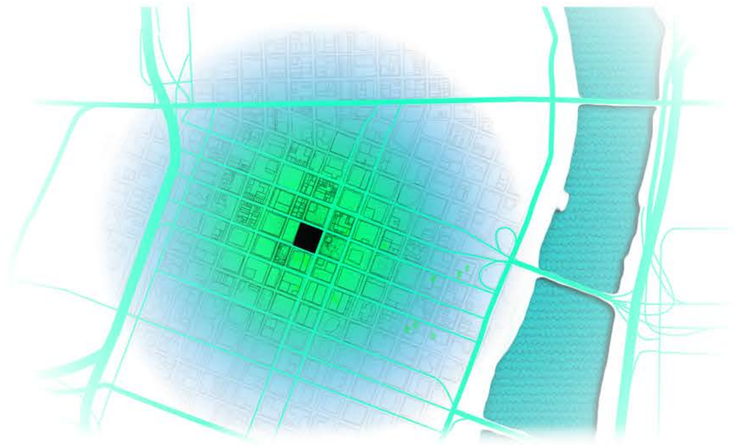
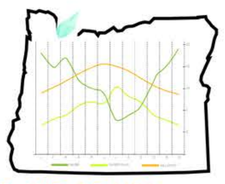
V.

A STUDY ON THE NEW METHOD OF AGRITECTURE





PORTLAND, OR, USA

Portland is an ideal setting for a project of this typology. With a bright and sunny summer, and a mild wet winter, V aims at capturing sunlight and water whenever possible in mass quantities. Portland lies within the fertile Willamette Valley, which makes it an ideal spot for farmers to grow crops. The city's love for locally grown food is displayed via weekly and bi-weekly farmers markets. V does not aim at replacing these farmers, but gives them an opportunity to come into the shade and collaborate for the betterment of the city's food supply.

Portland is also a rapidly growing city and thus young adults are migrating there. As a 'North Campus' to the Silicon Valley, the PDX area is home to many bright and exciting ideas. Therefore, a project of this scale and typology is best suited for the "Weird" lifestyle of Portland.

HYDROPONICS

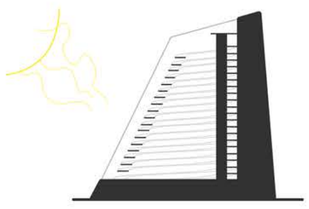
Traditional agricultural techniques have brought humanity to where it is today, but these techniques are quickly becoming a problem. Not just for the farmers who have to work the land, but also the consumer in the form of pesticides, cross-contamination, or GMOs. The problem is not only within the produce itself, but also the methods farmers use to retain their prospective yields. CO_2 emissions are absolutely unacceptable; from plowing the land, sewing the seeds, pest/herbicide distributions, harvesting, transporting to be processed, transporting to the store, and finally to you transiting to the store to purchase the product. Also, water is irrigated within areas that are not suitable for naturally growing crops, with a fraction of that not even making it to the crops. A change is definitely needed.

Hydroponics is the key to making this project possible. It uses 7% of the water required to grow crops using traditional methods, and the technology is only getting better. Along with more efficiency, hydroponics also allows for better monitoring and higher yields of crops. The introduction of multiple water treatment machines, in which the building can supply water not only for the plants, but also the residents within the farm.

LED LIGHTING BENEFITS

What if someone told you that by shining a high spectrum of UV light on your basil it would taste better, look greener, and smell stronger; or that a low level blue spectrum could eliminate the need for preservatives? What about if someone told you that by manipulating low spectrum infrared light all of your plants can be planted at the same time and reach maturity at the same time? Some might call this a lot of hoopla, but it has been proven that by using only certain frequencies of the light spectrum has tremendous benefits to growing plants. All with the advancements in LED lighting technology.

Light Emitting Diodes [LEDs] are incredible little pieces of technology that uses a small fraction of the energy traditional lighting in any setting, and can be mounted to just about anything or anywhere. They also produce a wide range of light from both sides of the spectrum, allowing for the previously mentioned specialty frequencies.

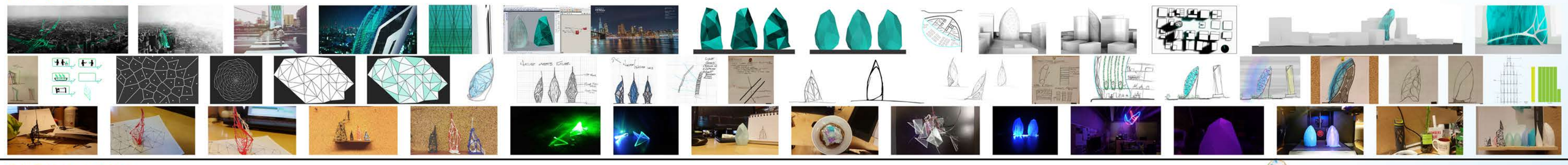


URBAN vs. VERTICAL FARMING

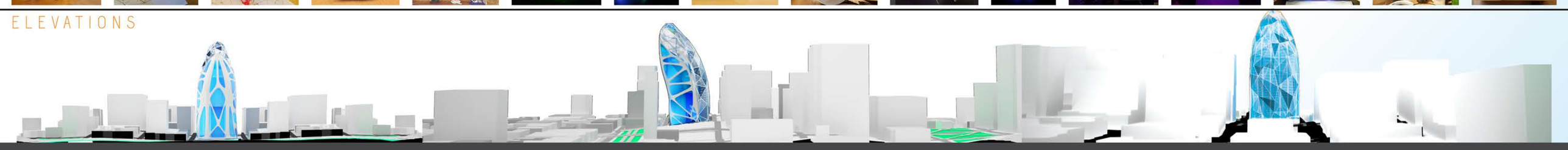
There is a trend emerging from cities called "Urban Farming" in which large warehouses are topped with numerous greenhouses, or in some cases are actual indoor plant growing facilities. This recent fad is not too far off of what this project aims to accomplish. They're similar in that they aim at providing locally grown produce to people in a setting not suitable for growing crops, via hydroponics. Where Urban Farming differs from Vertical Farming is not just the first word, but scale and services. Vertical Farming takes the greenhouses and stacks them to the sky, and leaving the bottom level for a market.

Vertical Farming is still non-existent for only a little while longer, therefore the only examples to base the project upon were other concepts and the incomplete Plantagon project in Sweden. With a plethora of examples to choose from, V was able to pick and choose aspects that worked in each and improve others. Plantagon was the main source of inspiration as it taught me about designing for sunlight capturing and retention, along with the concept of the plants doing the moving and not the farmer. However, Plantagon was too focused on the plants it seemed to be missing a human touch. Thus, the introduction of the residential units was brought into the mix.

PROCESS

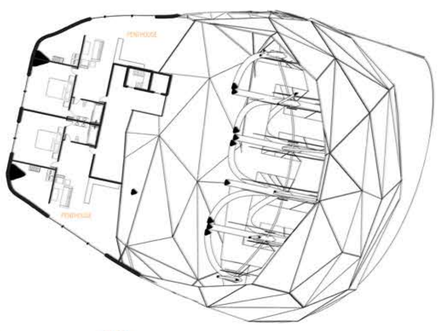


ELEVATIONS

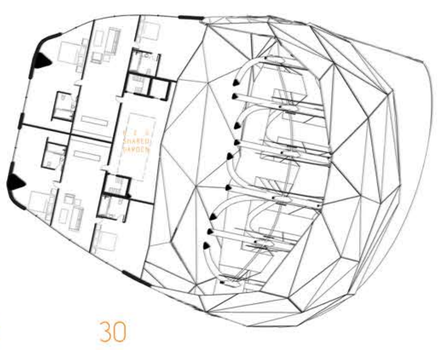


NORTH EAST SOUTH

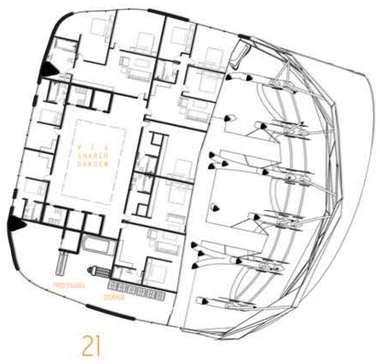
FLOOR PLANS scale | 1" = 1/32"



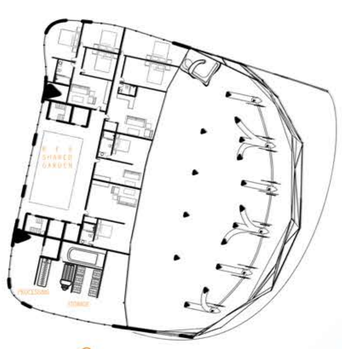
FLOOR 32



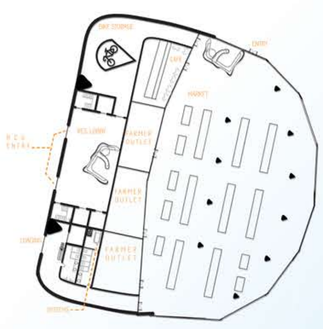
FLOOR 30



FLOOR 21

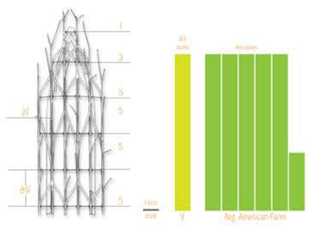


FLOOR 3



GROUND FLOOR

ACREAGE COMPARISON



V's vertical farming system is a series of gondola-like platforms that house the plant trays. This gondola system allows for both the front and back side of the system to be actively growing. The tapering at the top is modeled to bring in the sunlight and spread it downward without overheating the plants. Thus, the system tapers from five to three to one to not block any of the plants below. The system is made from lightweight material and utilizes very little water, making the 89 feet span between each control gear possible. Spacing the rows 21 feet apart, created the least overlapping shadows while also remaining structural. This spacing allows equal lighting throughout the day for each plant.

Through multiple sources of research the average farm is around 400-500 acres. Ask any farmer around this area, and your answer is more in the ~2,000 acre range. With V equating to 89 acres, it would seem that it doesn't stack up; however, the contrary is the truth. The majority of these local farms are not growing produce. Instead, they choose to grow grains to be milled into breads, corn for the ethanol plants, soybeans for providing the hydraulic oil for the elevator in the Statue of Liberty, or raising livestock. These local farms still have a tremendous impact on supplying the world/nation, but not within the produce realm. Utilizing Hydroponics, LED lighting, and a controlled environment V can pump out 3x the output of a farm of similar size. This, brings the total output to around 267 continuously farmed, pesticide-free acres. This approximated acreage allows for V to compete with any produce farm on any scale

PIONEER SQUARE

LEVEL 21 HARVEST

ACREAGE COMPARISON

The overall project's goal is to provide people with locally grown food that is more nutritious, and readily available for everyone. With the food industry being riddled with cross-contamination, preservatives, and low-quality produce, it should be no question why this project typology is needed in this world. The overall population of the earth is predicted to reach nine billion by 2050, of which 80% will be in an urban environment. Cities attract people for their economies and job markets, which makes it more difficult for farmers to remain, dare I say, within their field. This prediction creates a problem on both sides; the consumer not having the food they need, and the farmer being forced out due to expansion or retiring to the city to earn a living.

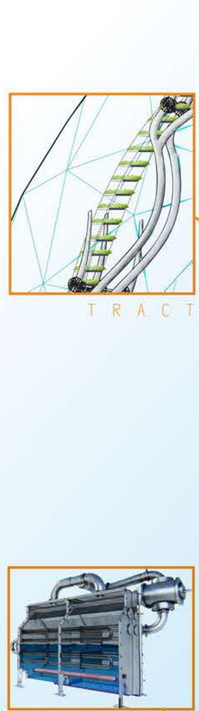
With these grim statistics in mind, allow me to explain my compromise. The farmer is not going to want to give up their land, especially to competition. Therefore, I have proposed to create an alliance and cooperation with the local farmers. The farmers who find V as a competition would be allowed to transition into another farm typology to meet the needs of the city. Any profits made from V will be going towards investing into the company, facility maintenance, and to assisting farmers into transitioning.

With the farmers market taking place in the Pioneer Courthouse Square, this location is perfect for bringing the farmers into the shade of the indoors and creating a business. Three outlet markets within the building will allow for the farmers to set up a business from the crops that V cannot produce; i.e. potatoes, corn, dairy, or meat. By bringing the farmers in V not only throws more weight, but it also offers the farmers to advertise their brand and hopefully lead into expansion. V will not take percentages of the outlet markets, but instead charge rent and utilities for each space. This is to provide the farmer with as much profit as possible, while also emulating the way land is negotiated between farmers. V is a project for the people, and therefore it would be against the entirety of the project to abandon those who have fed us up until its creation.

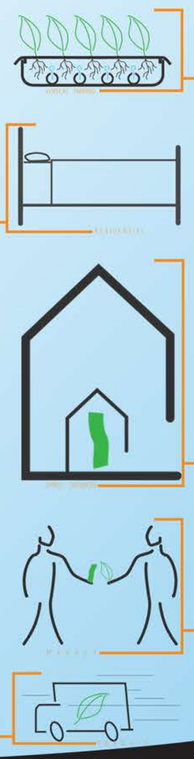
BROADWAY

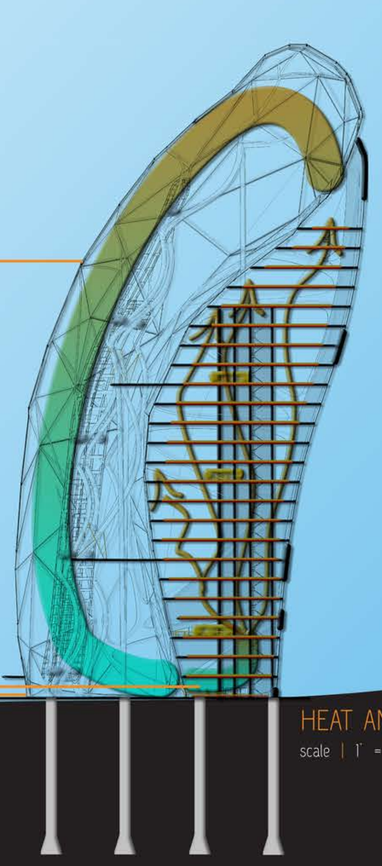
MARKET

BUILDING FUNCTION



WATER DISTRIBUTION SECTION





HEAT AND AIR DISTRIBUTION
scale | 1" = 1/32"

ARCH 772 | DESIGN THESIS
JARRETT MORK
CHRISTENSON
RHINO, GRASSHOPPER, MAXWELL, MAKERBOT, ADOBE SUITE,

P1 P2 P3 I II III IV V