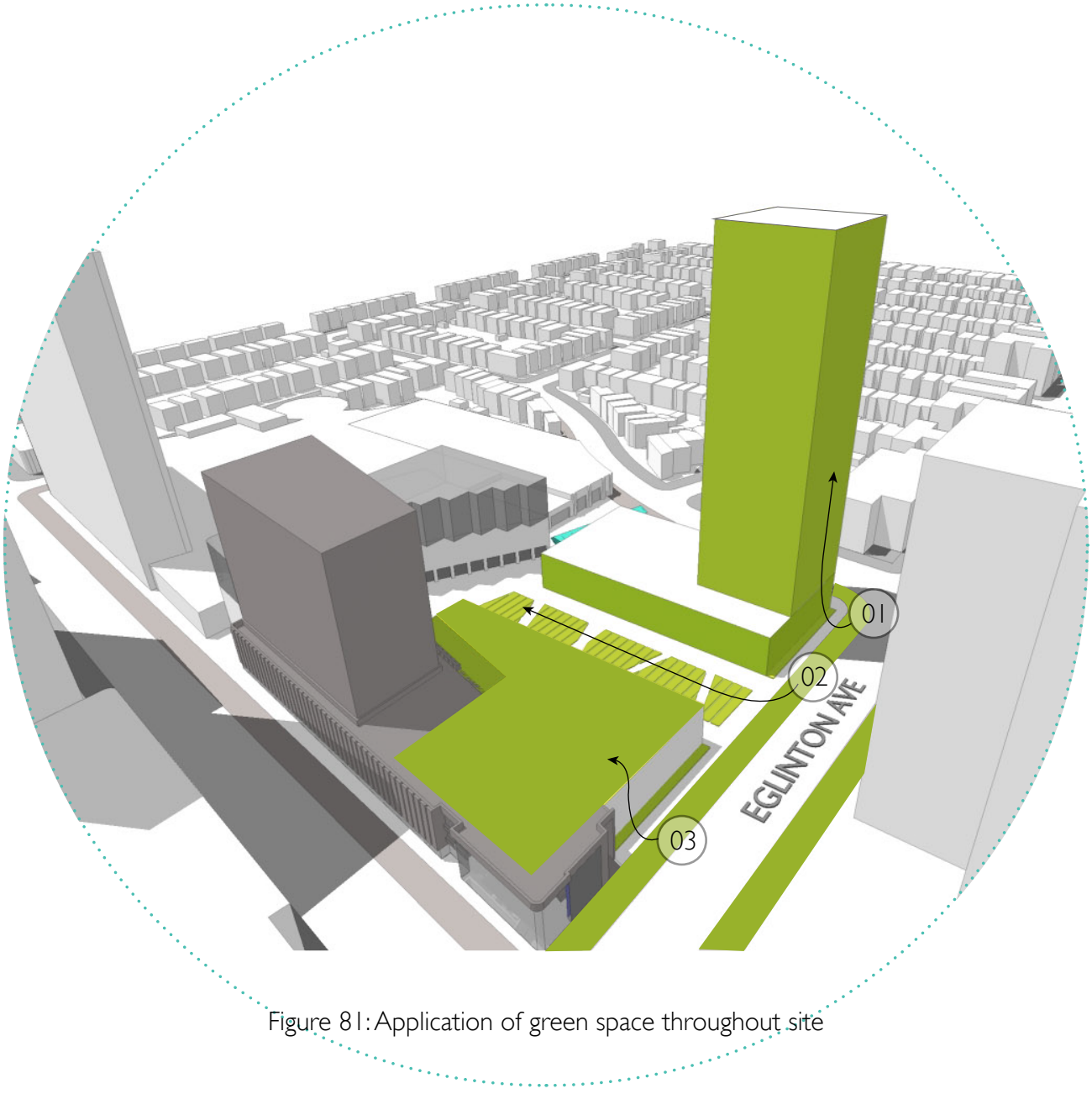


Figure 81: Application of green space throughout site

EXPOSE

- VISUAL EXPOSURE TO FOOD PRODUCTION SPACES

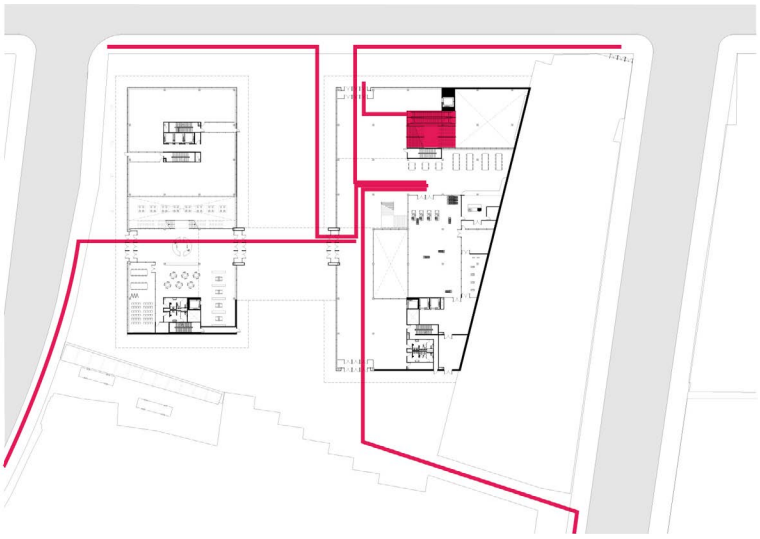
FUNCTIONS

- PRODUCTION
- RETAIL SPACE
- SERVICE SPACES
- EDUCATIONAL SPACE
- CIRCULATION

(right) Figure 82: Diagrams of design principals, throughout ground floor and site

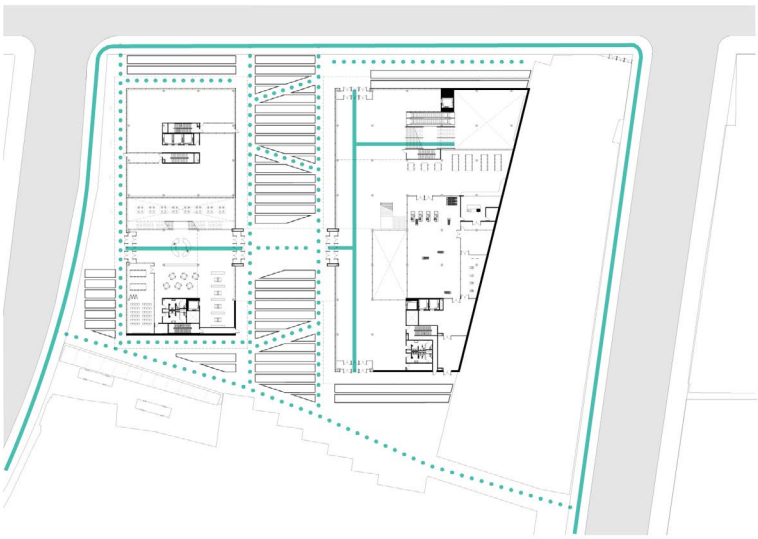
ENGAGE

- RESOURCE CENTRE
- GROWING BEDS



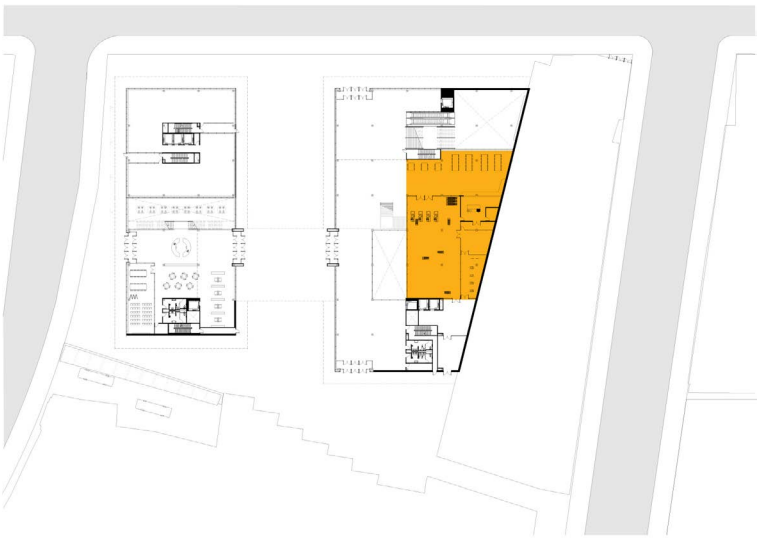
ACCESS

- ACCESS TO FOOD RETAIL SPACE, AT GRADE



CIRCULATION

- SURROUNDING SITE CIRCULATION
- ON SITE CIRCULATION
- INTERIOR CIRCULATION



RETAIL

- FOOD RETAIL SPACE AT GRADE

APPROACH

PUBLIC SPACE

Providing exposure to and engagement with the public realm was crucial for achieving the design objectives of the project. Essentially opening up the building and immersing people within the void, converging over the topic of agricultural production is nearly unheard of within the context of Toronto. By dedicating only a portion of the site above grade to productive practices, the impact on the public realm is minimized, as a large tower would cast an overbearing shadow onto the public streets and greatly hinder the quality of space surrounding the site. By providing extensive opportunities for public engagement with agricultural practices, the intent is that a sense of community, knowledge and awareness of food's impact on the Earth will also be cultivated on site.

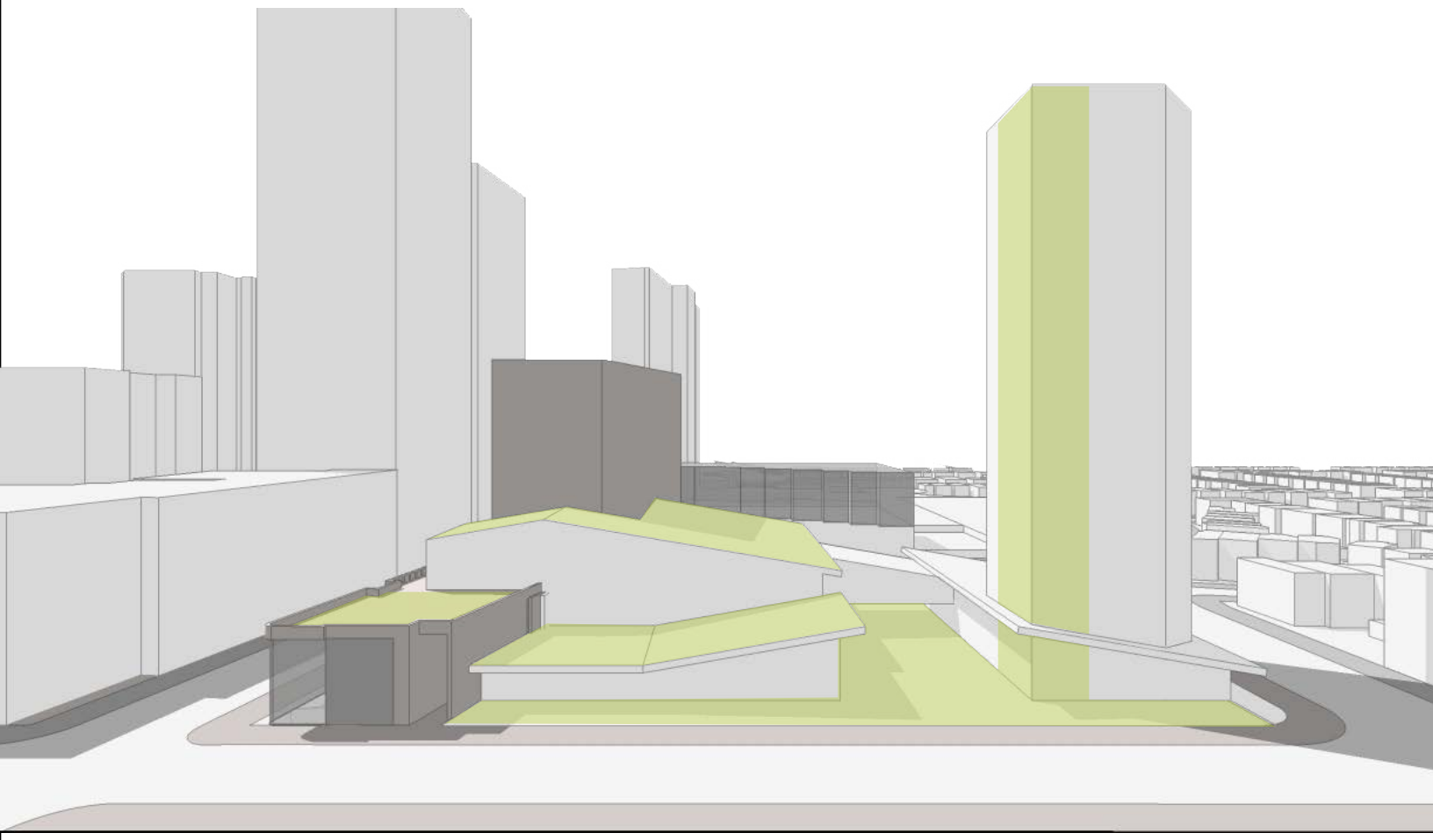


Figure 83: Approach to public space, on site extension of the 'Green Line'

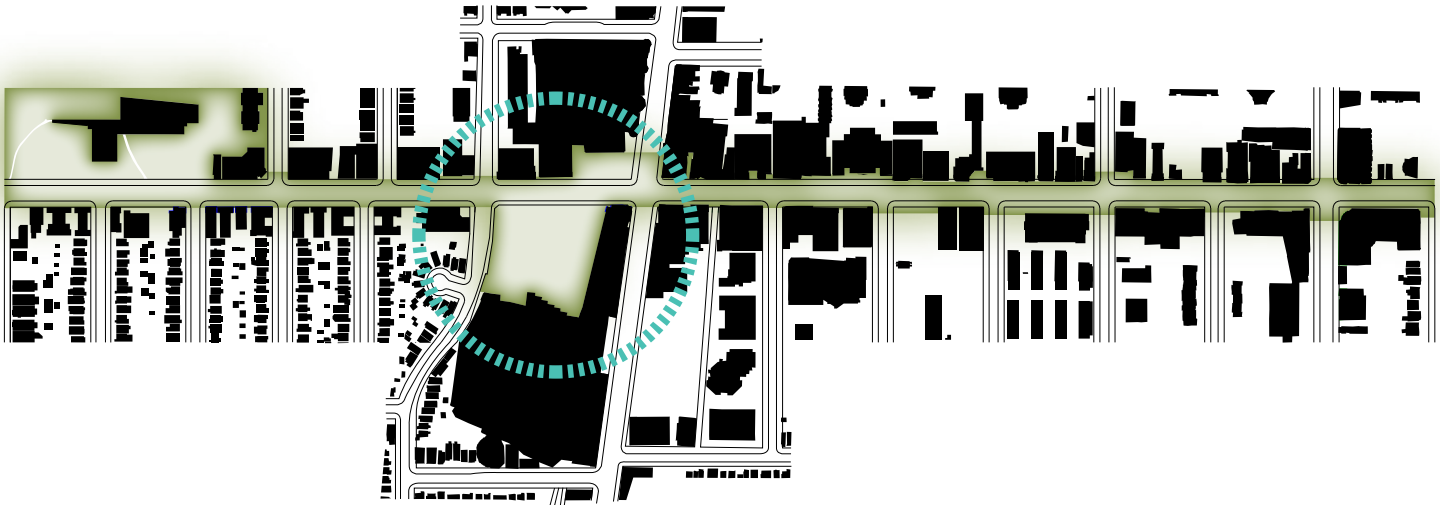


Figure 84: Anchoring the site to the 'Green Line', adding productive green space along Eglinton Ave.

Figure 85: Site plan outlining site circulation

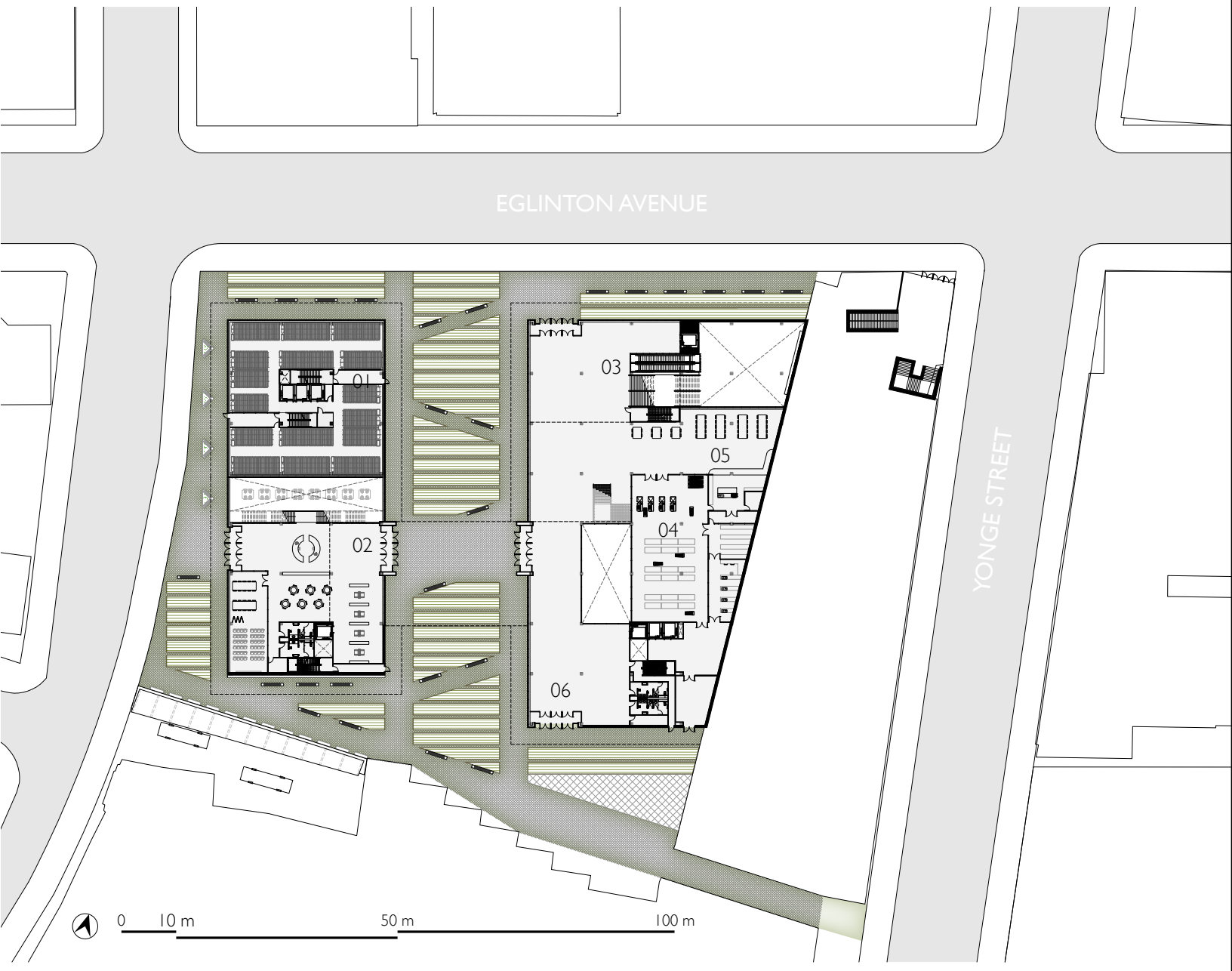


Figure 86: Ground Floor Plan

01 INTENSIVE PRODUCTION AREA
02 URBAN AGRICULTURAL RESOURCE CENTRE
03 ENTRANCE TO YONGE / EGLINTON SUBWAY
04 FRESH FOOD MARKET
05 FRESH FOOD CAFE
06 ACCESS TO TTC BUS STATION

Figure 87: Level 02

01 INTENSIVE PRODUCTION AREA
02 URBAN AGRICULTURAL COMMUNITY GREENHOUSE
03 COMMUNITY ROOFTOP GARDEN
04 COMMUNITY KITCHEN

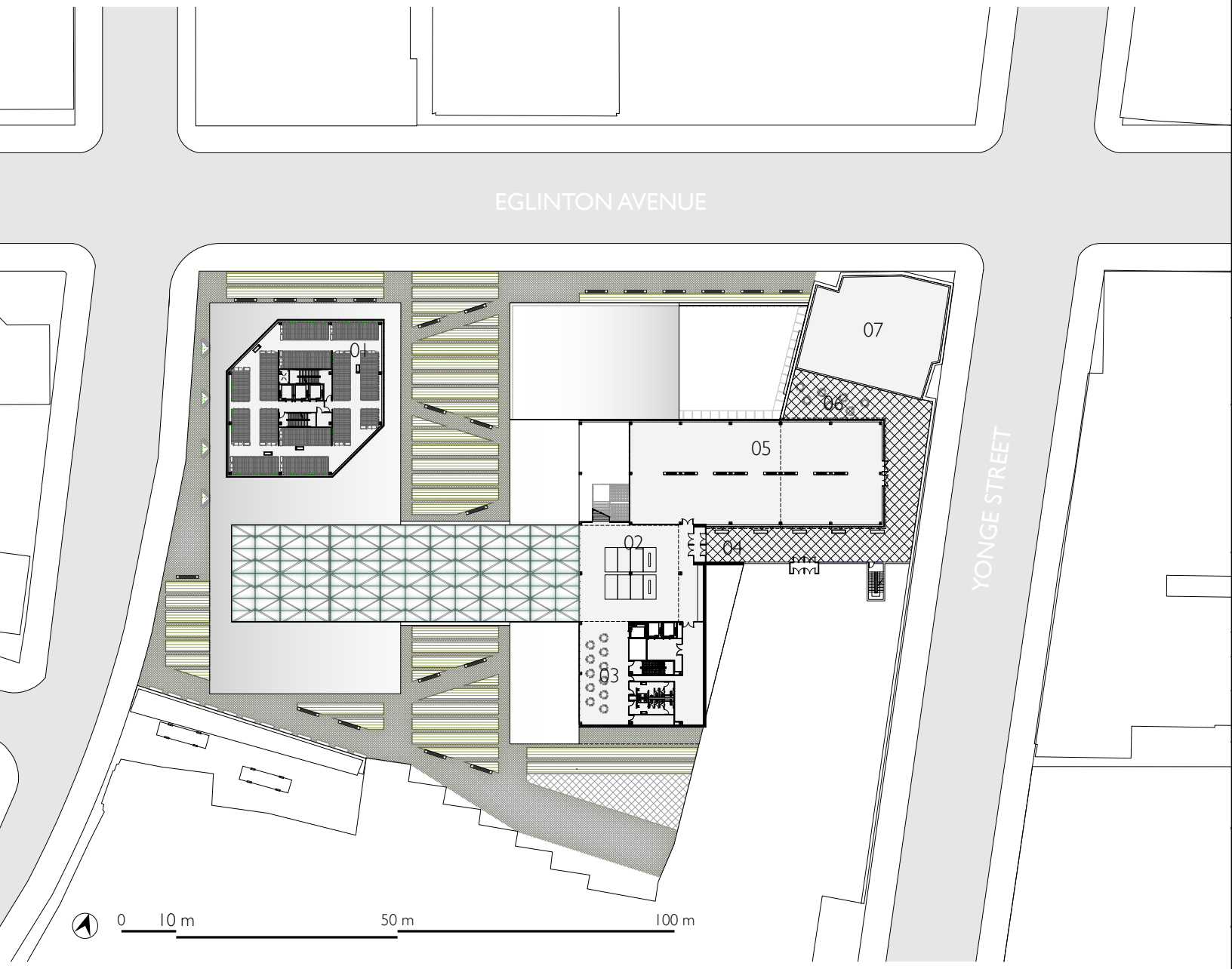


Figure 88: Level 03

01 INTENSIVE PRODUCTION AREA
02 HYDROPONIC DEMONSTRATION AREA
03 INFORMAL GATHERING AREA FOR UA GROWERS
04 ACCESS TO NEIGHBORING OFFICE TOWER
05 COMMUNITY HYDROPONIC GROWING AREA
06 INFORMAL EXTERIOR SEATING AREA
07 COMMUNITY GROWING AREA

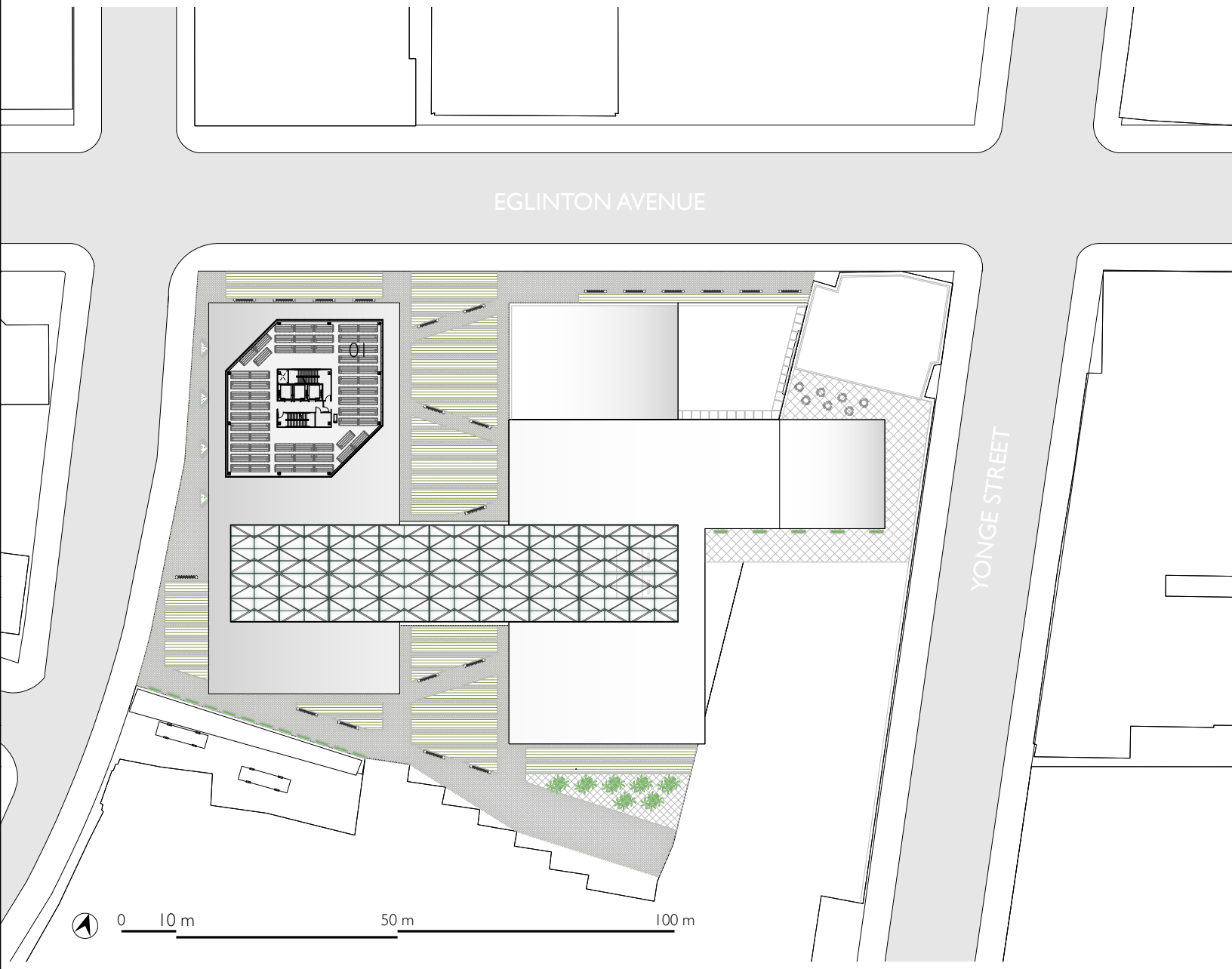


Figure 89: Level 04

01 INTENSIVE PRODUCTION AREA
BATO BUCKET PLANT SYSTEM

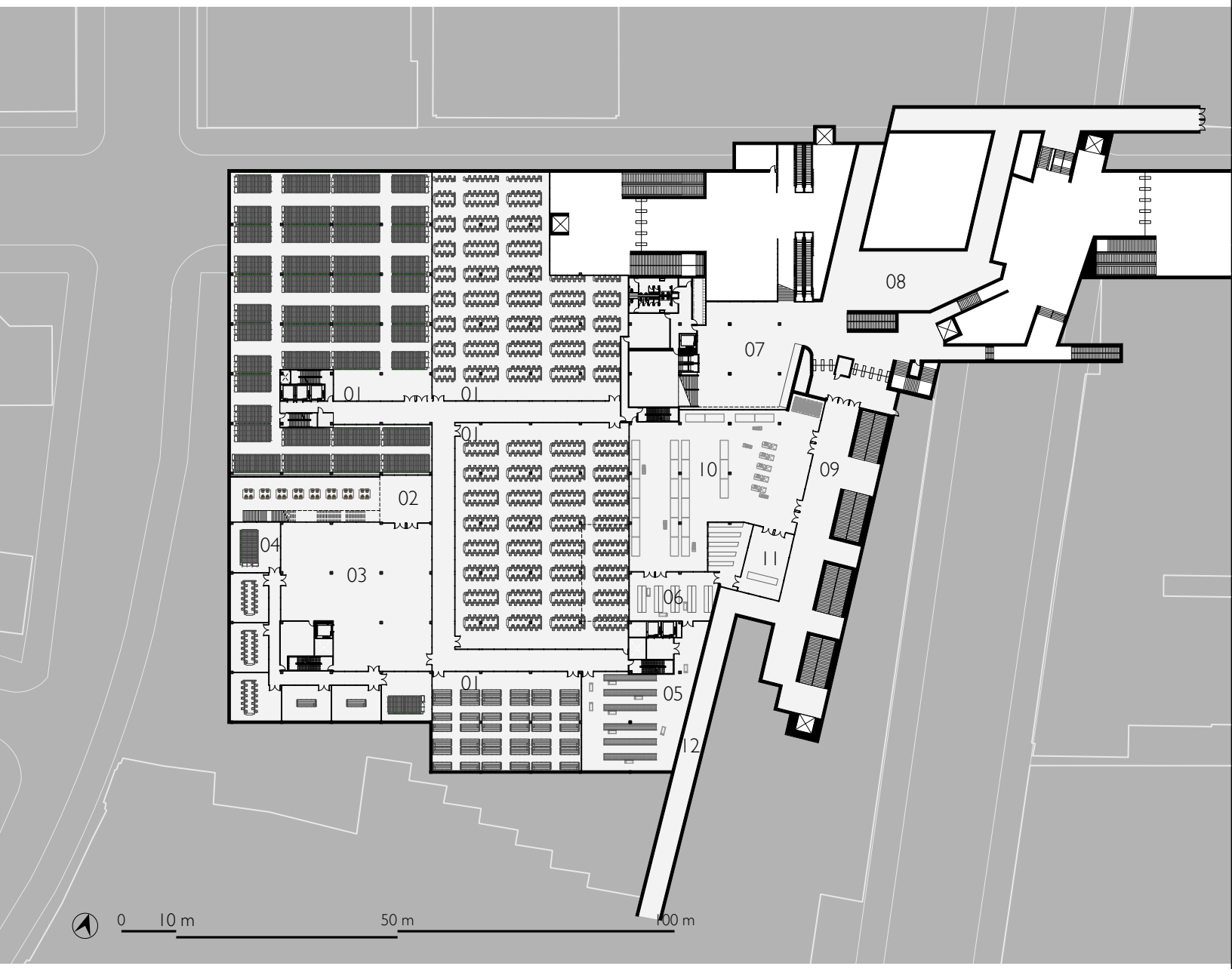


Figure 90: Lower Level 01

01 INTENSIVE PRODUCTION AREA
02 URBAN AGRICULTURAL RESOURCE CENTRE
03 INTENSIVE PRODUCTION OFFICE AREA
04 HYDROPONIC RESEARCH + TESTING PLOTS
05 CROP SORTING
06 REFRIGERATED MARKET FOOD STORAGE
07 YE / METROLINX ENTRANCE
08 ACCESS TO YE CENTRE
09 YE SUBWAY ENTRANCE
10 FRESH FOOD MARKET
11 CSA PICKUP
12 ACCESS TO TTC BUS STATION

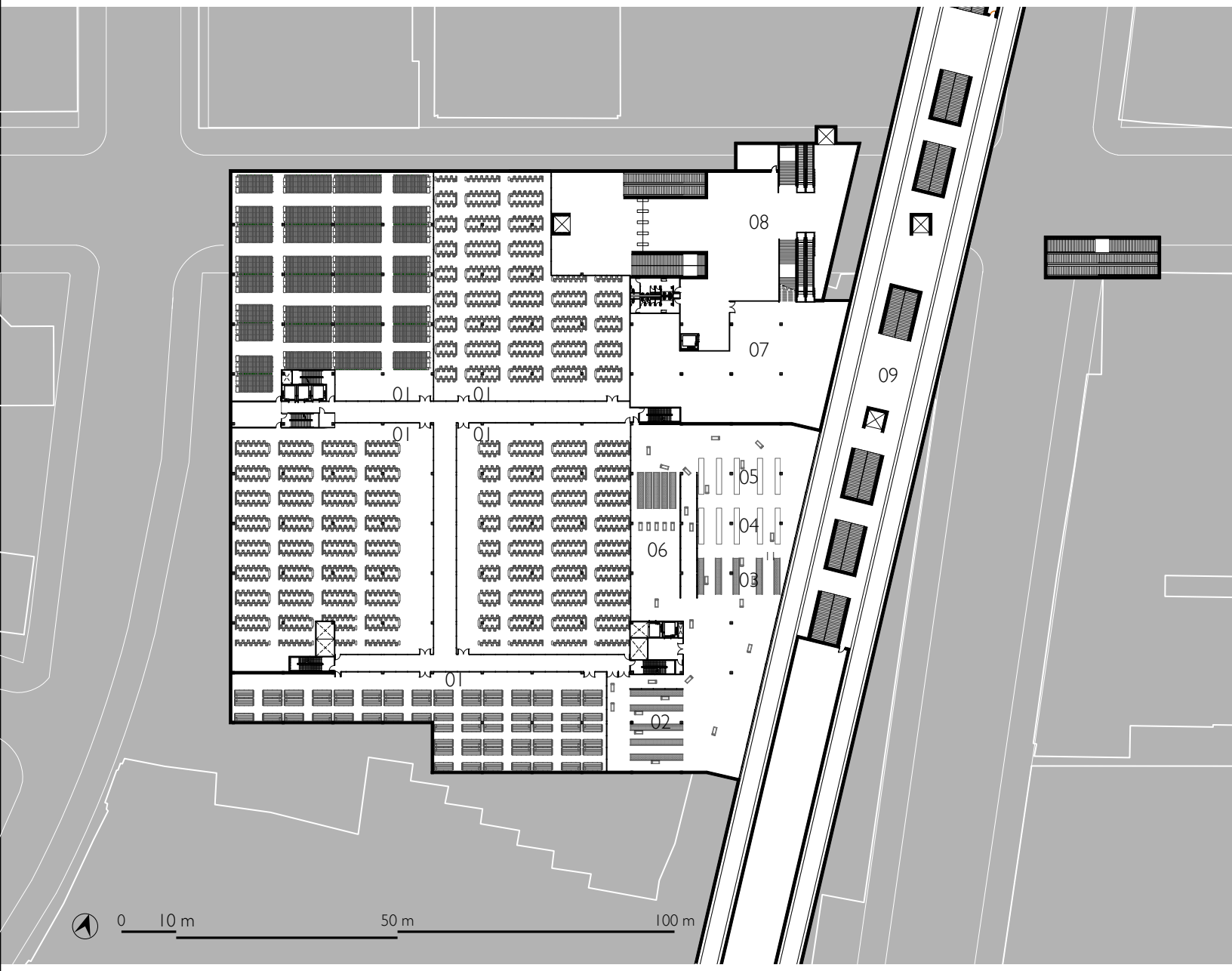


Figure 91: Lower Level 02

01 INTENSIVE PRODUCTION AREA
02 PREPARATION AREA: CROP SORTING
03 PREPARATION AREA: CROP WASHING
04 PREPARATION AREA: CROP PREPARATION
05 PREPARATION AREA: PACKING / LABELING
06 PREPARATION AREA: SORTING FOR DISTRIBUTION
07 LOWER CONCOURSE SERVICE AREA
08 LOWER CONCOURSE
09 YE SUBWAY PLATFORM

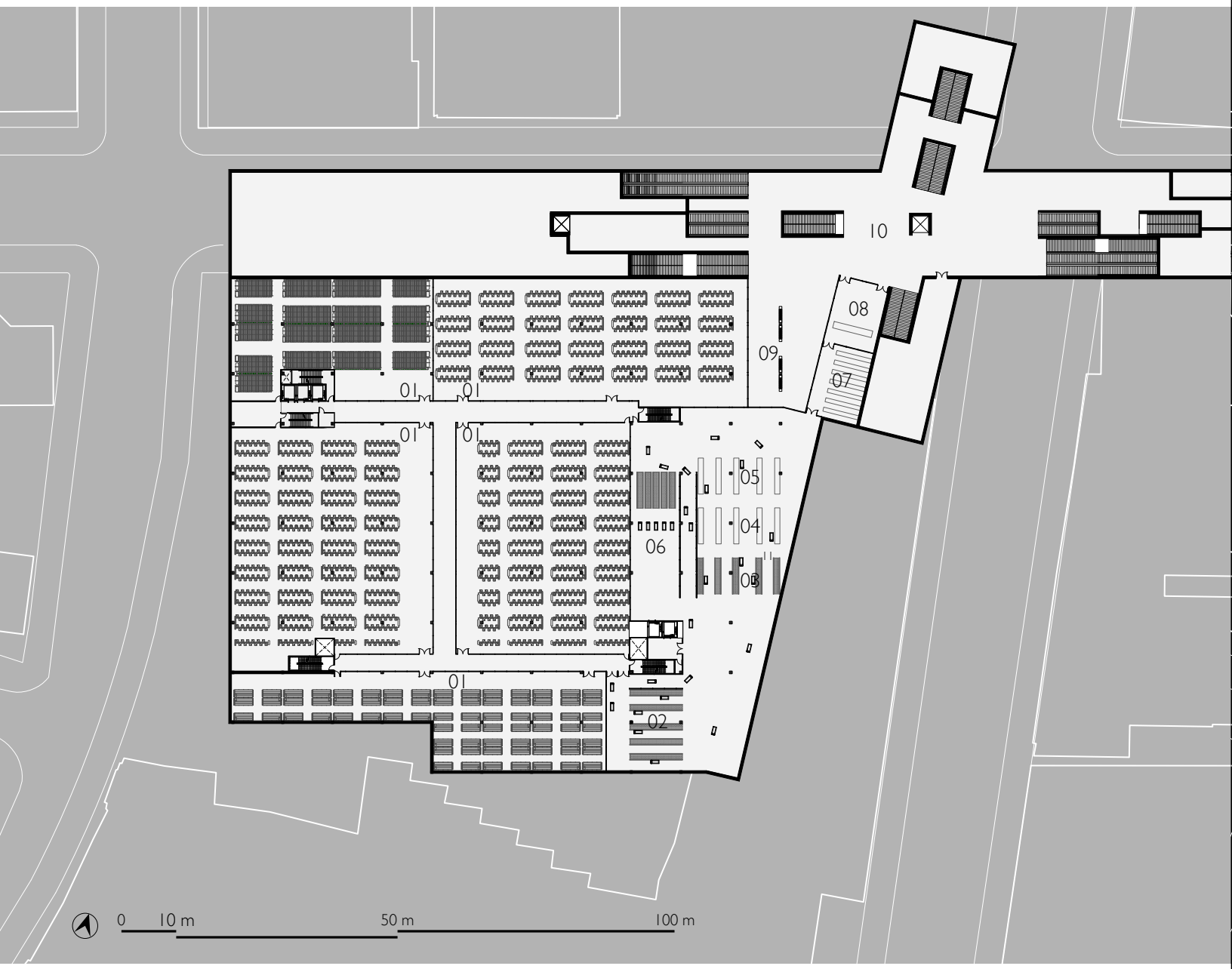


Figure 92: Lower Level 03

01 INTENSIVE PRODUCTION AREA
02 PREPARATION AREA: CROP SORTING
03 PREPARATION AREA: CROP WASHING
04 PREPARATION AREA: CROP PREPARATION
05 PREPARATION AREA: PACKING / LABELING
06 PREPARATION AREA: SORTING FOR DISTRIBUTION
07 CSA REFRIGERATED STORAGE
08 CSA PICK UP
09 LOWER CONCOURSE OBSERVATION AREA
10 LOWER CONCOURSE

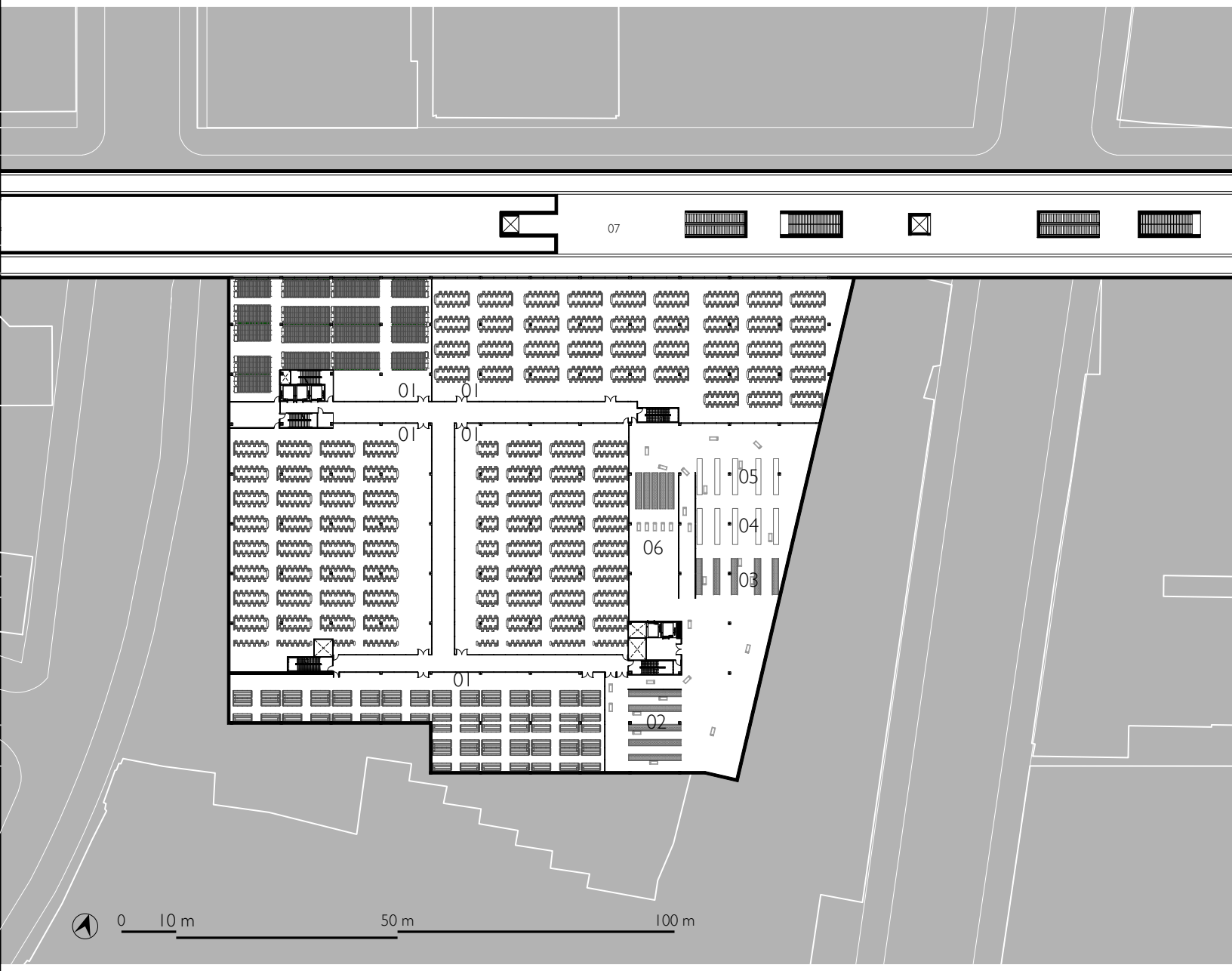
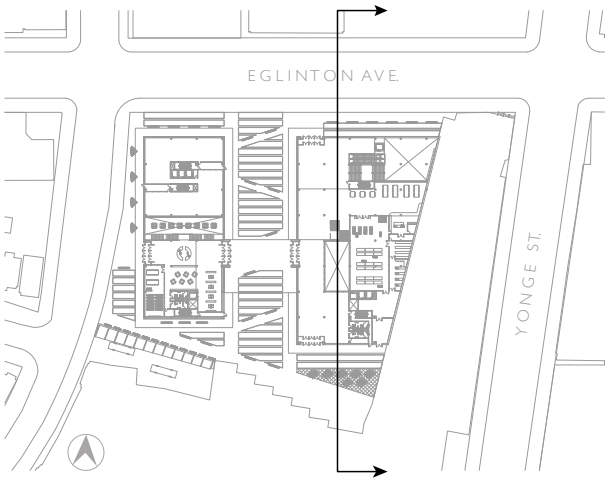


Figure 93: Lower Level 04

01 INTENSIVE PRODUCTION AREA
02 PREPARATION AREA: CROP SORTING
03 PREPARATION AREA: CROP WASHING
04 PREPARATION AREA: CROP PREPARATION
05 PREPARATION AREA: PACKING / LABELING
06 PREPARATION AREA: SORTING FOR DISTRIBUTION
07 METROLINX PLATFORM

BUILDING SECTION
PROJECT PROPOSAL



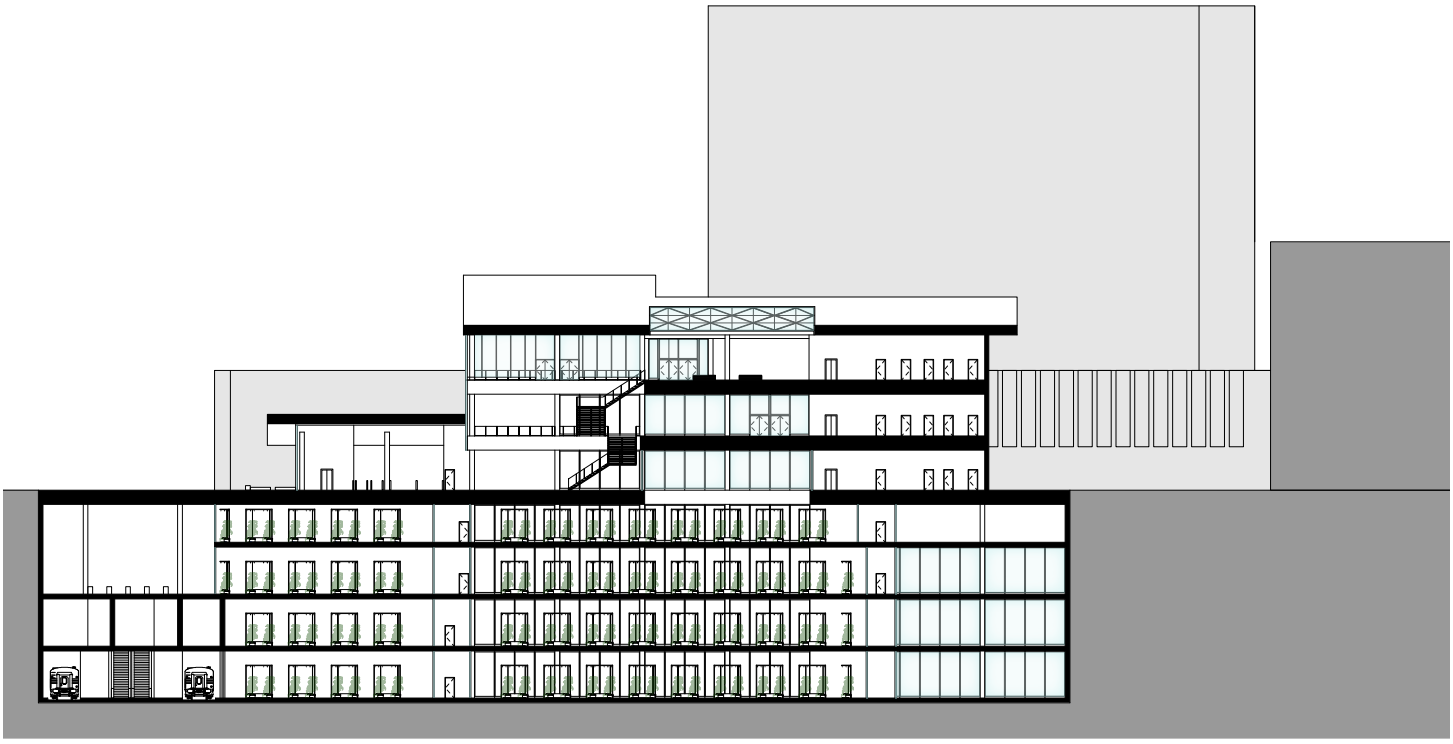
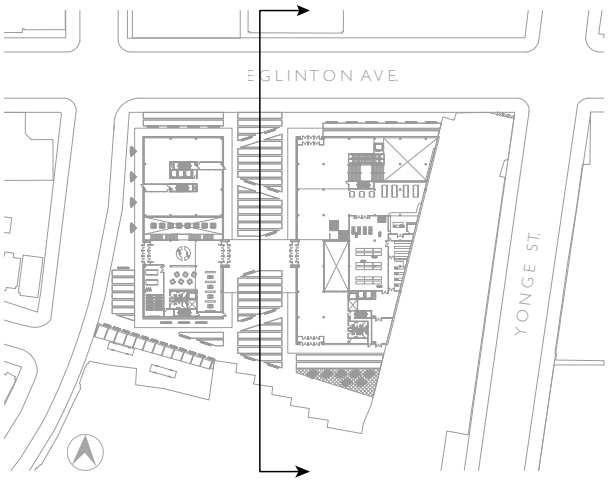


Figure 94: Transverse Building Section 01

0 10 m 50 m 100 m

BUILDING SECTION
PROJECT PROPOSAL



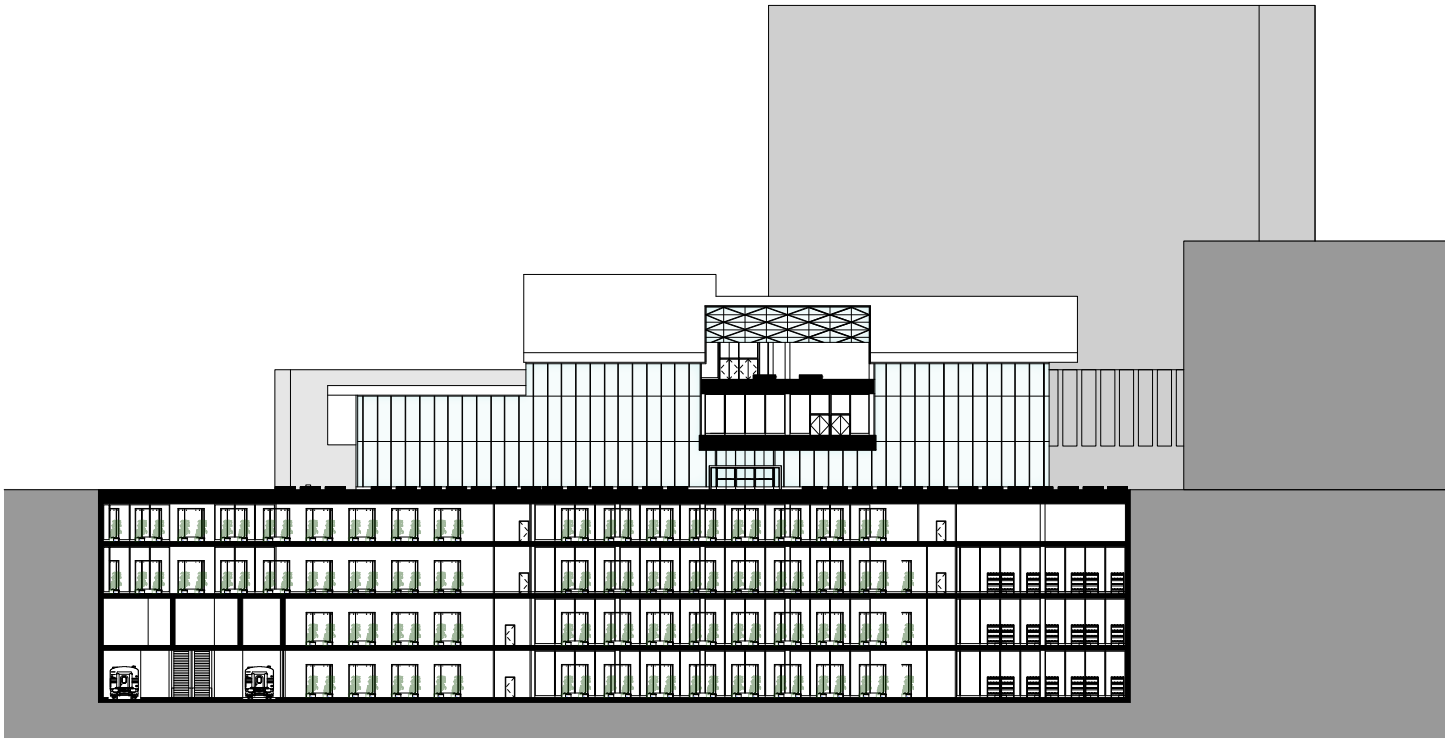


Figure 95: Transverse Building Section 02

0 10 m 50 m 100 m

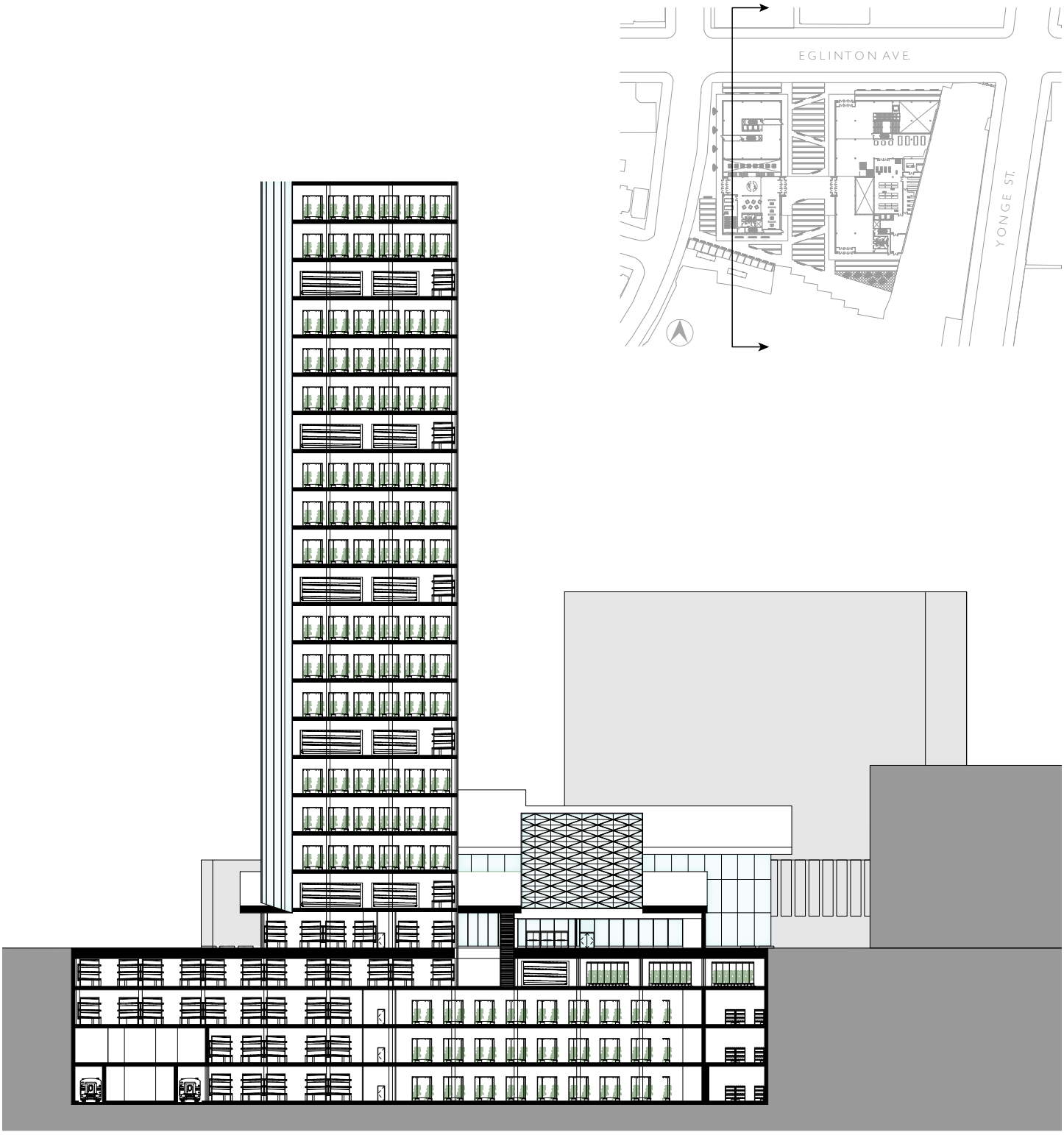


Figure 96: Transverse Building Section 03

0 10 m 50 m 100 m

BUILDING SECTION
PROJECT PROPOSAL

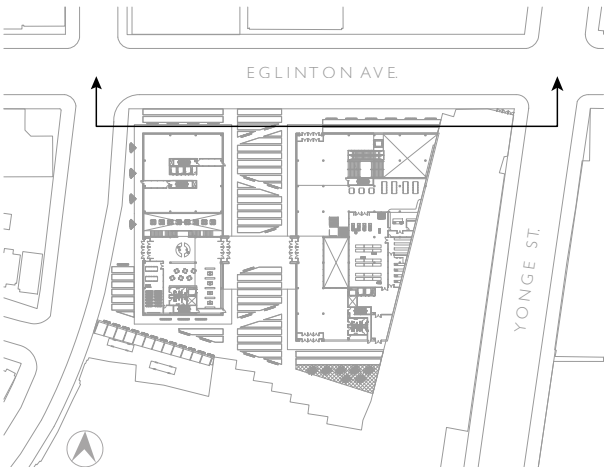


Figure 97: Longitudinal Building Section 01

0 10 m 50 m 100 m

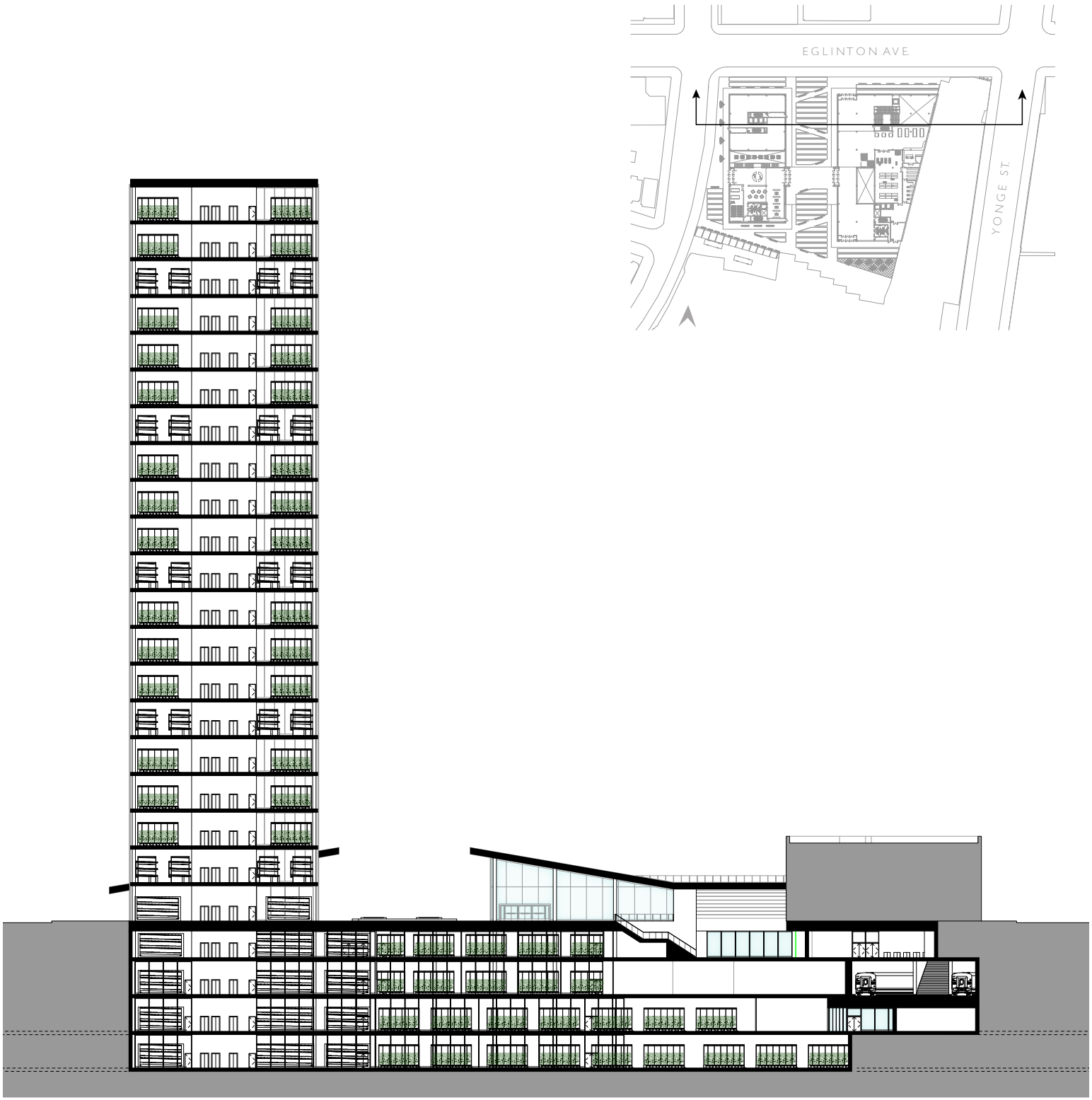


Figure 98: Longitudinal Building Section 02

0 10 m 50 m 100 m

BUILDING SECTION
PROJECT PROPOSAL

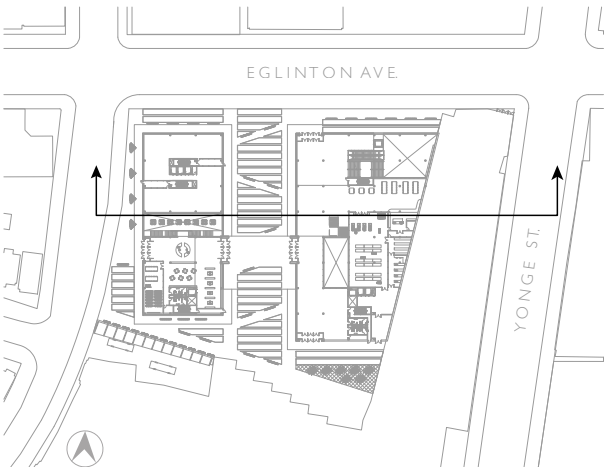


Figure 99: Longitudinal Building Section 03

0 10 m 50 m 100 m

Figure 100: Longitudinal Building Section 04

TOWER WALL SECTION
PROJECT PROPOSAL

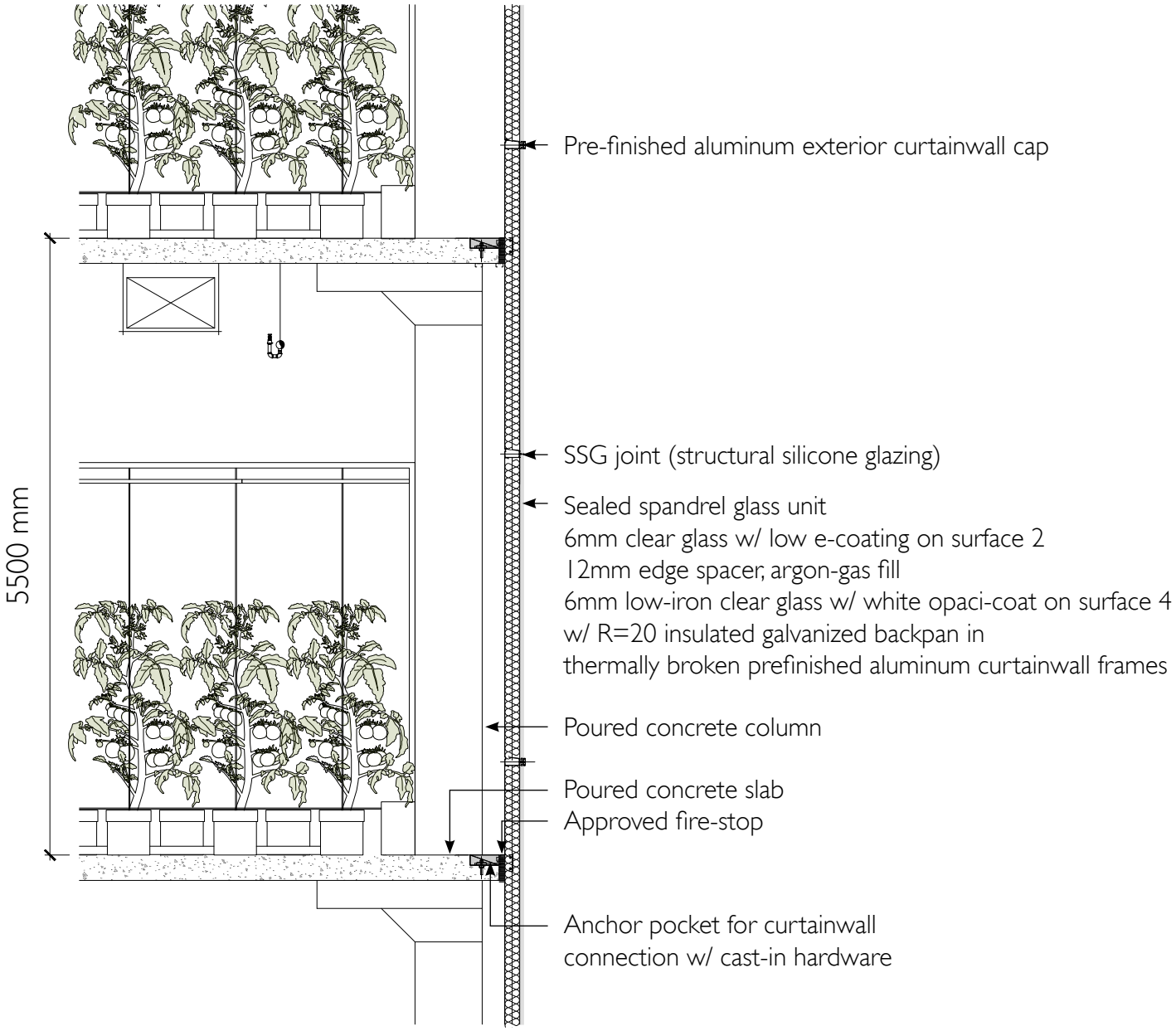


Figure 101: Tower Wall Section - through opaque spandrel panels

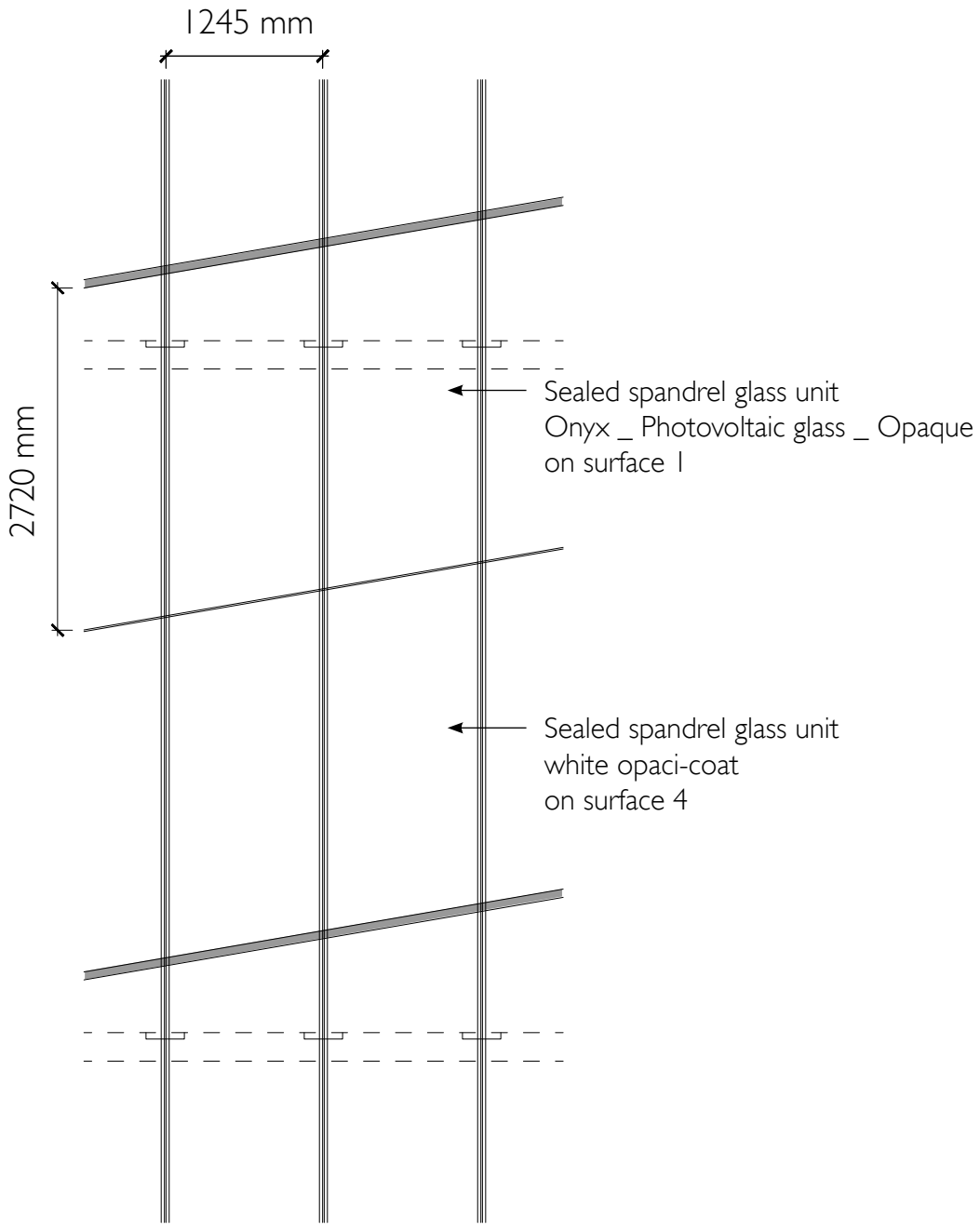


Figure 102: Tower Elevation - opaque spandrel panels

TOWER WALL SECTION
PROJECT PROPOSAL

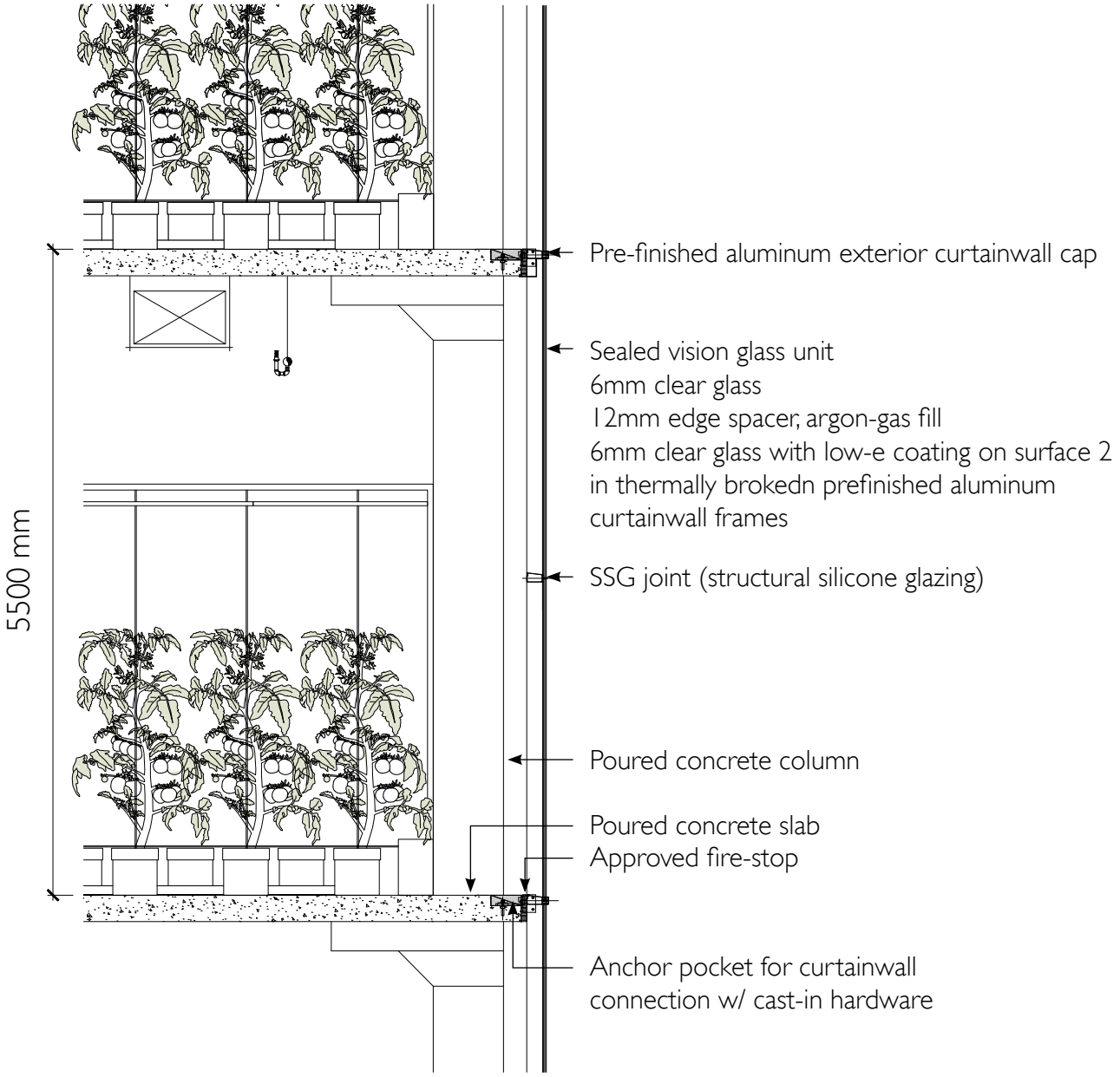


Figure 103: Tower Wall Section - through clear vision glass

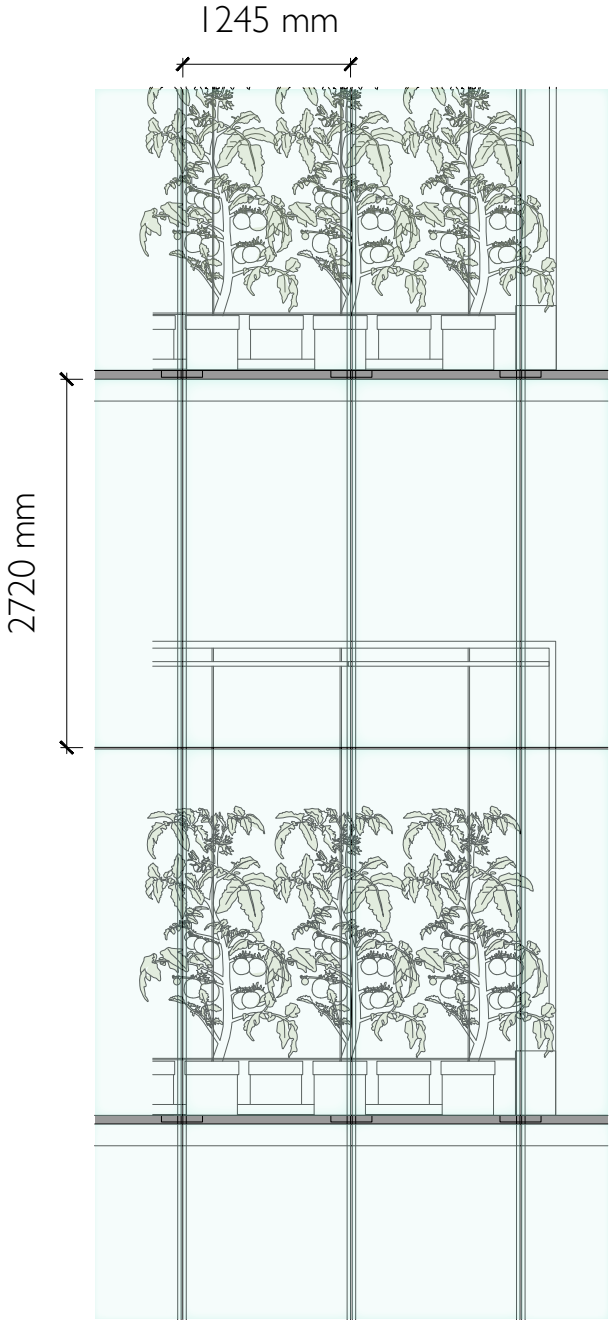


Figure 104: Tower Elevation - clear vision glass

CLADDING SYSTEMS
PROJECT PROPOSAL

The tower is clad with a conventional curtainwall system. The system contains vertical, horizontal and angled curtain wall mullions with a combination of 4 sided SSG (structural silicon glazing). The glass is held in place with vertical and horizontal pressure plates and caps. The horizontal caps occur at each floor level, to emphasize the angled design intent. The intermediate angled glazing joint is done in structural silicone glazing, to minimize the visual appearance.

At the spandrel locations, an insulated galvanized metal backpan has been introduced. The intent is to use +/- 130 mm deep curtainwall back section with semi rigid insulation to provide an R-20 insulation value.

To emphasize on the transparency and indoor, outdoor experience, a structural glass system has been introduced for the base buildings. The intent is to have cantilevered structural glass fin supports which are secured to the structure above. The glazing is held in place with SS spider fittings support off a laminated wood structure.

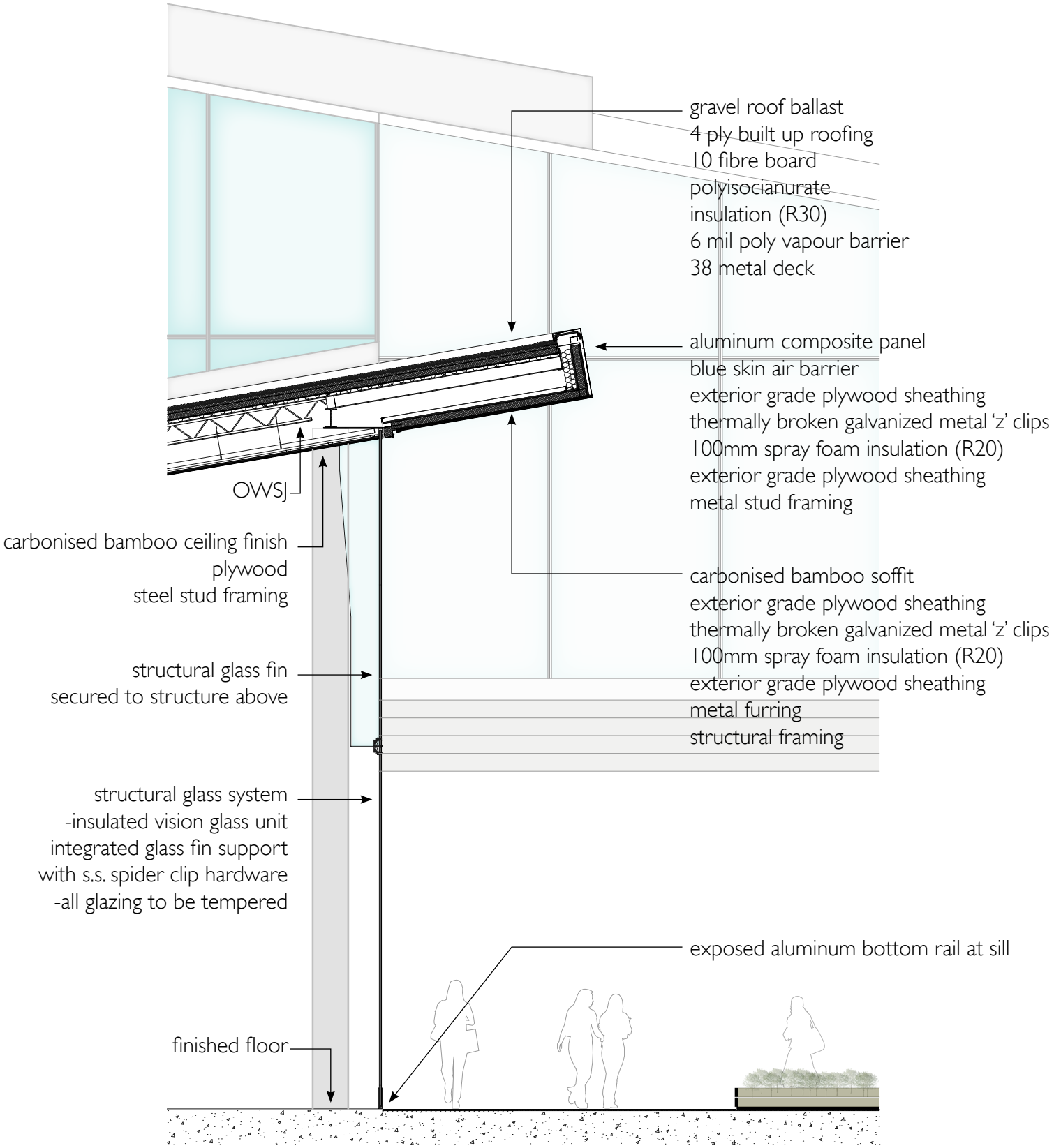


Figure 105: Base buildng, exterior wall section

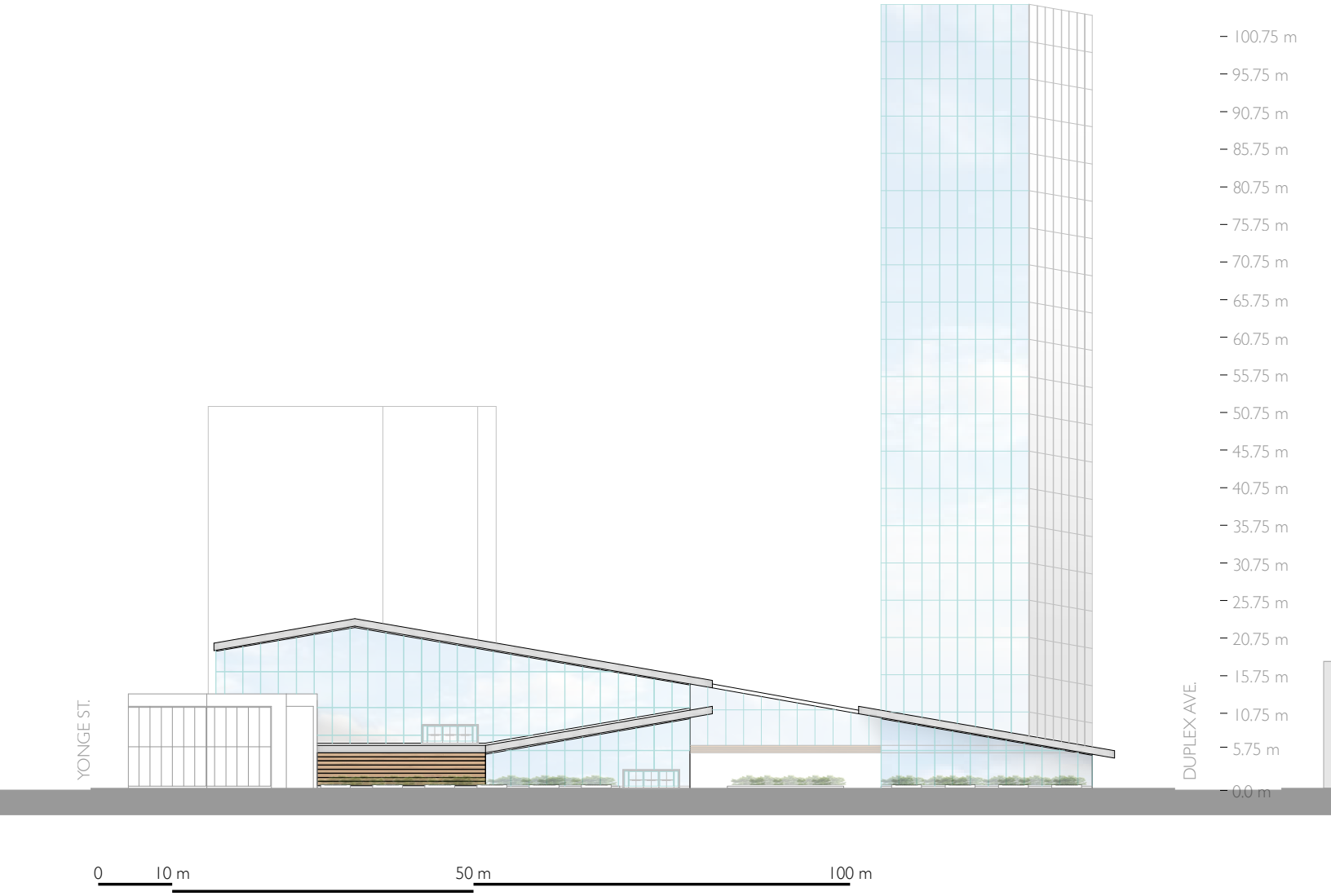


Figure 106: North Elevation

ELEVATIONS
PROJECT PROPOSAL

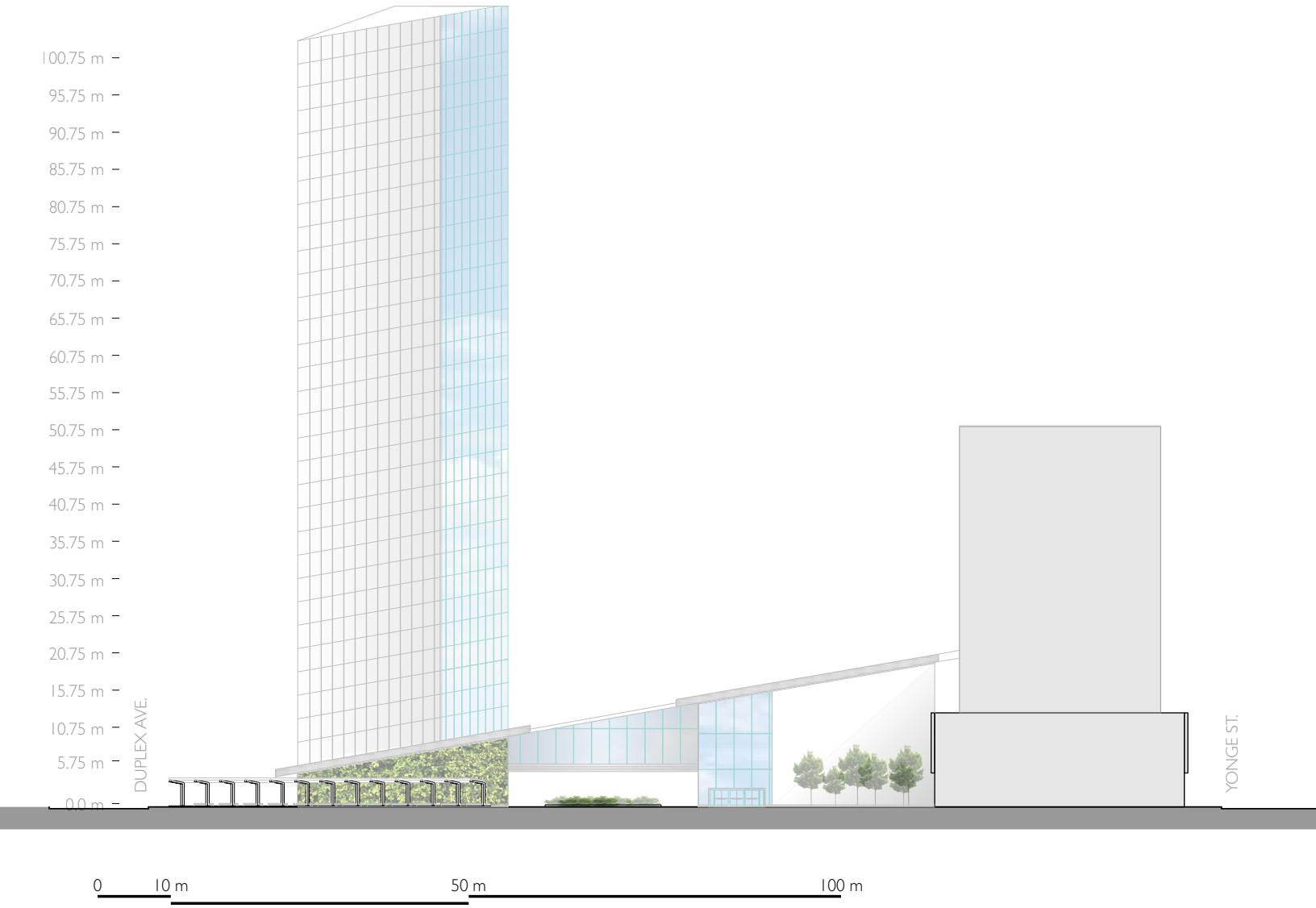


Figure 107: South Elevation

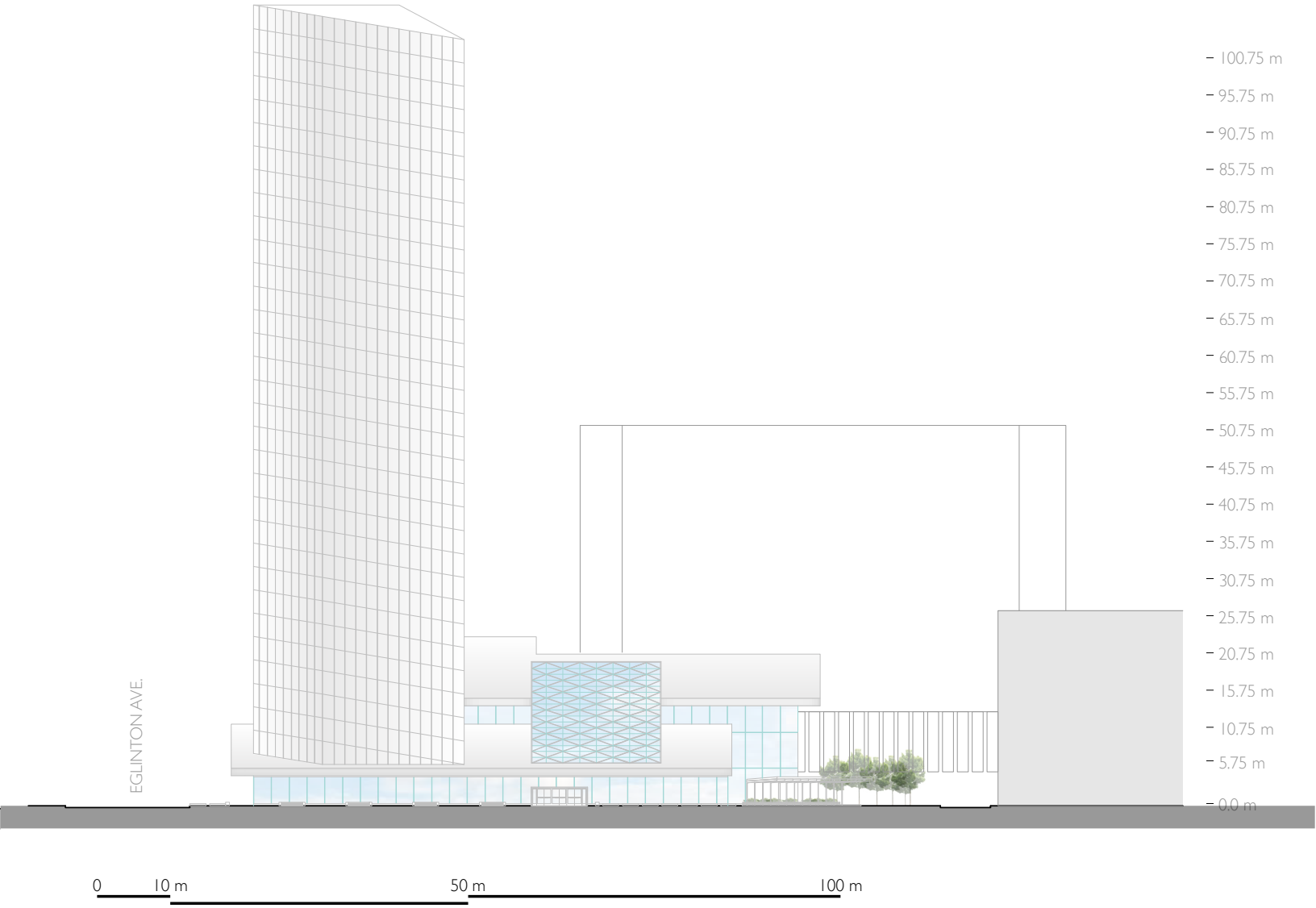


Figure 108: West Elevation

Figure 109: Eye level view, from NE corner of site across Eglinton

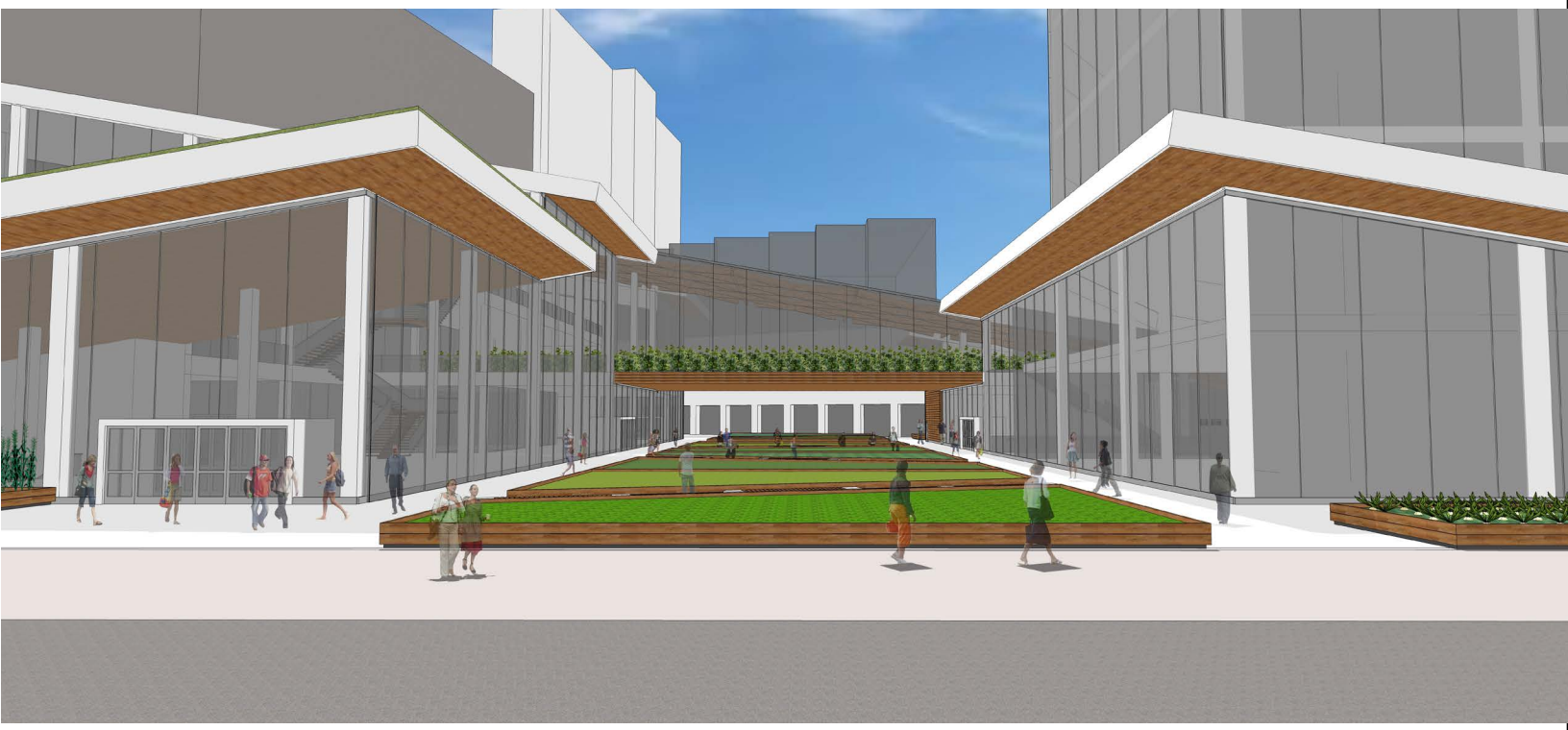


Figure 110: Eye level view, looking through the centre of the site

Figure 111: Eye level view, from NE corner of site

Figure 112: Building entrance and access to Yonge Subway Line and Metrolinx

Figure 113: Interior view of building from Eglinton entrance

Figure 114: Interior view of building within Urban Agriculture Community Greenhouse

Figure 115: Interior view of building within food cafe area

Figure 116: Interior view of east building overlooking the three levels

Figure 117: Interior view of building within Urban Agriculture Resource Centre

Figure 118: Exterior view from sidewalk, looking into the double height space within the UA Resource Centre

Figure 119: Interior view of building within Urban Agriculture Resource Centre

Figure 120: Interior view of building at base of double height space within the UA Resource Centre

Figure 121: Interior view, entrance stair to Yonge Subway Line and Metrolinx Line

Figure 122: Interior view of Yonge Eglinton Community Supported Agriculture Pick Up Area

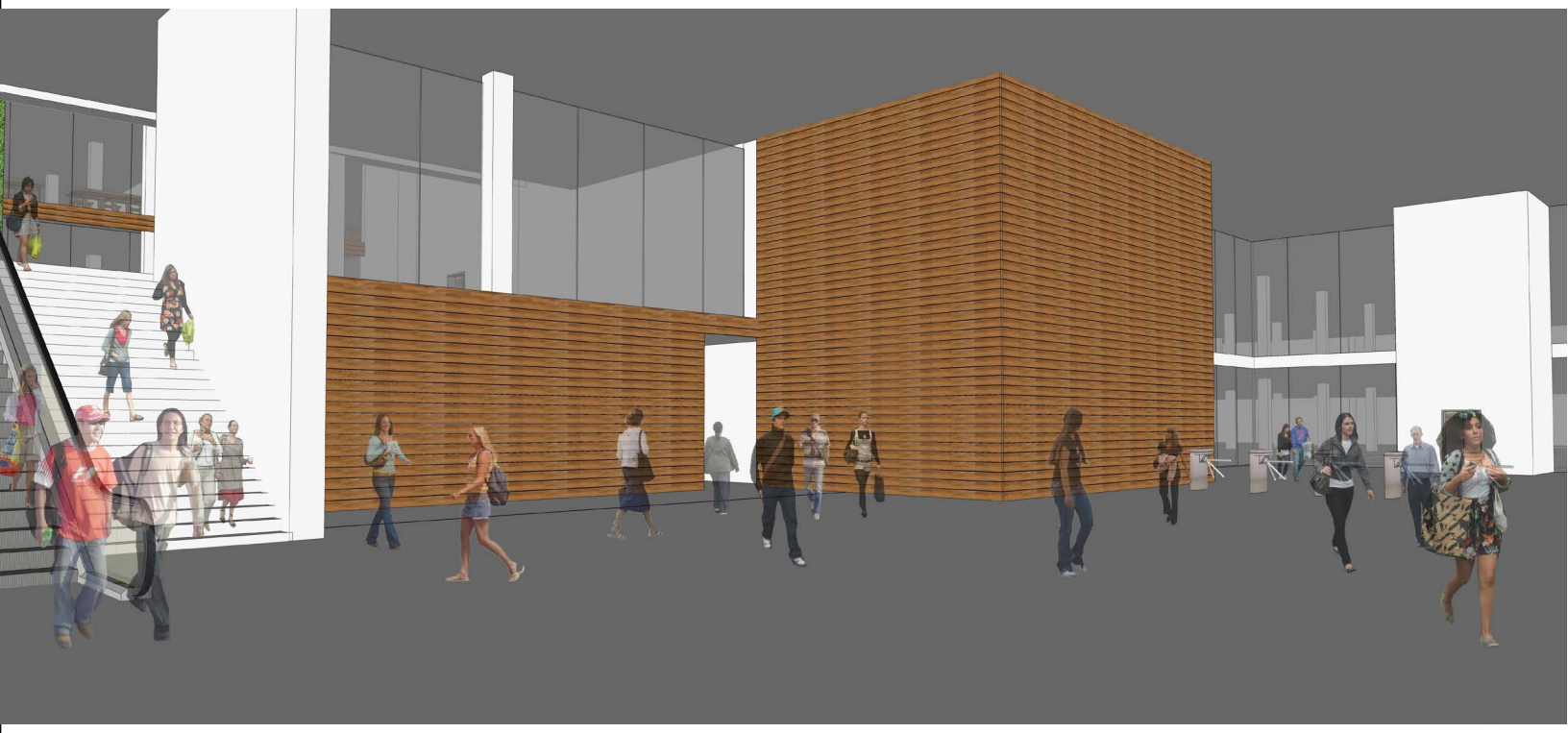


Figure 123: Interior view, entrance to Metrolinx Line

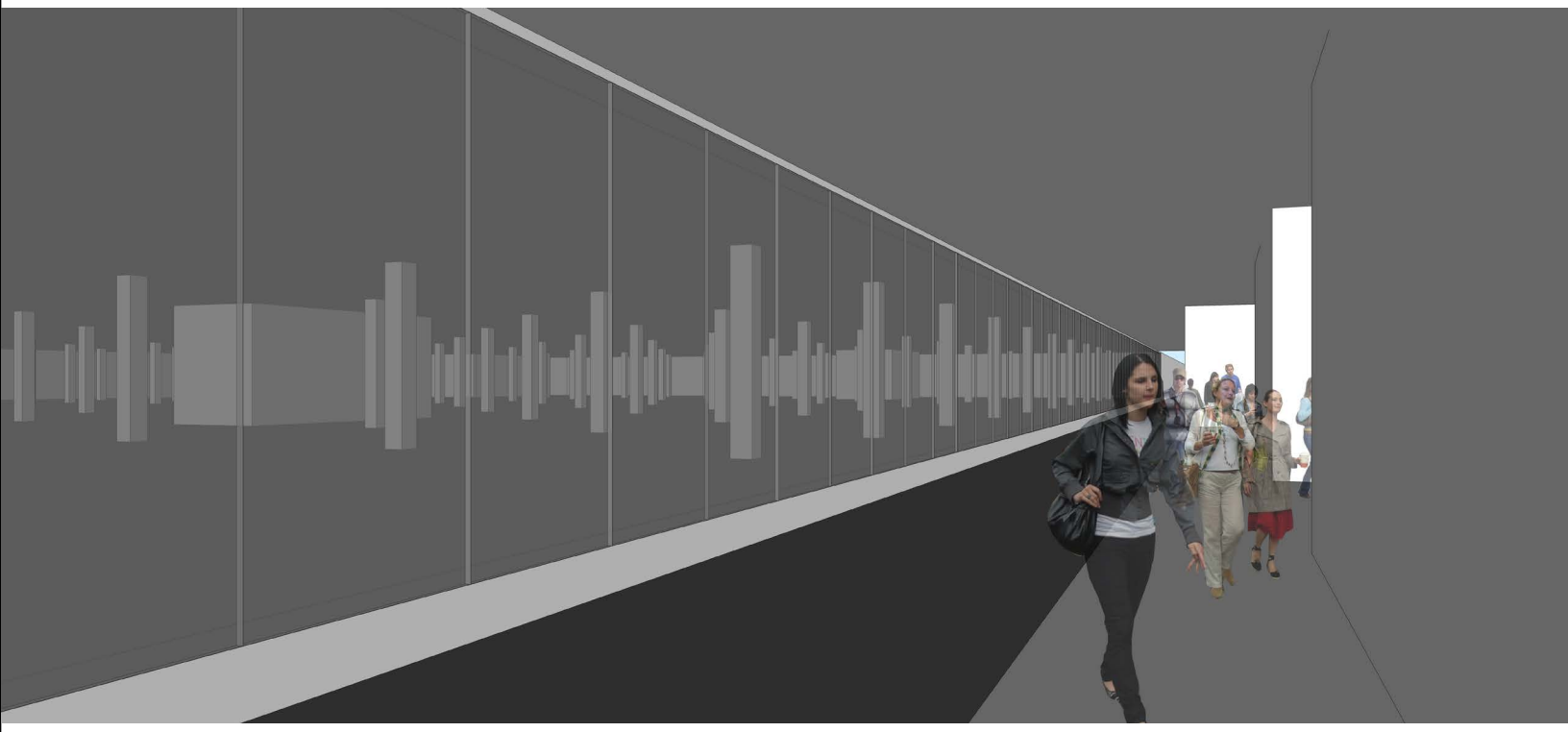


Figure 124: Interior view of Metrolinx Line platform, views into the agricultural production space

Figure 125: Axo view from SW corner of the site

Figure 126: Eye level view, from SW corner of site across Duplex Ave.

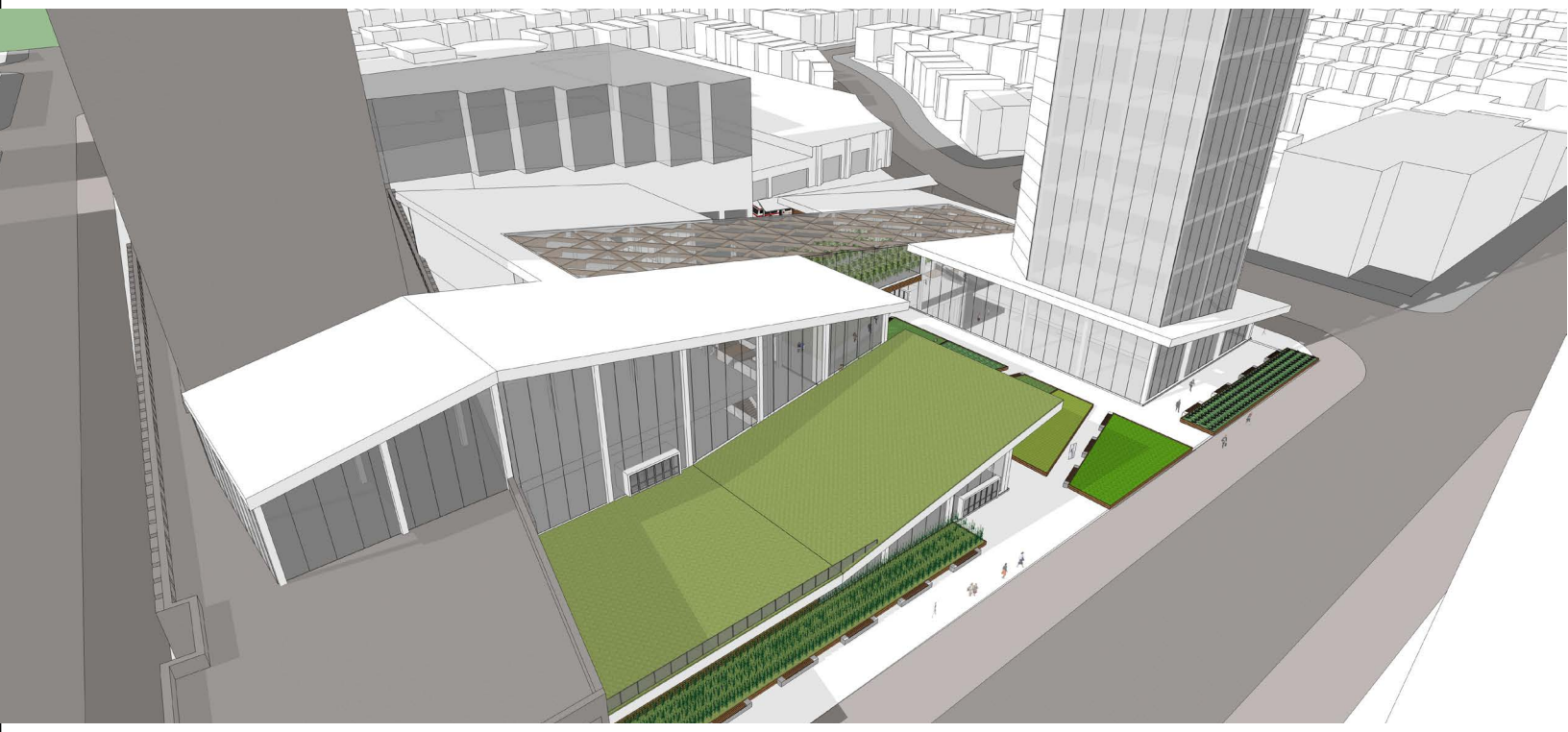


Figure 127: Axo view from NE corner of the site

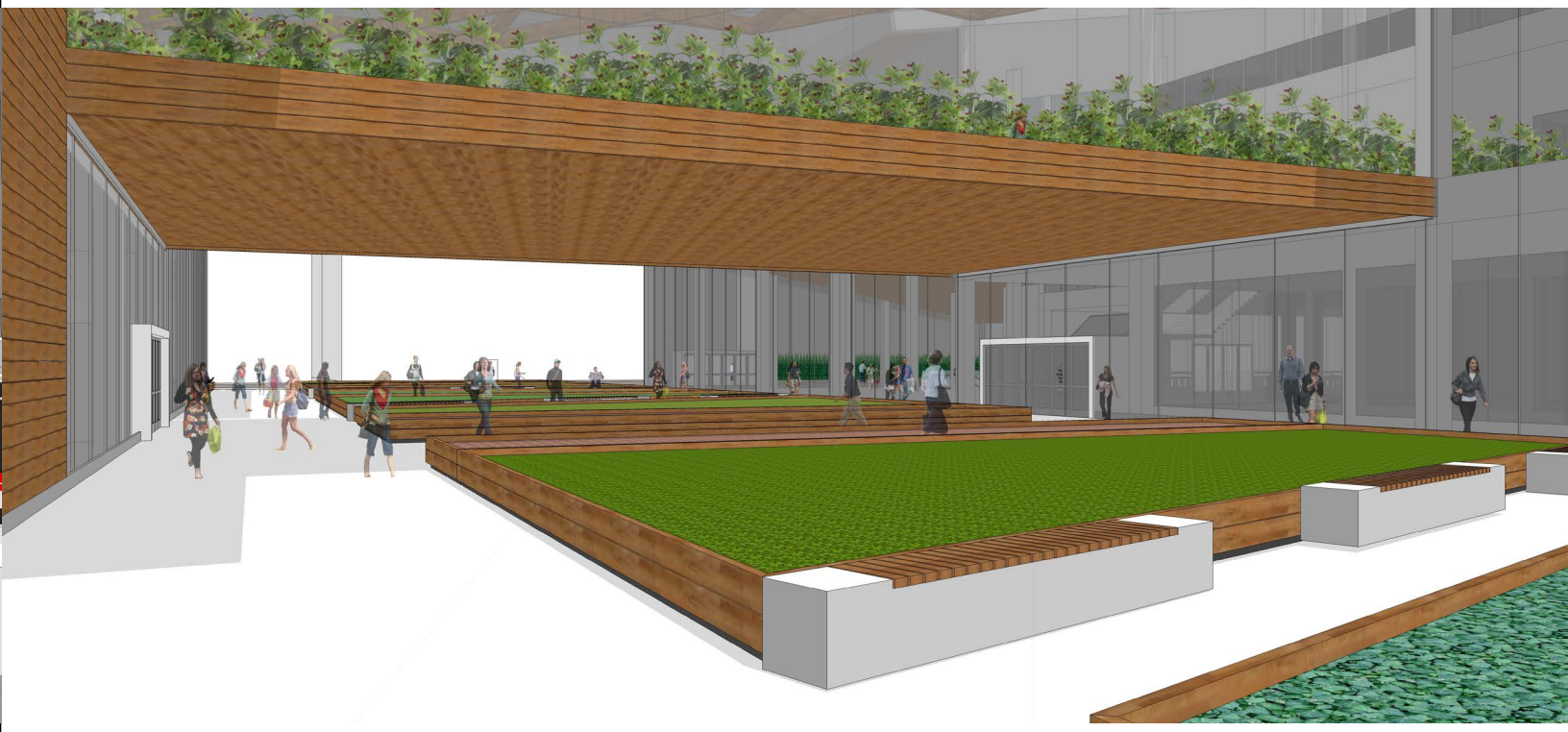


Figure 128: Eye level view, looking through the centre of the site from the south

PRODUCTION
CAPABILITIES OF SITE

7.0

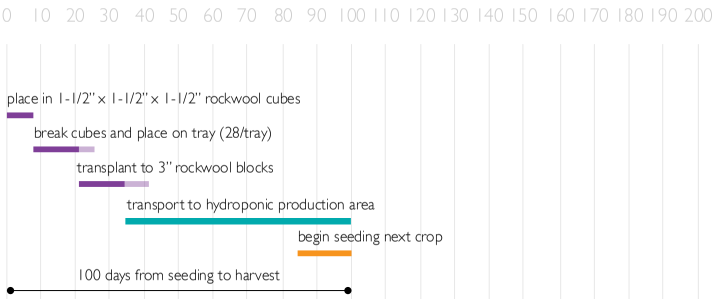
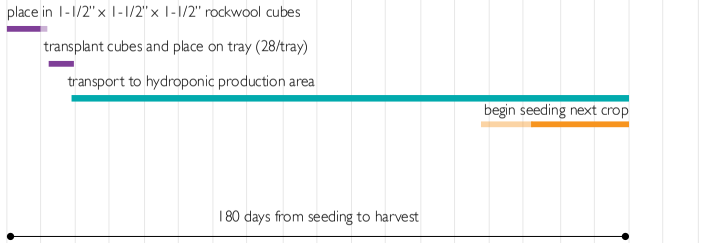
URBAN AGRICULTURE PRODUCTION

CROP ANALYSIS

In order to understand how the tower was to be designed, a thorough crop investigation was required. Analysis consisted of five, very common hydroponic crop varieties, tomatoes, lettuce, peppers, cucumbers, and microgreens. The investigation began with an understanding of the physical requirements of the space for the vegetables, looking at temperature, humidity levels, light, production system required for growth and the crop cycle of each. It became clear that each vegetable was unique and required it's own conditions, so isolating one crop per floor was the approach taken for the proposal.

Note: calculations throughout this section are based on:
one vegetable is equal to one unit.

(right) Table 02: Analysis of Crops proposed for on site, intensive agricultural practices

	Varieties	Weight (lbs.)	Temperature Range (C)	RH	Light (hours / day)	Production System	Crop Cycle (days)
Tomato	Beefsteak Cherry Cocktail Truss	0.02 - 0.44	21 - 27 - day 16 - 17.7 - night	60 - 70%	12 minimum	Bato Bucket	
Lettuce	Bibb Romaine Oakleaf Lolla Rosa Ruby Red Sail New Fire Red Brunia	0.625 - 1.5	18 - 21 - day 13 - 16 - night	75 - 85%	14 - 16	Raft Culture NFT	
Pepper	Cubico Mazurka Fellini Narobi Eagle Samantha Lesley Kelvin Fiesta Gold Flame	0.27	23 - 26 - day 21 - night	75%	18	Bato Bucket NFT	
Cucmber	European Long English	0.66 - 1.37	23.8 - 25.5 - day 20 max. - night	75%	14 - 16	Bato Bucket	
Micro-Greens	Arugula Basil Celery Cabbage Cilantro Endive Mustard Tangy Radish	per 1 sq.ft. 0.833 lbs.	26.6 - day 21.1 - night	75%	19	Single Rack Microgreen Growing System	

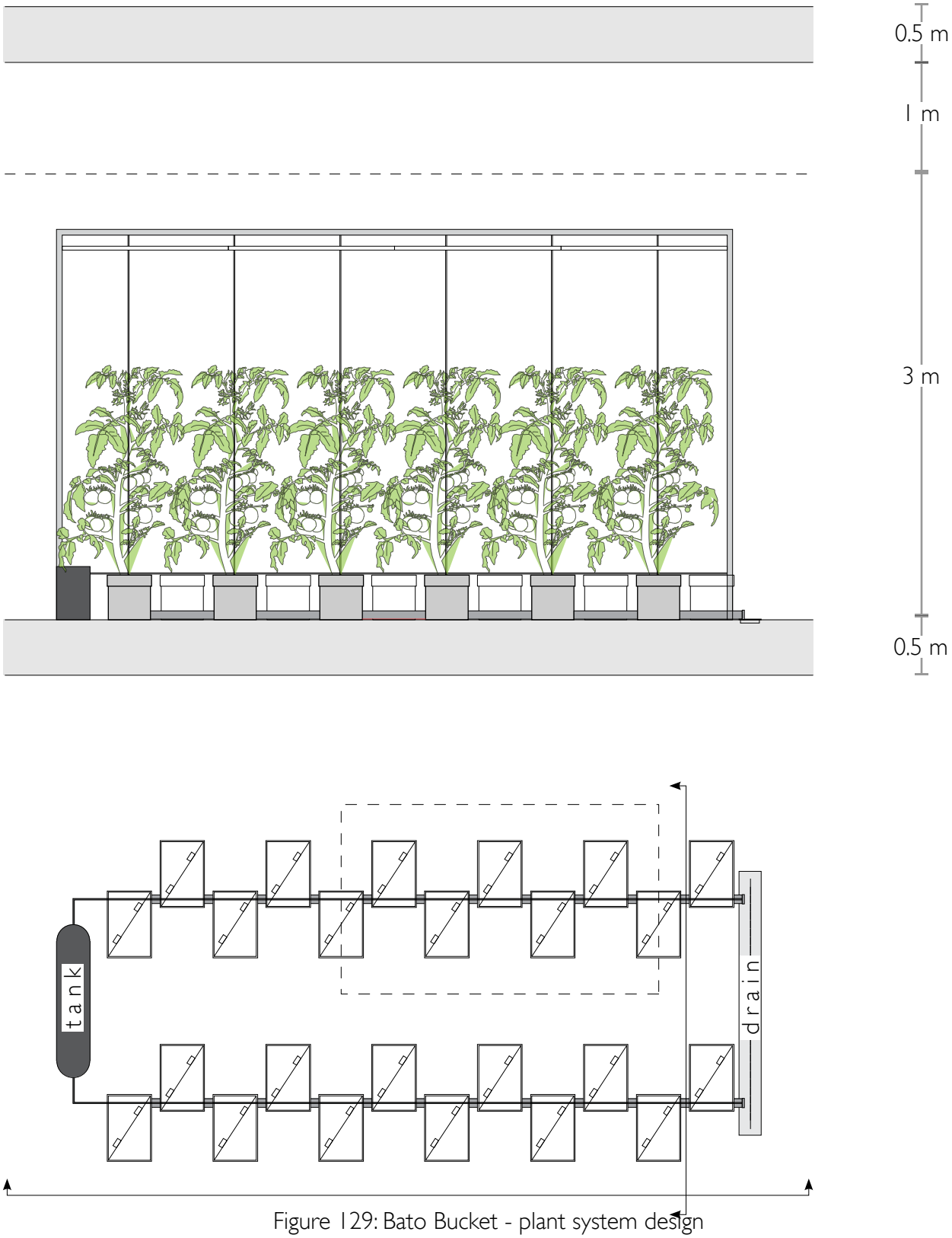
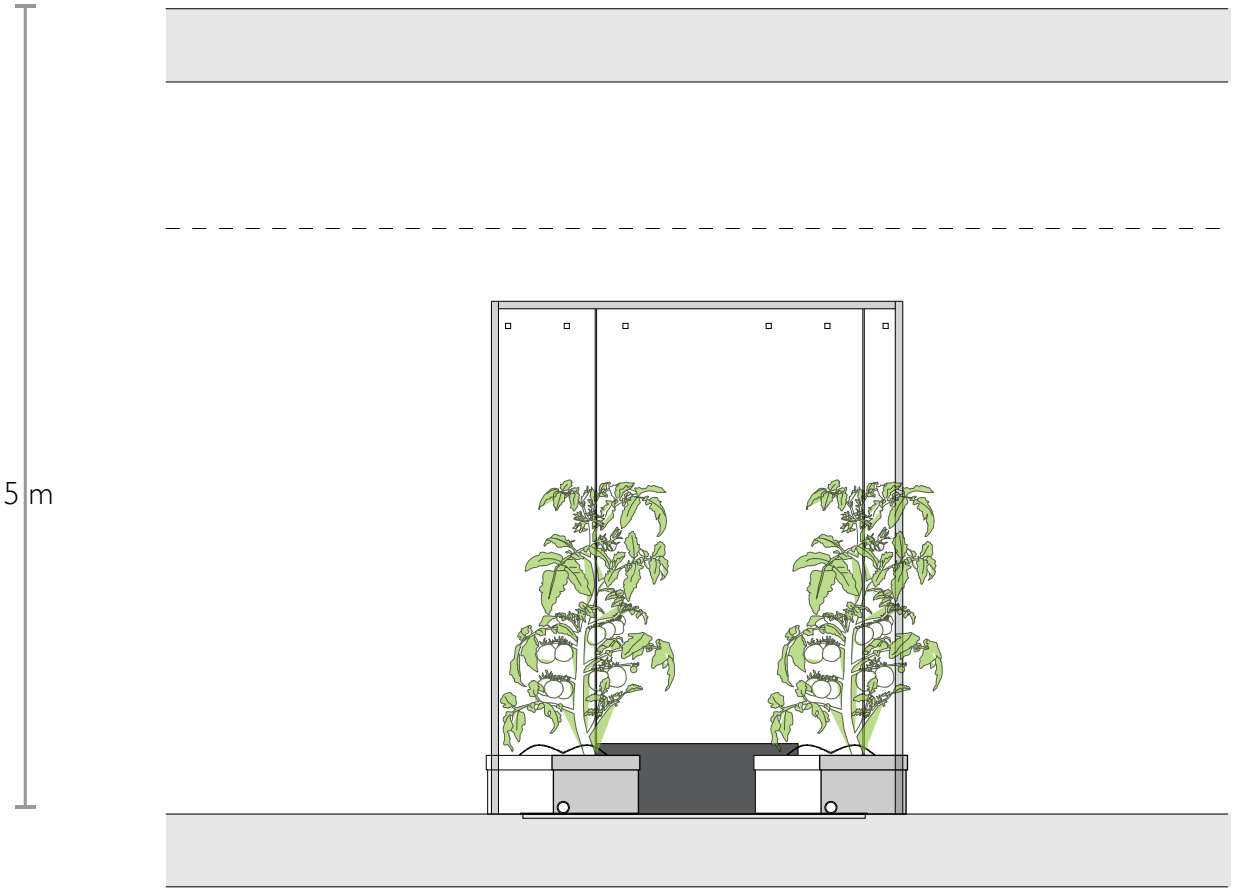
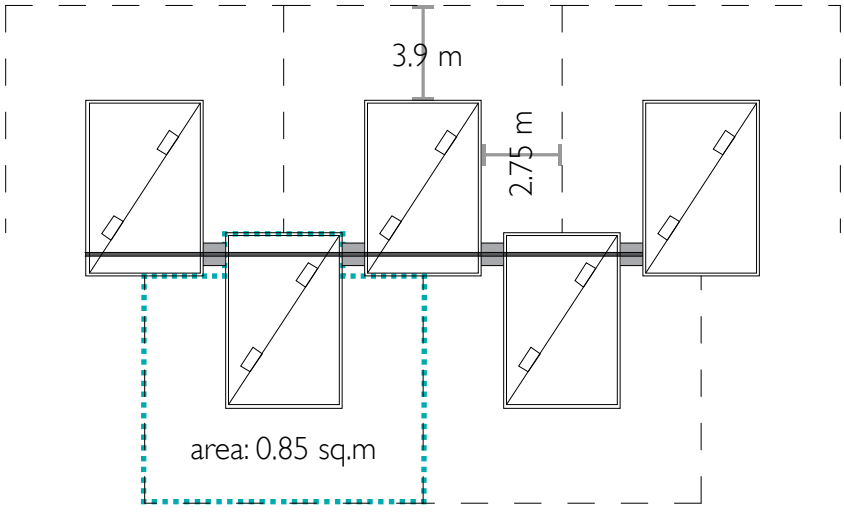


Figure 129: Bato Bucket - plant system design


5 m


3.9 m
2.75 m
area: 0.85 sq.m

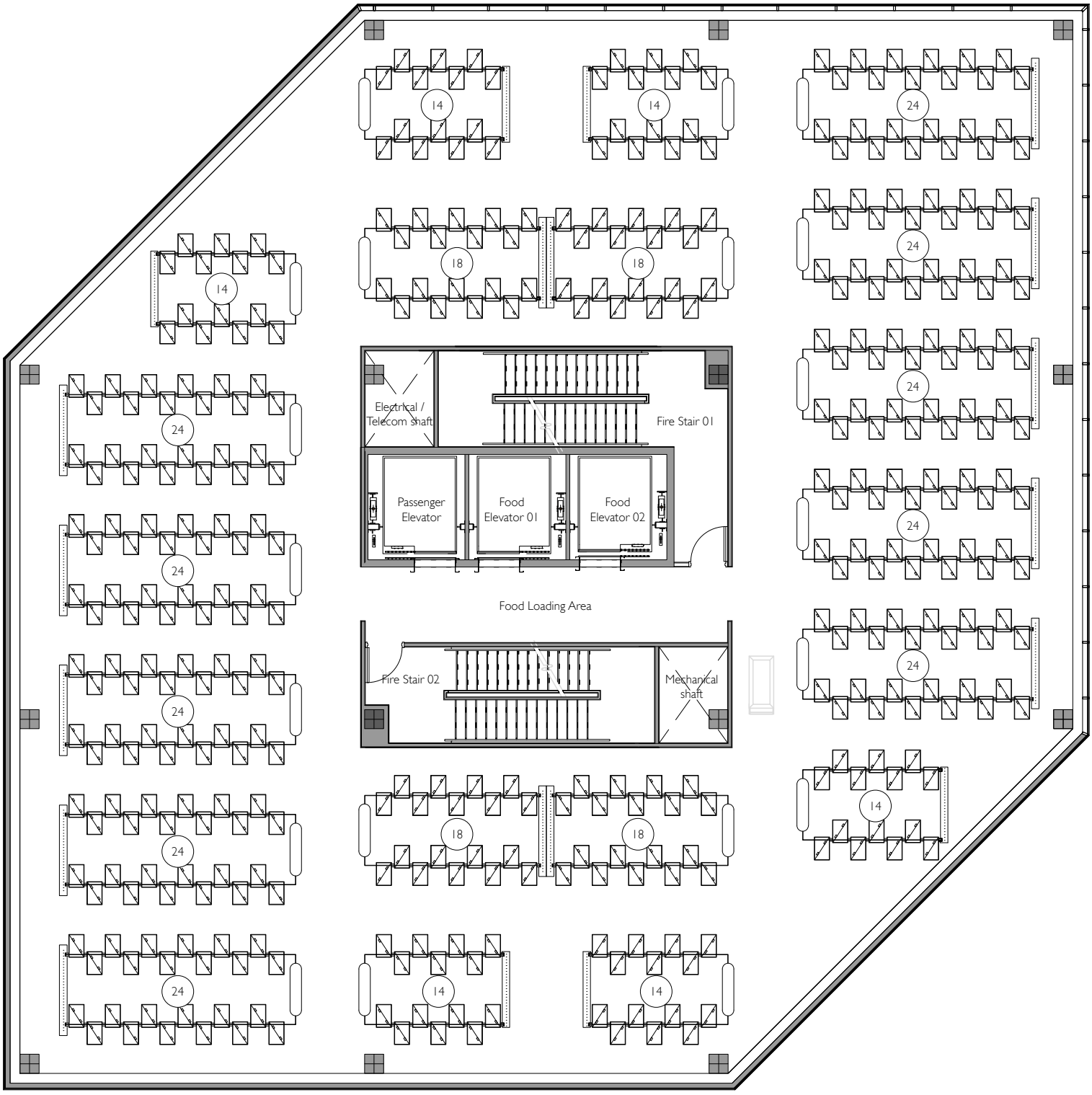


Figure 130: Bato Bucket - plant system design - tower layout

	No. of plant systems		bato buckets / plant system		plants / bato bucket		plants / floor	total plants / floor		crop / plant		crop / floor / crop cycle		crop cycles / year		crop / floor / year
tomato	10	×	24	×	2	=	480	792	×	10	=	7,920	×	3	=	23,760
	06	×	14	×	2	=	168									
	04	×	18	×	2	=	144									
cucumber	10	×	24	×	2	=	480	792	×	10	=	7,920	×	6	=	47,520
	06	×	14	×		=	168									
	04	×	18	×	2	=	144									
pepper	10	×	24	×	2	=	480	792	×	10	=	7,920	×	2	=	15,840
	06	×	14	×	2	=	168									
	04	×	18	×	2	=	144									

Table 03: Bato Bucket Crop Potential Analysis

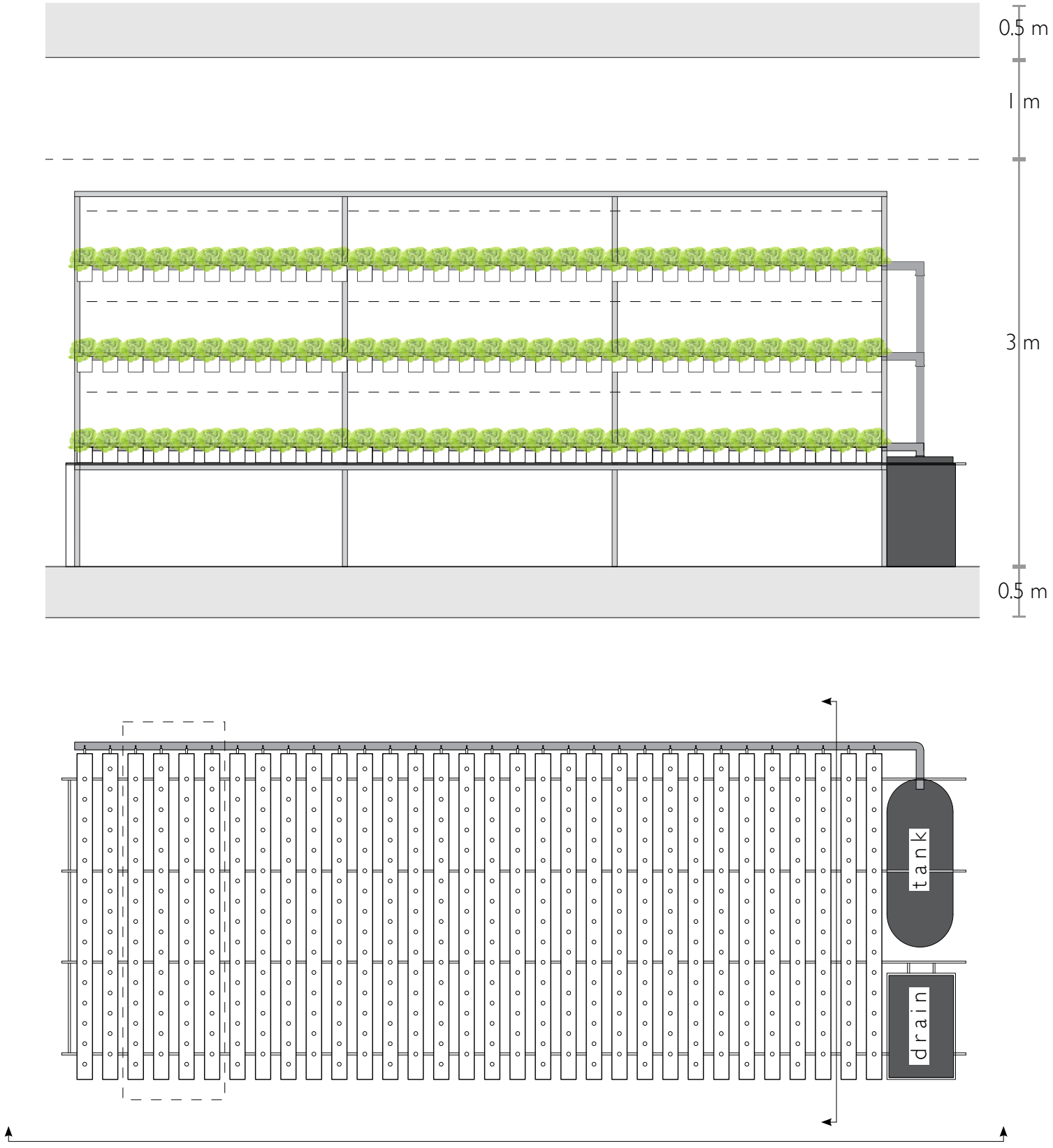
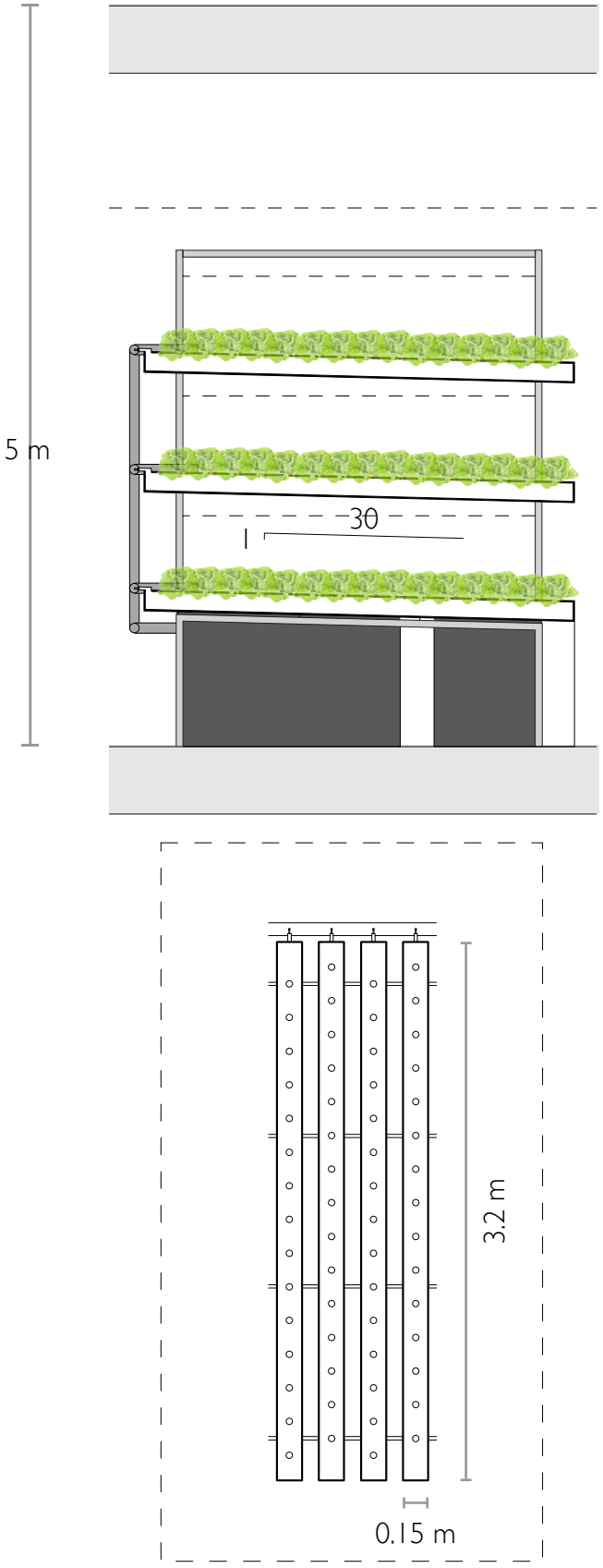


Figure 131: Nutrient Film Technique - plant system design


5 m
30
1
3.2 m
0.15 m

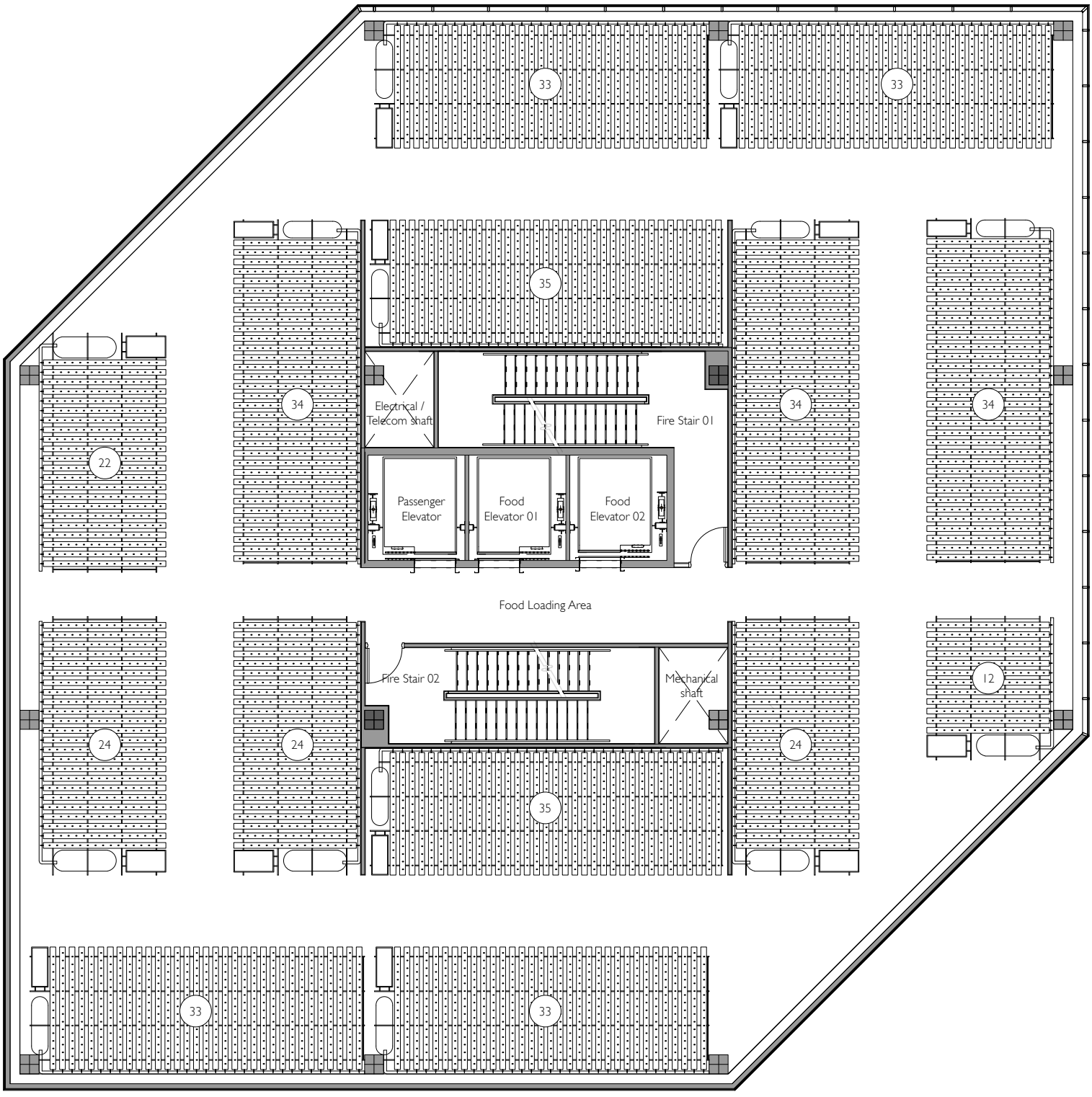
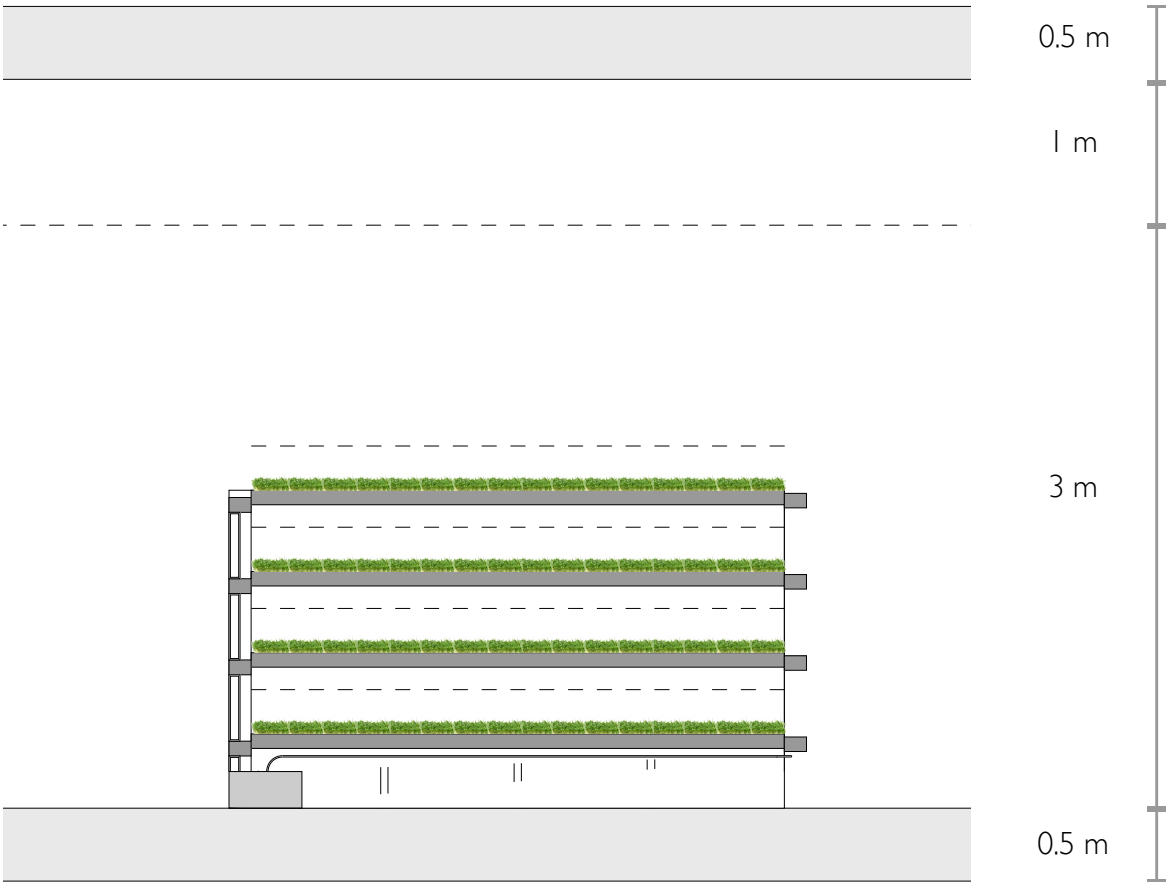


Figure 132: Nutrient Film Technique - plant system design - tower layout

No. of plant systems		troughs / plant system		lettuce head / trough		plants / floor	heads of lettuce / floor / crop cycle		crop cycles / year		heads of lettuce / floor / year
01	×	36	×	15	=	549	18,459	×	11	=	203,049
01	×	66	×	15	=	990					
03	×	72	×	15	=	3,240					
04	×	99	×	15	=	5,940					
03	×	102	×	15	=	4,590					
02	×	105	×	15	=	3,150					

Table 04: Nutrient Film Technique Crop Potential Analysis



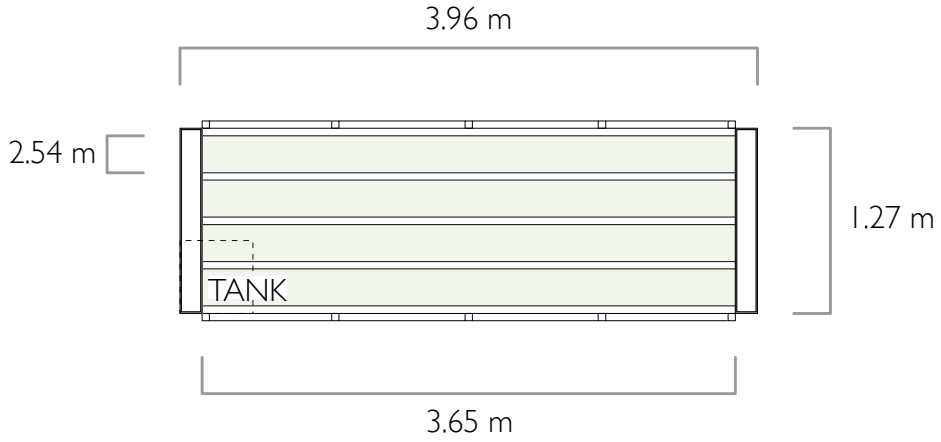
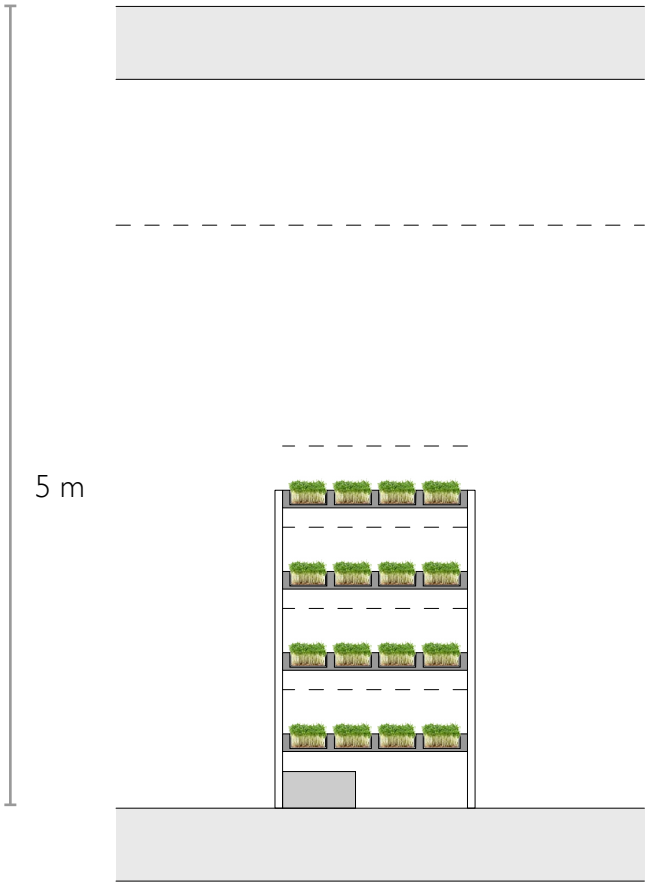
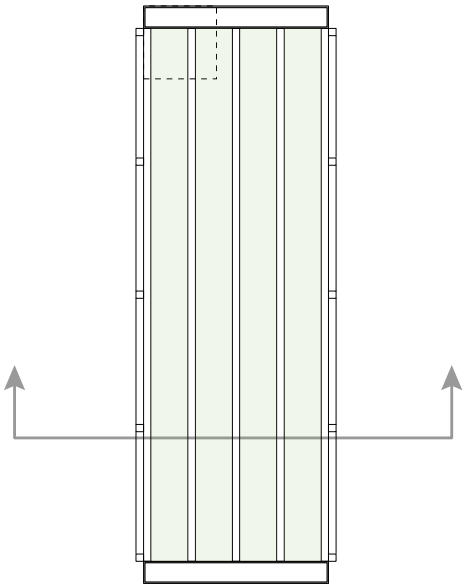


Figure 133: Single Rack MicroGreen - plant system design


5 m



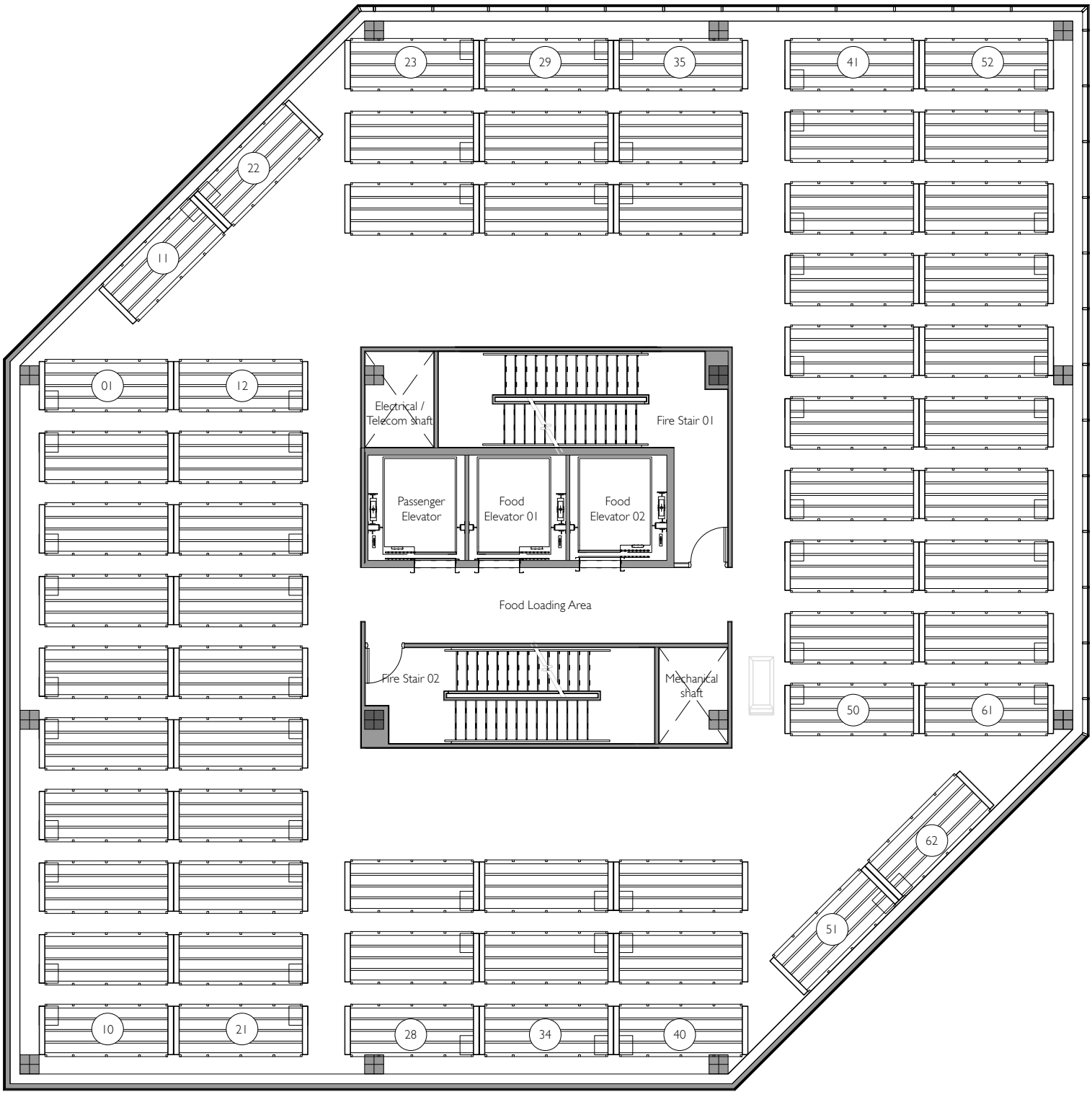


Figure 134: Single Rack MicroGreen - plant system design - tower layout

No. of plant systems		sq.ft. / plant system		sq.ft. growing space / floor		lbs. microgreens / sq.ft.		lbs. microgreens / floor		crop cycles / year		lbs. microgreens / floor / year
62	×	140	=	8,680	×	0.833	=	7,230	×	30	=	216,900

Table 05: Single Rack MicroGreen Crop Potential Analysis

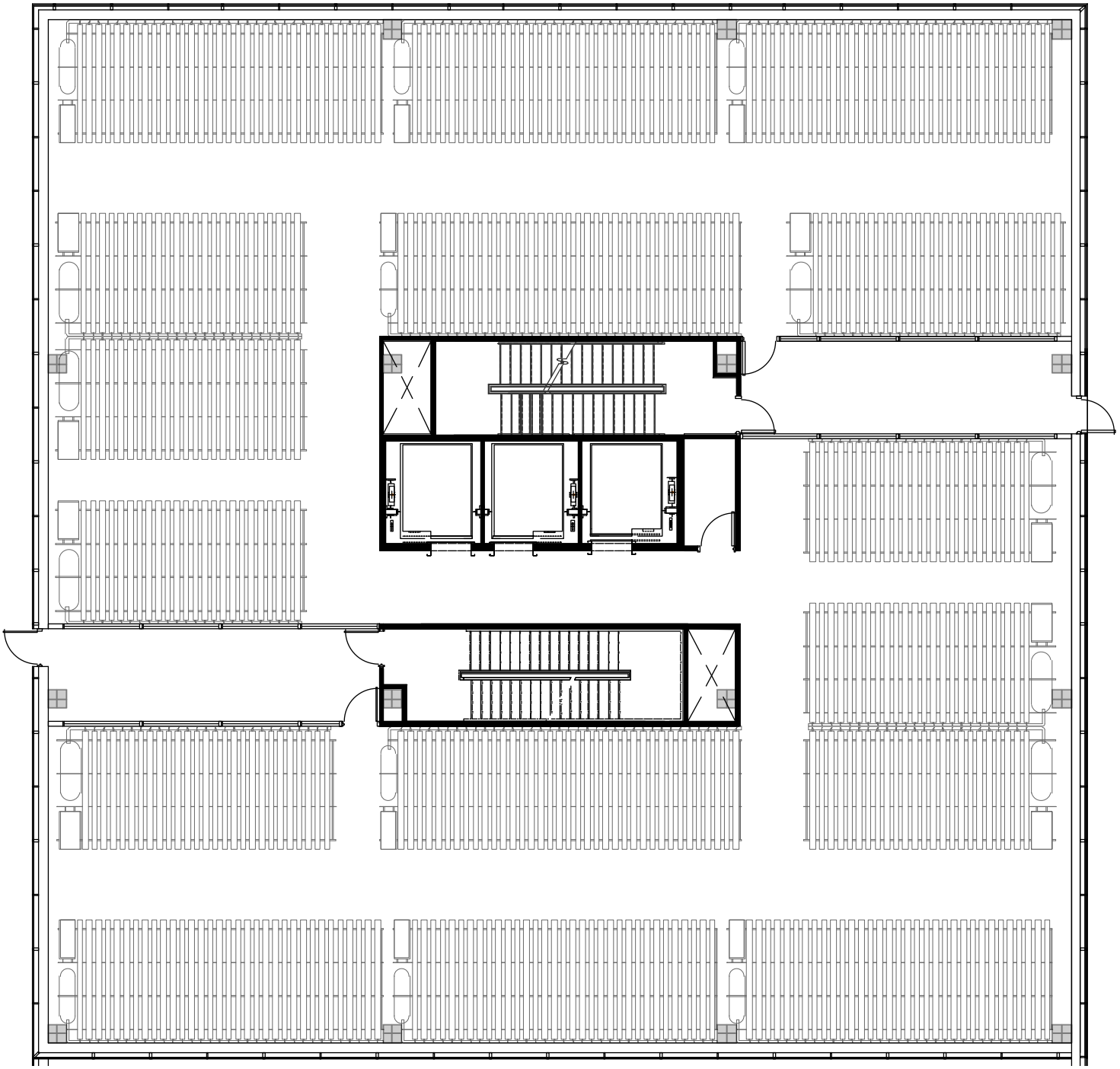


Figure 135: Nutrient Film Technique System Ground Floor layout

	No. of plant systems		troughs / plant system		lettuce head / trough		plants / floor	heads of lettuce / floor / crop cycle		crop cycles / year		heads of lettuce / floor / year
lettuce	6	×	72	×	15	=	6,480	21,150	×	11	=	232,650
	2	×	81	×	15	=	2,430					
	6	×	99	×	15	=	8,910					
	2	×	111	×	15	=	3,330					

Table 06: Nutrient Film Technique Crop Potential Analysis

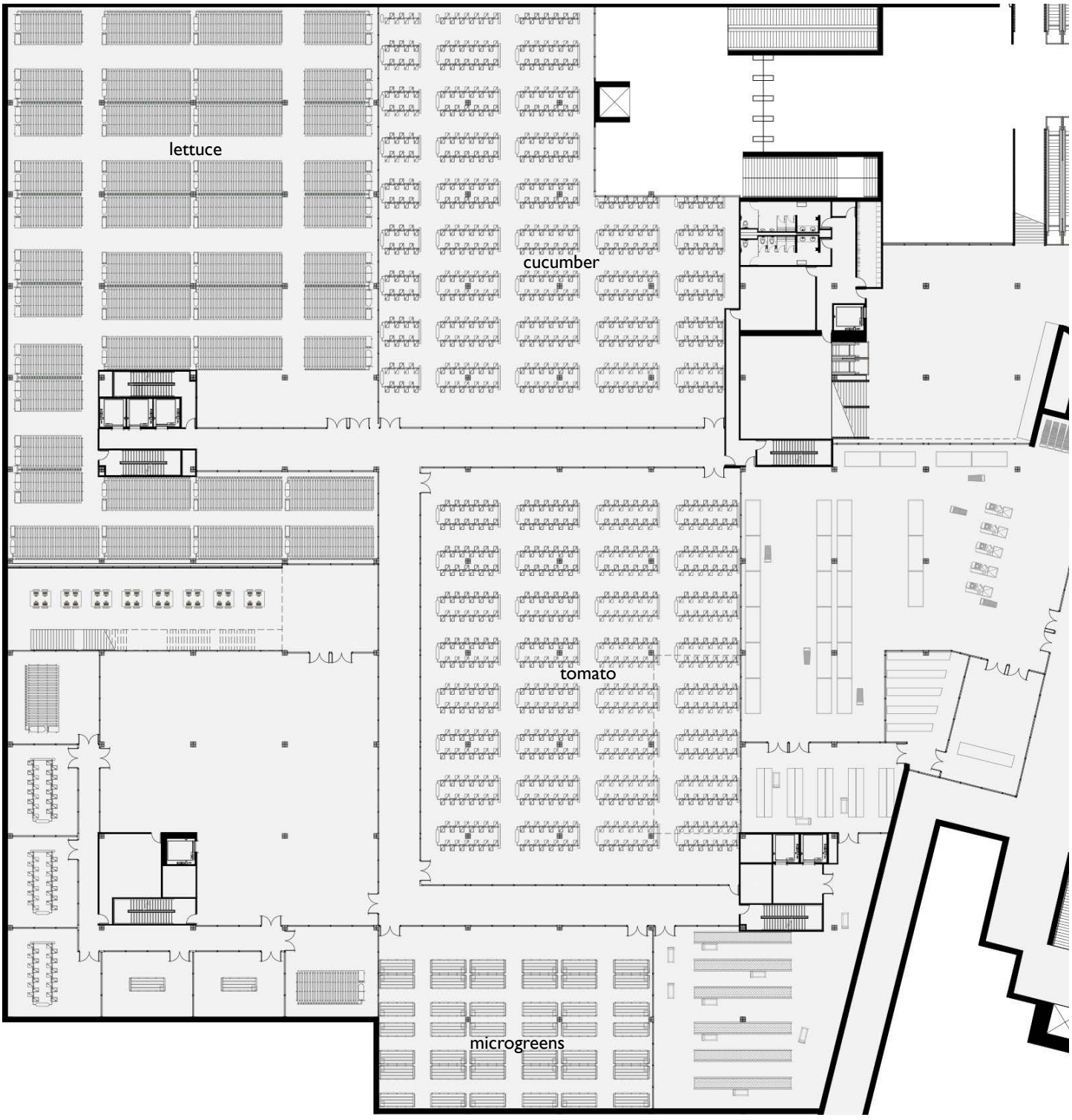


Figure 136: Plant Systems, Lower Level 01 layout

LOWER LEVEL 01
CROP POTENTIAL ANALYSIS

	No. of plant systems		bato buckets / plant system		plants / bato bucket		plants / floor	total plants / floor		crop / plant		crop / floor / crop cycle		crop cycles / year		crop / floor / year
tomato	32	×	24	×	2	=	1,536		×	10	=	15,360	×	3	=	46,080
cucumber	21.5	×	24	×	2	=	1,032	1,432	×	10	=	14,320	×	6	=	85,920
	8.5	×	14	×	2	=	238									
	4.5	×	18	×	2	=	162									

	No. of plant systems		troughs / plant system		lettuce head / trough		plants / floor	heads of lettuce / floor / crop cycle		crop cycles / year		heads of lettuce / floor / year
lettuce	23	×	99	×	15	=	34,155	54,675	×	11	=	601,425
	19	×	72	×	15	=	20,520					

	No. of plant systems		sq.ft. / plant system		sq.ft. growing space / floor		lbs. microgreens / sq.ft.	lbs. microgreens / floor		crop cycles / year		lbs. microgreens / floor / year
microgreens	42	×	140	×	5,880	×	0.833	= 4,898.04	×	30	=	146,941.2

Table 07: Crop Potential Analysis - Lower level 01

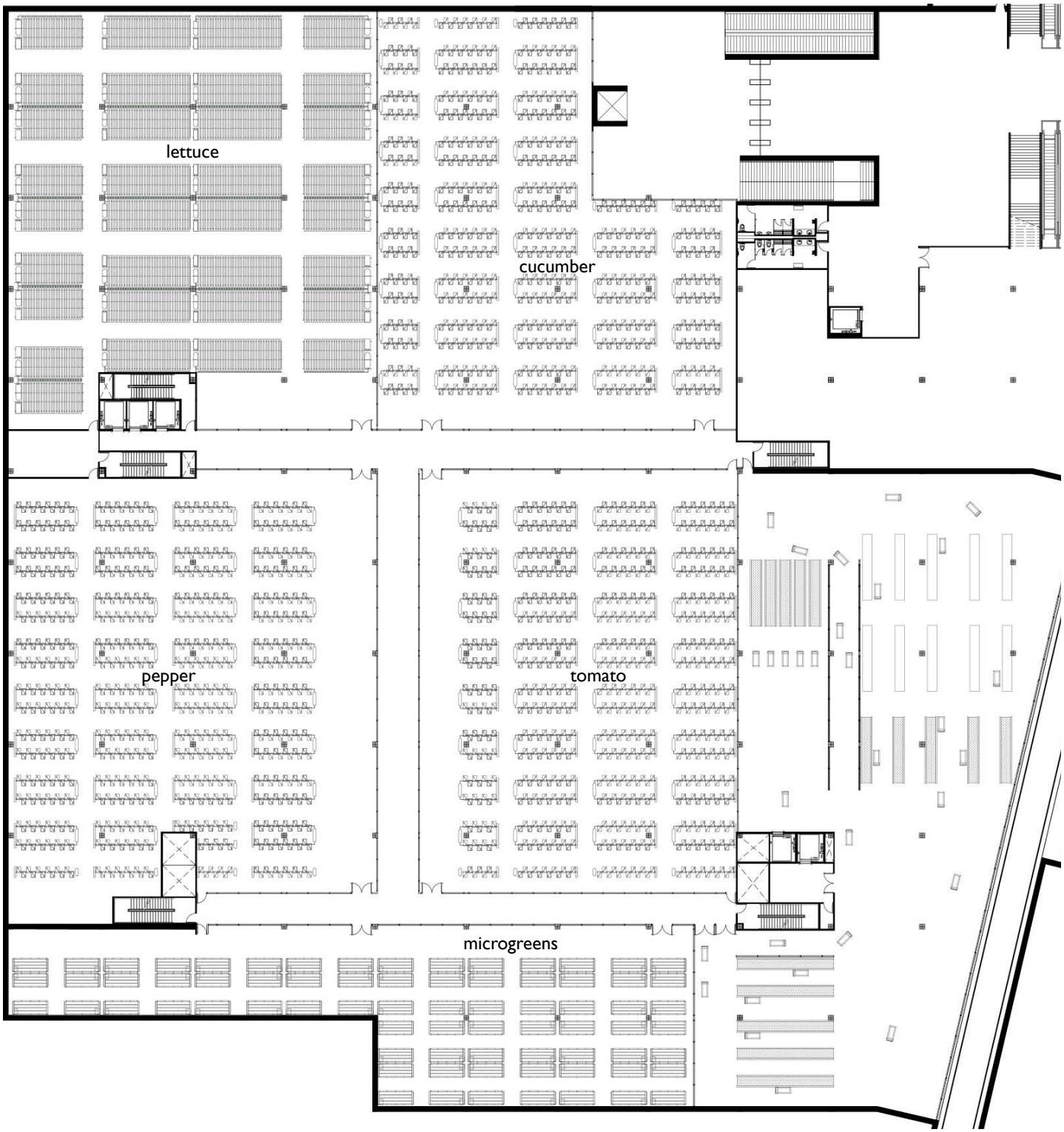


Figure 137: Plant Systems, Lower Level 02 layout

	No. of plant systems		bato buckets / plant system		plants / bato bucket		plants / floor	total plants / floor		crop / plant		crop / floor / crop cycle		crop cycles / year		crop / floor / year
tomato	25.5	×	24	×	2	=	1,224	1,462	×	10	=	14,620	×	3	=	43,860
	8.5	×	14	×	2	=	238									
cucumber	21.5	×	24	×	2	=	1,032	1,432	×	10	=	14,320	×	6	=	85,920
	8.5	×	14	×	2	=	238									
	4.5	×	18	×	2	=	162									
pepper	34	×	24	×	2	=	1,632		×	10	=	16,320	×	2	=	32,640

	No. of plant systems		troughs / plant system		lettuce head / trough		plants / floor	heads of lettuce / floor / crop cycle		crop cycles / year		heads of lettuce / floor / year
lettuce	16	×	99	×	15	=	23,760	42,120	×	11	=	463,320
	17	×	72	×	15	=	18,360					

	No. of plant systems		sq.ft. / plant system		sq.ft. growing space / floor		lbs. microgreens / sq.ft.	lbs. microgreens / floor		crop cycles / year		lbs. microgreens / floor / year
microgreens	73	×	140	×	10,220	×	0.833	= 8,513.26	×	30	=	255,397.8

Table 08: Crop Potential Analysis - Lower level 02

Figure 138: Plant Systems, Lower Level 03 layout

	No. of plant systems		bato buckets / plant system		plants / bato bucket		plants / floor	total plants / floor		crop / plant		crop / floor / crop cycle		crop cycles / year		crop / floor / year
tomato	25.5	×	24	×	2	=	1,224	1,462	×	10	=	14,620	×	3	=	43,860
	8.5	×	14	×	2	=	238									
cucumber	21.5	×	24	×	2	=	1,032	1,432	×	10	=	14,320	×	6	=	85,920
	8.5	×	14	×	2	=	238									
	4.5	×	18	×	2	=	162									
pepper	34	×	24	×	2	=	1,632		×	10	=	16,320	×	2	=	32,640

	No. of plant systems		troughs / plant system		lettuce head / trough		plants / floor	heads of lettuce / floor / crop cycle		crop cycles / year		heads of lettuce / floor / year
lettuce	16	×	99	×	15	=	23,760	42,120	×	11	=	463,320
	17	×	72	×	15	=	18,360					

	No. of plant systems		sq.ft. / plant system		sq.ft. growing space / floor		lbs. microgreens / sq.ft.	lbs. microgreens / floor		crop cycles / year		lbs. microgreens / floor / year
microgreens	73	×	140	×	10,220	×	0.833	= 8,513.26	×	30	=	255,397.8

Table 09: Crop Potential Analysis - Lower level 03

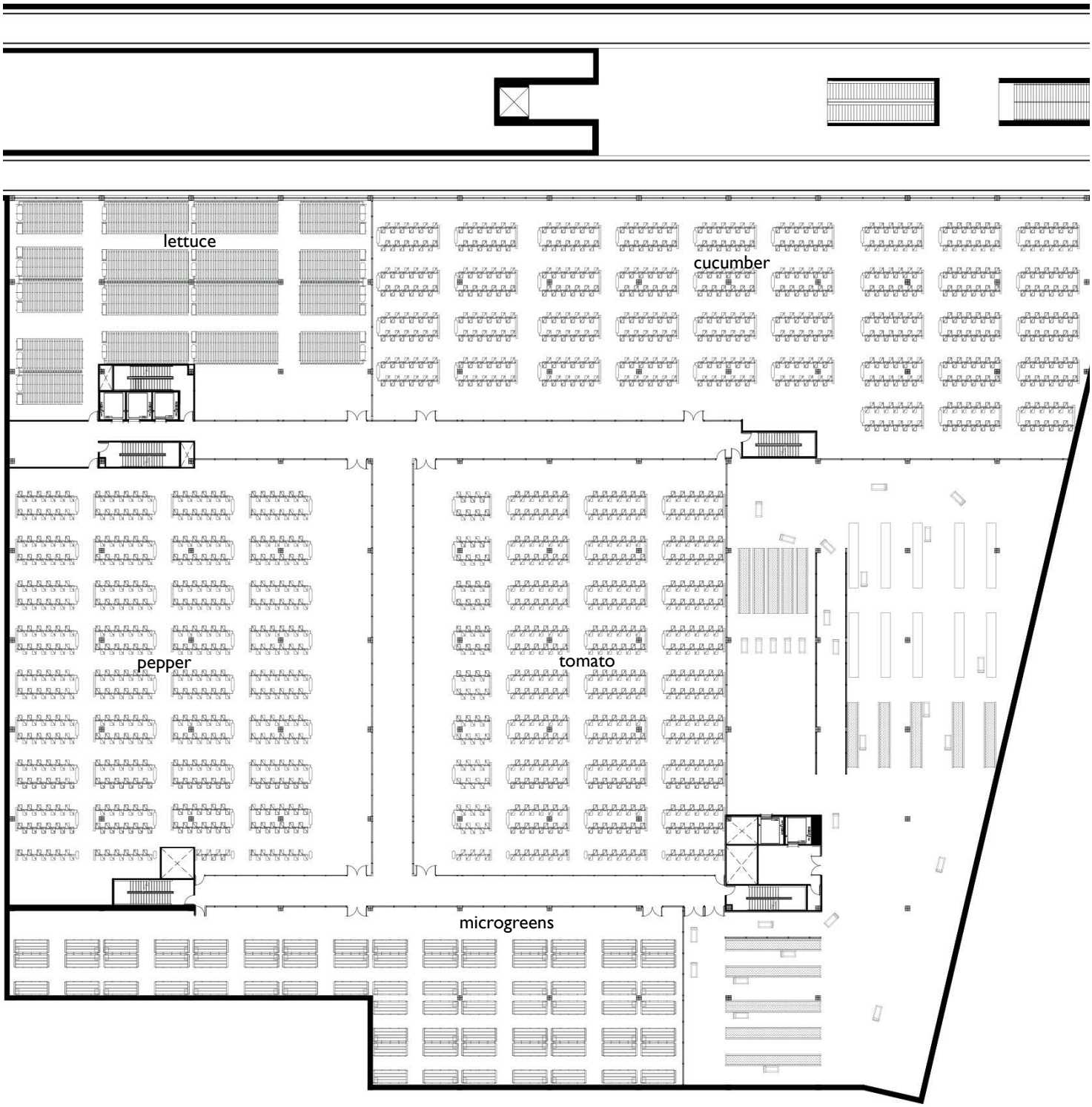


Figure 139: Plant Systems, Lower Level 04 layout

	No. of plant systems		bato buckets / plant system		plants / bato bucket		plants / floor	total plants / floor		crop / plant		crop / floor / crop cycle		crop cycles / year		crop / floor / year
tomato	25.5	×	24	×	2	=	1,224	1,462	×	10	=	14,620	×	3	=	43,860
	8.5	×	14	×	2	=	238									
cucumber	21.5	×	24	×	2	=	1,032	1,432	×	10	=	14,320	×	6	=	85,920
	8.5	×	14	×	2	=	238									
	4.5	×	18	×	2	=	162									
pepper	34	×	24	×	2	=	1,632		×	10	=	16,320	×	2	=	32,640

	No. of plant systems		troughs / plant system		lettuce head / trough		plants / floor	heads of lettuce / floor / crop cycle		crop cycles / year		heads of lettuce / floor / year
lettuce	16	×	99	×	15	=	23,760	42,120	×	11	=	463,320
	17	×	72	×	15	=	18,360					

	No. of plant systems		sq.ft. / plant system		sq.ft. growing space / floor		lbs. microgreens / sq.ft.		lbs. microgreens / floor		crop cycles / year		lbs. microgreens / floor / year
microgreens	73	×	140	×	10,220	×	0.833	=	8,513.26	×	30	=	255,397.8

Table 10: Crop Potential Analysis - Lower level 04

production capacity: crop / floor / year	tomato	cucumber	pepper	lettuce	microgreens
LL04	43,860	85,920	32,640	463,320	255,397.8
LL03	43,860	85,920	32,640	463,320	255,397.8
LL02	43,860	85,920	32,640	463,320	255,397.8
LL01	46,080	85,920		601,425	146,941.2
GF				232,650	
L01	23,760				
L02		47,520			
L03			15,840		
L04				203,049	
L05					216,900
L06	23,760				
L07	23,760				
L08			15,840		
L09			15,840		
L10			15,840		
L11	23,760				
L12	23,760				
L13			15,840		
L14			15,840		
L15			15,840		
L16	23,760				
L17	23,760				
L18			15,840		
L19			15,840		
L20			15,840		
Total:	343,980	391,200	256,320	2,427,084	1,130,034.6

crop	production capacity: crop / year	CSA (40%)	FOOD MARKETS (40%)	FOOD CAFE (20%)
tomato	343,980	137,592	137,592	68,796
cucumber	391,200	156,480	156,480	78,240
pepper	256,320	102,528	102,528	51,264
lettuce	2,427,084	970,833.6	970,833.6	485,416.8
microgreens	1,130,035	452,014	452,014	226,007

Table 11: Calculations allocating food division between various on site programs with a 20 story production tower

crop	CSA (40% / 356)	FOOD MARKETS (40% / 365)	FOOD CAFE (20% / 365)
tomato	377	377	188.5
cucumber	428.7	428.7	214.35
pepper	280.9	280.9	140.45
lettuce	2,659.8	2,659.8	1,329.9
microgreens	1,238.4	1,238.4	619.2

Table 12: Calculations outlining availability of food / program / day with 20 story production tower

COMMUNITY SHARED AGRICULTURE

CONCEPTUAL STRUCTURE

Food Program	Service	Box Programs	Price	Contents of Regular Box	Amount of Produce
Green Earth Organics	- Provides 100% Organic Produce - Seasonal sale prices on produce	Regular Harvest Box Family Harvest Box Super Harvest Box	$37 $47 $60	Fair Trade Bananas Carrots Star Ruby Grapefruit ON Red Onion Peaches PEI Yukon Gold Potatoes Green Leaf Lettuce Kiwis Valencia Oranges Ed Chard Gala Apples	1.5 lbs. 1 lb. 1 0.5 lb. 3 1lb. 1 3 3 1 2
Mama Earth Organics	Local . Organic . Delivered .	Single Regular Family Large	$27 $35 $45 $55	Orange, Valencia (mex) Grapefruit (mex) Leeks, Wild Bunch (on) Tomato, Vine (on) Lettuce, Green Leaf (usa) Asparagus (on) Fiddleheads (on) Radish, Red (on) Baby Bok Choy (on)	3 1 1 1 1 1 lb. 1 - 1/2 lb. 1 1 lb.
Plan B Organic Farms	Local Only or Local + Imported	Small Share (10 items/week) Large Share (12-14 items/week)	$25 $40	Pick and choose, 10 item / week share or 12-14 item / week share	varies.
Good Food Box	Offers a variety of food boxes with produce coming from local farmers and the OFT	Large Good Food Box Small Good Food Box Wellness Box The Organic Box - lrg. The Organic Box - sml. The Fruit Box	$18 $13 $13 $34 $24 $13	Bag of Apples Avocados Bunch of Bananas Cantiloupe Bag of Rainbow Carrots Bunch of Celery Corn -Peaches + Cream Lemons Head of Lettuce Bunch of Green Onions Oranges Potatoes Tomatoes - Plum	3 lbs. 2 1 1 24 / 2lbs. 1 3 2 1 1 4 3 lbs. 1/2 lb.

All Fruit and Vegetables Offered				Accessibility (pick up / drop off)
Field Cucumber Red Bell Pepper Blueberries (4oz.) Broccoli Carrots D'Anjou Pear Banana Gala Apples	Green Leaf Lettuce Hass Avocado Kiwi Lemons Ont. Green Cabbage Spinach QC HH Tomato Grapefruit	Mango Weekly Greens Weekly Apples (pkg. 6) Weekly Onions (3lb bag) Weekly Orange Citrus Weekly Potato Yams Yellow Zucchini		- Each order is shipped in reusable bins - Weekly or Bi-Weekly delivery - Deliveries are made between 2 - 9 pm on days when delivery is available within your neighborhood
Local: Wild Greens - Dandelion Herbs - Fresh Rosemary, Thyme Sunchokes Potatoes Red Leeks Onion Turnip	Tomato, vine Watercress Arugula Lettuce Spinach Mushrooms Asparagus Cucumber Fiddleheads	Radishes Beets Kale Microgreens Baby bok choy pepper, red bell chives sprout		- Weekly or Bi-Weekly delivery - Deliveries are made between 2 - 8 pm on days when delivery is available within your neighborhood - Client is charged once they recieve the produce - Program available to various zones throughout the GTA
Local + Imported: Root Vegetables: Carrots Potatoes Sweet Potatoes Onion Garlic Beets Parsnip Squash	Fruit: Apples Bananas Avocado Oranges Pears Kiwis Mango Grapefruit Lemons	Vegetables: Broccoli Cabbage Kale Celery Tomato Mushroom Zucchini Cucumber Cauliflower	Salad Greens: Lettuce Sprouts Herbs Baby salad mix Spinach	- Delivery available for: Dundas, Ancaster, Hamilton, Stoney Creek, Waterdown, Burlington, Oakville - Weekly box pick up available in: Hamilton, Burlington, Aokville, Mississauga, Toronto
Apples Avocados Bananas Carrots Celery Corn Lemons Lettuce Green Onions	Oranges Potatoes Tomatoes Spinach Baby Bok Choy Broccoli Pears Rhubarb Pineapple			- Delivery can occur anywhere within the city where there are 8 - 10 or more participants in the program - Boxes are dropped off to specific locations, then distributed by volunteers

Table 13: Local Community Supported Agriculture program structures

crop	crop / day		days / week		No. crops / week
tomato	377	×	7	=	2,639
cucumber	428.7	×	7	=	3,000.9
pepper	280.9	×	7	=	1966.3
lettuce	2,659.8	×	7	=	18,618.6
microgreens	1,238.4	×	7	=	8,668.8

Table 14: Calculations outlining availability of food for CSA program / week, with 20 story production tower

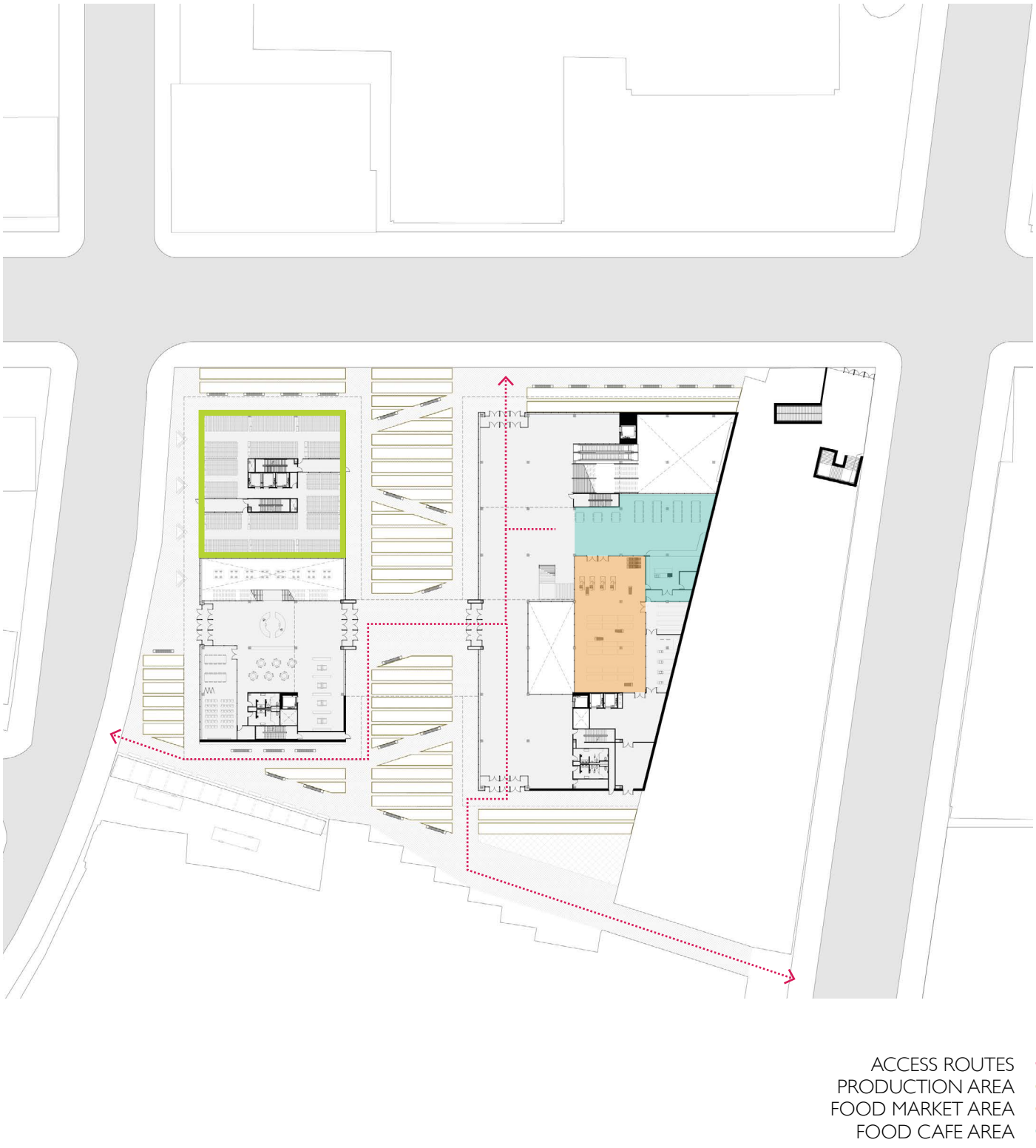


Figure 140: Ground Floor Plan, outlining location of food retail spaces and their proximity to transit

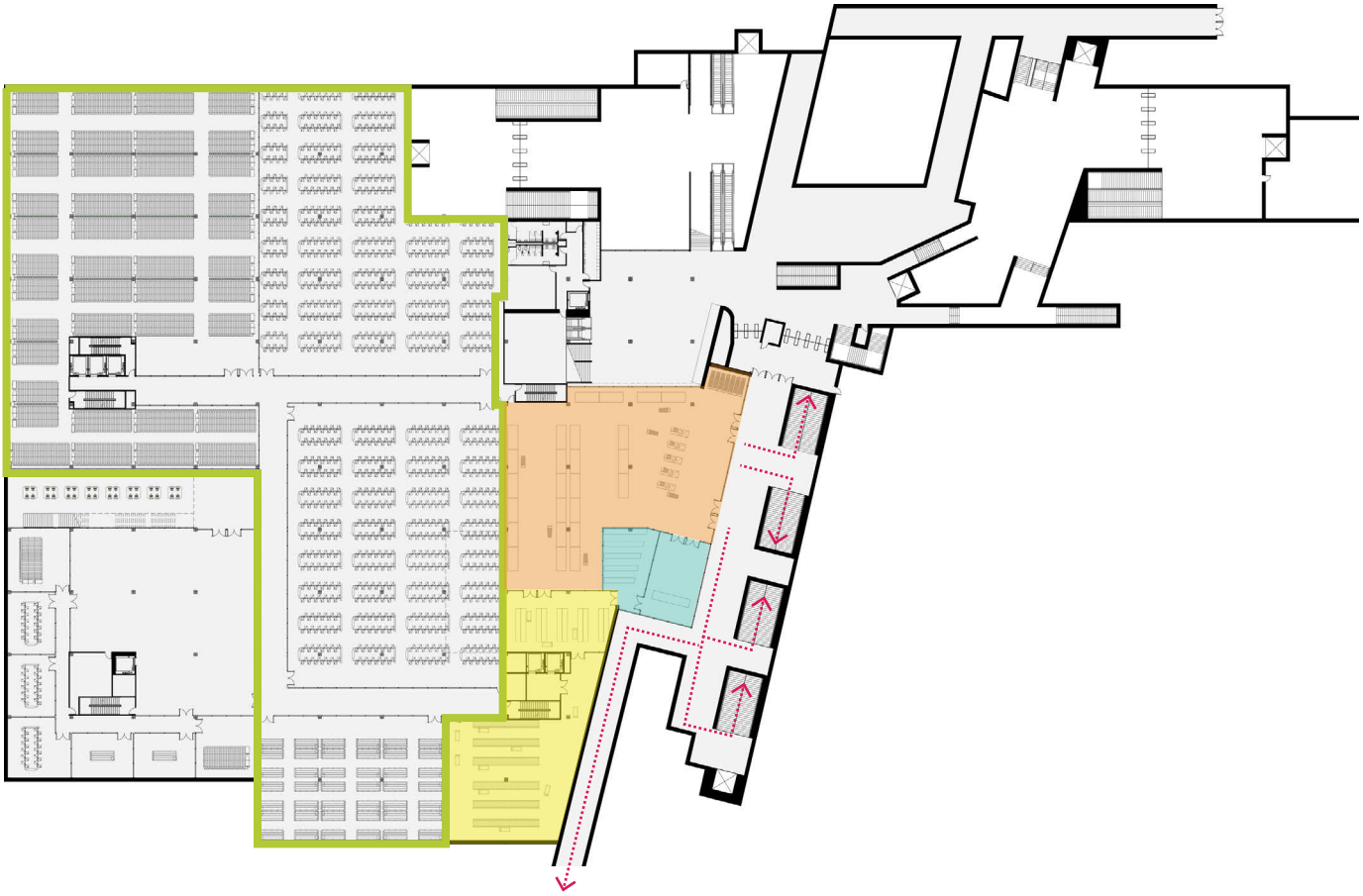


Figure 141: Lower Level 01, outlining location of food retail spaces and their proximity to transit

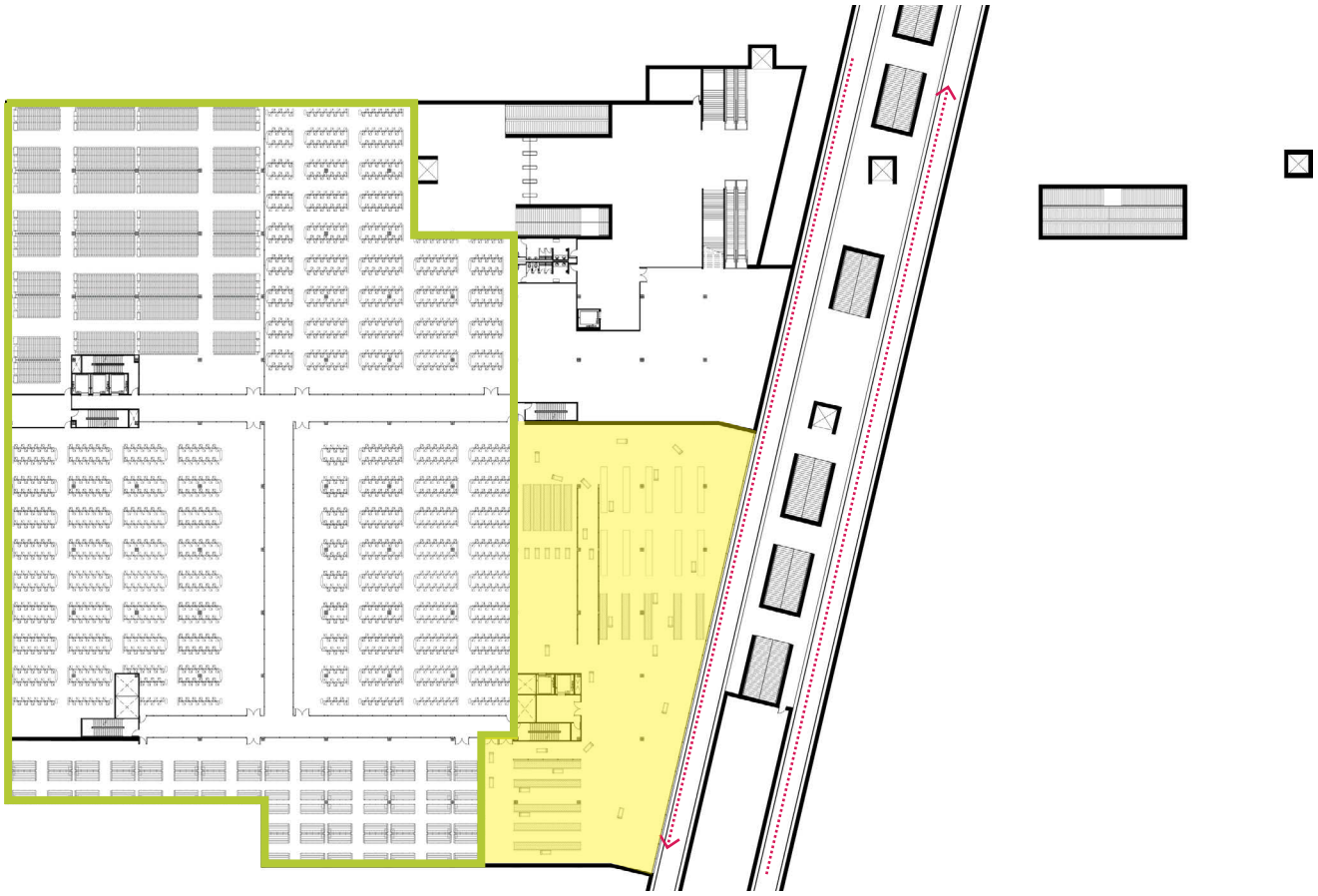


Figure 142: Lower Level 02, outlining location of food retail spaces and their proximity to transit

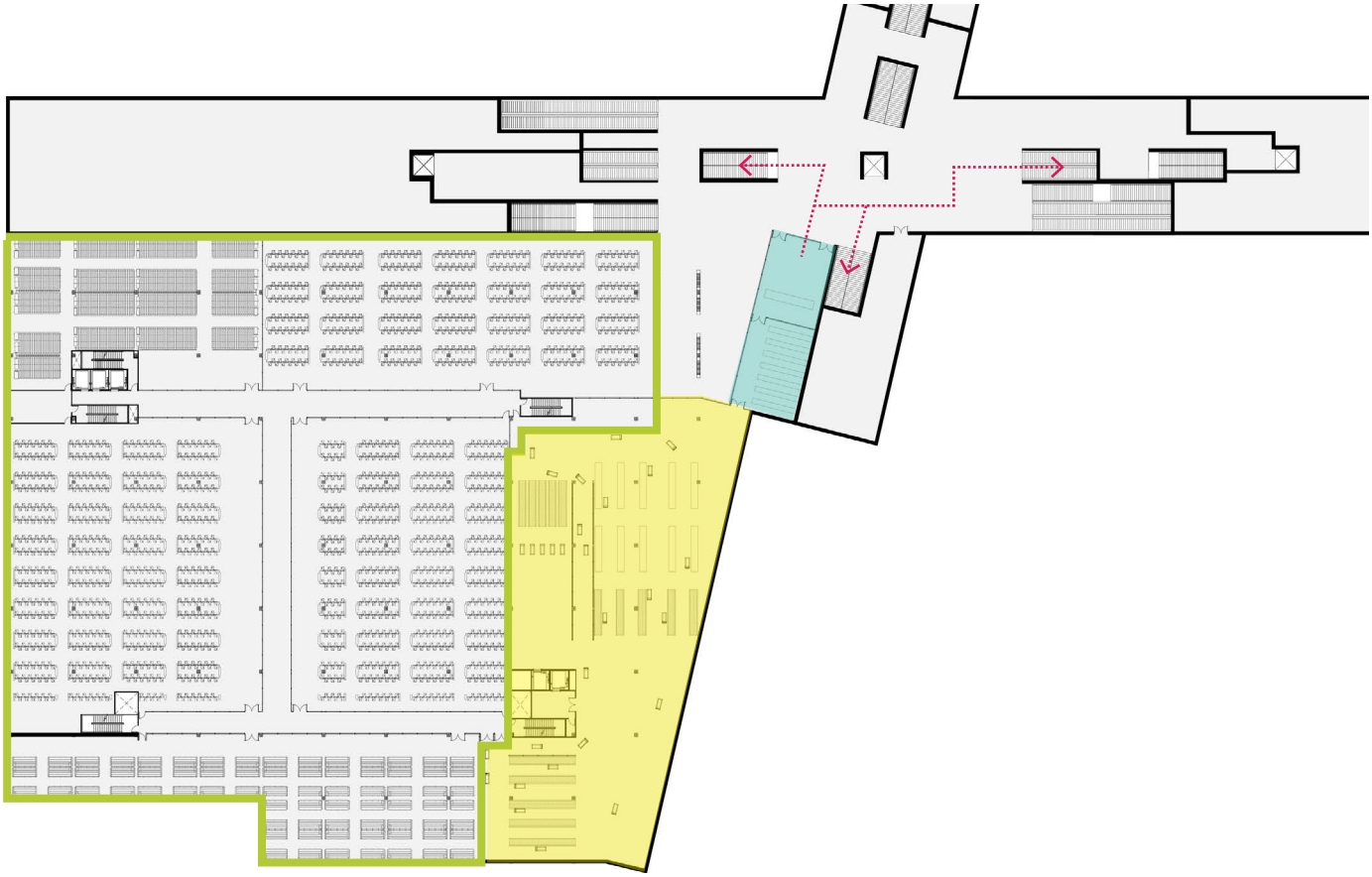


Figure 143: Lower Level 03, outlining location of food retail spaces and their proximity to transit

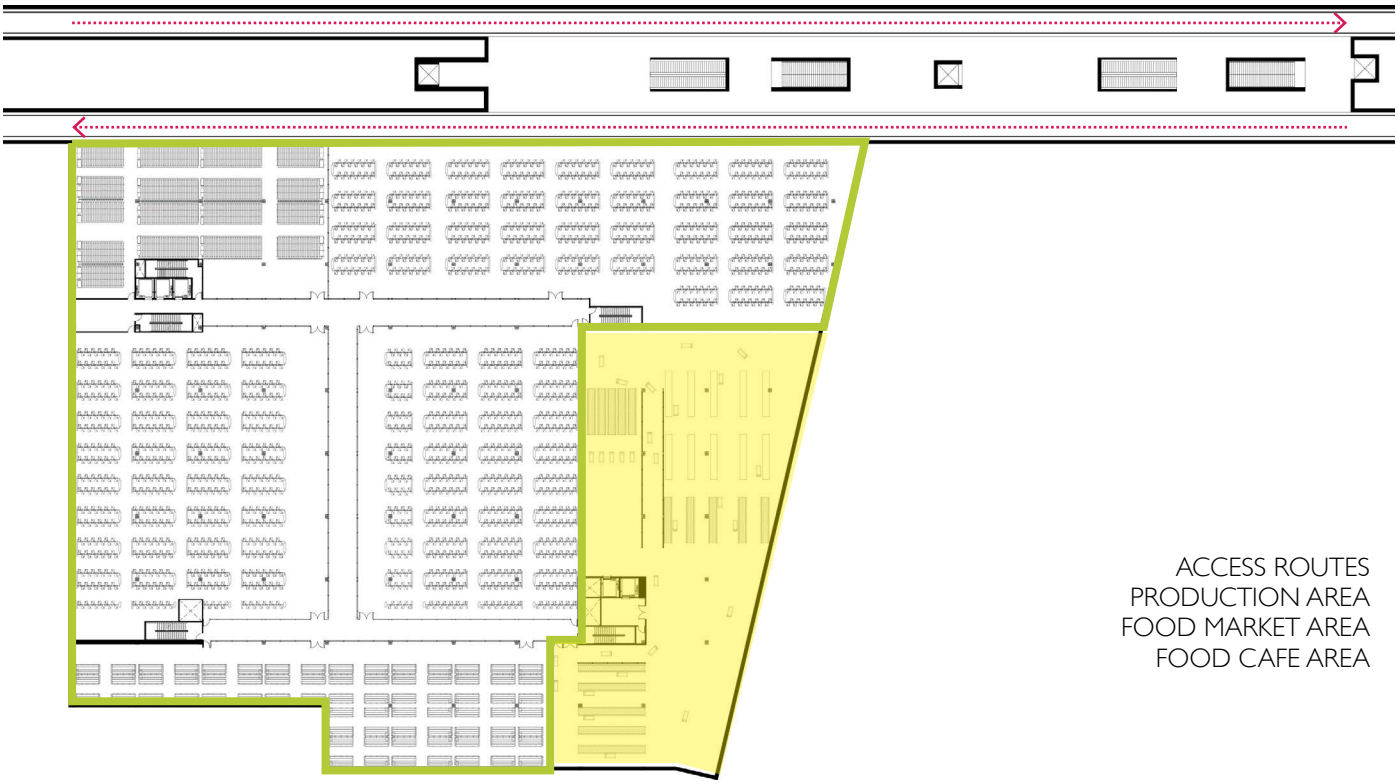


Figure 144: Lower Level 04, outlining location of food retail spaces and their proximity to transit

crop	crop / day		days / week		No. crops / week
tomato	377	×	7	=	2,639
cucumber	428.7	×	7	=	3,000.9
pepper	280.9	×	7	=	1966.3
lettuce	2,659.8	×	7	=	18,618.6
microgreens	1,238.4	×	7	=	8,668.8

Table 15: Calculations outlining availability of food for market / week, with 20 story production tower

crop	crop / day		servings / crop		servings / day
tomato	188.5	×	4	=	754
cucumber	214.35	×	4	=	857.4
pepper	140.45	×	4	=	561.8
lettuce	1,329.9	×	4	=	9,309.3
microgreens	619.2	×	4	=	4,334.4

Table 16: Calculations outlining availability of food for cafe / day, with 20 story production tower

PROJECT RESPONSE
CONCLUSION

8.0

The twenty first century is continuing to present unprecedented issues of concern. Due to the fact that food is connected to such a large variety of discourses, the food system of the north-western world will undoubtably be affected in the coming years. This translates into rising food prices, decreasing crop varieties, limited seasonality and overall has a negative impact on every individual's quality of life. If the large volumes of food imported on a daily basis are not offset by local food production, there will be disarray when food systems are interrupted. This thesis is attempting to challenge this future condition and implement an alternative method for how food is to be grown, moved and consumed within the city of Toronto.

During the onset of the project, it was understood that incorporating agriculture with architecture would not alone solve the world's food problems. An objective which emerged and remained apparent throughout the entirety of the project was attempting to integrate the public with agricultural production processes. Exposing, providing engagement with and easy access to agriculture in the city landscape was envisioned to alter and improve people's relationship with food. In order to create significant change, it was believed that people needed to become informed and interested in their food production processes. The research question, consistent throughout the project asked,

'How can architecture alter urban inhabitant's
current relationship with agriculture?'

This thesis looked to architecture as a means to help generate change within the agricultural discourse. It was intended to provide a feasible solution for integrating two seemingly opposing environments into the urban realm, the man made and the natural. Not only would architecture provide ideal growing conditions year round, it would also make a statement and place growing practices central within a populated urban environment.

What architecture can offer agricultural practices is a solution for decreasing the distance between places of food production and consumption, it can create an atmosphere conducive to growing food and it can maximizes yields within minimal area. In the project, these strategies have been addressed using hydroponic growing techniques. This thesis presented one approach, building a new development with the function of the building revolving around agricultural production. Other approaches, such as retrofitting old, underutilized buildings within the city may provide a more feasible approach to incorporating agriculture within the urban landscape.

The purpose of the thesis was to place agricultural production in a highly populated area of the city, where many people would be able to view and interact with food production. Ultimately, enhancing the existing, disconnected relationship between people and their food, by providing public access and engagement to the primary sector of food production, an alternative approach emerged.

Using architecture as a way to influence public engagement with agriculture, it became apparent that the public interacts with agricultural production in one of three ways:

Agriculture production as a public experience
Agriculture production for public consumption
Agricultural production for public demonstration

It was the intent to combine all of the ways interaction with agriculture could be used, and incorporated within the design. Rather than isolating the public from the productive spaces, or merging the two and sacrificing growing potential, the strategy employed intended to weave the public and productive spaces together, while still producing high volumes of food.

There were many challenges faced throughout the project,
1. Existing urban agricultural projects were limited; therefore, finding quantitative data on which to base design decisions were difficult. Much information had to be collected from agricultural sources, brought together and applied to an architectural context.

2. Current, successful urban agricultural initiatives within the city of Toronto are disconnected from their surrounding architecture. This is mainly because urban agriculture within the city practices traditional, horizontal growing techniques, able to act independently from an architectural component. Therefore, other aspects, such as program were analyzed to inform design decisions.

3. Often information about growing conditions, profits, energy requirements were not readily available, therefore, determining feasibility of the facility and it's production was difficult. Section 7.0 Production was based on production capacity of the plant systems employed.

4. Throughout the project, the design went through a variety of iterations which struggled to merge public and productive spaces. Generating different architectural techniques, such as visibility, interaction,

circulation, site design and so forth, allowed for the public to be immersed within a place of agricultural production, without contaminating productive spaces was a continuous challenge.

Developing the project to it's current state required an exploration of a variety of discourses, social / economic / environmental, as food was connected to so many realms of the city. The focus of the thesis was to respond to and alter all of these discourses to improve their relationship with agriculture.

The social discourse, aims to alter and improve the relationship people have with agriculture. The project looked to understand how food brought people together, and attempted to expand this beyond consumption to include agricultural production and preparation processes. Architectural strategies were employed to unite people within formal and informal growing spaces, so people could strengthen relationships among community members, while becoming informed about agriculture. The project addressed this by providing an extension of the public realm into the centre of the site and immersing people within public growing spaces. As well, various programs within the building aimed to achieve engagement, exposure and access for the public to agricultural production.

The economic discourse, with the objective to alter the perceived value associated with urban agriculture, the intent was to site the project in an unconventional location. Yonge and Eglinton was selected because of the high surrounding land values, and proximity to transit. The intent was to explore the possibility of placing this type of function at a prominent location within the city; an alternative approach to leftover, oddly shaped parcels of land which are currently dedicated to agricultural production. When reflecting on the architecture, and considering the feasibility of creating a tower for growing food within the city, the challenges and concerns seam to outweigh the benefits. Given the site selection of Yonge and Eglinton, it was often questioned whether this facility would be feasibly, considering the high land values of the surrounding community. The site satisfied the objective of placing an agricultural production facility within a dense area of the city, and the proposal took advantage of the high volumes of traffic which would pass by and through the site daily.

The environmental discourse, the focus at the beginning of the project was to introduce food production to places of high consumption,

within a dense, urban landscape. The materials and energy required to build and operate a brand new, large scale tower for growing is significant and the objective to reduce energy and emissions associated with agricultural production and distribution became far more complex. As well, introducing agricultural functions, which have significant ramifications on the city's services, water, waste, energy and so forth; therefore, requiring a large amount of modification to the existing urban environment. By trying to address the environmental impact of the current food system, this thesis has inadvertently created a proposal for a development which will have strong repercussions on the environment. The environmental impact of the project was questioned, as hydroponic growing techniques would demand large quantities of energy to operate. Although food was being grown closer to consumers and less processing and transportation would be required for distribution, the full environmental impact of this facility has not been assessed and further investigation is recommended. Further exploration is encouraged for developing synergies between an agricultural facility with surrounding development and environment.

The need to produce and eat local food must be reinforced, as "food production, processing and consumption together constitute perhaps the most basic aspect of resilience for human communities" (Veenhuizen, 2007). Using architecture to alter urban inhabitant's current relationship with agriculture can be approached in a variety of ways. Pairing the two will produce an ideal atmosphere for growing food, and will open up the possibility of growing in the city to all available land regardless of the amount of soil, space or light available.

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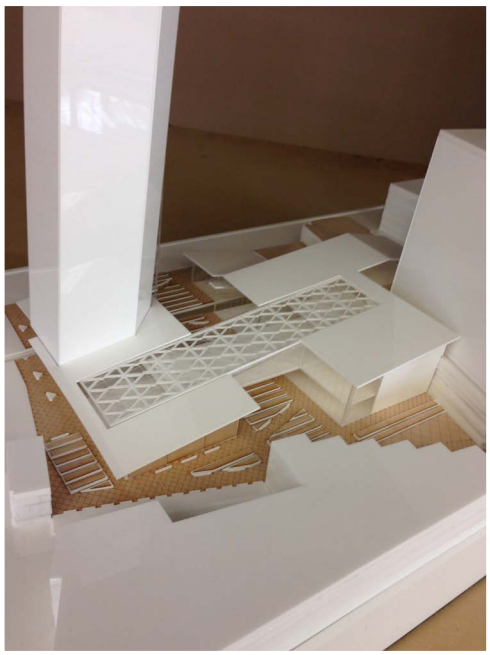
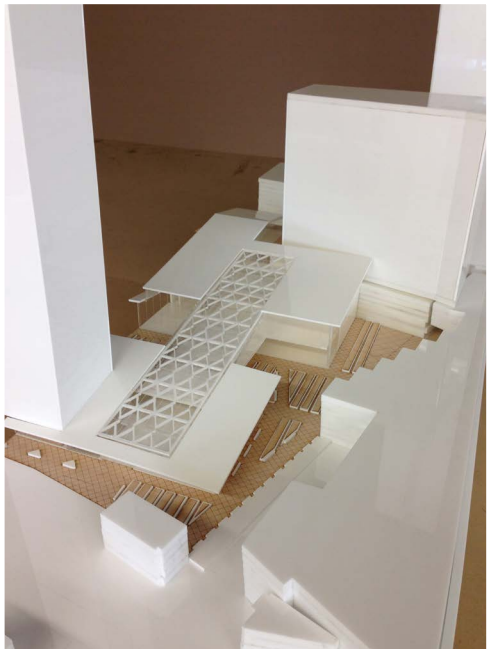
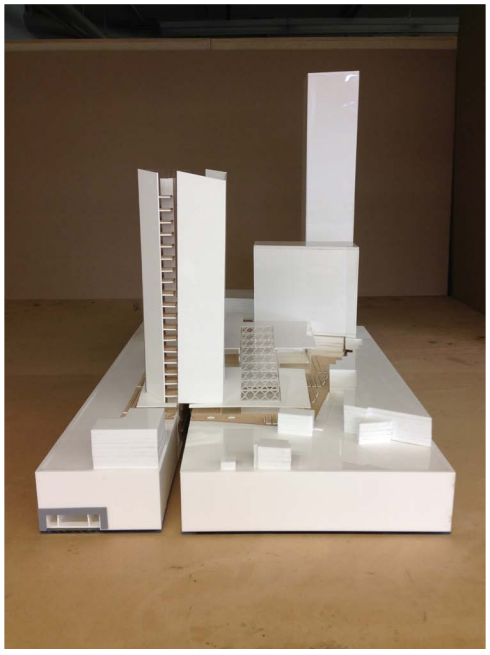
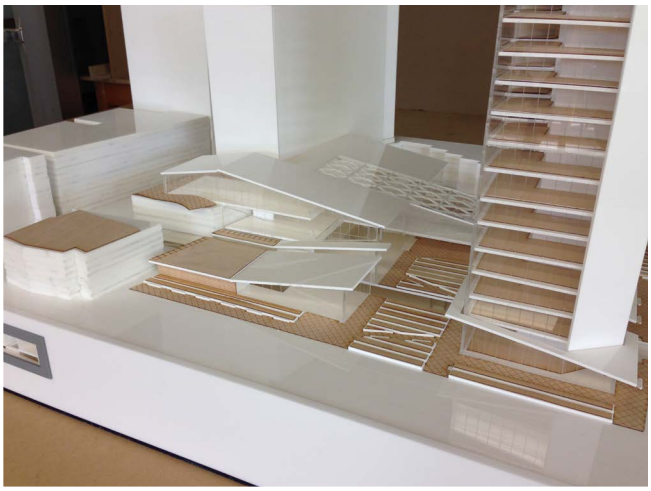
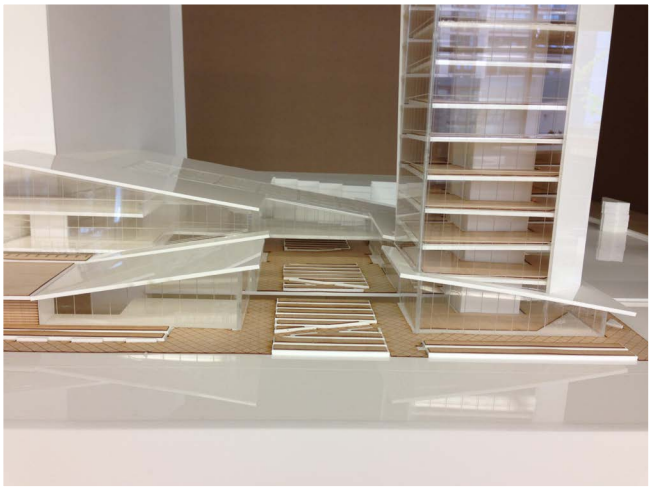
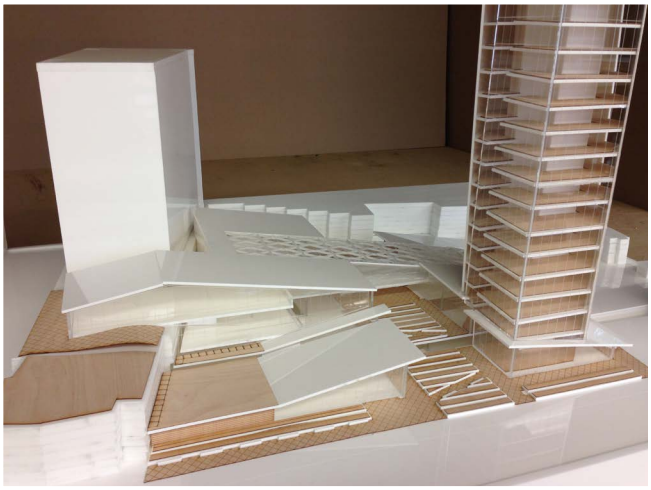
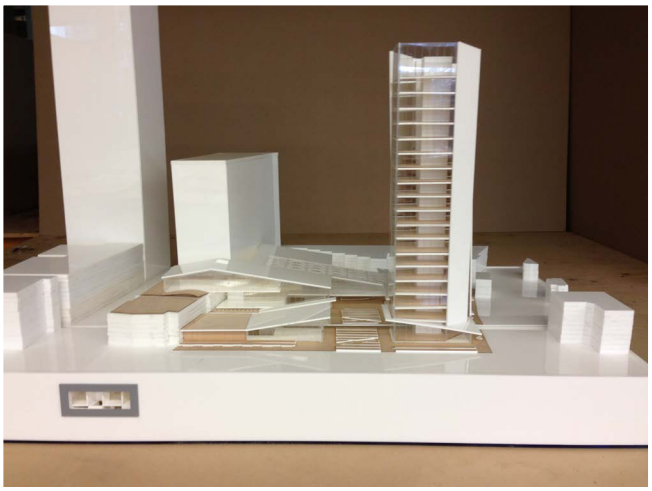
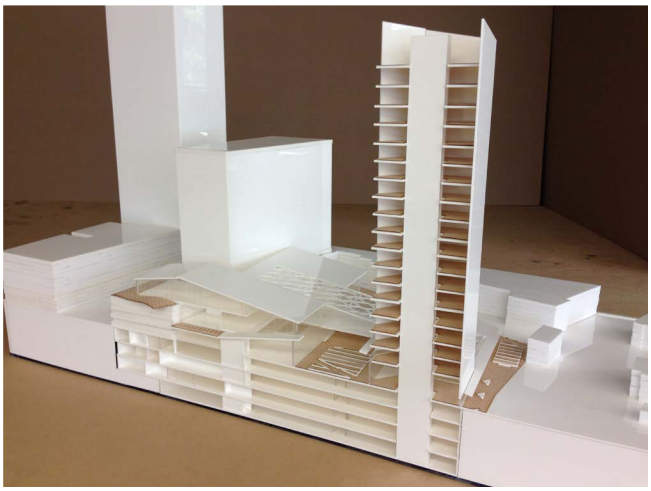
APPENDIX

MODEL PHOTOGRAPHS

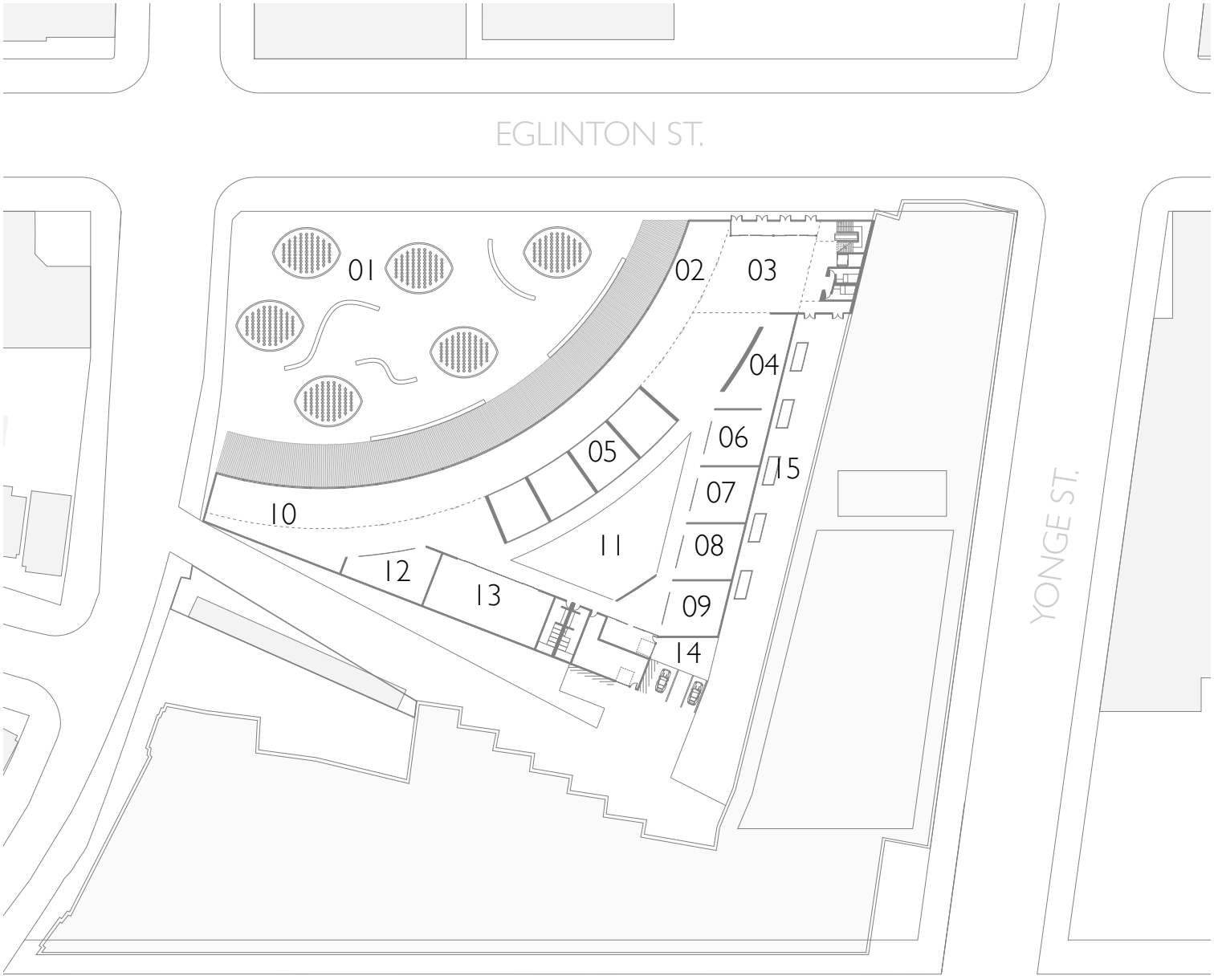
Final Presentation

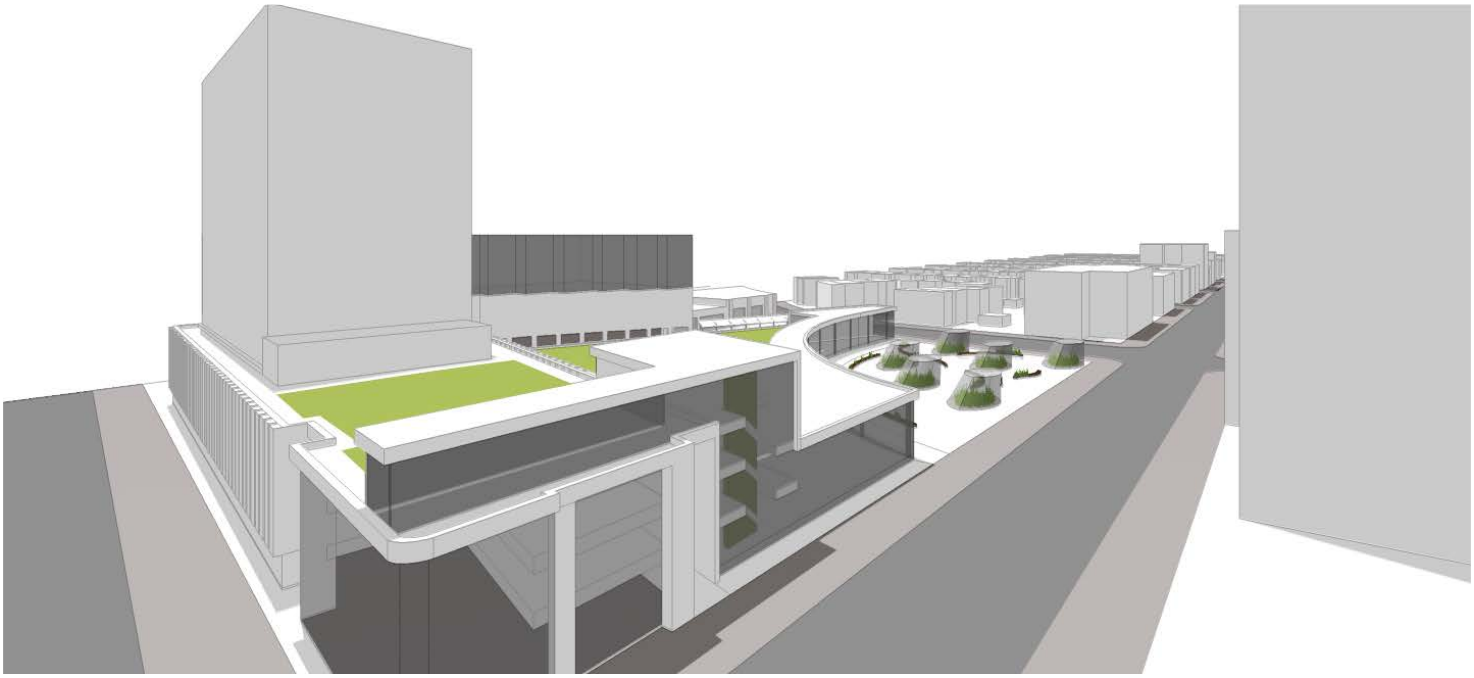


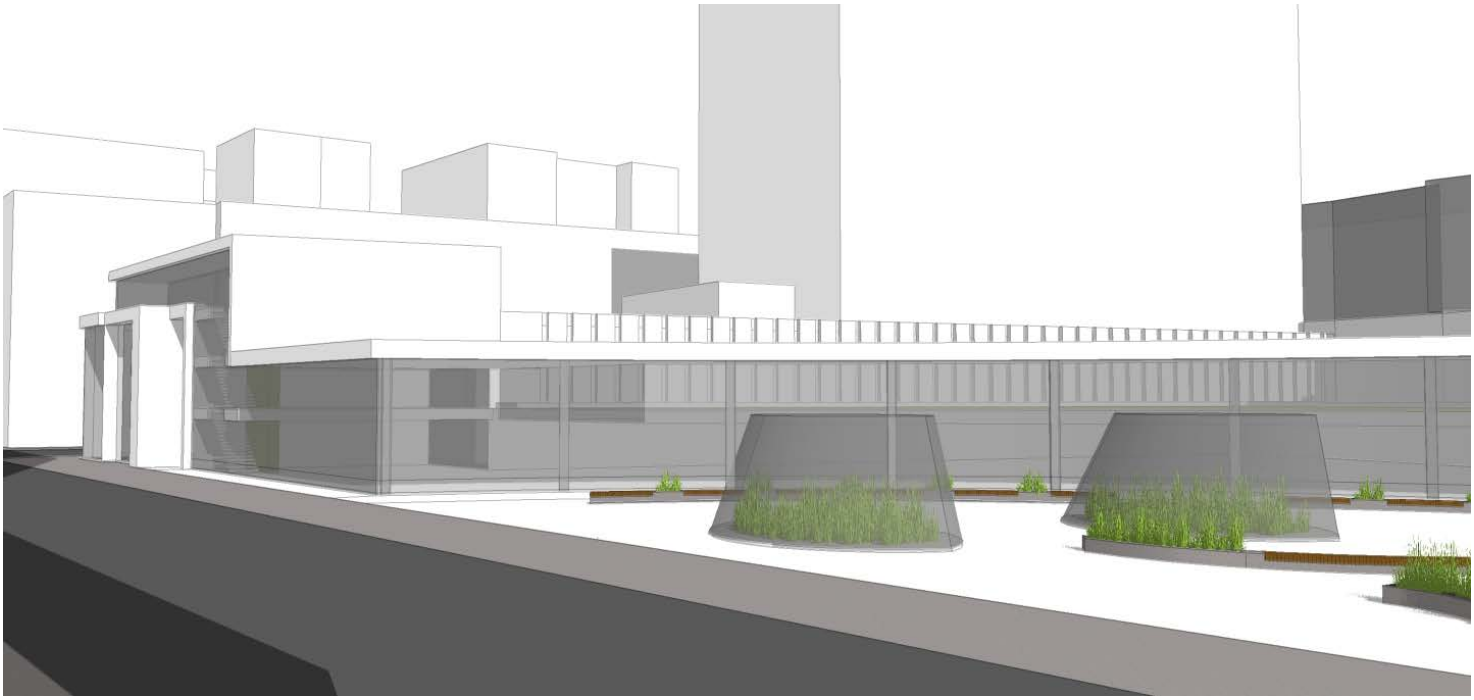



GROWING HUBS 01
FARMERS MARKET 02
MEETING AREA 03
COMMUNITY KITCHEN 04
DEMONSTRATION HUBS 05
POST HARVEST
HANDLING FACILITIES
WASHING STATION 06
CANNING FACILITY 07
DEHYDRATION FACILITY 08
PACKAGING FACILITY 09
RESOURCE CENTRE 10
BUSINESS INCUBATOR 11
OFFICE VISITING EDUCATORS 12
CLASSROOM 13
RESOURCE / TOOL SHARING 14
COMPOSTING DEMONSTRATION 15







THESIS PROJECT

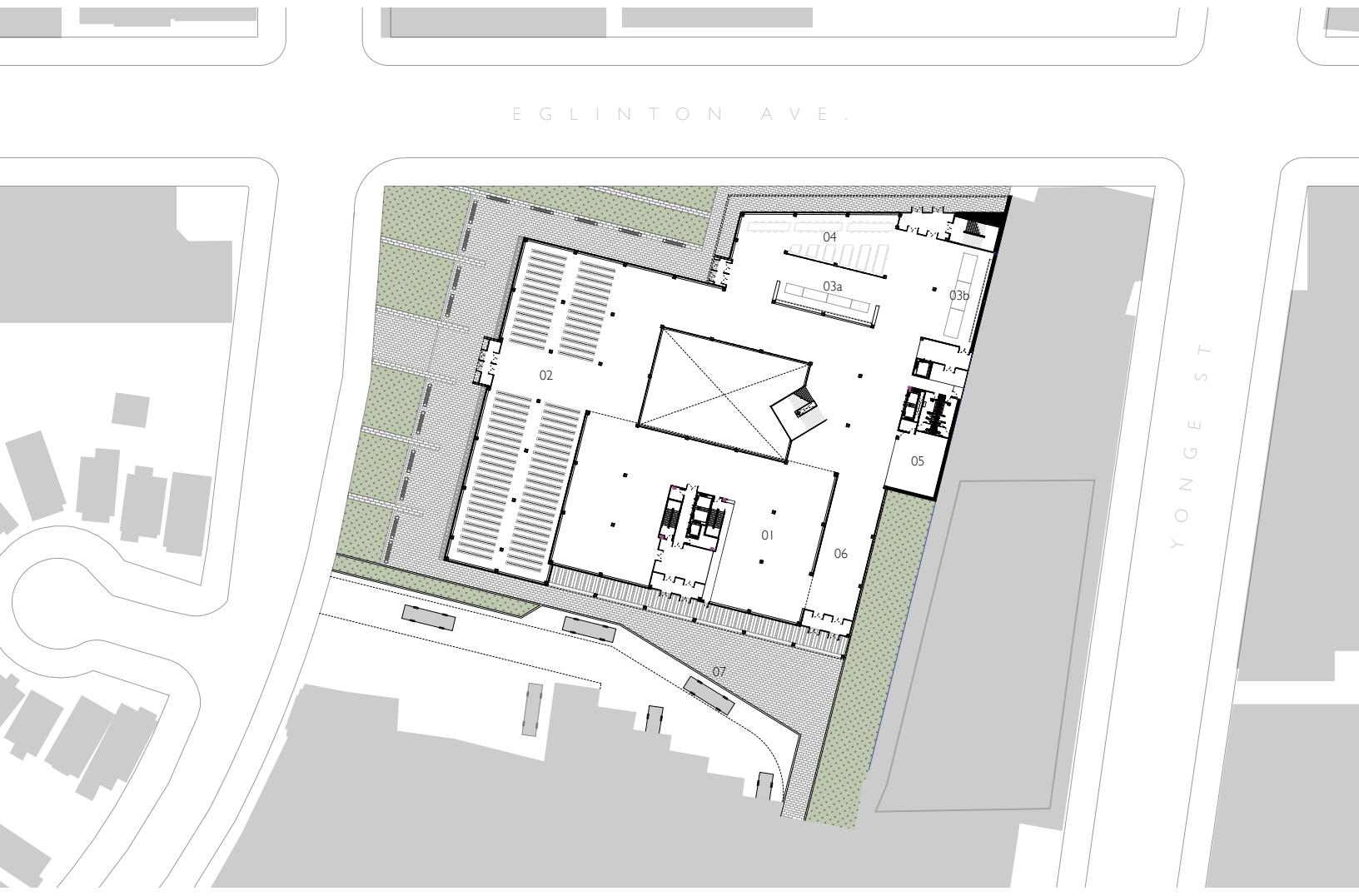
Information Panel 01

Information Panel 01
Information about different
types of growing methods
for urban agricultural practices
Information about different
types of growing methods
for urban agricultural practices

Information Panel 01

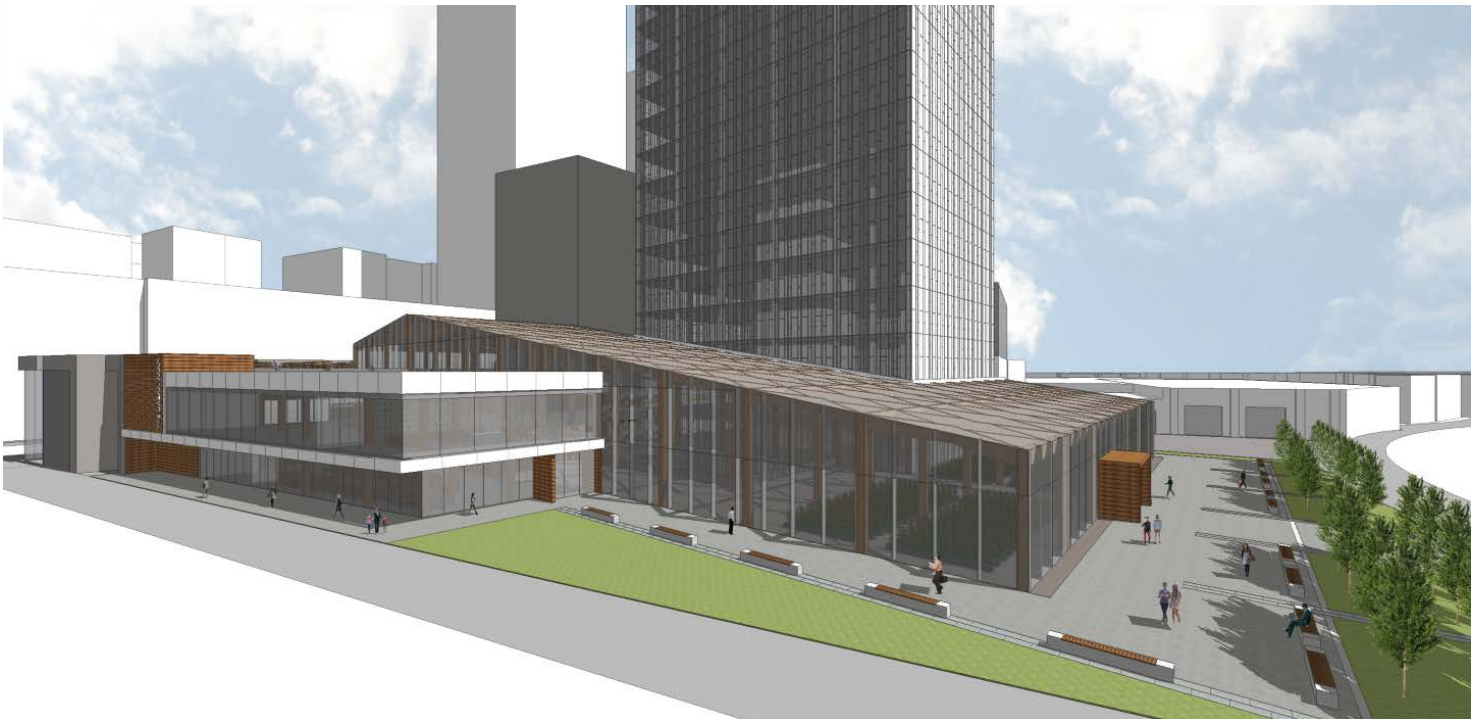
SUBSTANTIAL COMPLETION

Hydroponic Demonstration 01
Community Growing Beds 02
Fresh Food Cafe 03
Cafe Seating 04
Mechanical Room 05
Exit to Eglinton Bus Station 06
Bus Station Pick Up Area 07



Ground Floor

THE URBAN FARM



Y+E URBAN FARM FOOD CAFE

Y+E URBAN FARM