

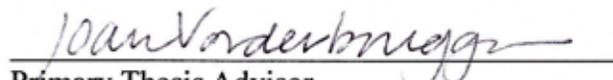
Ecological Living

A Design Thesis to the
Department of Architecture and Landscape Architecture
of North Dakota State University

By

Melissa C. Trueblood

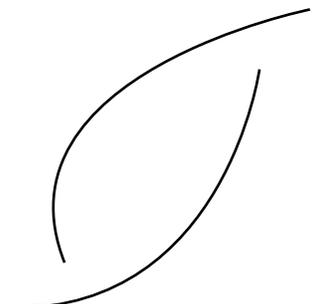
In Partial Fulfillment of the Requirements
For the Degree of
Master of Architecture


Primary Thesis Advisor


Thesis Committee Chair 4/8/2010

May 2010

Fargo, North Dakota



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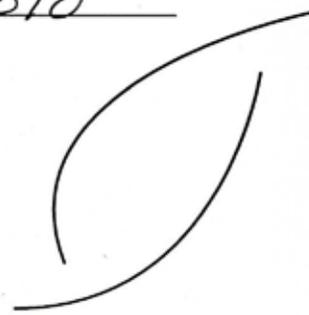
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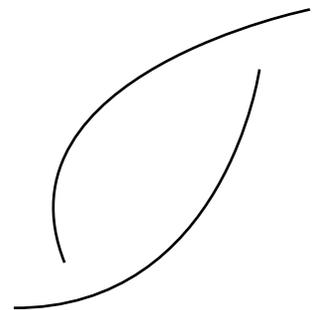

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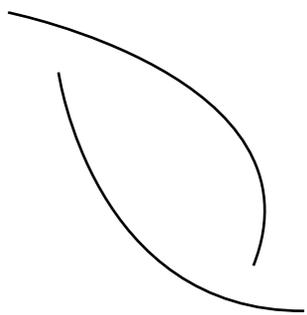

Date



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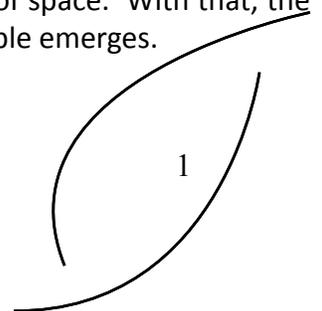
Thesis Abstract:

The natural world has set the precedent for life and the cycles in which living beings come and go. Many of our challenges in daily life are the struggles between time, money, and our **personal health**. With that, a look into ways in which our **environment** can teach us to live healthier longer lives may benefit us all.

This project will explore the most basic necessity of our being, as well as how we supplement our bodies daily with **nutrition**. The present need for non-processed pesticide free food can become a reality for those in Ely, Minnesota through research and development of an **indoor communal garden**.

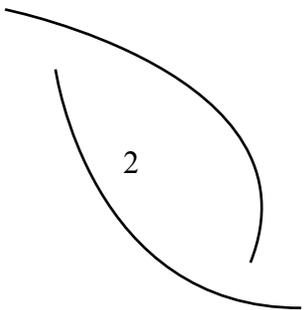
The site of the indoor garden facility is near proposed outdoor community gardens, as well as a baseball complex that initiates a sense of community in that specific area of the city.

This facility will be able to produce fresh fruits, vegetable, herbs, and flowers for the majority of the citizens in the community of Ely by utilizing the 20,000 square feet of space. With that, the hope of a healthier people emerges.



Thesis Problem Statement:

How does natural landscape affect the way one exists in that environment, ethically and physically?



Statement of Intent:

Project Typology:

The project typology will be a communal garden facility for the raising of crop and other plants for a more self-sufficient way of life.

The Theoretical Premise/Unifying Idea

Claim:

A person must be conscious of the natural environment around them in order to be able to respect and protect its existence and beauty. Education and basic necessity will pose as the basis for change through the development of a community garden space that allows the public to come together as a people and claim a plot of land for growth of crops and community alike.

Supporting Premises:

Persons aware of the natural environment in which they live and work are more likely to protect its beauty and purpose by realizing the need for a more self-sufficient way of life.

The longevity of our natural world is directly related to the education and choices made in our everyday lives to include the natural environment in which we live, work, and play.

The natural world often loses the battle for existence to the built environment by those who are oblivious to its necessity in our lives.

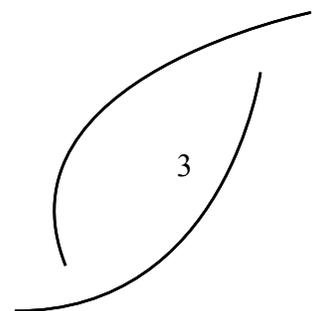
Through education and basic necessity one will become more aware of the need for the preservation of the natural world by locally growing his/her own food and taking responsibility for the affect they have on the world/environment.

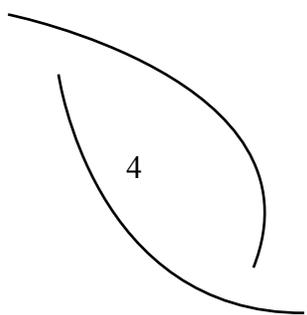
Conclusion:

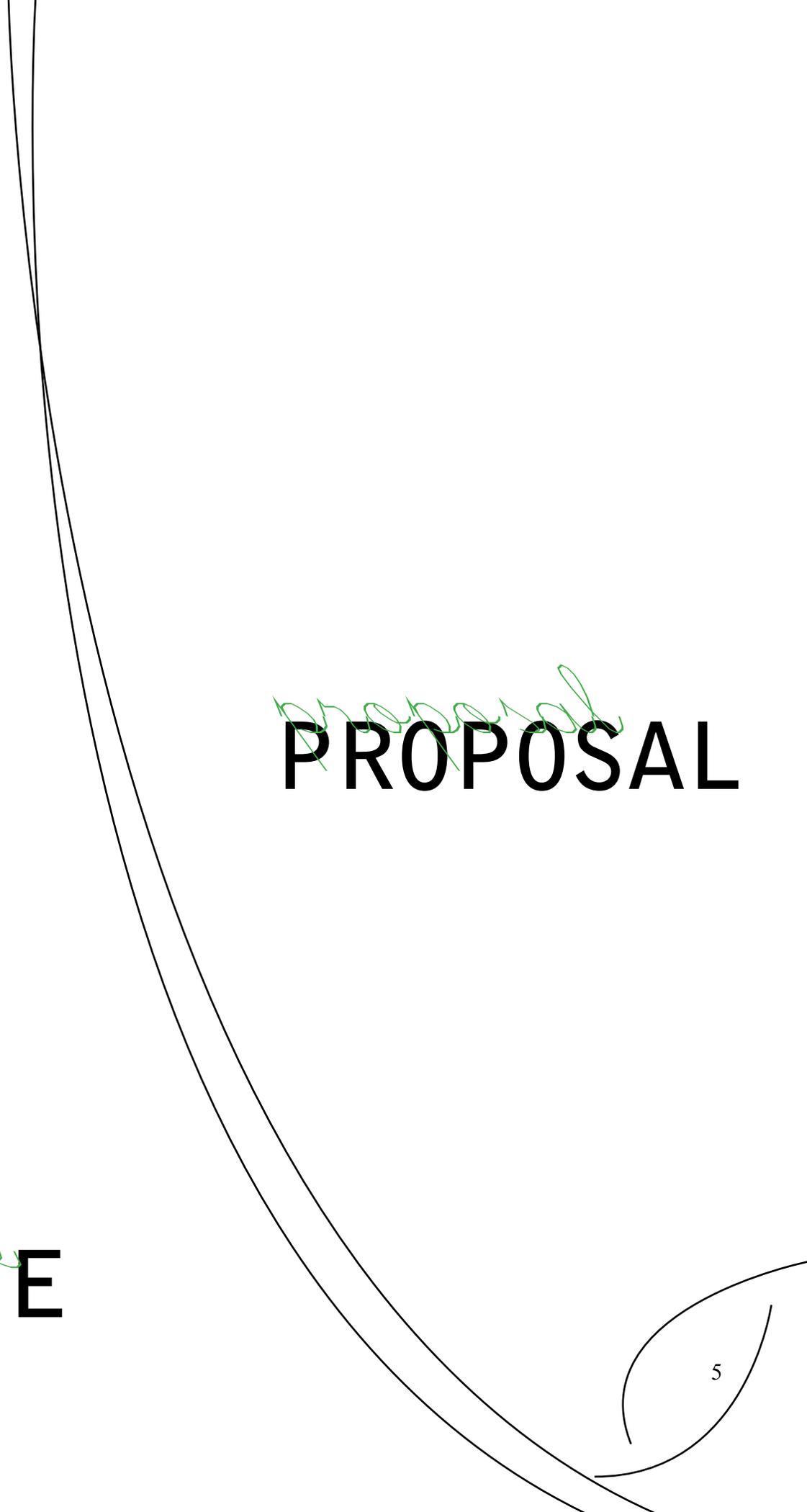
By protecting the environment in which we live, we secure a better way of life for ourselves, for our families, and for our future.

Project Justification:

The use of indoor communal gardens will benefit the community by creating a place to gather, as well as a place to grow community cultivated foods. If we fight for the environment and realize the role it could play in our lives, we could live in harmony; a balance between nature and the built environment could become a reality, by reducing the affects basic necessities have on our environment when we reach out so far for them.

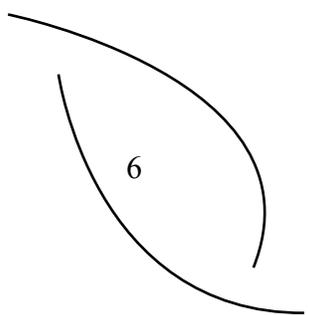






proposal
PROPOSAL

the
THE



Narrative

What excuse do you come up with when asked why you don't eat healthier?

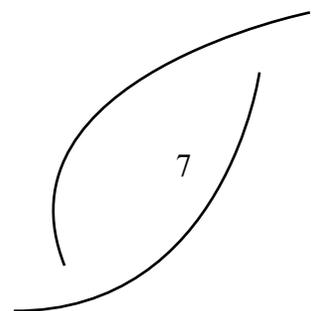
Do you claim you don't have the time? Is it a matter of money? Would you make an honest effort to eat healthier if such a choice was made easier on your schedule and budget?

There is an epidemic among Americans where they claim to not have the time or money to eat healthier; nor are they educated properly why they should. We tend to believe what the government sets as standards and do not question it further. Where is the respect one should have for their well being?

We go against Mother Nature time and time again, but if we are going to counter-act Her, we should do it in a beneficial way that promotes better all around health. That is why I have chosen to research and develop an indoor and outdoor communal garden space for Ely, Minnesota. This project will explore the most basic necessity of our being- the intake of food- as well as create a place to bring people together with the intention of helping a city as a whole.

It is my hope that this project will bring light to cultural, political, and economical issues that we bear today as Americans. We need to counteract the unbalanced way in which we as Americans eat due to our lack of culture and traditions to steer us in the right direction. I also see the question "what do I eat?" as a politically charged question due to the control the government currently has over the food distribution in this country.

The area of Ely, Minnesota can benefit from the use of an indoor community garden due to the high cost of importing 'fresh' fruits and vegetables into such a remote area. Therefore, the present need for non-processed pesticide free food can be a reality for colder regions, such as Ely.



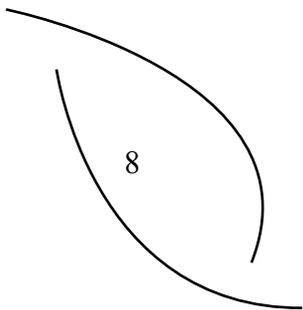
User/ Client Description

User description:

The sole beneficiaries of this project will be the **residents** of the city for their holistic benefit. It is intended for the residents to be the recipients of the food grown. They will have first pick when crops are harvested and disbursed. Remaining crops will be either sold to passersby or stored for future use.

This space will also allow for the education of process and technology used in this facility. Area **students**, ranging from K through 12th grade, will benefit greatly from learning through hand-on activities and gain knowledge for their future. They will have the opportunity to learn about the different types of growing techniques by conducting their own crop growing as an individual, discovering how fresh produce can look, feel, and taste differently than the produce often sold at the grocery store, as well as to learn the art of canning and preserving the crops for future use.

Passersby/ tourists will also gain knowledge and insight into the ways in which our lives can be bettered by the growth and intake of non- processed pesticide free food.



User/ Client Description

User description:

Residents:

The number of residents that benefit from the crops grown will depend on the success of the growing period. An intentional ongoing cycle of growing will occur to help sustain the need for fresh fruits and vegetables. At the points-of-harvest is when peak usage will occur. Parking will be generalized for all; handicap accessibility will be available.

Students:

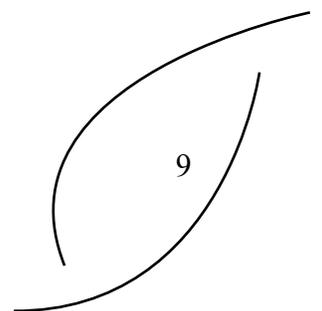
The number of students will be determined by the involvement the schools wish to have in the facility and utilize as a learning tool. The school months of September to May will be the peak months in which the students will be present. Parking will be generalized for all; handicap accessibility will be available.

Passersby/ Tourists:

The number of non-residents will vary due to the seasons. Many tourists frequent the area in the summer months of June, July, August, to camp and canoe in the Boundary Waters Canoe Area (BWCA). Non-residents will not be able to purchase the crops unless excess is available, or canned/baked/cooked goods are available for purchase at the time of their visit. Parking will be generalized for all; handicap accessibility will be available.

Client Description:

This facility will be funded and owned by the city of Ely, Minnesota.



Major Project Elements:

To achieve an indoor communal growing space that will sustain a community's needs, supplemental spaces are required. Apart from the main growing space, the spaces will include a small office/reception desk, storage, maintenance, restrooms, a large gathering/classroom space, as well as outdoor elements such as an amphitheater and small picnic area.

Office/Reception Desk A small office with reception desk will allow for visitors and residents to gain information about the facility and all it has to offer.

Growing Space This is the largest space that will house the crops being grown. Irrigation technology, multi level growing areas, and expandable space design will all be incorporated in this portion of the facility.

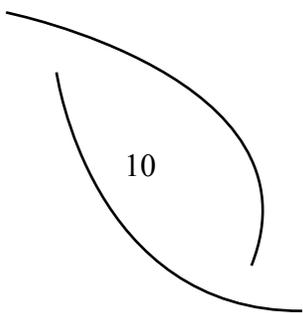
Storage Immediately adjacent to the growing space will be a sizable amount of storage for dirt, seed, and other items needed to sustain the growing process, such as the water purification system.

Maintenance This space will contain the necessary items to keep the building clean and working properly.

Large Gathering/ Classroom Space/ Breakout spaces This space is intended for the use of groups for the purpose of learning more about the value of the new facility and the benefits of growing one's own food. The space may also be used for public events such as meetings or receptions of sorts.

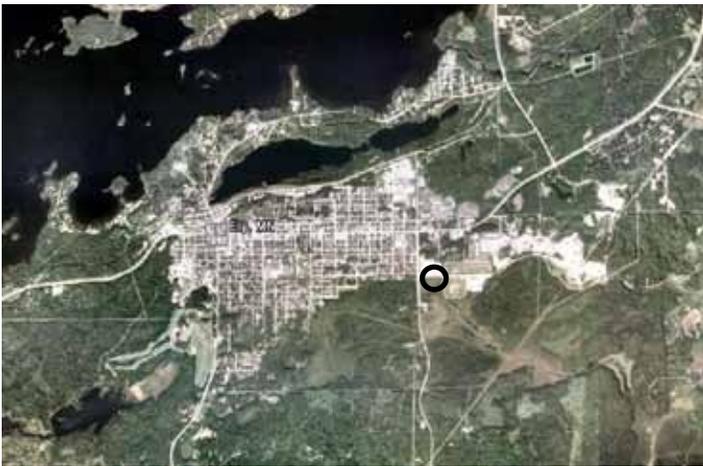
Amphitheater and Small Picnic Area These outdoor elements have the opportunity to bring people out into the landscape and experience the land just as they would experience the building; an extension of the interior spaces.

Canning Kitchen A place where canning and other food preparations can take place. It can also be utilized as a form of teaching. Cooking classes can be held in the kitchen.





http://www.iptv.org/bestofthemidwest/mappopup_midwest.cfm



Google Earth Image



Google Earth Image

Site Information-

Macro and Micro Scale:

The site chosen is located in Ely, Minnesota on what is known as the Iron Range. Located very close to the Canadian border, people often mistake it and it's residents for Canadians.

On a closer level, Ely is a fairly small town of approximately 3,400 friendly people that would make up the optimal setting for an indoor garden facility and be able to support the majority of the residents. The type of people also struck me on a positive level because the citizens of Ely have a "green" and natural mentality about them. Therefore I feel that this facility would be very successful in Ely.

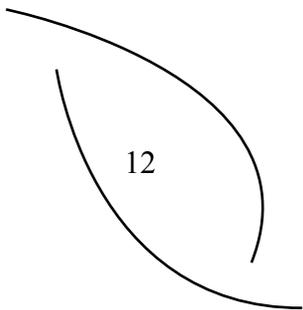
Ely's climate also lends itself to making the indoor garden facility possible because the winter consumes the area for approximately 7 months out of the year, leaving only 5 or less months for outdoor growing. With the use of this facility crops could be grown year around.

In the winter months, the site is open to dominant northern winds that bring in the cold air. In this case, trees/landscaping and proper positioning of the building will relieve the design of such harsh winds. During the summer months, the site is completely open to the sun's rays. The design will also need to take into account solar heat gain to maintain a healthy level of comfort within the design.

Project Emphasis:

Basic necessity provided by the natural world.

This is the idea that the natural world has set the precedent for life and the cycles which will foster a better life. By looking at such precedents, we can eventually learn to become self-sufficient once again. A long term goal of such magnitude can be a reality with the support of the community to change for the better.



A Plan for Proceeding

Definition of Research Direction:

Research will be conducted to gather data and information to support further understanding of the theoretical premise/unifying idea. Exploration of the site and historical data will also be studied throughout this process. As the project progresses, programmatic requirements will evolve.

Design Methodology:

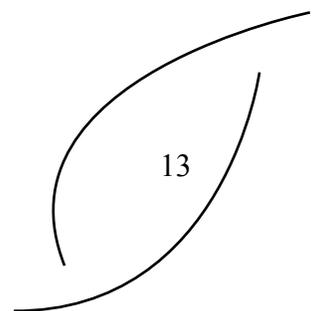
My design methodology will follow mixed method, qualitative quantitative approach. It calls for several different approaches to gathering pertinent information. A site analysis will be conducted, case studies will be reviewed, and graphic analysis will be used in gaining information about the project.

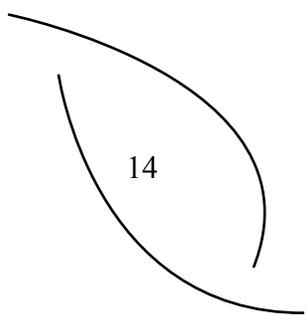
The basis behind these methods is the Concurrent Transformative Strategy that is guided by the theoretical premise/unifying idea. The integration of information and data will be determined upon review of the theoretical premise and its relevance to the project as a whole.

Conclusions will be based upon the interpretation of the research results.

Documenting the Design Process:

Sketches, notes, and other graphics developed during this process will be documented and saved to electronic files for future reference. Also, a separate folder of process, chronologically ordered by date, will be available for review. Along with the gathering of process sketches, a review of information and ideas will be reviewed at two week intervals.





Previous Studio Experience

second year fall [2006] Darryl Booker

Tea House - Fargo, ND

Mississippi River Rowing Club - Minneapolis, MN

Mountain Dwelling - Rocky Mountains, Colorado

second year spring [2007] Bakr Aly Ahmed

Montessori School - Moorhead, MN

Prairie Dance Academy - Fargo, ND

third year fall [2007] Ronald Ramsey

Agincourt Airport - Agincourt, IA

Shaker Barn - New York

third year spring [2008] Steve Martins

Childrens Museum - Fargo, ND

Multiuse Building - Fargo, ND

fourth year fall [2008] Don Faulkner

High Rise - San Francisco, CA

KKE Competition - Cigar Box

fourth year spring [2009] Stephen Wischer

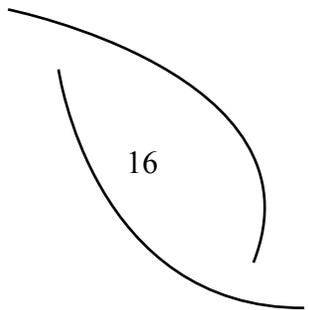
AVE Train Station, Hotel, and Personal Residence - Barcelona, Spain

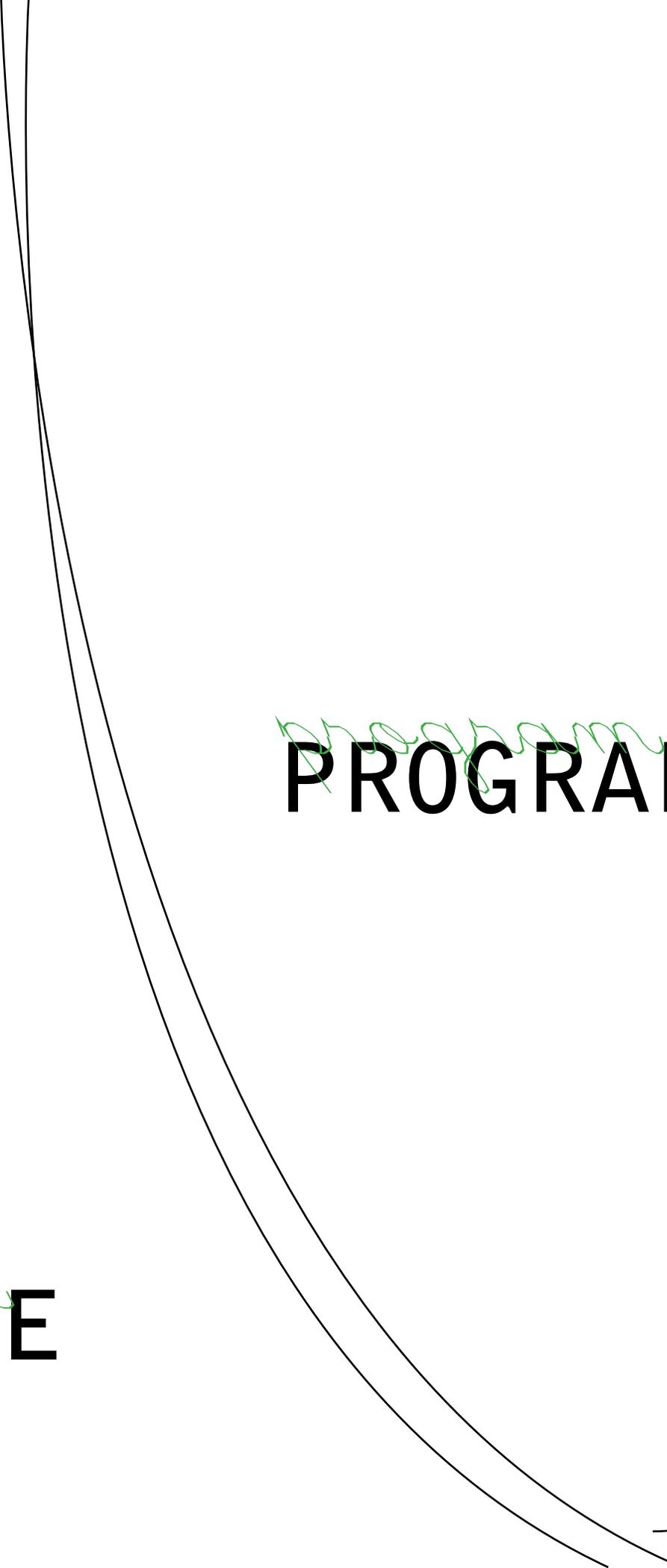
fifth year fall [2009] Regin Schwaen

Hotel - Fargo, ND

fifth year spring [2010] Joan Vorderbruggen

Thesis - Ely, MN





program
PROGRAM

the
THE

Theoretical Premise/Unifying Idea

RESEARCH

*Here is the vast, savage, howling mother of ours,
Nature, lying all around, with such beauty,
and such affection for her children,
As the leopard; and yet we are so early weaned
From her breast to society, to that culture which is exclusively
An interaction of man on man.*

-Henry David Thoreau

Environment is defined as ‘the air, water, minerals, organisms, and all other external factors surrounding and affecting a given organism at any time; an indoor or outdoor setting that is characterized by the presence of environmental art that is itself designed to be site-specific; the social and cultural forces that shape the life of a person or a population’. [dictionary.com] Yet, ‘what is considered a natural environment depends on the particular culture and society defining it’. [DesJardins 1999]

We, as Americans, define the natural environment more so as **‘wilderness’**. A wilderness exists as a meaning preconceived by a civilization to make sense of the unknown; ‘an attitude toward a collection of trees, other plants, animals, and the land on which they all exist’. [DesJardins 1999] ‘The Romantic appreciation of nature, with its associated enthusiasm for the “strange, remote, solitary and **mysterious**,” converted territory that was a threatening wildland into a desirable area capable of producing an invigorating spirit of wilderness.” [DesJardins 1999]

“Natural environments are likely to be named when there are unnatural environments and are likely to be noted only when they are outnumbered by these unnatural environments. The wildlands of the past, which were frightening, were plentiful and were not valued. The new wilderness, which is a source of **revitalization**, is rare and so valued that it needs to be preserved.” [DesJardins 1999]

Theoretical Premise/Unifying Idea

RESEARCH

With that said, the importance of our natural environment is fairly obvious due to the fact that it provides us as a people with the knowledge and resources we need to live our lives. Environmental processes equip us with air to breathe, water to drink, and food to eat. It also supplies us with raw materials to use in our everyday lives. Mother Nature's beauty is also of great importance and must be preserved.

The nature of *human intervention* is abrupt. The way in which we plan and implement projects in a shorter amount of time than natural process can occur harms the environment. The natural environment is not able to adjust accordingly on such a short time scale. An example of an unnatural expansion is sprawl. Sprawl, as defined by SprawlCity.org, is 'the spreading out of a city and its suburbs over more and more rural land at the periphery of an urban area. This involves the conversion of open space (rural land) into built-up, developed land over time'. [sprawlcity.org] Patterns of development have changed greatly over the past century. According to the U.S. Environmental Protection Agency (EPA), 'in the early 1900's, urban areas tended to be compact, with a strong central business district and industrial facilities serving as large employment centers'. Such communities were **walkable**, unlike today's metropolitan areas that have expand over large areas of land. The EPA also states that 'people must rely on automobiles for access to jobs and services, as residential and commercial areas are separated, and the pedestrian environment is increasingly inhospitable'. [EPA 2001] The impact sprawl has on the natural environment includes habitat loss and fragmentation, and degradation of water resources and water quality. By building on undeveloped land, wildlife communities are torn and displaced due to the destruction of their *habitats*.

Theoretical Premise/Unifying Idea

RESEARCH

A person must be conscious of the natural environment around them in order to be able to respect and protect its existence and beauty. **Education** and basic necessity will pose as the basis for change. Basic necessities are indispensable, such as food and shelter. These elements of daily life cannot be denied, nor should they be another's responsibility. By taking a step back and looking at the self-sufficient **PRECEDENTS** set by our ancestors, we could learn to reduce our Carbon Footprint and take the basic necessities required to survive, back into our own hands. From my standpoint, Americans have a healthy appetite for consumption; consumption of material possessions. These possessions make one feel as if they have power, whether it is a power over their peers or over the manufacturing world (in the sense that THEY have the choice to decide what they buy, when they buy it, where they buy it.) Yet this is not the case. We do not have THE CHOICE. "Our choice is not entirely our own because, even in a supermarket, the menu is crafted not by our choices, nor by the seasons, nor where we find ourselves, nor by the full range of apples available, nor by the full **spectrum** of available nutrition and tastes, but by the power of food corporations." [Patel 2007] To regain the 'power' that people labor to grasp with white knuckles, we must be educated on the impacts and ways in which we can change; change for the better. Whether or not you believe that an individual's lifestyle changes are able to improve the environment, we must start somewhere, and education/knowledge will be the root of it all.

To ignite change on an individual level begins with a look at the basic necessities that pertain to you. The most basic necessity in my eyes is food. The way our ancestors lived, first and foremost was driven by their location. The foods they ate were native to their area or grown specifically for their family in order for survival. We have lost this way of self sufficiency for many political, economical, and cultural reasons.

Theoretical Premise/Unifying Idea

RESEARCH

Culturally, we as Americans have lost our way. By this I mean that the passing of time has resulted in the ‘melting pot’ of culture and the outcome is a loss of strong cultural ways to guide us. How and what we eat was once culturally driven. Our families that preceded us had much stronger cultural traditions to govern the way in which they worshiped, celebrated, and ate. ‘As a culture we seem to have arrived at a place where whatever native wisdom we may once have possessed about eating has been replaced by confusion and anxiety.’ [Pollan 2006]

It’s quite ridiculous the amount of ‘expert’ help now needed to help us decide what to have for dinner. This situation we are in is noted by Pollan as a ‘national eating disorder’. As a weak dietary culture, we have rerouted our decision making to the legislative body to pinpoint the nation’s “dietary goals”. Political battle has flared up every few years over the design of the food pyramid. ‘A country with a stable culture of food would not shell out millions for the quackery (or common sense) of a new diet book every January.’ Pollan also goes on to state that a culture with a stable food practice would not be ‘shocked to discover that there are other countries, such as Italy and France, that decide their dinner questions on the basis of such quaint and unscientific criteria as pleasure and tradition, eat all manner of “unhealthy” foods, and, lo and behold, wind up actually *healthier* and happier in their eating than we are.’ Yet, to some degree we will always question what to have for dinner, and in turn, the omnivore’s dilemma will be ever present.

We find ourselves confused and anxious in the supermarket trying to decide on ‘organic’ or ‘conventional’; all these choices we once thought were better, now make life more difficult. It is my confusion why we strayed so far from what we know is healthy, and that is the fruits, **vegetables**, and herbs grown by our own two hands, not the produce that is chemically altered and visually more attractive; waxed. The ways in which the government has taken control of the foods we eat, when we eat them and how we eat them, is tragic. [Pollan 2006]

Theoretical Premise/Unifying Idea

RESEARCH

Due to government control of food processes, processing, and distribution, we have the RIGHT to expect the food we purchase at the grocery store to be safe to eat. We also have the right to voice our opinions about how and with what our food is grown. The decisions made about the foods we eat are largely the responsibility of the food industry. They invest the time and managerial resources to implement and maintain control of the manufacturing and processing of our foods. On a very broad scale, the food industry looks at safety, **nutrition**, quality, and value.

The controlling of food safety and quality encompasses a broad number of factors. The areas in which the government decides to set standards are often misleading. For example, quality attributes of food are market concerns rather than public health issues. Governments should refocus their resources on the public health aspects of quality and the market-related aspects of quality. Also, labeling is another area of concentration that we would benefit from by protecting us from fraud and misleading claims. [Gardner 2009]

With all the regulations currently on the manufacturing and distribution of food, we have less of a choice when it comes to 'healthy' food. Gardner specifically states, "In establishing safety standards, it is important that governments allow industry, the *scientific* community and the public to contribute information and ideas. Standards and guidelines should be sufficiently flexible to meet the needs of changing TECHNOLOGY. At the same time, governments should apply those controls that will assure real and meaningful safety benefits rather than merely perceived benefits." [Gardner 2009]

We are fed the same information time and time again, and we do not question it further. We must question why we as the people who consume the goods are not the priority. It seems to all be about making that extra penny at the expense of the health of the nation. At this point, if we don't question the matter, we will be digging our own premature grave.

Theoretical Premise/Unifying Idea

RESEARCH

By taking the issues of governmental control and their lack of respect for our well-being into our own hands, we regain the power we once possessed as a **self-sufficient** people. The solution of self-sufficiency, whether at the personal or community level, is one of many. This solution bears many economical benefits to other issues that plague the world and United States today. More and more people are coming to the conclusion that sustainable community farming systems provide a 'viable economic **alternative**' to the industrial food system. 'These community food systems are where food is grown, processed, and distributed locally with strong emphasis on environmental and social values.' [Adding Values...1997]

The main difference between the community food system and the industrial based food system is the notion that they exist in different mental realms. The industrial food system is basically a commercially based system of production and delivery of food, all of which are at the least economic cost. 'Profitability is achieved by replacing labor with capital; maximizing through output; controlling nature with technology, fossil fuel and chemicals; and by **specializing** and routinizing tasks. Conversely, sustainable community food systems operate at a human scale with strong attention to environmental integrity, economic self-reliance and social well being.' [Adding Values...1997]

The distribution of the FOOD is also a major concern for the environment. The amount of fossil fuels that industrial agriculture industry uses will eventually contribute to the future instability of agriculture. Currently 20% of fossil fuels used in the United States goes toward food production. [Food&WaterWatch 2009] This includes the production, growing, harvesting, and the post-agricultural processes of transporting, packaging, and storing food. 'This inefficient system uses 10 non-renewable fossil fuel calories to produce only one food calorie, and spends a total of 10,551 quadrillion joules of energy each year, which is roughly the same amount used annually by all of France. Only one-fifth of this energy is used in agricultural production. The rest is expended moving, processing, packaging, selling, and storing food after it leaves the farm.' [Food&WaterWatch 2009]

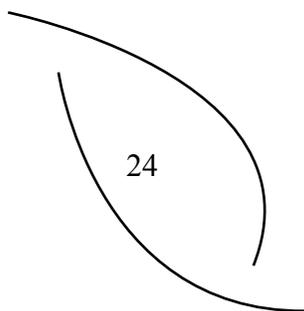
Theoretical Premise/Unifying Idea

RESEARCH

One of the biggest concerns in my eyes is the extensive **transportation** that takes place to distribute the food to our local supermarket. Transportation of food uses a very large amount of fossil fuels; approximately 120 million tons of CO2 emissions are directly attributable to domestic food transport each year, and imports and exports contribute an additional 120 million tons. The imports and exports are the most harmful to the environment, specifically the ozone, because they emit more CO2 per ton-mile than any other form of transport. [Food&WaterWatch 2009]

As I mentioned before, the way in which our cities are now planned and sprawl has overcome the built environment; the nearest supermarket is often on average a 10 to 20 minute drive. 'There are not adequate sources to absorb the CO2 emissions from these trips, because the forests that once served as CO2 sinks have been chopped down for residential and commercial development, including supermarket parking lots.' That is completely unnecessary when we can just as easily support the local growth of foods that are more likely to be healthier. The reason for why our foods are shipped over such long *distances* is because the value of the pretty penny has the large agri-businesses taking advantage of 'subsidies, price differentials, and changes in currency exchange rates to shift food between countries in search of the highest profit.' [Food&WaterWatch 2009]

Consumers can take the matter into their own 'green thumbs' and grow their own foods either within the home or as a community. Farmers markets are becoming more well-known, and as a great solution to the current problem at hand, they will hopefully be common knowledge very soon.



Theoretical Premise/Unifying Idea

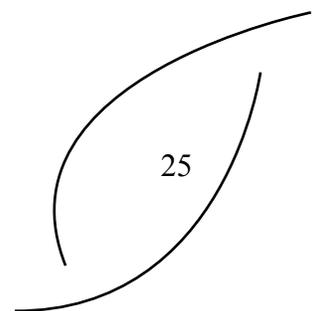
RESEARCH

To counteract the growing concern that human beings are becoming removed from the basics of respect for nature, one can kill two birds with one stone and GROW his/her own food individually or as a community. On an individual level the growing of food has quite a few possibilities. There are products to grow produce in individual containers or in larger multi-container systems. Interior gardens can supply you with year round supplies of healthy homegrown vegetables, fruits, and flowers. Hydroponic systems are used to achieve this goal. Hydroponics is soil-less growing; cultivating plants in water. [Interior Gardening 2009]

The advantages of such a method include: using two-thirds less water than a traditional soil garden; affordable; yield is higher than a soil garden; **clean**; plants can also grow year round regardless of the weather. 'Hydroponics proves that the only things needed to grow plants are water and a method of delivering the plant's food to the root system. The soil itself is simply the backbone for the roots so they have a stable place to grow.' [Interior Gardens 2009]

As for communal gardens, **crop** production is generally less than that of industrial methods, but the produce they do yield is on average healthier due to the control one personally has over the additives utilized during the growing process. [Interior Gardens 2009]

With this information, the spark of interest and knowledge on how to better one's self and the world around them is an attainable goal. If not to change the world, then the decision to better your personal health can lead to positive affects for the future of our population.



Theoretical Premise/Unifying Idea

RESEARCH

SUMMARY



The time has come for change; a change that not only benefits oneself, but the environment as a whole.

The environment in its current state is suffering. We have ravaged it over time, and the consequences are become more and more evident every day. The MYSTERIO of the wilderness has become a standardized, marketable entity that people assume will be around forever no matter how they live their lives. Perhaps the selfishness we all possess is quite a bit stronger in some more than others. But that selfishness could be turned around to benefit others as well. The want and/or need to be healthy should modify the decisions made about the food we eat, the cars we drive, the bikes we should ride, and the amount of sleep we get.

By choosing to eat healthier, the outcome is as discussed above: the environment will benefit if foods are grown locally and 'cleaner'. The cars we choose to drive, or not drive, also impact greatly on the events that impact the environment the most. These events include the expansion and sprawl of our cities and roadways. Projects such as this lead to the disruption, destruction, and possible extinction of animals and *habitats* because of the speed in which we invade their natural territory; they don't have time to migrate and adapt to a new location. These choices are directly related to the education, or lack there of, that we receive in and outside of school.

The way the current situations and consequences of our decisions are brushed over by the government and public officials in general make the impression that there is no need for excitement and change. Change needs to happen at the very top levels, as well, for the world as a whole to benefit in a significant way. I feel now that there are ways of **'going green'**, and products that exploit the same qualities, that those products should become the standard. If there are ways of manufacturing items, such as a pen, with recycled plastics, then why are they still making the previous 'non green' pens?

Theoretical Premise/Unifying Idea **RESEARCH**

SUMMARY

Perhaps the **answer** to that question is as simple as, we are in the transition period where the standards of designing, manufacturing and above all, living are changing. One disadvantage, yet inevitable, is the loss of culture due to the mixing of cultures, and the loss of strong traditions that once dominated peoples way of life. Once again, simple education would prevent the diminishment of culture by showing people the importance and reasons for what people did. Survival in an over-arching theme among cultures. This led to their growing of their own food and the recipes they conjured up. The recipes passed down from generation to generation are what make them unique.

To regain culture would perhaps help the over-all perception on the way we live, as well as eventually becoming the backbone of our habits and traditions again to spark the change needed. There is no quick solution to the hole we have dug ourselves. Yet, I believe we still have an obligation to the FUTURE people of this planet. We cannot tell the future, but to help guide the environment back on track would be ideal. With this battle comes the obligation of architects to display the best judgement when designing and contributing to the built environment. Decisions such as to reuse structures or expand on un-built land has one of the biggest consequences detrimental to the environment. The use of un-built land is leading to the loss of millions of a acres each year. According to Sprawl City, the United States lost 24.8 million acres to development from 1982 to 1997. [SprawlCity.com 2009]

With that, **lifestyles** change, public transportation policies and investments are changed, and housing trends change, but not for the better. All this change impacts the decisions made when designing, but to then back-peddle is to counteract the problems stirred up by the step in the wrong direction. It is simply knowledge and our selfishness to be bettered that will change our ways for a step in the right direction.

Typological Research

Case Study Number One

QUEENS BOTANICAL GARDEN

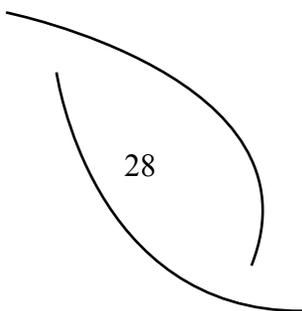
Flushing, New York (Flushing Meadows)
Architect/Interior Design: BSKS Architects
Completed: September 2007
Program: Visitor Center, auditorium, administrative offices
Gross Square Footage: 15,831 ft²
Publication: GreenSource Magazine April 2008



The Queens Botanical Garden (QBC) is located within the heart of Flushing, a neighborhood that is ethnically diverse. Home to a large Chinese population, as well as many Koreans and Latinos, the gardens pose as the communities ‘backyard’, and creates a place for residents to visit regularly. Among the community there was a desire to feature water as a primary design element. This aesthetic appeal of water was closely related to the approach the designers took to ‘demonstrate environmental stewardship, promote sustainability, and celebrate the rich cultural connections between people and plants’.

Water, as the over-arching theme, plays a large role in many of the designs I have chosen as case studies. The Queens Botanical Garden treats water as a valuable resource, relying almost entirely on rainwater (for irrigation) that is collected and “stewarded” on site. This is an approach to keep runoff out of New York City’s already “overburdened” sewer and wastewater system. Another aspect of this project that appears in other case studies is the push for education about the environment and sustainability. With the Queens Botanical Garden, educational features are an integral part of the design. The staff has worked hard to make the sustainable strategies used available for the public to easily experience and learn about.

“The success of the QBC project depended on tight integration of its systems; the city’s procurement policies stipulate a competitive bidding process and separate mechanical, electrical, plumbing, and general construction contracts held directly by the owner.”



Typological Research Case Study Number One

QUEENS BOTANICAL GARDEN



The project's environmentally sensitive strategies range from the use of a water-management cycle, to the installation of composting toilets, and the use of local woods and materials. "The role of water as the building's organizing theme is most evident when it rains. Then, water cascades from a dramatic folded-zinc-clad roof that hovers over the entry plaza on canted columns down into the channel below." The water then flows into a "cleansing biotope" in a reservoir where "gravel and aquatic plants remove sediments and nutrients from the water before it is pumped underground to a fountain near the garden's main gate". "The process mimics the natural hydrology of the site, which originally contained low-lying streambeds that were tributaries of the Flushing River".

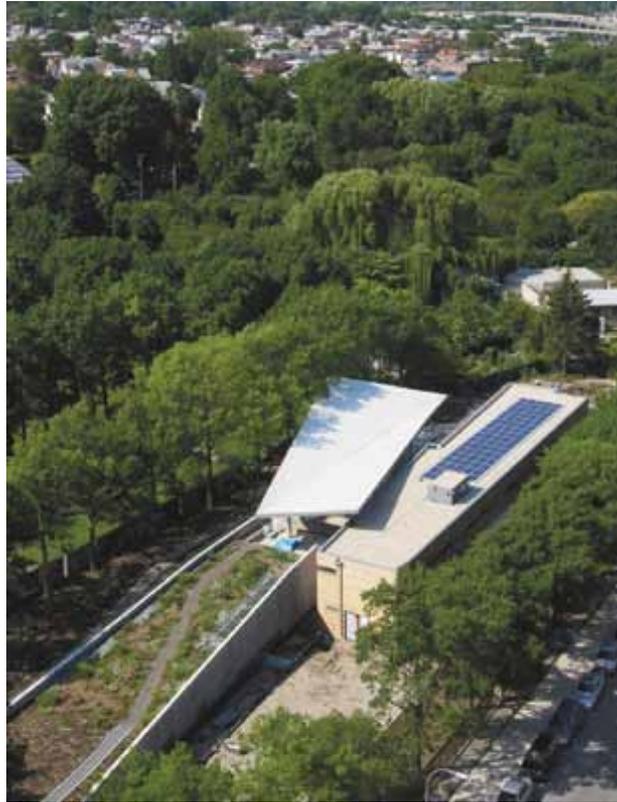
There is a graywater pool located under the green roof that is filled with marsh grasses and other species to cleanse the water before it is brought back into the building to be used for flushing the toilets in the public restrooms. Other green strategies are those incorporated into material use. The designers strived to use locally harvested and milled black locust on the decks of the bridges, as well as western red cedar cladding that is certified by the Forestry Stewardship Council. Salvaged hemlock was also used for the formwork for the auditorium's walls. The hemlock was not part of the final product; it was the imprint in the concrete from its use as formwork. On the interior, the architect's approach was to use as few finishes as possible.

Typological Research Case Study Number One

QUEENS BOTANICAL GARDEN

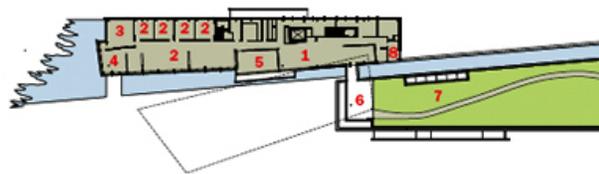
The facility is a “two-story, steel-framed structure clad with western red cedar”. “A partially underground reinforced-concrete-structure contains an auditorium, covered with a green roof planted with sedum, grasses, and perennial flowers. Separating these two programmatic elements is a water-filled channel that visitors encounter as they enter the building, passing over it on a small bridge to reach the reception area.”

After analyzing the plans and photos of the Queens Botanical Garden, it’s apparent that light plays well with the design. Steel stilts on which the off-centered canopy sits mimic the trees of the forest. On the south and eastern sides of the building the designers utilized horizontal wood members in close range to shade the interior against the intense day light.



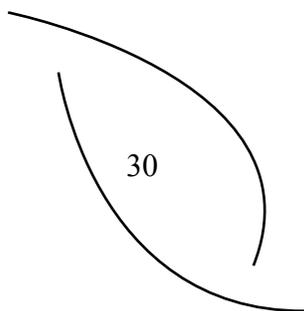
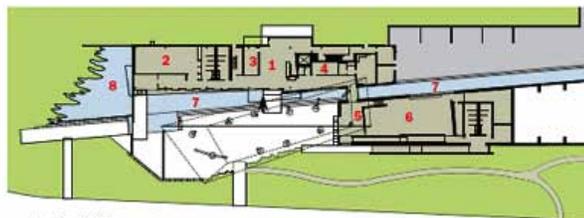
SECOND FLOOR

- 1 Staff lounge
- 2 Offices
- 3 Director's office
- 4 Conference room
- 5 Staff conference room
- 6 Roof terrace
- 7 Green roof
- 8 Composting restroom



GROUND FLOOR

- 1 Reception
- 2 Board room
- 3 Wedding rental office
- 4 Visitors' services
- 5 Vestibule
- 6 Auditorium
- 7 Water channel
- 8 Cleansing biotope

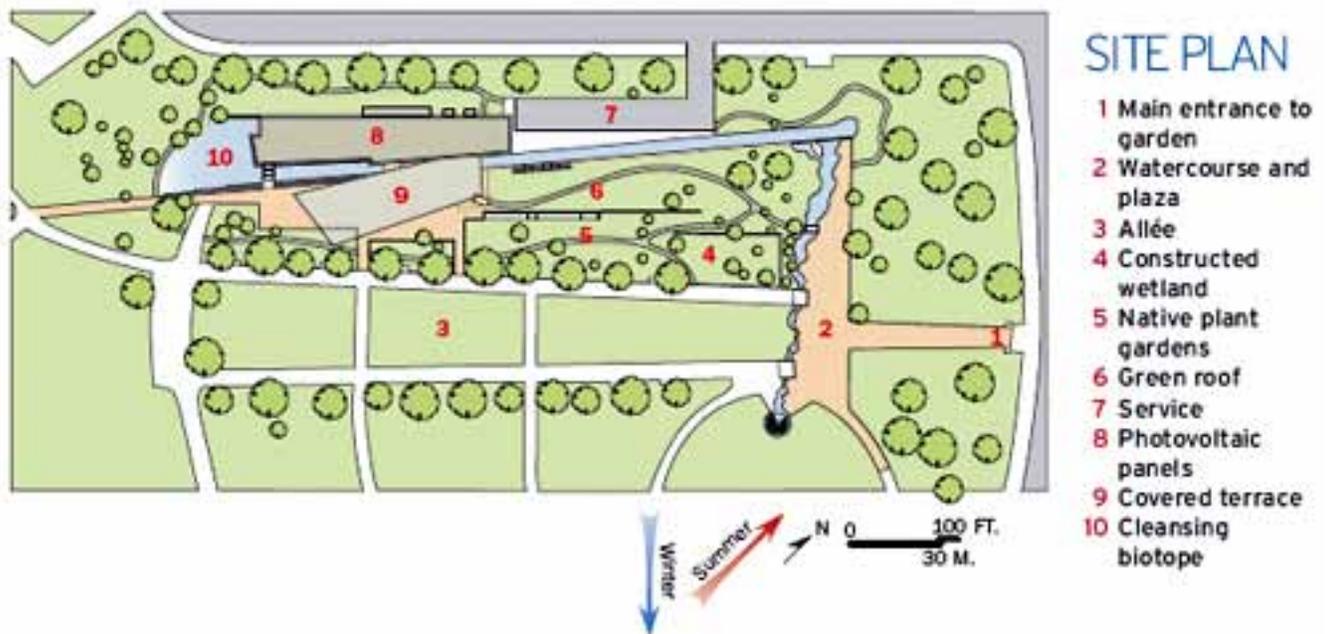


Typological Research Case Study Number One

QUEENS BOTANICAL GARDEN

A simple design and layout in plan lends itself to a clean functional design in section and elevation. From the point of entry on the site to the point of entry into the building, there are multiple chances to engage in learning about the purpose and simplistic beauty in which the design strives to protect, such as the alle of trees, the wetlands, and the native plant gardens. The site plan, along with the building plans, show that there is limited access to the north western side of the building. There is service access, but the experience of this façade and site are minimal, suggesting that it is not important. This could be true due to the concentration of public spaces that include experiences of the water-cycle system included in the design. The separation of the auditorium space from the rest of the spaces is key for the use of the facility by multiple groups simultaneously. It gives a sense of privacy and hierarchy to the space and its functions.

With this case study, the Queens Botanical Garden reveals ways in which a design can be environmentally sensitive not only for the present but for the future, due to its strategies of water recycling and education of its users. The study goes in depth with solutions to reconcile with the land and provide ways in which the impact on the site can be healed. The construction of wetlands lends itself to the animals that could have otherwise been displaced by the construction of the facility.



Typological Research Case Study Number Two

MERCER SLOUGH ENVIRONMENTAL EDUCATION CENTER

Bellevue, Washington

Architect: Jones & Jones Architects and Landscape Architects

Completed: October 2008

Program: Classrooms, visitor center, community spaces, elevated walkways, and wet labs

Gross Square Footage: 11,104 ft²

Publication Source: GreenSource Magazine November 2009



With their eyes to the sky, the ultimate tree house(s) were designed for Bellevue, Washington by Jones & Jones. They received the challenge to “get people out into nature without destroying the very thing they have come to appreciate”. The client, the city of Bellevue, partnered with the nonprofit Pacific Science Center to develop “an interpretive center that would truly immerse visitors in their natural surroundings.”

This design holds many of the aspects of green design that I strive to include in my thesis. This case study shares the sensitivity to site and education just as the others do, yet the Mercer Slough Environmental Education Center (MSEEC) goes literally ‘above’ and beyond the norm when it comes to its approach to protecting the existing landscape on site.

The undertaking of the site brought the firm to a whole new level. By thinking about the site in three dimensions, they were able to successfully design on such a sensitive site. “The proposed site was covered with mature trees, steeply sloped, and positioned just above a sensitive wetland- Mercer Slough, a 320-acre gem protected by the city”.

MERCER SLOUGH ENVIRONMENTAL EDUCATION CENTER

The grading and filling required for a ground level design would have greatly compromised the site and all that the project stands for; therefore, the decision to elevate the structures was an easy one. “The result is a unique collection of seven shed-style buildings, elevated above the forest floor and threaded through open spaces in the forest canopy, connected by aerial boardwalks that traverse the upper story of the woodland without disturbing the ecosystem on the ground”.

Ward states that as one moves further into the site ‘road noise falls away and the experience of being in the understory deepens.’ Boardwalks provide connections between various lookout points that in turn provide views of the city. This connection is ‘an important component of the center’s goal of strengthening the city’s stewardship of its natural surroundings.’



Typological Research Case Study Number Two

MERCER SLOUGH ENVIRONMENTAL EDUCATION CENTER



With the major environmental challenges tackled, educating the public about the decisions made was next on the list. The project called for a storm water management system the lent itself to educating. “With site soils that had not previously been impacted, the team sought a way to let the ground remain “light and fluffy”—essentially, to let the ground be their storm water management system.” The tree-like pilings the individual sheds are supported by allow for storm water to flow around them with minimal disturbance. “All soil retention is done with gabion walls—rock fill enmeshed in wire enclosure—through which storm water is filtered. Rain that falls on the building roofs is directed to the gabion walls through gutters installed along the boardwalk railings, where they become a prominent and sometimes interactive display of the storm water-management efforts.” This type of detail is what made Jones & Jones perfect for the design of this facility. Other details that have been included in the design are bioswales and compost-amended filter strips to remove sediments and contamination from runoff before it reaches the slough. Opportunities for education within the buildings allow for the teaching of how a building works; for example, utilities and conduits were left uncovered. Also, the boardwalks that connect each building branch off to other out-look points where lessons can be conducted on subjects such as watershed and forest ecosystems.

To minimize energy consumption, the designers approached with the view that nature provides us with fresh air for a reason, and to deny the people on the inside such a gift would be cruel. Especially due to the tree cover that keeps the area shaded and cool, natural ventilation is utilized. Windows are controlled by carbon-dioxide sensors. “During cooler months, the buildings are warmed by hydronic radiant heating (with the exception of the restroom buildings, which use electric wall heaters), powered by gas-fired condensing boilers that are 92 percent efficient and operated by digital direct controls (DDC). Walls are wood-framed using two-by-eights and insulated with cellulose to nearly R-30, and floors are structural insulated panels (SIPs) with an R-value of 48. The SIPs reduce thermal bridging, but they are also low in thermal mass, which presented some difficulty in keeping the buildings consistently warm enough on cloudy winter days—a problem that the team resolved by implementing the DDC system and commissioning the controls.”

MERCER SLOUGH ENVIRONMENTAL EDUCATION CENTER

Parking was not an afterthought by any means, but the last aspect discussed. The parking area follows stormwater-conscious strategies by allowing for existing trees to stay and the parking spaces entwine and fit into the gaps in the trees. “This keeps the parking to a minimum and encourages the use of alternative transportation.”

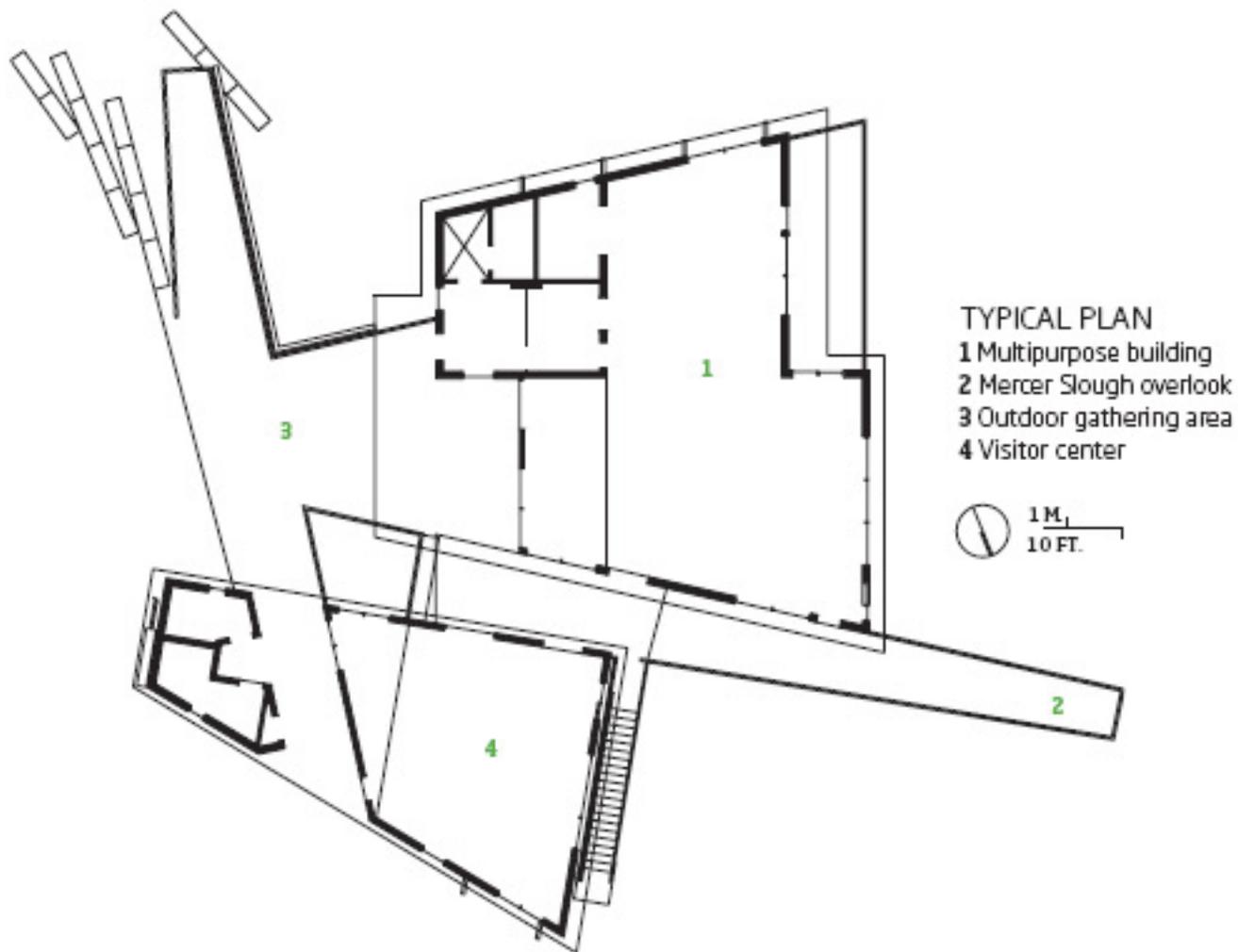
This structure was made using “a system of helical pilings, which were salvaged from a natural gas drilling operation, and concrete pile caps that lift the building foundations off the forest floor—anywhere from four to thirty feet”. By elevating the design as a whole into the canopies of the forest, natural day light became a dominant element within the design. The rooftops are angled and positioned to allow the facades to maximize their opening potential for daylighting. The roofs of five out of the seven buildings are light-colored roofs to reflect solar radiation.

The site demanded a very sensitive approach; therefore, the decisions made allow for the original site conditions to remain the final site conditions, with a few additions for parking and main structure of the facility. In plan, the circulation of the seven buildings is closely related to a tight knit community, and is situated in a playful, organic way. Jones & Jones connected each of the sheds to each other literally, as well as, figuratively. Their decision to create indoor and outdoor spaces that encompass the interaction with nature at a higher level allow for people to flow in and out without hesitation while their inner child comes alive.



Typological Research
Case Study Number Two

MERCER SLOUGH ENVIRONMENTAL EDUCATION CENTER

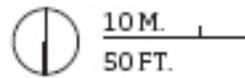


MERCER SLOUGH ENVIRONMENTAL EDUCATION CENTER



SITE PLAN

- 1 Foest canopy overlook and treehouse
- 2 Classroom building
- 3 Welcoming plaza
- 4 Multipurpose building
- 5 Mercer Slough overlook
- 6 Visitor center
- 7 Registration (existing house)
- 8 Wetlab classroom



Typological Research

Case Study Number Three

ROYAL BOTANIC GARDENS, PALM HOUSE

Kew, England

Design: Decimus Burton and Richard Turner

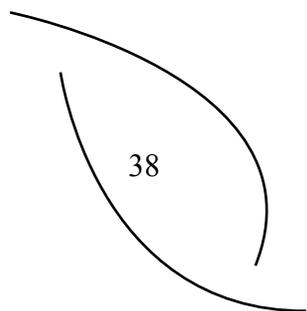
Completed: 1848

Program: Indoor garden space

Publication Source: Glasshouses and Wintergardens of the Nineteenth Century

In 1843, Queen Victoria visited Chatsworth and became very impressed with Joseph Paxton's Great Conservatory. This led to the designing of The Great Palm House at Kew by Burton and Turner.

The use of this case study gives validity to the historical precedents for growing gardens. Unlike the Queens Botanical Gardens and Mercer Slough Environmental Educational Center, the Palm House actually housed plants and other living organisms. As the main goal of my thesis, an interior growing space is a unique and highly technical space. To see such a project successfully completed at such an early point in the time of technical buildings is refreshing.



ROYAL BOTANIC GARDENS, PALM HOUSE

The structure of the garden is cast and wrought iron on a stone plinth one meter high. This plinth holds the lower ventilation flaps and pivoting windows in the upper lantern provided ventilation above. Heat was produced in a subterranean heating system of twelve boilers, which provided hot water for the heating pipes that laid under the floor. Cast-iron gratings were laid over the pipes in the floor. Koppelkamm states that even in the freezing temperatures of the winter, it was possible to keep the interior of the building at 27° Centigrade.

An unusual approach was taken to solve the need for chimneys. The designers did not want to 'spoil the appearance of the building with chimneys' so a subterranean tunnel was built which led to a chimney shape of an Italian campanile. It was not only used to exhaust smoke, but also as a railway to supply the heating system with fuel. The campanile was also used as the water tower to provide water pressure for the irrigation system within the growing space. Eventually two chimneys had to be built on the upper lantern, but have since been demolished.

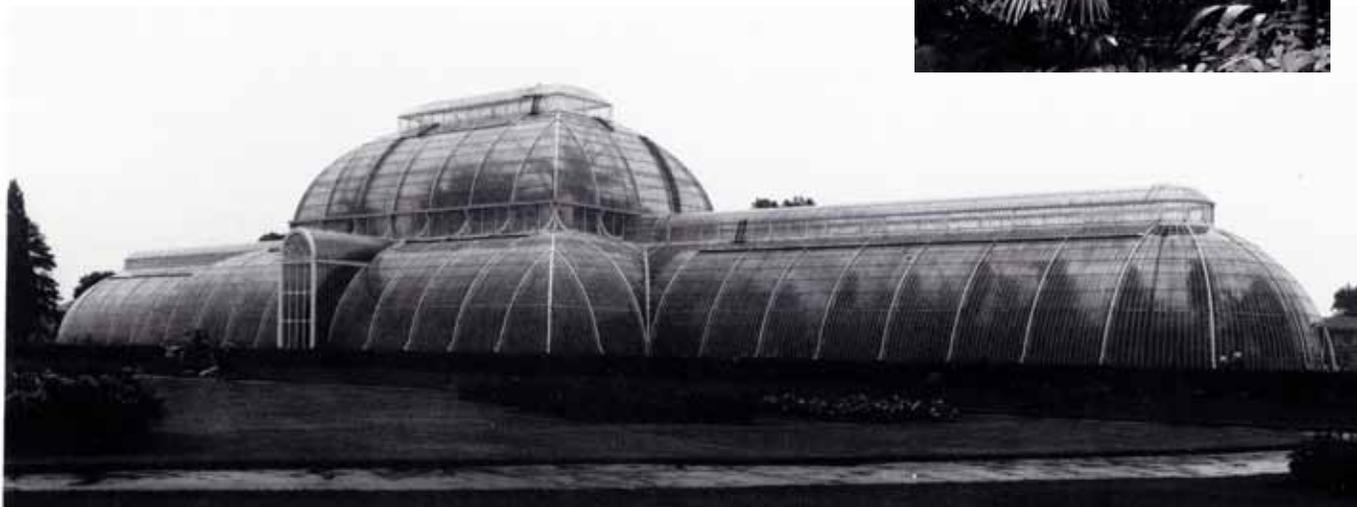
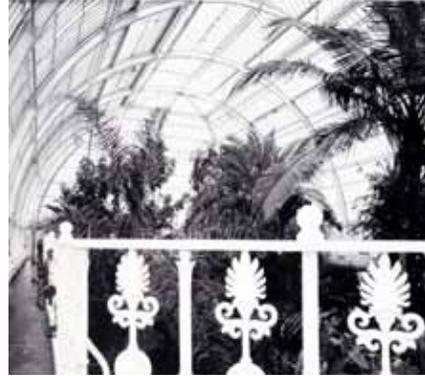
Mezzanine galleries located in the 20 meter high central dome space are reached by spiral staircases. The dome was designed to house the palm trees.



Typological Research Case Study Number Three

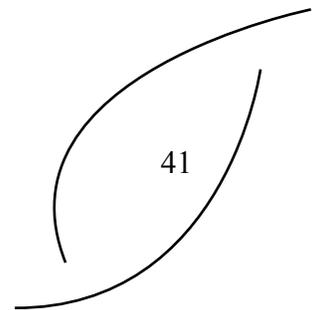
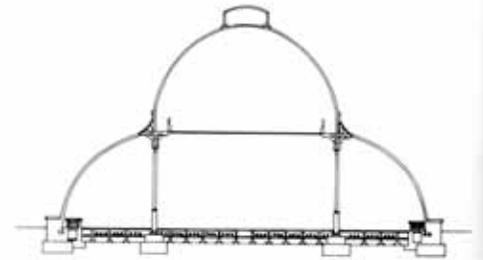
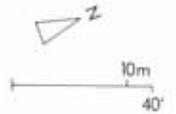
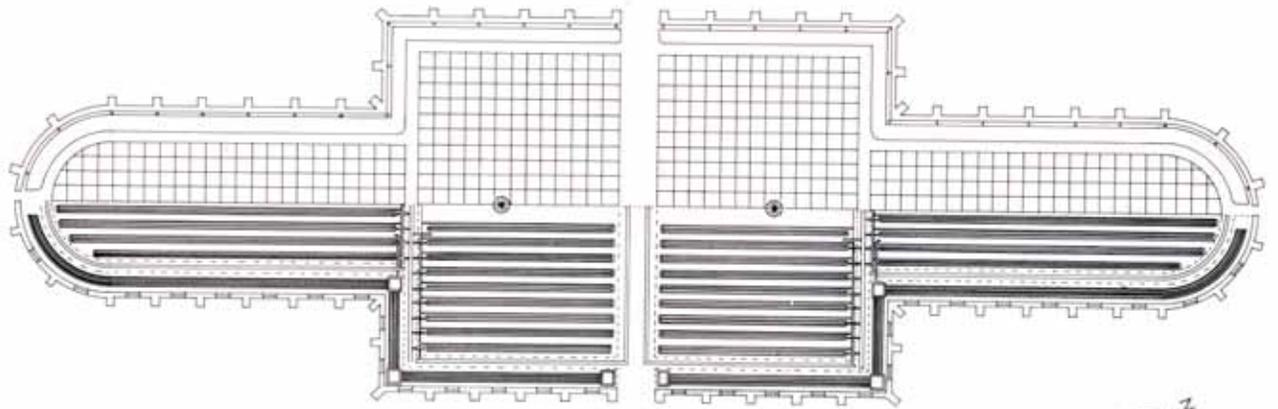
ROYAL BOTANIC GARDENS, PALM HOUSE

The large expanse of glass allows for an immense amount of light to aid in the growing of the plants and trees. In plan, the design is very simple but the details of the structure and intricacy of the glazing leads to a very interesting design. By studying the floor plan, the whole footprint of the building is an open space to accommodate for different arrangements of the plants. This versatility of the space makes it an optimal place to bring in new plants and keep it changing. With that, the circulation within the space is ever changing creating new experiences.



Typological Research
Case Study Number Three

ROYAL BOTANIC GARDENS, PALM HOUSE



Typological Research Case Study Number Four

VERTICAL FOOD GARDENS

Los Angeles, California

Architect: Elmslie Osler

Program: vertical growing wall

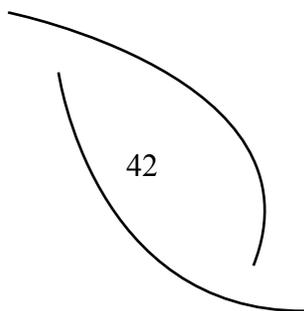
Gross square footage: 2,000 ft²

Publication Source: Architectural Record



Located in L.A.'s Skid Row, Taja Sevelle, along with Elmslie Osler Architect and George Irwin of Green Living Technologies, came together to design and build a 2,000 ft² green wall they dubbed Urban Farming Food Chain. After experimenting with growing vegetables such as lettuce vertically, they quickly turned the project into reality. The growing walls are found in four locations of L.A.'s Skid Row, a district that contains one of the nation's largest homeless populations.

Each 30 foot long by 6 foot high wall contains 4,000 plants growing in 180 square panels made of stainless steel. The panels are divided into 4x6 inch dirt-filled cells. An X-shaped slit on the underside of the cell allows for drip lines to irrigate the crops and then naturally drain. A fully loaded wall weighs on average 15 pounds per square feet.



Typological Research
Case Study Number Four

VERTICAL FOOD GARDENS



Typological Study Research

SUMMARY

My intention when selecting case studies was to choose a range of projects that encompassed the current trend(s) of the typology, as well as an example from the birth of the typology. Also included is a look at a landscaping design that will play back into the eventual design of my thesis. With this range of studied works, the hope is to have the current and historical knowledge for the proper design of an indoor growing space and educational center that will become a near reality.

The theoretical premise and unifying idea was reinforced positively through the research of educational centers, as well as sustainable strategies incorporated into the reviewed projects, all of which have either indoor or outdoor growing spaces. Yet the growth of food for self-sufficiency is only present in one of the four case studies. The idea that man and nature can cohesively exist in the realm of nature through the built environment is especially evident in the case of Mercer Slough Environmental Education Center. The attention given to the site and the solution is extremely successful. The other two case studies, Queens Botanical Garden and the Royal Botanical Garden, bring the past and future onto the same level of study. Their connection to one another is not visually evident, but their intention to detail and connection to nature is one in the same. As for the fourth case study, L.A.'s vertical growing walls in Skid Row it is the type of growing detail that can be directly implemented in my thesis design.

All of the case studies presented emit a level of educational value that is either made obvious, or is simply a product of design. Their attention to concerns for the environment come through in the landscape designs, or lack thereof, as in the Mercer Slough Environmental Education Center. They have shown change for the bettering of quality-of-life for the plants and animals within or around the structure, and for the people that occupy the spaces.

Typological Study Research

SUMMARY

The most uncommon aspect of the project selection as a whole would be their specific uses. They each contain aspects of my over all design intention for the thesis, such as examples of growing indoors and outdoors, water reuse and sustainability, and the use of light in the design to improve spacial quality and as a tool for growing. Each of their sites are fairly different as well. The first three of four cases studied are in natural settings, where as the fourth study of growing walls is located in a very urban setting of concrete and glass. The sites that are within a natural environment strive to maintain that natural setting, as to not disturb the current processes and habitats. An urban jungle as a 'green' project site- such as the one discussed- is almost 'unnatural', but takes the biggest leap into solving a problem on a more personal level than most.

The vertical growing walls is a great solution to a societal problem that has led to many being homeless and hungry. It also has the greatest chance out of the case studies for failure, due to its need for constant upkeep and interaction, for the success of the food grown. They all have a positive impact on the education of our society that could, in turn, affect political issues and policies for the future. The Royal Botanical Gardens, built in 1848, give us a great view as to the importance and status symbol the design and typology had on the time period. The way an indoor growing garden was viewed back then displays the strong cultural practices and the high regard in which they were held.

Functionally, the case studies are all for the use of public. They relate to one another through that aspect spatially as well. In general, spatially, each design has free flowing spaces that are multi-faceted. Open space designs such as the Royal Botanical Gardens allows for concentration on the intimate details of the foundation and skin due to lack of other interior spacial needs. The technical needs of Mercer Slough Educational Center and the Queens Botanical Garden are those relating to the preservation of site and the use of passive strategies, such as daylighting and heating. All of these are present at some sort of scale in each of the projects presented.

Historical Context

Historical SOCIAL PHYSICAL

After the discovery of ways in which to grow food, people were able to settle lands and become self-sufficient in ways that led to the start of the 'conservatory' or 'greenhouse'.

[Woods & May 1988; Cunningham 2000; Koppelkamm 1981]

Conservatories have also been referred to as orangeries, glass houses, and green houses. Their history is heavily architectural, but architecture that is influenced by man's perception of the need to grow plants, as well as to enjoy them. Evidence has been found in Pompeii to conclude that greenhouses were most likely present as far back as second century BC. Gardeners of ancient times would have been preoccupied with the growing of food for survival, yet time would have been set aside for trees and flowers. Curiosity simply caused the evolution of indoor growing spaces; curiosity of seeds or seedlings, pip or kernel, bulb or root. [Woods & May 1988]

Awareness among the Greeks and Romans of root development due to warm soils led to the use of manure from the stables. Warm soils, especially important during the early stages of growth, along with sunshine, produces early flowering, and in turn produces an early crop. This technique is known as forcing. With the ability to force the growing of fruits and vegetables earlier, as well as later, in the season, the Romans utilized various ways to keep their crops warm at night, which was the biggest concern for the success of the plant. To keep their plants warm, gardeners made hot beds by either digging pits in the ground or by creating a raised bed surrounded by a low brick wall and filled it with manure. They also fastened wheels onto a wooden bed used for the garden so it could be brought inside at night to keep warm. [Woods & May 1988]

These practices then turned into the idea that if warmth promoted early growth, then daylight would be the best source of that. To harvest daylight, and hold its heat hostage, needed to be approached differently than their current strategies; therefore they turned to the construction of glass houses. [Woods & May 1988]

Beginning in the fifteenth century, world trade and colonization gave way to a flood of new and unusual plants, fruits, and vegetables that led to 'modern' glasshouses becoming a reality for many due to the knowledge gathered by travelers.

One of the most sought after plants became the orange tree. During the cold season, the trees needed to be protected from the weather; therefore if they were planted directly in the ground, structures had to be built around them. These structures could either be permanent or dismantled during the warmer months. The **TEMPORARY WINTER STRUCTURE** had drawbacks as far as bad insulation and the need to seal up all the joints each time it was erected. It was also very expensive to take down and rebuild the structure every year. But it wasn't until the end of the seventeenth century that permanent orangeries came about. [Woods & May 1988]

In the mid-seventeenth century, plain masonry houses with large windows were the design of the time. Not until the eighteenth century did the greenhouse develop into an 'elegant temple'. Within the first forty years of the nineteenth century came rapid change to the idea of indoor growing spaces. Marked by the Great Conservatory at Chatsworth, the introduction of glass roofs changed the game forever. The glasshouse/conservatory then became a permanent display and collection of native and exotic plants.

What started out as a way to respond to architecture- placing trees on terraces and stairways- quickly became a problem due to winter conditions, therefore the birth of glasshouses became the solution. A solution turned commodity, the glass house/conservatory owes its success to the advances made in manufacturing of sheet glass over the past 250 years. [ConservatoryInfo 2009] As an irresistible fascination among people, the glass house became a standard portion to many middle and upper class homes. The system of construction was easily conceived by layman, making it easily attainable in the later centuries. Some may say that this was a downfall and detrimental to its own success because it was no longer seen as a status symbol.

Historical Context

Historical SOCIAL **PHYSICAL**

No longer a prominent status symbol, the conservatory still existed for the housing of less hardy plants during the winter. **CONSERVATORIES**, small and large, evolved into ‘architectural statements of beauty.’ [Cunningham 2000] In the nineteenth century the production of iron and steel made it possible for a much larger variety of structures to be completed, just as those found in the intricate skin details of conservatories, new and old. With the new technology available, conservatories on a larger scale were built for large cities as grand public conservatories, such as the enormous glass houses built for the World’s Fairs and other exhibitions. ‘But it wasn’t until 1880 that the American aristocracy got their first view of European luxury in the form of industrialist Jay Gould’s immense glasshouse at Lyndhurst, his estate in New York’s Hudson River Valley.’ The design surpassed the glass house designs before it, requiring a curvilinear steel frame. Yet, there was a desire for a place within the ‘urban fabric’ where people could come together within a natural setting. The City Beautiful movement of the later half of the nineteenth century played a very large role in making the desire for a natural gathering place a reality. [Cunningham 2000]

After the Depression and the smoke settled after the wars, the want for public works such as the conservatory had since died. During the 1960’s, the onset of **environmentalism** led to the revitalization of the conservatory. Buckminster Fuller’s geodesic dome design became synonymous with designing with nature. These structure were easily and efficiently heated and cooled. [Cunningham 2000]

Conservatories do also have factors working against them. In other words, they are complicated designs that include programs for the comfort of the public, as well as the safety of the public as outlined by government regulations. The materials of the design also take a lot of abuse from the high humidity levels needed for the success of plant growth, and the affects people and general wear have on the building. Structurally, the history of conservatories is directly related to the history and progression of building technologies -specifically the evolution of glass and steel. [Cunningham 2000]

The **structure** of garden conservatories more often than not were doomed to fail due to their material choice, such as wood that fell victim to rotting or being incinerated by an unattended boiler. By the 1880s, iron became the dominant choice for construction, but even that failed because the iron would rust and deteriorate from the high humidity, corrosive fertilizers, and leaks in the glazing. The baton was then handed over to aluminum. As a structural material, aluminum looked promising. The added strength gave designers a sense of freedom to play with, as well as a proposed method of eliminating the need to paint or maintain the outside glazing strips known as barcaps. 'But the early aluminum had trouble dealing with the climate, becoming discolored and pocketmarked.' Eventually other forms of steel alloys became available and able to stand up against its enemies. The development of glass also progressed into a more applicable way of glazing the conservatory. [Cunningham 2000]

In 1907, the United States attempted to overlap flat panes of glass as a solution to the lack of proper materials to link the glass cladding. This approach of overlapping was quickly turned down due to the condensation build up between the panes. Moisture in the overlapped portion of glass would freeze and expand, breaking the glass, which at the time had to be custom made. 'Frigid winter days echoed with a symphony of breaking glass.' Only a few conservatories are still enclosed by their original glass. This is due to natural disasters and man-made alike. For example, extensive heavy snows have crushed segments of many conservatories in the North, taking a huge toll on the tender plant stock within. [Cunningham 2000]

Glass had gone through a transformation as well. In 1960, plastic was released as an alternative to glass. This too had failed due to yellowing in the sun, over heating, and the chemicals used on plants and as sealants contributed its failure. Exolite then came into existence. Exolite is a translucent material that was replaced by heat-strengthened glass. It is able to be made in various thicknesses for different purposes; roof vs. walls. [Cunningham 2000]

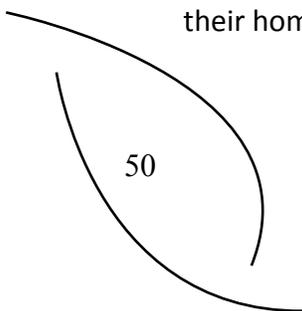
Historical Context

Historical SOCIAL PHYSICAL

One of the trends that roller-coasters through the media is the Green Movement. 'GOING GREEN' is a world wide trend that targets people who are willing to change their lifestyles in some way to better the environment and it's future. Eviana Hartman, Washington Post, wrote an article titled **Going, Going, Green**, where she states that ' "doing something for the environment" once meant tossing a newspaper in a recycling bin or buying organic lettuce; now nearly every aspect of daily life- from the toilets we flush to the flowers we decorate our dinner tables- is being radically rethought. Entrepreneurs, scientists and thinkers are working to transform industry so that it functions more like nature, lessening pollution and inefficiency while propelling the economy forward.' [Hartman 2006]

This trend of Going Green was ignited by research and developments in the agriculture community to better their processes and the environment. 'The "environmental movement" is a significant thread in the fabric of American philosophical thought - first developed by the Transcendentalists (most famously Henry David Thoreau) but tangibly expanded upon during the era of American pragmatism in the latter half of the 19th century'. **Environmentalism** isn't a trend, or a cult, or a form of hysteria. It is rooted in American philosophy and, being at once innovative and practical, idealistic and active, one could easily define modern environmentalism as quintessentially American.' [WebEcoist 2009]

This notion of 'quintessentially American' has almost put us as Americans on a pedestal. To put environmentalism solely on the shoulders of Americans is a little extreme. Basically, by saying that only Americans have the resources to save the environment is denying the rest of the world the chance to donate their resources and help. I feel that change has to start somewhere, which is usually at the personal level; therefore we need to build a **band wagon** for our friends and family to jump on because the hardest part is starting something new. The community garden space and education center that I will be designing will create the 'band wagon' for Ely, Minnesota. This is a small enough community where there is a close connection to one another and their surroundings. It is a wilderness setting that has a lot of potential for staying the way it is. The protection of their home is of highest importance.



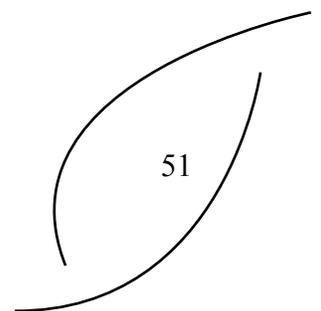
Historical SOCIAL PHYSICAL

The history in which Ely, Minnesota roots itself is very colorful. The Ojibwe, or Chippewa Indians have called the Ely area home for hundreds of years. Voyageurs first came to the area in search of furs during the 1700's. Eventually the trappers and voyagers moved on to another location and then the explorers and prospectors looking for gold soon moved in. The mid-1800's gave way to the gold-hungry prospectors that unfortunately only found fool's gold- iron pyrite. The iron ore the prospectors did find were found in what is known as the Laurentian Divide. In 1883, the iron ore discovered turned out to be a very high grade. It was first discovered on the far west edge of what is now known as **Miner's Lake**. The discovery of iron ore in such saturation has made Ely and Minnesota famous. [EADA 2009]

In 1888, **Ely** was incorporated as a village. Initially located near the east end of Shagawa Lake (now known as Spaulding), Ely eventually migrated west with the discovery of more iron ore. When Ely was first settled, it was named Florence, but after the people learned another community bore the same name, they changed it to Ely. [EADA 2009]

Ely is located in the heart of the Superior National Forest. It is a gateway to the Boundary Waters Canoe Area (*BWCA*). As a passage way into the BWCA, tourists and adventurers alike travel through Ely each year. The amount of tourism that Ely receives plays a large part in the wide variety of shops that Ely has to offer, such as specialty shops, canoe outfitters, outdoor supply stores, and restaurants. [EADA 2009]

A change in population from 1990 to 2000 was -3171 people. That number is estimated to have decreased from the year 2000 to 2004 by -167 people. Although the next census does not come out until 2010, the pattern shown predicts declining population numbers. This threatens the economy of Ely and hurts it's survival rate, but the intention of creating a community garden and educational center hopefully brings interest back in to the city for permanent residents, not just for the passersby. [EADA 2009]



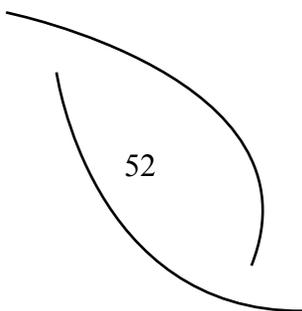
Goals for **THE** **project**

Academic Goals:

The academic goals which I plan to achieve are to conduct research continually throughout the process, and become very familiar with the different angles to an issue that I am very passionate about. The current problem of who, what, where, and when our next meal comes from is a large problem we as Americans face daily. To be able to design a possible solution, such as an indoor growing space to supplement a city as a whole (with food) would be a unique and possibly ideal solution to the current issue as it stands today. An understanding of the issue from all angles will lead to the best possible solution. The link between man and nature can exist on the same level with the help of architecture and landscape architecture. To create a place that brings the understanding of nature, agriculture, and the benefits of their preservation into one, leads to a clearer future for all.

Digital presentation skills will play a major part in portraying the final design and the road taken to the finished product. With that, I plan to expand on my knowledge of computer modeling and rendering programs in order to display the solution as clear as possible.

Other academic goals that I feel should be achieved are those recognized by the faculty at a level of higher education. The professionalism demonstrated when developing, discussing, and presenting information is key to the success of an individual now and in the future.



Goals for **THE** **project**

Professional Environment Goals:

These goals include the presentation and sustainable details that will make the understanding of the project as a whole very evident. Also, to have an understanding of a current demanding issue that I can carry into a work place will make me useful and beneficial to a firm. Professionally, I would like to market myself as willing to learn and take in new information at every opportunity, and that will be clear due to the amount of time and detail put into the thesis work.

Personal Goals:

At this level of education, expectations of students are very high. My personal goals of this thesis project are of the highest intentions. They are to be more informed on the issue of self-sufficiency and sustainability. This can lead to long lasting knowledge and an advantage to keeping up with current issues that will plague us all sometime in our lives, in one way or another. These goals are a personal dedication to myself to produce a project of the highest quality. By setting a schedule of the dates and deadlines in which to finish different portions of the project, I will be able to keep up with the heavy workload and make the best of the time given. This will help me find a healthy balance between school, work, and play; a lifelong applicable approach.

Site Analysis

Narrative Visual and Sensory Details

Views from the site are fairly open. The site is located on the southern edge of the community where the edges of the site are blurred by the surrounding tree lines and vegetation. Creating the southern border of the site is a tree line including poplar, spruce, tamarack, birch, white pine, and balsam trees. These few species of trees do not get much taller than 20 -25 feet which guarantees optimal access to the sun for the growth of the plants within the structure.



Seasonally the views won't change too much other than the loss of leaves and abundance of snow that accumulates in the area during the winter months. The loss of leaves on the trees will allow for better sun access in to the building in the winter months due to the lower sun angles the northern hemisphere receives. Also, the snow in the winter months adds reflective qualities to the landscape with how white the area becomes allowing for the building to stay bright during the day, yet some artificial light will be needed.



Views **to** the site are easy to come by. When traveling south to the site from the city, the site is completely visible because of a vacant lot to the north that opens up visibility. Views looking into the site from the road on the western edge of the site are screened slightly by a thin layer of smaller trees and bushes. Similarly, the views from the east edge of the site are screened by thin trees and shrubs.



The site falls into the **wilderness** category. With that comes the image of tangled trees, endless shades of green, and the clean cut of cold fresh air inflates your lungs. If you stand quietly you are able to hear the creaky of the tall gangly trees that sway in the wind. Those that bare leaves quiver with each new gust of wind. The trees may be a fair distance from the structure but the sheer amount of trees leads to a feeling of being amongst the forest.



The location of the site is optimal because it is adjacent to a baseball field complex which is already established and brings the people of the community down to the area in which I am proposing to build the indoor garden facility.

The topography of the site is relatively flat. With only a three foot increase in elevation across the site it gets fairly wet and swampy across the whole site. Cat tails, prairie grasses, and thorn bushes sprawl across the site.

Without *built* features on or near the site, the wind is not affected by anything other than the trees on and around the site. Winds in the area tend to not be affected by the time of day, mainly just the current weather which can be affected by the time of day and temperatures that correspond.

The human characteristics of the site are ideal to the needs of my design. The state trail that runs through my proposed site reinforces my choice to create a space where the people of Ely can be educated and benefit from the **environment** in which enjoy. There is a cemetery located near the site, but traffic is minimal.

As I approached the edge of my site, it shows almost no contact what so ever with humans. Further investigation revealed that people have created a few trails off the main state trail. Also, quite a bit of garbage has been littered in the trees at the edge of the site where it meets the baseball complex. The presence of people on the site currently seems very minimal, but there has been contact.

Site Analysis

Quantitative Soils

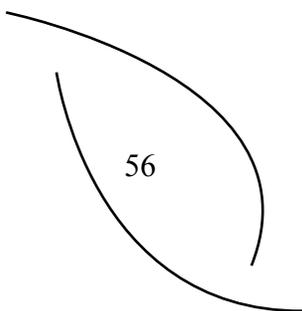
My site visit allowed for the first hand interaction with the soggy, swampy ground that the site exhibits. Shown in the picture below is the red rock soil/mud/rock that is found across the northern part of Minnesota due to the iron ore deposits in the area. At my site, the color is a very dominant feature.

- * Landform: Flats on flood plains
- * Slope: 0 to 1 percent
- * Down-slope shape: Linear
- * Across-slope shape: Linear
- * Parent material: Organic materials mixed with alluvium
- * The surface area is covered with clay and loose soil
- * Depth to restrictive feature: More than 80 inches
- * Drainage class: Very poorly drained
- * Depth to water table: About 0 inches
- * Frequency of flooding: Frequent
- * Available water capacity: Moderate (about 8.9 inches)

Land Profile:

- * 0 to 38 inches: Muck
- * 38 to 47 inches: Stratified fine sand to loamy fine sand
- * 47 to 80 inches: Muck

[Web Soil Survey 2009]

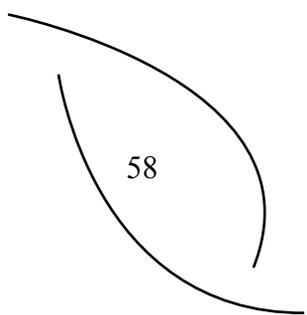


Site Analysis **Quantitative**

There are currently no utilities on the site, but there are utilities present on two adjacent sites to the north and east. Utilities such as water, sewer, and electric could easily be extended to the site from the surrounding area for the community garden and educational center's use.

The vehicular traffic observed was very minimal; approximately 6 cars every half hour. It is my assumption that the citizens of the nearby neighborhoods like their peaceful setting in which they live. I will strive to keep the vehicular traffic low and support pedestrian traffic as much as possible. The difficulty is that the baseball complex adjacent to the site attracts quite a bit of attention during games/tournaments. It is not a far walk for the able, but those who are elderly or disabled the distance is much too far to walk from the main street of the community. Also, the ease of buying good and produce at the facility would deter people from approaching on foot from far away.





Site Analysis
Quantitative of Ely, MN



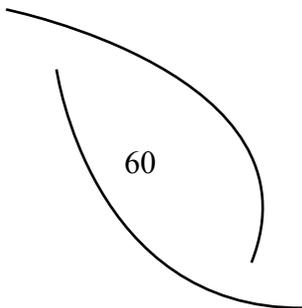
Ely, Minnesota is located in the Midwest Region of the United States in St. Louis County. Located fairly close to Canada, Ely often gets mistaken for a Canadian community. It reaches far into the Superior National Forest where much it meshes in to the Boundary Waters Canoe Area. This sets up Ely for quite a bit of tourist activity and attention. The attention that Ely already gets will benefit the success of the proposed indoor garden facility.

Site Analysis

Quantitative Topographic Map(s)



The slope of the site, as previously mentioned before, is approximately 0 to 1 degrees, yet there are steeper portions of the site due to a bit of infill burms . The overall grade of the site is suitable for movement and informal activity.



Site Analysis
Site Reconnaissance **Quantitative**



North



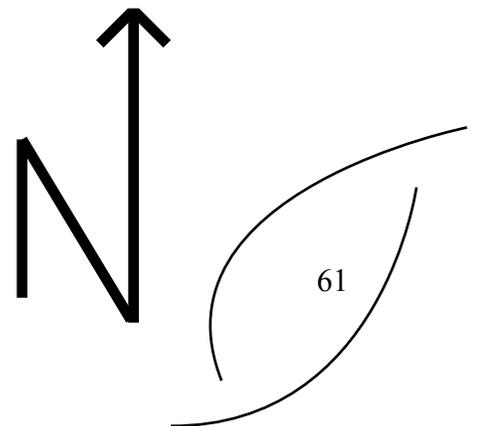
West



East



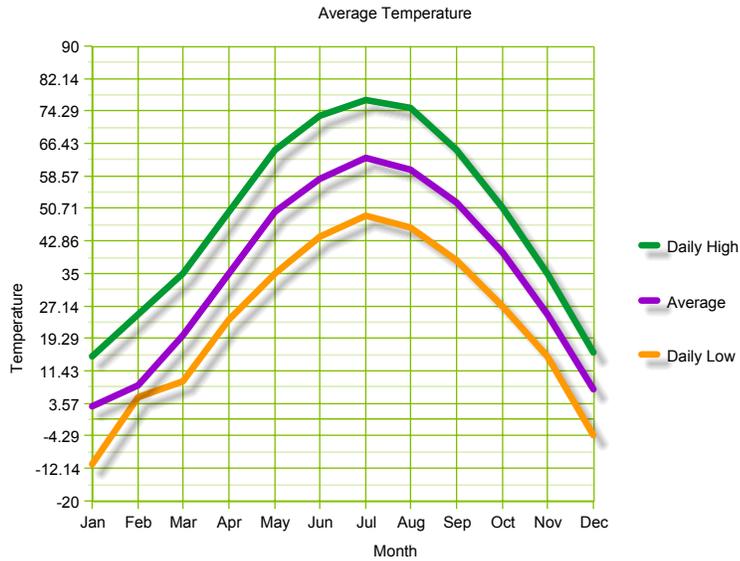
South



Site Analysis

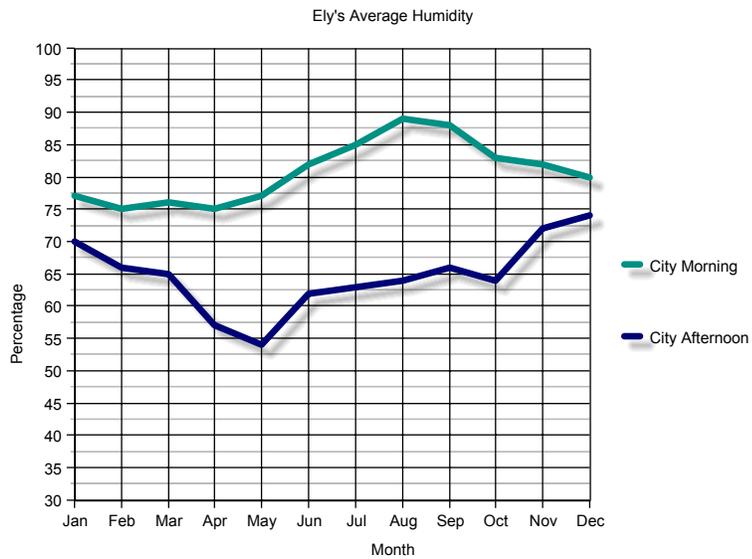
Quantitative Climate Data

The temperatures at a latitude as far north as Ely can get extreme. The winters are bitter and the summers get into the 80's, which is an 'extreme' to the people of norther Minnesota.



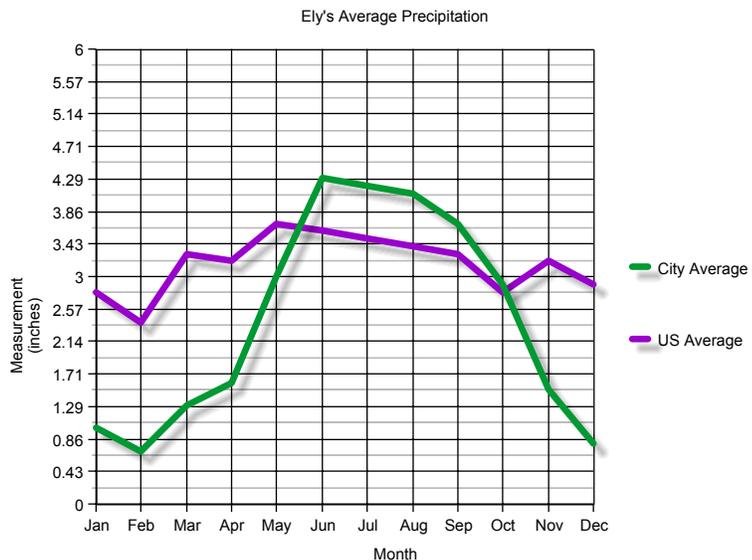
www.city-data.com/city/Ely-Minnesota

Humidity in northern Minnesota stays fairly even due the amount of lakes. Ely is very close to the Boundary Waters Canoe Area which supplies the region with moisture.

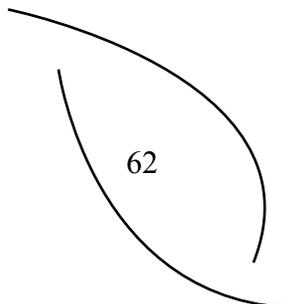


www.city-data.com/city/Ely-Minnesota

Ely's location, as mentioned above, goes through extremes, especially with the abundance of precipitation. The humidity is directly proportional to the amount of precipitation received.

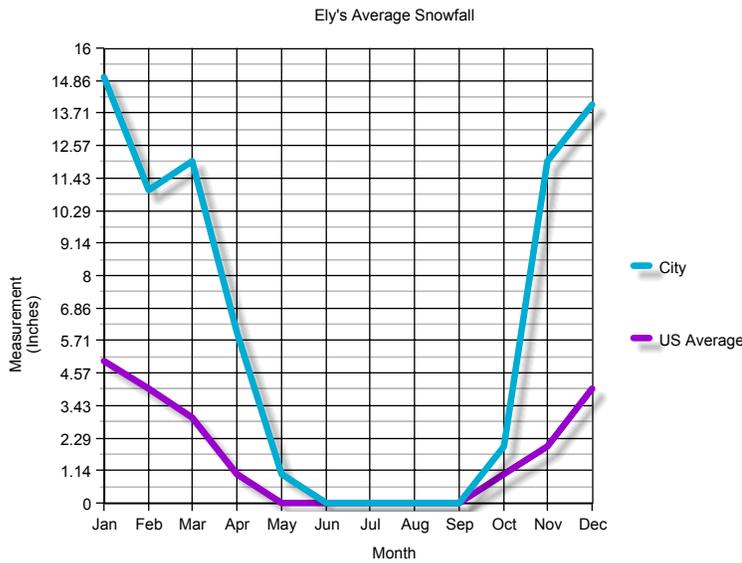


www.city-data.com/city/Ely-Minnesota



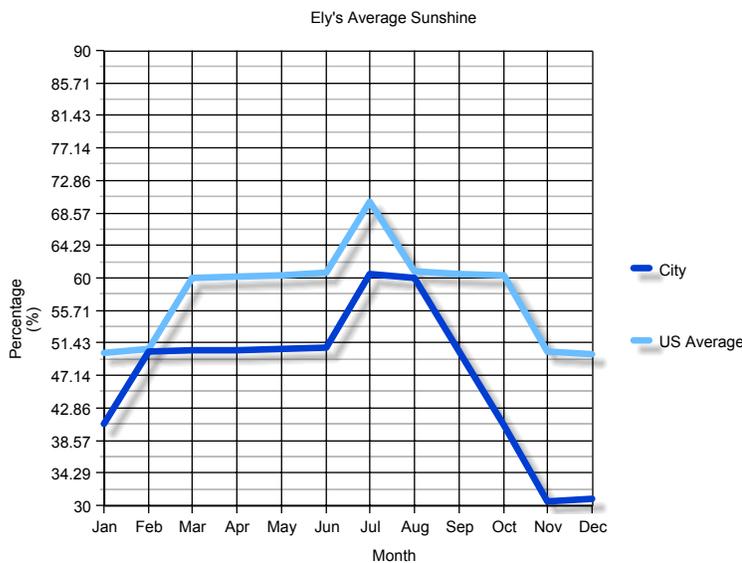
Site Analysis

Climate Data **Quantitative**



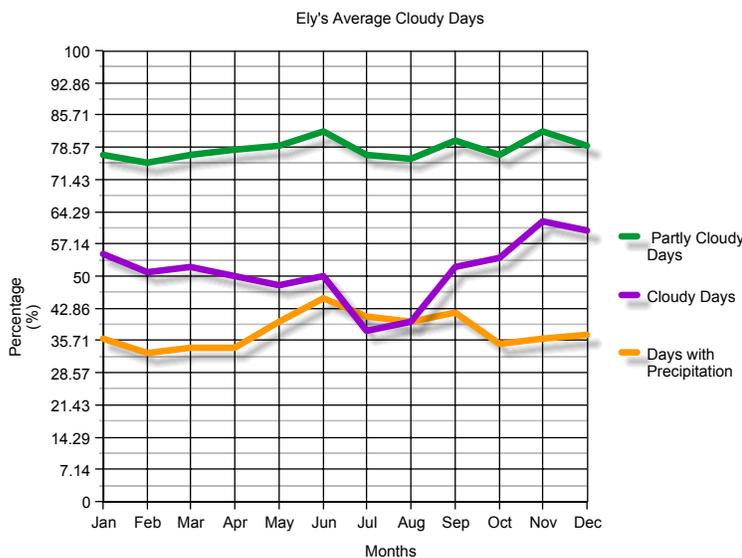
The amount of snowfall in Ely mimics that of a mountainous region. The Laurentian Divide provide a natural structure that triggers the drop of precipitation to its adjacent communities. The amount of snow each year also is directly related to the amount of tourism that saturates the city.

www.city-data.com/city/Ely-Minnesota



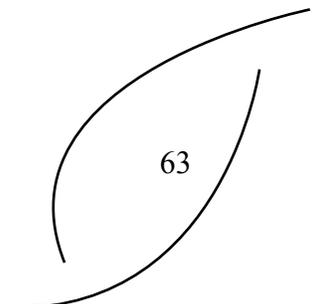
Summers in Ely provide one with a sufficient amount of sunlight, but the winters often cause people to become depressed due to the lack of sunny days. Also, the lack of sunshine will directly affect the success of the indoor garden and any passive solar strategies used.

www.city-data.com/city/Ely-Minnesota

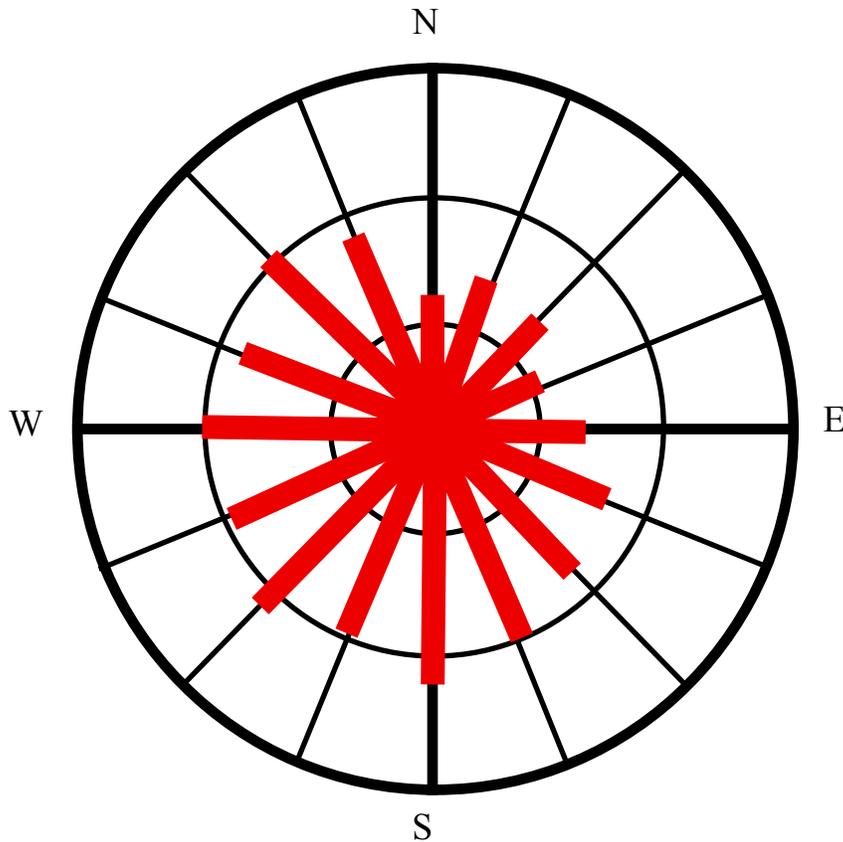


As stated above, the cloudy days Ely has will most likely hinder the growth of produce in an indoor garden, therefore other strategies must be utilized to supplement the lack of sun.

www.city-data.com/city/Ely-Minnesota

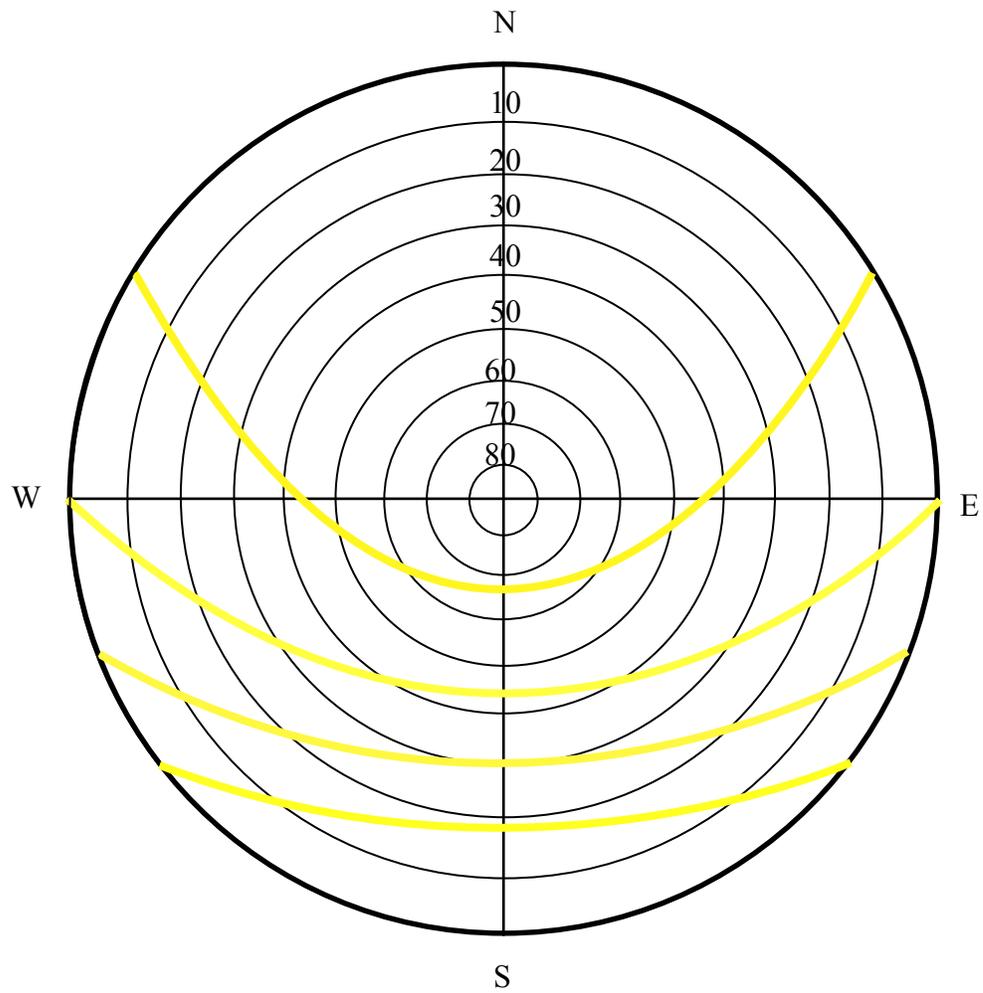


Wind Rose for Ely Area

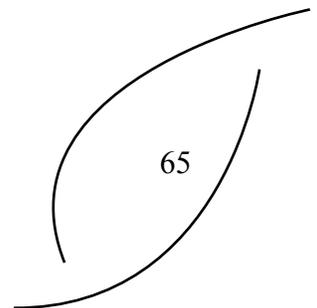


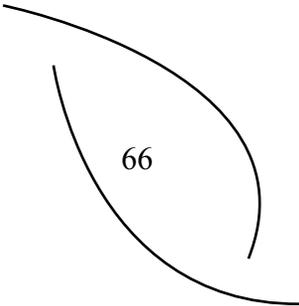
Strong winds from the south, southwest, and northwest will be beneficial to the design with the integration of passive heating and cooling methods.

Site Analysis
Climate Data **Quantitative**



Latitude: 47 degrees





Programmatic Requirements

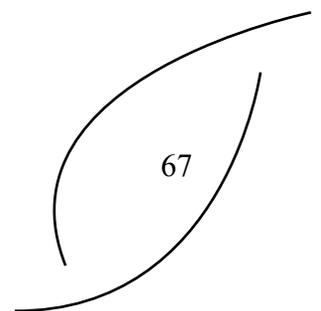
Space Allocation

Site Parameters

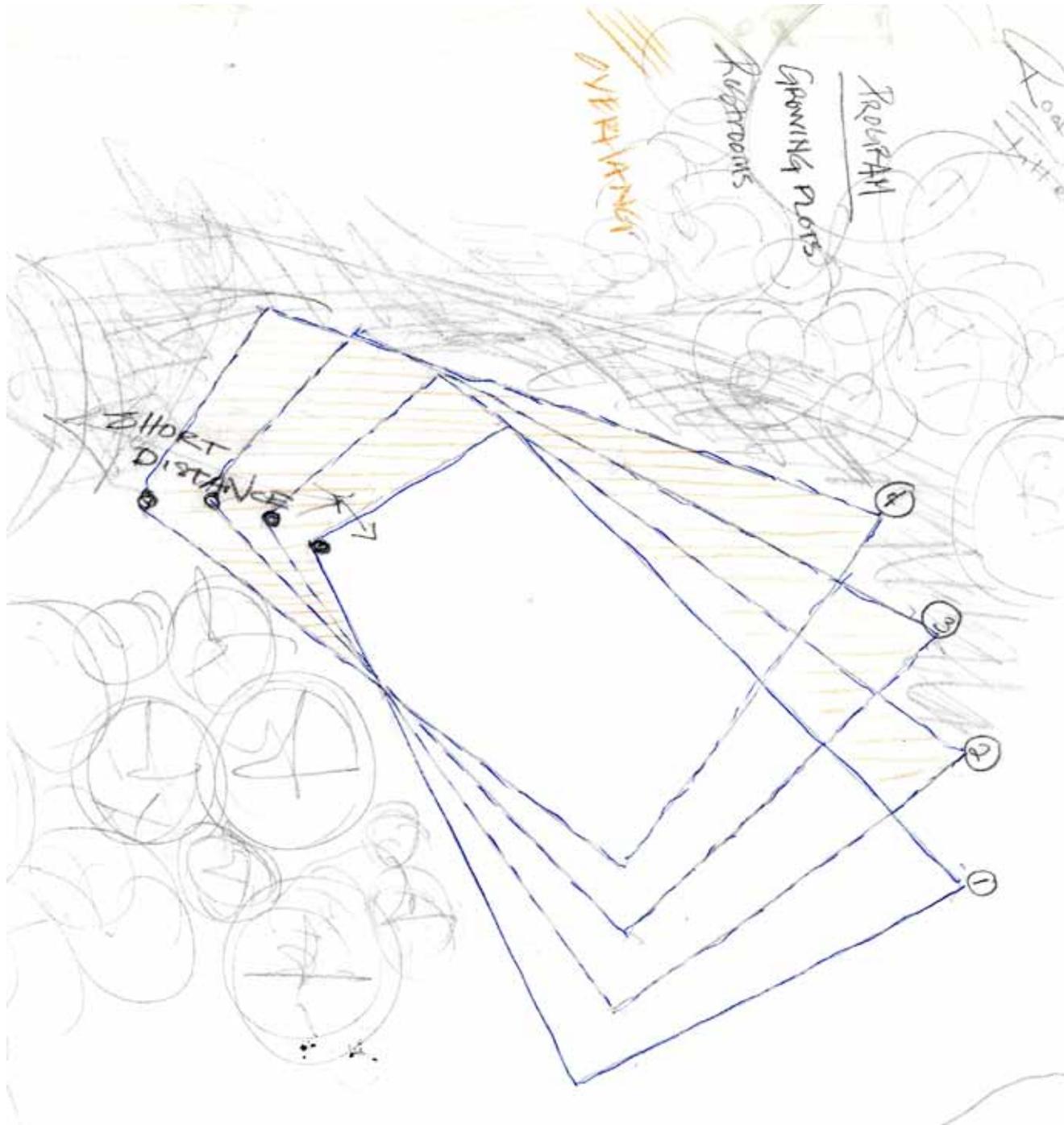
Total Square Footage of Site: 131,250 S.F.

Available square footage for building footprint: 50% (estimate) = 65,625 S.F.

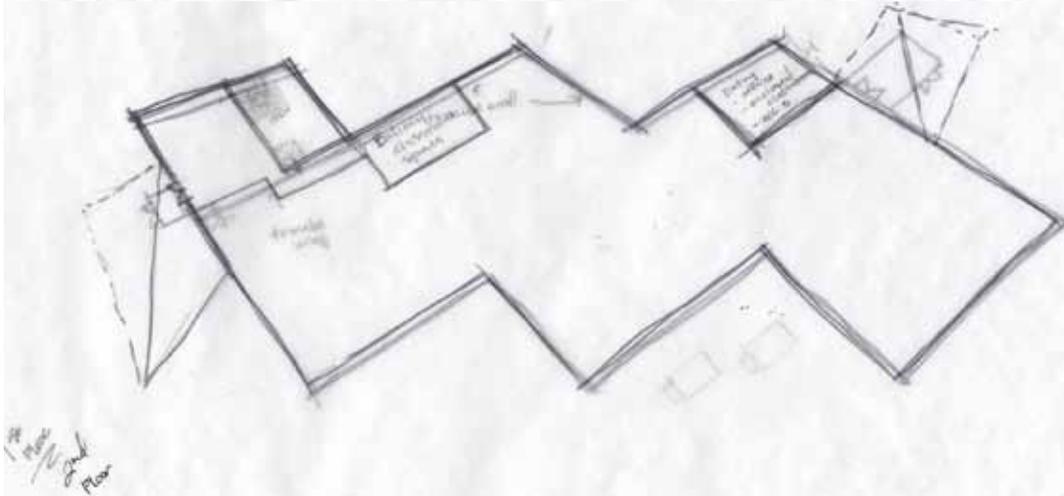
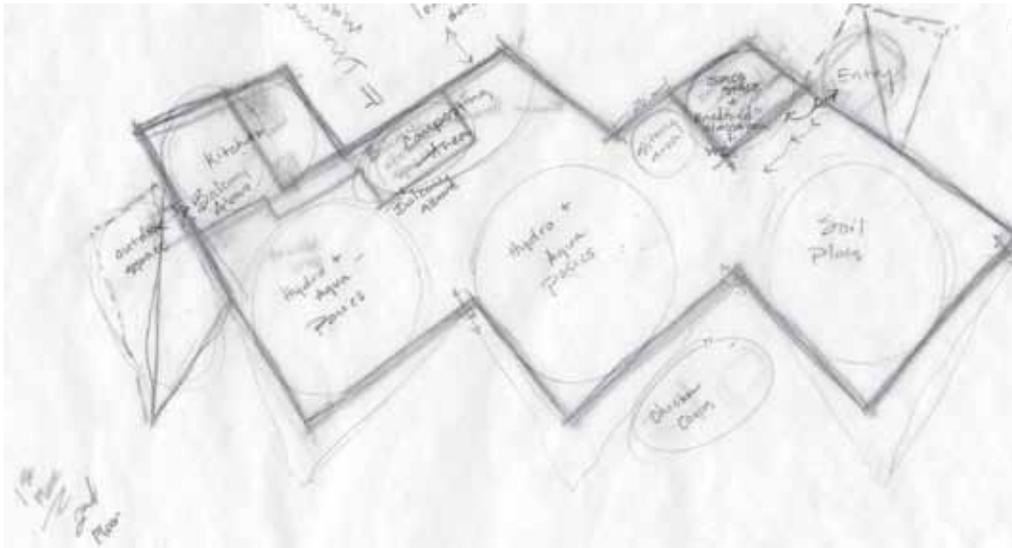
Public Spaces	Initial Estimate	Final
Lobby	600 S.F.	
Office/Reception Desk	100 S.F.	
Open Market	750 S.F.	
Restrooms(2)	180 S.F.	
Growing Spaces		
Indoor Growing Spaces	17,600 S.F.	
Outdoor Growing Spaces	2000 S.F.	
Storage	300 S.F.	
Maintenance	200 S.F.	
Restroom(3)	180 S.F.	
Food Production Spaces		
Kitchen	1600 S.F.	
Root Cellar	400 S.F.	
Service Spaces		
Loading/Receiving	600 S.F.	
Mechanical (4)	1200 S.F.	
Total Square Footage	25,710 S.F.	



Process

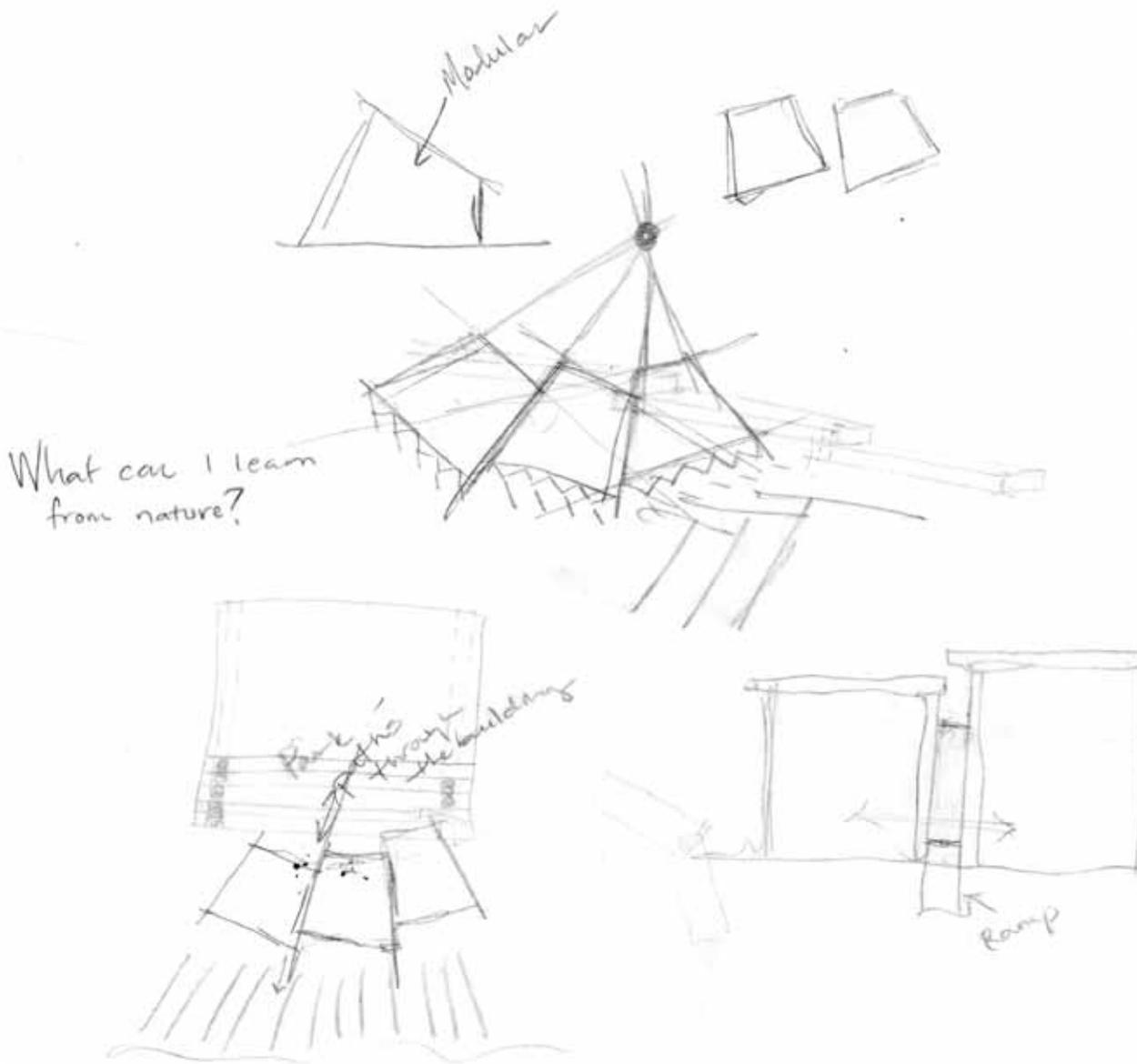


My process began by studying the sun angles and paths, as well as, try to utilize a small footprint so the impact of the building on the site is minimal. The initial design was to create a continuous ramp spiraling up towards the tree tops where garden plots could be situated. The spiraling sensation would angle back at the same time allowing for optimal sun penetration.

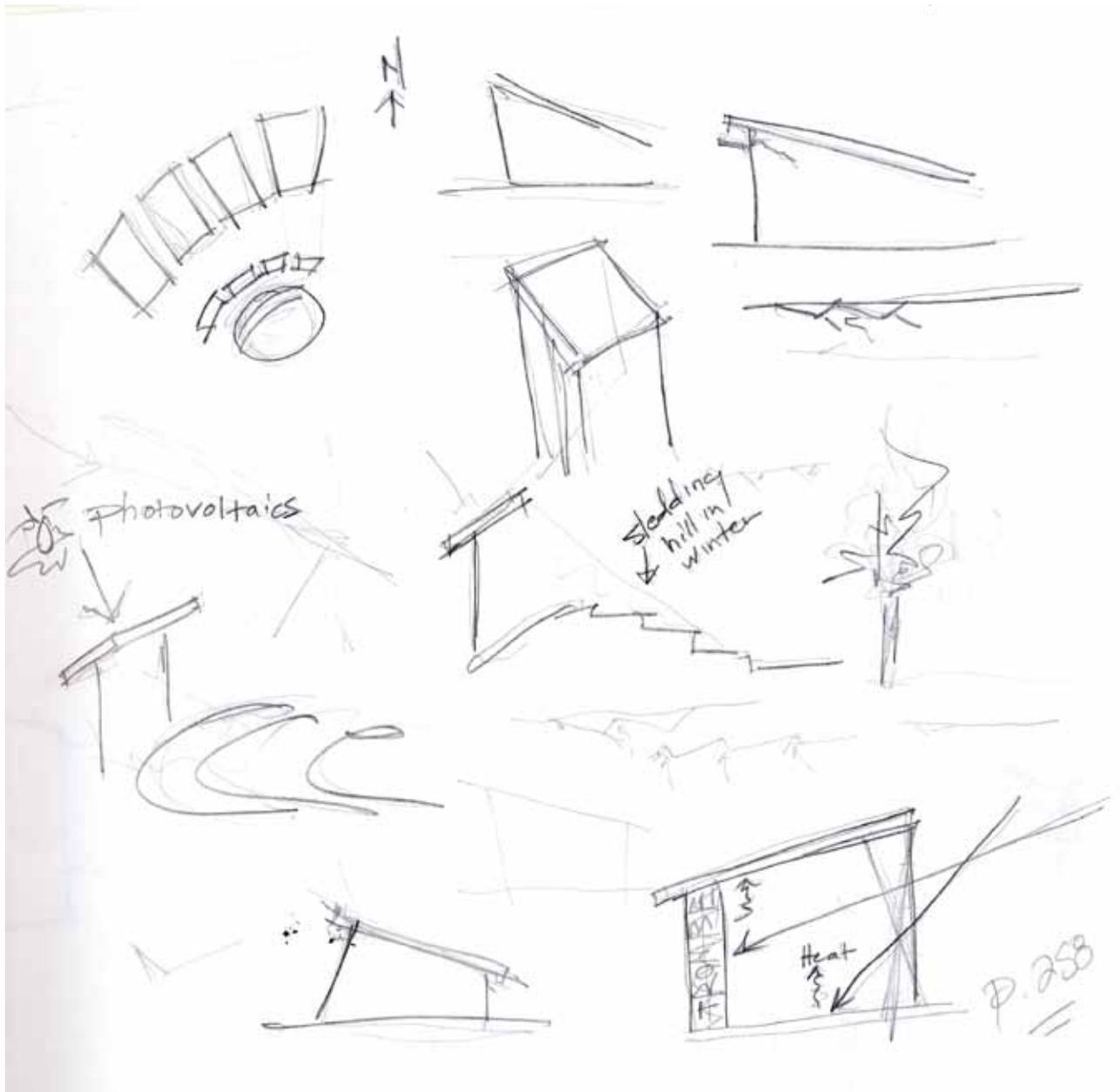


The initial design was then converted into a more horizontal design with the same form repeated in order to create more growing space due to a site change that allowed for more square footage. Designation of spaces, entries and exits, and structure were then explored.

Process

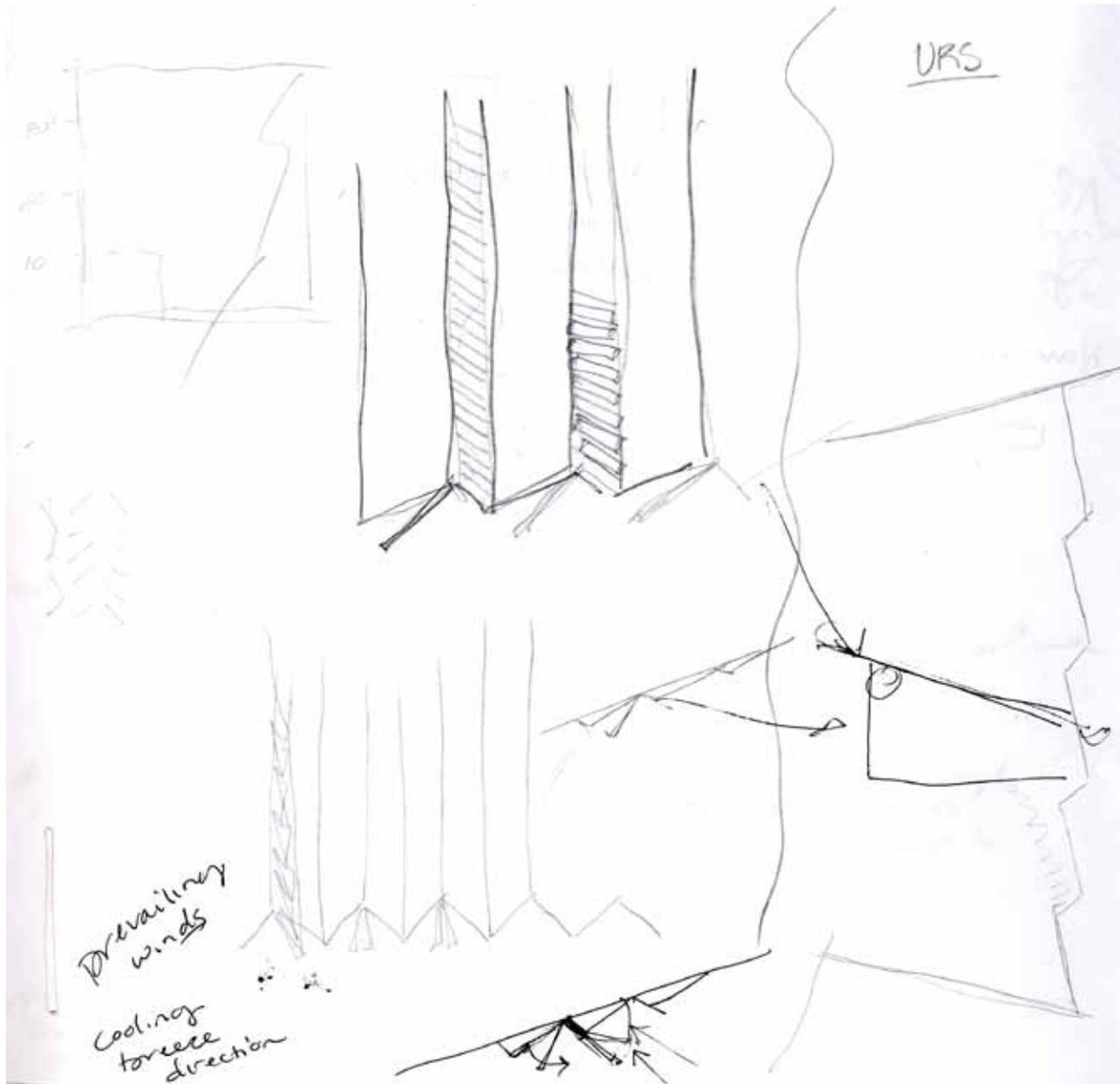


A change of heart led to a new development and thought as to where the project should go. A more aesthetically pleasing form then emerged with the study of sun paths and angles on the new site. Also, the human activity on the site and with the design influenced many aspects. Another major intention was to create a design that could easily be replicated for the expansion of the facility if need be.

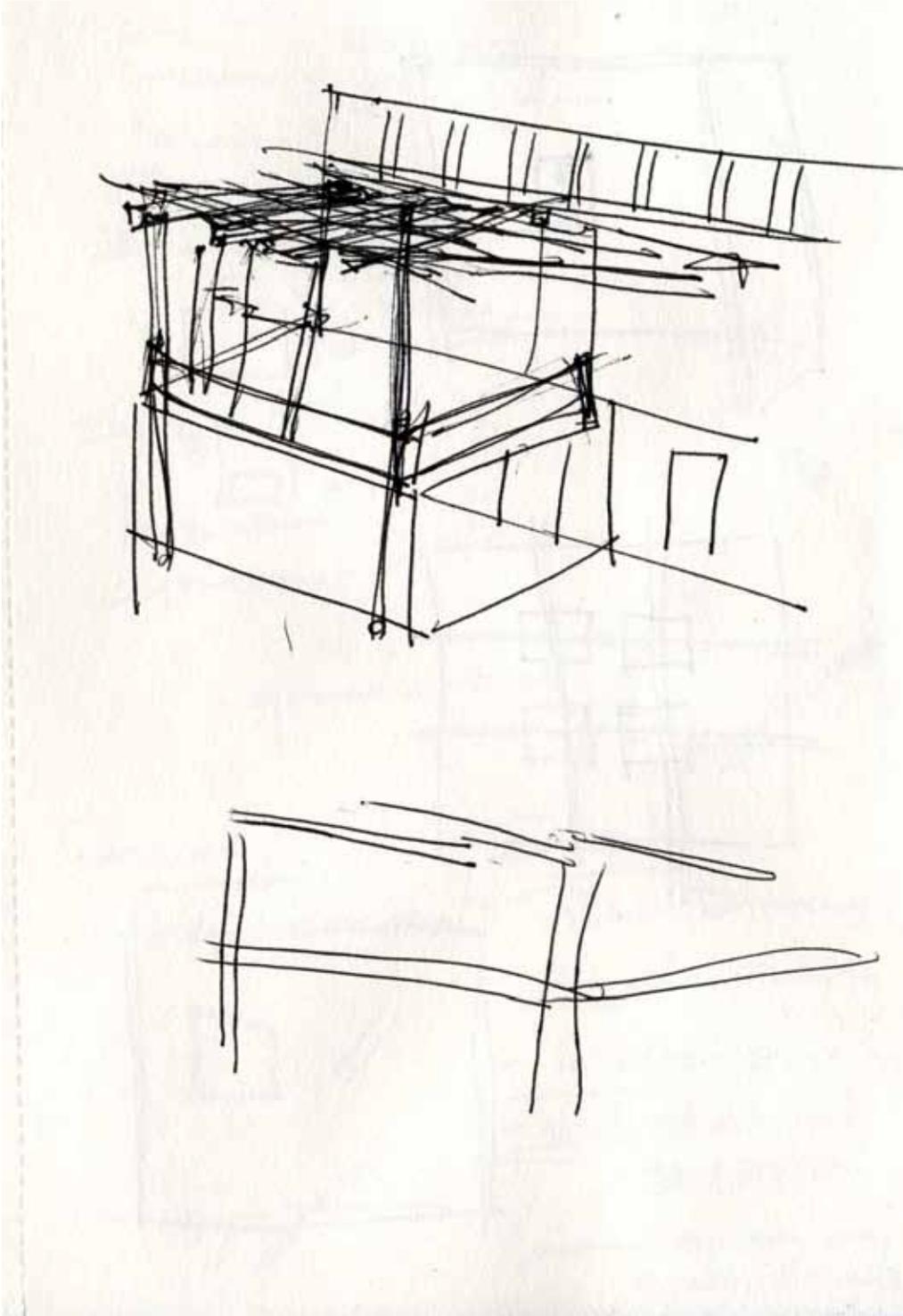


These sketches display a bit of the thought put in to the main growing space facade angles dealing with solar gain, as well as site design and creating spaces for visitors to be among the design but be more comfortable in their setting. The same outdoor shading devices house photovoltaic panels that convert solar gain to energy that is used on the site for various reasons. A trombe wall was also developed to store heat from the solar gain received during the peak hours of the day.

Process

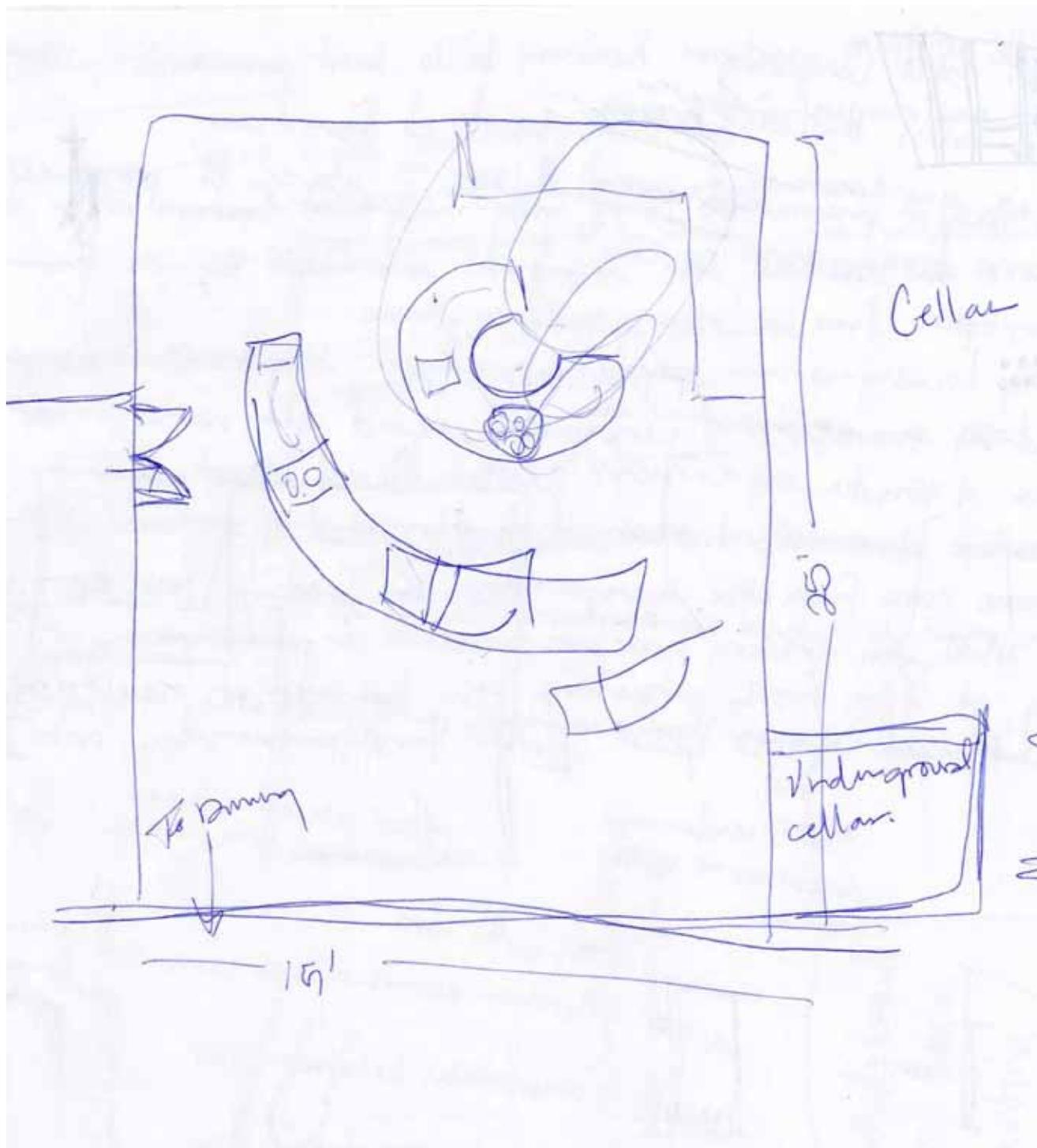


The warm summer winds enter the site from the south east, and the sketches above show the process in which I tried to utilize those winds to naturally ventilate the growing space. The serrated facade runs vertically from floor to ceiling allowing for every other 2.5 foot panel to be opened letting the outside in.



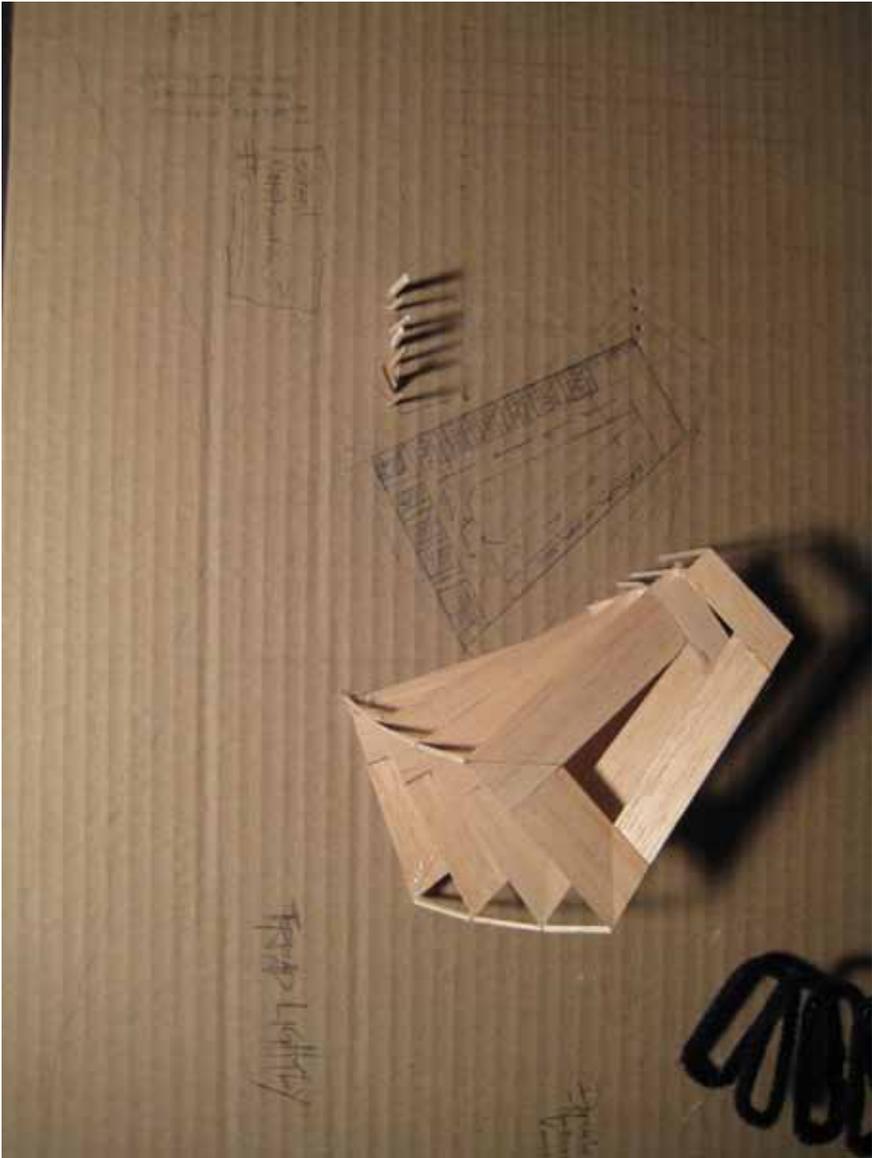
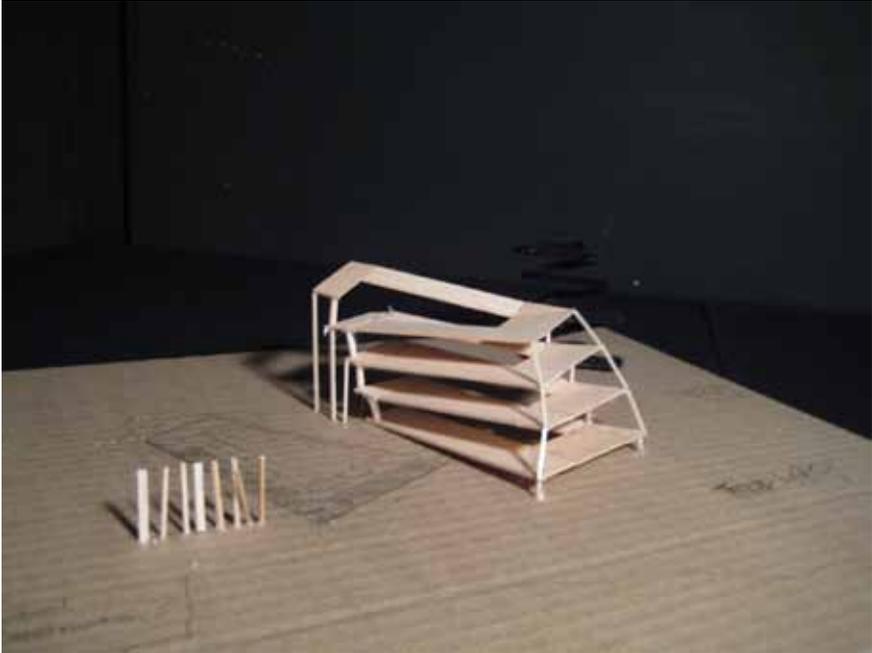
On the south facade of the design, a multi-use space sits adjacent to the kitchen space and can be used as place for people to eat what they prepare during their cooking class or a space for wedding receptions and other events. The same intention shows itself in the space above as well, but as an outdoor space to be used in the warmer months.

Process

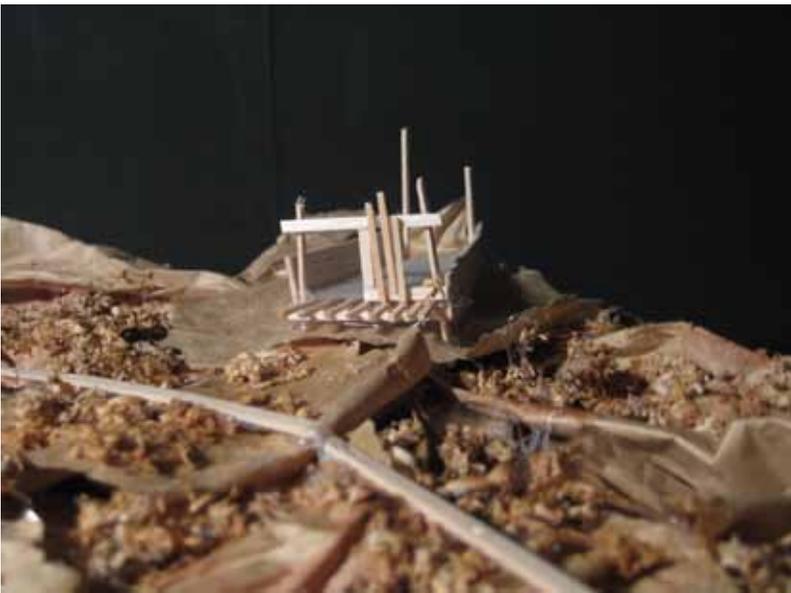
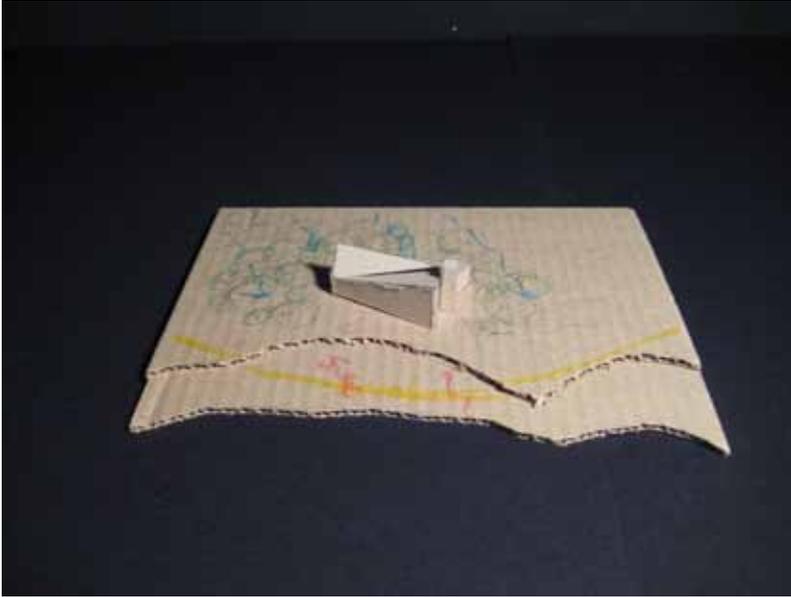


These next two pages consist of design ideas for the community canning kitchen. I wanted to include an area for the teacher to be able to instruct a cooking class but at the same time have the space work well for anyone cooking. With two main work stations consisting of oven, stove top, and sink, three supplementary work stations primarily for cutting and prep work will be sufficient for the space. The arrangement of these stations plus storage is the key to a fully functioning kitchen space.

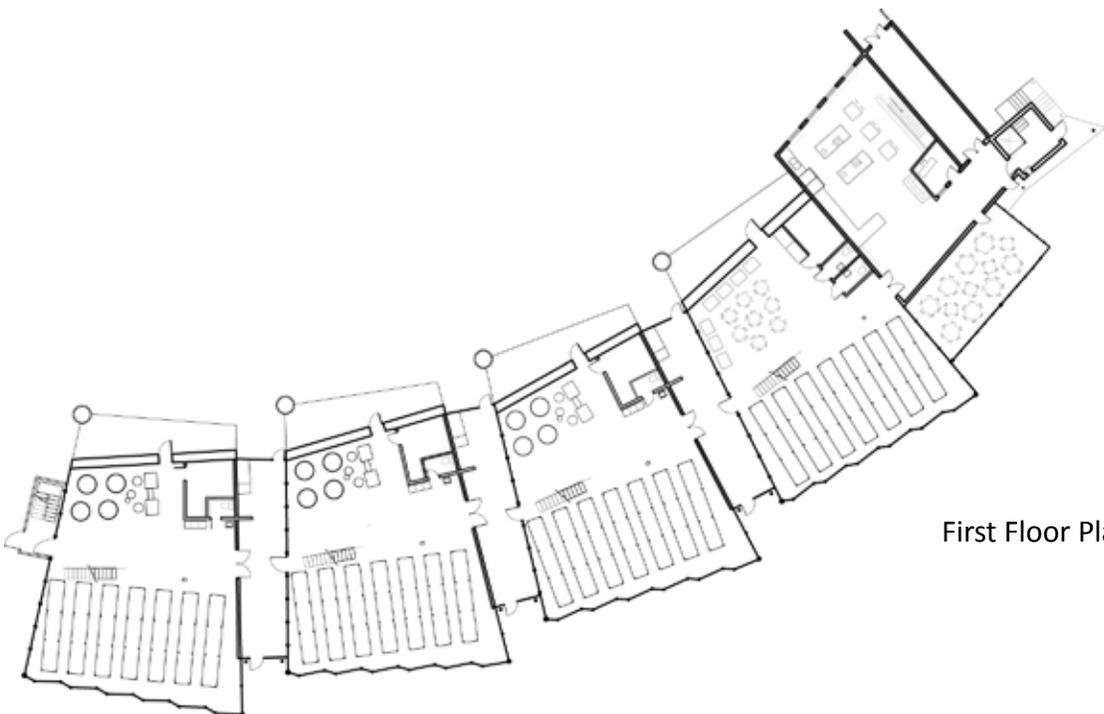
Process Models



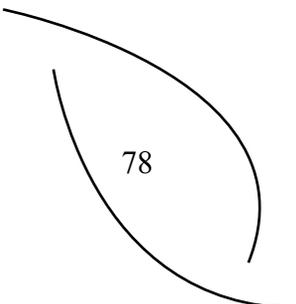
Process Models



Final Design Floor Plans



First Floor Plan



78



Root Cellar Plan

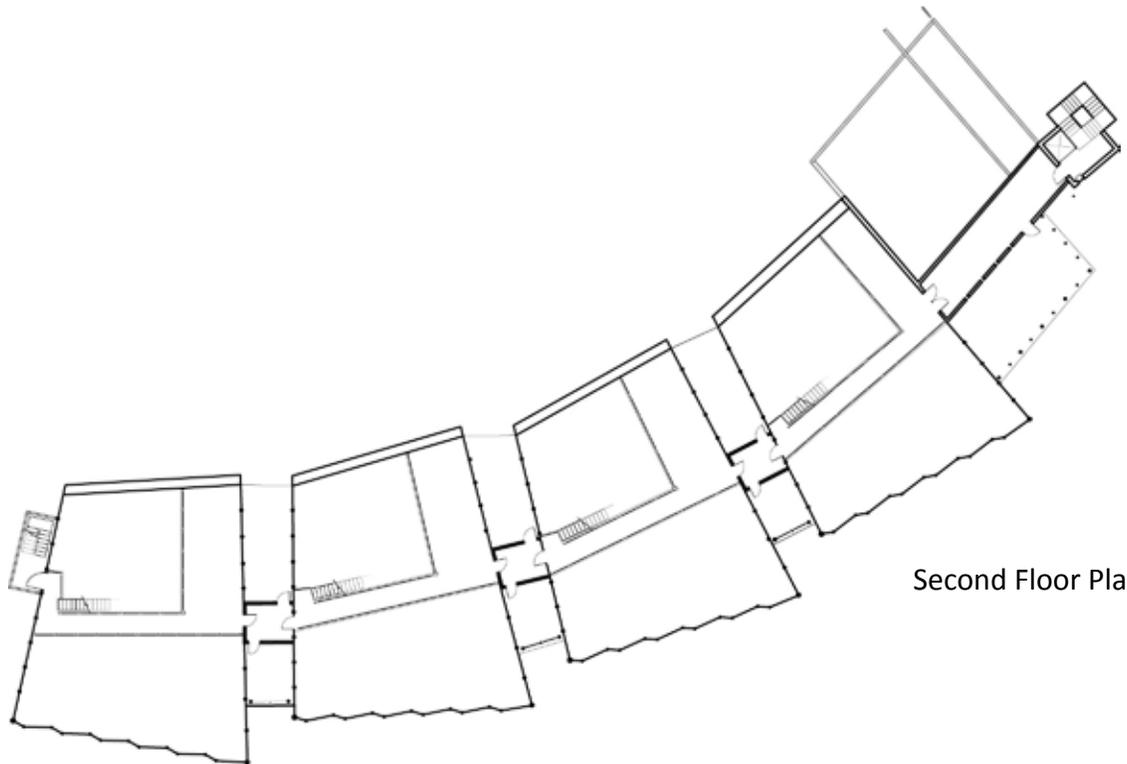
Final Design Floor Plans



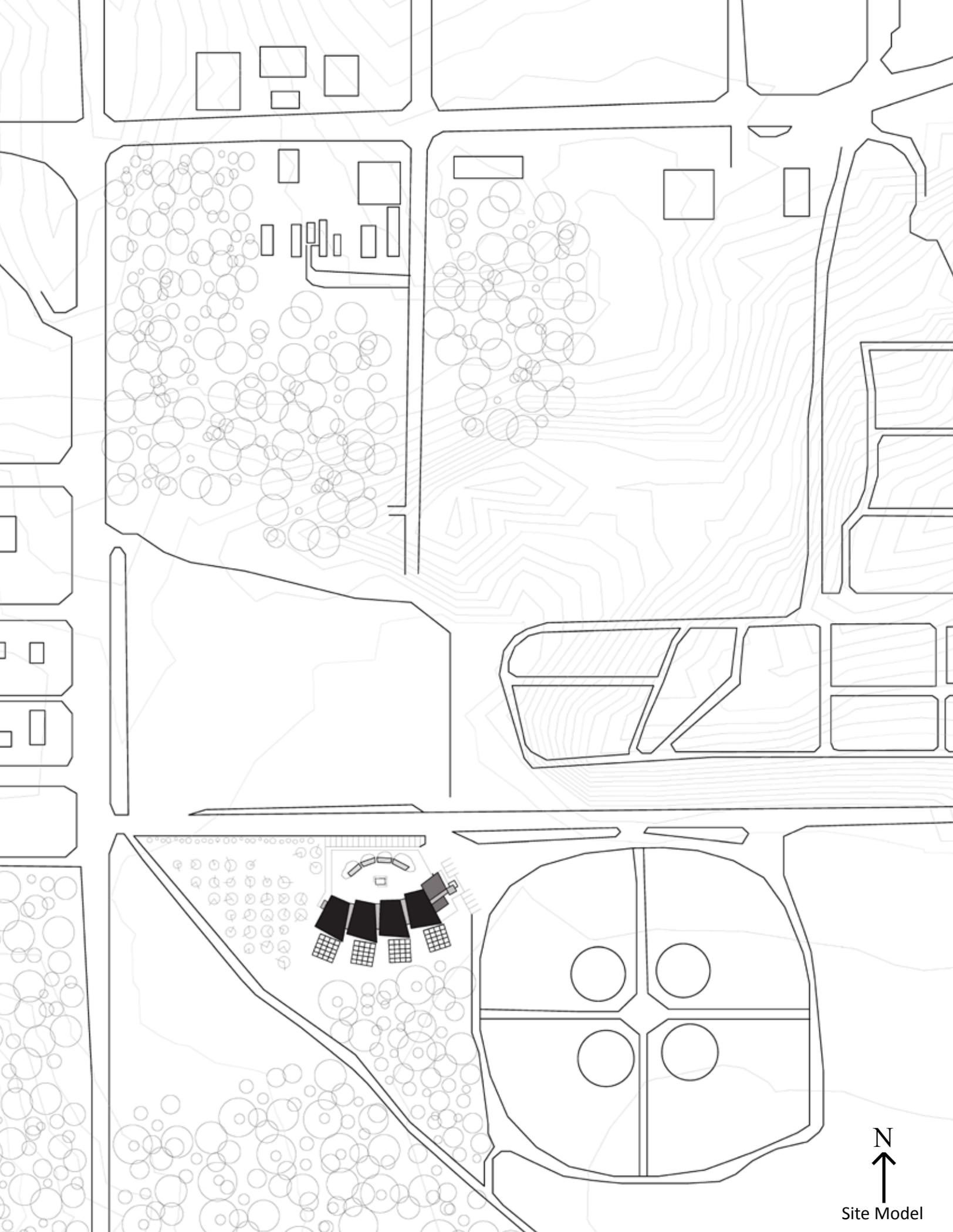
Fourth Floor Plan



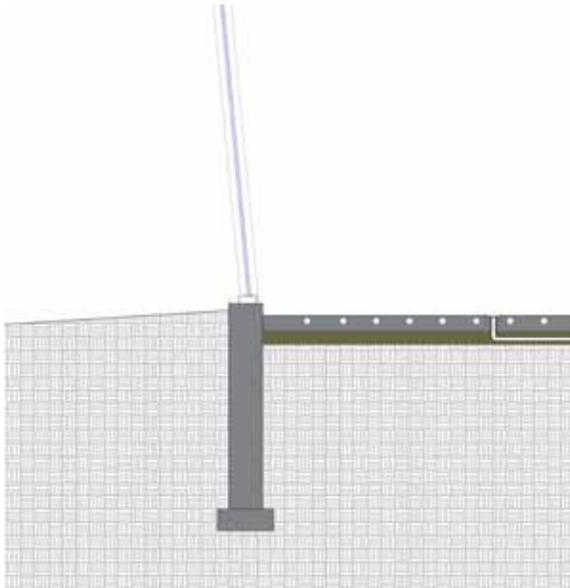
Third Floor Plan



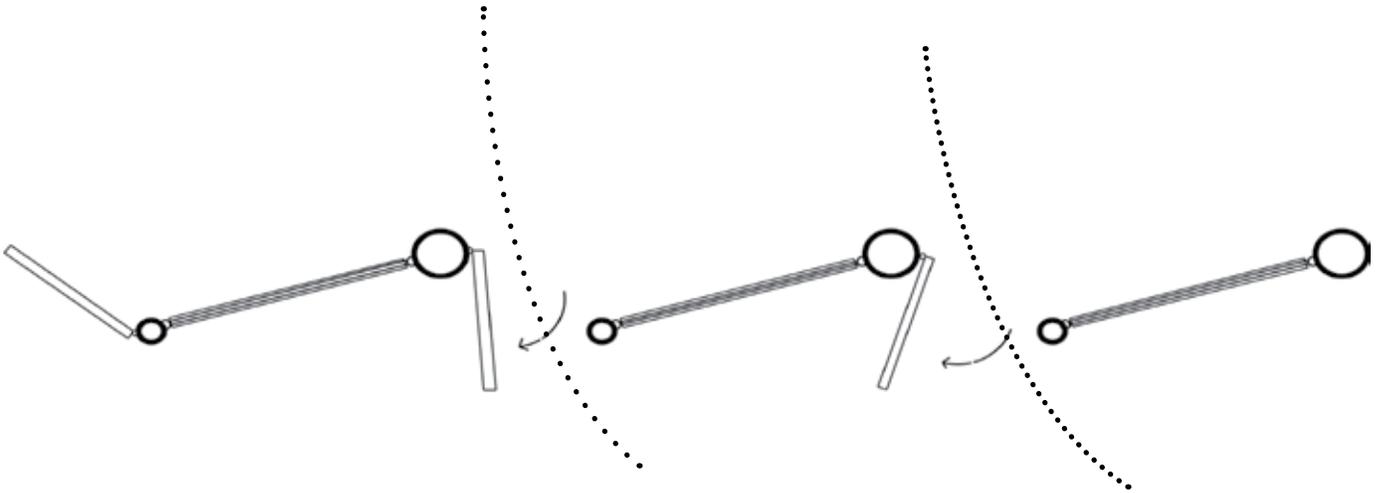
Second Floor Plan



Site Model

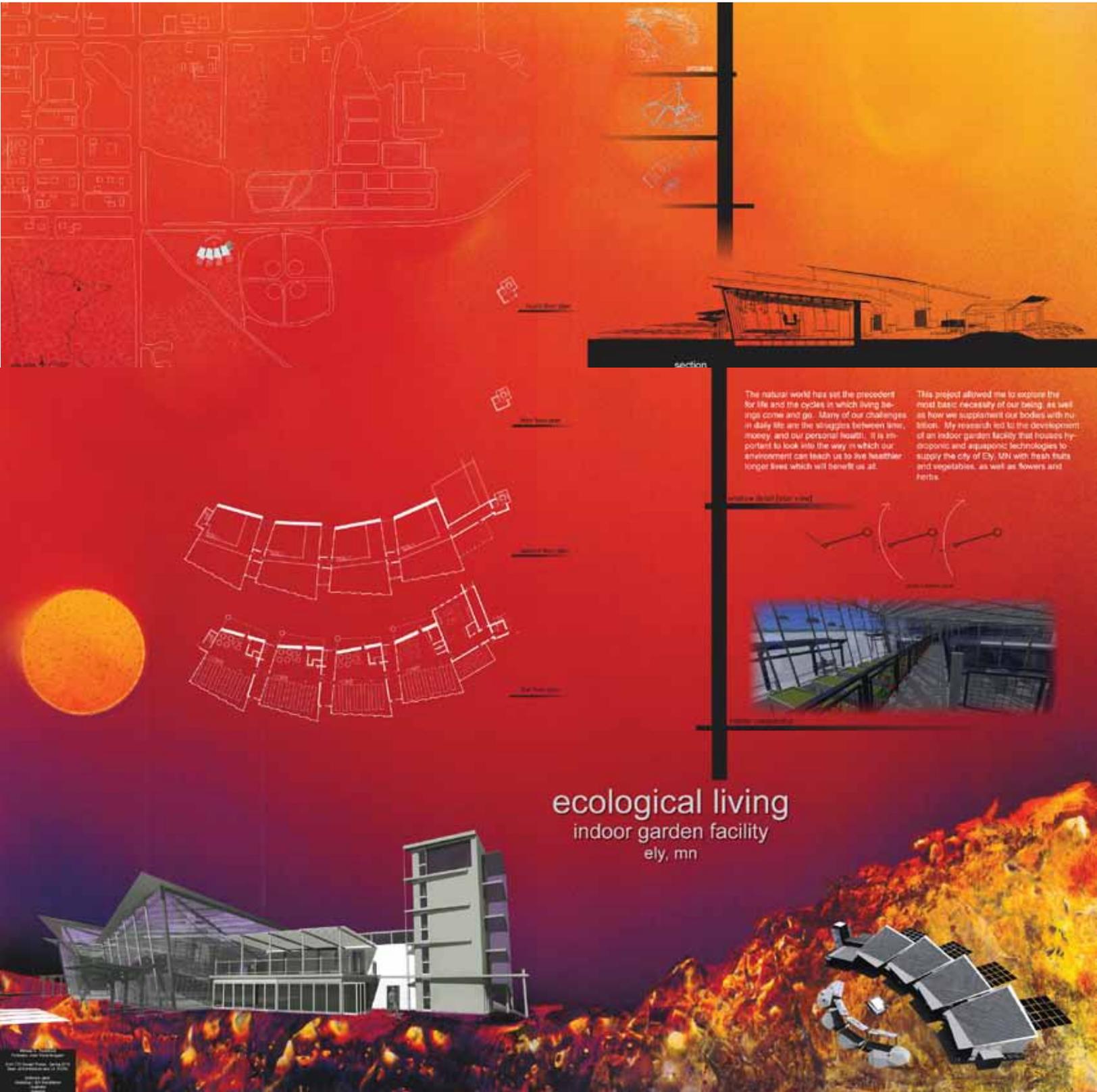


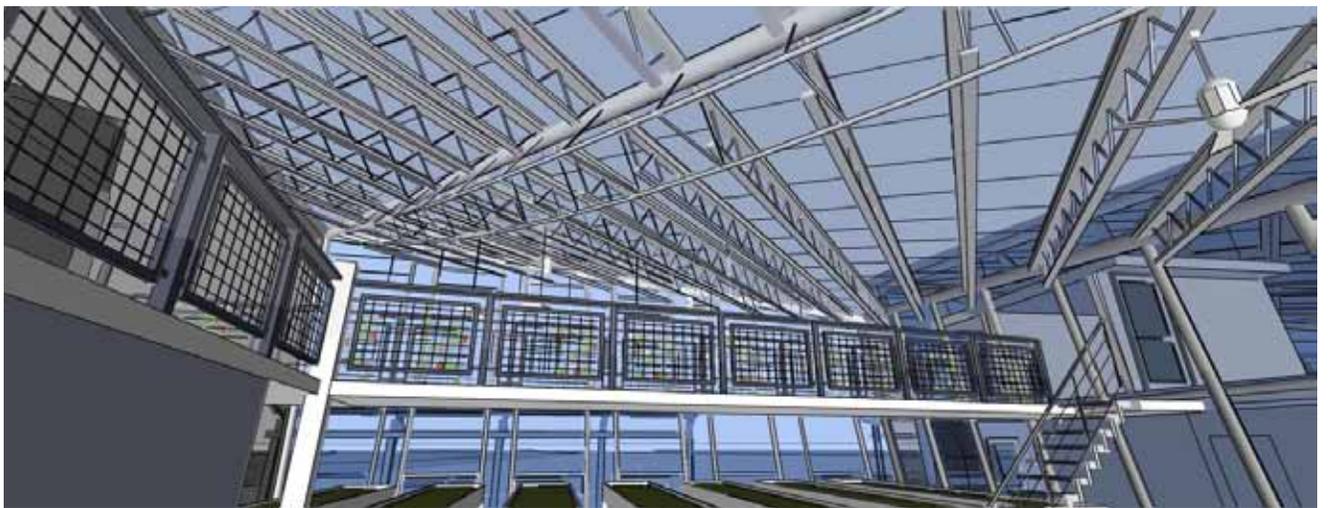
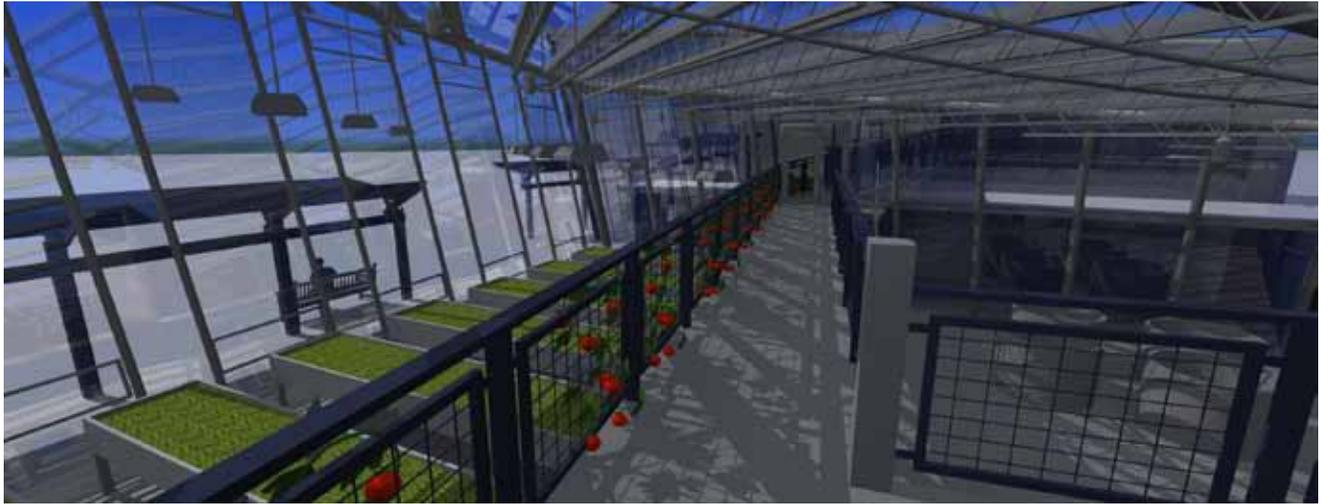
The detail drawing to the left shows the foundation system that would be used in conjunction with an in-floor heating and cooling system.

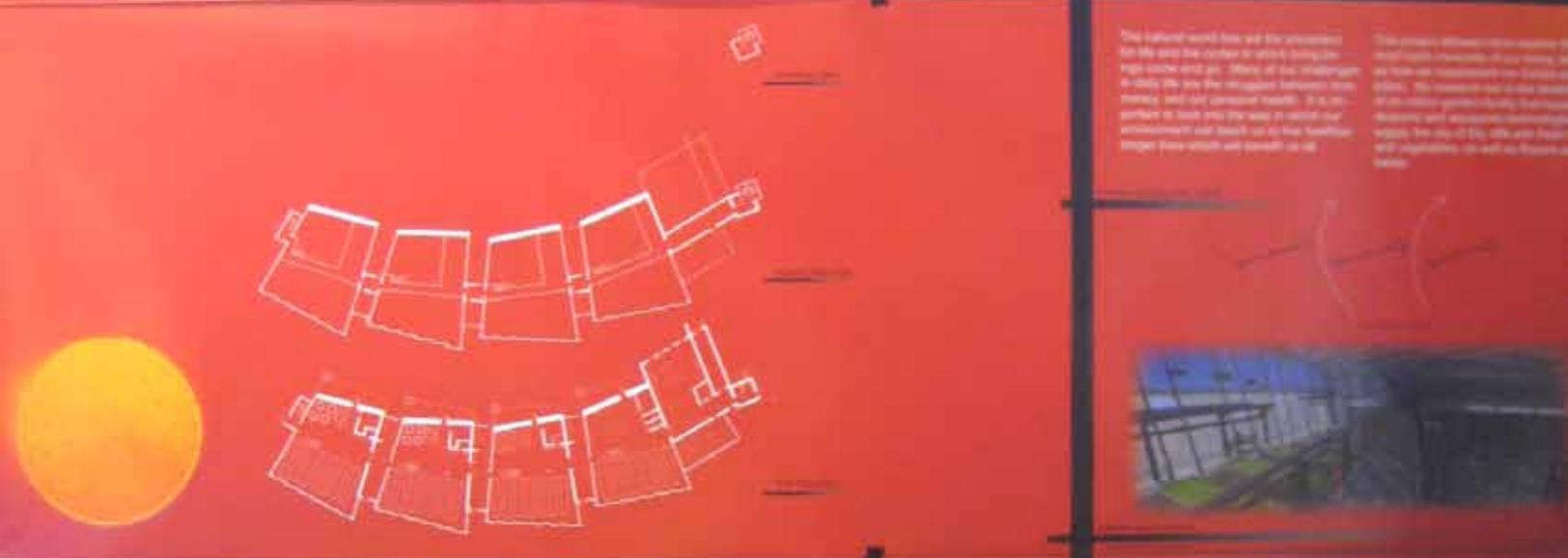


south summer winds









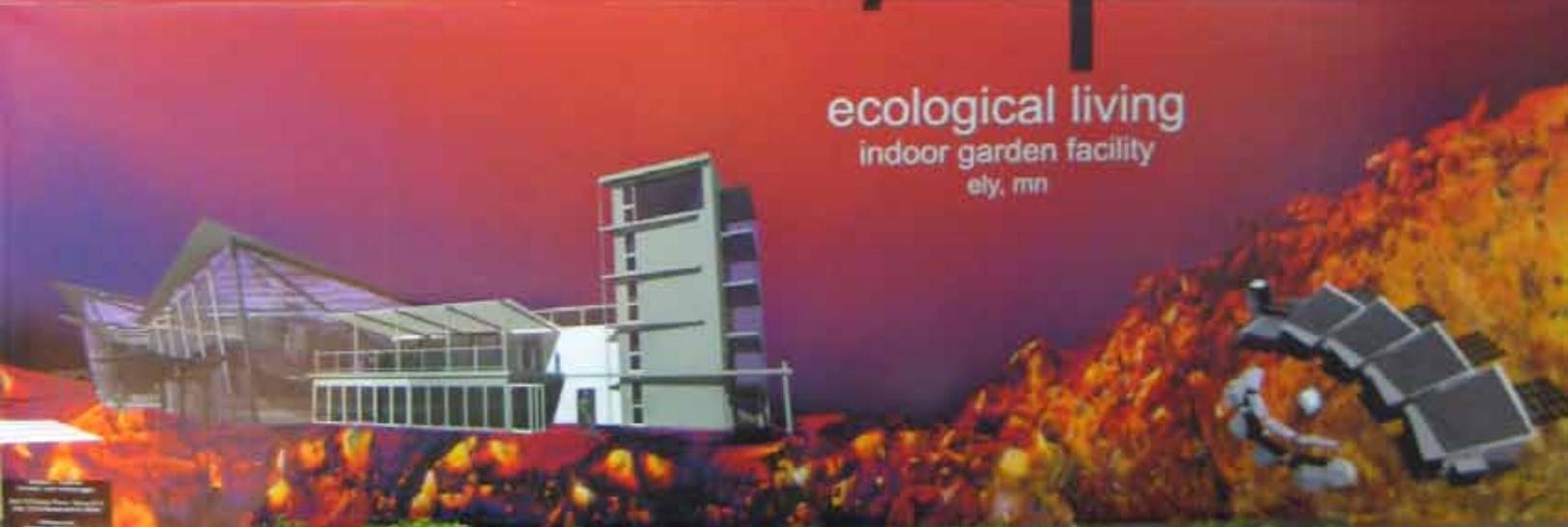
The natural world has led the way for us. We see the garden as a living organism, one that grows and evolves. It's a challenge to study life in the struggle between form, function and our greatest health. It's a challenge to look into the way in which our environment can help us to live healthier lives that which will benefit us all.

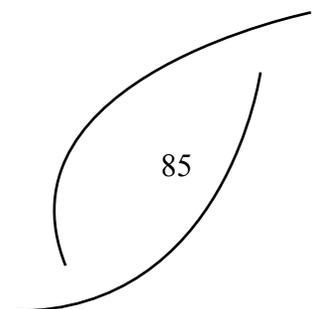
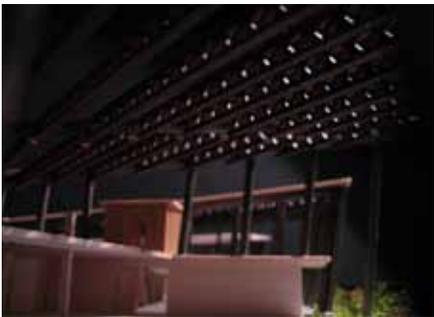
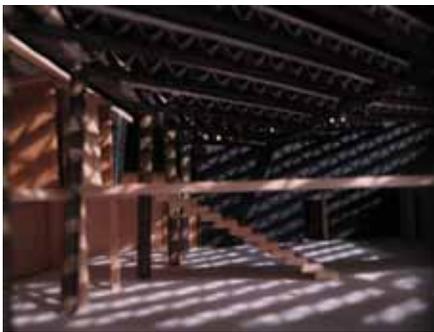
The project allows us to explore the possibilities of a new way of living, one that is more sustainable and more resilient. It's a challenge to look into the way in which our environment can help us to live healthier lives that which will benefit us all.

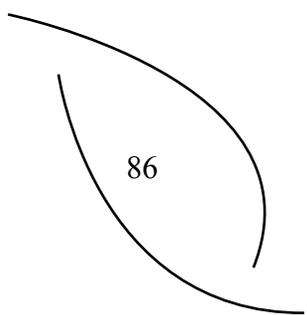


ecological living

indoor garden facility
ely, mn







The growing system utilized in the indoor garden facility is called UVI Aquaponic System. “It is the combined culture of fish and plants. Aquaponic systems are recirculating aquaculture systems that incorporate the production of plants without soil. Recirculating systems are designed to raise large quantities of fish in relatively small volumes of water by treating the water to remove toxic waste products and then reusing it. In the process of reusing the water many times, non-toxic nutrients and organic matter accumulate. These metabolic by-products need not be wasted if they are channeled into secondary crops that have economic value or in some way benefit the primary fish production system.” [Recirculating Aquaculture... 2006]

The UVI Aquaponic System

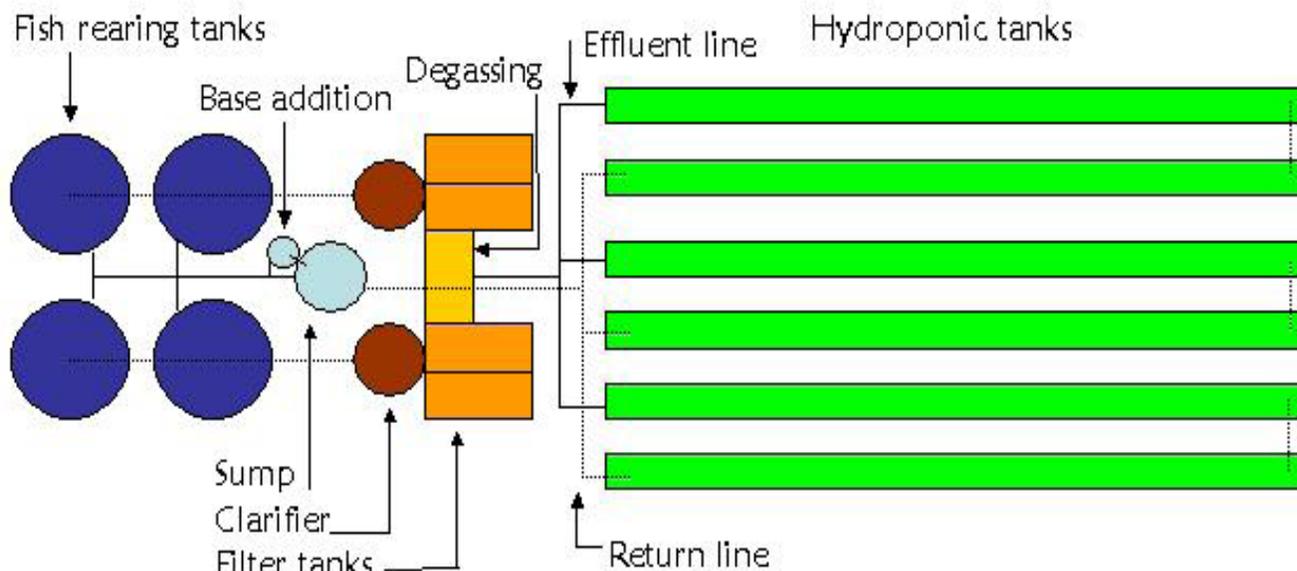


Image: University of the Virgin Islands AES



Eco Logical Living

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“NDSU created a learning environment which made it easy to adapt and deveop into a well-rounded person”

