

# ORCHARD TO RETAIL

URBAN FARMING &  
COMMERCIALIZATION  
THE MIX-USE FUNCTIONS

DOWN TOWN DETROIT  
MICHIGAN USA

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**POLITECNICO  
DI TORINO**



**L A E R E N C E  
T E C H N O L O G I C A L  
U N I V E R S I T Y**

## **POLITECNICO DI TORINO**

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### **GREEN DEAL: URBAN AGRICULTURE (DOWN TOWN DETRIOT MICHIGAN)**

Mix use function for retail and commercial functions  
With the use of greenhouse on rooftops and vertical farming.

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# ABSTRACT

## ORCHARD TO RETAIL

urban farming and  
commercialization

Cities all over the globe consume 75% of the Earth's energy. At the current pace, the urban population is expected to double by 2050, reaching 70% of the world's overall population, posing fundamental concerns about how to feed cities in the future.<sup>1</sup>

In developing cities, agriculture is one of the major factors of work opportunities in the food supply chain (e.g. In Hanoi, Vietnam, 80 percent of fresh vegetables and 40 percent of eggs produced by urban and Peri-urban agriculture<sup>2</sup>). Nevertheless, land prices are growing and cultivation is declining due to the rise in urbanization. The consequence is a rise in global warming and pollution of the earth. To cope with all this, urban areas with indoor or vertical farming need to be built (mix use functions, agriculture, commercial & education). Which will encourage social gathering (retail shops, restaurants, Green Square), job opportunities, and on the other hand, it will follow the sustainable goals for retail green architecture by mean of 20-minute walkability, fresh food, and recreational activities.

Food is a topic that is multi-layered. This includes many facets of the social and family lives of individuals, including leisure, personal well-being and wellbeing, and

household economics. In the supply chain that brings food from manufacturing to end-users, the entities, actors, and organizations involved have great impacts on ordinary citizens. Vertical farming and aquaponics, with the integration of architectural spaces, would change the understanding of building architecture. The need for urban farming development, especially in Detroit, where the soil is polluted and brownfields with harsh cold weather, is to turn the urban green architecture from horizontal spread to vertical integration.

Detroit is a city renowned for many aspects, including automobile technologies, music, and a diverse community of food. It is also the first city in the United States to provide urban agricultural projects to support the homeless and help residents of the city who experience economic hardship. In the 1890s, Mayor Hazen Pingree spent \$3,000 in an urban planting scheme that targeted vacant lots during an economic crisis to feed people and improve the food supply. Mayor Coleman Young initiated the Farm-A-Lot initiative in 1970 and approved the planting of gardens on vacant lots purchased by the city.

Detroit has an active yet disparate food system that prevents many inhabitants of the city access to safe, fresh, and sustainably grown food. This is increasingly apparent in the prevalence of diet-related diseases such as diabetes and hypertension, and in a steadily rising epidemic of obesity that impacts people of color and young people overwhelmingly. There is an overabundance of marginal grocery stores charging high prices for low-quality food, and many people rely on government food subsidies such as SNAP and WIC.<sup>3</sup>

Food processes, though, require more than economic players and procedures. Thus, to recognize the different components of a food system, a more inclusive concept is required. In reality, food systems consist of four primary elements: people, procedures, goods, and locations. It is estimated that the Detroit food sector is responsible for an annual economic effect of about \$5.8 billion, promoting about 59,000 jobs and about \$1.9 billion in employment and earnings each year throughout the three-county area. Manufacturing has the greatest effect on spending, as it is responsible, directly and indirectly, for an annual economic impact of about \$2.3 billion, about 40 percent of the overall food system and the restaurant category has the greatest impact on wages, as it is responsible, directly and indirectly, for supporting about 24,500 workers.<sup>4</sup>

Several buildings in Detroit are expected to

be finished in 2020 or beyond, several major developments will open in the coming year (One 11 West building near Little Caesars Arena, expansion of Hotel Fort Wayne and Cambria Hotel). For the last five years, much of the growth in the area has been in downtown and Midtown. Many major projects, such as The Boulevard, The Corner, and the Piston's Training Center, are all completed in 2019, an in-between year for construction in Detroit.

This is high time for industrial and ecological intermixing, which would offset the environmental effects of building and turn the concrete jungle into a green natural setting. Stimulating livestock development would ensure production and the need for food of high quality. In this metropolitan region, providing vertical farms and aquaponics with retail stores would have fresh green vegetables to ensure nutritious food and use valuable energy resources with scarce resources at the same time.

This project initiative aims to establish opportunities for the development and flourishing of young talent. Didactic methods of cultivation found their origins in the medieval model; by giving substantial assistance, the master craftsman took care of a few novices. The project will serve as an institution of education; it is the educational equivalent of the greenhouse that protects the fragile seedlings against hail, wind, cold, and other factors. There are cold winters, as in Detroit, that are not ideal for agriculture.

For unemployed Detroiters, skills preparation and work preparation are crucial to obtaining access to employment in the different sectors of the food system. Any positions in the food industry are lowly trained, but many need preparation and/or qualifications such as ServSafe Food Handler or ServSafe Manager Qualification with any degree of expertise. The good news is that it is possible to teach certain skills needed in the food industry relatively quickly and effectively, making it a sector with substantial but surmountable barriers to entry with the right kinds of programs and interventions in place. In addition to training itself, these guidelines concentrate on teaching educators, targeting funding, focusing on children, and developing an awareness network. The creation of the workforce is not as easy as providing a single curriculum; rather, it

requires a series of integrated interventions to ensure program approach maturity, a selection of options, effective recruitment and registration, and comprehensive and reliable networks of placement and help. Workforce expansion should also preferably aim and tap into federal, state, and local funds associated with credential-based training programs.

Education today is, in days gone by, a little like agriculture. To remain fit and up-to-date, it is important to hold the latest stock of food for thinking. Nevertheless, distribution does not fulfill the desire. The latter is becoming more and more polished and more informative. There is a strong demand for expertise, but education is unable to keep up with the high rate of developments in the knowledge economy.

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<sup>1</sup> Environment, UN. "Resource Efficiency & Green Economy." UNEP - UN Environment Programme. Accessed September 30, 2020. <https://www.unenvironment.org/explore-topics/resource-efficiency/what-we-do/cities/resource-efficiency-green-economy>.

"Environmental Development." Elsevier. May 23, 2013. Accessed September 30, 2020. <https://www.journals.elsevier.com/environmental-development/news/urban-resource-flows-and-the-governance>.

<sup>2</sup> Lee, Brody, Tony Binns, and Alan B. Dixon. "The Dynamics of Urban Agriculture in Hanoi, Vietnam." Field Actions Science Reports. The Journal of Field Actions. February 15, 2010. Accessed September 30, 2020. <https://journals.openedition.org/factsreports/464>.

<sup>3</sup> Economic analysis of Detroit's food system, A report commissioned by the Detroit Food & Fitness Collaborative, and produced by Econsult Solutions, Inc. and Urbane Development, LLC. [http://d3n8a8pro7v7hmx.cloudfront.net/gleaners/legacy\\_url/226/DETROIT\\_book\\_r6\\_8\\_29\\_14\\_lowres.pdf\\_docID\\_9962?1443223248](http://d3n8a8pro7v7hmx.cloudfront.net/gleaners/legacy_url/226/DETROIT_book_r6_8_29_14_lowres.pdf_docID_9962?1443223248)

<sup>4</sup> "Detroit Food System Study." Urbane Development. May 14, 2019. Accessed September 30, 2020. <http://urbane-dev.com/projects/detroit-food-system/>.

## **THESIS QUESTION**

How contaminated land and brown fields can use for Farming? How can the spaces be intermixed with the commercial activities, vertical Farming and aquaponics? Will it also result in job opportunities and fresh food, being of harsh weather in Detroit?

## **AIMS**

The main aim of the thesis is to proposed vertical farming and commercial greenhouse as the solution of the above mentioned reasoning's and intermix with commercial spaces.

## **HYPOTHESIS**

Proposed the commercial design, which will intermix with retail shops on the ground, indoor aquaponics and vertical Farming on the other floors with the public axes on some parts to educate them about the farming and research. For adaptive reuse of the buildings, restaurants and offices will proposed in existing building, and roofs of it will use as commercial greenhouse.

## **KEYWORDS**

Food Hub, Retail shops, Urban Farming, vertical farming, Green Deal, adaptive-reuse.

## **RESEARCH METHODOLOGY:**

The thesis is composed of three parts. It begins with a brief overview and intermixing of green & commercial theory, which will consider as a tool and method to insert urban farming in the project with different layers. The second part analyzes three case studies at different scales, with physical, social, economic and environmental perspectives in order to obtain a catalogue of strategies. Finally, the third part is the application of the previous research, analysis and learnings into a new project on the proposed site of downtown Detroit.

## **SCALE**

### **2. RETAIL + FARMING**

- Commercial rooftop greenhouse + commercial part - Outdoor
- Hydroponic production - hydroponic / traditional production for rent
- Indoor vertical production in shopping centers (demalling reconversion) + sales

THEORAYTICAL  
APPROCH AND  
METHODOLOGY

REASONING  
AND  
FEASIBILITY OF THE PROJECT

## FARMING, FOOD AND DETROIT

Detroit has an active yet disparate food system that prevents many inhabitants of the city access to safe, fresh, and sustainably grown food. This is increasingly apparent in the prevalence of diet-related diseases such as diabetes and hypertension, and in a steadily rising epidemic of obesity that impacts people of color and young people overwhelmingly. There is an overabundance of marginal grocery stores charging high prices for low-quality food, and many people rely on government food subsidies such as SNAP and WIC.

With the introduction of vertical farming and green houses on rooftop, the above situation can be handled with the production of fresh food and fulfil the requirement of food in the area. if it repeated in different areas with vertical farming the critical situation of food can be resolved.

The growing number of urban farms gardens and mom-and-pop farms sprouting up in Detroit. Urban farming is inspiring city-grown fresh food, supporting

environmental stewardship and bringing together community members.



Source: AP photos

Down Town Detroit Farm was the initiative to way forward in increase inner-city residents' access to quality fresh, produce." We need all kinds of development. Detroit may be a leader in urban agriculture, but it and other greening initiatives are one piece of a larger puzzle. There are all kinds of studies that show working, walking and playing in **green spaces** can have a positive impact on the health of children and adults."<sup>5</sup> \_\_\_\_\_ Malik Yakini, Detroit farmer.

<sup>5</sup> Detroit's Urban Farming and Urban Gardens." VisitDetroit.com. September 23, 2019. Accessed September 26, 2020. <https://visitdetroit.com/urban-farming-detroit/>.

## INDUSTRIALIZATION AND SOIL CONTAMINATION



Source: Encyclopedia Britannica

Detroit's industrial development accelerated and majority of the area was industrialized in 1865.<sup>6</sup> Wayne State University urban geology Professor Jeffrey Howard; digging into Detroit's vacant land and industrial sites and classify the city's soils. Many of which are disturbed and contaminated because of the city's industrial legacy. He mentioned that all this toxicity in the soil could make its way into the food we eat and water we drink,

causing serious health and developmental problems, especially for children.<sup>7</sup>

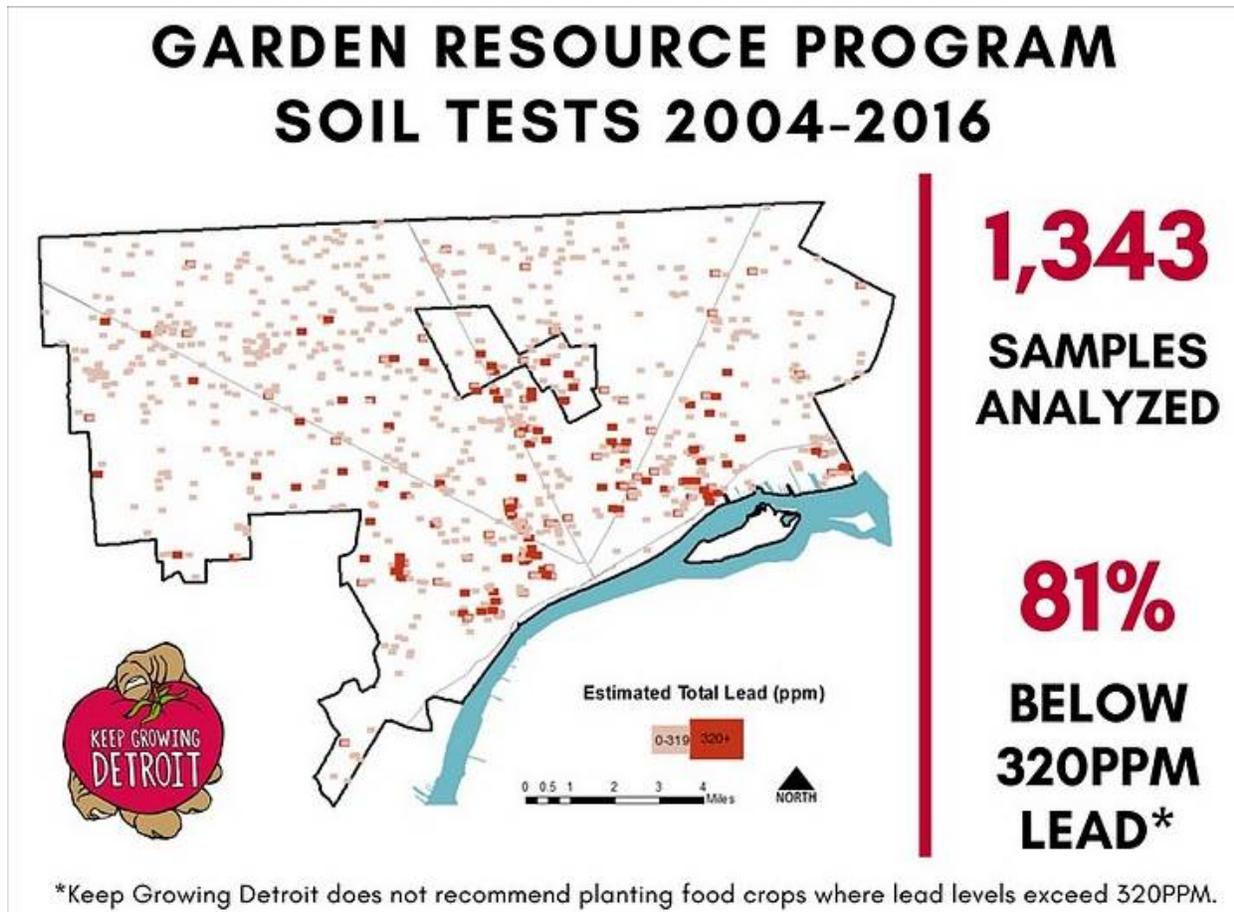
To resolve the land problem and food production vertical farming and green houses on rooftop will help to produce fresh food and meet the requirement of food in the city as the land has most of the impurities which can induct into the food to avoid this unhealthy way we have to do vertical farming and green house which can produce fresh & good quality of food.

<sup>6</sup> The Editors of Encyclopedia Britannica. "History." Encyclopedia Britannica. August 05, 2020. Accessed September 26, 2020. <https://www.britannica.com/place/Detroit/History>.

<sup>7</sup> Nina Ignaczak | Monday, December 12, and Sponsored By. "Digging Deep: Detroiters Work to Clean up City's Toxic Soil." Model D. Accessed September 26, 2020.

<https://www.modeldmedia.com/features/digging-deep-soil-121216.aspx>.

## KEEP GROWING DETROIT (KGD)



Source: keep growing Detroit (<http://detroitagriculture.net/>.)

KGD, the non-profit corporation that advocates food autonomy in Detroit, has for the past few years been measuring and managing a database of soil pollution in urban farms and gardens around the region. It indicates that less than 19 percent of the soil collected from urban gardens and farms in Detroit comprises amounts that meet touch requirements.<sup>8</sup>

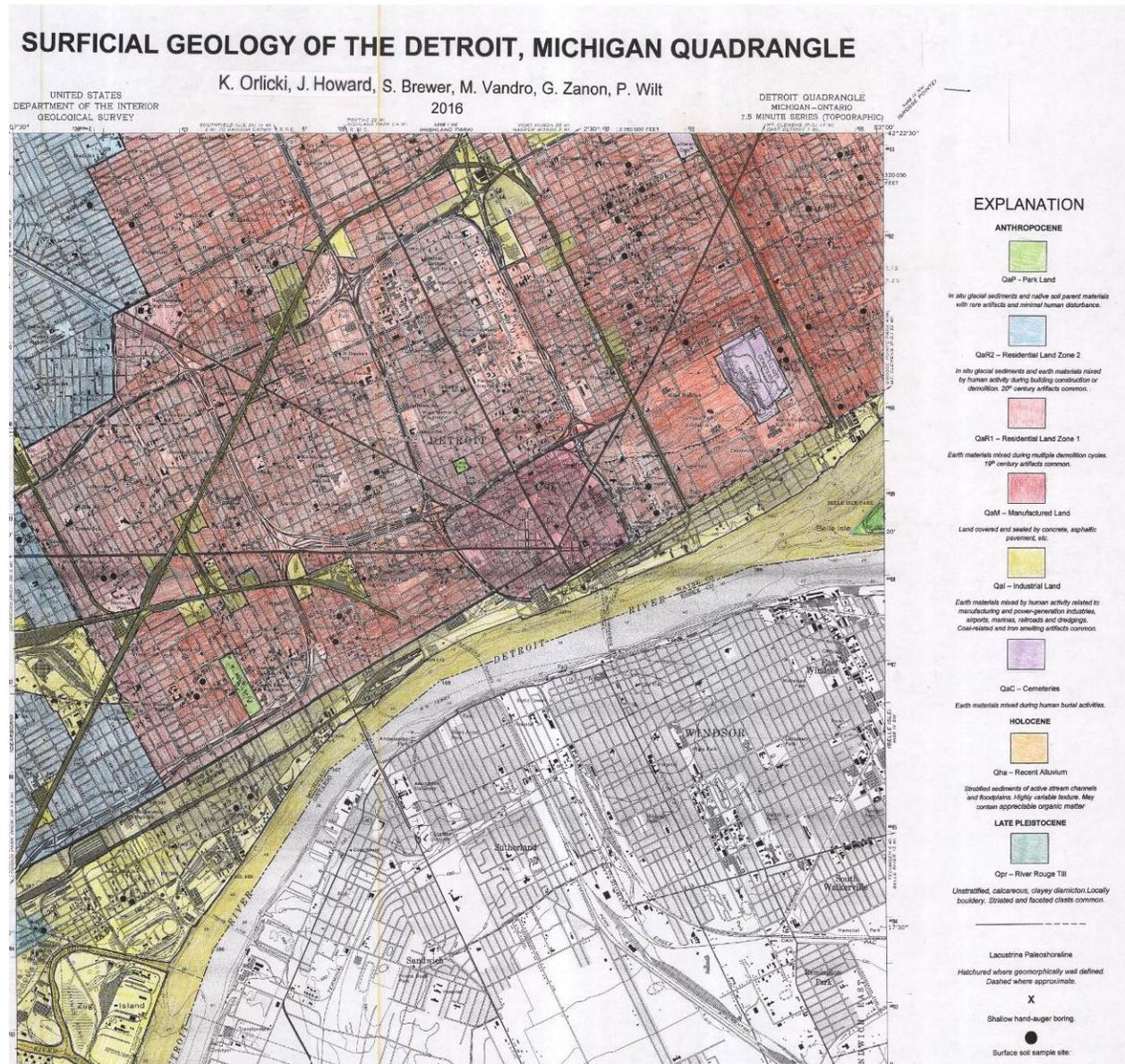
That's the reason that the types of urban farming like aquaponics, hydroponics is suitable to do which do not need soils to that the we can avoid the soil contamination effect on the food and produce good quality of food.

<sup>8</sup> "The Latest News..." Keep Growing Detroit. June 29, 2020. Accessed September 26, 2020. <http://detroitagriculture.net/>.

# SURFACE MAP OF DETRIOT

When mapping advanced, it seemed clear that much of the natural landforms once present had been demolished by grading and drilling, and artificial landforms were eventually built from filling materials. The riverfront of Detroit,

delineated as a region of primarily agricultural development, and the downtown area as an area of predominantly soil polluted manufactured land.<sup>9</sup>



<sup>9</sup> Urban Geology of Detroit. Accessed September 26, 2020. <https://s.wayne.edu/urbangeology/urban-geology/>.

## BROWN FIELDS

As inhabitants migrated into the surrounding countryside, they left behind abandoned deteriorating buildings and contaminated land. Real estate developers and lending institutions often avoided “brownfield” and other urban properties that could have been polluted because they feared they would be held liable for expensive clean up.

My project could become the example to do the vertical farming if they have to repeated on that brown fields pointed on map and the land can utilized in the batter way for the food production and vegetation.

The brownfield map used to develop this dataset from the Michigan Department of Environmental Quality (MDEQ). The Inventory of Facilities includes all locations where there have been a release of hazardous substances as defined under multiple subsets of NREPA. Although this points referred to as Brownfields, it can contain other types of designations



SOURCE:<https://portal.datadrivendetroit.org/datasets/D3::brownfields/data?geometry=-83.115,42.324,-82.984,42.346>.

including but not limited to Leaking Underground Storage Tanks (LUST), Baseline Environmental Site Assessments (BEAs) and Environmental Site Assessments. Each of these designations requires further action, and the sites are pursuing cleanup in conjunction with the DEQ.<sup>11</sup>

<sup>10</sup>Urban Geology of Detroit. Accessed September 26, 2020. <https://s.wayne.edu/urbangeology/urban-geology/>.

<sup>11</sup> "Brownfields." D3's Open Data Portal Data Driven Detroit. Accessed September 27, 2020. <https://portal.datadrivendetroit.org/datasets/D3::brownfields/data?geometry=-83.115,42.324,-82.984,42.346>.

# HARSH WEATHER AND FARMING

During the winters: a snowy November turned into a mild December, which quickly flipped into the Polar Vortex in late January. However, the winter weather lasted well into April, and results flood due to rain and melting of snow.<sup>12</sup>

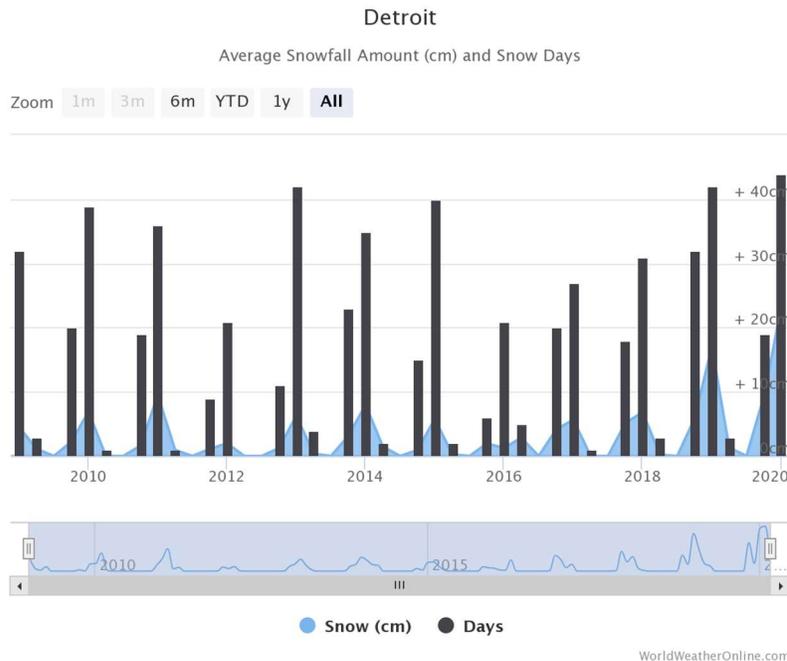
The farming growing season is frustratingly short and with severe cold and snow have had devastating impacts on farming and agricultural communities. Wet conditions are preventing farmers from getting into

the fields and from planting for the growing season. Due to these conditions farmers are many weeks behind schedule that they are nearly out of time and options during the year for cultivation.<sup>13</sup>

The another reason that the vertical farming and greenhouses on the roof top can be the solution for the problem as in it we had to do the indoor farming and the environment can control from inside by using the led techniques and heating control system.



## AVERAGE ANNUAL SNOW



<sup>12</sup> FOX 2 Detroit. November 06, 2019. Accessed September 28, 2020. <https://www.fox2detroit.com/weather/michigan-winter-2019-20-will-be-remembered-for-snow-totals-over-cold-temps>.

<sup>13</sup> "You Are HereMDARD." MDARD - Farmers: Crop Disaster Resources. Accessed September 28, 2020. <https://www.michigan.gov/mdard/0,4610,7-125--500531--00.html>.

<sup>14</sup> US Department of Commerce, NOAA. "Seasonal\_snow." National Weather Service. August 01, 2019. Accessed September 28, 2020. [https://www.weather.gov/dtx/seasonal\\_snow](https://www.weather.gov/dtx/seasonal_snow).

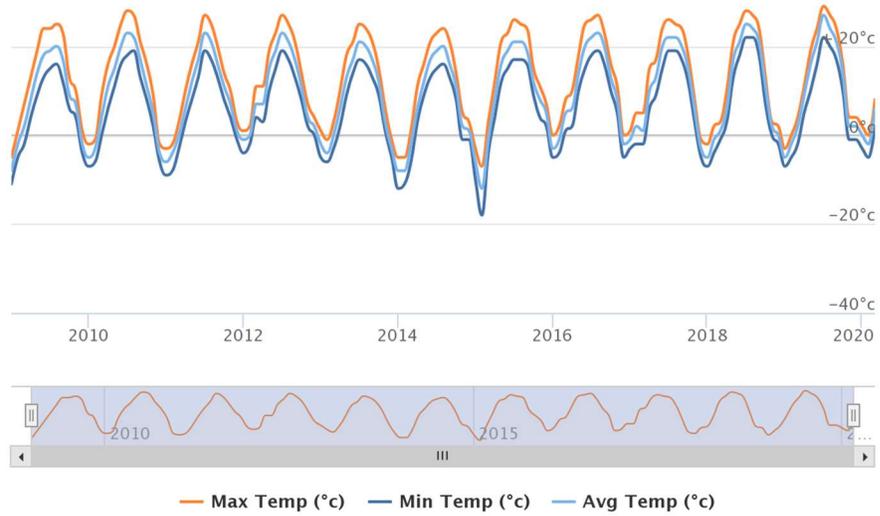


## AVERAGE ANNUAL TEMPERATURE

Detroit

Max, Min and Average Temperature (°C)

Zoom 1m 3m 6m YTD 1y **All**



WorldWeatherOnline.com

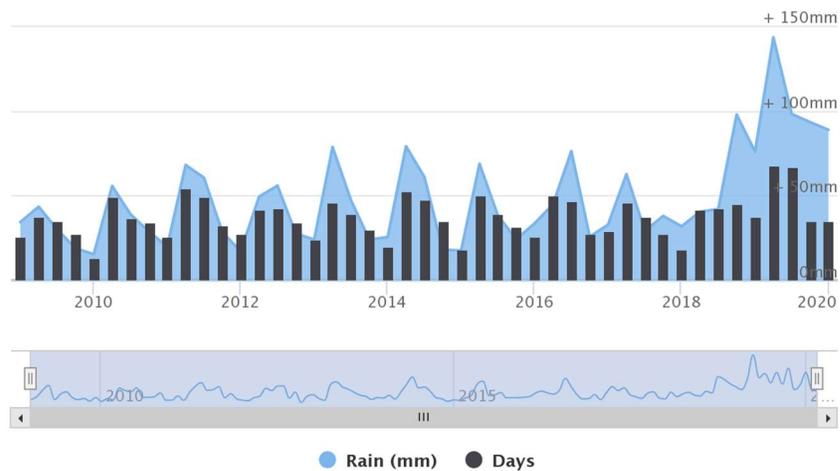


## AVERAGE ANNUAL PRECIPITATIONS

Detroit

Average Rainfall Amount (mm) and Rainy Days

Zoom 1m 3m 6m YTD 1y **All**



WorldWeatherOnline.com

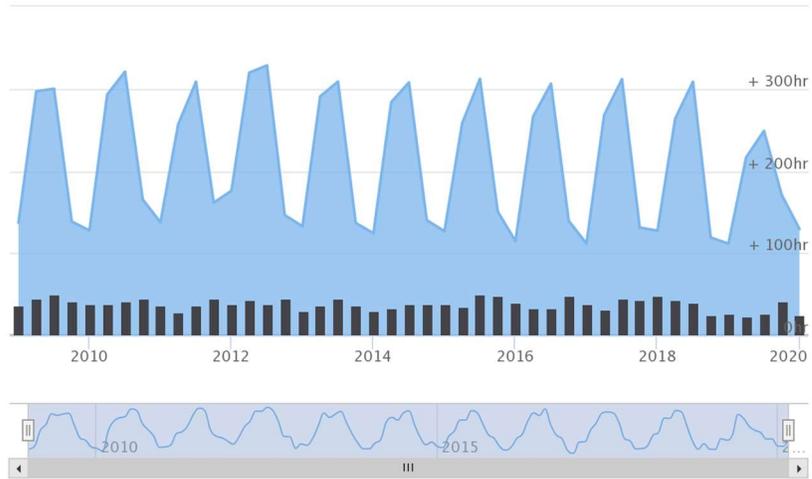


# DAYLIGHT HOURS / SUN HOURS

Detroit

Average Sun Hours and Sun Days

Zoom 1m 3m 6m YTD 1y **All**



● Sun Hour (hr) ● Sun Days

WorldWeatherOnline.com

TOOLS AND  
METHODS

## URBAN AGRICULTURE AS AN INTEGRATED FARMING

Detroit has proven to be especially fertile ground for urban agriculture. While urban agriculture has recently garnered a great deal of attention as the Potential solution to Detroit's current woes.<sup>15</sup>it has a long history in the city as a solution to the problems of population loss, soil contamination, brown fields and harsh winters.<sup>16</sup>

The city's modern urban farming movement has roots dating back to the 1970s when then-Mayor Coleman Young started the Farm-A-Lot program.<sup>17</sup>However, like many city programs, Farm-A-Lot was phased out due to budget constraints.<sup>18</sup>since the end of Farm-A-Lot in the early 2000s, the Garden Resource Program Collaborative (the Collaborative) has largely driven urban agriculture in Detroit.<sup>19</sup>

Two new ventures continue that innovation of urban farming by introducing vertical

farming systems into the city's mix. One, known as Artesian Farms of Detroit in the Bright moor district on the far west side, has begun to grow vegetables in a hydroponic system. The other, known as Green Collar Foods, set up its vertical racks with geponics system in a corner of Eastern Market's newly renovated Shed 5. In the future, adding vertical racks greatly will increase the production capacity of any given project by taking advantage of vertical space.<sup>20</sup>

The insertion of vertical farming and aquaponics in CBD area will be the continuation of innovative type of integrated faming, which will help in the redevelopment of urban agriculture production, with intermix of retail spaces considering the above-discussed issues in the beginning.

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<sup>15</sup> Gallagher, *supra* note 30.

<sup>16</sup> In 1894, then-Mayor o\_ Detroit Hazel Pingree launched his "potato patch plan" as a work-relief measure during the second summer of the depression in 1894. The program enrolled 1,546 families and raised \$30,998 in 1896. MELVIN G. HOLLI, REFORM IN DETROIT: HAZEN S. PINGREE AND URBAN POLITICS 70 (Richard C. Wade ed., 1969).

<sup>17</sup> FOOD SYSTEM REPORT, *supra* note 6, at 16.

<sup>18</sup> *Id.* at 17.

<sup>19</sup> See *id.* at 17–19.

<sup>20</sup> Gallagher, John. "Vertical Farming Sprouts in Detroit's Brightmoor District." Detroit Free Press. May 03, 2015. Accessed September 30, 2020. <https://eu.freep.com/story/money/business/michigan/2015/05/02/detroit-farm-urban-agriculture-brightmoor-vilsack/26300041/>.

# POTENTIAL BENEFITS OF URBAN FARMING

## SOCIAL + CULTURAL

- Community gathering spaces
- Builds social capital
- Express and maintain cultural heritage
- Provides an educational venue
- Opportunities for community activism
- Food justice

## ECONOMIC

- Generate revenue
- Employment opportunities
- Entrepreneurial opportunities
- Reduce municipal maintenance expenses
- Increased affordability of food
- Household savings
- Higher property values

## HEALTH BENEFITS

- Access to fresh, affordable food
- Access to culturally important foods
- Improve community food security
- Greater variety of foods
- Opportunity for physical exercise
- Improved psychological well-being
- Improved knowledge of cooking techniques and food preparation

## ENVIRONMENTAL

- Reconnects community members with natural environment
- Increases urban green spaces
- Mitigates urban heat island
- May improve air quality
- Increased urban biodiversity
- Increases storm water capture and infiltration, and reduces runoff
- Reduces food waste through composting
- Decreases agrochemical use
- Reduces carbon footprint

## URBAN FARMING TYPES AND TECHNIQUES:

In cultivation techniques, the primary objective is to attain high yield and high quality goods at the least possible expense. Morphological and physiological requirements, such as propagation, rooting, transplantation, pruning, water and mineral delivery, pest control, crushing, etc., should be considered for the cultivation of crops.

The conventional use of the actual soil on site, also known as in-ground agriculture, where crops are grown at ground level as well as in mounted beds, is among the many methods of cultivation in greenhouses.

Plants receive water, nutrients and minerals from the soil and can also be enhanced by adding ample amounts of organic matter, such as compost. Soils must therefore be well-drained and have a medium to light texture. A significant part of developing systems is CO<sub>2</sub>, soil pH, nutrients, sun, water.



If plants are supplied with a nutrient-rich solution and satisfy their oxygen requirement, it is likely that plants can also grow without soil. That type of farming includes:

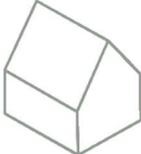
1. Hydroponic
2. Aquaponics
3. Aeroponics

# 1. HYDROPONICS



The production of food through the hydroponic system is divided into water growth and substrate growth. In the first scenario, just water is used as a medium where a solution of nutrients partly or entirely covers the roots of the crops. In the second scenario, in a substratum used as a support medium, the roots expand and develop, inside which the nutrient solution is added by means of water and comes into contact with the roots. Here, they will be analyzed below:

- The NTF (Nutrient Film Technique) system;
- The floating system (Float system);

	Reduced emissions of
	Keep the temp. >15 °C
	Cultivation inside spaces with variable Sizes
	No pesticides or chemical fertilizers are used
	Use of 70% less water than traditional Crops

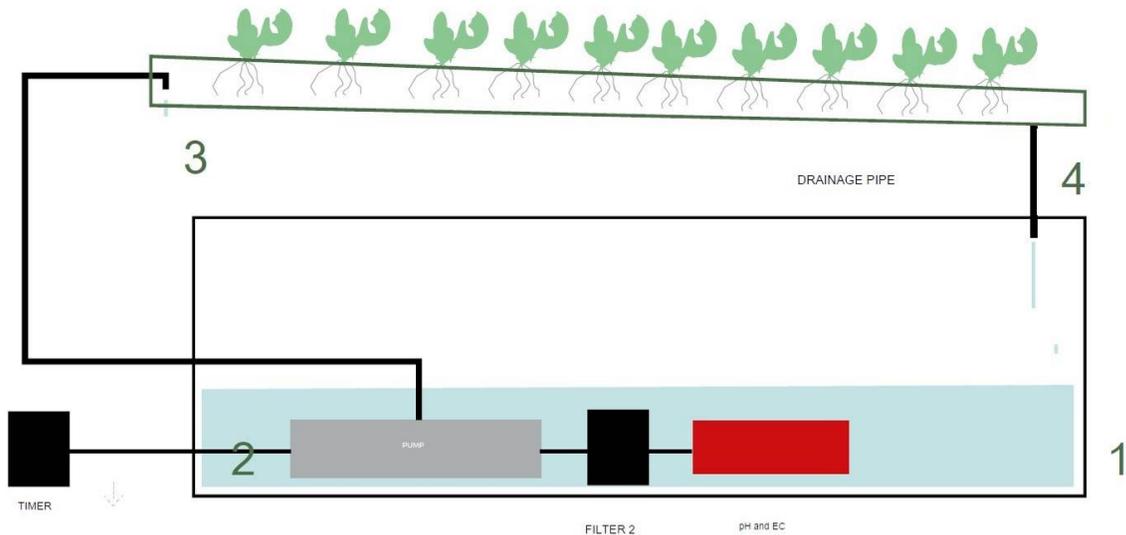
## NUTRIENT FILM TECHNIQUE (NTF)

This process makes it easier for plants to come into close contact with the substances required for growth. The NTF is a device that uses water as a growth medium, constantly bringing the nutrient solution into circulation through a special system of channels and tubes that hold the nutrients required for the roots to evolve.

There are many types of vegetables that can be made with this sort of method, such as: tomatoes, cucumbers, melons, peppers, aborigines, cabbage, and strawberries. Due to its many benefits, such as substantial water savings and

decreased pesticide usage, this form of device is the most regularly utilized, ensuring the development of good-quality food with high levels of hygiene.

Introducing modern technology able of lowering labor costs inside these systems, but at the same time automating the automation of staff. The production method, in terms of cost, is considered a risk. While a loss of up to 75 percent is spoken about from the point of view of energy prices. Up to 25 lettuce plants per square meter per month can be generated by these systems <sup>21</sup>.



NTF system function diagram

<sup>21</sup> F. Orsini, M. Dubbeling, Rooftop Urban Agriculture, cit., P. 67 18 F. Orsini, M.

Dubbeling, Rooftop Urban Agriculture, cit., P. 67

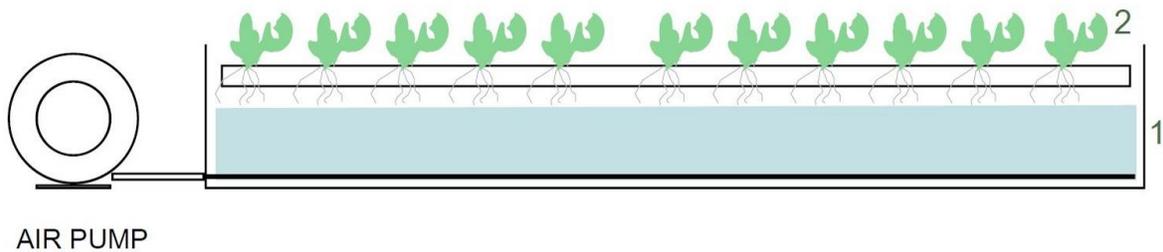
1 BASIC TANK SYSTEM	Inside which the aqueous solution in which the nutrients are dissolved are Contained. In the case of small modules, the sizing of the tanks is around 70-100 L, for larger modules from 500 l onwards <sup>22</sup> .
2 PUMPS ELECTRICAL	Necessary to carry the nutrient-rich solution into the tanks through PVC distribution pipes. With a minimum power of 0.5 W, it is able to bring the nutrients into each growth channel, about 2-3 l per minute <sup>23</sup> .
3 GROWTH TANKS	Allow the growth and development of plant roots. The length of the channels must not exceed 12 m to avoid the problem of decreasing the level of oxygen in the nutrient solution. The diameter must be suitable for the type of crop, in order to ensure better circulation of nutrients. Generally, the cultivation channels are PVC pipes with a concave section <sup>24</sup> .
4 TUBES OF DRAINAGE	They collect nutrients from the cultivation channels and bring them back to the tanks. These are connected in the final part of the concave system, placed in special wooden or iron supports designed and built for this purpose.

<sup>22</sup> F. Orsini, M. Dubbeling, Rooftop Urban Agriculture, cit., P. <sup>23</sup> <sup>24</sup> ibid 20 ibid

## FLOAT SYSTEM

The roots of the plants grow on polyester for this method of production, floating in the tanks in which the nutrients are added. The roots are partly or fully submerged and the containers serve as plant growth support. In specific, it is possible to develop lettuce, basil, celery, rockets, etc. through this method.

It depends on the type of plant picked, but it is possible to grow between 25 and 230 plants per square meter per month<sup>25</sup>. Ventilating the solution via an air pump located near the device is critical. In the production of small and low-weight plants, this sort of device is used.



### 1 GROWTH TANKS

Containers for growing plants generally consist of an Impermeable material coated with plastic material. The water level that must be reached within these is around 10-30 cm. Within these are the nutrients necessary for growth.

### 2 FLOATING PANELS

"Floating" panels in Styrofoam. In this case we are talking about two different sowing methods; in the first case sowing is carried out directly in the holes of the containers inside which there is a granular layer of substrate; the second involves the Transplanting of plants already sprouted into the foam rubber after a careful cleaning of the support <sup>26</sup>.

<sup>25</sup> F. Orsini, M. Dubbeling, Rooftop Urban Agriculture, cit., P. 68

<http://www.fritegotto.it/FERTIRRIGO-FACILE-Coltivazioni-in-Floating-System-su-supporti-galleggianti-in-vasche/>

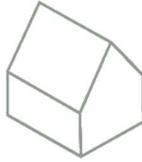
<sup>26</sup> F. Orsini, M. Dubbeling, Rooftop Urban Agriculture, cit., P. 68

## 2. AQUAPONICS



The mixture of hydroponic agriculture and aquaculture is aquaponics cultivation. It also comes under the soilless crop types, combining the Bean cultivation with the breeding of fish. It is acquiring this typology higher exposure, so much, so that a real solution can be considered both in agriculture and in breeding for production.

The movement towards sustainable aquaponics production, i.e. 'organic' breeding of fish and vegetable goods for marketing purposes, has recently started to expand following the latest European and national regulations.

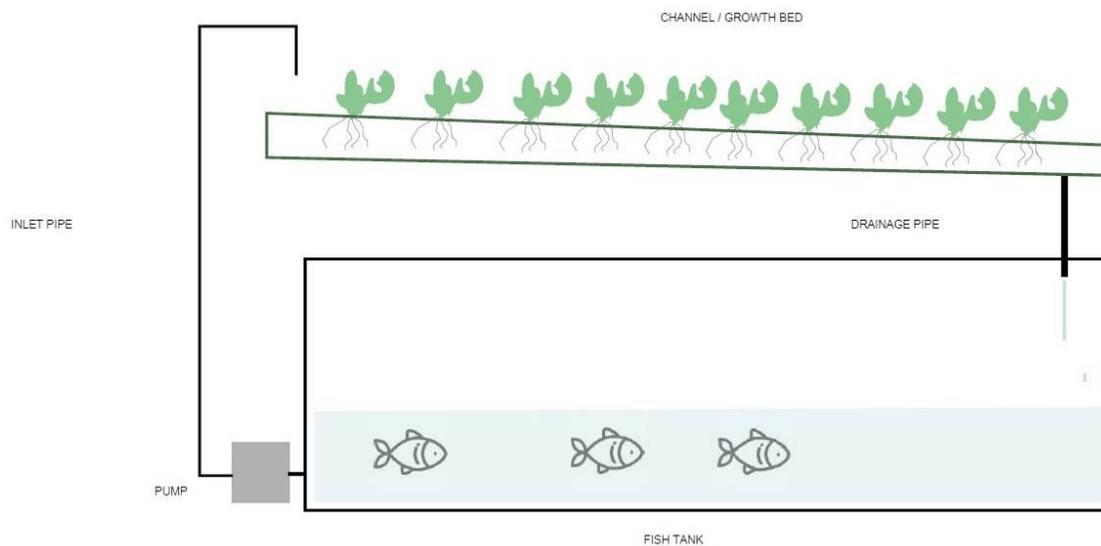
	Reduced emissions of
	Keep the temp. >15 ° C
	Cultivation inside spaces with variable Sizes
	No pesticides or chemical fertilizers are used
	Use of 70% less water than traditional Crops

## AQUAPONICS SYSTEM

Into the plant growth tanks, the water contained in the fish tanks is pumped. The water hitting the plants is rich in nutrients purified by the seed roots. In the tanks used for aquaculture, the water filtered by the plants should be reinserted such that the cycle continues.

We are talking about "flood and drain" that is, the pump is triggered for 15 to 30 minutes every hour, which transfers the water from the fish tank to the plant growth beds. The plants' roots come into contact with the water at this period and the bed is flooded.

<sup>27</sup>



The residual nitrates are removed by the roots in the growth bed, thus purifying the water that is reintroduced into the breeding tank. In particular, the water flows uniformly in the growth bed and transports the nutrients for the proper production of the plants in the "flood" phase, rather than in the "drain" phase.

Reasonable aeration of the roots is permitted and the requisite oxygen for the conversion and assimilation of the compounds (nitrification and mineralization) is supplied at the same time. Lastly, the role of a siphon is to maintain the water level in the growth bed, drain the excess and restore it to the fish tank.

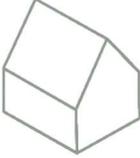
<sup>27</sup> <http://homeaquaponicssystem.com/basics/aquaponics-system-design-flood-and-drain/>

### 3. AEROPONIC



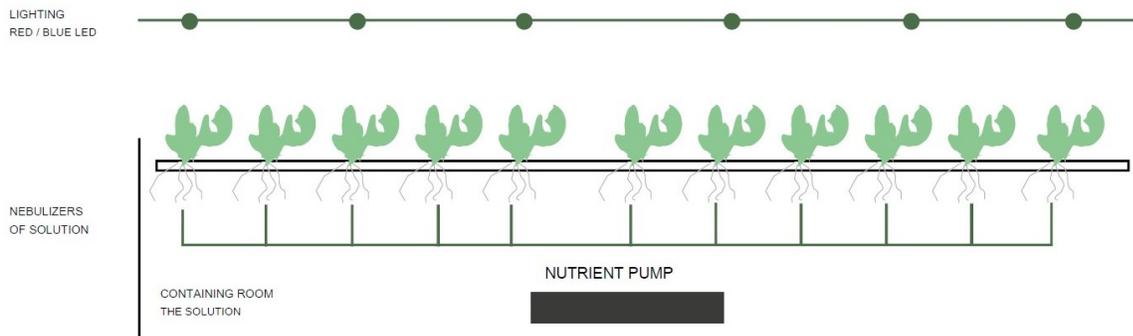
The cultivation of AEROPONICS is a method used for the cultivation of soil-free food items within greenhouses where special artificial supports are put on the plants. In this scenario, a system is used through which water is nebulized, enriched with the required nutrients for plant growth. This is clearly a cultivation that must naturally take place without external risks in a closed environment.

This means that, given the careful monitoring of the atmosphere used for production, the sensitivity of plants to possible harmful agent's decreases and the use of pesticides and herbicides often decreases.

	Reduced emissions of
	Cultivation inside spaces with variable Sizes
	No pesticides or chemical fertilizers are used
	Use of 70% less water than traditional Crops

## TYPES OF AEROPONICS:

LOW PRESSURE	HIGH PRESSURE	ULTRASOUND
<p>Because of the low cost of the structure and in terms of consumption, they are preferred to high-pressure ones, used mainly in domestic manufacturing.</p>	<p>This is because it takes a higher pressure to adequately nebulize (60-90 psi) Until very small drops of water are collected from the aqueous solution. This causes much more oxygen than low pressure structures to be collected from the roots.</p>	<p>However, with unsatisfactory effects, ultrasonic nebulizers were used to produce a mist in aeroponics devices.</p>



The plants are suspended, protected within PCV channels by special perforated panels (generally of expanded polystyrene). The nebulizers that disperse the solution of water and nutrients required for the growth of plants, in the form of small droplets, are placed at the base of them. Misting devices ensure that water is used to a minimum.

Plant roots respond to the form of cultivation method, so they get used to processing predetermined quantities of nutrients and expect an appropriate configuration for the growing setting. The LED lighting device is mounted above the growth lines, simulating the sun's rays by emitting red / blue spectra.

## ADVANTAGES AND DISADVANTAGES OF AQUAPONICS

ADVANTAGES	DISADVANTAGES
Improved growth management by targeted nutrient solution distribution.	Artificial illumination raises the expense of electricity.
Plants are growing faster, so the yield is larger.	Growth in the nutrient solution of undesirable algae and fungus
Decrease in the use of water due to recirculation of water. The water for irrigation is distributed directly to root areas	Investment in an appropriate method of ventilation
Effective use of fertilizers	Technological difficulties within hours can lead to the death of plants
High product consistency	For hydroponic systems, not all plants are available.
Use of less greenhouse space. Due to the reduction of substrates and thus the lightening of crop weight, it achieves up to five times more production in less space, minimizing cultivation loads.	The hydroponic device often needs supervision and maintenance. In addition, experts are required to manage the systems for optimal production.
The ability for a nutrient solution to be reused to optimize energy.	Pollution easily spreads and impacts many plants
Recirculation of water. The water for irrigation is distributed directly to root areas	Device design includes detailed technological expertise
Due to greater control over other parameters of the climate (temperature, relative humidity) and pests.	Development of waste materials and solution for hydroponic waste containing high nutrients
Beginning through the use of substrates other than soil and/or easier management of soil-borne pathogens without pathogens.	Lower initial costs for equipment for set-up and ongoing costs for repairs.
Growth and yield are independent of the type of soil/quality of the field being cultivated. Plants, rooftops and greenhouses can be grown everywhere, underground.	

CASE  
STUDIES

# 1ST CASE STUDY

AN ORCHARD IN THE CITY

**Le Verger, ZAC Vallon Régny, Marseille**

Marciano Architecture & environmental

design office ICHD



## 2.1-AN ORCHARD IN THE CITY



Le Verger, an exciting and creative initiative that puts the city and its residents back into touch with their food.

In June 2019, the group affiliated with the Marseille developer Habside, the real estate firm Immo Mousquetaires, the Marseille agency Marciano Architecture and the environmental design office ICHD, also from Marseille, named Le Verger as the winner of the call for projects initiated by Soleam for the construction of the ZAC Vallon Régny flagship island.<sup>28</sup>

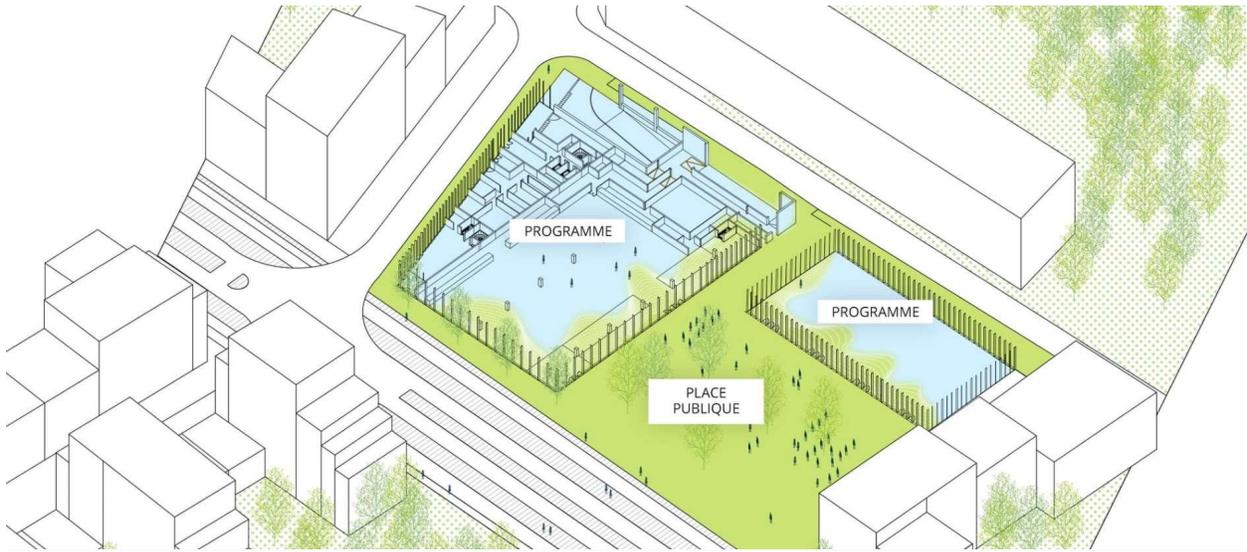
This project has evolved along three axes, all suited to the ZAC's ambitions: to reconcile with the essence of the region, to

deliver a decent and sustainable model of development, to invent and engage in an ecosystem. It had to be sustainable and willing to help the transition of urban lives in the direction of higher development, better consumption and better living.

The idea was to encourage small producers in the local sector and reconnect people with their community. Offering seasonal, new and ultra-new items to eat enables Marseillais to reconnect with their city's market gardening history, which was self-sufficient in the 1950s. To minimize emissions & protect the atmosphere, promote short circuits and economical energy systems.

<sup>28</sup> "Le Verger, Un Projet Ambitieux Et Innovant qui Reconnecte La Ville Et Ses Habitants à Leur Alimentation." Le Verger. Accessed September 24, 2020. <http://www.leverger-marseille.fr/#habitants>.

## A PROGRAM CONNECTED TO THE PUBLIC SPACE



## HABITAT LIVING IN VALLON REGNY

60 spacious, comfortable accommodations to accommodate families. The accommodations will be spacious, with bright terraces offering the possibility for future inhabitants to have their small planter. Large housing types 4 and 5 will be offered to accommodate families in the neighborhood & easily divisible into small apartment's type 2 and 3 to respond to changes in life



## BARN

350 m2 of office space and food-tech incubators around healthier living, consuming & producing that can benefit as a large-scale experimentation ground in a privileged environment from processing greenhouses & market hall. The barn consists of workspaces around "better producers, better consume, and better life"



## MARKET HALL

1,200m<sup>2</sup> of the market hall for a space dedicated to more responsible and local consumption. The market hall is a space dedicated to consumption that is more responsible. It offers a range of regional products, products from greenhouses and fish farming made on site, but also everyday consumer products. It is a responsible mode of consumption with fresh and ultra-fresh ingredients.



## CAR PARK

Easy parking with abundant underground parking spaces, and places for soft mode.



## FOOD COURT & LIVING SPACE

A food court, living space: 760m<sup>2</sup> of catering and service areas to bring real neighborhood life to the future inhabitants of Vallon Regny. The Food Court offers dining areas to bring a real neighborhood life to the future inhabitants of Vallon Regny. The proposed architecture takes up the philosophy of the hall in connection with nature and local production. Shared spaces will allow associations to settle in this central square. Cooperative cuisine or even eco-nursery could thus offer real



moments of discussion and teaching for the families of Vallon Regny.

## GREENHOUSES

2100m<sup>2</sup> of organic vegetable and fish production greenhouse that can feed 1,000 to 3,000 inhabitants in complete safety, all year round, favoring short circuits. Modularity will be thought out from the start in order to allow programmatic evolution over time. The greenhouses placed above the hall allow production that respects the environment. No pesticides used short circuit deliveries. Each year, 30 tons of market gardening



and 10 tons of fish can be produced. The greenhouse is also a place of experimentation for nearby schools.

## ENTERTAINMENT ALL YEAR ROUND

CULINARY WORKSHOPS	EVENTS	CONCIERGE
Culinary and educational workshops around producing better and eating better will be organized by the production greenhouses.	Events can be organized in shared spaces to create links between residents.	A neighborhood concierge to help and advise residents will take place.

## THE ENVIRONMENT

TO BUILD	TO EAT	TO RECYCLE
An environmental approach at all stages of the project aimed at best practices for preserving the environment and quality of life.	An urban production project that reconnects the city with its food to allow more sustainable management of resources, a transformation of eating habits for healthier consumption and better living.	Development of resources and waste through a circular economy approach.

## STRONG VALUES TO DRIVE INNOVATION

 <p><b>SECURITY:</b> Control in such a way as to preserve the health and well-being of residents and consumers.</p>	 <p><b>PROXIMITY:</b> Decrease the distances and bring the inhabitants closer to create bonds and trust.</p>
 <p><b>QUALITY:</b> Meet expectations by exceeding standards to offer the best.</p>	 <p><b>DURABILITY:</b> Reconcile progress with the preservation of the environment.</p>

"Le Verger, Un Projet Ambitieux Et Innovant qui Reconnecte La Ville Et Ses Habitants à Leur Alimentation." Le Verger. Accessed September 24, 2020. <http://www.leverger-marseille.fr/#habitants>.

## CASE STUDY OUTCOMES

The design brief driven from the case study to cooperate the design project. Following are the data that has taken from case study.

<b>AN ORCHARD IN THE CITY</b>				
<b>Function</b>	<b>Area m<sup>2</sup></b>		<b>No of people</b>	<b>Area m<sup>2</sup>/person</b>
10 floor residential building, 60 Houses	5400 20% area for lift and services		300	15
7 floor Office building & food tech incubator	350		25-30	5 for normal 12 for executive office
Market hall	1200		260	4.6
<b>FOOD COURT</b>				
Overall space	760 60% dining area, living space 40% kitchen etc.		250	3
Dining area, living space	456		228	2
Kitchen/cooking			1	0.24
store			1	0.18
restroom			1	2 Handicap 6
<b>FARMING</b>				
<b>Function</b>	<b>Area m<sup>2</sup></b>	<b>Production/year</b>	<b>No of people feed/year</b>	<b>Area m<sup>2</sup>/worker</b>
Cultivated space/ Green house	2100	10 tons fish 40 tons vegetable	1000 to 3000	50

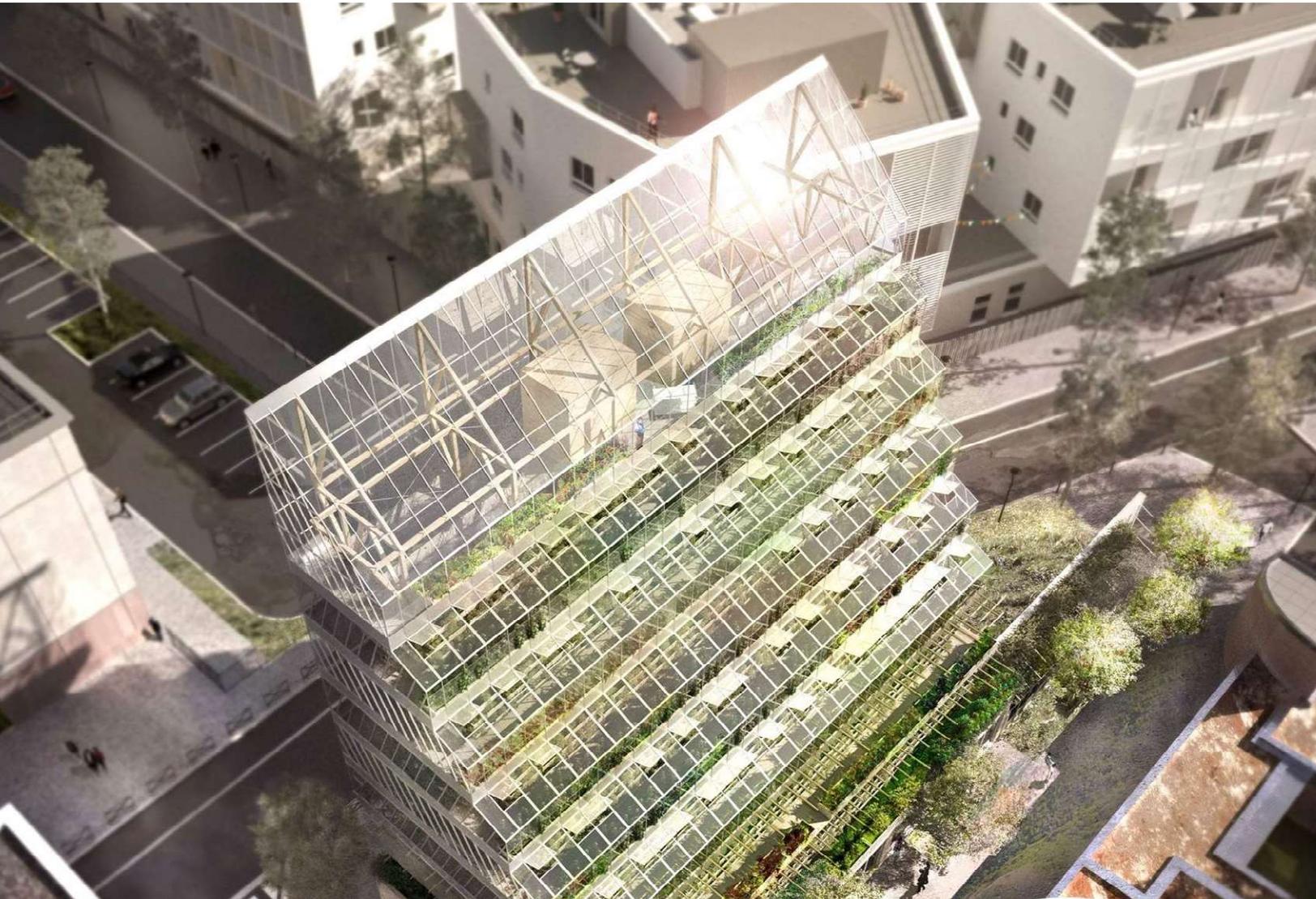
The data will help and used for the project and will guide in zoning, intermixing the functions with square meter according to the number of people.

"Le Verger, Un Projet Ambitieux Et Innovant qui Reconnecte La Ville Et Ses Habitants à Leur Alimentation." Le Verger. Accessed September 24, 2020. <http://www.leverger-marseille.fr/#habitants>.

## **2ND** CASE STUDY

**AGRO-MAIN-VILLE,  
URBAN AGRICULTURE  
TOUR IN ROMAINVILLE**

**ABF-lab, architect-engineers**



## 2.2-AGRO-MAIN-VILLE, URBAN AGRICULTURE TOUR IN ROMAINVILLE

Project management:  
ABF-lab, architect-  
engineers (representative),  
Topager (agricultural  
engineer), S2T (BE TCE),  
Altern Workshop  
(Landscape)

Project management:  
OPH ROMAINVILLE

Type of procedure: project  
management  
competition, Public  
market

Program: urban  
agriculture tour,  
educational space, shop

Location: rue Albert Giry  
93230 Romainville / Paris

SHON: 2000 m<sup>2</sup>

Year: November 2015

Cost: 3.4 M €

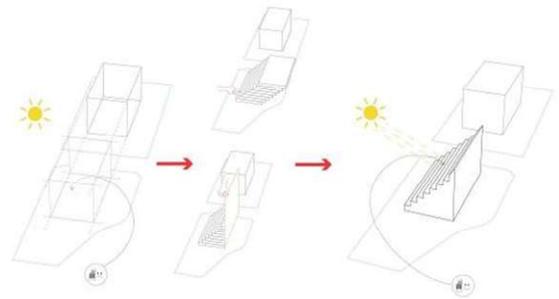
Perspectives: ABF-lab, Air-  
studio, Clément Talbot  
Second ranked project.<sup>29</sup>



Source: ABF lab

<sup>29</sup> Abf-Lab. "LAB." ABF. Accessed October 01, 2020. <http://abf-lab.fr/projets/agro-main-ville>.

It was apparent and fundamental to orient all crops towards the sun in order for a vegetable garden to provide the best of itself and to produce quality food. They were also attempting to fulfill the challenge of not having any artificial lights to supply the vegetable gardens and to be able to plant as much variety as possible.



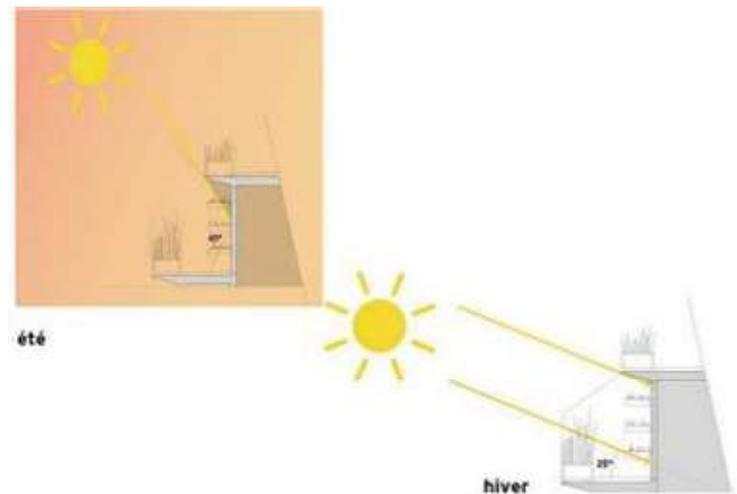
That creativity does not always rhyme with experimentation; they chose to work around transformability and partial or full versatility in the project.



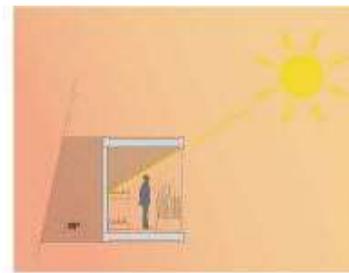
Source: ABF lab

Market garden building project based on two recurring concepts:

1: Optimize the amount such that the vegetable crop accommodating plateaus obey the sun's direction and are thus as productive as practicable.

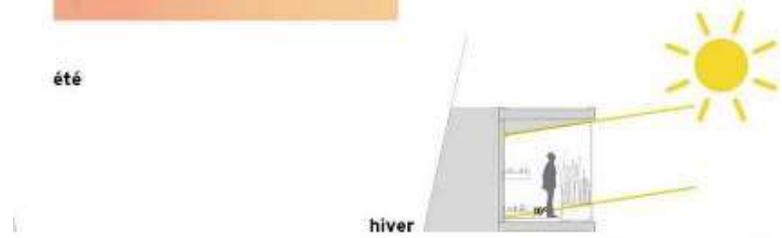


2: Anticipate "protective measures" in the very architecture of the building so that it can support accommodation in the event of a transition. In other words, two projects in a single project.



été

hiver



The photo of the "idyllic farm," the "human hand in the act of constructing," the "terroir," the "natural landscape," the "social dimension." Thus, the project is an assembly of carpenter's wood "anchored" in a natural dune landscape from which the virgin vines come to ascend. "implanted" "implanted" "piece of land" "piece of land" "belongs".



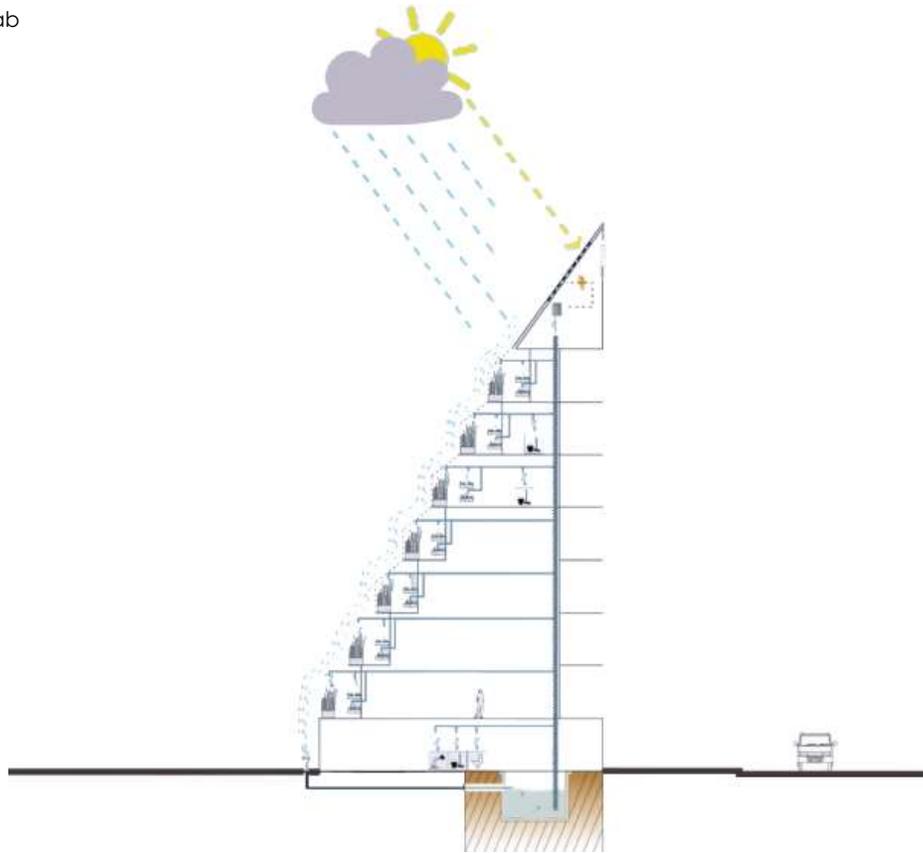
This initiative contributes to improving the living environment through the development of ultra-local, nutritious and high-quality produce, thus reducing prices, CO2 emissions and energy needs. Fossil bones.

Therefore, the experience of an agricultural building in the city is a means to become conscious of and shift actions in the path of more environmental and social responsibility.



Source: ABF

Source: ABF lab

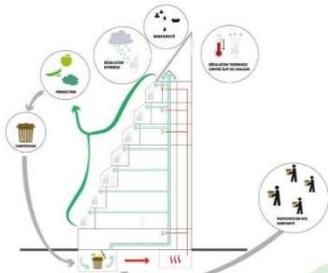
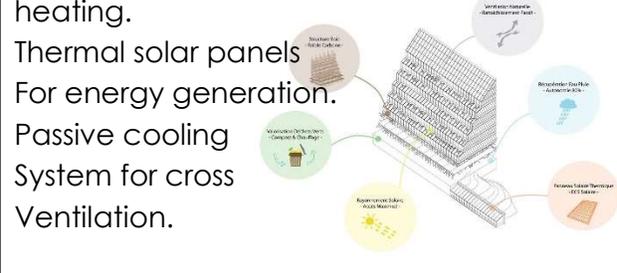


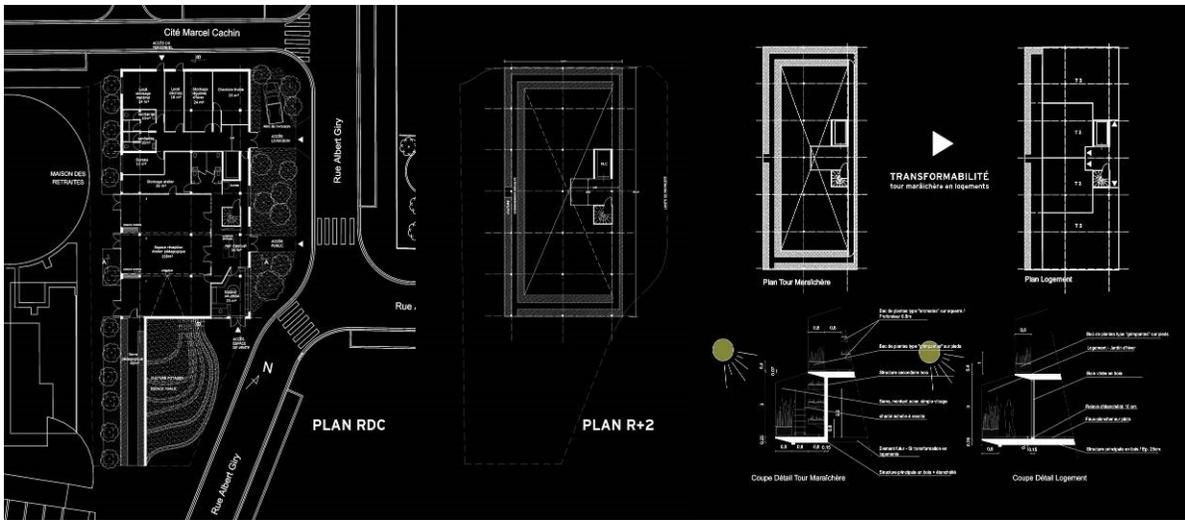
Source:  
ABF lab



# CASE STUDY OUTCOMES

The following design approach from the case study will use in cooperation of the project design.

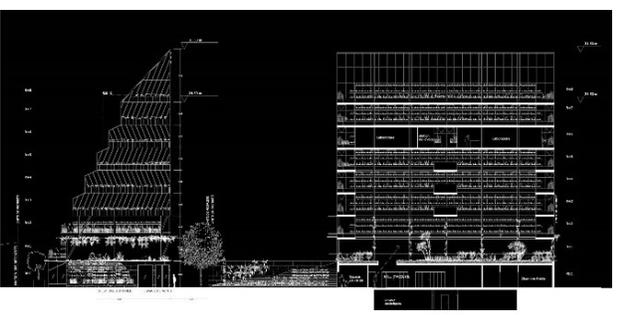
<p>Recycling Rainwater used for plants &amp; for cooling down the indoor temperature.</p> 	<p>Green waste recovery by compost &amp; heating. Thermal solar panels For energy generation. Passive cooling System for cross Ventilation.</p> 
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Architectural drawings including site plan, floor plans (PLAN RDC, PLAN R+2), and cross-sections (Coupe Détail Tour Marschère, Coupe Détail Logement). The drawings show building orientation, solar analysis, and internal layout.

Solar analysis with according to the building orientation to have the maximum natural sun light for the plants and design the facaed according to it.

Vertical division of the floors for the Indoor vegetaion is divided with 3 meteres height each floor and keep the grond floor 4 meter height to have grand look and accessibilty and visibility.



Abf-Lab. "LAB." ABF. Accessed October 01, 2020. <http://abf-lab.fr/projets/agro-main-ville>.

# 3RD CASE STUDY

THE NEW FARM  
NETHERLANDS  
THINK VERTICAL



## 2.3-THE NEW FARM NETHERLANDS, THINK VERTICAL

There are eight levels of The Current Farm, plus the glasshouse on the roof. Whether it is the fish farm on the first level, oyster mushrooms grown in coffee grounds or a shipping container in which lettuce is cultivated under LED lights, each floor is an ecological renewal zone.<sup>30</sup>



### ROOFTOP: AQUAPONICS

Industrial-scale aquaponics facility & greenhouse on the roof used to grow tomatoes, aubergines, courgettes, peppers and leafy vegetables.



### 6<sup>TH</sup> FLOOR: FISH FARM

Wastewater from the fish farm is used on the roof as manure for the crops. The water is purified by plants and runs out to the fish tanks.



<sup>30</sup>"The Building." The Building | The New Farm. Accessed October 16, 2020. <http://thenewfarm.nl/en/the-building/>

### **5<sup>TH</sup> FLOOR: RESEARCH LAB FOR NEW TECHNOLOGIES**

People introduce their creations to the audience in The LivingLab and have the leading edge in vertical urban agriculture. Although large and small companies collaborate on Smart Urban Food Strategies along with information organizations, there is also a large space for innovative workshops.



### **4<sup>TH</sup> FLOOR: VERTICAL URBAN FARMING**

The floor provides the potential for creative entrepreneurs to apply vertical urban agriculture in reality. On this floor in the south-west wing of the house, Haagse Zwam and Rebel Urban Farms are two of the businesses engaged in small-scale farming. The remainder of the fourth floor has been torn through to the level above and provides almost 10 meters of space for a specially fitted cell. This is where, in the Living Lab, companies show their inventions.



### **3<sup>RD</sup> FLOOR: COOKING STUDIO & MULTIFUNCTIONAL SPACE**

For 20 years, Kookfabriek, in the south-west wing of the building, has organized culinary workshops for groups of up to 140 people. The other half of the floor contains a 230-seat multifunctional hall for plenary



meetings and many adjacent rooms for breakout sessions and seminars.

## 2<sup>ND</sup> FLOOR: OFFICE SPACE & SUPPORT FUNCTIONS

In order to successfully use vertical urban cultivation, the offices handle the support roles for businesses on the fourth and fifth floors. This is also, where the office of The New Farm is located.



## 1<sup>ST</sup> FLOOR: INCUBATOR FOR START-UPS

The floor is the hotbed of Incubator and Accelerator start-ups. Just outside the building, Horticoop's Leafy Green Machine consists of a shipping container with slats, LED lights and temperature control that can generate up to 80 kg of lettuce a week.

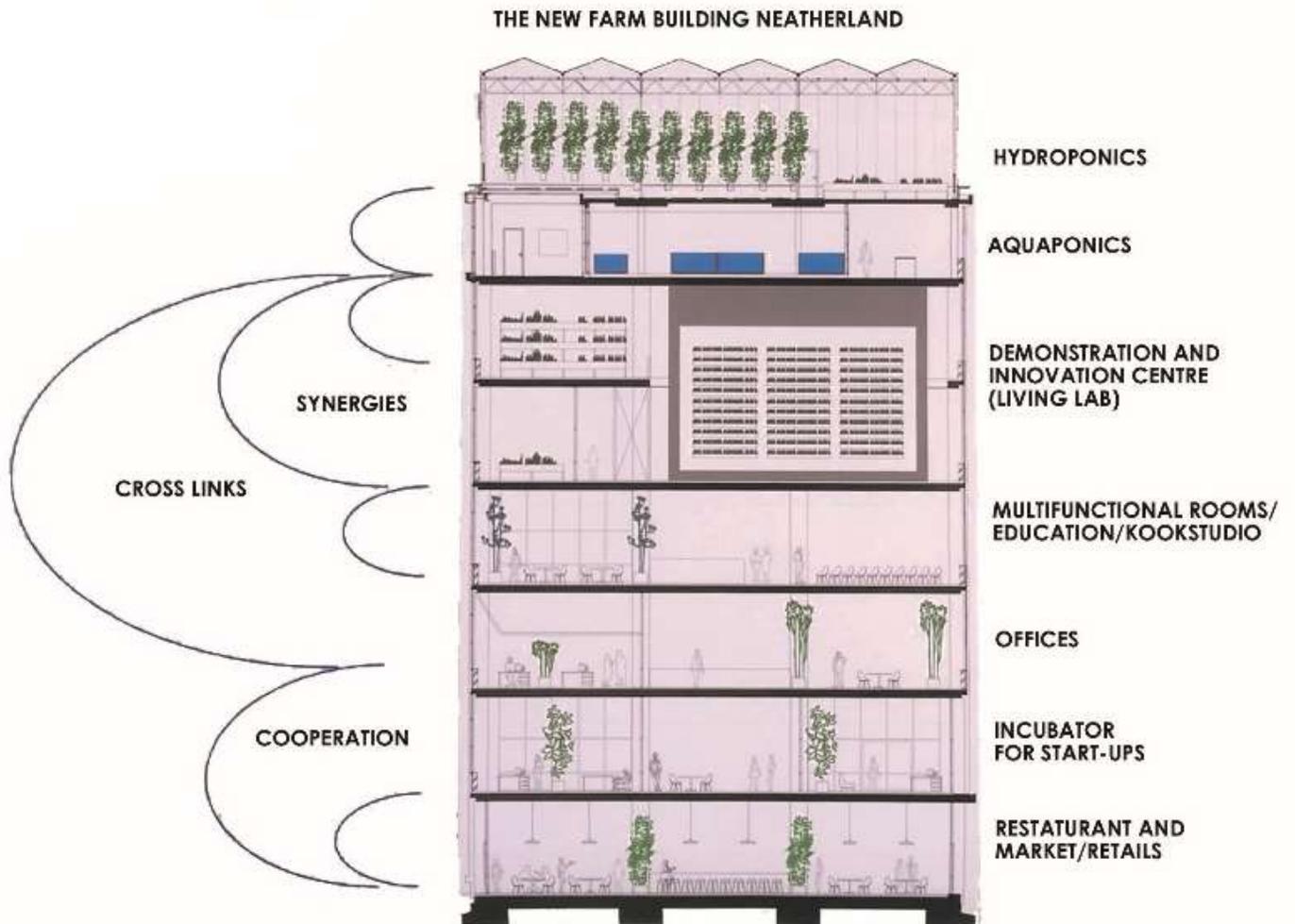


## GROUND FLOOR:

The department outlets, the market hall and the large outdoor seating restaurant.



## CASE STUDY OUTCOMES:



From the case study, the vertical connection of the vertical urban farming had noticed and how the functions had managed related to activity.

The division of function in vertical urban farming and there link to each other is the important aspect of the case study.

The intermixing of multiple functions without disturbing the each other activities is also the notice bale factor.

Following of the above-mentioned point will use to do the vertical farming in the project and do the connections between the functions.

"The Building." The Building | The New Farm. Accessed October 16, 2020. <http://thenewfarm.nl/en/the-building/>.

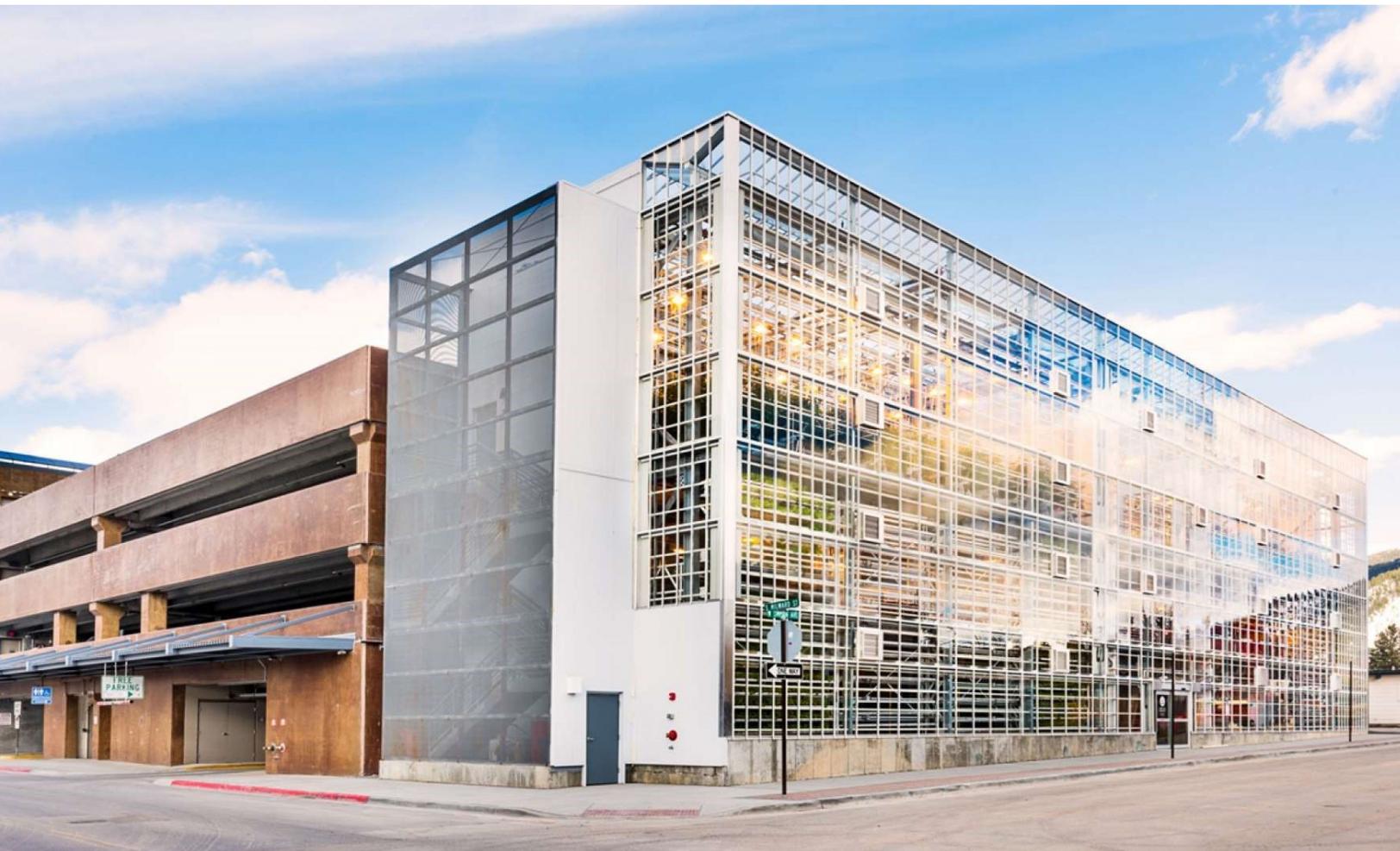
# 4TH CASE STUDY

Vertical Harvest 2016

E/YE DESIGN AND LARSSEN LTD.

[JACKSON] USA.

LEONOR MARTÍN



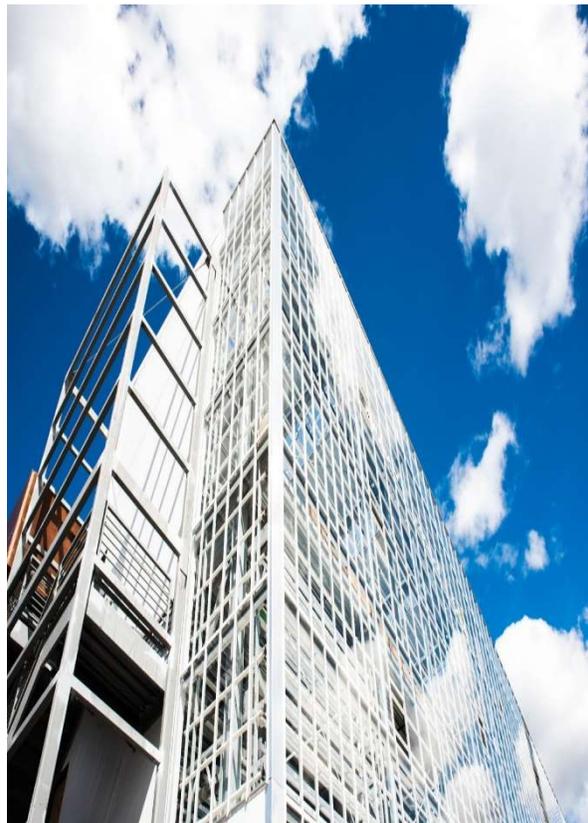
## VERTICAL HARVEST:

In the developed urban setting of the city of Jackson Hole, Wyoming, Vertical Harvest is a revolutionary three-story greenhouse. A four month growing season area with a high altitude (6200 ft above sea level) and harsh climatic conditions with temperatures far below zero and snowstorms.

Through the continuous supply of food, the greenhouse contributes to food security. The greenhouse contributes to food safety by ensuring a constant supply of food that does not depend on weather and environmental factors and, on the other hand, fosters community self-sufficiency.

Vertical Harvest is an impact-driven organization that produces and operates cost-effective and profitable hydroponics. Vertical Harvest is an impact-driven company that installs and operates cost-effective and profitable hydroponic farms and grows over 30 different crops 365 days a year (100,000 pounds of fresh lettuces, tomatoes, herbs, and microgreens annually).

The Vertical Harvest is a greenhouse for a start-up whose building is situated on 4,500 square feet of city-owned property. The construction is the property of the city and the corporation is run by the entity incorporated as a limited liability company "low-profit," which means that it has specified social priorities instead of simply maximizing revenue.

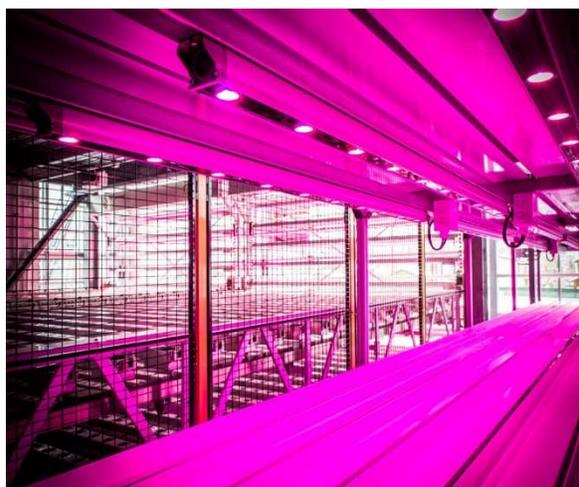


Source: <https://www.metalocus.es/en/news/vertical-harvest#>

Considering the water and land scarcity and the impacts associated with climate change on conventional outdoor agriculture development, this indoor urban agriculture system has positive effects. The Vertical Harvest is capable of growing five acres worth of vegetables on 1/10th of an acre compared to conventional agricultural systems, according to the co-founders.

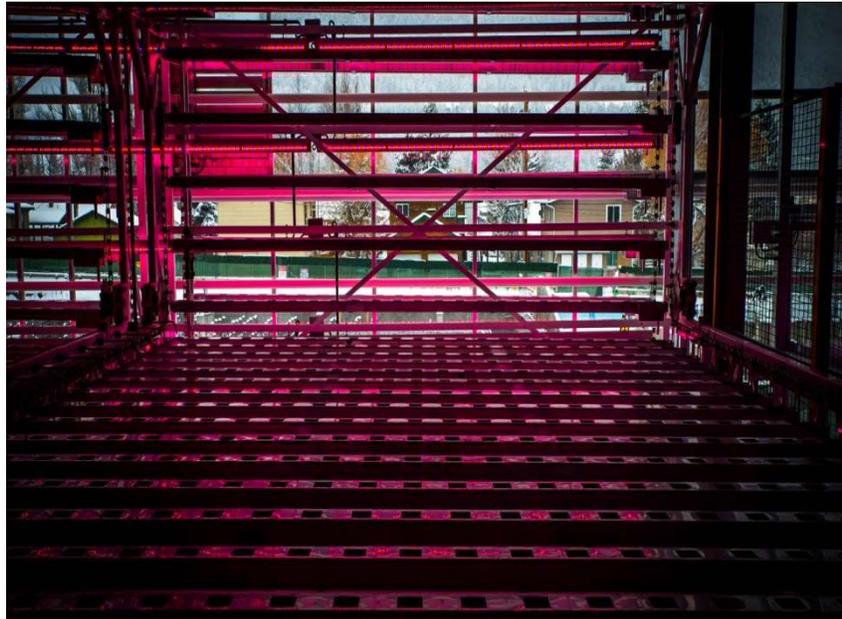
The project is focused on a Managed Agricultural Environment (CEA) scalable activity that increases productivity and output from small urban land. In addition, by reducing the external supply of food, this sustainable form of agriculture decreases the adverse environmental impacts of transport.

The building's interior environment is complicated and adapts the microclimates according to the unique needs of the crops in order to adapt to the appropriate conditions. The model works like three greenhouses stacked on top of each other, so each floor has a microclimate of its own. For example, on the first floor, the greenhouse produces lettuce and microgreens, and for vining crops such as tomatoes, the colder, top floor is used.



Source: <https://inhabitat.com/this-vertical-farm-will-provide-wyoming-residents-with-100000lbs-of-fresh-produce-each-year/>

The green house, on the other hand, has vertical carousels that are growing. Since the system depends not only on artificial LED lighting, the system uses conveyor belts to keep the plants moving around and optimize natural exposure to sunlight, combining natural and artificial light, resulting in substantial cost savings.



In addition, for harvesting and transportation, the conveyor belt system carries the plants to the workers.

The distinctive character of this project is its social impact. The Vertical Harvest drives a "Grow well" mission to resolve the paradigm of career growth, concentrating on the integration of underserved and overlooked community members and individuals with intellectual disabilities such as Autism and Down syndrome to perform operations with a sustainable emphasis on the production of fresh food.

The Vertical Harvest has a diversified crop portfolio and handles the multi-channel delivery of community, retail sales to customers, wholesale to more than 80 supermarkets and restaurants in three states, and food services. The Vertical Harvest also manages organic food for local markets.



In addition, by encouraging nutritional transparency, vertical farming is a means of supplementing the current food industry. The learning and participatory methods have the ability to help neighborhoods become healthy and towns more sustainable by getting the food processing process closer to the group.

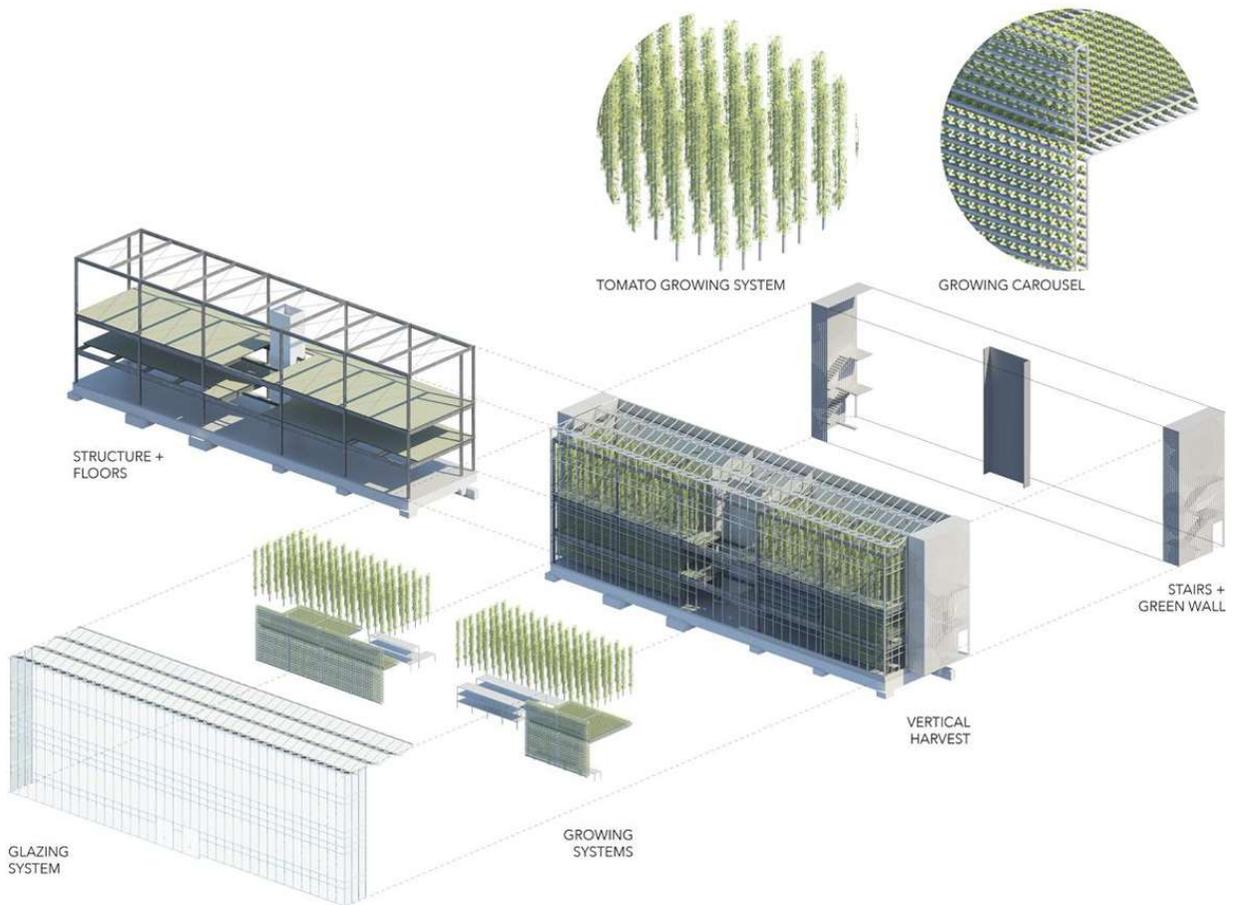
The Vertical Harvest also has an area devoted to public space and group meeting, as well as a portion dedicated to urban crop education initiatives; it has also become an attraction point for the region with guided tours inside the infrastructure. The end goal is that other populations across the globe will scale and reproduce the concept of indoor agriculture.



Source: <https://verticalharvestfarms.com/about-us/>

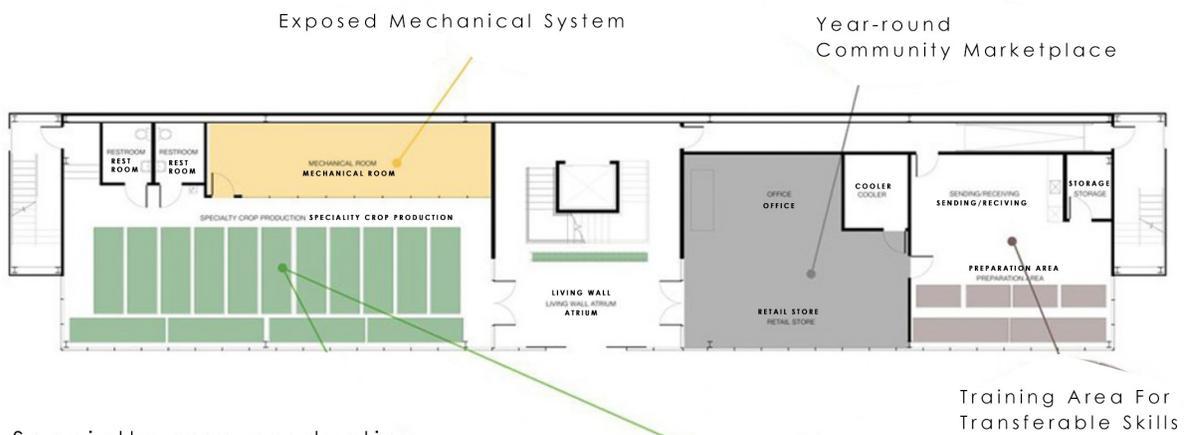
Using greenhouse techniques and optimizing natural light, the vertical harvest consumes 50 percent less energy than conventional vertical farming. Its success is dependent on infrastructure innovation, which is configured by a hydroponic

farming method, ensuring that the crop roots lie in water infused with the requisite nutrients and no soil is used. Moreover, relative to conventional farming systems, the amount of water and fertilizer required to grow the plants is minuscule.





**VERTICAL HARVEST  
1ST FLOOR**



Specialty crop production  
Office function:

Sending/receiving area

Retail store

Living wall

atrium

Storage

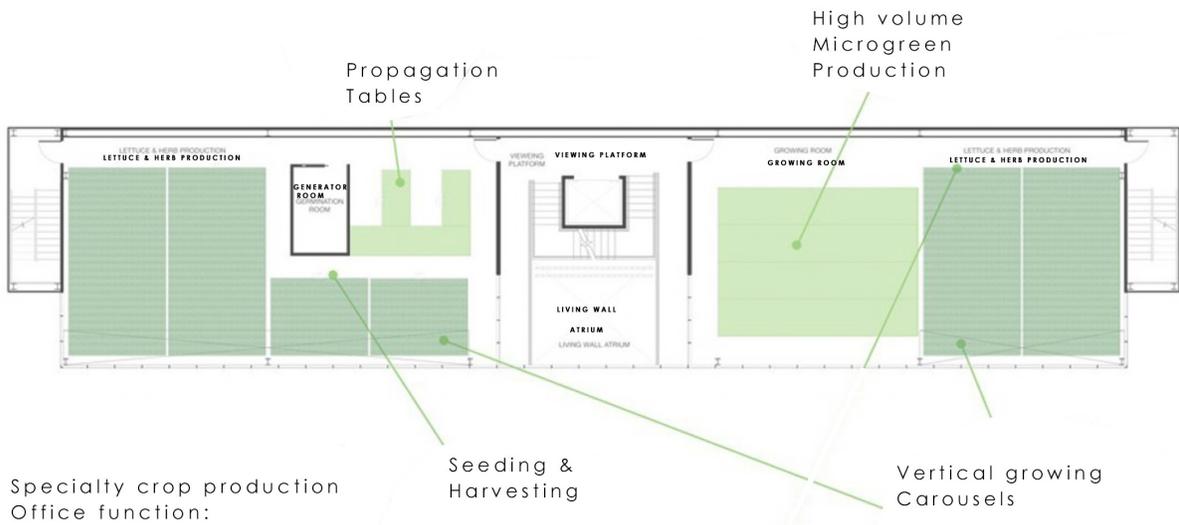
Mechanical room

Preparation area

Cooler Restroom

A Living  
Classroom

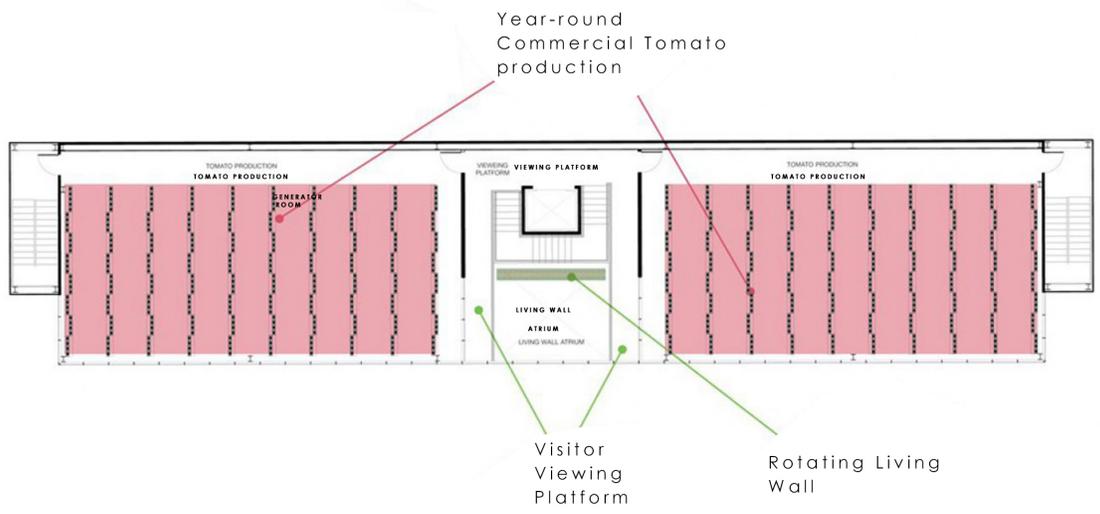
**VERTICAL HARVEST  
2ND FLOOR**



Specialty crop production  
Office function:

- Viewing platform
- Germination room
- Lettuce & herb production
- Living wall atrium
- Growing room

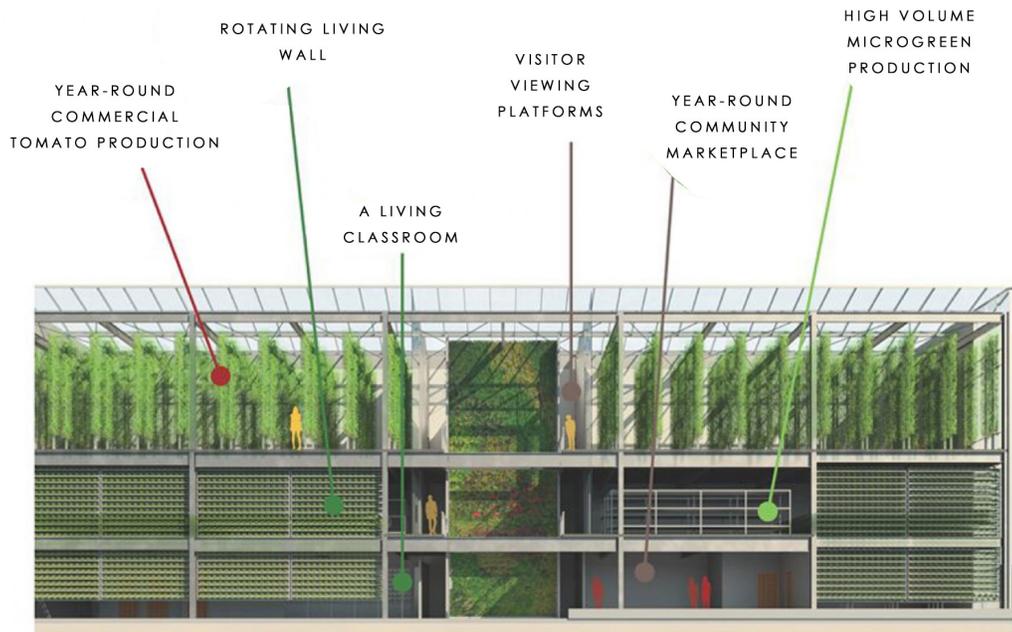
VERTICAL HARVEST  
3RD FLOOR



Specialty crop production  
Office function:

- Viewing platform
- Living wall
- atrium
- Tomato production

# VERTICAL HARVEST CROSS SECTION



RENDERED LONGITUINAL AND CROSS-SECTION





**DESIGN  
BRIEF**

**DESIGN BRIEF GREEN DEAL  
ORCHARD TO RETAIL**

Function	Area m <sup>2</sup>	No of people	Area m <sup>2</sup> /person
----------	---------------------	--------------	-----------------------------

**VERTICAL FARMING / TOWER G+14**

Retail shops G+2	2575	1030	2.5
3 <sup>rd</sup> floor Incubator for startup	642		
4 <sup>th</sup> floor Offices/workshop/education	609	60-80	5 for normal 12 for executive office
5 <sup>th</sup> + 6 <sup>th</sup> floor Innovation Lab/demonstration	775		
7 <sup>th</sup> floor Cooking studio/multifunction	267	90-110	2.5
8 <sup>th</sup> + 9 <sup>th</sup> + 10 <sup>th</sup> floor Vertical farming	801	40-45 tons vegetable	
11 <sup>th</sup> + 12 <sup>th</sup> floor Aquaponics	534	5-6 tons fish	
13 <sup>th</sup> + 14 <sup>th</sup> floor Roof top Green house	400	20-25 tons vegetable	
Overhead water tank	86 cubic meter	18697 gallons	
Underground water tank	207 cubic meter	45003 gallons	

**ROOF FARMING**

Function	Area m <sup>2</sup>	Production/year	No of people feed/year	Area m <sup>2</sup> /worker
Cultivated space/ Green house	2462	13 tons fish 45 tons vegetable	1000 to 3000	50

**MARKET**

hall	594	149	4
------	-----	-----	---

<b>FOOD COURT G+1</b>			
Overall space	1124 60% dining area, living space, 40% kitchen etc.	375	3
Dining area, living space	290	145	2
Kitchen/cooking		1	0.24
store		1	0.18
restroom	104	10 at a time	4 & for Handicap 6
<b>SQUARE / MULTIPURPOSE AREA / WELCOMEPOINT</b>			
Overall space	1018	407	2.5
<b>HERBS CAFE G+1</b>			
Overall space	586	195	3
seating area, living space	310	206	1.5
restroom	24	6 at a time	4 & for Handicap 6
Aquarium	207 cubic meter		
<b>NATIONAL THEATER G+1</b>			
Overall space	760	304	2.5
Back stage	180		
stage	48		
restroom	30	7 at a time	4 & for Handicap 6
Overhead water tank	140 cubic meter	30436 gallons	
<b>OFFICES ON RENT G+3</b>			
Overall space	2248	900	2.5
Total offices		20 offices	
common restroom	7.12	2	3.56
Underground water tank	315 cubic meter	68483 gallons	
Overhead water tank	110 cubic meter	23914 gallons	

**FINAL  
PROJECT**



## AGRICULTURE PRODUCTION

Urban agriculture is touted as a strategy for more locally reliant food systems, yet there is little understanding of its potential food provisioning capacity. The quantity of fresh fruits and vegetables consumed by city residents, we compare these requirements with a catalog of the publicly owned, vacant parcels in Detroit to assess the feasibility of producing significant quantities of the fresh produce consumed within city limits. If high-yield, bio intensive growing methods are used, 31% and 17% of the seasonally available vegetables and fruits, respectively, currently consumed by 900,000 people could be supplied on less than 300 acres without incorporating extraordinary postharvest management or season-extension technology. This indicates that urban agriculture could play

an important role in food provisioning in many places.

In Detroit, there is a varied cultivation of crops in the city and its surroundings. Nevertheless, the production relies on the climatic conditions so the cultivation of some foods is seasonal.

Through the elaboration of organic fertilizers, the farmers can foster the adequate crops development using sustainable low-cost natural systems with easy access and free of chemicals.

In order to avoid the utilization of pesticides, the traditional natural pesticide can be made with the use of rue plant, mugwort, garlic, chili pepper, milk, panela and nettle.



**ORNAMENTAL  
PLANTS**

Begonias  
Geraniums  
Conchas  
Azaleas  
Astromeliads  
Hydrangeas  
Jasmine  
Orchids  
Roses



**MEDICINAL  
PLANTS**

Lemon Balm  
Ataco  
Chamomile  
Absinthe  
Dulcamara  
Stevia  
Escancel  
Borage  
Violets



**FRUITS**

Strawberries  
Tree Tomato  
Uvillas  
Blackberries  
Peach  
Apple  
Pear  
Custard apples  
Avocado  
Citrus



**VEGETABLES**

Pumpkin  
Onion  
Garlic  
Cabbage  
Lettuce  
Potatoes  
Ocas  
Mellocos  
Carrot  
Coriander  
Parsley



**CEREALS AND  
LEGUME**

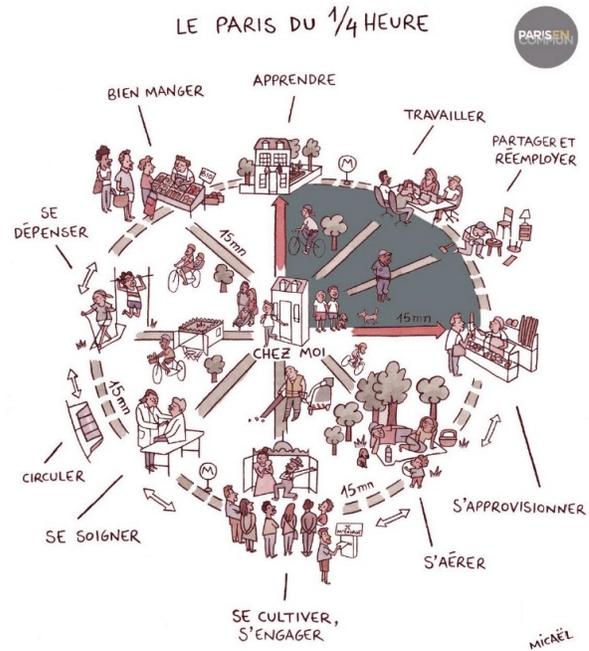
Corn  
Barley  
Habas  
Wheat  
Beans  
Peas

## 15-MINute walkable city

Several cities around the world are looking forward to reduce their carbon footprint and to increase quality of life by transforming the dynamics. The idea of the “15 minutes city” was conceived by Carlos Moreno, a professor at the Sorbonne in Paris.

The concept of “la ville du quart d’heure” refers to the accomplishment of six basic social functions (living, working, supplying, caring, learning and enjoying) within a 15-minute reach on foot or by bike, in order to cut down unnecessary journeys. The “15 minutes city” is based on four principles: proximity, diversity, density and ubiquity. It is based in the work of Jane Jacobs, who related the proximity with the vitality of cities.

The analysis of the actual state of the influence area of the urban area inside the Detroit of downtown, which are intervened on the thesis, considers the 15 minutes city concept.<sup>31</sup>



The objective is to identify the needs of the zone within an updated sustainable development scope, related to the access of the neighbors to goods and services, the impact of the current mobility systems, density, public spaces, greenery, etc. But, above all, the idea is to identify spaces of opportunity for a potential comprehensive intervention.

<sup>31</sup>Anne Hidalgo, the mayor of Paris, has embraced the idea of “la ville du quart d’heure,” or the 15-minute city  
SOURCE: <https://360.here.com/15-minute-cities-infrastructure>

URBAN  
ANALYSIS

## DOWNTOWN BY NEIGHBOURHOOD



Detroit is the largest city in Michigan, and with a population of over 670,000, it also has the highest number of people. The greater metro area is home to 4.3 million people, making it the second largest metro area in the United States behind Chicago. Although synonymous with the automobile industry, Detroit is also regarded as a cultural center and a repository for architecture. Since the 2000s, the city has focused on restoration of several historic theaters and other venues, as well as high-rise buildings and riverfront revitalization. In recent years, the populations of Downtown

Detroit, Midtown Detroit and several other neighborhoods have experienced growth.

The primary residential areas of Detroit include Downtown, Midtown, New Center, North End, East Side, West Side, and the Southwest/Near West. Each area is made of many distinct neighborhoods or districts. Some neighborhood boundaries and names are long-established and well-known by Detroit residents. In other cases, neighborhood perimeters may be less rigid, and there may be multiple names for a particular district or neighborhood.

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Source:<https://www.thepernateam.com/blog/detroit-neighborhoods-communities.html>

# DOWNTOWN BY NEIGHBORHOOD



 SITE

  
0 3 6 KM  
RULER



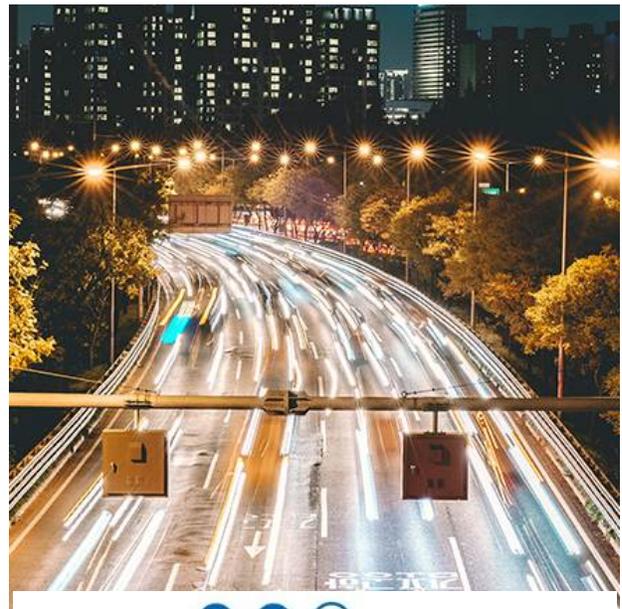
## MOBILITY

The existing public transportation system consists of the city bus system operated by DDOT, regional bus systems, local and regional rail, as well as a number of private shuttles operating to serve anchor institutions, hospitals, university campuses, and hotel, restaurant and entertainment districts.

The transportation system has the good connection to the site and provide full access to the people to connect and avail the facilities they have.

Following are the way of transportation provided for public use:

- Light-Rail/Streetcar Systems. The Detroit People Mover. ...
- Bike Share/Rental. MoGo. ...
- Bus Services. DDOT. ...
- Limo/Car Share/Taxi Services. Taxis can be found at various hotels in the downtown area and at TCF Center while conventions are in town. ...
- Shuttle Services. Big Beaver Shuttle. ...
- Train. Amtrak. ...
- Scooters. Bird.

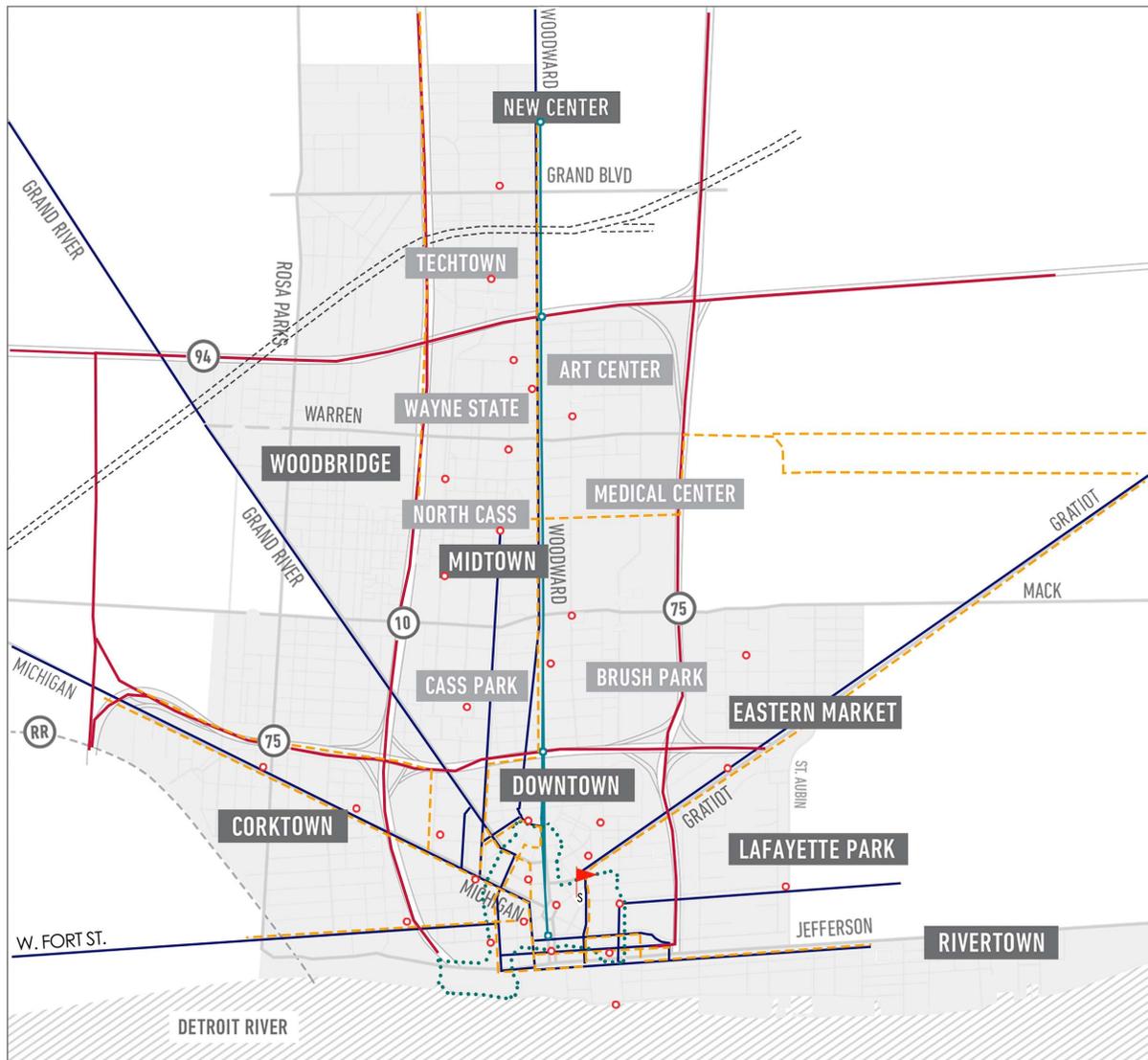


**1 IN 3 DETROIT RESIDENTS ARE LIVING BELOW THE POVERTY LINE (39.3%)**



**1 IN 5 OF TRANSIT-DEPENDENT HOUSEHOLDS ARE BEYOND A 30-MINUTE WALK TO FIXED-ROUTE TRANSIT**

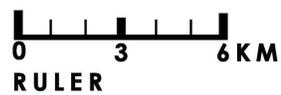
# MOBILITY



## LEGEND

- MOGO STATION
- QLINE
- BUS SERVICES (DDOT)
- LIGHT-RAIL
- - - SUBURBS ROUTE (SMART:FAST)
- HIGHWAY
- - - TRAIN LINE

▲ SITE



# PARKS, BIKE LANES AND GREENWAYS



## LEGEND

-  COMPLETED BIKE LANES
-  COMPLETED GREENWAY
-  IN PROGRESS BIKE LANES
-  IN PROGRESS GREENWAY
-  SITE

-  PARK : 0.0-0.5 ACRES
-  PARK : 0.51-1 ACRES
-  PARK : 1.01-5 ACRES
-  PARK : 5.01-10 ACRES
-  PARK : 10.01-25 ACRES
-  PARK : >25 ACRES



# PUBLIC SPACES



## LEGEND

### SCHOOLS:

- PUBLIC
- CHARTER
- PRIVATE
- HIGH SCHOOL
- K-8
- ▲ EARLY CHILDHOOD
- ▲ SITE

### MULTIPURPOSE:

- LIBRARY/MUSEUM
- ARTS/CULTURE ORGANIZATION
- GALLERY
- THEATER/PERFORMANCE SPACES



**SITE  
ANALYSIS**

# DEVELOPMENT UPDATES 2018



## LEGEND

UPCOMING DEVELOPMENTS

PARK/PUBLIC SPACE

BUSINESS IMPROVEMENT ZONE (BIZ) AREA

MOGO STATION

QLINE

THE DISTRICT DETROIT

BIKE LINE

**1** 44 MICHIGAN AVENUE  
44 Michigan Avenue  
DEVELOPER: Basco Detroit  
PRIMARY USE: Office  
COMPLETION DATE: N/A

**2** 1242 WASHINGTON BOULEVARD  
1242 Washington Boulevard  
DEVELOPER: Karp and Associates  
PRIMARY USE: Office  
COMPLETION DATE: 2020

**3** THE ASHTON DETROIT  
659 Howard Street  
DEVELOPER: Means Group and Brian Holdwick  
PRIMARY USE: Residential  
COMPLETION DATE: N/A

**5** CHEMICAL BANK HEADQUARTERS  
2047 Woodward Avenue  
DEVELOPER: Chemical Bank  
PRIMARY USE: Office  
COMPLETION DATE: 2021

**6** CROWNE PLAZA 2ND TOWER  
2 Washington Boulevard  
DEVELOPER: Gabriel Ruiz Huerta  
PRIMARY USE: Hotel  
COMPLETION DATE: 2021

**7** DETROIT CREAMERY COMPANY  
1922 Cass Avenue  
DEVELOPER: Olympia  
Development of Michigan  
PRIMARY USE: Office  
COMPLETION DATE: 2020

**8** FORMER DETROIT POLICE DEPARTMENT HEADQUARTERS  
1500 Beaubien  
DEVELOPER: Bedrock  
PRIMARY USE: N/A  
COMPLETION DATE: N/A

**9** GATEWAY CENTER BUILDING REDEVELOPMENT  
1101 Washington Boulevard  
DEVELOPER: Karp and Associates  
PRIMARY USE: Residential  
COMPLETION DATE: N/A

**10** HAMILTON ANDERSON EXPANSION  
1435 Randolph Street  
DEVELOPER: Rainy Hamilton  
PRIMARY USE: Office  
COMPLETION DATE: 2020

**11** HARMONIE CLUB HOTEL  
311 East Grand River Avenue  
DEVELOPER: Basco Detroit and Patricia Cole  
PRIMARY USE: hotel  
COMPLETION DATE: 2020

**12** HARVARD CENTRE SQUARE  
1344-1346 Harvard Street  
DEVELOPER: Bedrock  
PRIMARY USE: Residential  
COMPLETION DATE: N/A

**13** HASTINGS PLACE  
1468-1498 Randolph Street  
DEVELOPERS: City of Detroit, Downtown Development Authority, and Hiram Jackson  
PRIMARY USE: Residential  
COMPLETION DATE: 2020

**14** THE LELAND  
400 Bagley Street  
DEVELOPER: Michael Higgins  
PRIMARY USE: Residential  
COMPLETION DATE: 2020

**15** LOFTS ON BROADWAY  
1320-64 Broadway Street  
DEVELOPER: Basco Detroit  
PRIMARY USE: Residential  
COMPLETION DATE: 2019

**16** MARQUETTE BUILDING  
243 West Congress Street  
DEVELOPER: To be announced  
PRIMARY USE: Office  
COMPLETION DATE: N/A

**17** FORMER MICHIGAN CENTRAL STATION  
(not highlighted on map)  
2001 15th Street  
DEVELOPER: Ford Motor Company  
PRIMARY USE: Office  
COMPLETION DATE: 2022

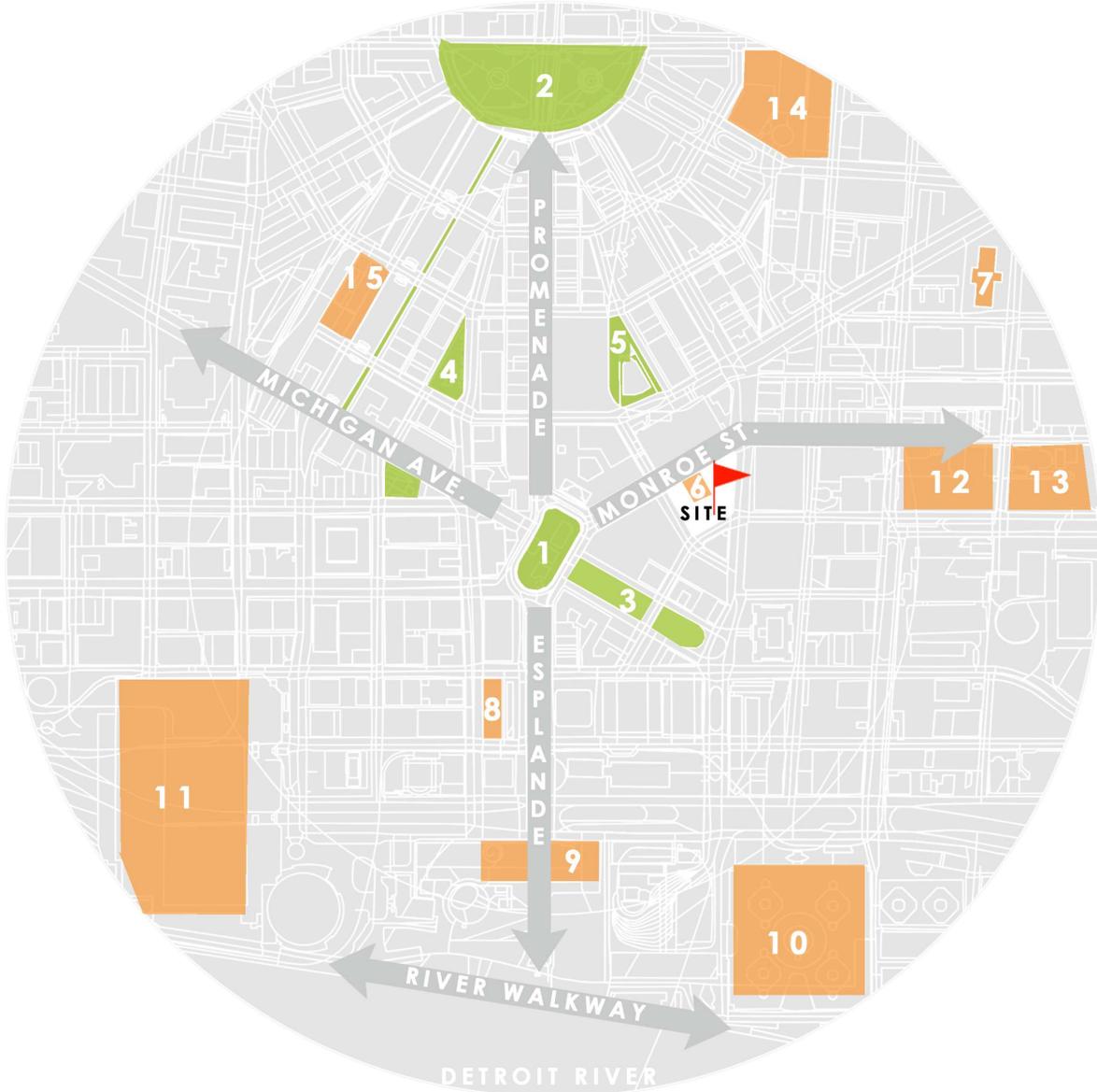
**17** MONROE BLOCK  
Monroe and Farmer Street  
DEVELOPER: Bedrock  
PRIMARY USE: Office and residential  
COMPLETION DATE: 2020, 2022

**19** PARK AVENUE BUILDING  
2001 Park Avenue  
DEVELOPER: Rino Soave  
PRIMARY USE: Residential  
COMPLETION DATE: 2020

**20** UNITED ARTISTS THEATER BUILDING  
150 Bagley Street  
DEVELOPER: Olympia  
Development of Michigan  
PRIMARY USE: Residential  
COMPLETION DATE: 2019



# DIVISIONS, SPREADING & LANDMARKS



## LEGEND

- |                                 |                           |                      |
|---------------------------------|---------------------------|----------------------|
| 1: CAMPUS MARTIUS PARK          | 2: GRAND CIRCUS PARK      | 3: CADILLAC SQUARE   |
| 4: CAPITOL PARK                 | 5: LIBRARY PARK           | 6: NATIONAL THEATRE  |
| 7: FRANK MURPHY HALL OF JUSTICE | 8: GUARDIAN BUILDING      | 9: HART PLAZA        |
| 10: GM RENAISSANCE CENTER       | 11: TCF CENTER            | 12: GREEKTOWN CASINO |
| 13: ST. MARY'S CATHOLIC CHURCH  | 14: DETROIT ATHLETIC CLUB | 15: BOOK TOWER       |

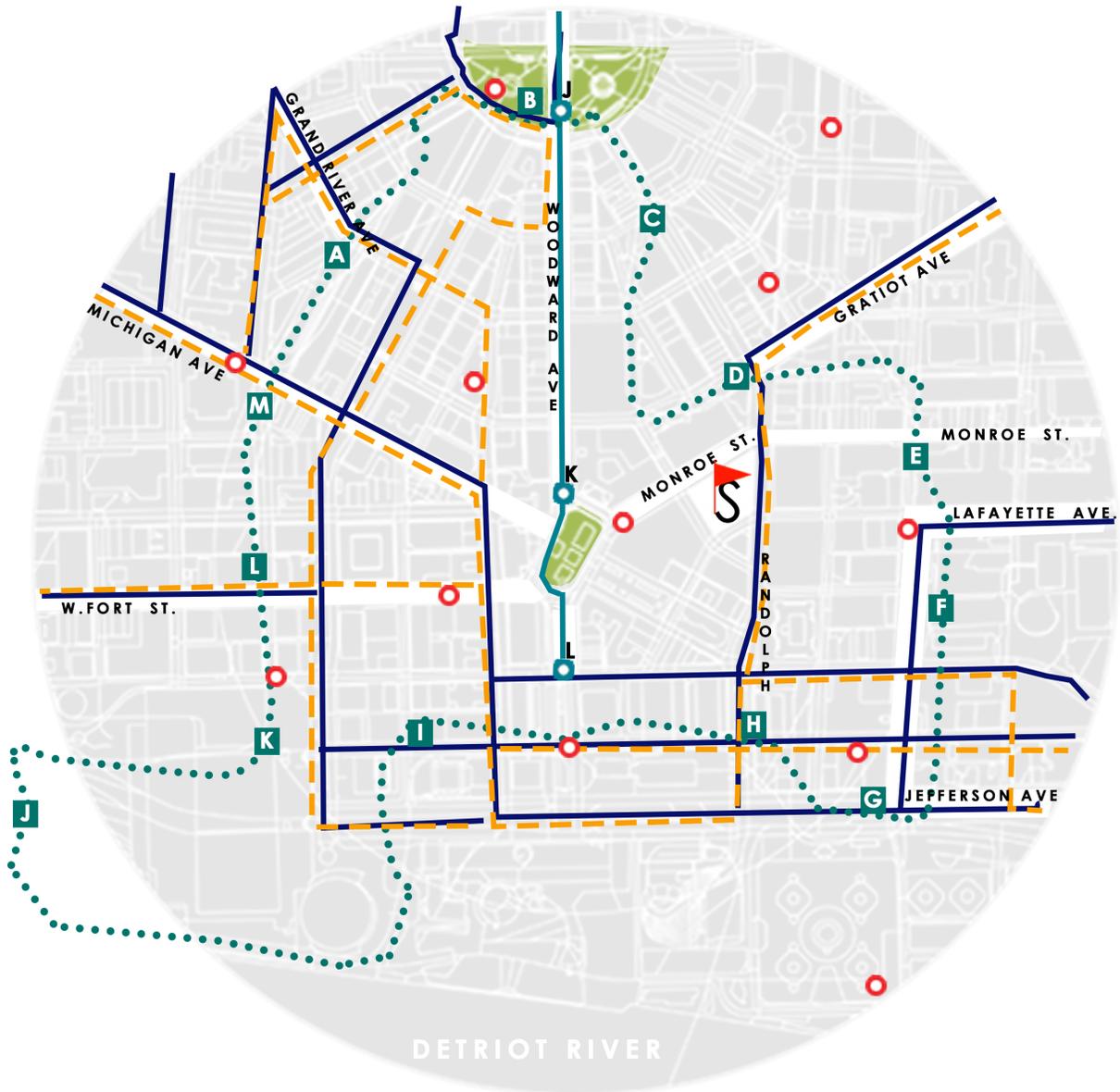
## WOODWARD AVE.

**ESPLANADE:**  
BOULVERED WITH  
MULTIPURPOSE ACTIVITY,  
PARK, WALKING/JOGGING  
TRAIL ON SEA FRONT.

**PROMENADE:**  
BOULVERED FOR  
LEISURELY PLEASURE &  
DIFFERENT COMMERCIAL  
SHOPS & RESTAURANTS.



# TRANSPORTATION 1KM



## LEGEND

- MOGO STATION
- QLINE
- BUS SERVICES (DDOT)
- LIGHT-RAIL/PEOPLE MOVER
- - - SUBURBS ROUTE (SMART:FAST)
- ▴ SITE

## DETROIT PEOPLE MOVER STATION

- A-TIME SQUARE    B-GRAND CIRCUS PARK    C-BROADWAY
- D-CADILLAC CENTER    E-GREEKTOWN    F-BRICK TOWN
- G-RENAISSANCE CENTER    H-MILLENDER CENTER
- I-FINANCIAL DISTRICT    J-JOE LOUIS ARENA    K-TCF CENTER
- L-FORT/CASS    M-MICHIGAN AVENUE

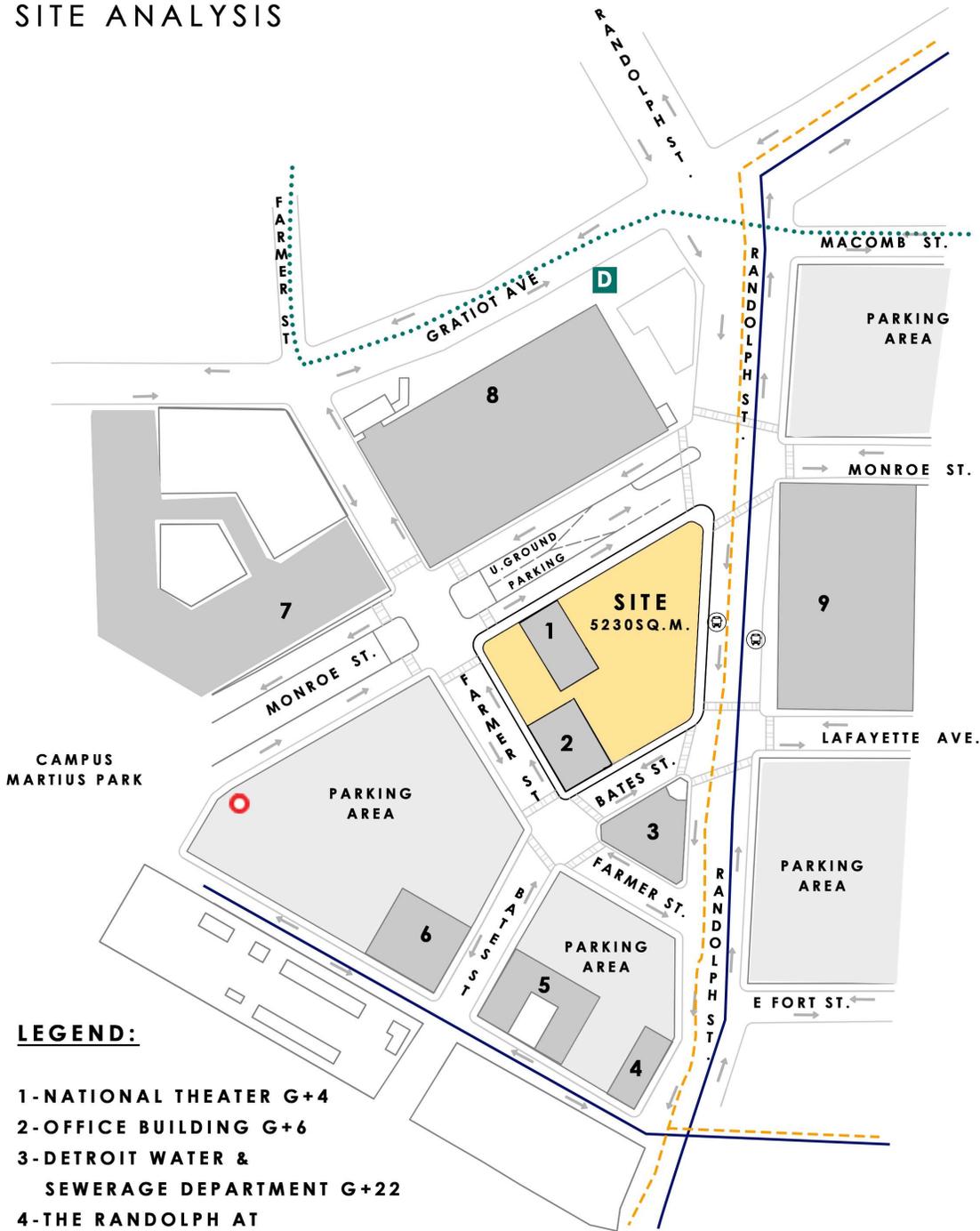
## Q LINE STATION

- J-GRAND CIRCUS    K-CAMPUS MARTIUS    L-CONGRESS ST.



SCALE: 1:5000

# SITE ANALYSIS



## LEGEND:

- 1-NATIONAL THEATER G+4
- 2-OFFICE BUILDING G+6
- 3-DETROIT WATER & SEWERAGE DEPARTMENT G+22
- 4-THE RANDOLPH AT CADALE SQUAREG+10
- 5-NEW CADILLAC SQUARE APARTMENTS G+19
- 6-CADILLAC TOWER G+38
- 7-BEDROCK WELLNESS CENTER G+15
- 8-CADILLAC CENTER BUILDING G+8
- 9-PARKING PLAZA G+6

- BUS SERVICES (DDOT)
- ⋯ LIGHT-RAIL/PEOPLE MOVER
- - - SUBURBS ROUTE (SMART:FAST)
- MOGO STATION
- B BUS STATIONS



SCALE: 1:2000

**SITE PICS:**

**SITE SURROUNDING AND  
ACCESS FROM  
PRIMARY ROAD  
PIC.A AND PIC.B.  
AND THE OTHER  
SIDES OF THE  
ROAD.**



**A**



**B**



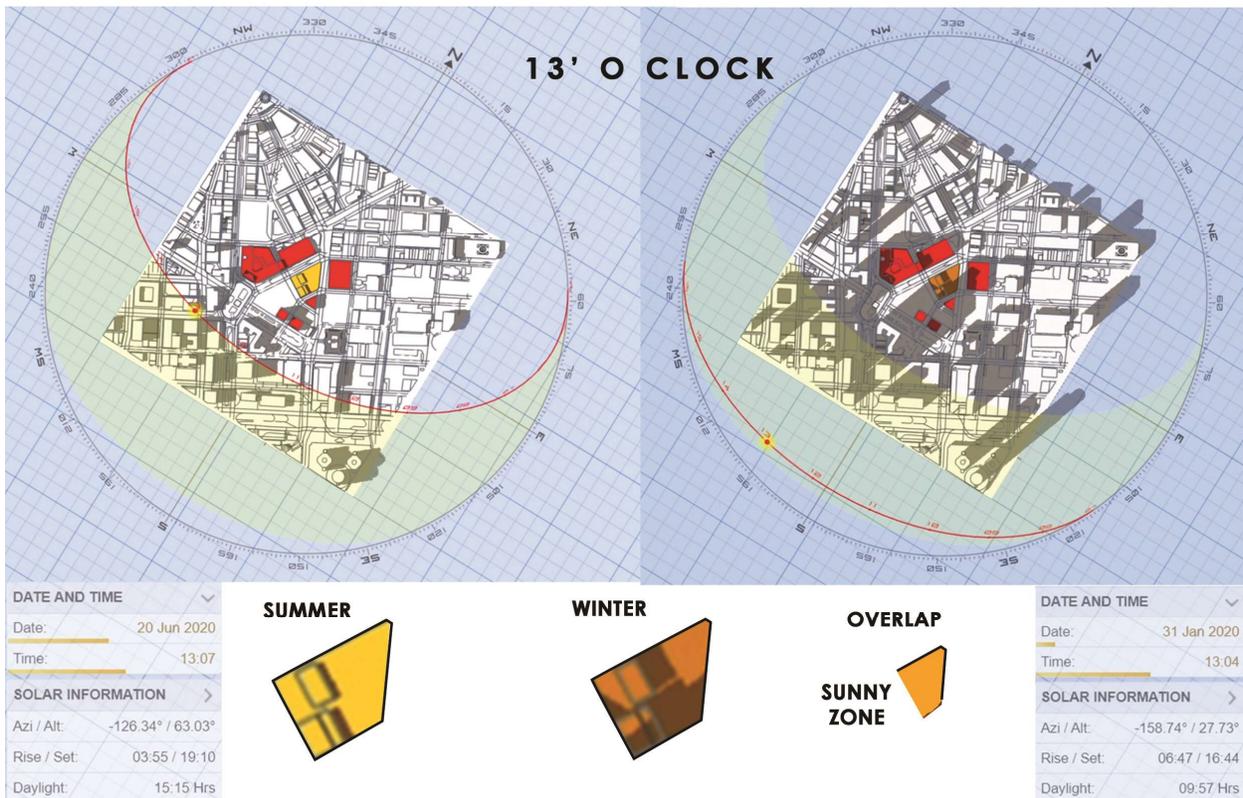
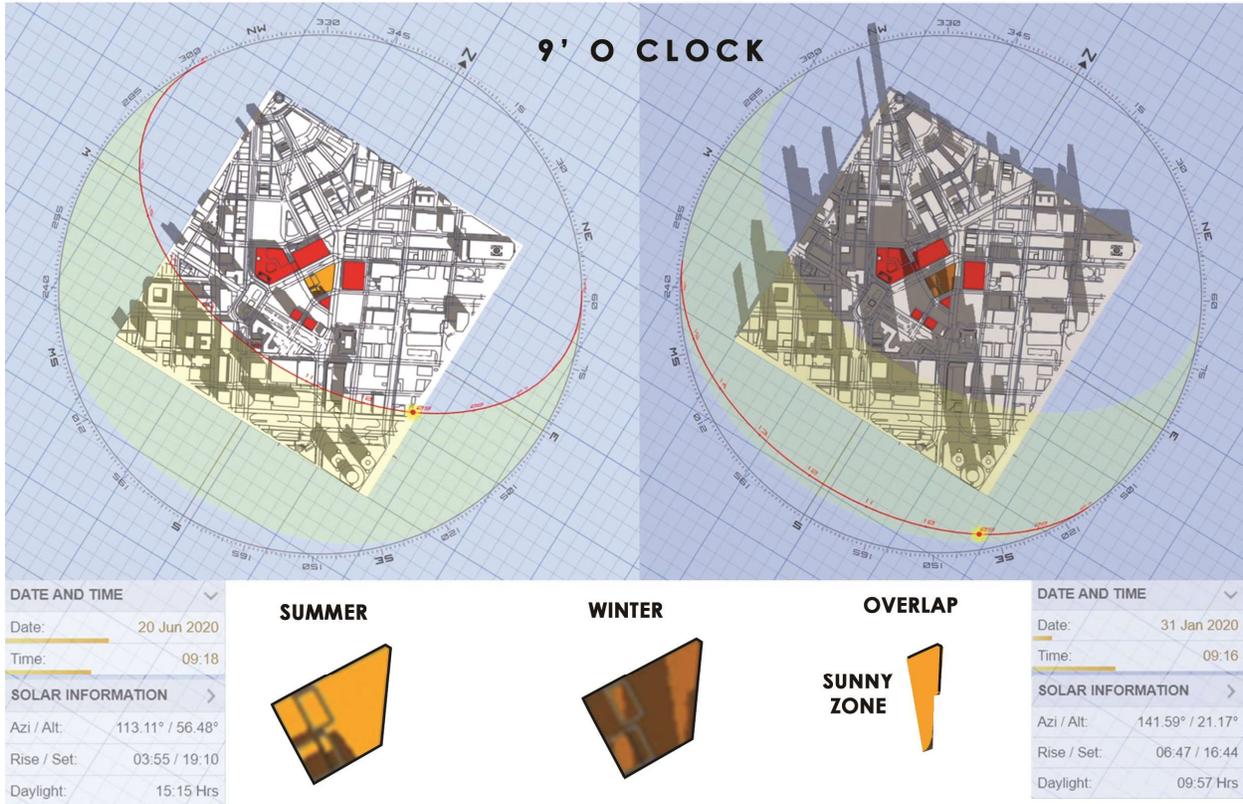
**C**

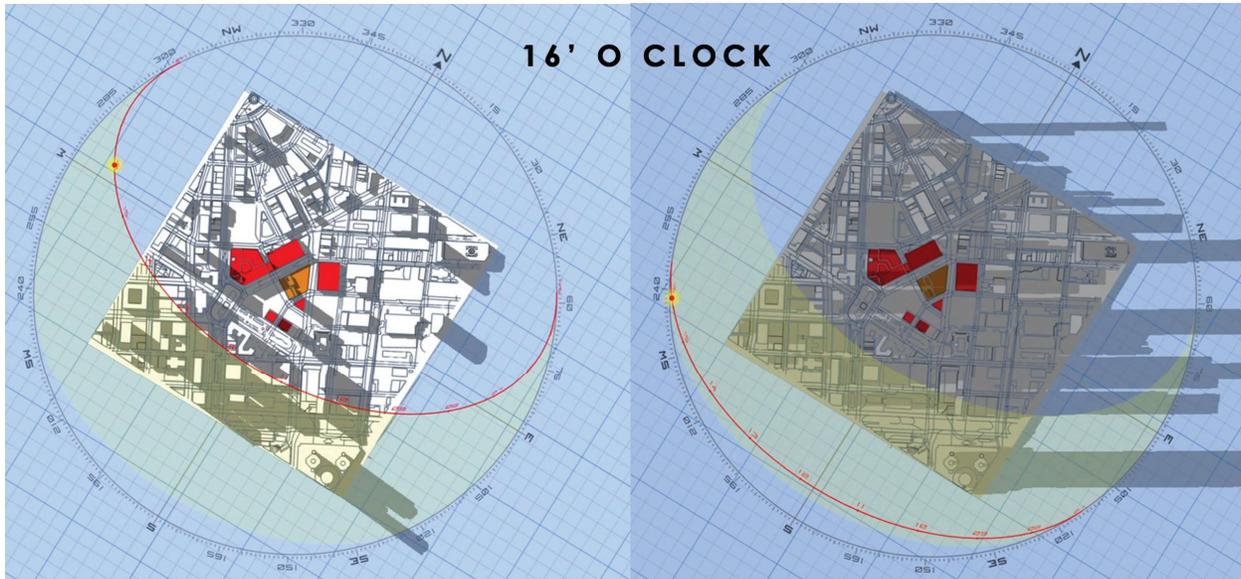


**D**

# SUN SHADOW ANALYSIS FOR PLACEMENT OF FUNCTIONS

SUMMER 20 JUNE                      WINTER 31 JAN





16' O CLOCK

DATE AND TIME	
Date:	20 Jun 2020
Time:	16:15
SOLAR INFORMATION	
Azi / Alt:	-83.98° / 29.51°
Rise / Set:	03:55 / 19:10
Daylight:	15:15 Hrs

**SUMMER**



**WINTER**

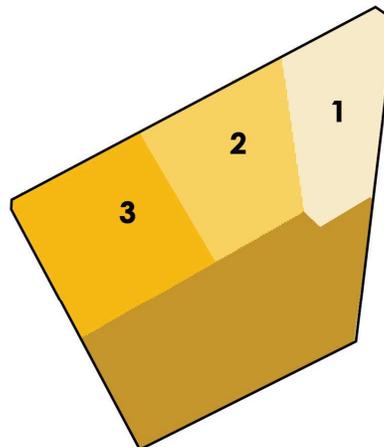


**NO SUN OVERLAP  
DUE TO EARLY SUN SET  
IN WINTERS**

DATE AND TIME	
Date:	31 Jan 2020
Time:	16:03
SOLAR INFORMATION	
Azi / Alt:	-120.18° / 6.14°
Rise / Set:	06:47 / 16:44
Daylight:	09:57 Hrs

## CONCLUSION

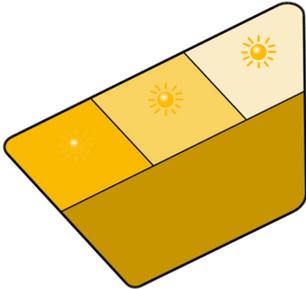
- 1- IS THE ZONE THAT HAVE MOST OF THE SUN DURING THE WHOLE YEAR AND IS THE BEST PLACE TO PUT THE VERTICAL URBAN FARMING.
  - 2- IS THE ZONE WHERE THE SUN HAVE THE EXPOSURES IN RANDOM HOURS AND THE SECOND MOST SUNNY PLACE.
  - 3- IS THE ZONE WHERE SUN HAVE FEW HOURS OF EXPOSURE.
- REST OF THE SITE IS IN THE SHAADOW.



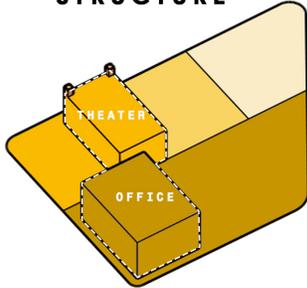
DESIGN  
DEVELOPMENT

# CONCEPT

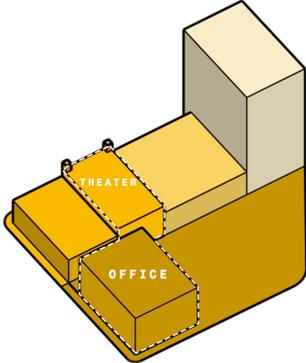
① SUN SHADOW ANALYSIS PLAN



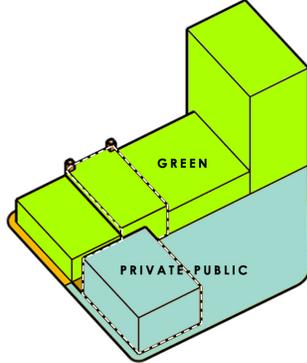
② SITE WITH EXSISTING STRUCTURE



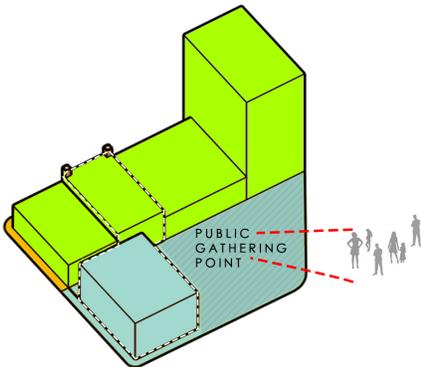
③ NEW DIVISIONS WITH EXSISTING



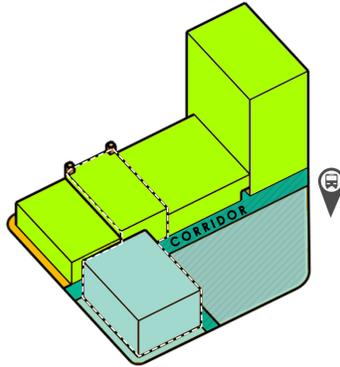
④ GREEN ZONE & PRIVATE-PUBLIC ZONE



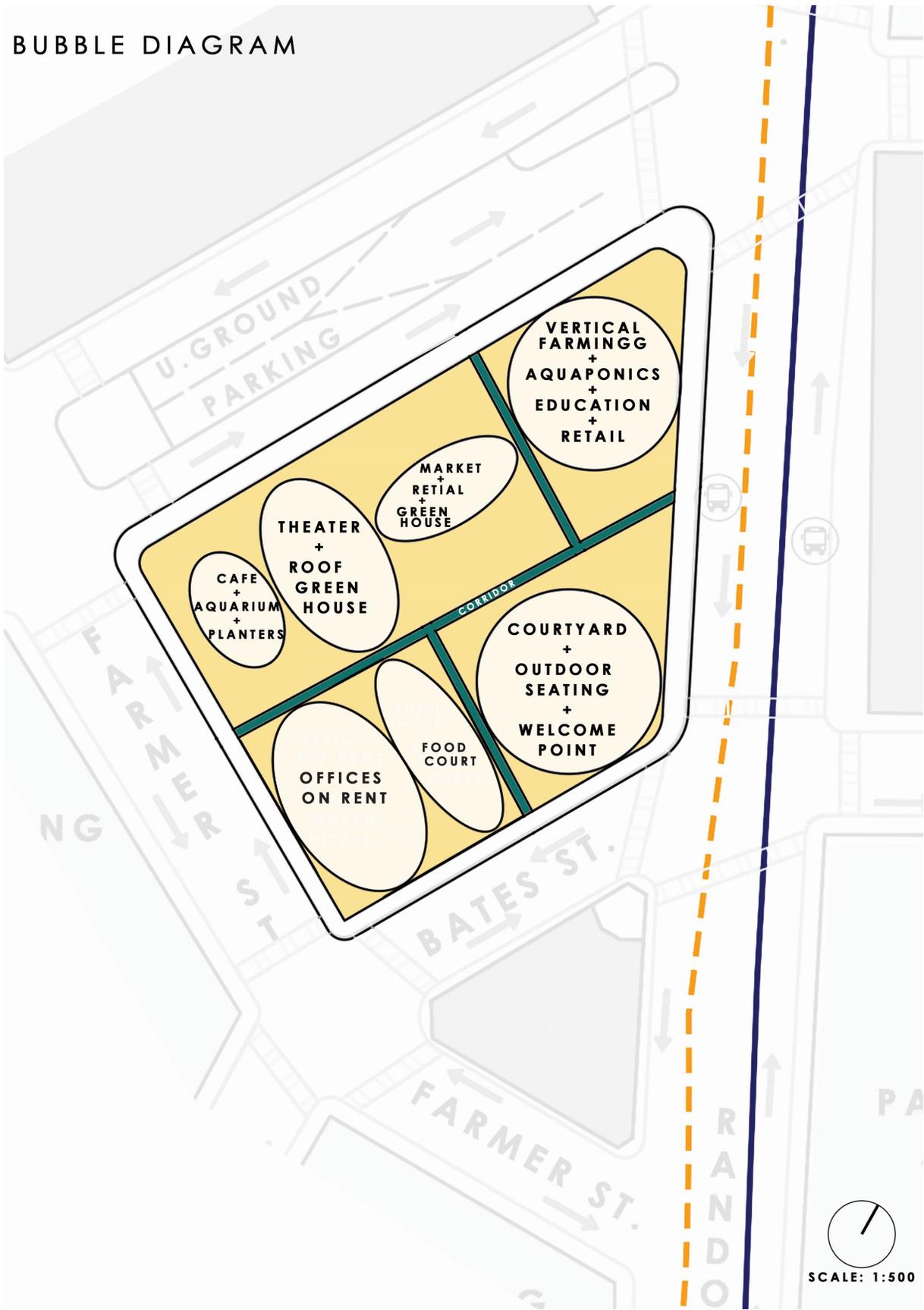
⑤ WELCOME POINT



⑥ ACCESSIBILITY



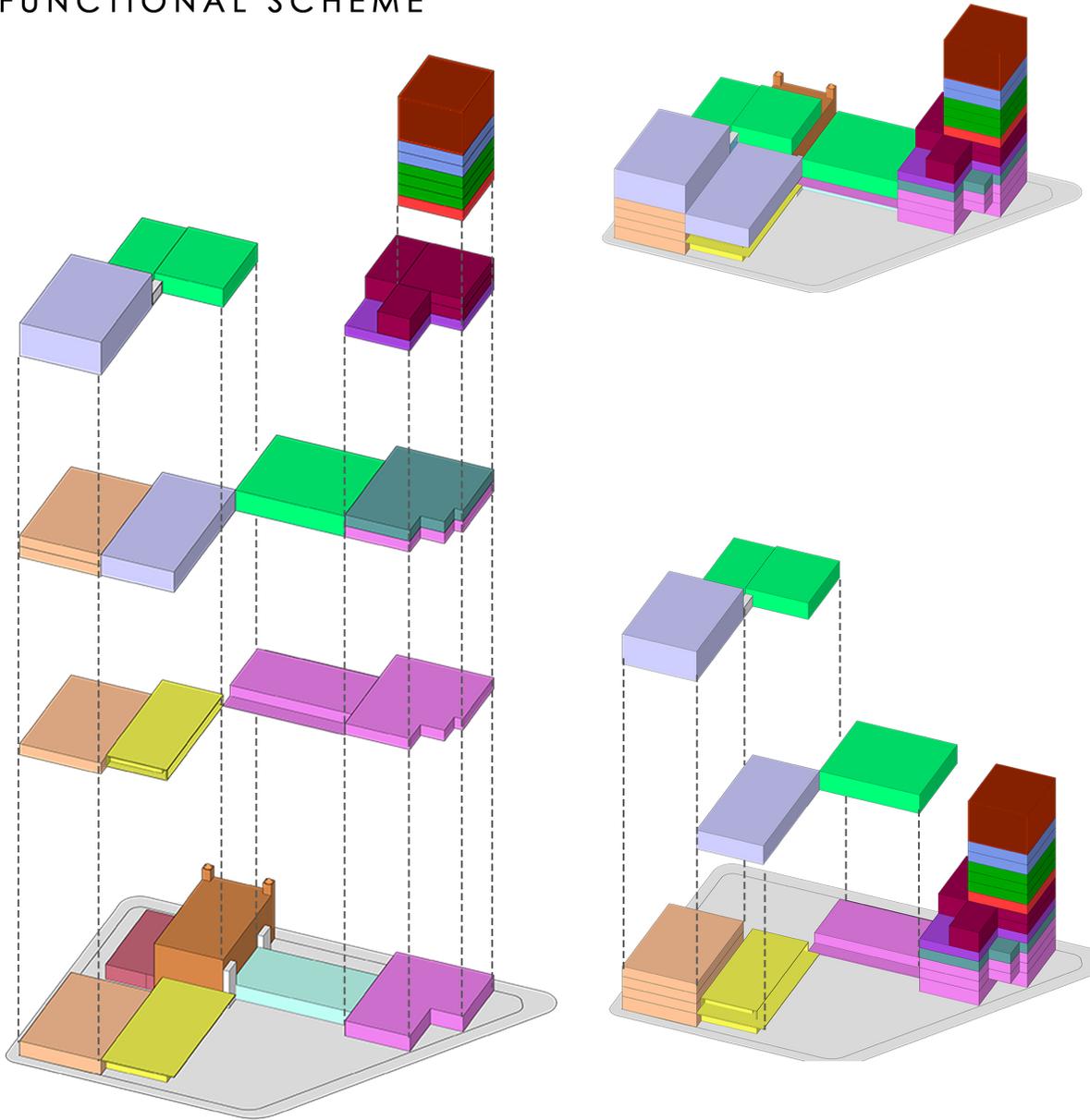
BUBBLE DIAGRAM



DESIGN BRIEF GREEN DEAL				
ORCHARD TO RETAIL				
Function	Area m <sup>2</sup>		No of people	Area m <sup>2</sup> /person
<b>VERTICAL FARMING / TOWER G+14</b>				
Retail shops G+2	2575		1030	2.5
3 <sup>rd</sup> floor Incubator for startup	642			
4 <sup>th</sup> floor Offices/workshop/education	609		60-80	5 for normal 12 for executive office
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Total offices		20 offices	
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Underground water tank	315 cubic meter	68483 gallons	
Overhead water tank	110 cubic meter	23914 gallons	

# FUNCTIONAL SCHEME



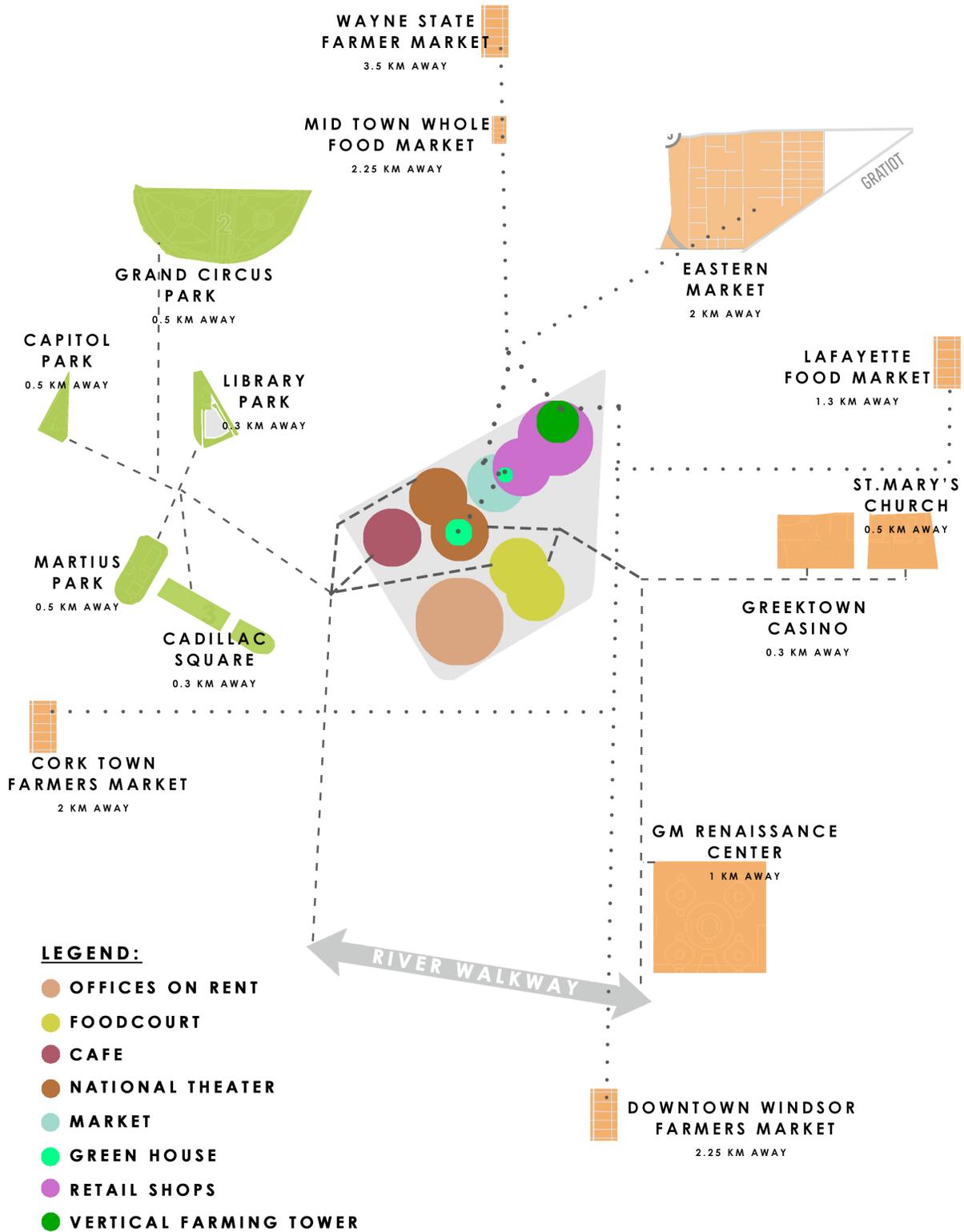
**LEGEND:**

- OFFICES ON RENT
- FOODCOURT
- CAFE
- NATIONAL THEATER
- MARKET
- GREEN HOUSE
- RETAIL SHOPS
- PRODUCTION

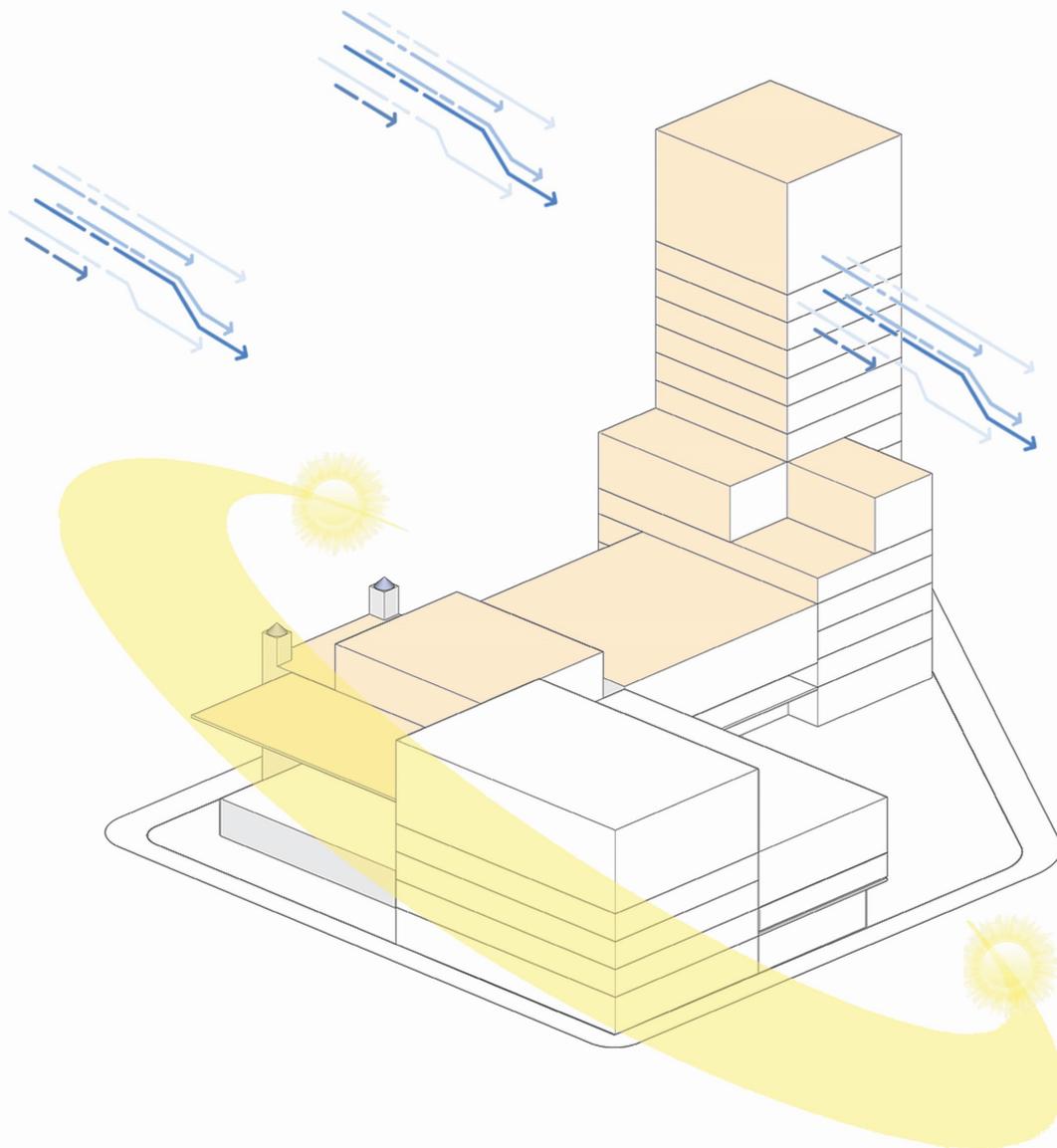
**VERTICAL TOWER**

- AEROPONICS
- AQUAPONICS
- VERTICAL FARMING
- COOKING STUDIO/MULTIFUNCTION
- INNOVATION LAB/DEMONSTRATION
- OFFICE/WORKSHOP/EDCATION
- INCUBATOR FOR STARTUPS
- RETAIL SHOPS

# CONNECTIONS WITH EXISTING URBAN TISSUE



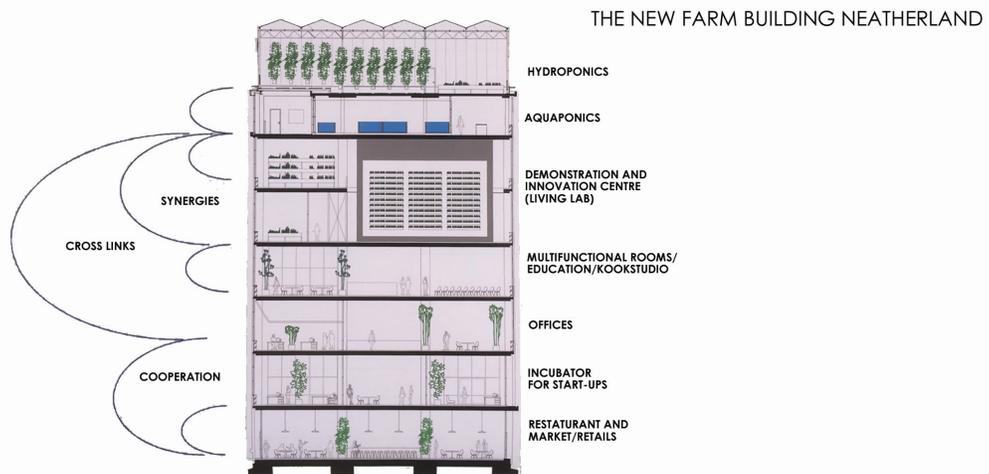
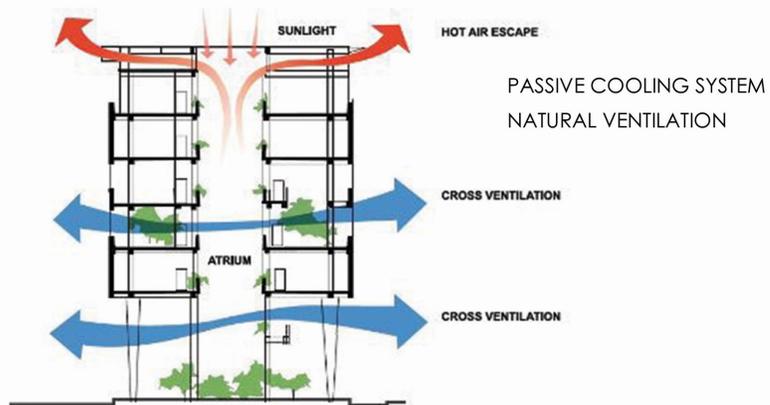
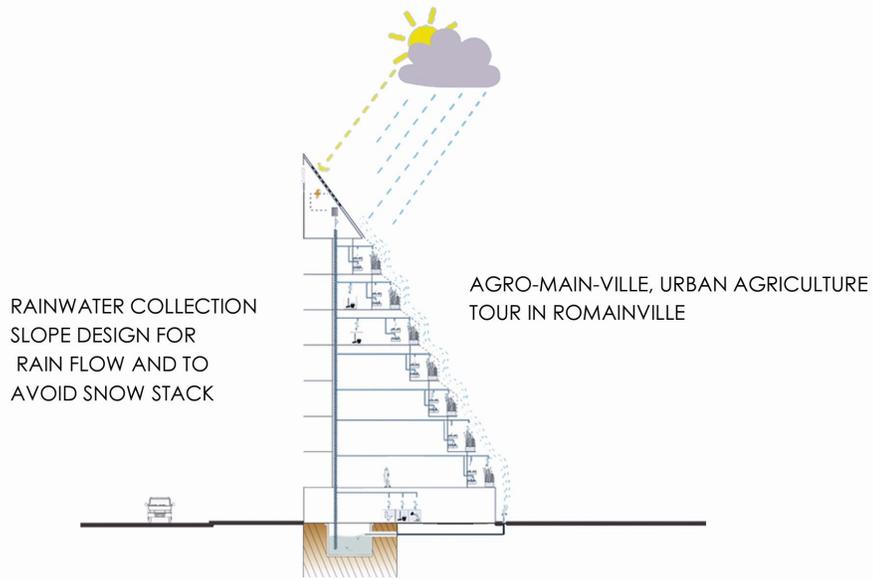
## ORIENTATION



THE FUNCTION HAS BEEN PLACED ACCORDING TO THE SUN ORIENTATION. KEEP THE SOUTH FACADE TRANSPARENT TO TAKE ADVANTAGE OF MOST OF THE NATURAL LIGHT. THE FARMING HAS BEEN DIVIDED IN DIFFERENT LEVELS, SO THAT THE SUN LIGHT CAN BE USED AS MUCH AS POSSIBLE, THE BUILDING IS PLACED PERPENDICULAR TO THE WIND DIRECTION SO THAT THE CROSS VENTILATION WILL BE TAKEN PLACE AND PASSIVE COOLING SYSTEM OF THE BUILDING WORK CORRECTLY.



# ARCHITECTURAL STRATEGIES



PLANS  
BY FLOOR

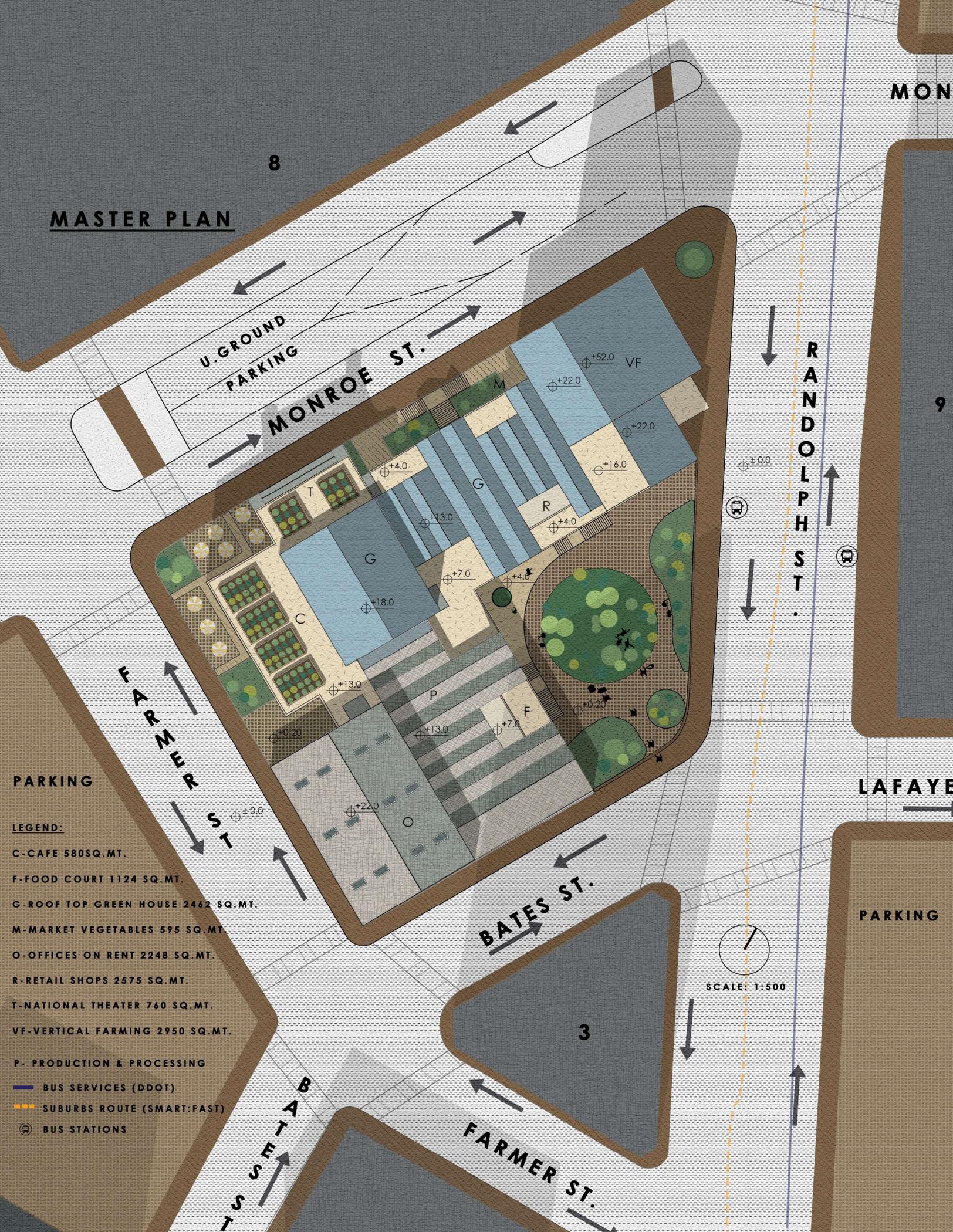
# MASTER PLAN

## PARKING

### LEGEND:

- C- CAFE 580SQ. MT.
- F- FOOD COURT 1124 SQ. MT.
- G- ROOF TOP GREEN HOUSE 2462 SQ. MT.
- M- MARKET VEGETABLES 595 SQ. MT.
- O- OFFICES ON RENT 2248 SQ. MT.
- R- RETAIL SHOPS 2575 SQ. MT.
- T- NATIONAL THEATER 760 SQ. MT.
- VF- VERTICAL FARMING 2950 SQ. MT.

- P- PRODUCTION & PROCESSING
-  BUS SERVICES (DDOT)
-  SUBURBS ROUTE (SMART:FAST)
-  BUS STATIONS

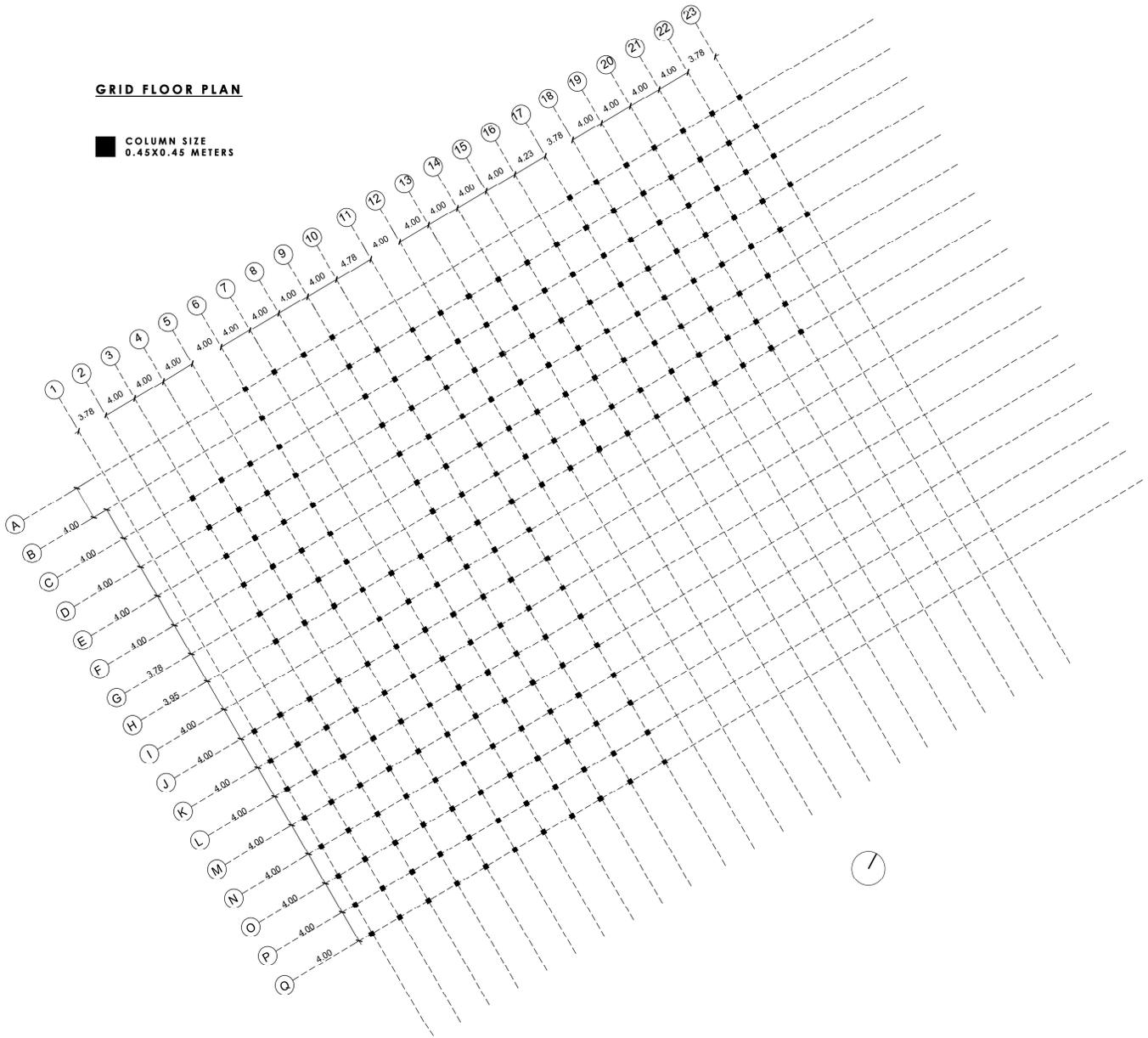


SCALE: 1:500

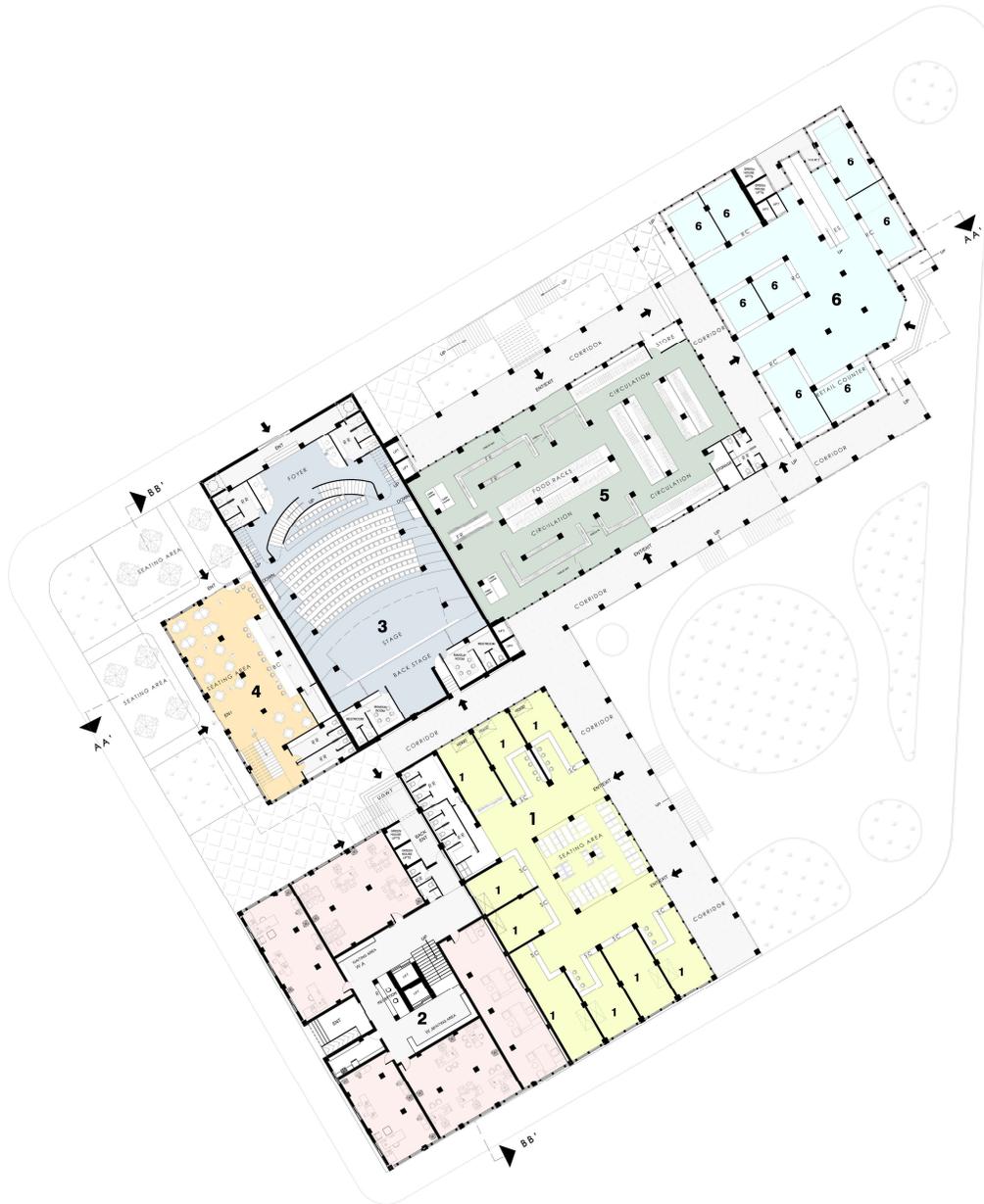
# GRID PLAN

## GRID FLOOR PLAN

■ COLUMN SIZE  
0.45X0.45 METERS



# GROUND FLOOR PLAN



## GROUND FLOOR PLAN

### BUILDING BLOCKS

- 1. FOOD COURT
- 2. OFFICE
- 3. NATIONAL THEATRE
- 4. CAFE
- 5. FOODMARKET & RETAIL
- 6. VERTICAL FARMING TOWER

### LEGEND

- 1. FOOD COURT  
SC. SERVING COUNTER  
RR. REST ROOM
- 2. OFFICES  
WA. WAITING AREA  
RC. RECEPTION
- 3. NATIONAL THEATRE
- 4. CAFE  
BC. BAR COUNTER
- 5. MARKET  
FR. FOOD RACKS
- 6. RETAIL SHOPS  
RC. RETAIL COUNTER  
ES. ESCALATOR



# FIRST FLOOR PLAN



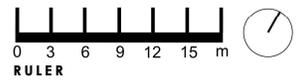
## FIRST FLOOR PLAN

### BUILDING BLOCKS

- 1. FOOD COURT
- 2. OFFICE
- 3. NATIONAL THEATRE
- 4. CAFE
- 5. FOODMARKET & RETAIL
- 6. VERTICAL FARMING TOWER

### LEGEND

- 1. FOOD COURT
- SC. SERVING COUNTER
- RR. REST ROOM
- 2. OFFICES
- WA. WAITING AREA
- 3. NATIONAL THEATRE
- PR. PROJECTORE ROOM
- 4. CAFE
- 6. RETAIL SHOPS
- RC. RETAIL COUNTER
- ES. ESCALATOR
- RR. REST ROOM



# SECOND FLOOR PLAN



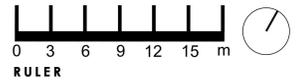
## SECOND FLOOR PLAN

### BUILDING BLOCKS

- 1. FOOD COURT
- 2. OFFICE
- 3. NATIONAL THEATRE
- 4. CAFE
- 5. FOODMARKET & RETAIL
- 6. VERTICAL FARMING TOWER

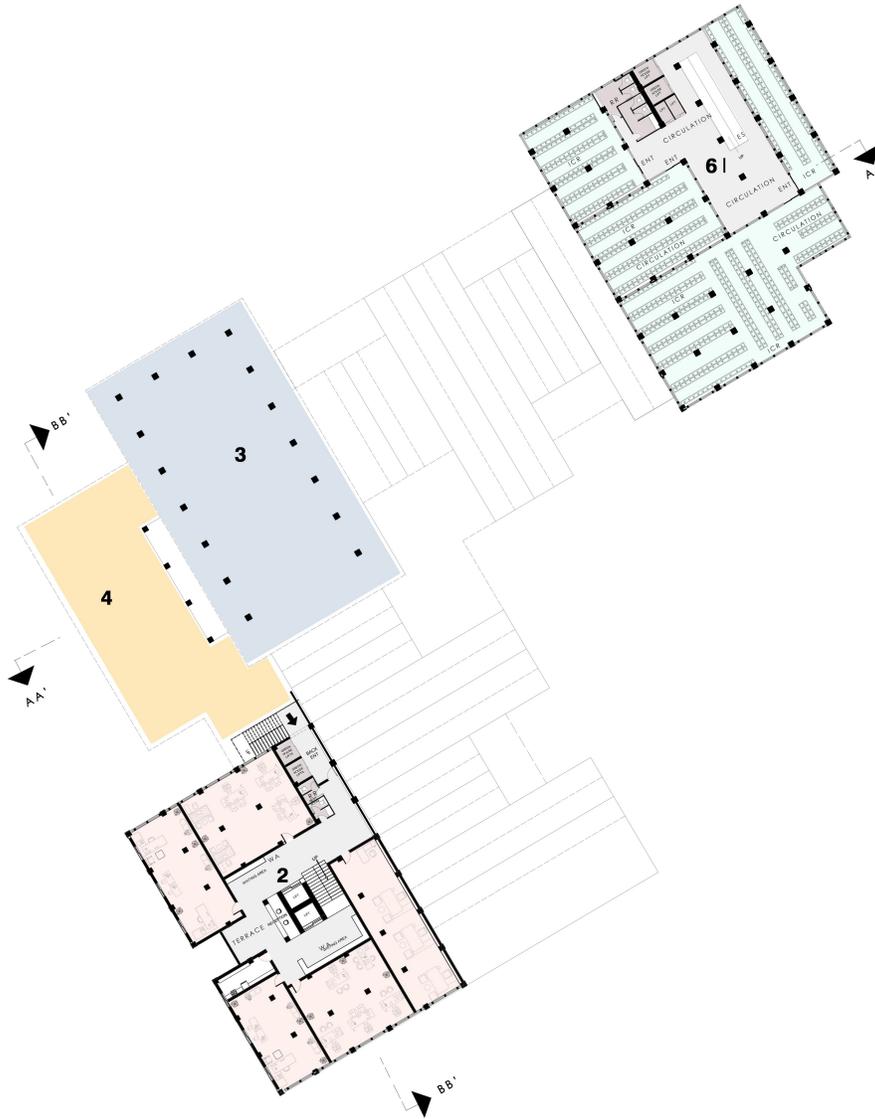
### LEGEND

- 1P. PRODUCTION AREA
- RR. REST ROOM
- 2. OFFICES
- WA. WAITING AREA
- 3. NATIONAL THEATRE
- 4. CAFE
- 5G. GREEN HOUSE
- 6. RETAIL SHOPS
- RC. RETAIL COUNTER
- ES. ESCALATOR
- RR. REST ROOM



# THIRD FLOOR PLAN

## THIRD FLOOR PLAN



### BUILDING BLOCKS

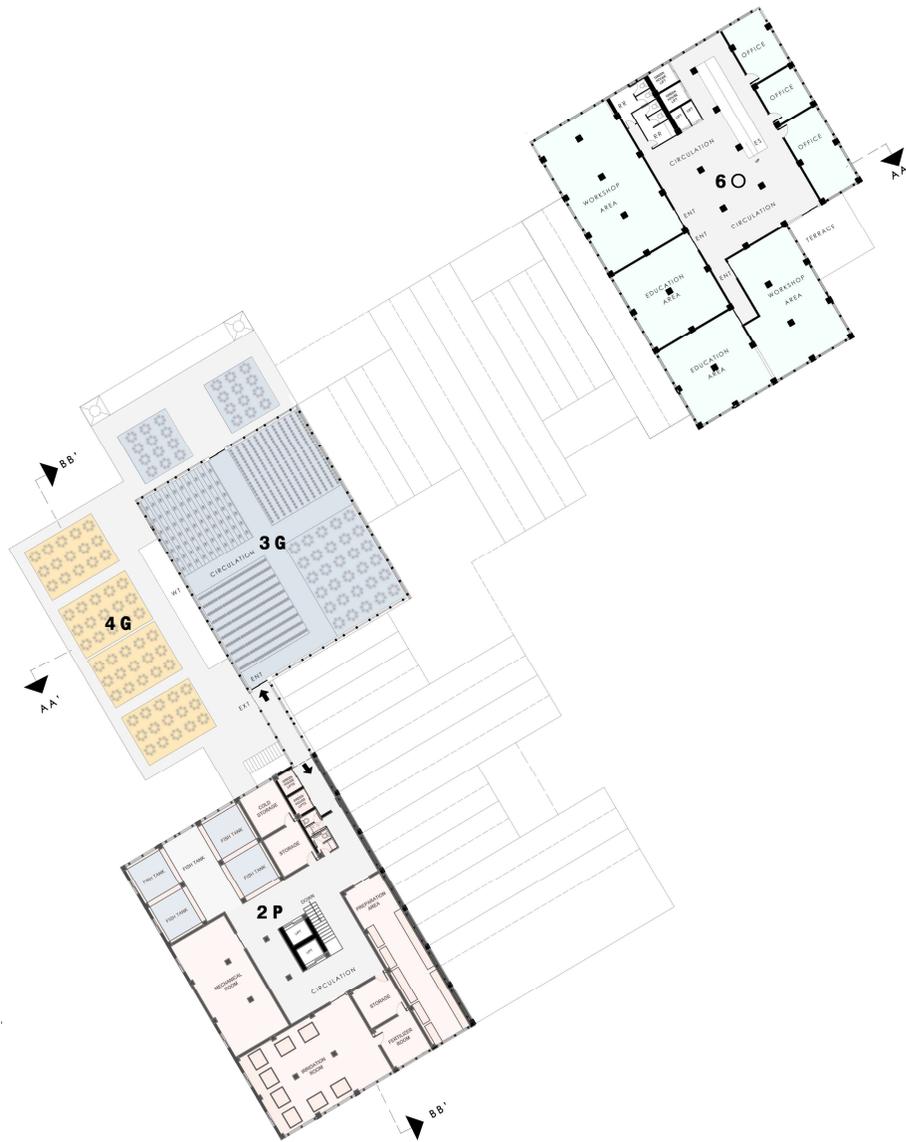
- 2. OFFICE
- 3. NATIONAL THEATRE
- 4. CAFE
- 6. VERTICAL FARMING TOWER

### LEGEND

- 2. OFFICES
- WA. WAITING AREA
- 3. NATIONAL THEATRE
- 4. CAFE
- 6I. INCUBATORS FOR STARTUPS
- IRC. INCUBATOR ROOM FOR PLANTS
- ES. ESCALATOR
- RR. REST ROOM



# FOURTH FLOOR PLAN



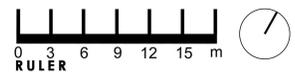
## FOURTH FLOOR PLAN

### BUILDING BLOCKS

- 2. OFFICE
- 3. NATIONAL THEATRE
- 4. CAFE
- 6. VERTICAL FARMING TOWER

### LEGEND

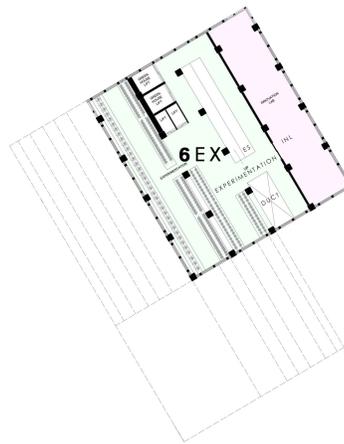
- 2P. PREPERATION AREA
- 3G. GREEN HOUSE NATIONAL THEATRE
- 4G. OUTDOOR VEGETATION CAFE
- WT. WATER TANK
- 6O. OFFICE, EDUCATION & WORKSHOP
- ENT. ENTRANCE
- ES. ESCALATOR
- RR. REST ROOM



# FIFTH & SIXTH FLOOR PLAN



FIFTH FLOOR



SIXTH FLOOR

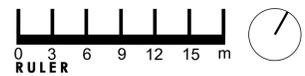
## FOURTH & SIXTH FLOOR PLAN

### BUILDING BLOCKS

- 6. VERTICAL FARMING TOWER

### LEGEND

- 6DG. DEMONSTRATION & GREEN HOUSE
- ENT. ENTRANCE
- ES. ESCALATOR
- RR. REST ROOM
- GRH. GREEN HOUSE
- INL. INNOVATION LAB
- 6EX. EXPERIMENTATION & INN. LAB
- ENT. ENTRANCE
- ES. ESCALATOR
- INL. INNOVATION LAB

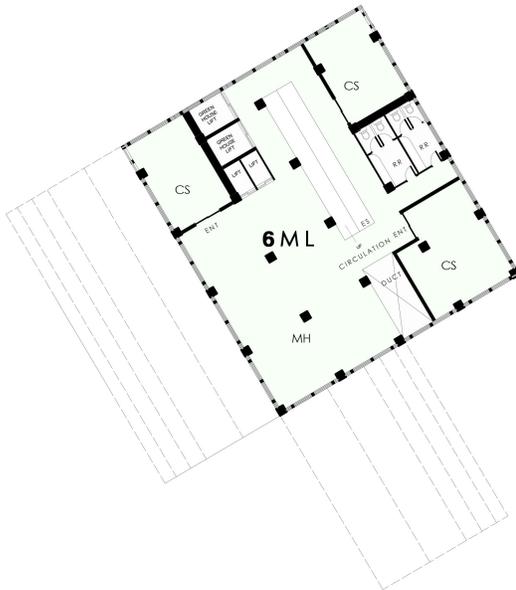


# SEVENTH FLOOR PLAN

## SEVENTH FLOOR PLAN

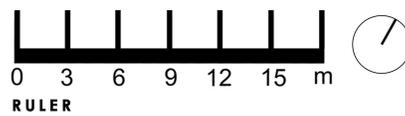
### BUILDING BLOCKS

6. VERTICAL FARMING TOWER



### LEGEND

6ML. MULTIPURPOSE FLOOR  
ENT. ENTERANCE  
ES. ESCALATOR  
RR. REST ROOM  
CS. COOKING STUDIO  
MH. MULTIFUNCTIONAL HALL



# EIGHT, NINTH & TENTH FLOOR PLAN

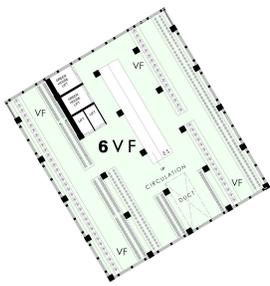
## 8TH, 9TH, 10TH FLOOR PLAN

### BUILDING BLOCKS

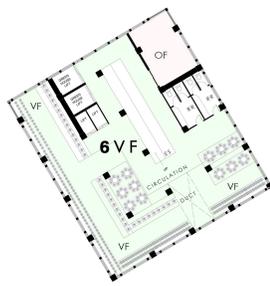
6. VERTICAL FARMING TOWER

### LEGEND

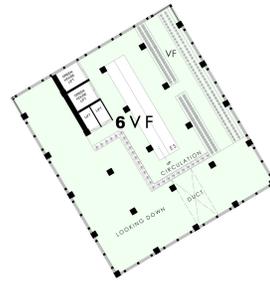
6VF. VERTICAL FARMING FLOORS  
 ES. ESCALATOR  
 RR. REST ROOM  
 OF. OFFICE



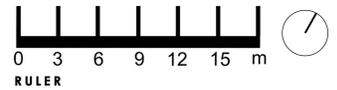
8TH FLOOR



9TH FLOOR



10TH FLOOR



# ELEVEN & TWELVETH FLOOR PLAN

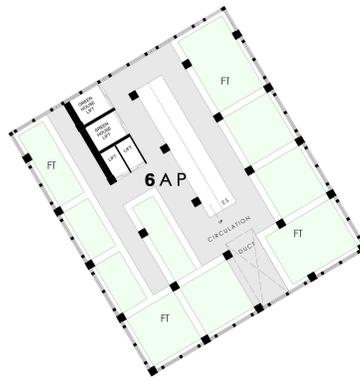
## 11TH & 12TH FLOOR PLAN

### BUILDING BLOCKS

6. VERTICAL FARMING TOWER



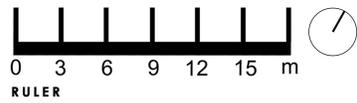
11TH FLOOR



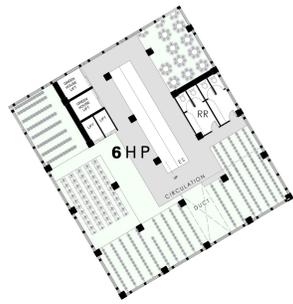
12TH FLOOR

### LEGEND

6A.O. AQUAPONICS FLOORS  
 ES. ESCALATOR  
 RR. REST ROOM  
 CR. CONTROL ROOM  
 FT. FISH TANK

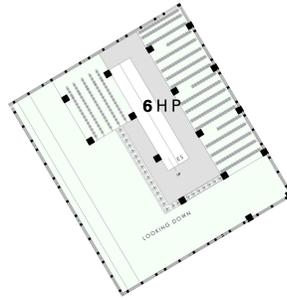


# THIRTEEN & FOURTEENTH FLOOR PLAN



HYDROPHONICS

13TH FLOOR



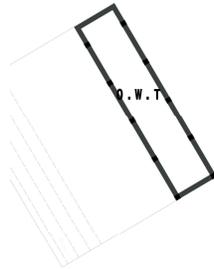
HYDROPHONICS

14TH FLOOR

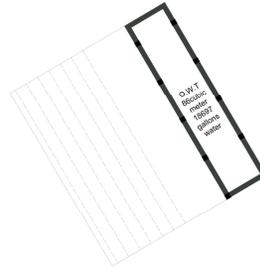
## 13TH & 14TH FLOOR PLAN

### BUILDING BLOCKS

6. VERTICAL FARMING TOWER



OVERHEAD TANK



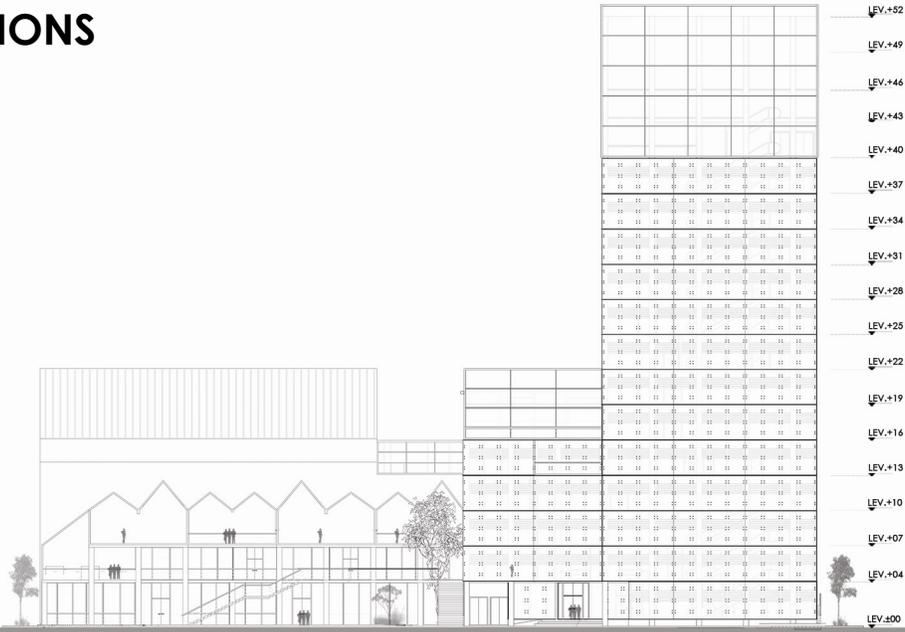
OVERHEAD TANK

### LEGEND

6HP. HYDROPHONICS FLOORS  
 ES. ESCALATOR  
 RR. REST ROOM



# ELEVATIONS

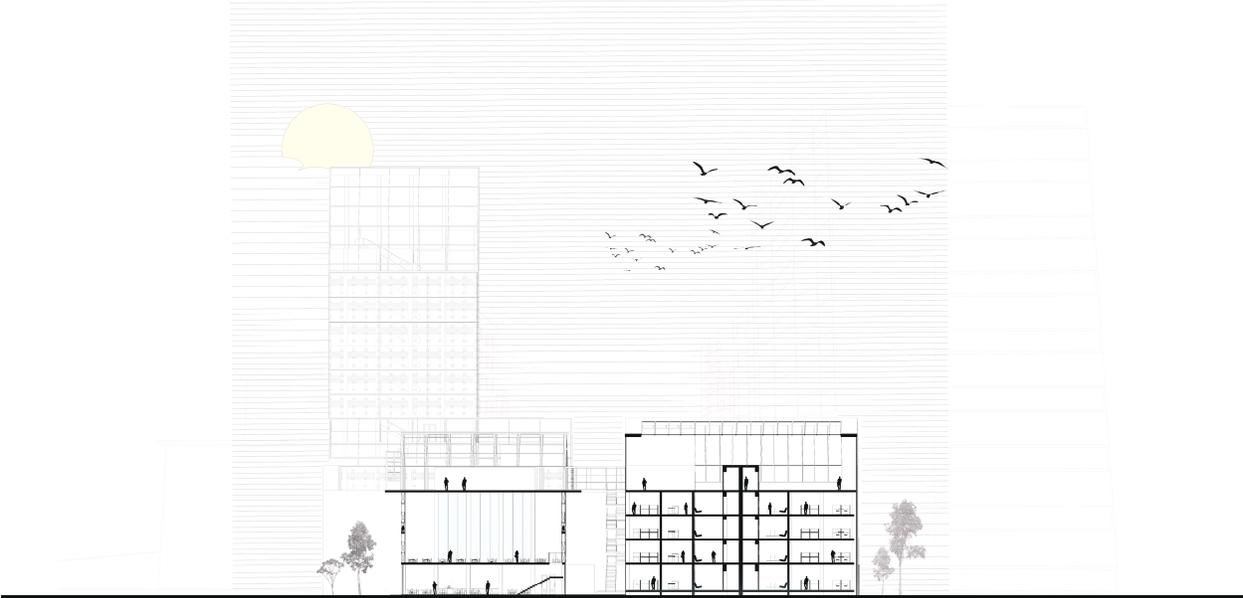


**NORTH ELEVATION**



**EAST ELEVATION**

# SECTIONS



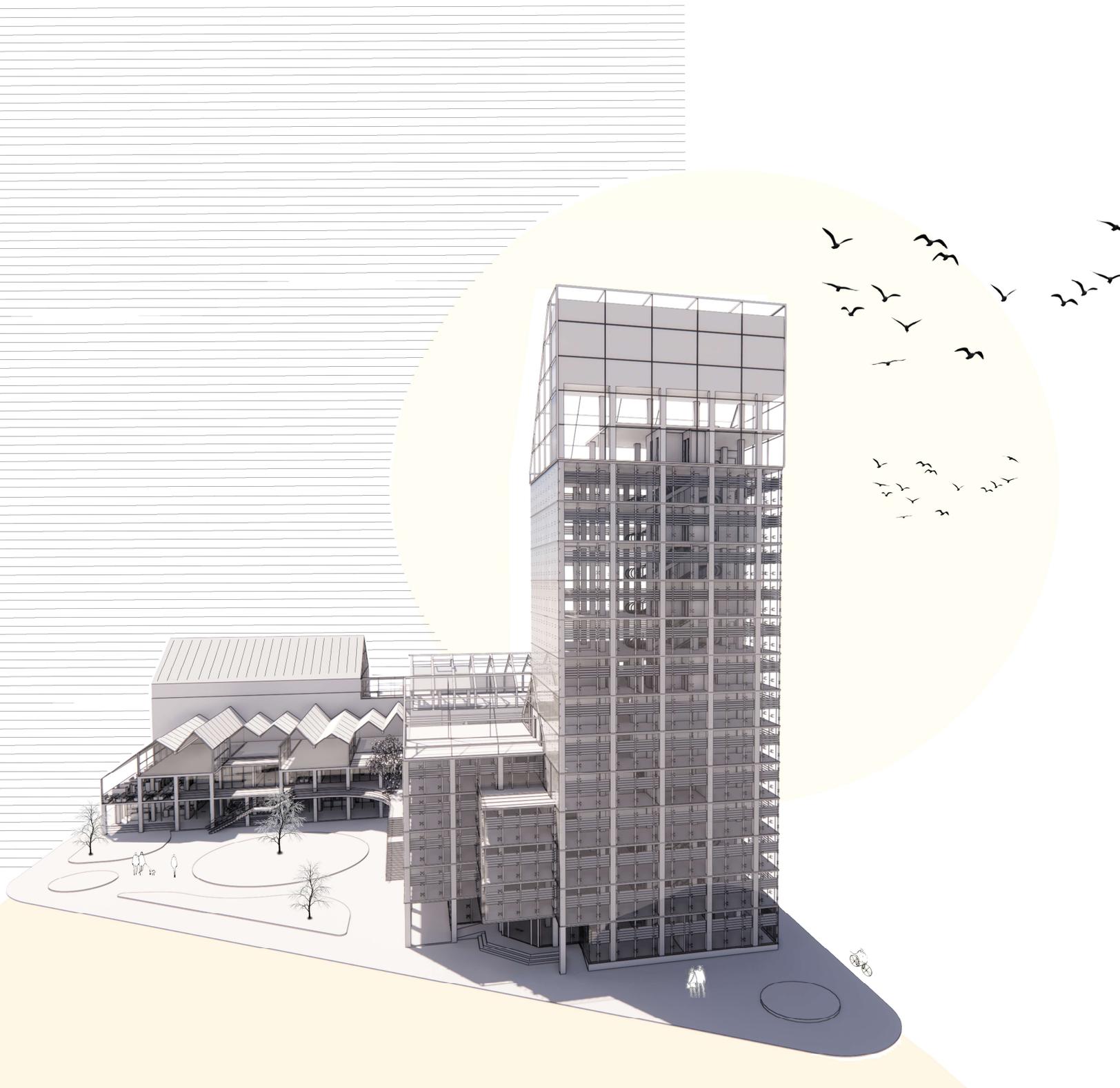
SECTION AT BB'



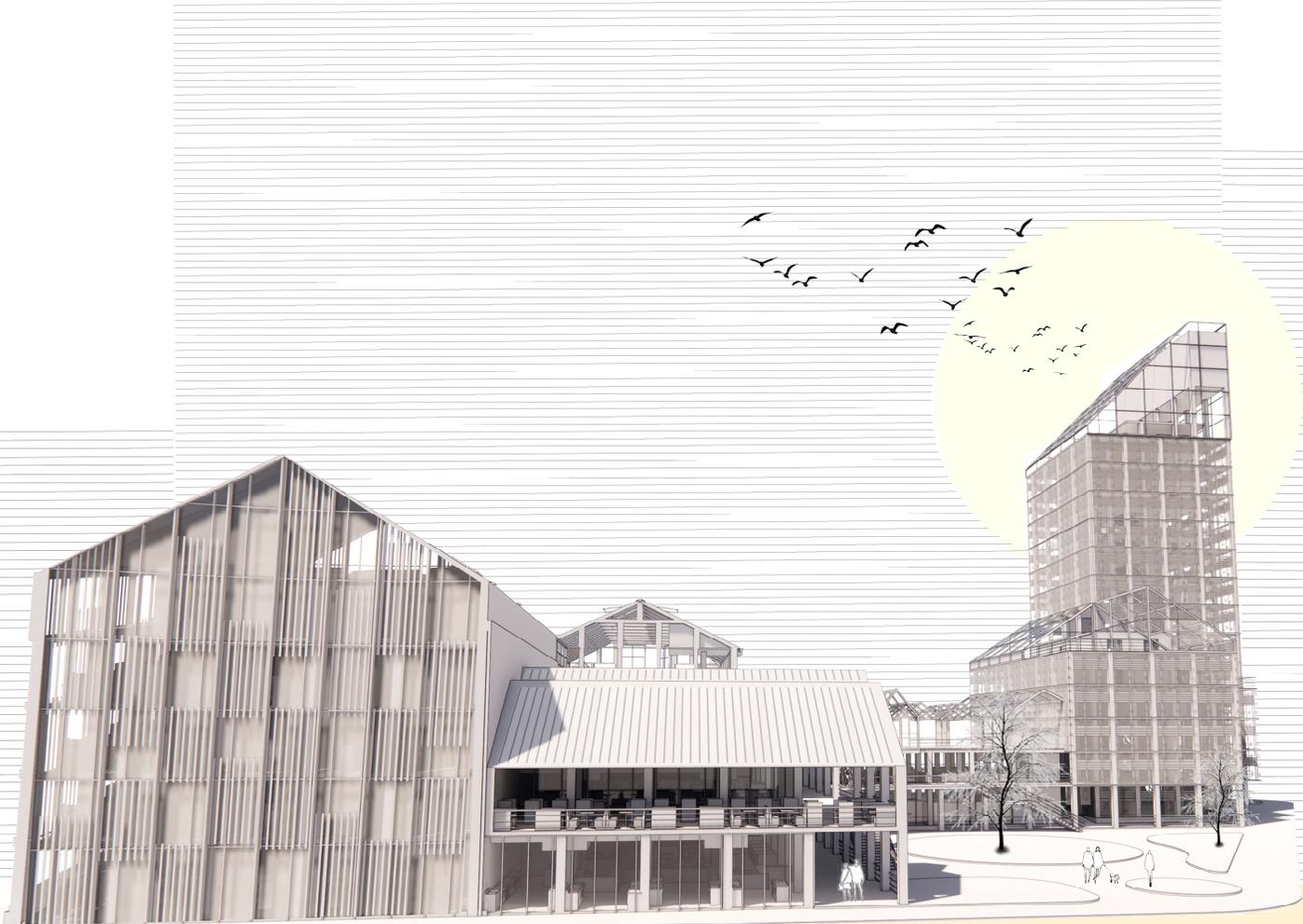
SECTION AT AA'

# VIEWS

TOWER SIDE VIEW  
NORTH-EAST SIDE



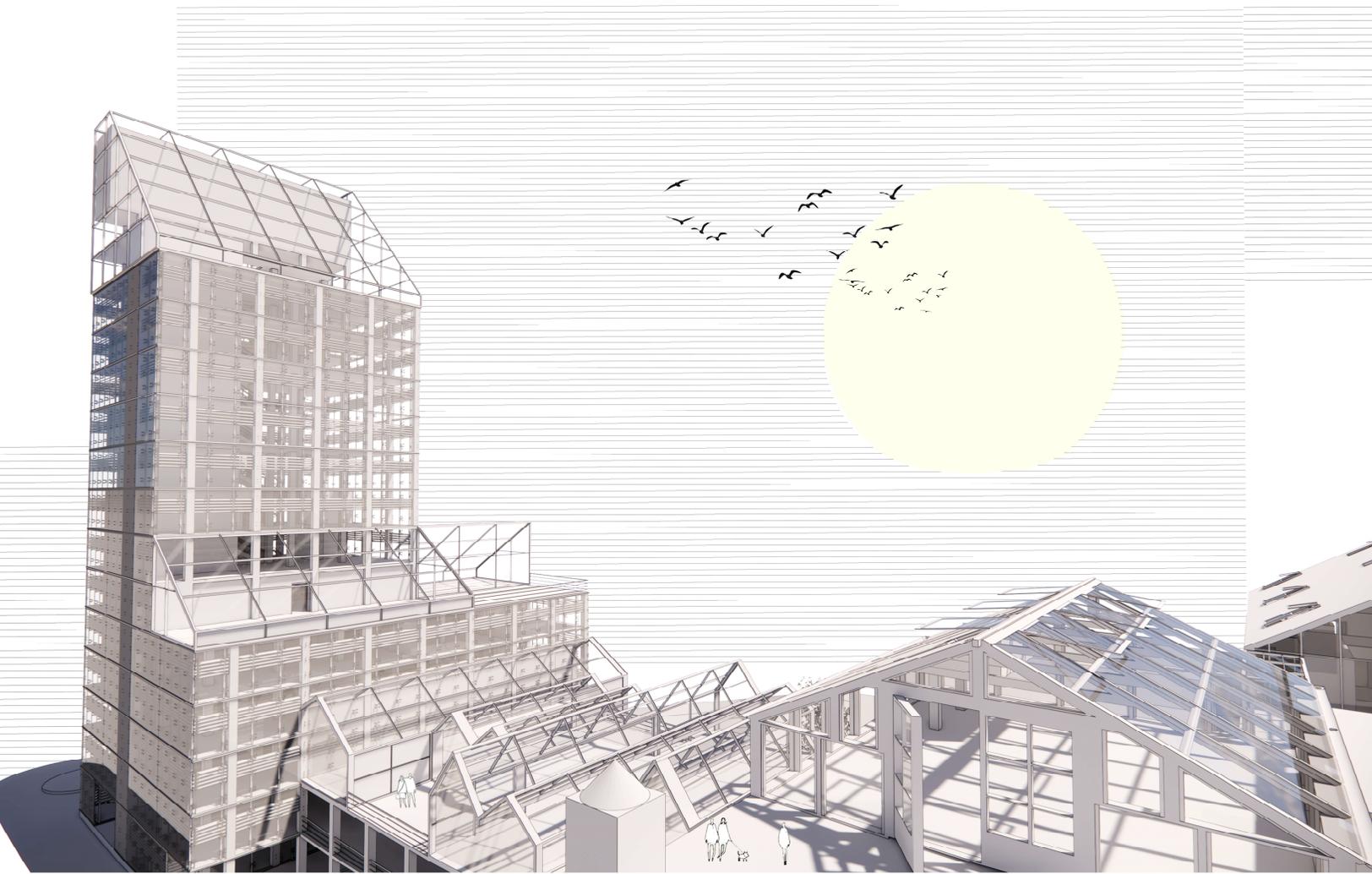
OFFICE SIDE VIEW  
EAST SIDE



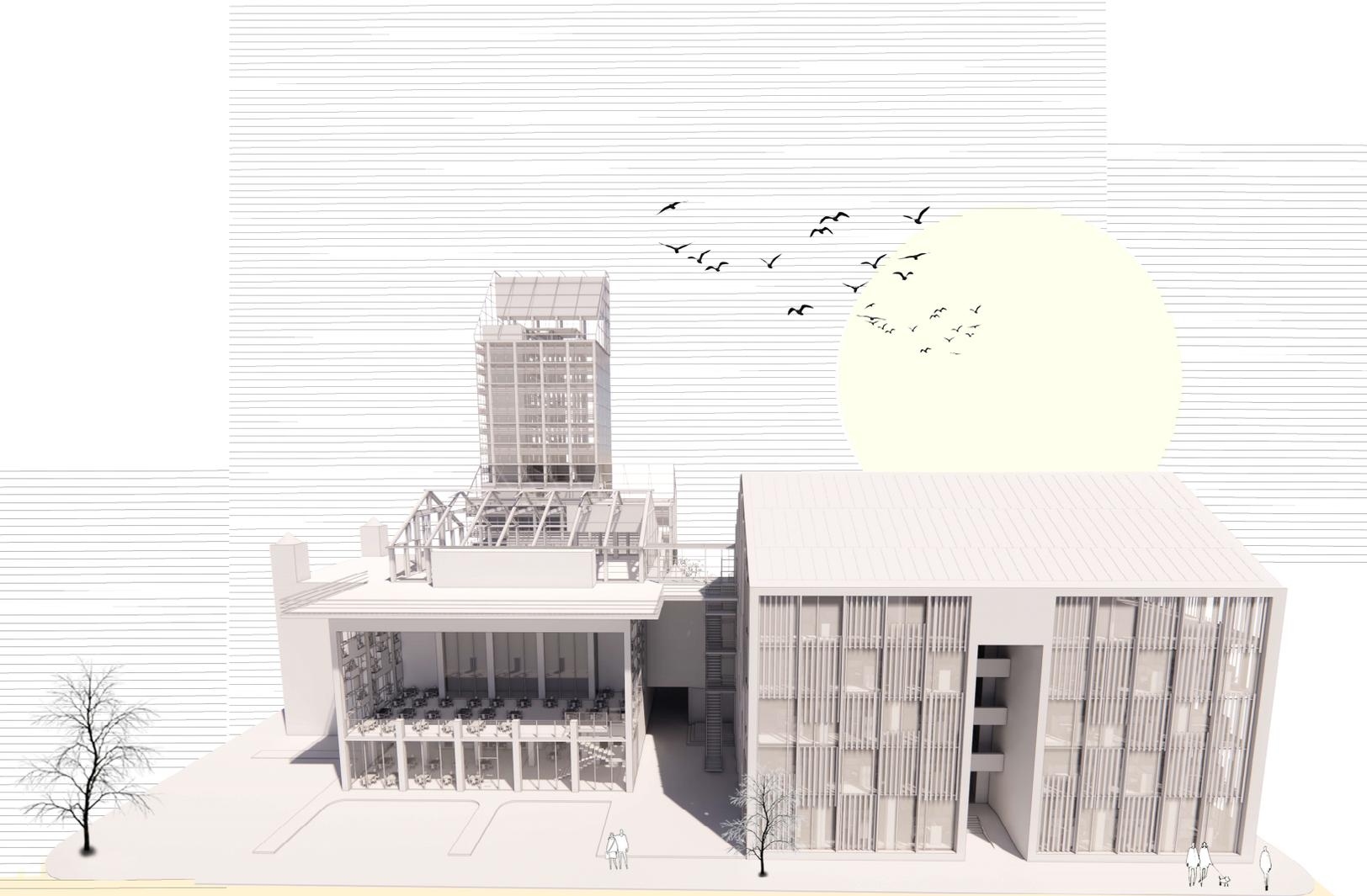
COURTYARD VIEW  
EAST SIDE



ROOFTOP GREENHOUSE VIEW  
SOUTH-WEST SIDE



CAFE SIDE VIEW  
SOUTH SIDE



**DRAWINGS  
BY BLOCK**

## Reference for office building facade

### TALBOT GATEWAY, BLACKPOOL COUNCIL OFFICE, UK

Architects: AHR Architects

Area: 12002 m<sup>2</sup>Area: 12002 m<sup>2</sup>

Year: 2014



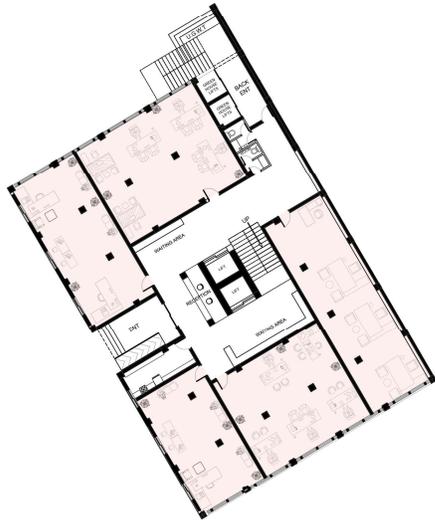
source: <https://www.ahr.co.uk/Talbot-Gateway-Blackpool-Council>

The BREEAM Excellent development comprises of a five-story office building with 85,000 ft<sup>2</sup> net internal office floor area, along with ground floor retail, offices and associated plant accommodation at ground and the roof. Car parking is provided for c.300 cars (including disabled persons spaces) in the Banks Street car park, west of Blackpool North Train Station.

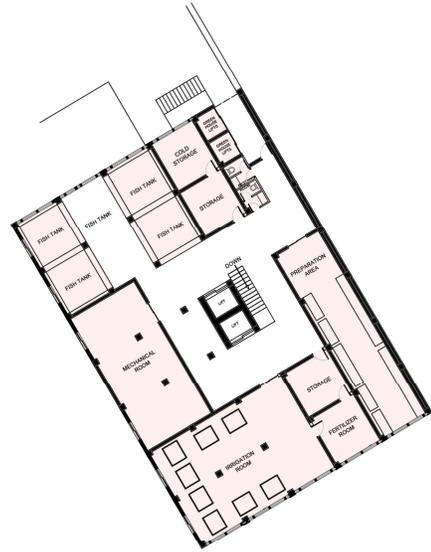
To achieve the EPC rating of A, the design of the building was thermally modelled and tested to allow the façade design to develop to optimize daylight penetration into the office space whilst the provision of vertical fin solar shading reduces the solar load on the South East and South West façades. A double skin facade overlooking Deans-gate Plaza provides the transparency and a change in aesthetic with the protection from solar gain and helps to provide a marker for the entrance to the building.

# OFFICE BLOCK

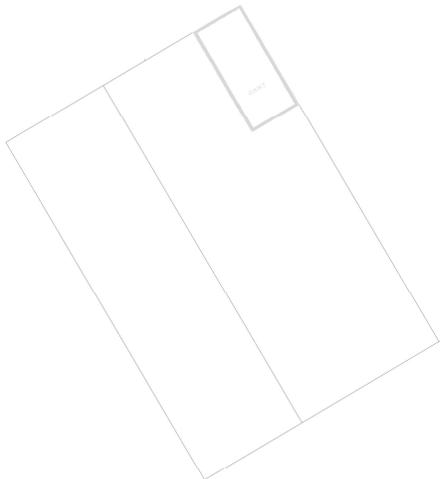
## PLANS



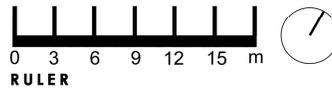
**GROUND FLOOR OFFICE**



**FOURTH FLOOR GREEN HOUSE**



**ROOF**

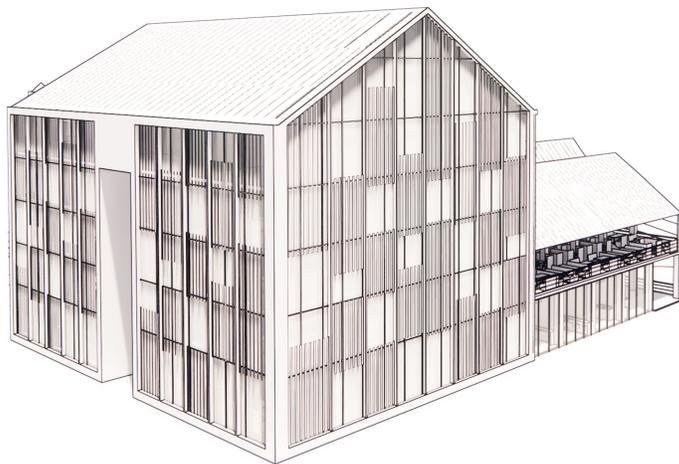
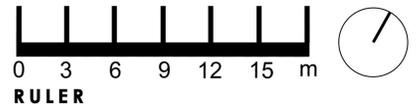


VIEW AND ELEVATION



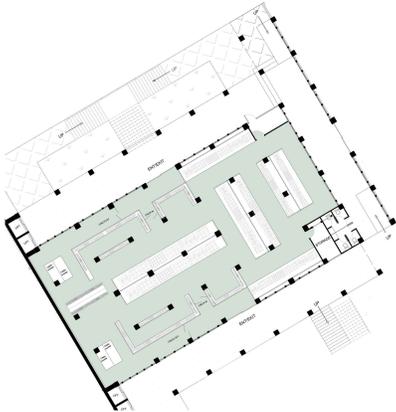
**SOUTH ELEVATION**

**EAST ELEVATION**

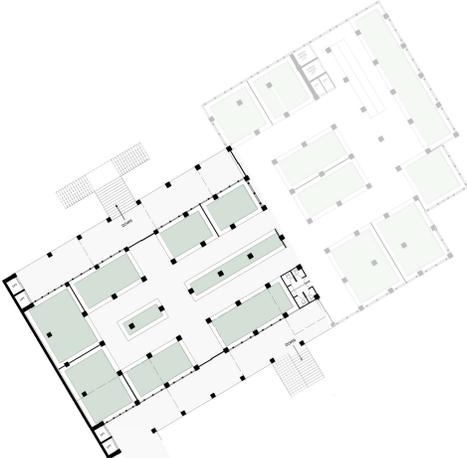


# MARKET BLOCK

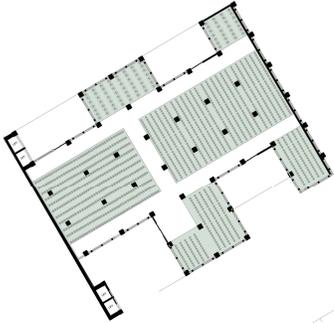
## PLANS



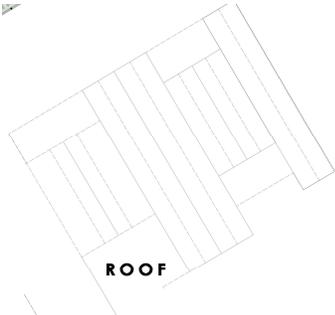
**GROUND FLOOR  
MARKET HALL**



**FIRST FLOOR  
RETAIL SHOPS**



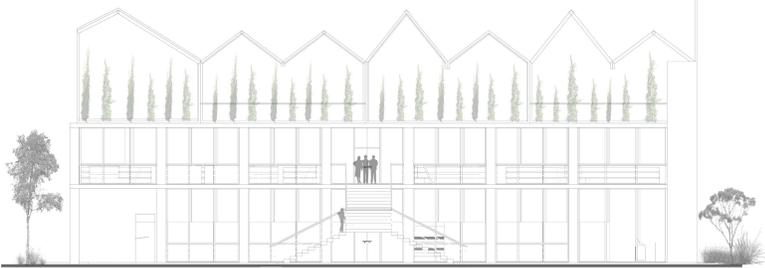
**SECOND FLOOR  
GREEN HOUSE**



**ROOF**



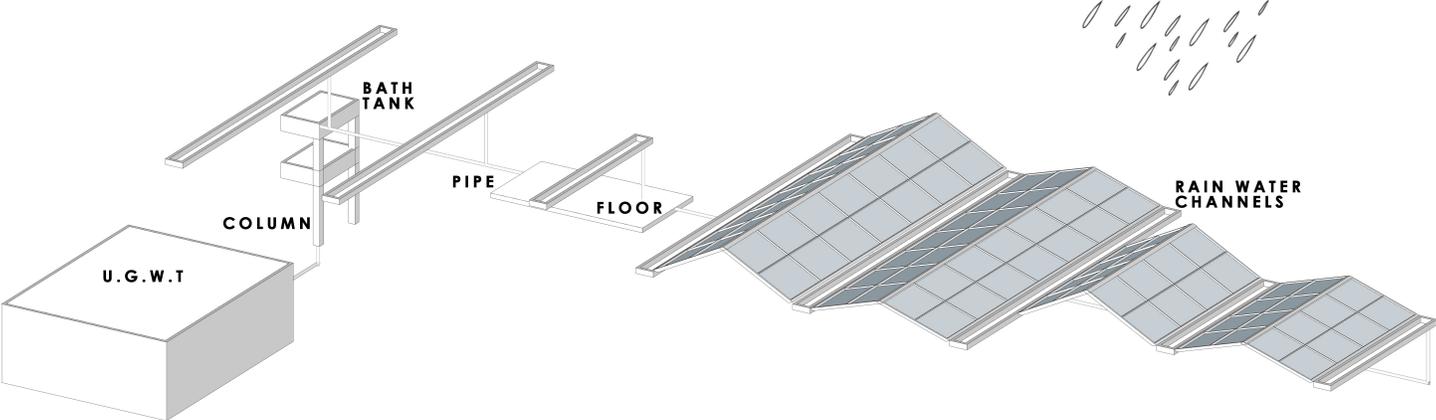
ELEVATION AND VIEW



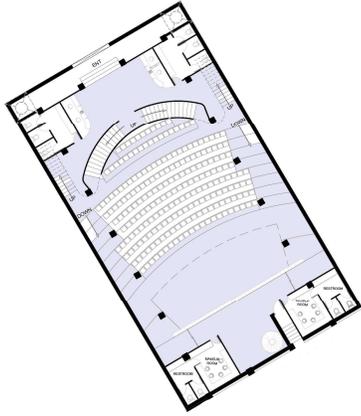
WEST ELEVATION



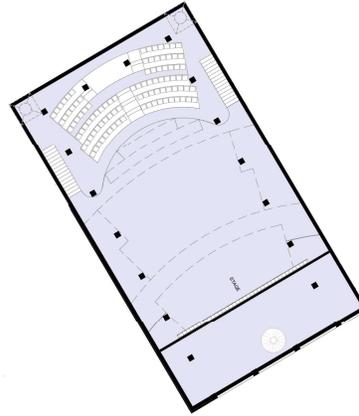
# RAIN WATER COLLECTION SYSTEM



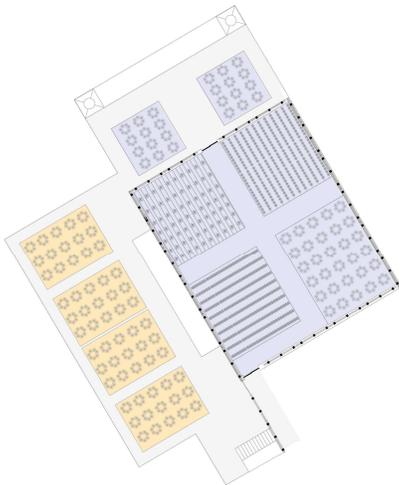
# THEATER BLOCK



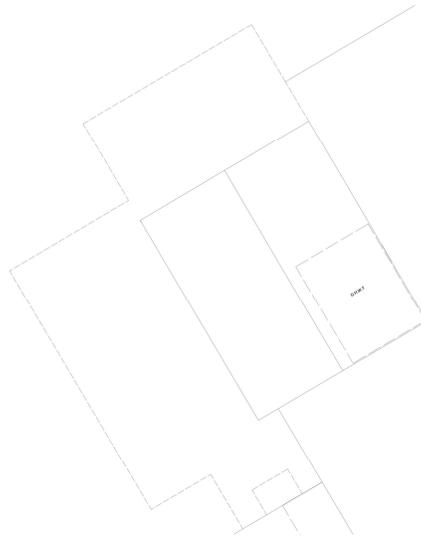
**GROUND FLOOR**



**SECOND FLOOR**



**FOURTH FLOOR**



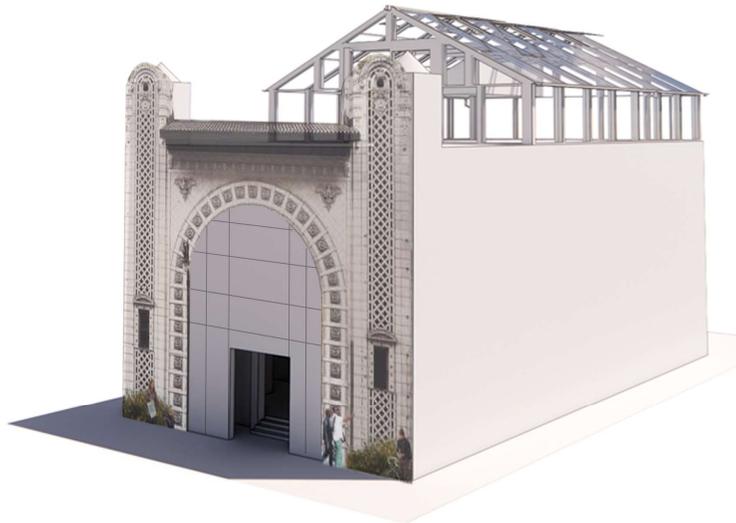
**ROOF**



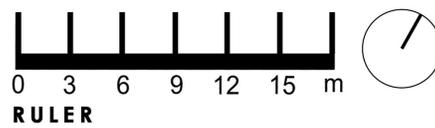
ELEVATION AND VIEW



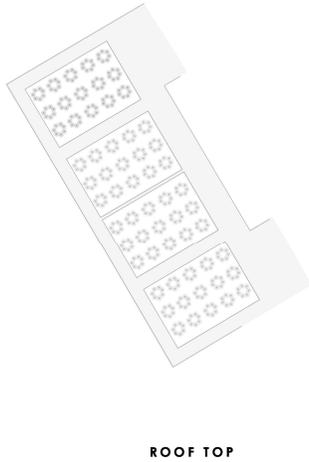
**EAST ELEVATION**



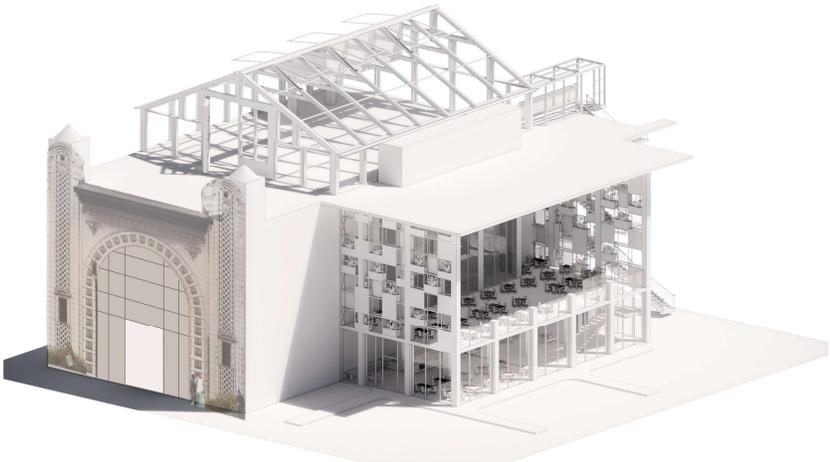
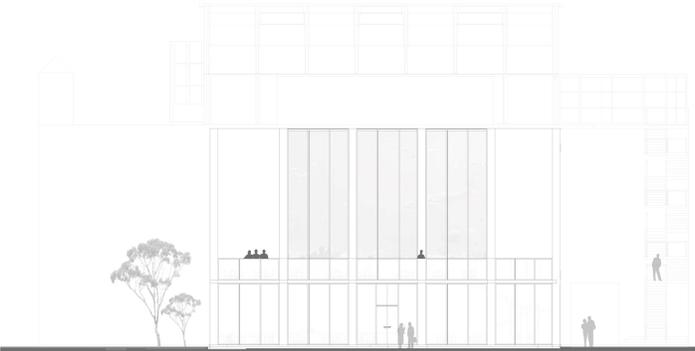
**VIEW**



# CAFE BLOCK

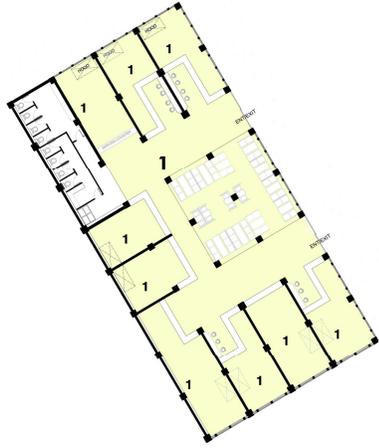


ELEVATION AND VIEW

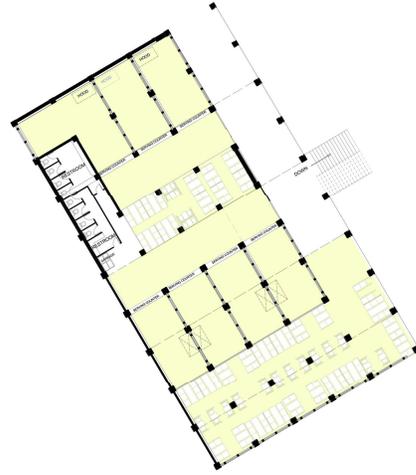


# FOODCOURT BLOCK

## FOOD STALLS



GROUND FLOOR

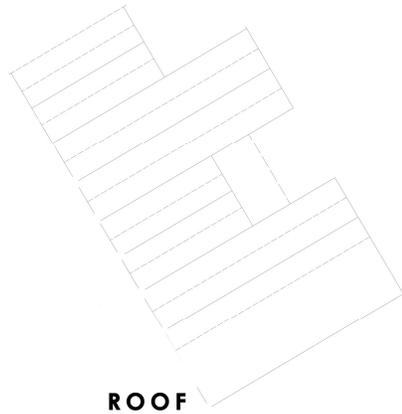


FIRST FLOOR

## GREEN HOUSE PRODUCTION



SECOND FLOOR



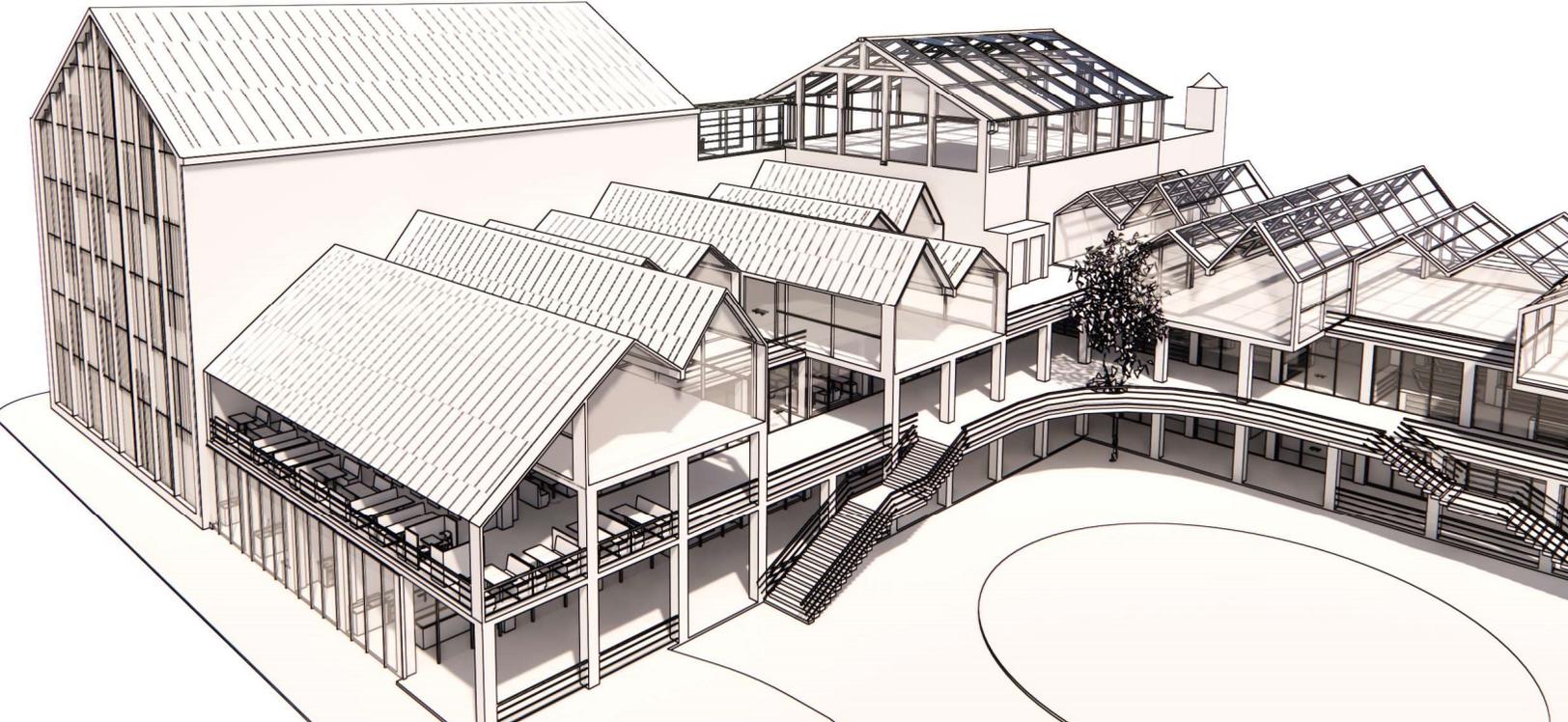
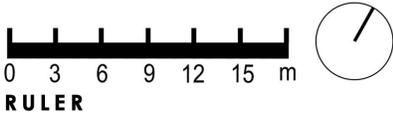
ROOF



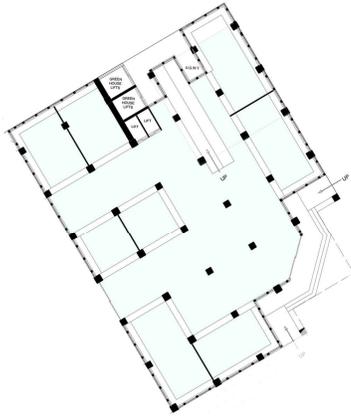
ELEVATION AND VIEW



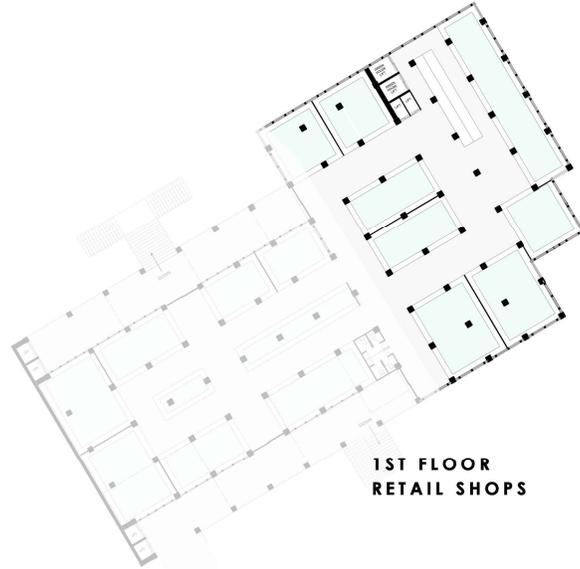
**NORTH EAST ELEVATION**



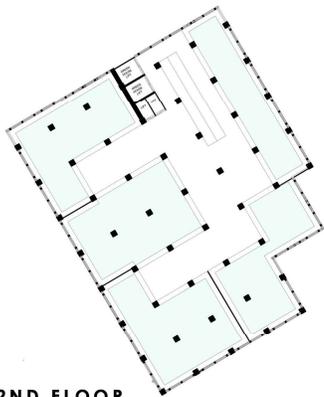
# VERTICAL FARMING BLOCK



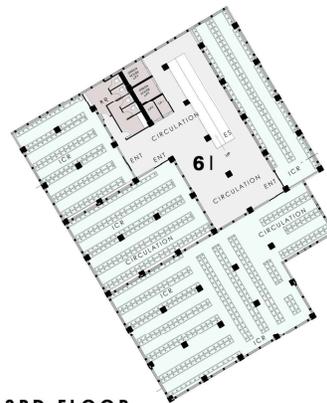
**GROUND FLOOR  
RETAIL SHOPS**



**1ST FLOOR  
RETAIL SHOPS**



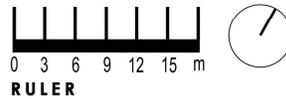
**2ND FLOOR  
RETAIL SHOPS**

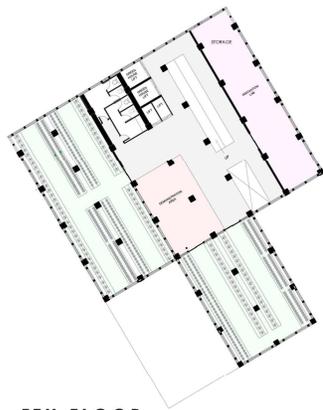


**3RD FLOOR  
INCUBATOR STARTUP**

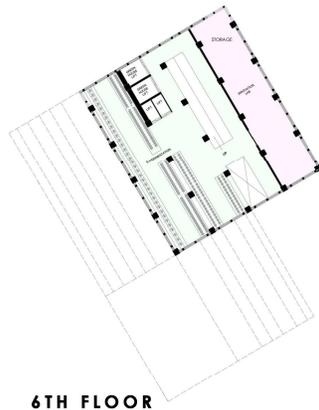


**4TH FLOOR  
1. OFFICE AREA  
2. WORKSHOP  
3. EDUCATION**





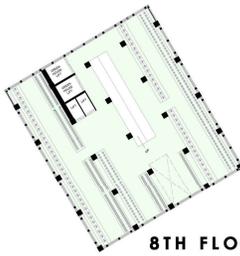
**5TH FLOOR**



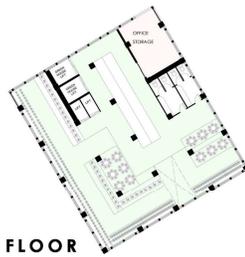
**6TH FLOOR**



**7TH FLOOR**



**8TH FLOOR**



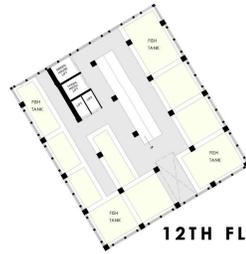
**9TH FLOOR**



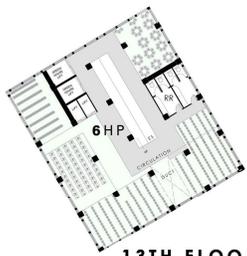
**10TH FLOOR**



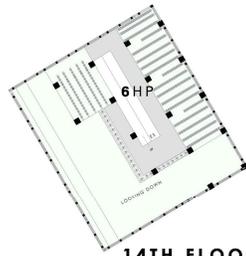
**11TH FLOOR**



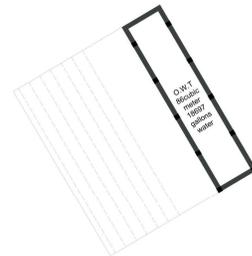
**12TH FLOOR**



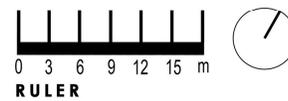
**13TH FLOOR**



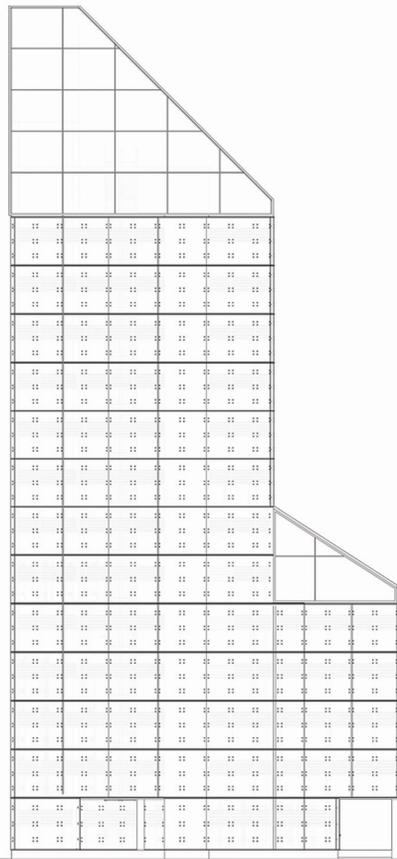
**14TH FLOOR**



**OVERHEAD TANK**



# ELEVATION AND VIEW

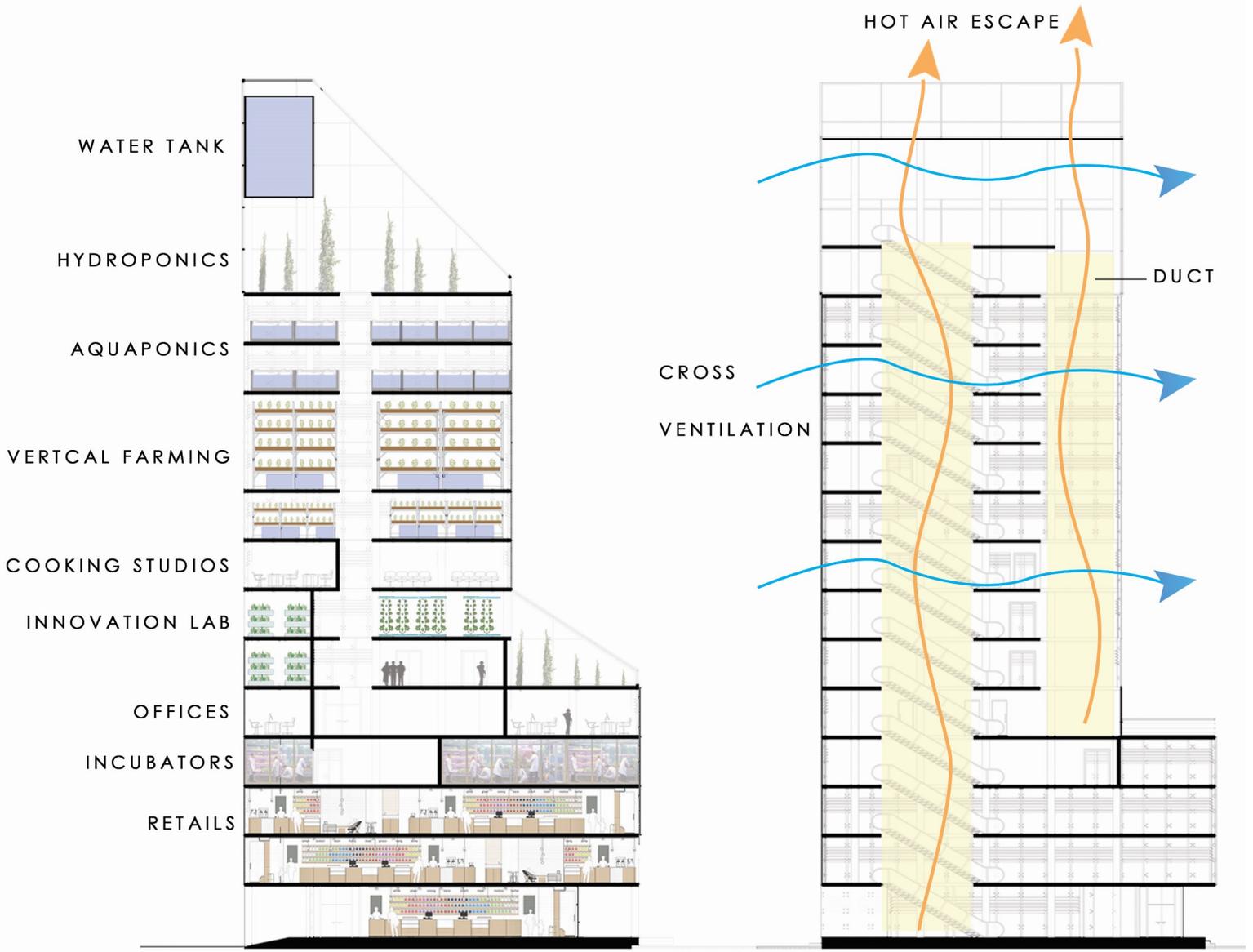


WEST ELEVATION



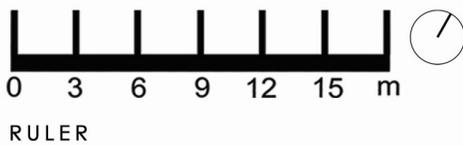
RULER

# SECTION AND DETAIL



SECTION

PASSIVE COOLING SYSTEM  
NATURAL VENTILATION



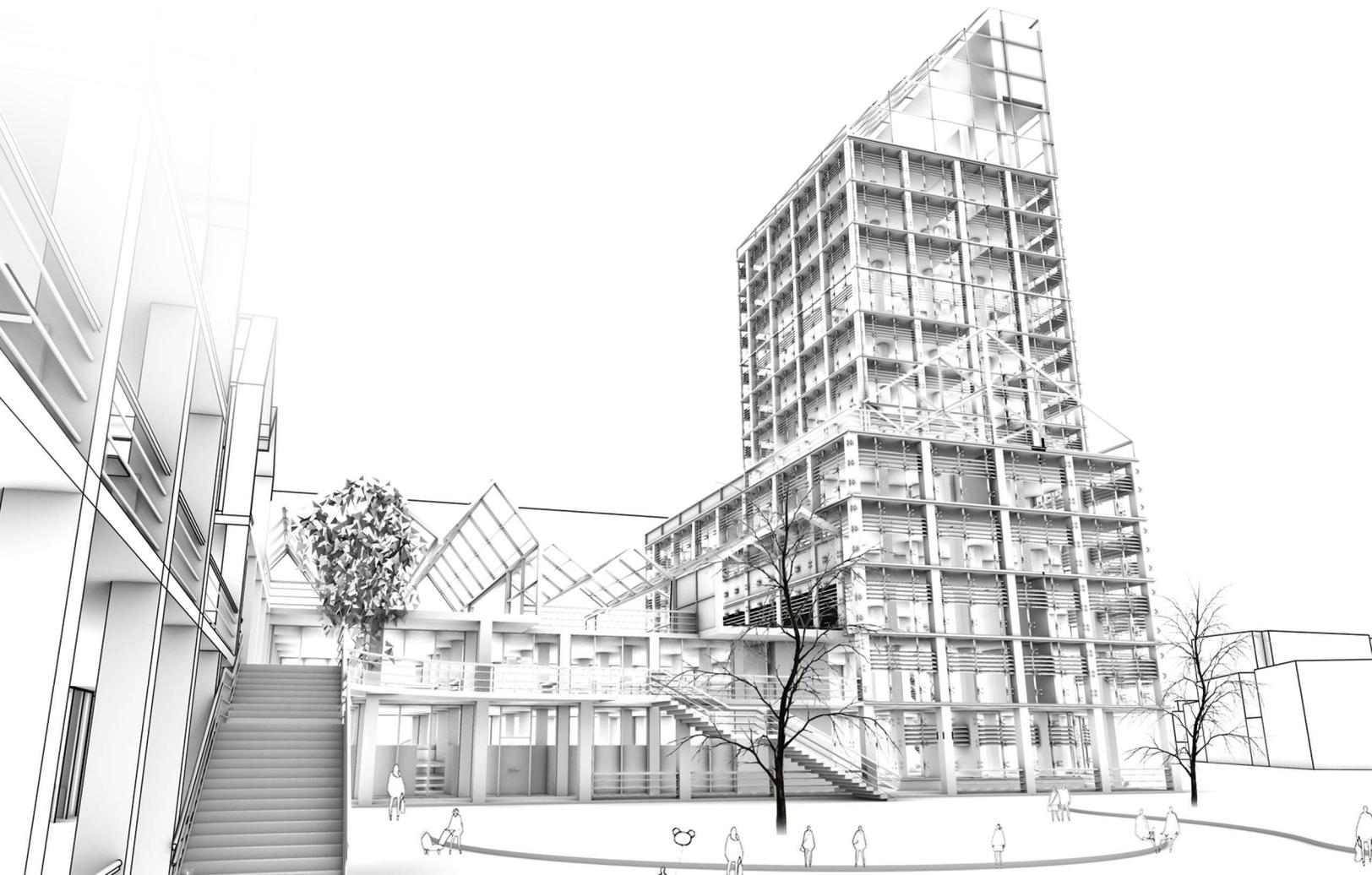
RULER

# ISOMETRIC VIEWS

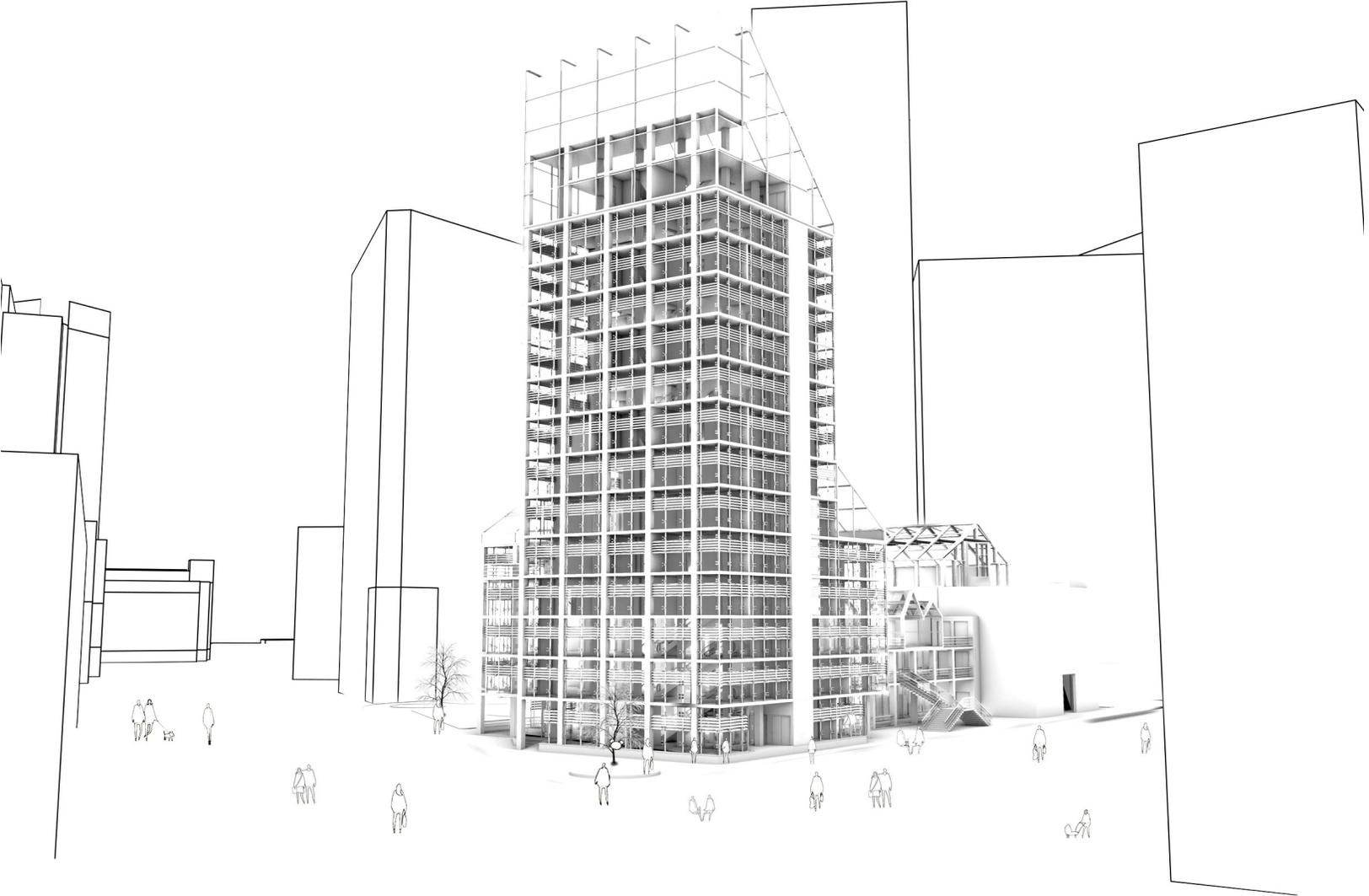
COURTYARD VIEW



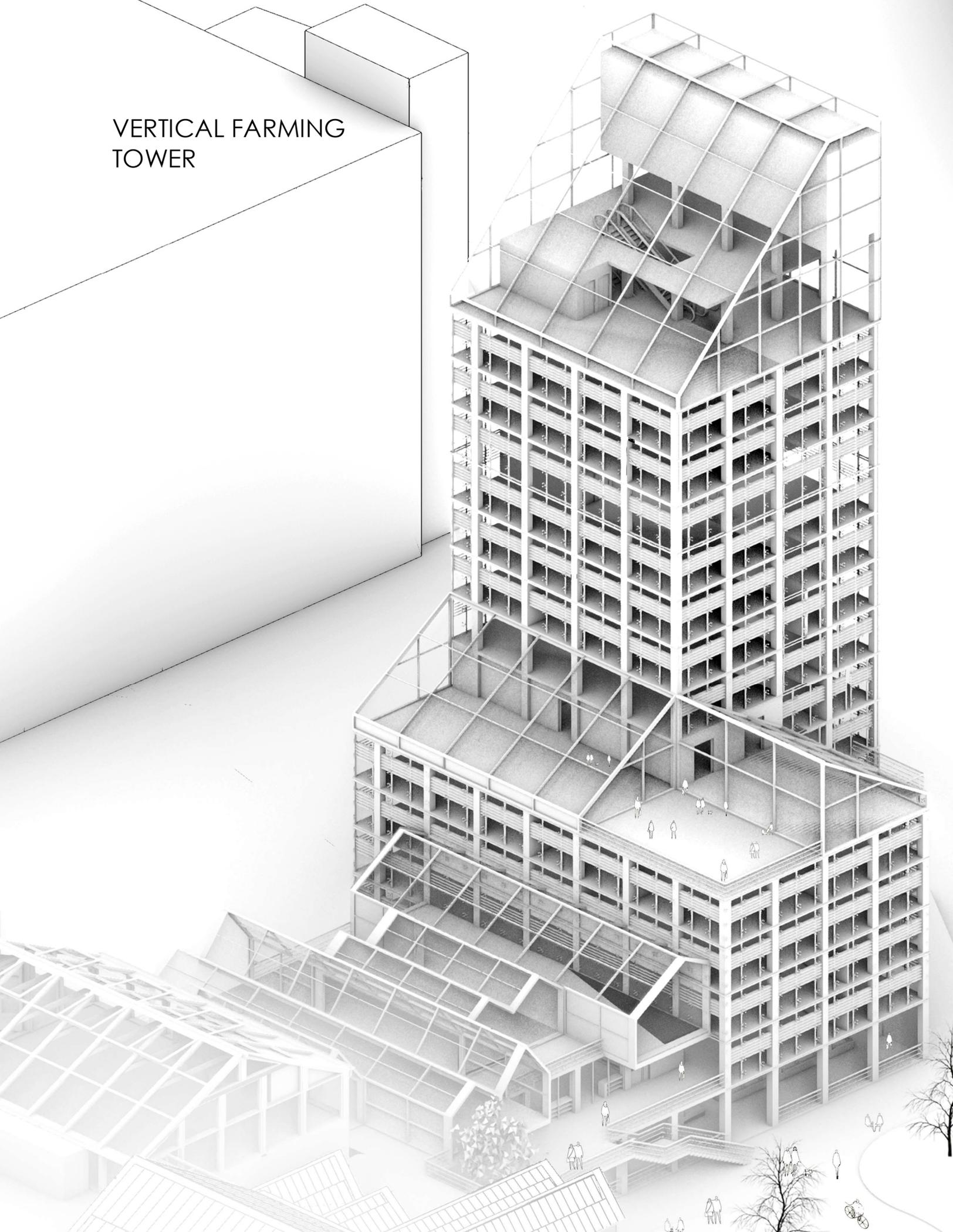
COURTYARD  
FLIGHT VIEW



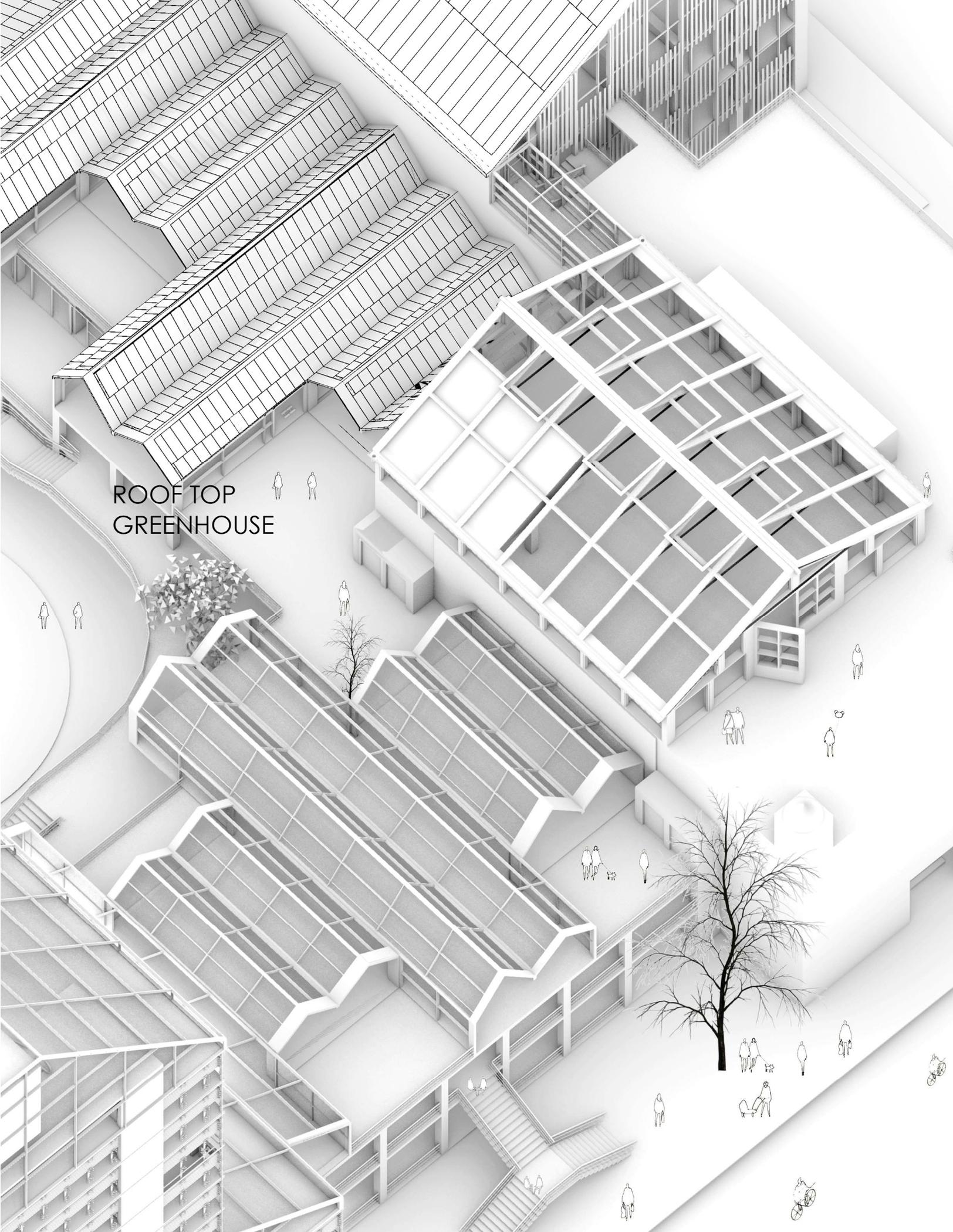
VERTICAL FARMING  
TOWER



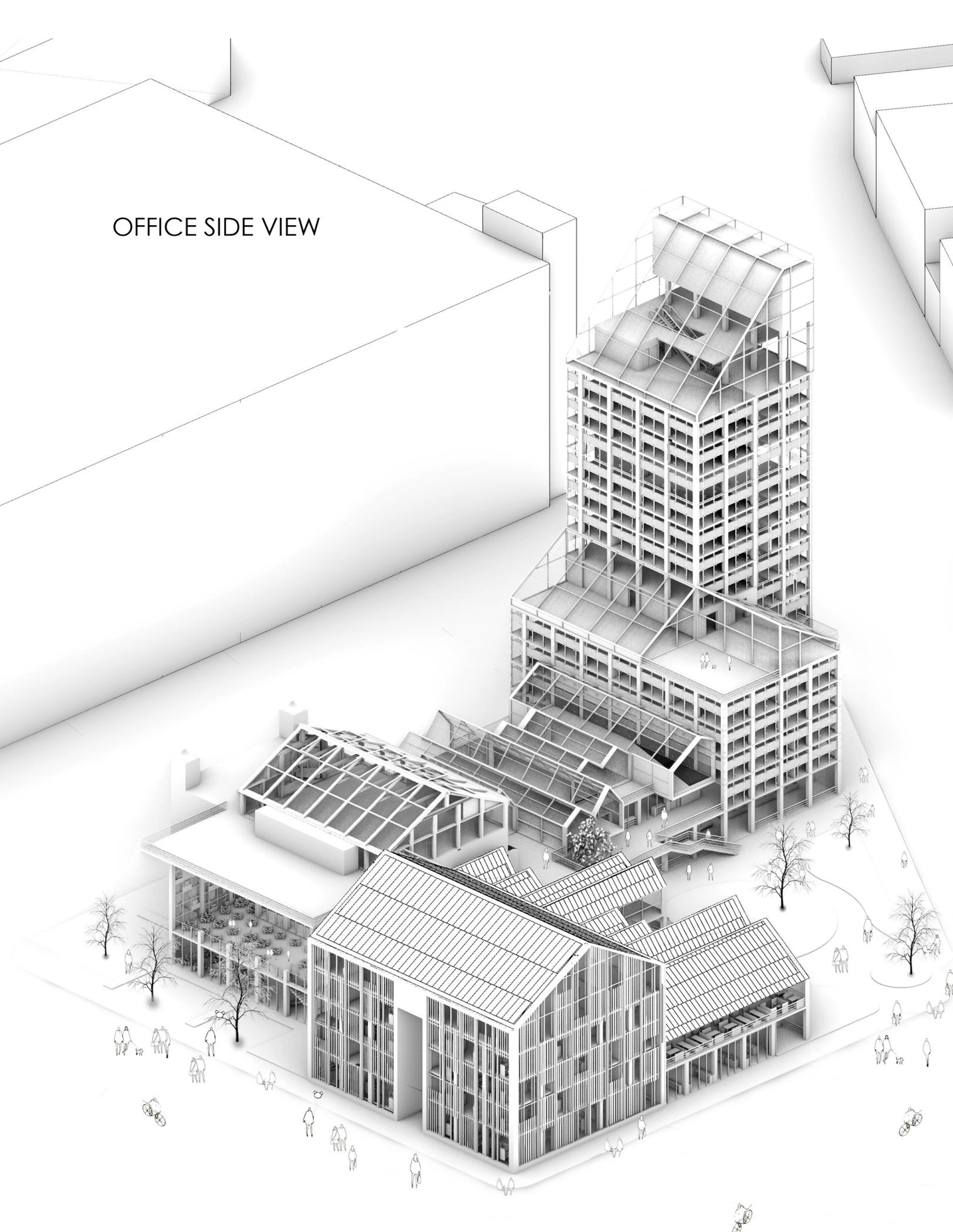
VERTICAL FARMING  
TOWER

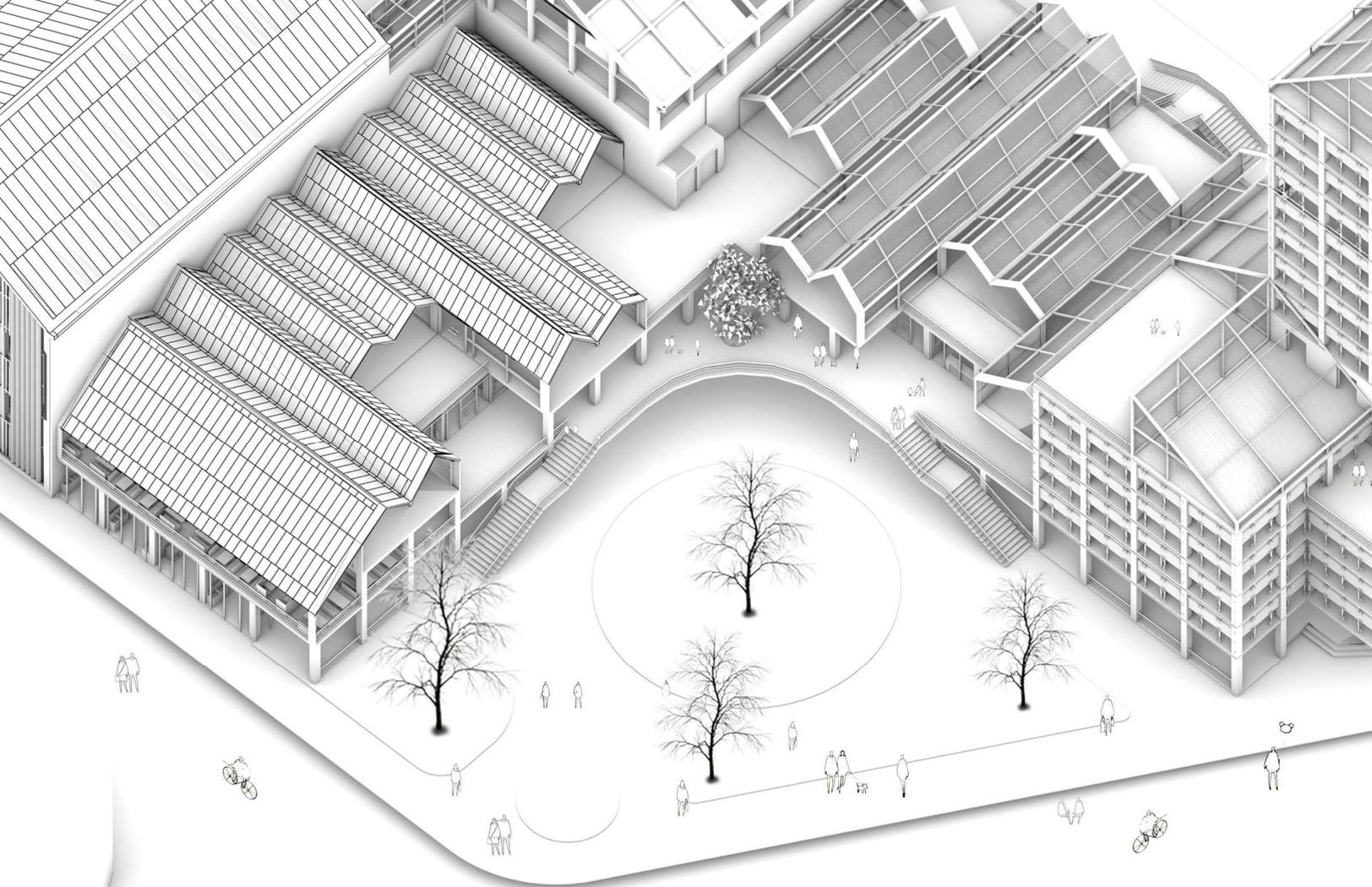


ROOF TOP  
GREENHOUSE

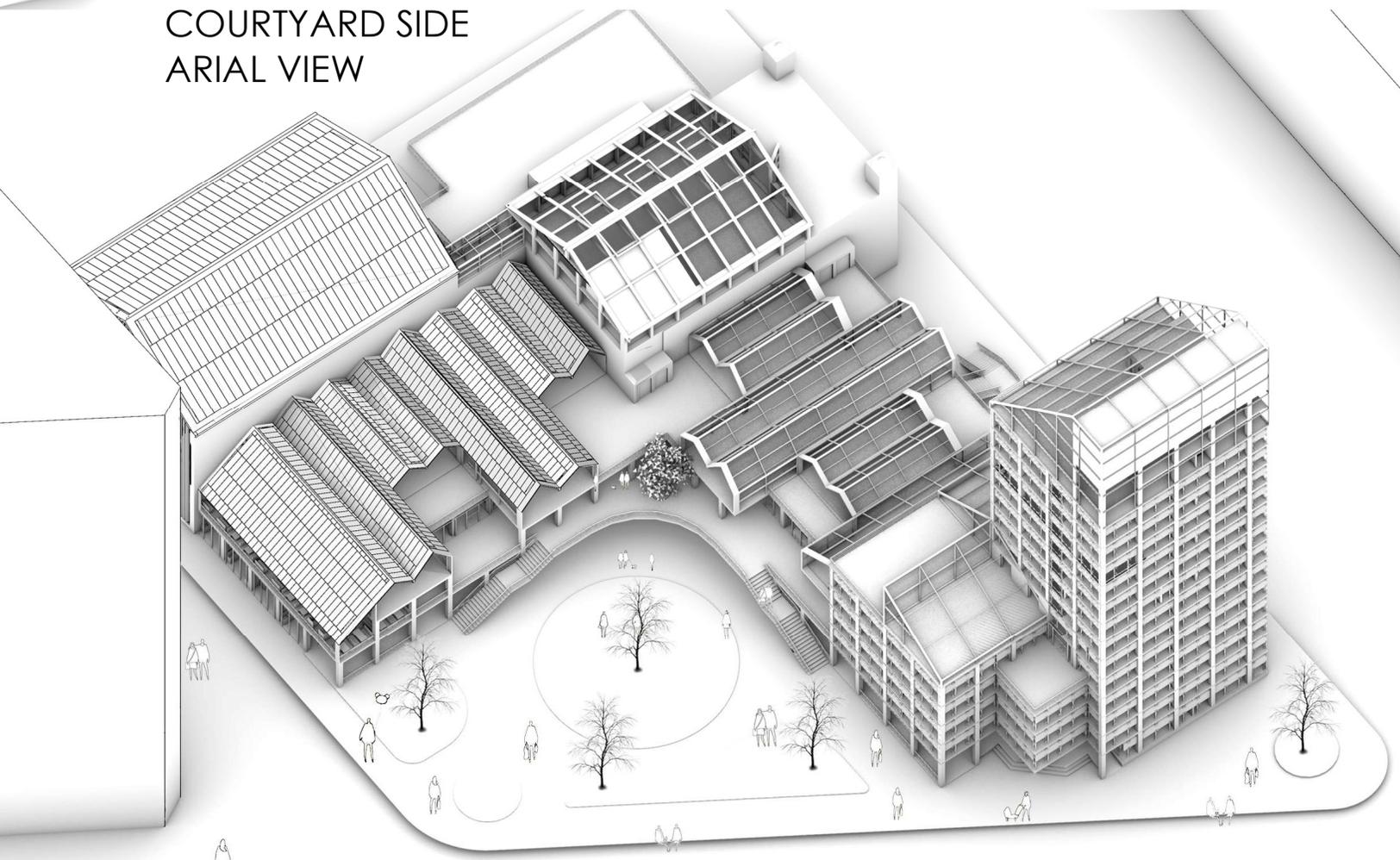


OFFICE SIDE VIEW





COURTYARD SIDE  
ARIAL VIEW



# CONCLUSION

The introduction of vertical farming and intermixing of commercial and rooftop greenhouses can have positive impacts in the cities. With the future forecasts about climate change and accelerated growth of urban areas, the introduction of food production by mean of indoor farming in the areas where food production and quality of food is the problem, will facilitate more opportunities to citizens to have access to healthy and fresh foods, reactivate new social dynamics and improve local economies and environment impacts in the surrounding.

The proposed project in downtown Detroit plays an important role to initiate such type of intermixing project with urban farming in different areas where the soil contamination, harsh weather, brownfields is big problem to use for vegetation. This project will help in the production of fresh food and meet the needs of the requirement of the urban areas by the production of quality of food.

This project will also help to reduce the carbon footprint in the environment and convert the concrete jungle into the natural environment and can reduce the impact of construction in the urban areas. by mixing the green with the commercial areas will also educate the people and create the green bubble environment which will create the sense of healthy feeling and fresh air environment. This thing will results the improvement of health and freshness among the people.

The new urban farming production can adapt to the continuous evolution in the cities. It is up to the architect and people to adopt the methods of transformation, exploiting the potential that cities offer, redefining contaminated land spaces, guiding new transformation processes in a new vision of relations between the commercial architecture and farming and reimagining new hypothetical scenarios of urban farming.

For this reason, this project will provide the way of designing that also feeds the geography of amenities that is quality of public spaces and services to citizens, which the American context is lacking.

In this project, the vertical farming and greenhouses placed according to the sun and air orientation. to get the maximum sun the green houses are placed in the sunny zones and designed to have proper cross ventilation and have the passive

cooling system to save the energy. The roof is designed to have the direct access of rain to the plans if needed and there is the roof water collection system, which will help to reuse the water for vegetation.

Overall, the project is designed according to the consideration of energy saving and intermixing of functions without disturbing the activities of each other by having their own privacy and bubble. The project will provide the opportunity in the future as the base to continue development in such areas where the land is contaminated or need to intermix with commercial areas.

We have to think about the directions we were taking while construction as the concrete jungle is increasing day by day with urban population and the lack of quality food and green spaces is decreasing. It's the time we should start to intermix our spaces with vertical farming and green house so that our future will be safe and healthy.

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<sup>5</sup> Detroit's Urban Farming and Urban Gardens." VisitDetroit.com. September 23, 2019. Accessed September 26, 2020. <https://visitdetroit.com/urban-farming-detroit/>.

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<sup>15</sup> Gallagher, *supra* note 30.

<sup>16</sup> In 1894, then-Mayor o\_ Detroit Hazel Pingree launched his "potato patch plan" as a work-relief measure during the second summer of the depression in 1894. The program enrolled 1,546 families and raised \$30,998 in 1896. MELVIN G. HOLLI, REFORM IN DETROIT: HAZEN S. PINGREE AND URBAN POLITICS 70 (Richard C. Wade ed., 1969).

<sup>17</sup> FOOD SYSTEM REPORT, *supra* note 6, at 16.

<sup>18</sup> *Id.* at 17.

<sup>19</sup> See *id.* at 17–19.

<sup>20</sup> Gallagher, John. "Vertical Farming Sprouts in Detroit's Brightmoor District." Detroit Free Press. May 03, 2015. Accessed September 30, 2020. <https://eu.freep.com/story/money/business/michigan/2015/05/02/detroit-farm-urban-agriculture-brightmoor-vilsack/26300041/>.

<sup>21</sup> F. Orsini, M. Dubbeling, Rooftop Urban Agriculture, *cit.*, P. 67 18 F. Orsini, M. Dubbeling, Rooftop Urban Agriculture, *cit.*, P. 67

<sup>22</sup> F. Orsini, M. Dubbeling, Rooftop Urban Agriculture, *cit.*, P. <sup>23</sup> <sup>24</sup> *ibid* 20 *ibid*

<sup>25</sup> F. Orsini, M. Dubbeling, Rooftop Urban Agriculture, *cit.*, P. 68  
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<sup>31</sup> Anne Hidalgo, the mayor of Paris, has embraced the idea of "la ville du quart d'heure," or the 15-minute city. SOURCE: <https://360.here.com/15-minute-cities-infrastructure>

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