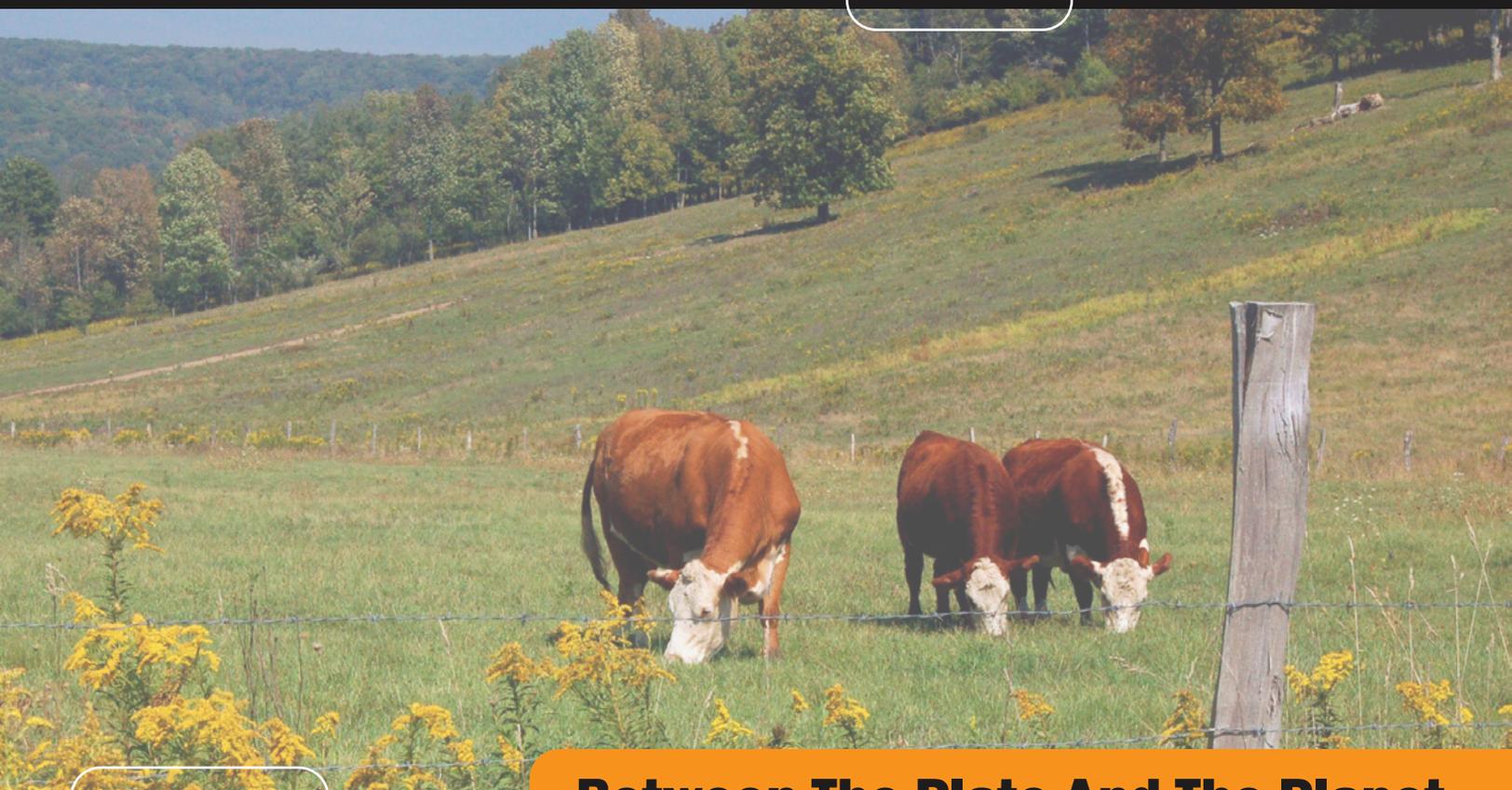
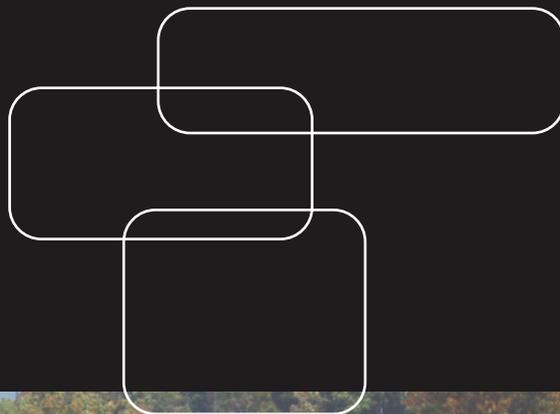


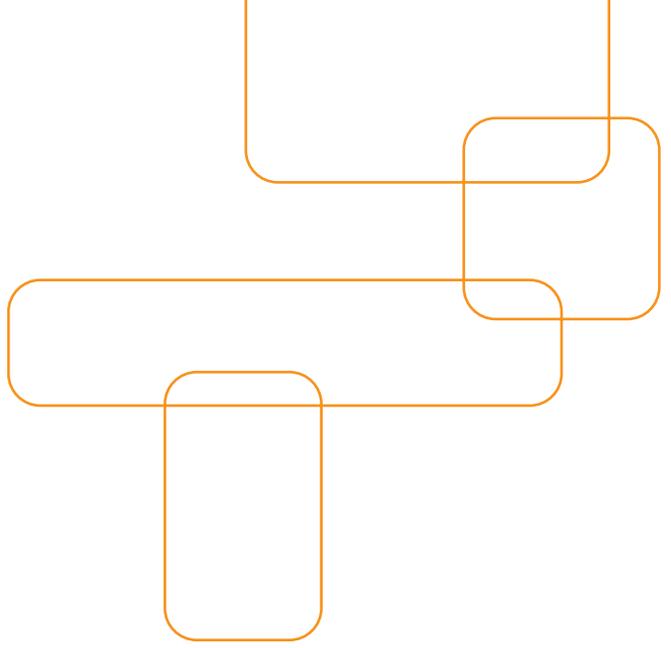
Bio dynamic Farming



Between The Plate And The Planet



Design Thesis
Kyle Lunke



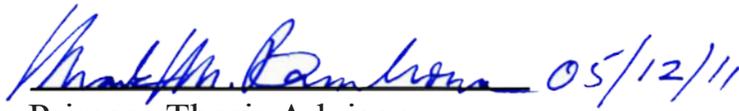
Biodynamic Farming
Between The Plate And The Planet

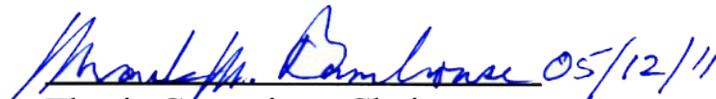
A Design Thesis Submitted to the Department of
Architecture and Landscape Architecture of North
Dakota State University

By

Kyle Lunke

In Partial Fulfillment of the Requirement
for the Degree of Master of Architecture


Primary Thesis Advisor


Thesis Committee Chair

September 2010
Fargo, North Dakota



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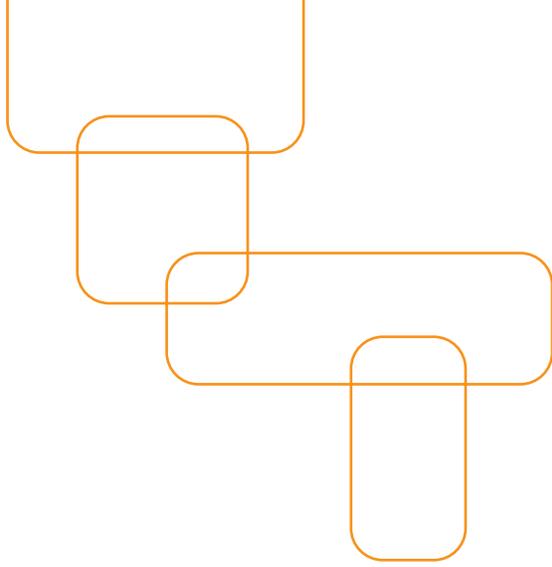
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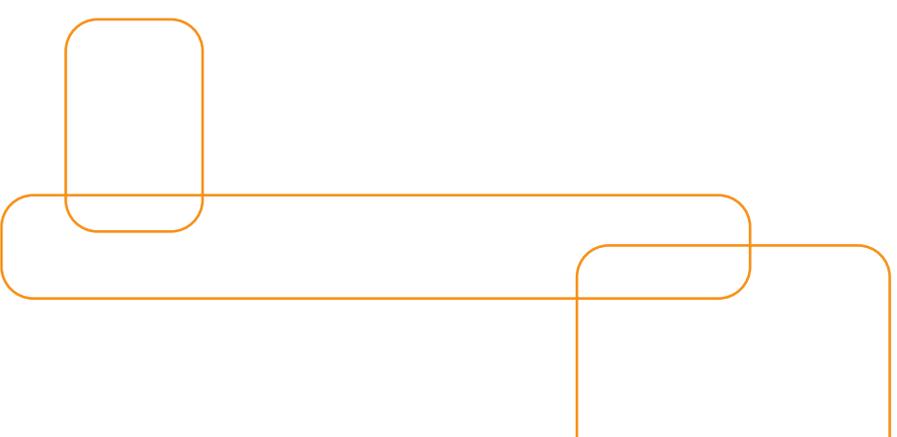
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Abstract

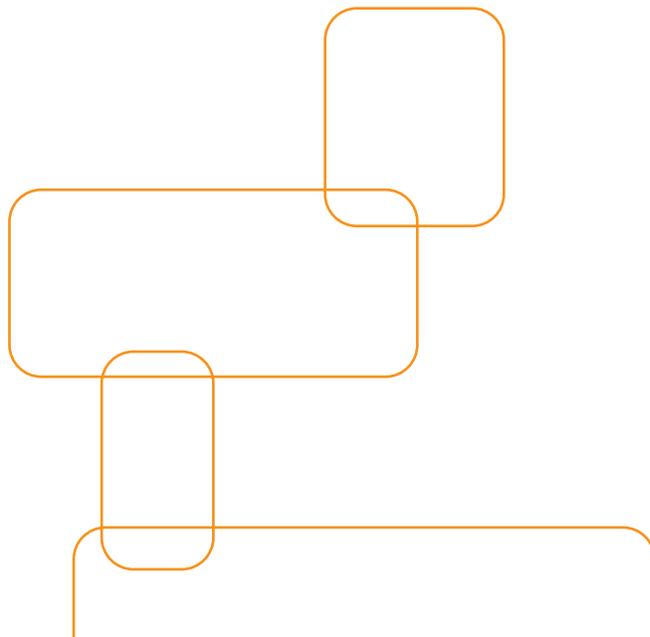
Food: There are a number of reasons why food in the United States may be subjected to health, social, and environmental concerns. This thesis book examines sustainable agriculture and how the built environment may help to reverse the problematic trends of food in our daily lives.

Architecture: The architecture is a farm complex that promotes regenerative agricultural methods. The design of the building and its surrounding environment is located in LaPointe on Madeline Island, Wisconsin.

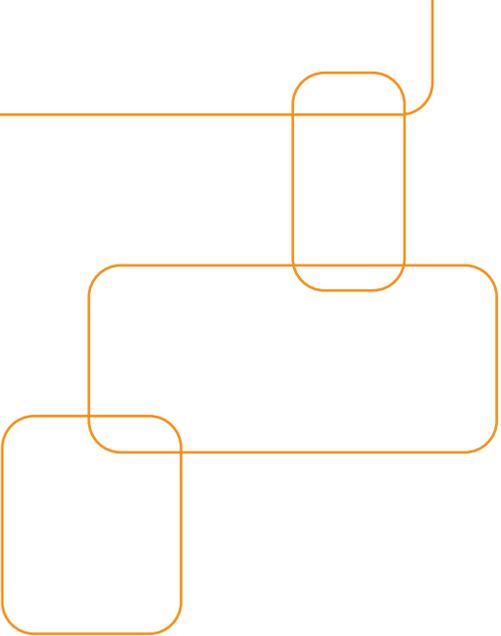
Problem Statement



Are there concerns with industrialized agriculture?



Statement of Intent



Typology

A pasture-based, regenerative, biodynamic, local-market farm and informational outreach

The Claim

There are growing concerns in developed countries with industrialized agriculture and how food is raised; moreover, people must become aware of the consequences poor food choices may have on themselves and our planet.

Premises

Food is fundamental to human survival and therefore we must be conscious of how food is raised, prepared, and eaten.

To decrease junk, fast, and standardized food, we must learn that the way we eat may have major implications on our health, culture, and planet.

In every culture since humans first walked the earth, food has been rich in tradition and quality of life. United States' social and health respect for food has been diluted in the past century due to people's fixation on 'fast paced' consumption.

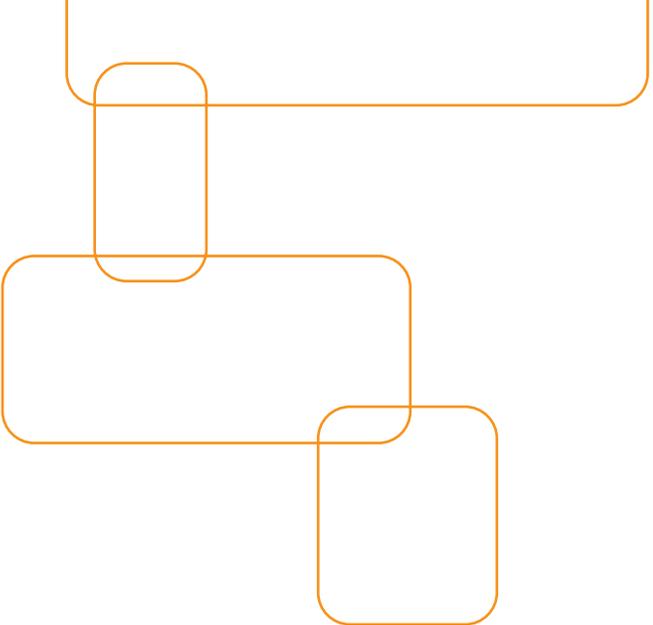
Theoretical premise/unifying idea

In order to reduce agricultural concerns in developed countries it is important to have farm models that teach people healthier farming methods, food choices, and ways of living.

Project justification

Due to the United States' 'fast-paced' consumption and increasing demands from large food industries, we have become unhealthy physically, socially, and environmentally. People are increasingly becoming overweight, which leads to other health problems such as diabetes, high blood pressure, and high cholesterol. Some people have forgotten the social importance food has on our society. Furthermore, agriculture methods such as using pesticides on plants, spraying synthetic chemicals on fields, and creating bad livestock conditions all have negative impacts on us and our environment. People need to concentrate on the concerns with food through sustainable farming practices, good animal husbandry, protecting ecosystems and biodiversity, and protecting the health of the consumer and the producer.

The Proposal



The Narrative

Food is a human right, substance for nutrition and pleasure, essential for organisms to produce energy and stimulate growth, and imperative to maintain life. Food's crucial influence on humans and their civilization is what has established thousands of years of tradition and bond with this universal necessity. These traditions have cultivated appreciation of pleasure and quality of daily life in our environment. However, in the heat of the United States' fast-paced consumption, food may be subjected to health, social, and environmental concerns.

"You are what you eat." This phrase has taken a new turn in the last few decades. There has been an alarming increase in people becoming overweight and obese. According to the National Institute of Health in 2005, over 100 million Americans are overweight. That is one-third of the United States' population. Being overweight greatly increases the risk of many serious health conditions such as type 2 diabetes, high blood pressure, and high cholesterol. We must ask ourselves: what is contributing to the growing obesity problem? Much of what we eat is quick and easy, from fat-laden fast food to microwave and prepackaged meals. Our daily schedules are so crammed that there is little time to eat healthier food or squeeze some exercise in. Portion sizes, in the house and out, have greatly increased. Our sedentary lifestyle and our love affair with the television also contribute to the rising problem.

Throughout history, food traditions have always been an integral part in our culture. However, with the fast-pace of society our culinary traditions have been diluted. North Americans spend less than an hour each day eating their meals and in the last thirty years there have been no concentrated effort to fight in the name of taste (Nabhan, 2006). We are enslaved by speed and have surrendered to the fast life; which disrupts our habits, pervades our homes, and forces us to eat Fast Food. Americans no longer grow, cook, and enjoy the pleasures of cuisine with the people we care about.

Face-paced consumption and increasing demands from large food industries also put our environment at risk. The Foundation for Biodiversity found that 93 percent of food product diversity has been lost since 1900. Moreover, one in three livestock varieties and 30,000 varieties of vegetables have disappeared or are near to disappearing (Anningson, 2008).

Pesticides on plants and bad irrigation practices have been linked to problems with our health and environment. Sixteen percent of energy consumed in the United States is now used to grow, harvest, transport, process, and prepare our food. For the first time in the U.S. history, we import more food from other countries than we eat from our own fields, streams, orchards, and bays. In addition, food coming from great distances is responsible for a growing percentage of food poisoning (Nabhan, 2006). These harmful agricultural issues continually impact us and our planet.

In order to stem the tide of unhealthy junk, fast and standardized food, we must educate children and adults about making good healthy food decisions. Teaching people about the value of taste, cooking, and pleasures of slow life will help to influence people's food behaviors and restore food traditions. We must do research and scientific experiments for sustainable agricultural methods. This research expands to protect biodiversity, renewing farming methods, ecological restoration, genetic conservation, maintaining an organic relationship between gastronomy and agricultural science, recovery of species or stock, and culinary revival of place-based heritage foods. Researchers must hone into the historic role played by foragers, hunters, and small-scale horticulturists in regenerating habitats in ways that allow for sustainable harvests of plants and animals for food (Nabhan, Walker, & Moreno, 2010). The research of these aspects will help to revive our environment and the way we eat.

In conclusion, the mission of the architectural design is to bring people together for the opportunity to change their attitude about food. The design is to provide suitable measures of guaranteed sensual pleasure and slow, long-lasting enjoyment with food, nature and the built environment; letting the architecture facilitate people's rediscovery of nature and the important relationship we have with plants and animals.

The farm, food center, and garden will operate as the headquarters for the Slow Food Organization. Slow Food will work in conjunction with Taste of Ark, US Terra Madre Network, Renewing Americas Food Traditions (RAFT), US Youth Food Movement, and the city of Bayfield/La Point, Madeline Island. These organizations will use the farm for developing projects, festivals, and activities. It will be open and used by visitors, farmers, food artisans, chefs, researchers, scientists and anyone interested in sustainable agriculture, preserving biodiversity, and future means and methods. The public will be able to participate in an earth market, festivals, food tasting, cooking shows/demonstrations, exhibitions, and tours that promote sustainable food, social bonding, food traditions, and the pleasure of gastronomy.

Major Project Element

It is necessary to define the farm buildings on the site and the major spaces within those buildings for public knowledge.

Horse Stable

The horse stable is the first of the farm buildings when approaching the site which makes it convenient for the visitors who are horseback riding. The stable has five stalls, a tack room, a wash room, and a small hayloft.

Storage/Work Barn

During the summer months this barn will mostly be used for making and repairing farm equipment. However, during the winter months when equipment needs to be stored, the barn will transform to accommodate the storage needs.

Hay Barn

The hay barn is used to store hay, feed and shelter the cattle in the winter time, feed and shelter the pigs in the summer time, and store the fresh compost that accumulates during the winter. With all these functions in one barn it becomes a very integral building for the farm's success.

Summer Shelter

A long indoor/outdoor shelter is attached to the hay barn. This will mostly be used during the summer for a quick emergency cattle shelter. It will also be used for picnics, small festivals, and other activities.

Pig Shelter

The pigs are in their shelter during the winter months between the hay barn and the hen shelter. There is one large free stall for the fully grown pigs and five smaller stalls for the sows and their piglets. Having the pig shelter adjacent to the hay barn makes it convenient for the farmer during the spring time when the pigs are moved into the hay barn to become pig-aerator pigs (explained in design process).

Hen/Rabbit Shelter

The Hens and the rabbits are in the same shelter during the winter time. The two animals work together to benefit not only themselves but the farm as well (explained in design process). The broiler hen's cope is kept on the ground level and the rabbit cages and laying hen boxes are raised above four feet on either side of the isles. There is also an outdoor paddock in which the farmer can let the hens out when desired.

Silo/Water Tower/Viewing Deck

The silo tower is broken up into three different sections with two staircases spiraling up to the top. The bottom section stores the silage for the pigs and hens. The middle section holds the water from the retention ponds and then gravity fed to the water tanks for the animals. On the top of the tower is a viewing deck for people to observe the farm and view the island and beyond. The silo is situated between the pig and hen shelter for easy access

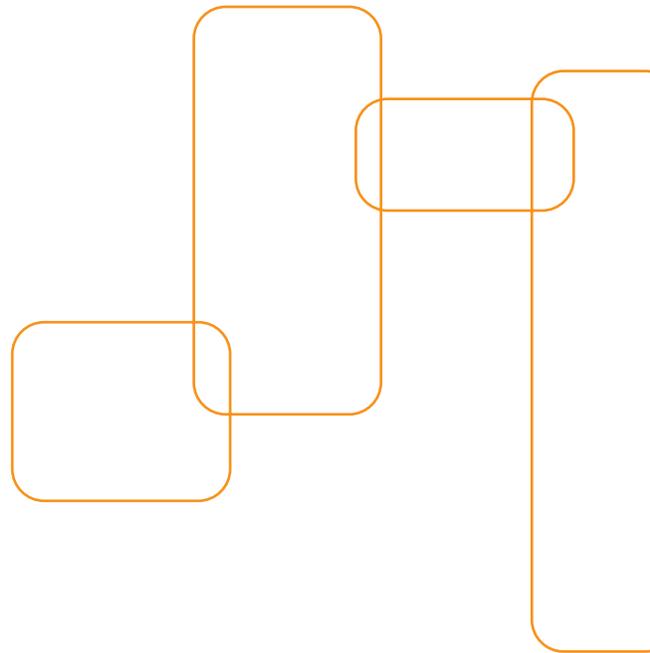
Outdoor Court

The outdoor court is situated between the summer shelter and the silo. It is a large space designed for groups of visitors to gather, ask questions to the tour guide, and relax under the shade with a cold beverage from the kiosk.

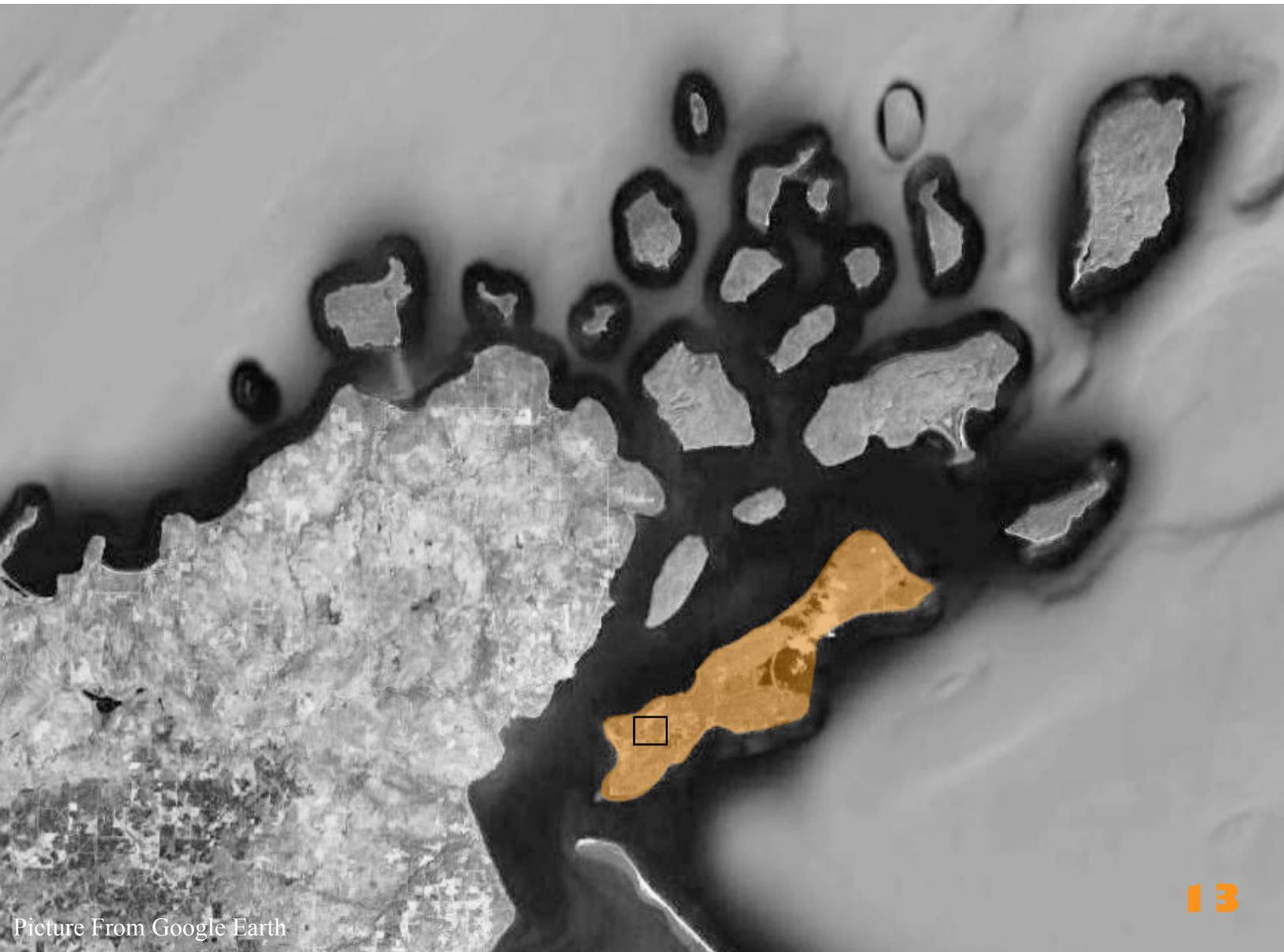
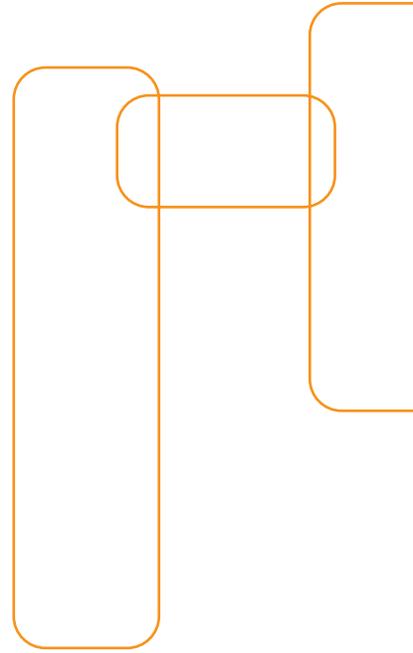


Site Information

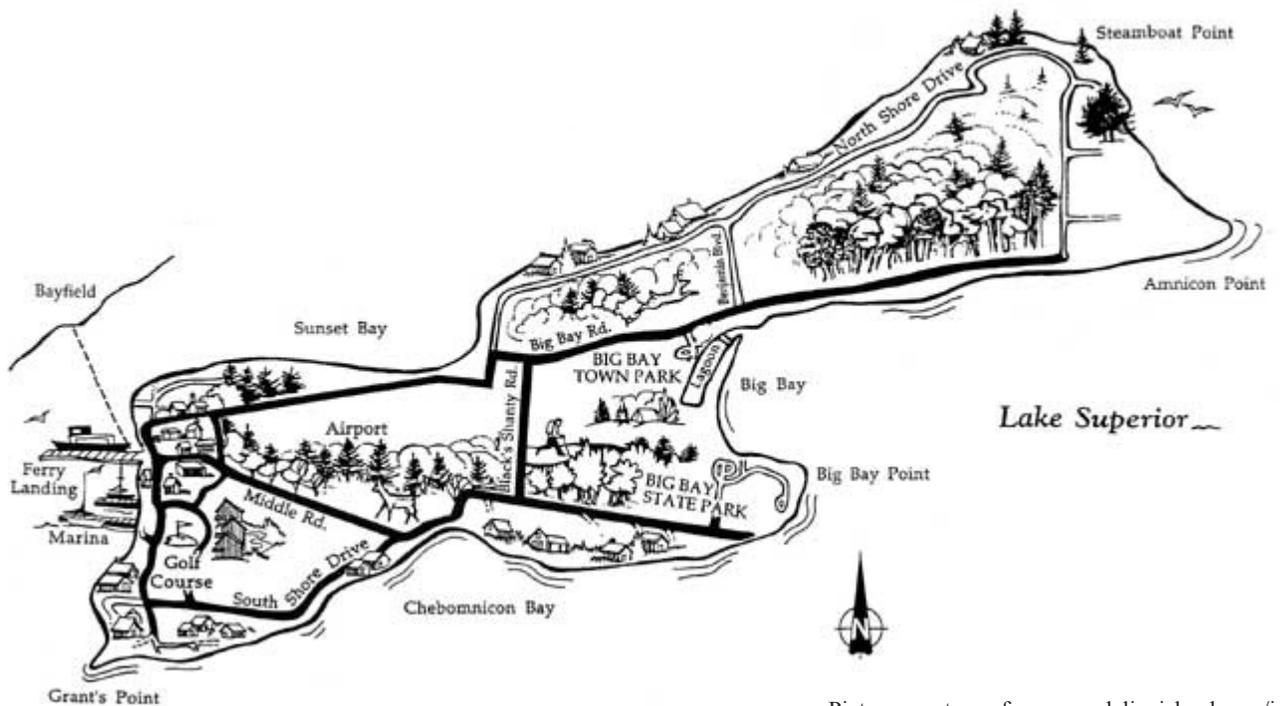
Located in Lake Superior just off the Wisconsin's North Coast, Madeline Island is the largest of the Apostle Island Archipelago. It is approximately two miles northeast of Bayfield. It is 14 miles long and 3 miles wide and is the only Island with commercial development. The site will be located in the town of LaPointe, on the southwest part of Madeline Island. The Island is the traditional spiritual center of the Lake Superior Chippewa and was one of the earliest settlements in the region.



The year-round population of the island is approximately 220, but swells to between 2500 and 3000 when summer residents return back. During the spring, summer, and fall, the ferry is the only means of transportation for visitors. The ferry takes about 20 minutes from Bayfield to LaPointe, Madeline Island. Not only is the ferry ride necessary to reach the island, it is a great scenic cruise on Lake Superior. During winter months, there is an ice-road to commute back and forth.



The Island is a popular vacation spot for people who want to “get away”. Most are vacationers from all over the Midwest. On Madeline Island and Bayfield, people engross in the charm and abundant natural beauty of the area. Some of the best fishing and sailing on the Great Lakes can be found here. People can also play a round of golf, rent a canoe/kayak/bike, and get close to wildlife. There are many activites for visitors such as apple festivals, wineries, and farmer’s markets, while discovering quaint shops and restaurants. The local people of Madeline Island have a deep respect for traditions, nature, and the slow-pace of life. This area is perfect for a self-sustaining farm.



Picture courtesy of www.madelineisland.com/island

Project Emphasis

The emphasis of this project is to enhance biodiversity, fertility, and growth in plants and animals by understanding the intricate symbiotic system nature has to offer. The important principle is that every organism is contributing to some sort of ecosystem service on the farm. This natural model heals the land, thickens the forage, reduces weeds, stimulates microorganisms, reduces pathogens, and increases nutritional qualities in plants and animals. The mission is to create an ecologically, economically, and emotionally enhance agricultural prototype and facilitate it around the world.

Plan for Preceding

Research Direction

The research direction for this thesis will be realized through a number of facets. The research focus will carry out a comprehensive understanding of the theoretical premise/unifying idea. Research will also be committed to entirely comprehending the project typology, historical context, site analysis, and programmatic requirements.

Design methodology

The technique used for the complete design will be a mixed method model, which engages both quantitative and qualitative assembly of analysis. Both will be implemented by the collection of data in a concurrent manner and will give confidence to design decisions. Analyzing, interpreting, and reporting the data will transpire throughout the research process. Priority in the research will be on the theoretical premise/unifying idea as well as the project typology and site analysis.

Documenting the design process

Careful attention will be placed in the documentation process of the design. Submittals of the process/schematic sketches and mockup models will occur biweekly into a digital collection folder. A physical collection of all the design process sketches and models will be compiled into a binder and put on display for review.

Previous Studio Experience

Second Year

Fall 2007: Stephen Wischer

Tea House

Rowing Club

House for Twins

Spring 2008: Mike Christenson

Community complex

Community Courtyard

Third Year

Fall 2008: Steven Martens

Wildlife Research Facility

Masonry Guildhall

Spring 2009: Ronald Ramsay

School Renovation

Mid-rise Office Building

Fourth Year

Fall 2009: Bakr Ali Ahmed

Vertical Community

Spring 2010: Darryl Booker

Slum Renovation – Santo Domingo

Public School – Tanzania, Africa

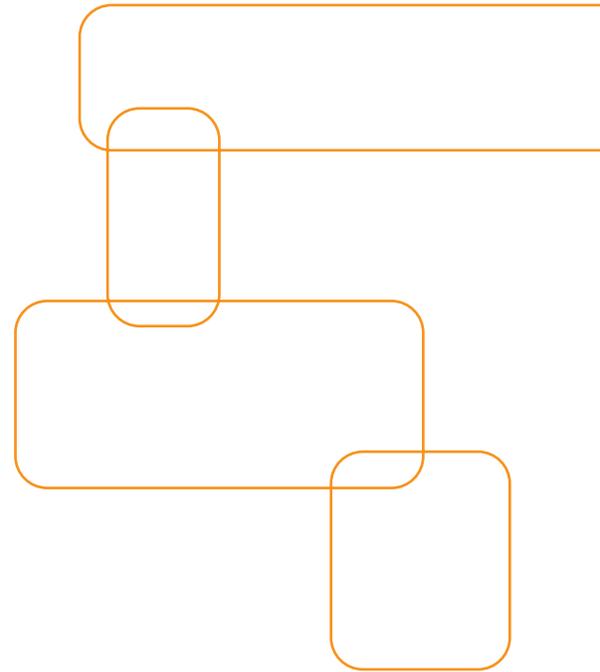
Santo Domingo housing

Fifth Year

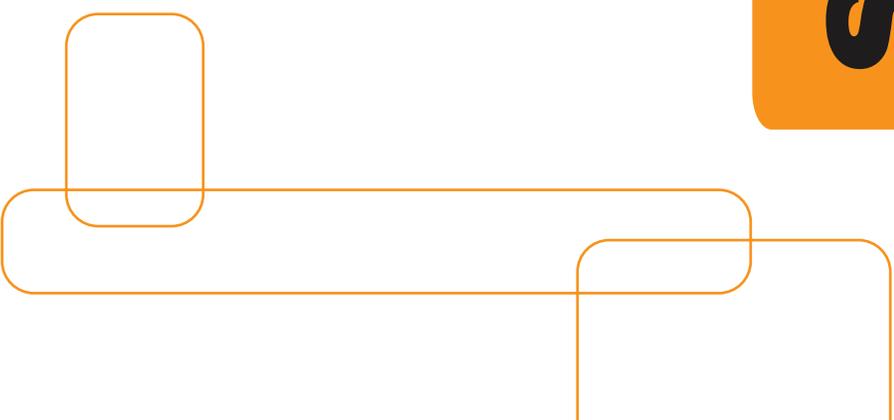
Fall 2010: Mark Barnhouse

Water Experiment Station

Program Document



Research Results



The research reflecting the theoretical premise/unifying idea is compiled into four subjects of investigation: health concerns of people and animals in the realm of food, the mortification of our food traditions, causes of ignorant farming practices and the impacts it has on our planet, and the summary: reversing the modern trends of food and farming. Through these examinations a holistic knowledge on modern food and farming practices can be met to further support my thesis design.

Health concerns of people and animals in the realm of food.

“But why should these companies want to change? Their loyalty isn’t to you, it’s to the stockholders. The bottom line: they’re a business, no matter what they say. And by selling you unhealthy food, they make millions. And no company wants to stop doing that, If this ever-growing paradigm is going shift, it’s up to you.” Morgan Spurlock – Super Size Me (2004).

Do we live to eat or eat to live? It’s evident in the United States that there is a growing problem of people becoming overweight and obese. Obesity has become a truly alarming condition and is now being spoken of as an epidemic that affects at least 300 million people in America, the U.K. and parts of Europe and Asia. In the U.S. 30 percent of adults are obese: one in three women and one in four men. According to the American Obesity Association, \$100 billion in medical costs and some 300,000 deaths annually can be attributed to obesity in the U.S.. Furthermore, airlines have burnt 350 million more gallons of fuel in 2000 than in 1980 because of the extra body weight. The food we eat is desensitizing our insulin receptors, lining our arteries with gunk, and slowly killing our engorged bodies. Food is meant to keep us alive, not kill us. Illnesses such as diabetes are at an all time high. 1 in 10 people in the U.S. suffers from diabetes and if current trends continue 1 in 3 will suffer in forty years. Obesity in children is especially disturbing and happening at a rampant pace. In the U.S. childhood obesity is growing at the rate of 20 percent per year, with

about 16 percent of children and teenagers considered overweight.

In the last few decades, the rate of obesity in the United States has more than doubled for preschoolers and adolescents, and has more than tripled for children age's six to eleven. These children are not only damaged physically, but mentally as well. Most children with obesity shy away from other children and neglect playing. They are teased and have a hard time participating in physical activities. At an early age they are already at risk of major health problems such as diabetes and heart disease and often carry these risks into obese adulthood. The American Heart Association issued a strong warning in 2005: childhood obesity is such a critical public health problem that it threatens to reverse the last fifty years of progress against heart disease. If this trend continues, obesity will soon top smoking as the nation's most preventable cause of death.

When looking at the root of the obesity epidemic, researchers point to the effects of fast-food diets, especially those that put emphasis on super-sized portions of high-calorie, saturated fats and sugar with very little nutrition. The decreasing amount of households that do not prepare healthy home-cooked meals from fresh ingredients is also adding to crisis. In addition, public schools are selling out children's health with the food they choose to serve.

Currently, the American school lunch program is part of a gradual downhill trend in nutritional standards that seriously compromises the health of children and teenagers. It also encourages poor food choices that stay with children their entire (shortened) life. Research shows that poor childhood nutrition is also linked to developmental problems, such as learning disabilities, aggression, and antisocial behavior.

The health of animals in the last few decades has also taken a turn for the worst. Consumer demand for fast-food has dramatically changed the methods of raising animals. The method is at a much larger scale and is a very

rapid and intense process. There is a higher demand to raise more and more animals to supply consumers for more and more meat at cheaper and cheaper prices. This new demand has caused great suffering to billions of farm animals around the world. Goodall writes, “Clearly, the root of all this anguish is the fact that these farm animals are treated as though they are mere things, yet they are living beings capable of suffering pain and fear, knowing contentment, joy, and despair.” (Goodall 2005, 69). She goes on to explain that these animals deserve the right to live in conditions that allow them to express as many natural behaviors as possible. The industrial model of factory farming doesn’t find it efficient or profitable to consider animals conscious beings. Instead they treat them like machines, having no more feelings or rights than a vending machine.

The way animals are raised, transported, and processed in our time also have health implications for people. The modern large-scale industrial “farm” has forgotten traditional farming customs: one who honors his stewardship of the earth. Farms have now become a monoculture of raising animals, instead of raising many kinds of animals that create a natural micro life cycle. Each factory farm raises one kind of animal and keeps them cramped in as little space as possible where they are forced to put on weight as quickly and cheaply as possible. This is in order to maximize profits in as short a time as possible. This sort of farming places no value on life and is gradually harming our health and traditions.

Farms are overcrowded and restrict animals to very little space. Cows are gated up very closely together and there is little room to move, and hens are packed inches from each other into small wire cages where there is no room to stretch their wings. The overcrowding of farms and factories with animals causes environmental problems as well because of the excessive, concentrated animal waste. It contributes to the problem of acid rain, increases the greenhouse gases that cause global warming, contaminates our waterways and oceans, and creates terrible “smell pollution.”

Animals, more than ever, in these “operations” are fed high-calorie grain and large amount of corn and soy. Additionally, many factory farms throw ground up remains of dead animals in the cattle feed for higher protein content. Apart from the disease aspects, it seems grotesque to feed cows, who are herbivores, animal remains. The corn that feeds the cattle is usually grown with heavy doses of chemicals and is the most commonly genetic engineered crop in North America. All the pesticides, herbicides, fertilizers and injected hormones end up in the meat we consume. Every-time we eat these meat products we are supporting the chemically dependant agriculture that is poisoning our land, water, and air, which jeopardize our health.

There are growing examples of diseases in the slaughterhouses. E. coli is a deadly bacteria spread by cattle waste, and in the U.S., 200 people are reported to be infected by it daily. In 2005 The Food and Drug Administration estimates that 5000 deaths and 76 million cases of food-borne illnesses occur annually. The United States Department of Agriculture (USDA) is supposed to monitor the safety of the meat-processing plants; however the agency hardly penalizes companies for irresponsible infractions. There have been many alarming stories over the last 40 years in slaughterhouses, yet the USDA simply slaps them on the wrist and issues a warning based on promises that they will clean up their plant’s operation.

Other bacterium and viruses such as Mad Cow disease (Bovine Spongiform Encephalopathy) are spread through overcrowded animals on farms and contamination in the meat processing plants. Injected hormones (Bovine Growth hormones) are designed to fatten cows quickly. Routinely pumping hormones into cows are not only painful to the cow’s utters, but has been linked to the buildup of estrogen in humans. Some believe that girls are going through puberty at a much younger age, because of this issue.

These concerns are troubling to say the least. The degrading health of people and animals in the United States are increasing every minute. These concerns, however, can be reversed, and there is hope for our nation.

The recent mortification of our food traditions

“Food to a large extent is what holds a society together and eating is closely linked to deep spiritual experience” – Peter Farb

“The land is the only true basis of any culture we might call our own.” – Frank Lloyd Wright

“Farming was the only truly moral occupation” – Thomas Jefferson

Gastronomic traditions have been compressed and swallowed up by food industries in the last 40 years. It's key to realize that economics is what threatens the well-being of farm animals and the health of people who eat them. Many small traditional farms are giving up, unable to compete with large mechanistic practices of the multinationals. These huge corporations seek to dominate livestock production on a global scale. Furthermore, old traditions around the world are dying out, and the contract between people and the animals who serve them is collapsing.

The contemporary male or female has become disconnected with the immense heritage of wisdom in the cultivation of fruits and vegetables, the raising of animals, and the sharing for traditional local dishes. It used be that foods, recipes, alimentary customs, and recurring yearly family traditions were passed down from generation to generation. Today this chain has been broken. Petrini writes, “Children and young people in our time have never seen a cow or a stable, the courtyard of a farmstead, or a wine cellar up close. They identify the smell of an apple with a brand of shampoo, and imagine that fish grow in the rectangular shape of “fish fingers” they consume battered and fried.” (Petrini 2003, 68) He believes this is particularly troubling for our generation and the ones to come. The food industry has manipulated their tastes, from French fries to fatty snacks and soft drinks; and the way food is eaten in fast-food restaurants takes away from food traditions. The florescent lighting, reflective floors, shared tables, the bolted down uncomfortable stools, the clamshell cardboard containers all act as incentives to

eat quickly and is ruining years of established traditions.

Of course there's the argument that fast-food helps people with tight budgets because the food is cheap. However, the multiple daily spending of fast-food overtime will exceed that of buying fresh food at the local market. In comparison to the postwar period the percentage of people's income spent on food has steeply fallen. Buying certain products is not a question of cost, for anyone can afford better food by adjusting their spending patterns. Moreover, the potential for massive medical bills later on in life is much greater for those who choose cheaper unhealthy foods (Goodall 2005, 45).

Food traditions are in every culture of the world and almost all view the family dinner as the place to strengthen bonds through telling stories and sharing ideas while enjoying good food. These days, less than 50 percent of American families actually sit down for meals together on a daily basis, according to national studies. Food traditions have changed considerably in the last century. The start of the change happened during the industrial revolution when agrarian traditions began to fade. Children are now being raised in households where both the adult family members work and no longer have the time or inclination to spend the hours in the kitchen preparing home cooked meals that everyone enjoys around a dinner table. Not only are children eating an increasing amount of junk food with often terrible effects on their health, but family traditions around the dinner table are becoming a rarity. The problem contributes to the breakdown of the family, which is a great misfortune of our time.

By the time children reach middle school, many families have completely given up on eating together. This is terrible news because it frequently promotes solitary eating, which often leads children to a diet of unhealthy snacks in front of the television. "Families who make it a priority to slow down, unplug from all the electronic stimuli, and join together for a homemade meal are twice as likely to have five servings of fruits and vegetables a day as those who do not, and are far less likely

to eat fatty fried foods and sodas, according a Harvard Medical School Study” (Goodall, 221). Eating together as a family does more than boost nutrition. Research shows that children who regularly eat family meals do better in school and have fewer behavior problems. According to a study done at the University of Minnesota in 2007, teenagers who eat family meals get better grades and say they are happier with their present life and are more optimistic about the future. They are less likely to smoke cigarettes, have substance abuse problems, become depressed or suicidal, or develop eating disorders.

Food needs to be seen as a privilege and not something to take for granted, which can be started by getting back to our food traditions. All living things are sustained by other living things. If life is sacred, then the food that sustains life must be sacred as well. Throughout nearly all of human history, food and farming were considered a blessing. Farmers prayed for rain, for protection against pests and diseases, and for plentiful harvests. People held food and farming to a higher blessing and gave thanks to God for their food and farms. Today this has changed. For many, farming has become just another business and food just something to buy. They don't view food and farming as something necessary to maintain human survival and those who treat food and farming as something sacred tend to be labeled as behind-the-times, odd, radical, or naïve. We need to get back to respecting and honoring one of the most fundamental means of living by ways of food traditions.

Causes of ignorant farming and the impacts it has on our planet

Quote: “A nation that destroys its soils destroys itself.” – Franklin D. Roosevelt

America was still an agrarian nation at the turn of the century. In 1900, over 40 percent of people farmed and over half still lived in rural areas. At the turn of the twenty-first century, less than 2 percent of Americans called themselves farmers and only around 25 percent lived outside major metropolitan areas. Farms in the U.S. have dropped nearly two-third, peaking at 6 million in 1930 to 2 million today. During the twentieth century, America was transformed from an agricultural to an industrial nation.

As a result, our industrial nation has exploded and is leading us down a very dangerous path. We pollute the planet with synthetic chemicals in the air, water, and land. A huge amount of pollution comes from agricultural chemicals that are used as fertilizers, pesticides, and herbicides to grow our food. Industrial farming is the backbone of what harms the farmland itself. Traditional farmers used to rotate their crops and their livestock and would usually allow fields to lie fallow for a year every so often. With this kind of consideration, the land remained fertile for hundreds of years. However, commonsense land management goes out the window when agribusiness steps in and takes charge. Big corporations are interested in immediate profit for the short term and show slim concern for future generations. These corporations do not care about their consumers; rather, they are much more interested in their stockholders. Massive cash flow in as little time as possible maximizes their profits, which keeps their stockholders happy. It's of no concern to them that farmland is being destroyed by bad land management, usage of chemical fertilizers along with pesticides, herbicides, and fungicides.

Growing food with these poisons is becoming more dangerous. Over time, insects have become resistant to chemical pesticides because of the instinct to survive: the survival of the fittest. Once the first application of the chemicals are introduced to the fields, insect predators will quickly be poisoned and die. However, after repeated applications, some insects build up a tolerance. After many years of farming, there are whole populations of “pests” that have evolved to become resistant to the chemicals. The response of the farmer is to spray more and with increasingly toxic pesticides. It is not uncommon for the farmer today to spray three times as many chemicals as what was needed forty years ago to kill the same insect. The same situation happens in exterminating weeds, rodents, and diseases. Farmers are using more and more pesticides and finding them less and less effective. Each year, about three million tons of farm chemicals are applied to the surface of this planet. All these chemicals don’t just stay on the farm. They soak into the soil and escape into the environment, they rise into the jet stream and fall in the rain and snowflakes: they are taken by the wind and arrive in our backyard, our parks and playgrounds, our preserved wild lands, and even our organic soils; they submerge into the soil and into our groundwater, reservoirs, and wells; they slither their way into lakes, rivers, and oceans; and of course, they easily end up in the bodies of animals and people (Goodall 2005, 41).

The gradual reduction of biodiversity, of our natural environments and living species of animals and plants that populate our planet, is one of the most disturbing aspects of the twenty-first century. Petrini writes, “In the last hundred years, 300,000 plant varieties have vanished from the earth, and the process is continuing at the rate of one variety every six hours. Every year 17 million hectares of forest disappear: since the beginning of the twentieth century we have lost 75 percent of the genetic diversity of our agricultural products, and today fewer than 30 plants nourish 95 percent of the world population” (87). The situation of domesticated animals is just as bad. Half the breeds that existed at the beginning of the twentieth century have disappeared, and a third of those that remain at risk.

Agribusiness tends to grow only those strains of crops that obtain high yields and maximum market value. Thus, the genetic variation that occurs in nature gradually disappears. The reduction of biodiversity on the land has disengaged the crucial symbiotic relationships between plants and animals. These relationships are necessary to enhance the fertility of the soil to be able to sustain life for the many generations to come. The distinctive and exceptional genetic heritage cultivated through thousands of years of selection through nature is vanishing due to the loss of breeds of plants and animals. This forces us to relinquish the flavors of a particular territory, replacing indigenous breeds with those that are more productive, which brings a change in our sensory experience of food.

There is some optimism, however. In 1997, Slow Food published the Manifesto dell'Arca which is dedicated to protecting suppliers of fine food and weakening industrial standardization; to make certain the survival of endangered animal and plant breeds; to spreading taste education; to protecting the right to gastronomic pleasure. In this report, researchers and scientist compiled and circulated a list of products at risk, analyzed them, and dispersed knowledge back into the commercial flow to help commit the government to preservation.

Genetically modified Organisms (GMOs) are another problem. The uncertainty of the affects they may have on our environment is disconcerting. Laboratory tests that guarantee the harmlessness of GMOs are tainted by a time imbalance that should make us apprehensive. Since these are not new varieties, but new species, ecosystems that have evolved over millions of years cannot be suddenly altered on the basis of "reassuring" tests lasting a few years. GMOs are also problematic because fields on which they have been grown cannot be returned to traditional crops for many years. It takes 30 years for fields to become clean, and there is added potential of desertification, which is already advancing at an exponential rate. Moreover, transgenic agriculture is hyperproductive, requiring ample amounts of fertilizer and high levels of irrigation, which is unsustainable for our planet.

GMOs also pose a grave threat to biodiversity, aiding the gradual depletion of our plant and animal species. Another problem with GMOs is the claim that these crops help to overcome world hunger. Hunger shouldn't be treated as a problem of production. Excess production doesn't go to feed the world's hunger because of problems of distribution. Money, or lack of it, has always been what keeps undeveloped countries from the distribution of food.

The means of transporting food and animals also poses a serious threat to our environment. It's recommended that people travel to regional farms, farmers market, or a natural food markets rather than a local standardized supermarket. People are driven by their appetites that demand instant satisfaction by going to the nearest stores. In these near-by stores we can find apples in the mid-summer and strawberries in the winter because somewhere in the world, less than twenty-four hours by air, it is always the right season. We can also find cheeses and cured meats from almost every nook of the world. We don't realize that the massive use of transportation has a serious environmental effect in terms of air pollution, energy consumption, surface congestion, and accidents.

The argument that our fields and food industries are being regulated by our government and provide the insurance of safety cannot be measured seriously. Unfortunately, those in government do not always grasp the problem, leaving food industries to regulate themselves, which is an industry whose entire purpose is to increase volume. Many politicians are funded by large food corporations in return for their support. They generate a false image to the public that these food industries aren't causing any harm to people and our environment.

The concerns of our damaging agricultural methods are undeniable. It's hurting our planet and the species that inhabit it. This steep downward trend could potentially put our existence in major threat. With that being said, there is still time to put things back on track. It's going to take will-power and an individual effort by all.

The summary: reversing the modern trends of food and farming

“Humans merely share the earth. We can only protect the land, not own it.” – Chief Seattle

“The twenty-first century was suppose to bring so much opportunity and convenience to industrialized nation, but instead it’s created a breakdown in dietary habit, family relationships are suffering, our food is less nutritious, our bodies are becoming fatter, and everyone is hurrying about-working more and enjoying life less” – Jane Goodall

To further advance this thesis, it is critical to examine the concerns food and farming methods have on people and the planet we share. We need to be cognitive of these problems to understand the need to make the right food choices. Collectively we, the people, are the force that can thwart obesity problems and prevent humans and animals from being poisoned from chemicals that have been lavishly sprayed over the crops. We can reduce disease-causing bacteria that kill and make people sick each day. We can bring back sacred food traditions and tighten our family bond. We can help bring back plant and animal species, save the ones that are in danger, and reduce monoculture farms. We can fight to decrease genetically modified organisms. We can lessen the billions of tons of fossil fuels used to transport food from one end of the planet to the other, which is having negative effects on our climate. It is necessary to recognize how food has shaped our nation in order to halt the pandemic of fast, fat-laden processed foods, standardization, and dishonest food industries. The rest of the research summary is to elucidate how we can stem the tide of modern food and farming trends.

Children and young people are the adult consumers of tomorrow and, therefore, their relationship with food needs to be determined at an early age. Teaching our children, teenager, and young adults will be essential for the success of healthy change in the food they buy. It is a matter of urgency to intervene with the food industries and teach people about traditions and the quality

of taste. It starts with their parents setting an example at a young age. We can teach children by becoming examples of what we want them to be. Furthermore, a great deal of emphasis needs to be present at their schools as well. Alimentation education is vital for children to think independently, and stray away from what advertising tempts them to eat.

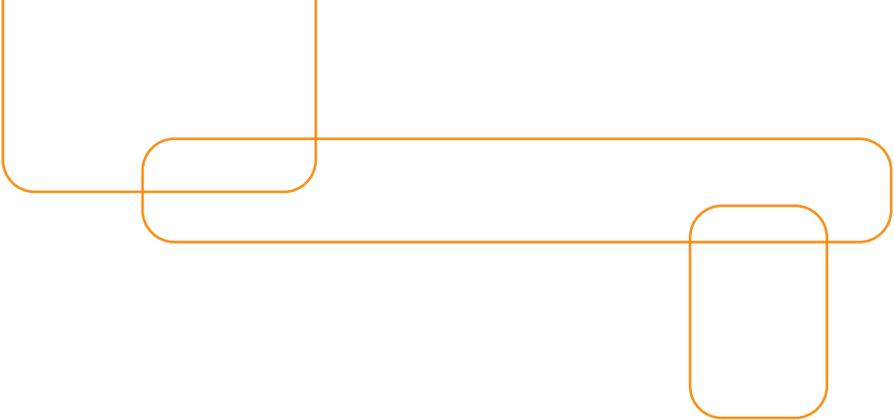
Although many school systems do have a health educational class, there needs to be a different approach to alimentary education. There is a lack of engagement in the student's perception of touch, smell, and taste. Quantitative information should be taught similar to other subjects in school. For most children, lectures go in one ear and out the other after being tested. There needs to be a stress on connecting the pleasures of food with their cognitive capacities arising from sensory experience. This will bring awareness in their own recognition of the qualitative characteristics of what they are eating, and the pleasure it can give them. A good way for alimentary education to progress forward is by having cooks and artisanal food makers take over the class room and truly engage student's awareness with food.

How can we turn the tables and return to a healthy, safe way of farming, in the face of a daunting and rapidly growing corporate takeover? It all begins with us, the consumers. We have the power to amend the demand of food. If there is a high demand for organic food, for example, then the food industry has no other option but to start reversing the trend toward organic food. Farmers will then need to start growing more organic food in order to meet the demand of the food industry, and so on. As consumers, we have the power to tilt the food market to one that is much more safe and healthy. We can start demanding to label GMOs. The United States is one of the only nations that doesn't demand genetically altered foods to be labeled. If food containing GMOs would be labeled, it would give people the option of avoiding these foods. We can hold restaurants more accountable, talk to our grocer, read labels carefully, buy grass-fed

animal products, support the right of farmers, and so on.

We can help to save family farms that promote a sustainable way of farming, promote the production fresh organic food by shopping at farmers markets, buying from local farmers, becoming a shareholder in a farm, or joining a food co-op, buy fair-trade and organic imports, etc. By eating locally and seasonally, we can help small farmers get back on their feet while increasing the health of our ecosystems. In order to sustain the profitability of farming, farmers must develop meaningful relationships with their consumers. In order to sustain such relationships, farmers and consumers must know and trust each other. They must be committed to working together for their mutual good, and by sharing their commitment to stewardship of the natural environment, farmers and their consumers can lead a purposeful and meaningful life.

The purpose of my thesis is to give people the opportunity to lead an improved life for future generations through our essential means of survival: food. We must educate people about the concerns surrounding food and how to manage them; to help train our senses, refine traditions, and restore withered dimensions of sensory experience; to aid in altering our farming practices to one that is more sensible; to reclaim the validity of food, repairing the health, social, and environmental trepidation of food; to save the food we eat one purchase, one meal, one bite at a time; the food choices we make are votes, everyone can make a difference.



Typological Research

Case Study I

Project: Winery complex

Location: Laguardia, Spain

Completed: 2000

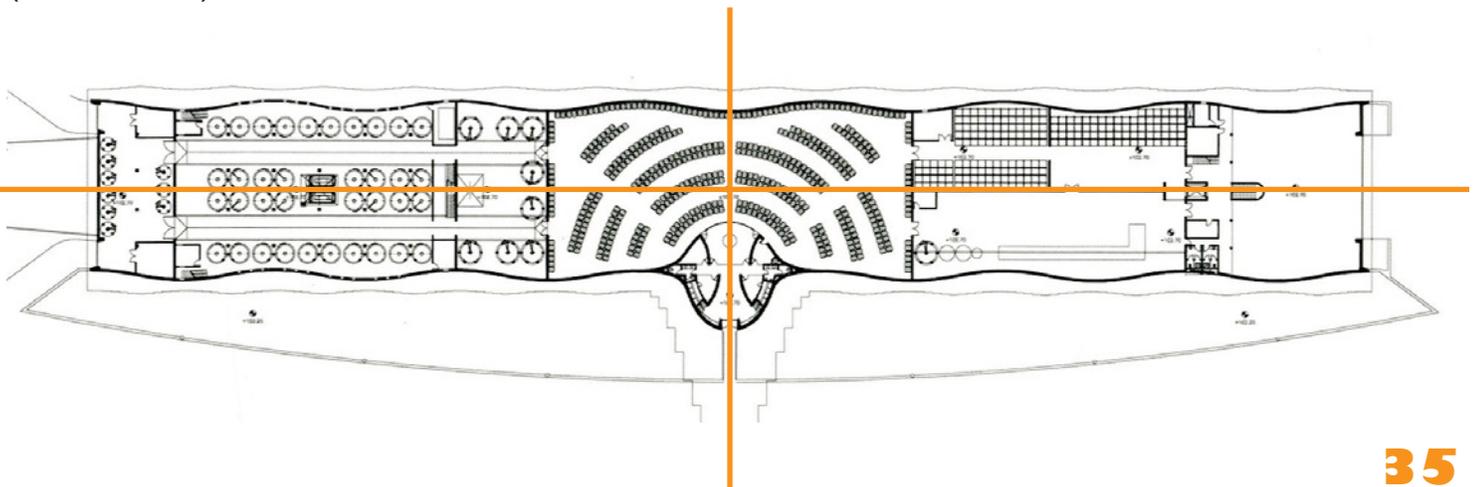
Size: 8,000 square-meter

Designed by architect/engineer Santiago Calatrava, Ysios Winery is located in Laguardia Spain and makes, stores, and sells wine. Vineyards cover half of the rectangular site. Calatrava reveals his remarkable sensitivity to the natural landscape. Rather than bearing down on the land, it derives its buoyant, rippling forms from the topography in which it sits. The winery is situated in such a way that it stands out against the blue mountain range of the high sierras of the Pyrenees. A difference of 10 meters in height from the north to the south of the site made for a complicated design. The linear program of the winemaking process dictated that the structure of the building be rectangular and it was set along the east-west axis (Jodidio, 71).

Bodegas Ysios Winery



Courtesy of www.mimooa.eu/images





Courtesy of <http://ysios.com>

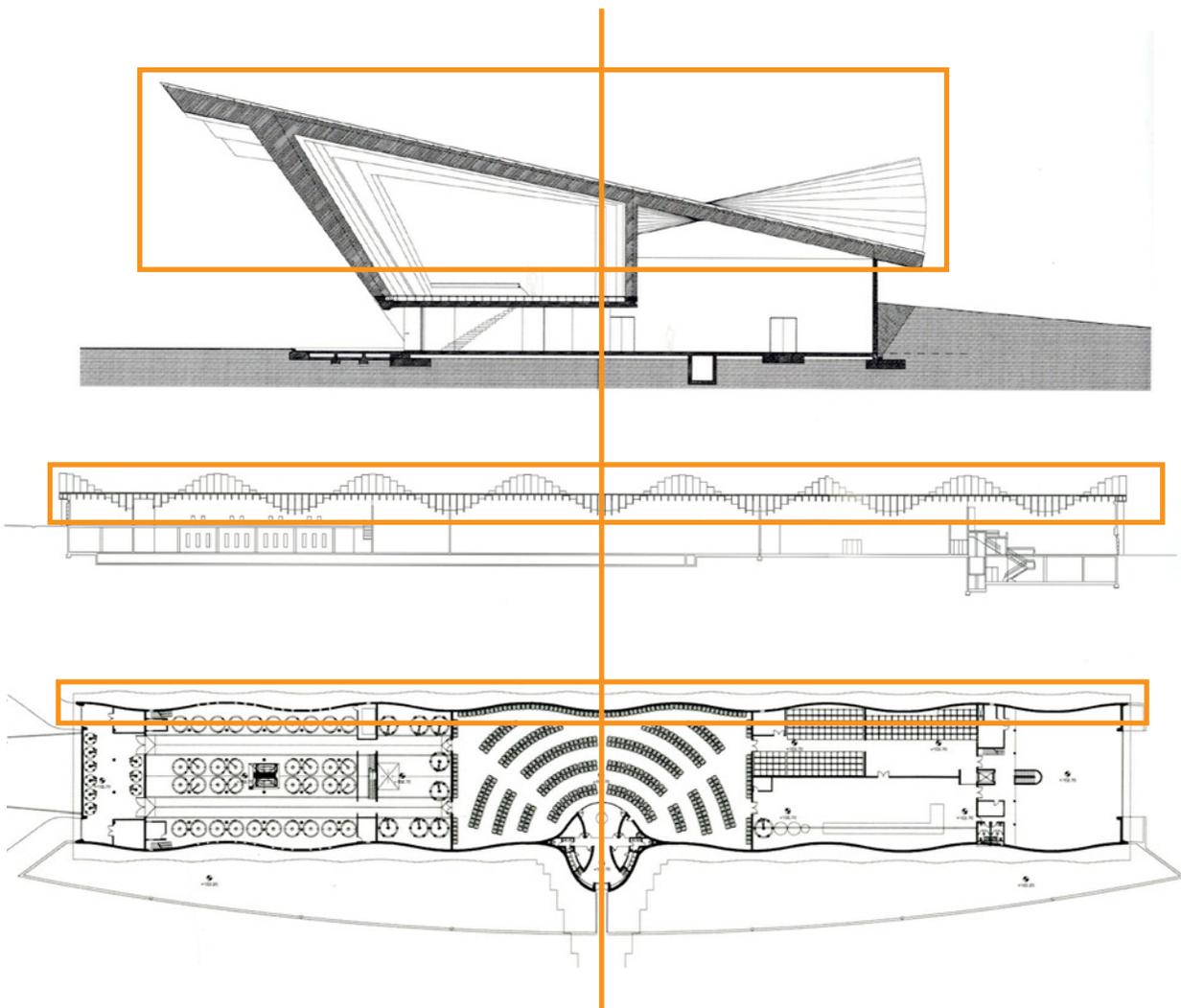
Structure: The ripple effect of the wall seen in the plan is not just an aesthetic feature. The sinusoidal wooden walls, for all their thinness, are incredibly strong. The rippling curves constitute the most robust structure possible.

Natural light: Natural light thoughtfully floods the main entrance greeted by the barrel housing space. This is accomplished by extending the roof line and letting the south-facing façade pour in light.

Massing: The mass of the building from the exterior is directly related to masses in the interior. The sinusoidal walls and the ripple effect of the roof is translated into the inside making a strong connection from the exterior to the interior.

Plan to section/elevation: The sinusoidal shape of the building can be observed in plan, elevation, and sections (both longitudinal and transverse). Not only do these waves seem to be in harmony with nature but they make the building more structurally sound.

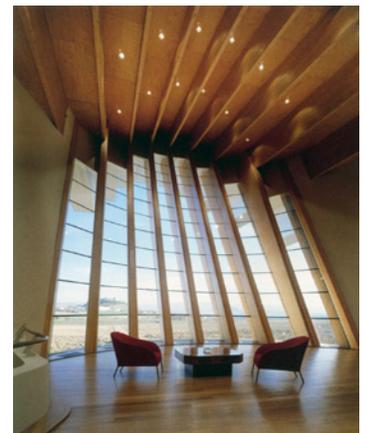
Two longitudinal concrete load-bearing walls, separated from each other by 26 meters, trace a 196 meter-long sinusoidal shape in plan and elevation. These walls are covered with wooden planks, which are mirrored in a reflecting pool that evokes the image of a row of wine barrels. The roof, made of aluminum-clad cypress beams, appears to ride like a gentle wave over the land, and are also accentuated by the mirroring pool that encircles the base of the building. The cypress laminated beams are designed as a continuation of the façades and combines concave and convex surfaces as it evolves along the longitudinal axis. With its swooping pinnacle window in the center of the structure, a balcony is placed for visitors to enjoy the panoramic view of the countryside. (Jodidio, 71).



Geometry and hierarchy: The Ysios Winery is rectilinear in nature. As mentioned before, the geometry of the ripples are implemented throughout the building. The hierarchy is created by a disruption in the ripple running along the middle of the roof line where the primary entrance is.



Conclusion: The Ysios Winery represents a good case study in regards to my theoretical premise and unifying idea. The art of growing, producing, tasting, and selling wine has a certain reverence which the building and the surrounding environment should respect. I feel the Ysios Winery is sensitive to the art of wine and helps me to understand the sensitivity that needs to be present in my design through food.



Courtesy of <http://ysios.com>

Taliesin and Midway Farm

Case Study II

Project: House/studio/farm

Location: near Spring Green, WI

Size: The building is 37,000 square feet;
Site: 600 acres



Courtesy of <http://en.academic.ru/pictures>



Courtesy of <http://en.academic.ru/pictures>

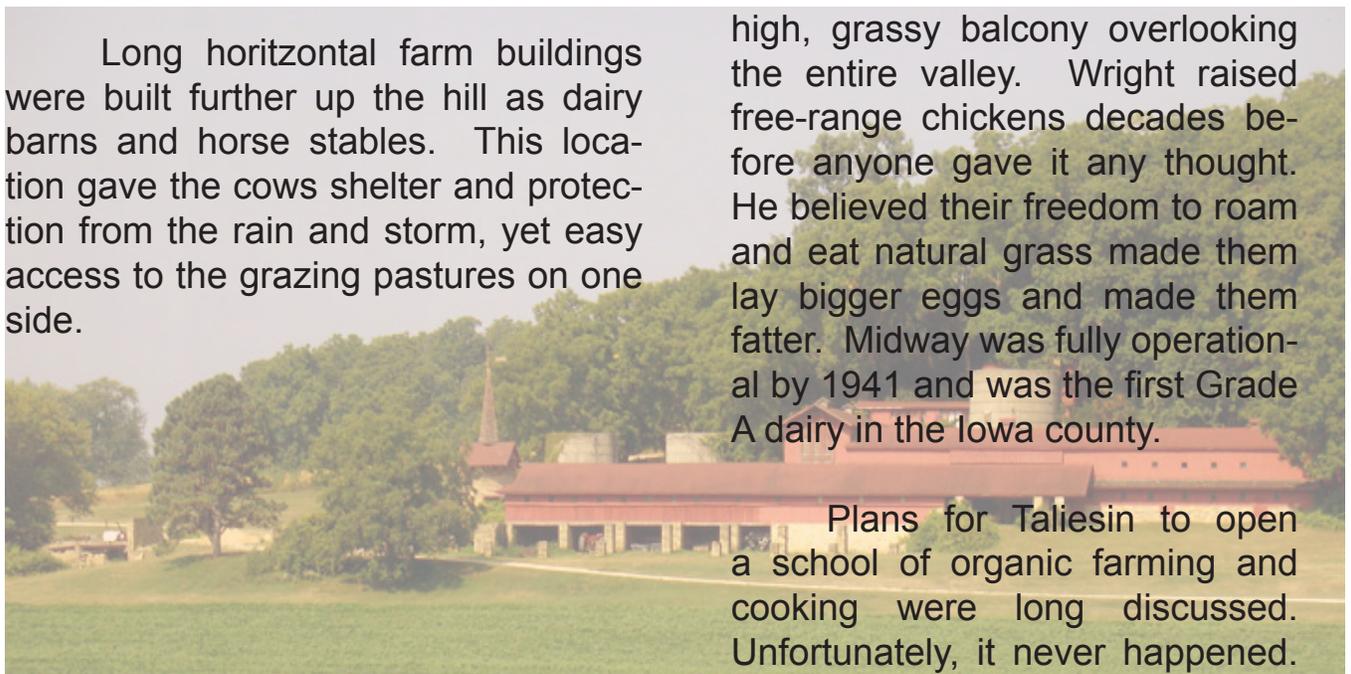
Designed by Frank Lloyd Wright in 1911, Taliesin in Spring Green is one of Wright's most famous houses. The word "Taliesin" is Welsh for "shining brow." It was named Taliesin because the low one-story structure wraps around the brow of the hill with spectacular views over the lake below and surrounding hills. The house was designed during a time in Frank Lloyd Wright's career when he was troubled by society and his own personal life. The inspiration of the house became a place of refuge against two generalized and impersonal threats. One is climate, against which the house protects by means of its walls and roof, its hearth, and its ventilation sash (Hildebrand, 62). The other threat is the intrusiveness of communal society. The house protects against this by means of walls, roof, and doors and also by subdued interior light conditions. Trees and shrubs were also means against societal hostility.

Wright had a vision of a self-sufficient farm. “There was an overall design concept for the entire site including a layout for roads, where certain crops would be planted and even the location of a night pasture” (Nemtin, 5). He was always progressing ahead and he, like architecture, was further advanced in farming methods than everybody else. Wright had continually been acquiring or inheriting land in the valley and had nearly 600 acres, including the Hillside home school. In 1938, between the Taliesin residence and the Hillside school, Wright designed and built Midway Farms. More and more students arrived to live on the farm to be taught by Wright. His apprentices spent much of their days farming in order to provide the food they all ate, and quite simply, to learn the earth. Throughout the summer and fall harvest season, they spent more time in the field than studying and doing design work. For Wright, Taliesin was a farm, and for many years the earth’s deadlines superseded those of the studio.

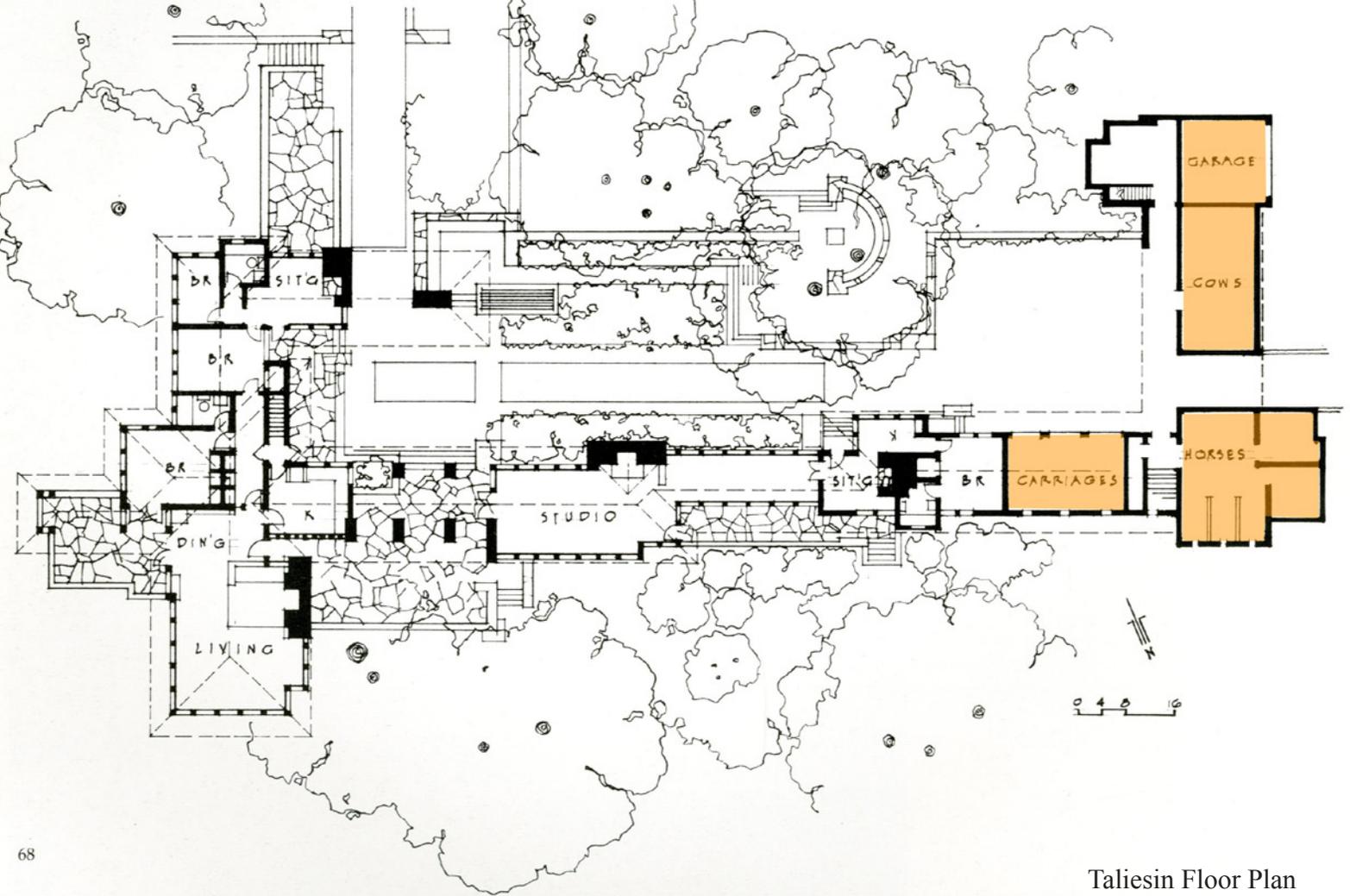


A special barn for young calves was incorporated to the east of the main dairy barn. This calf barn offered access to an adjoining small wooden area in which the calves could graze and play. The adult dairy herd had free range to the pasture lands all around Taliesin. The highest barn of the complex was the chicken coop, built as a bridge between the round hill and the top of the dairy cow barn. This offered Wright’s contented chickens an outside run as a kind of high, grassy balcony overlooking the entire valley. Wright raised free-range chickens decades before anyone gave it any thought. He believed their freedom to roam and eat natural grass made them lay bigger eggs and made them fatter. Midway was fully operational by 1941 and was the first Grade A dairy in the Iowa county.

Long horizontal farm buildings were built further up the hill as dairy barns and horse stables. This location gave the cows shelter and protection from the rain and storm, yet easy access to the grazing pastures on one side.



Plans for Taliesin to open a school of organic farming and cooking were long discussed. Unfortunately, it never happened.

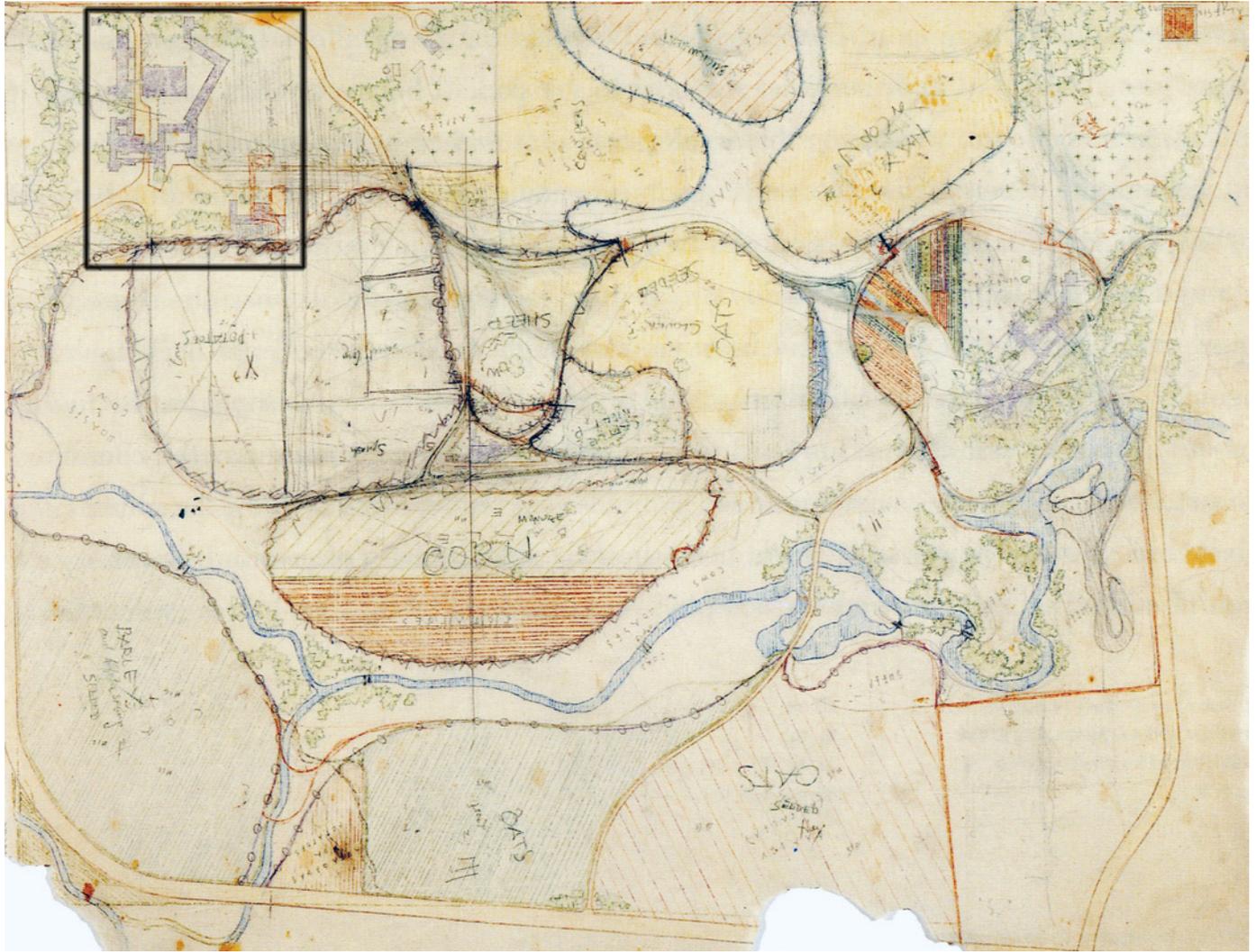


Taliesin Floor Plan

Structure: Wrights' attention to structure detail, exterior and interior, is what separates him from other architects. The structure of Taliesin and much of the Midway Barn is stone masonry. From the columns to the fire places that pop out of the low lying roof, natural field stone structures can be distinguished between the finished wood outside and the gray shingles of the roof.

Natural light: The overriding premise or inspiration of design is the idea of "refuge." Taliesin was a place for Wright to get away from society, and so he brought this into the design in many ways. He was particularly careful of how natural light would enter into the building to enhance this idea of "refuge." Light would come in, cut across the space and then dive into a corridor which, depending on where one is standing, appears to have a sense of "refuge."

"There is beauty of living on the land; the countryside is a precious thing in anybody's life. The farm has beauty and a richness of experience that would be enough if people could only see the goodness in what they are doing." - Frank Lloyd Wright

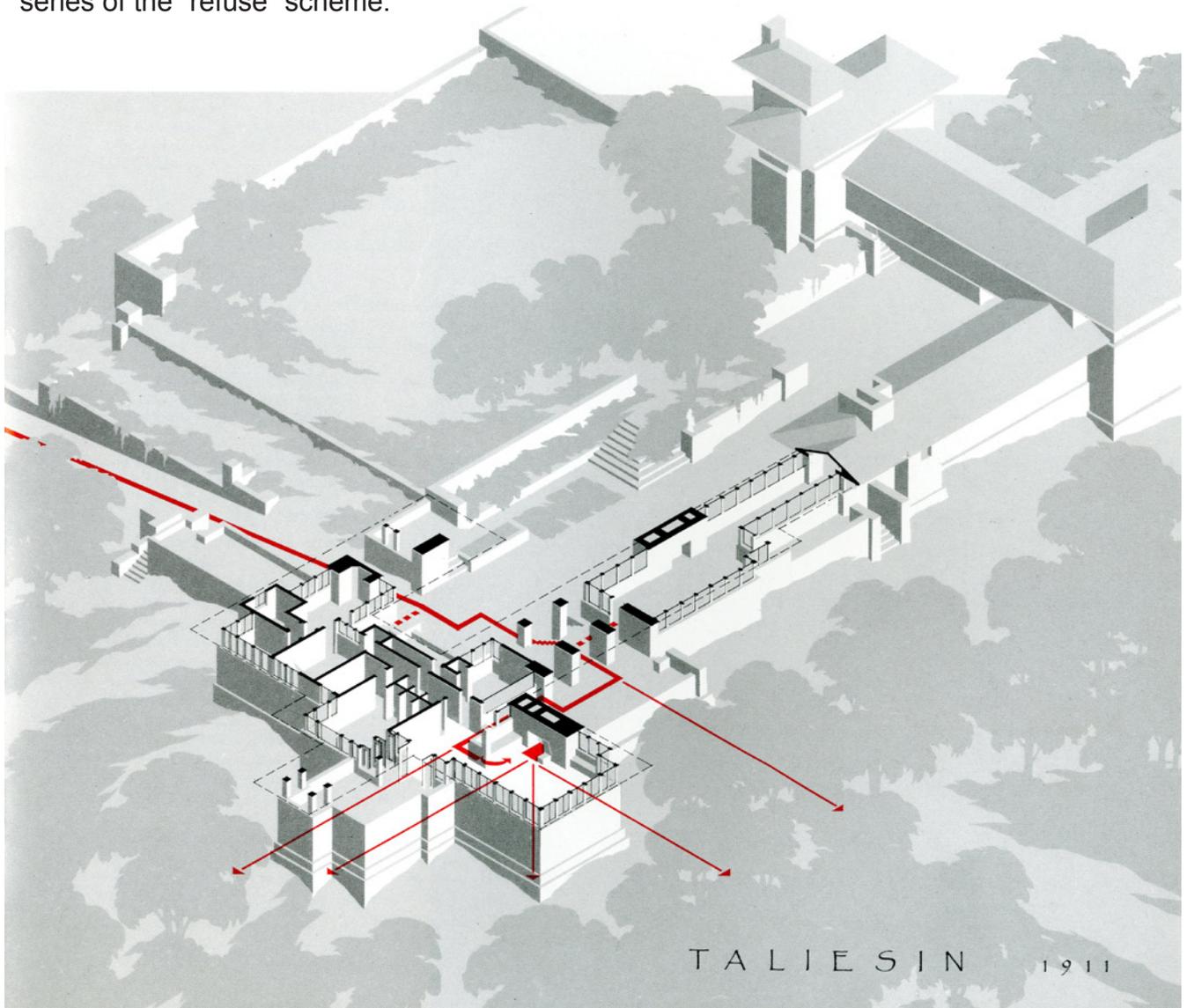


Massing: The massing of the building is quite similar to other Frank Lloyd Wright prairie style houses: Long rectilinear masses converging into more centralized square masses. The masses in Taliesin are very integrated with the earth as they wrap around the hillside.

Plan to section/elevation: The plan to sections/elevations correlates. The house, like many others of Wright's houses, is set up on a 2' x 2' grid. This grid helps to layout spaces in plan view and how fenestration will work in conjunction with the plan.

Geometry and Hierachy: Another says that the geometries of the house are gentler, more intimate, and more freely composed than any other house that Wright designed (Hildebrand). The geometries are long, low, and rectilinear in nature. These geometries are embedded into the hillside; the planes appear to extend out of the hill in every direction as one would perceive walking around the exterior of the house. The Hierarchy of these geometries are the fire place cores and the spaces they are associated with. These cores are also a participant through the series of the “refuse” scheme.

Conclusion: Most interesting to me are Wright’s Midway farm techniques. He was thinking about an organic way of farming nearly thirty years before it become widely thought about. His designs are sensitive to different animal’s needs, which encourage animals to live in the most natural setting as possible. This will surely help my design when thinking about how architecture can enhance animal’s lives. Wright’s integration with the earth and use of natural material is also worth noting and will inevitably facilitate my design.



Diagrammatic drawing by William Hook

Case Study III

Quintessa Winery

Project: Winery

Location: Rutherford, CA

Size: Winery = 27,000 sq ft
Winery caves = 15,000 sq ft
Office Building = 4,800 sq ft

Quintessa was designed by Walker-Warner, based out of San Francisco. The design is environmentally sensitive and combines efficiency with aesthetics. The inspiration of the winery came from a combination for the passion of winemaking and a respect for the environment. The project demonstrates how smart architectural design can efficiently facilitate the wine-making.

The most important issue was the need to minimize the impact of a large structure on the existing vineyards and surrounding landscape. Almost built into the hillside, the simple sculptural main building form reflects the natural grade of the landscape. The exterior of the winery harmonizes with the countryside. The interiors are sleek and modern.



Courtesy of walker-warner.com



Privately owned photographs



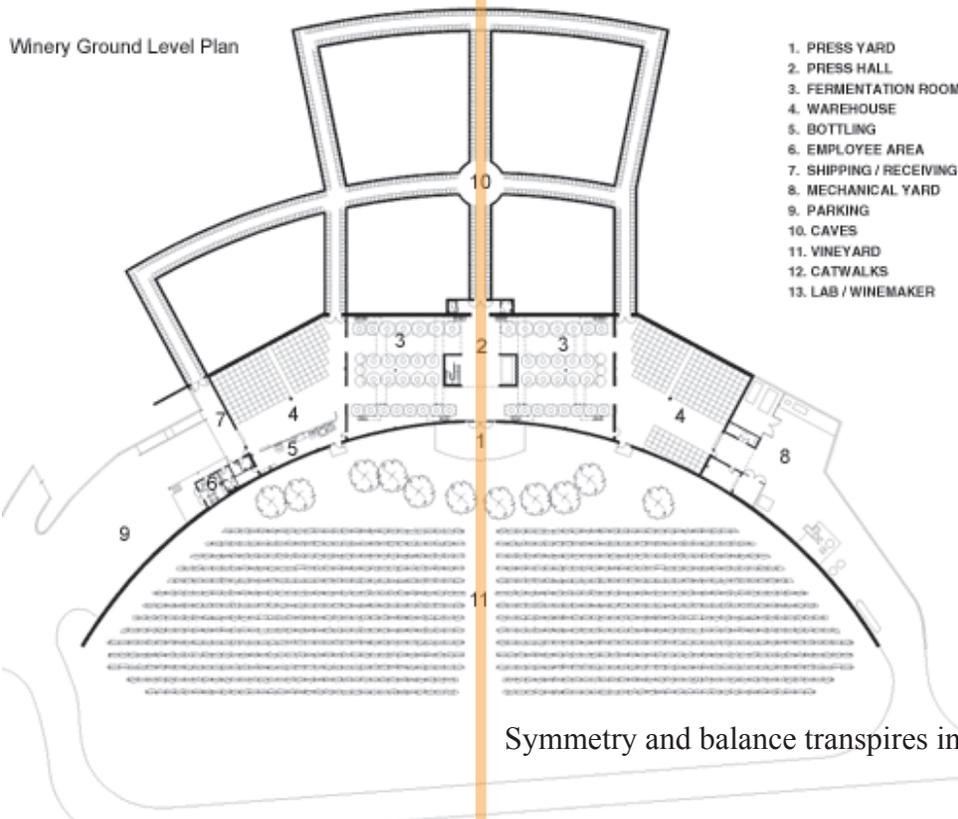
Hierarchy of the main entrance

Courtesy of walker-warner.com

The location of the crescent-shaped building provides direct visual access to the nearby road, however it gives its visitors a sense of revealing upon entering. The roof terrace is where grapes can be gravity fed through to the fermentation tanks. The environmentally conscious design assists with heating and cooling the winery. Irrigated sod roofs, thermal mass, and the use of night air ventilation prevent the need for mechanical refrigeration in the bottling and wine case storage areas. The design of the detached office and reception building utilizes large roof overhangs and exterior wood screens to shield the hot summer sun.

Structure: The structure of the Quintessa Winery is a combination of masonry and steel. The large masonry retaining wall is correlated with the steel frame structure of the winery above grade. The crescent-shaped masonry wall not only provides for a more robust structure, but also reflects the design concepts.

Winery Ground Level Plan



1. PRESS YARD
2. PRESS HALL
3. FERMENTATION ROOM
4. WAREHOUSE
5. BOTTLING
6. EMPLOYEE AREA
7. SHIPPING / RECEIVING
8. MECHANICAL YARD
9. PARKING
10. CAVES
11. VINEYARD
12. CATWALKS
13. LAB / WINEMAKER



Courtesy of walker-warner.com

Symmetry and balance transpires in the design

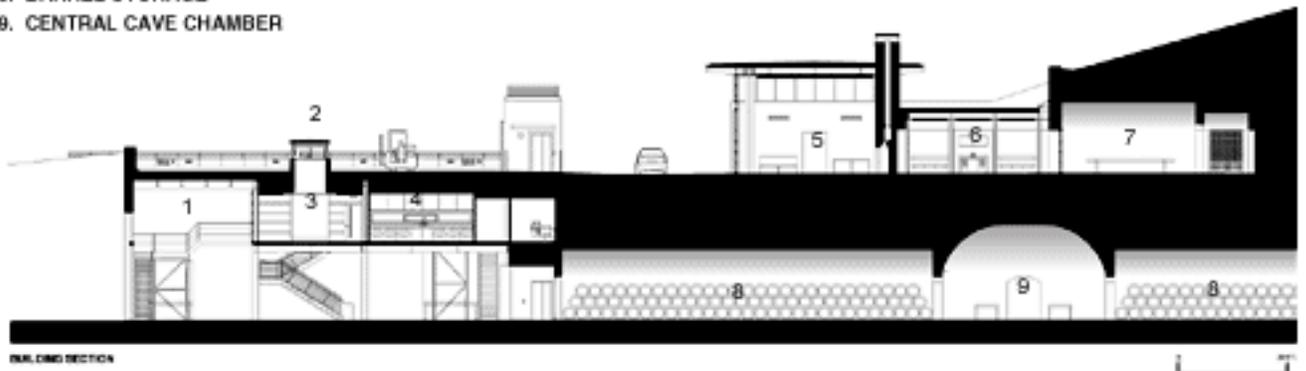
Natural light: Special attention was given to letting natural light into the lobby/greeting space. Light is brought in from the large glass entrance and also the clear story above. The light hits the masonry wall, dividing the lobby from the more intimate space. The contrast between the direct natural light in the lobby and diffused light in the tasting space was executed well.

Conclusion: By studying this building, I have a better understanding of sizes and proportions of space that will be closely related to the spaces in my design. I also recognized how the building relates to the site and how it combines efficiency with aesthetics. This knowledge will enhance my thesis design.



Privately owned photographs

1. FERMENTATION ROOM
2. CRUSH TERRACE
3. MEETING ROOM
4. WINEMAKING LABORATORY
5. LOBBY
6. TASTING ROOM
7. TASTING CAVE
8. BARREL STORAGE
9. CENTRAL CAVE CHAMBER



BUILDING SECTION



Summary of case studies

The Typological research includes Ysios Winery in Laguardia, Spain, Taliesin estate/Midway farm in Spring Green, WI, and Quintessa Winery in Rutherford, CA. Each study has its own intrinsic value and together provides a catalyst towards my thesis design. A comprehensive analysis of each building was completed by examining how the case responds to the site, conceptual underpinning of the case, and through Clark and Pause's 11 Aspects of Design (if they applied, depending on the case).

Each study presents common characteristics; the key characteristic is the social value of food/wine. It's important for me to understand how the design of a building influences or lends a hand to the function which it serves. The two wineries, Ysios and Quintessa, are good examples of how design can grasp the spirit of winemaking, and also comprehend the process which wine must go through. Wright's Midway farm is extremely important to my thesis because it demands value and appreciation for the food we eat. The spatial relationship between the three also assists me in recognizing the size of spaces and the strong connection they must have.

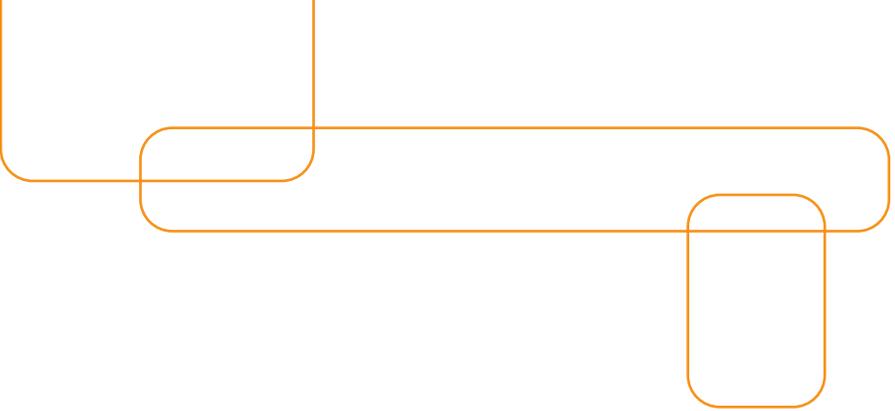
Each study also presents uncommon characteristics with each other. Although each building is heavily influenced by its surrounding and natural landscape, they are done in different ways. The Ysios Winery rests on the land, creating a strong connection with the earth on

the mountains behind. Ysios' geometry is quite different than the other two case studies. It has forms that are more fluid and free flowing, which demand the need for the latest in technological innovation. Taliesin's and Quintessa's sites allowed them to become better integrated with land; they are one with nature so-to-speak. Their sensitivity to the contours of the natural landscape not only endures in a beautiful design, but one directly speaking to the function. All three buildings include sustainability aspects, but are preformed in different ways. The uncommon characteristics of each building will help me to discover how my design will communicate its site.

Each building is affected by different cultural, social, and political contexts. They understood these issues and applied them to the design. This is especially evident with the Midway farm. Wright was concerned with the current farming methods being used through the country so he began to think of new ways to farm. His innovation and sensitivity to the animals and the land they graze transpired through his architecture.

Through a comprehensive analysis of Ysios Winery, Taliesin/Midway Farm, and Quintessa Winery, I am ready to move forward and make the confident decisions necessary for a successful thesis design.

Historical context



History of Madeline Island/LaPointe

Madeline Island has a rich history, and is the largest of the twenty-two islands making up the Apostle Islands archipelago in Lake Superior. The Islands are a result of the glaciers that once covered North America. They are originally part of the main land edge of the great rift or fault which formed the depression to which waters of Lake Superior collected. When the glaciers melted, wind and water from the great lake caused erosion that formed the islands. The islands are composed of mostly red sandstone because of the glacial shift.

Madeline Island is the most southern Island of the Apostles and is the only year-round inhabited island. It is named after Madeleine Cadotte, daughter of Chief White Crane and wife of fur trader Michael Cadotte. The Island has been inhabited by Native Americans, fur traders, and missionaries. Madeline Island has been the site of some civilization for over 400 years.

The Ojibway (Chippewa) and other native peoples made their home here hundreds of years before European contact. Etienne Brule, a French explorer, visited Madeline Island about the same time as the pilgrims landed at Plymouth Rock. Between 1660 and 1665, explorers and fur traders began to settle around the Apostle Islands. Jesuit Father Claude Allouez and Father Jacques Marquette arrived and a mission was soon established at LaPointe, on Madeline Island. For the next 150 years, it was an important outpost for French, British and American fur traders.



Courtesy of www.wisconsinhistory.org



Courtesy of www.wisconsinhistory.org

The Apostle Islands became home to a host of settlers after the 1855 construction of the locks at Sault St. Marie, Michigan opened up the Lake Superior country. Like Native American inhabitants before them, the new settlers found water transportation routes to be most convenient. Freight and passenger ferries began crossing the Bay between communities.

The eventual development of rail and road systems led to the disappearance of all ferry boats except those providing the connection between Bayfield and LaPointe, on Madeline Island. Ferries have run between the two communities for nearly a century and a half. Early sailing ferries have given way to steamers, then to gas and diesel boats, and finally making the marked changes in structural design necessary for transporting vehicles in the 21st century.



Privately owned photo

History of western agriculture: development of industrial agriculture

By learning the history of western agriculture, we can begin to understand the causes of 21st century concerns of food. These concerns involve the reduction of American health, the diminishing of food traditions, and the ignorant farming practices.

Agriculture was developed at least 10,000 years ago and has undergone significant developments since the time of the earliest cultivation. Agricultural practices such as irrigation, crop rotation, fertilizers, and pesticides were developed long ago but have made enormous impacts in agriculture practices in the last 100 years. In the past century, agriculture has been characterized by enhancing productivity, replacing human labor by synthetic fertilizers and pesticides, selective breeding, and mechanization. The recent history of agriculture has been closely tied with a range of political issues including water pollution, biofuels, genetically modified organisms, tariffs, and farm subsidies. In recent years, there has been a backlash against the current methods with increasing support for the organic movement and sustainable agriculture.

During the middle ages (between the 5th century and the 15th century), western agriculture underwent a number of important changes.

Tools including the scythe and plow were improved from classical versions, a three field system of crop rotation was invented, and the moldboard plow and wheeled plow were increasingly used. Draft horses were bred and increasingly used as a working animal in many parts of Europe, while oxen continued to be used for the same purpose. Much of Europe had low population densities during this period, to which extensive farming was well-suited. In parts of Southern Europe, more intensive farming combined techniques continued from classical Roman agriculture and those adopted from Islamic regions. During the late middle ages, the use of manure as fertilizer increased, which in turn decreased the necessity of regular fallowing of fields.

Between the 16th century and the mid-19th century, Great Britain saw an enormous increase in agricultural productivity and profit output. New agricultural practices like enclosure, mechanization, four-field crop rotation and selective breeding enabled an unprecedented population growth, freeing up a significant percentage of the workforce, and thereby helping to drive the Industrial Revolution. By the early 19th century, agricultural practices paid particularly careful selection of hardy strains of plants and cultivars. The yields per land unit increased dramatically from the middle ages and before.

The 19th century also yielded advances in the understanding of plant genetics, and subsequently, the development of hybrid crops. Increasing dependence upon monoculture crops led to famines and food shortages, most notably the Irish Potato Famine (1845-1849). Grain elevators and storage silos also appeared in the 19th century.

In the late 19th century and into the 20th century, farming tasks could be done with speed and on a much larger scale. This is primarily due to the rapid rise of mechanization, particularly in the form of a tractor, and later the combine harvester. These advances, joined with science-driven innovations in methods and resources, have led to much higher produce per land unit and what may be the practical limit. The development of rail and highway networks and the increasing use of container shipping and refrigeration in developed nations have also been essential to the growth of mechanized agriculture, allowing for the economical long distance shipping of produce.

Ikerd writes, “The industrialization of agriculture allowed us to accomplish those two things. Through specialization, standardization, and consolidation of control, we bent nature to serve our material needs. We gradually harnessed the vagaries of biological processes and transformed farms into factories without roofs. Our fields and feedlots became biological assembly lines with production inputs coming in and agricultural commodities going out.

We achieved the economies of large-scale specialized production as we applied the principles, strategies, and technologies of industrialization to farming” (Ikerd 25).

While chemical fertilizer and pesticide have existed since the 19th century, their use grew significantly in the early 20-th century. Scientists began engineering new chemicals for commercial use. Their work led to the Green Revolution, which applied western advances in fertilizer and pesticide use to farms worldwide, with sporadic success. Other applications of scientific agricultural research since 1950 included genetically modified organisms, hydroponics, and the development of biofuels such as Ethanol.

However, the exhaustive farming practices pioneered and extended in recent history have generally led to increased outputs which have also led to the destruction of farmland. As global population increases, agriculture continues to replace natural ecosystems with monoculture crops. Since the 1970’s western farmers and consumers have become aware of, and in some cases critical of, widely used intensive agriculture practices. This growing awareness has led to interest in organic farming, permaculture, heirloom plants and biodiversity. It is contributing to the growth of the Slow Food movement, and the continuing development for sustainable agriculture.

1. To produce a clear, succinct, and meaningful theoretical premise and unifying idea that will guide my thesis through every step of the process.
2. To stay on a well-timed schedule permitting the design to successfully unfold to my satisfaction.
3. To become proficiently knowledgeable in every aspect of my theoretical premise and unifying idea. This will be achieved by reaching a thorough understanding of my assembled research.
4. A design solution that embraces the need for food to reclaim its validity; to repair the health, social, and environmental trepidation surrounding food.

5. A concise and professional compilation of all research, documentation, and design progress into the thesis. To my ability, the thesis should be of the highest quality possible.

6. A professional and masterful graphic presentation. All renderings, drawing, details/diagrams, and board layouts should tell the story of the project. It should be able to speak for itself and engage curiosity.

7. To develop a design that encompasses many aspects of architecture. A focus on understanding how different construction methods, mechanical systems, electrical systems, plumbing, etc. can be implemented.

8. To develop a meaningful design, one that is harmonious to the site, induces our sensual experience, creates interest, and bonds with the catalyst of the project: food.

Site analysis



The Narrative

Superman is my favorite superhero. As a kid I remember watching all the movies and cartoons on television. Although I knew there was no such place, Superman's Fortress of Solitude always captivated me. It's a place for Superman to find tranquility, somewhere to achieve peace of mind, to slow down and remember what's important. When thinking about where I wanted to select my thesis site, I knew it had to be a sort of "Fortress of Solitude."

Madeline Island is labeled as a place to get away from the everyday hustle and bustle of city life.

I stepped onto Madeline Island Ferry to embark on the journey across Lake Superior to the town of LaPointe, Madeline Island. While the ferry cruised along, I took pleasure in the beauty of nature surrounding me. The cool breeze off the lake increased my awareness, and I began to appreciate the colors of autumn. I felt a certain sense of serenity as though my body and thoughts began to slow down, enabling me to find comfort in myself. I knew I was on the right path to finding my thesis site.

My site needed to be in walking distance from the loading dock. When I stepped off the ferry I decided to walk around the quaint town of LaPointe in search of the site.





I strolled down picturesque Main Street and explored some of the little shops and taverns. It felt surreal; everyone appeared to be relaxed and enjoying life. After conversing with some of the locals, I could sense a great pride for their island and a deep respect for nature and the environment. I wandered through Madeline Island's historical museum and learned a great deal of the island's heritage. As I walked out of the Museum I noticed a clearing of trees in the distance. I quickly walked over to the tall grassy area. Right away I was taken aback by this place; the fresh air, the quiet breeze through the grasses, the wonderful views. I stood there in complete harmony with my surroundings.



Minutes passed before the serenity faded and I panned the site for other the qualities it presents. There is great potential for focusing views southerly toward the large marsh and the lake beyond. The marsh makes it favorable to grow eatable wild berries along the south side of the site. Moreover, the openness of the site makes it possible for a community garden to be grown in conjunction with the building. The coniferous trees running the north end across the street gives one the feeling of being submerged in nature but yet a sense of security knowing the town is just west. Looking around one last time, I fell back into a trance. It truly is a place to get away, to experience life at a slower pace, to enjoy existence, to be in your own Fortress of Solitude.



Site Characteristics



Grids

Perhaps, to some extent, a grid is formed with the main street and secondary roads within the inner city limits of LaPointe. However, Madeline Island doesn't present a grid system mainly because there is no large-scale farming done on the Island. Most of the Island is preserved forests and wetlands, and, therefore, is left for nature to make its own ordering system.

Textures

The textures in and around the site change drastically throughout the seasons. The textures of the site itself during the spring, summer, and autumn are that of prairie grassland. South of the site are textures of trees and marshland to the west; textures of aquatic plants and the smoothness of mud and water. Textures of deciduous trees are to the north and choppi-ness of the lake to the far west. Obviously these textures evolve throughout the seasons, with the most change happening during the winter months.



Geometries

Aside from the beautiful forms nature has blessed us with; there are faded rustic forms of old cabins nestled within the trees to the east and west of the site. These geometries relate to one other because of their rectilinear in form and have simple gable roofs. There is also a line of telephone poles that run along the road to the north.



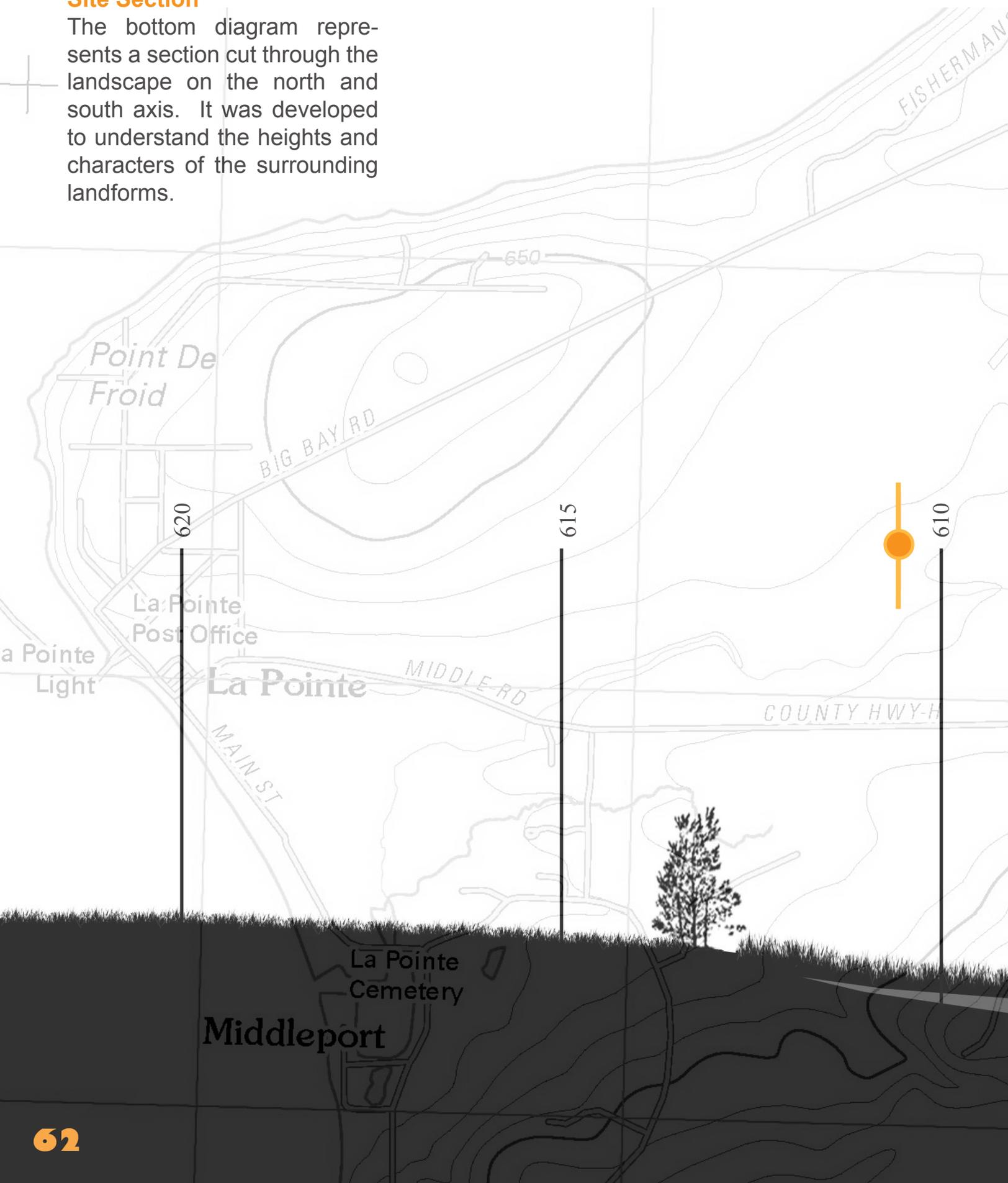
Shade and Shadow

The shade and shadows will constantly transform during the day, month, and year. Shadows will be cast regularly along the south end of the site due to a line of semi-tall deciduous trees that separate the site and the marshland.



Site Section

The bottom diagram represents a section cut through the landscape on the north and south axis. It was developed to understand the heights and characters of the surrounding landforms.





Built features

The population density of LaPointe is low (285) and therefore only a few built structures are around the site. There are a couple cabins tucked in the woods to the north and one exposed house to the east. Looking south from the site one is able to see an apartment complex in the distance. LaPointe is to the west. There is a baseball field and beyond that is a town building complex, which houses the chamber of commerce and other small offices.

Lighting Quality

Lighting quality is another characteristic that varies depending on the time of year. The spring and summer has a much different light quality with the reflections of luscious greens and bright blues. The autumn presents a much different quality in that leaves turn to many colors, which eventually fall to the ground letting light penetrate through the trees more freely. The winter is the most dramatic change. Colors are limited and light can easily reflect off the white snow.



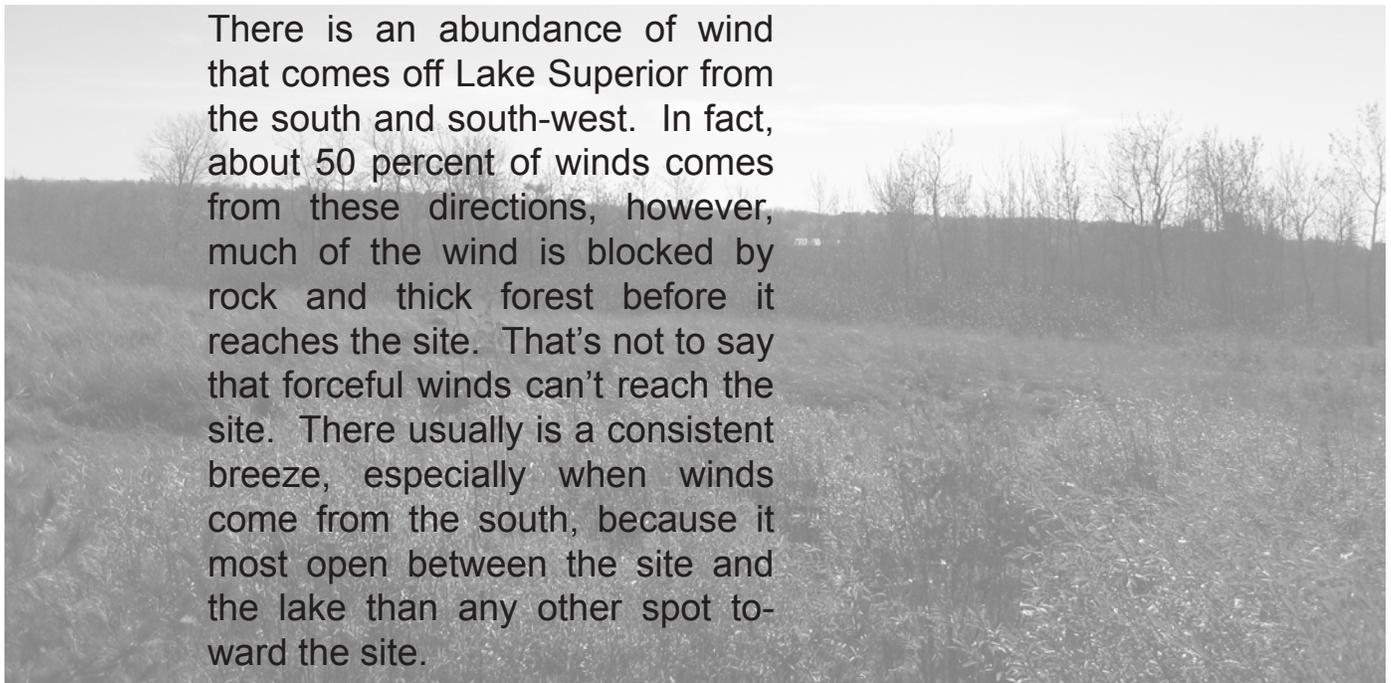
Water

Obviously, as the site is on an island, water is everywhere. The cool blue water of Lake Superior can be viewed and even heard from the site. There is also a two pond on site. One is on the west side and the other is on east side of the site. At eye level the ponds aren't very noticeable because there are tall grasses and aquatic plants surrounding them.



Wind

There is an abundance of wind that comes off Lake Superior from the south and south-west. In fact, about 50 percent of winds comes from these directions, however, much of the wind is blocked by rock and thick forest before it reaches the site. That's not to say that forceful winds can't reach the site. There usually is a consistent breeze, especially when winds come from the south, because it most open between the site and the lake than any other spot toward the site.

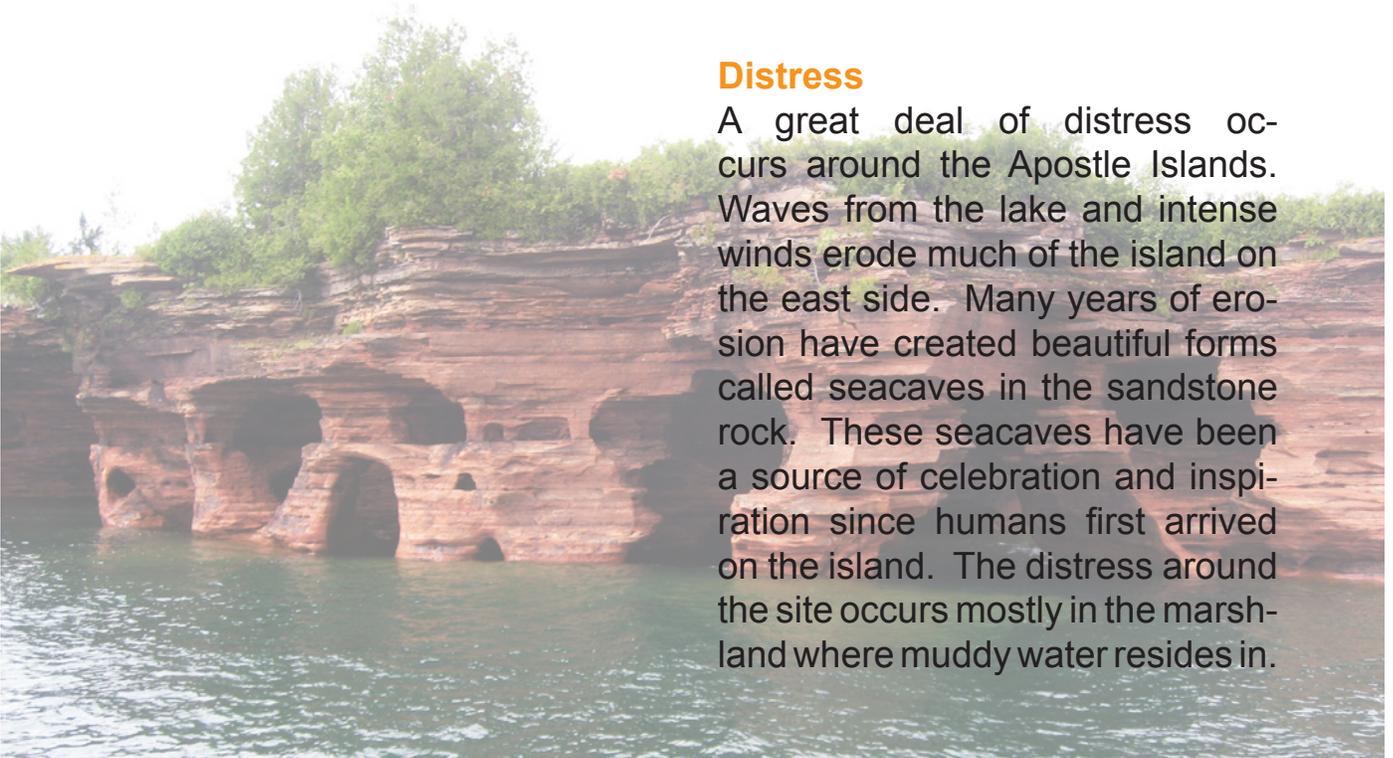


Human Characteristics

Even though Madeline Island has been occupied for over 400 years, it is minimally affected by human activity. Much of the island is heavily forested and preserved by Big Bay State Park, which covers much of the north side of the island. The Town of LaPointe is where one will find the most influences produced by human civilization. At some point in history the trees on site were cut down which fostered tall grasses and brush to grow. A drainage ditch was dug through the site running north and south for draining water

Distress

A great deal of distress occurs around the Apostle Islands. Waves from the lake and intense winds erode much of the island on the east side. Many years of erosion have created beautiful forms called seacaves in the sandstone rock. These seacaves have been a source of celebration and inspiration since humans first arrived on the island. The distress around the site occurs mostly in the marshland where muddy water resides in.



Site Statistics



Traffic

Although the road north of the site (Middle Road) is one of the busiest, there is minimal traffic. During the two hours spent on site, I could count on one hand how many vehicles went by. Just west of the site is a place for tourists to rent mopeds and bikes, thus, the occasional moped or biker scoots by. Pedestrian traffic was most frequent. Many tourists take nature hikes and local residents use the road for exercising.

Soils:

Soil is produced by the action of soil-forming processes on materials deposited or accumulated by geologic forces. Glaciers have advanced and retreated over the site's surface area a number of times between 25,000 and 9,500 years ago and have deposited the minerals we see today. The soil on site is mostly silt or clayey sand and water soil to the south in the marshland. The soil is formed mainly under forest vegetation. However, extensive plant communities, dominated by grass, sedges, or shrubs, are common in areas subject to prolonged wetness in the marsh.

Topography:

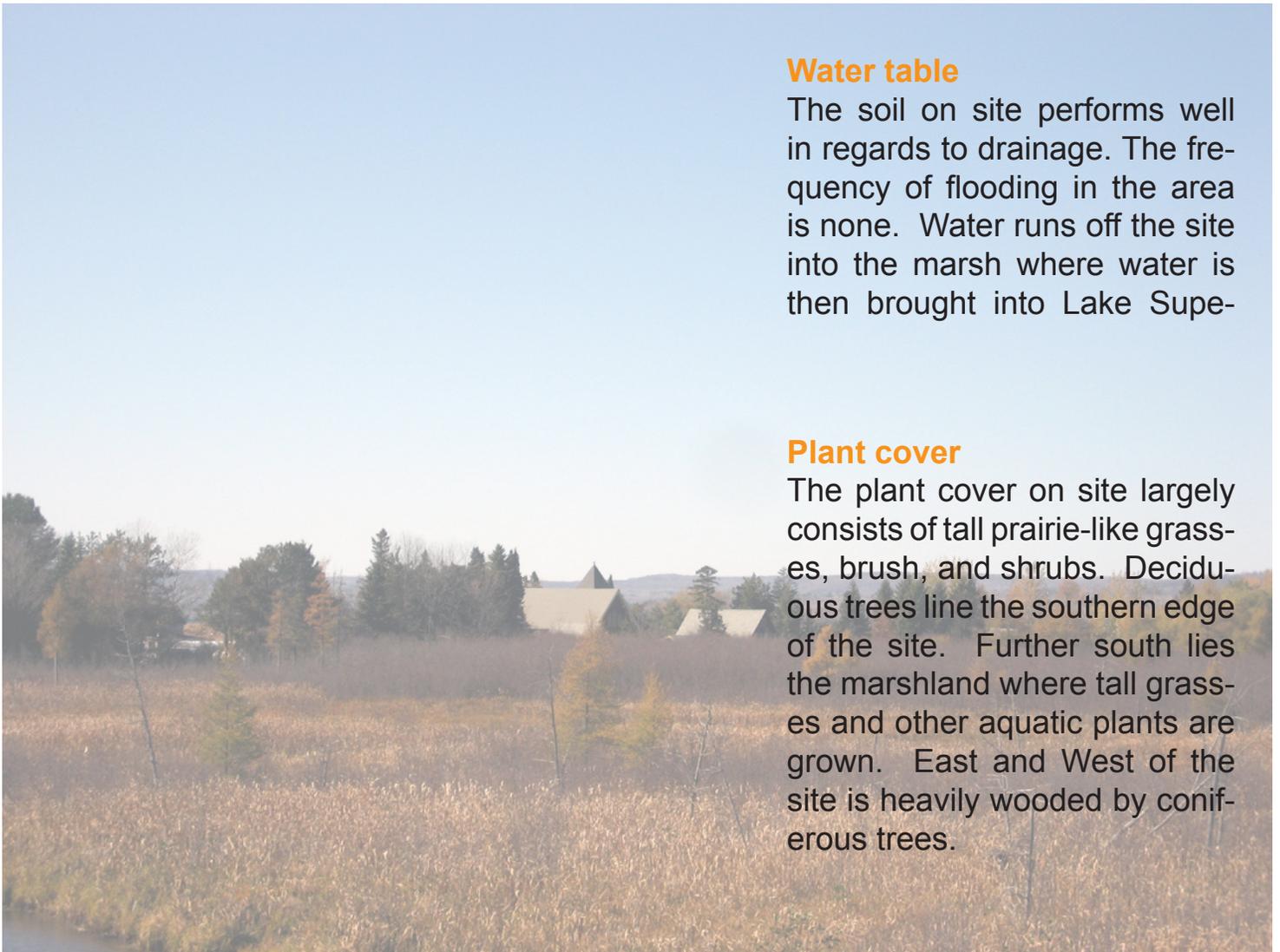
The topography of the site is gradually sloped from north to south at a 2 – 6% slope. The slope on the east and west axis converge in the middle, also at a 2 – 6% slope. These slopes are sufficient for water drainage and work together to drain water into the marsh. The slope is relatively flat for a variety of wildlife and activity.

Water table

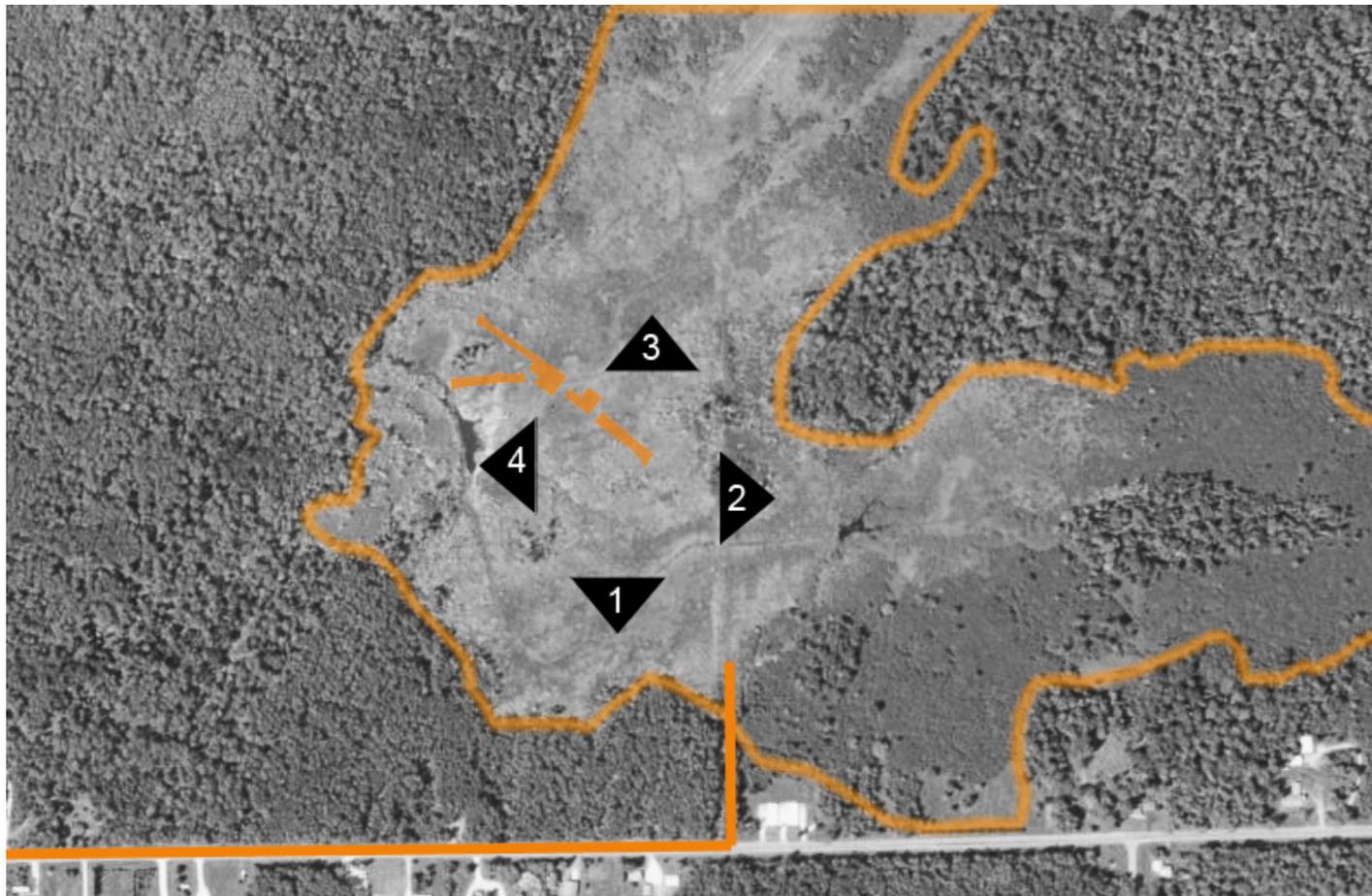
The soil on site performs well in regards to drainage. The frequency of flooding in the area is none. Water runs off the site into the marsh where water is then brought into Lake Supe-

Plant cover

The plant cover on site largely consists of tall prairie-like grasses, brush, and shrubs. Deciduous trees line the southern edge of the site. Further south lies the marshland where tall grasses and other aquatic plants are grown. East and West of the site is heavily wooded by coniferous trees.



Base Map



The base map is used to give the reader a better understanding of the site and its outstanding features. It is also used for the photo-grid diagram in coorespondance to the next page.

1



2



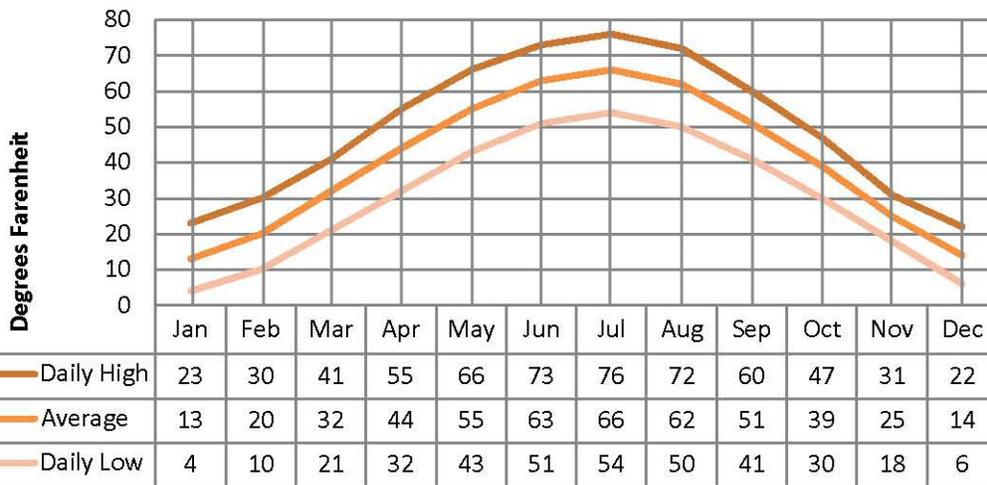
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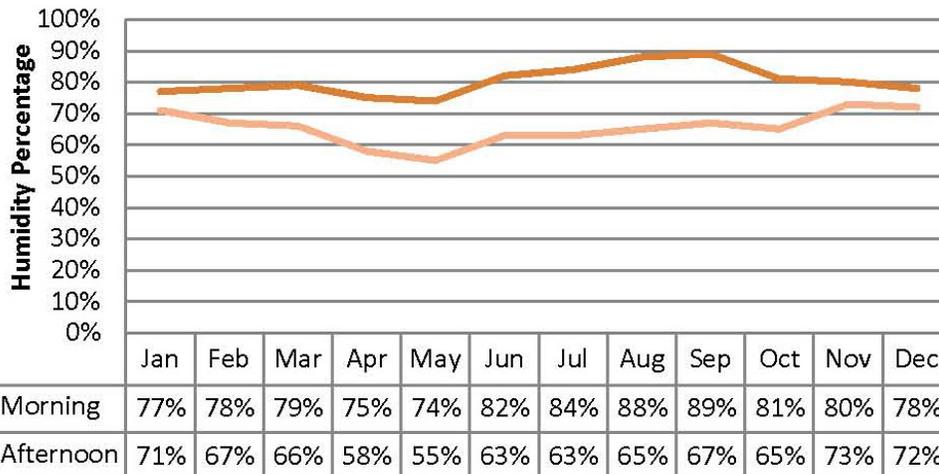
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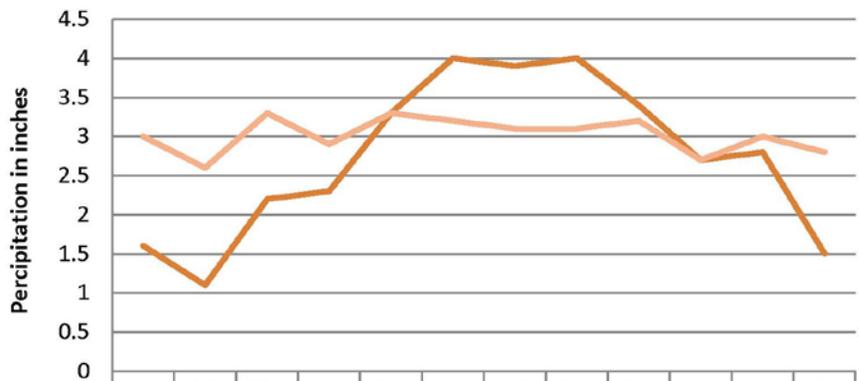
Average Temperatures



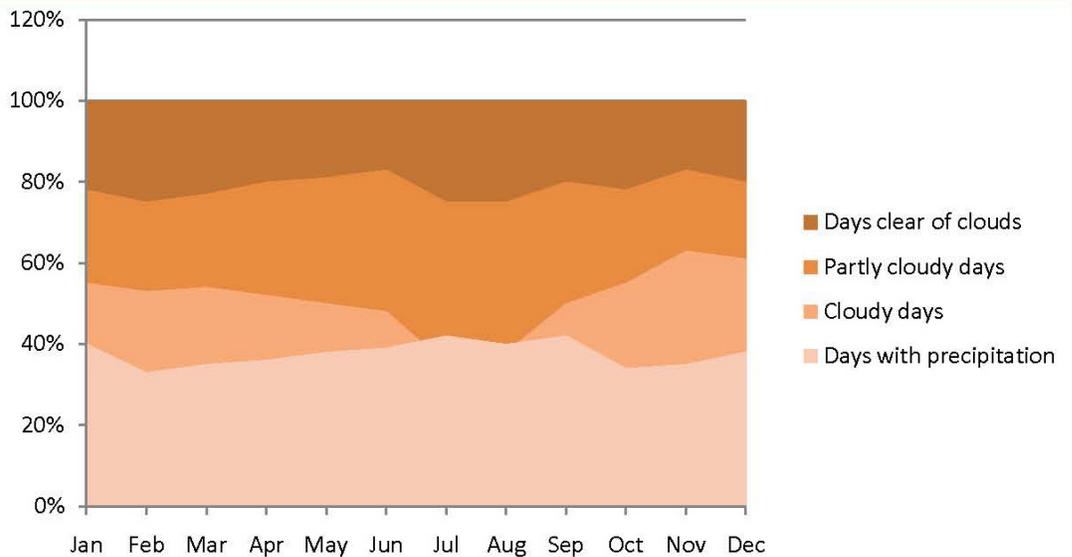
Humidity



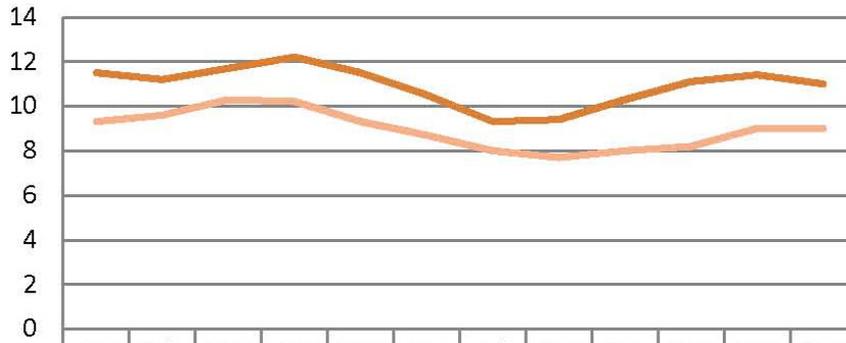
Percipitation



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
La Pointe Average	1.6	1.1	2.2	2.3	3.3	4	3.9	4	3.4	2.7	2.8	1.5
United States Average	3	2.6	3.3	2.9	3.3	3.2	3.1	3.1	3.2	2.7	3	2.8

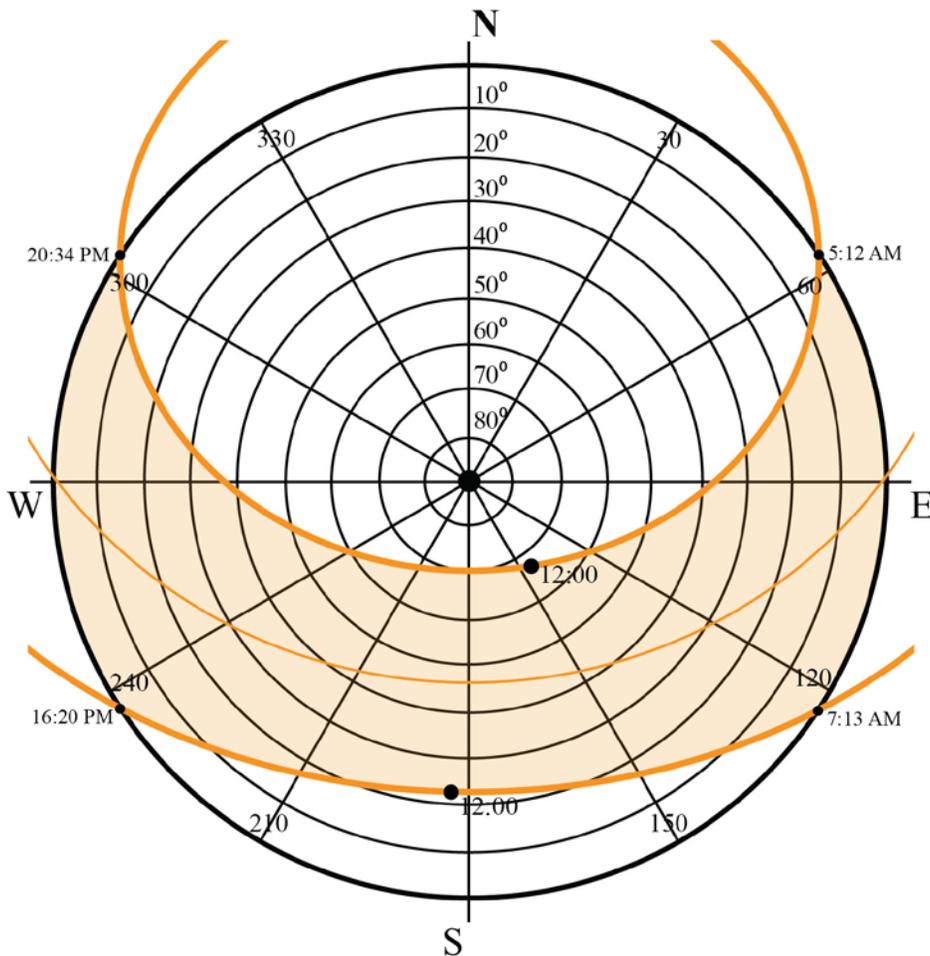


Wind Speed (mph)



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
La Pointe	11.5	11.2	11.7	12.2	11.5	10.5	9.3	9.4	10.3	11.1	11.4	11
U.S. Average	9.3	9.6	10.3	10.2	9.3	8.7	8	7.7	8	8.2	9	9

Sun Path Diagram



Programmatic Requirements

Horse Stable: Overall - 3,800 sq. ft.

- Individual horse stalls - 300 sq. ft. (5)
- Outdoor paddock - 2,600 sq. ft.
- Wash space below, Hayloft above - 800 sq. ft.
- Tack room - 600 sq. ft.
- Wide circulation - 900 sq. ft.

Storage/Work Barn: Overall - 4,700 sq. ft.

- Public Bathrooms - 150 sq. ft. (2)
- Large shop/tractor and chickmobile storage - 2,000 sq. ft.
- Shop extension/broilermobile storage in winter - 2,400 sq. ft.

Hay Barn: Overall - 5,000 sq. ft.

- Hay storage - 1,200 sq. ft.
- Winter cow shelter - 3,500 sq. ft.
- Calves stall - 200 sq. ft.
- Bull stall - 100 sq. ft.

Milking Parlor: Overall - 1,000 sq. ft.

- Waiting space - 500 sq. ft.
- Step-up platform - 400 sq. ft.
- Ramp - 100 sq. ft.

Summer Shelter: Overall - 2,800 sq. ft.

Pig Shelter: Overall - 2,000 sq. ft.

- Storage - 200 sq. ft.
- Sows and their piglets individual stalls - 100 sq. ft. (5)
- Large free stall - 1000 sq. ft.
- Circulation - 300 sq. ft.
- Outdoor paddock - 1,600 sq. ft.

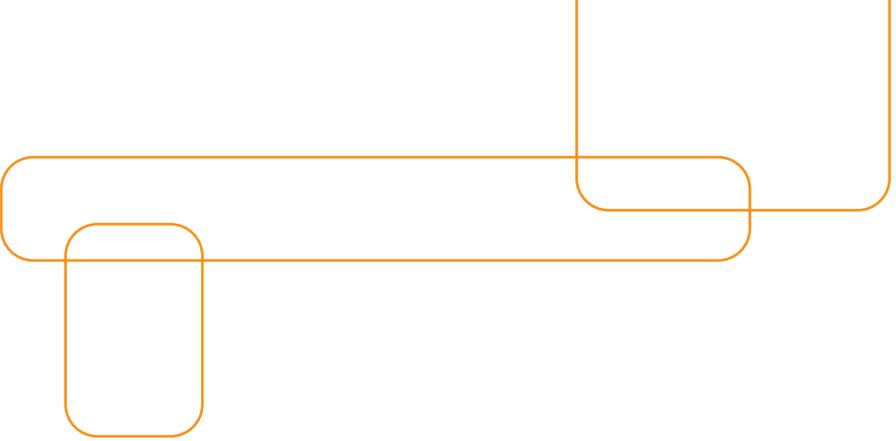
Hen/Rabbit Shelter: Overall - 2,000 sq. ft.

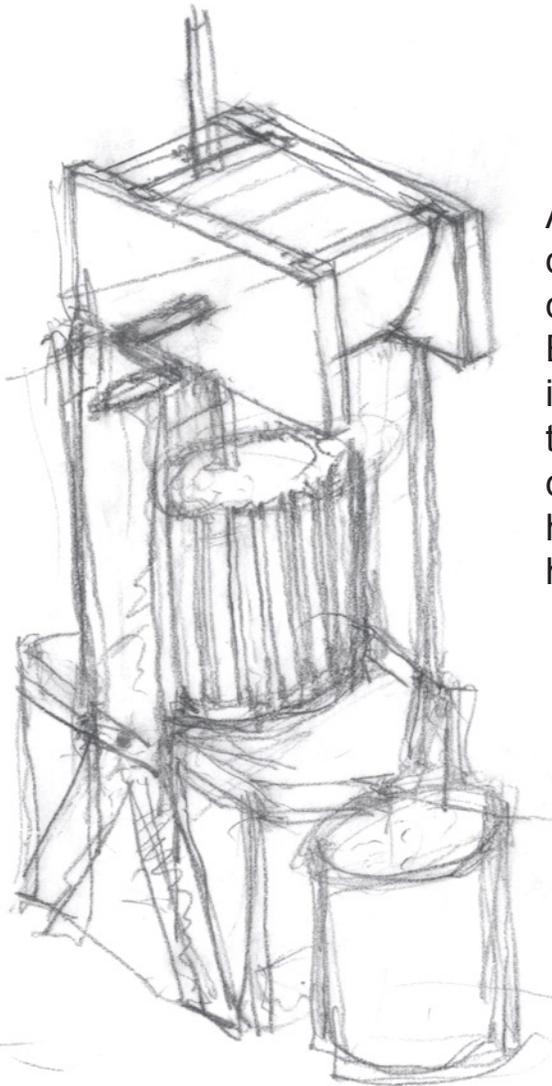
- Broiler hens at floor level and rabbit cages above - 850 sq. ft.
- Broiler hens at floor level and laying hens above - 850 sq. ft.
- Circulation - 300 sq. ft.
- Outdoor paddock - 1,600 sq. ft.

Silo/Water Tower/Viewing Deck: Overall public usable space - 500 sq. ft.

Outdoor Court: Overall - 2,500 sq. ft.

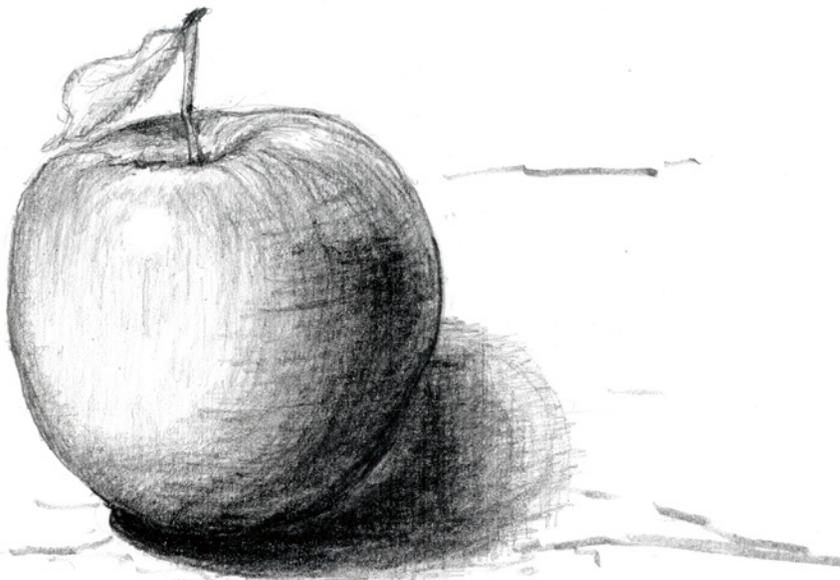
Design Process

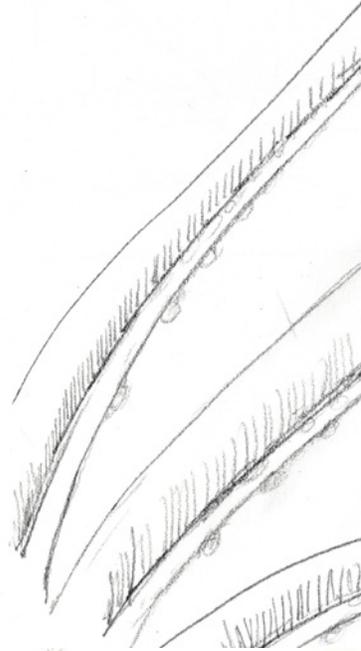
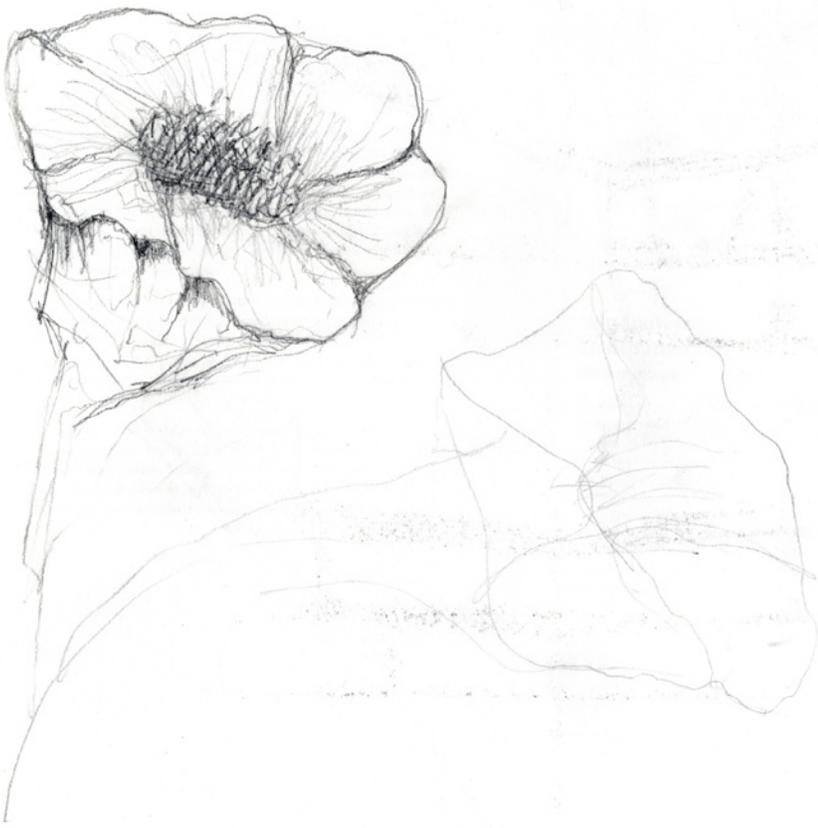




An apple study was done for beginning design inspiration. Even though the ideas didn't fall through in the final design, the studies helped me to get my hand going.

APPLE GRINDER



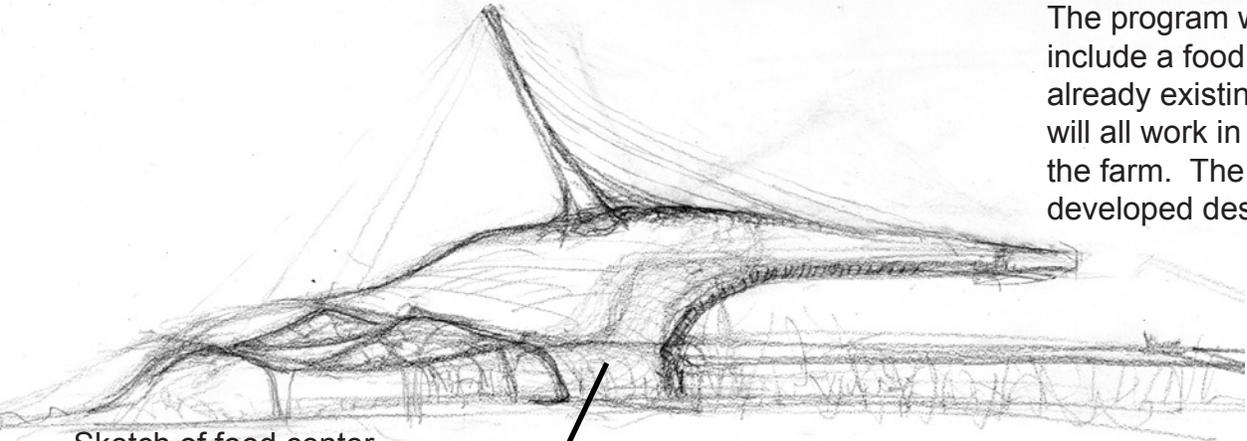


Sketches of flowers inspired me to think of the farm design as an organism that responds to the changes of seasons.

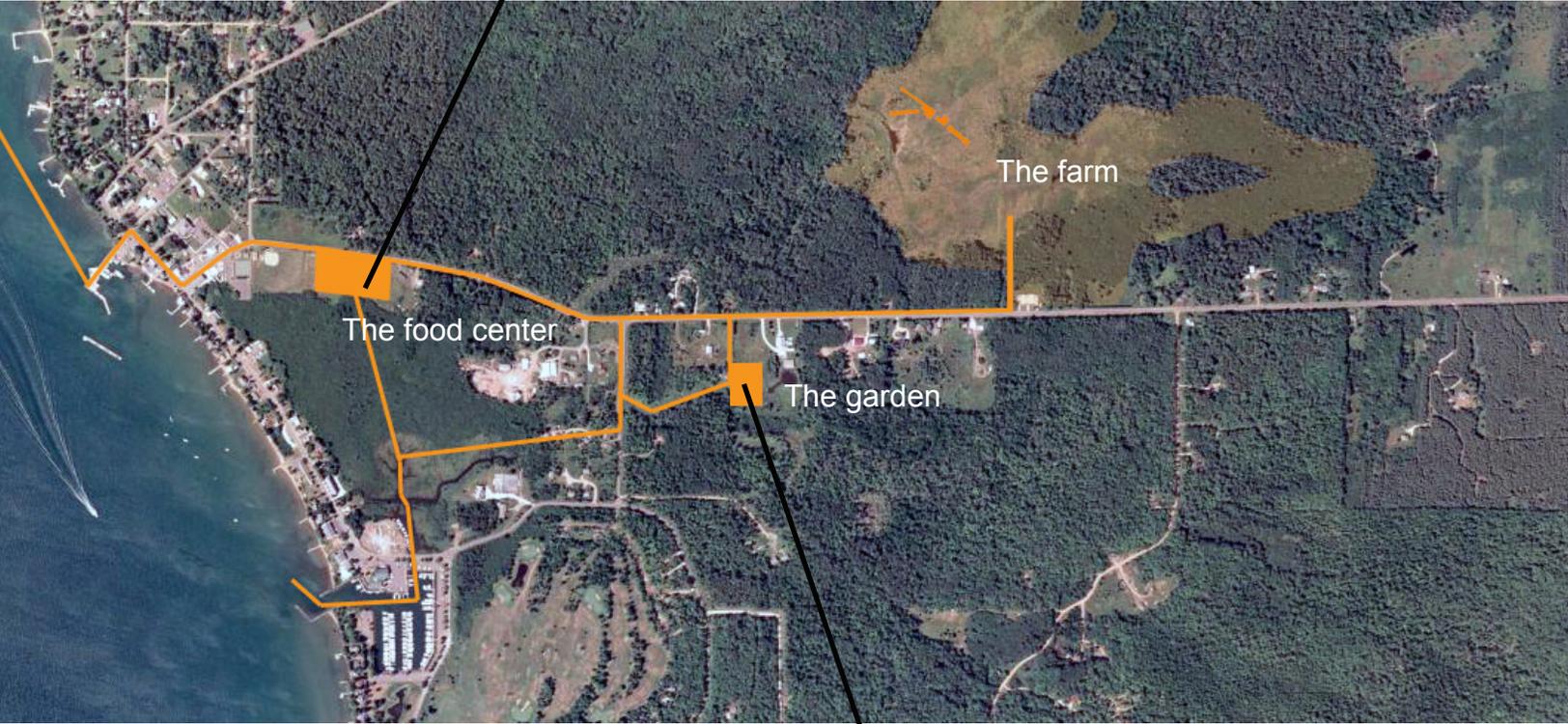


Drawing of seacaves on the Apostle Islands.

The program was extended to include a food center and a an already existing garden which will all work in conjunction with the farm. The farm is the only developed design.



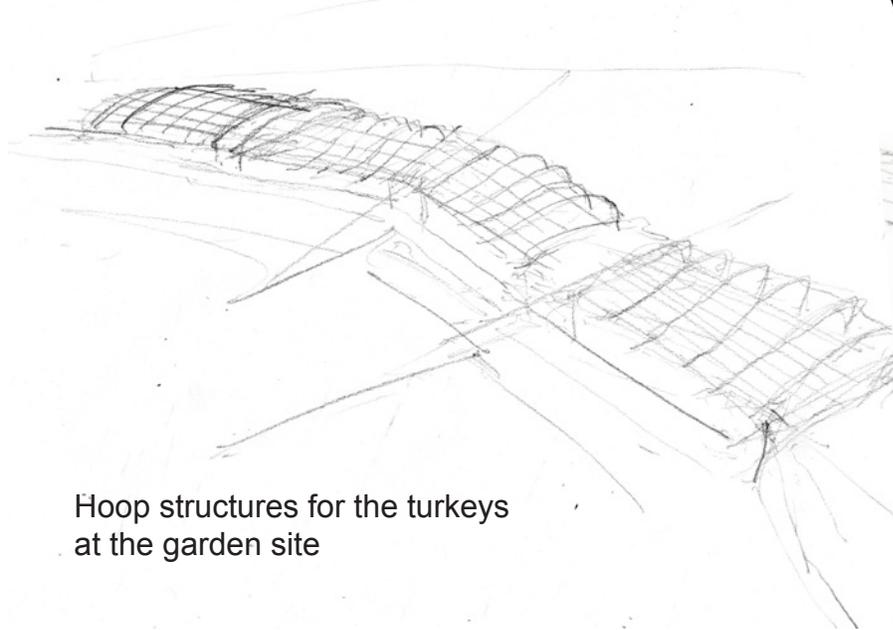
Sketch of food center



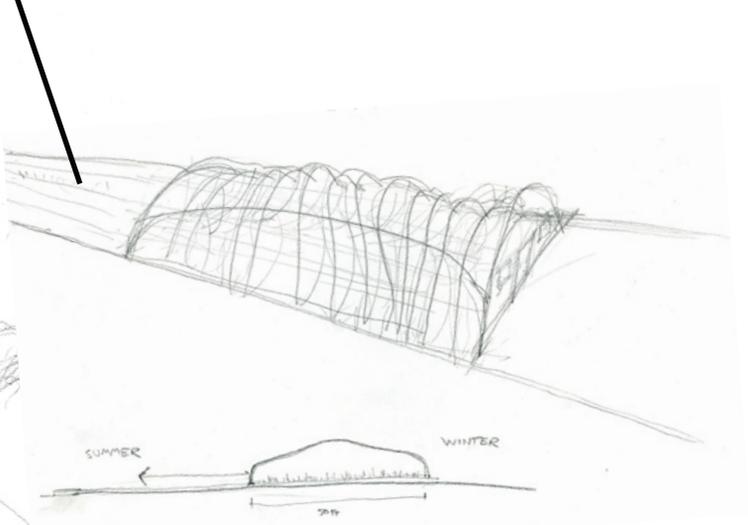
The food center

The farm

The garden



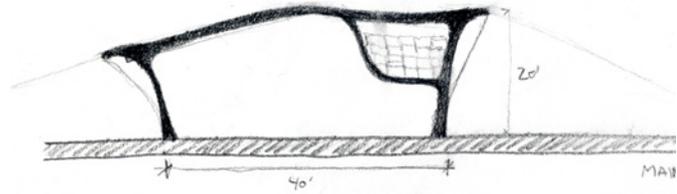
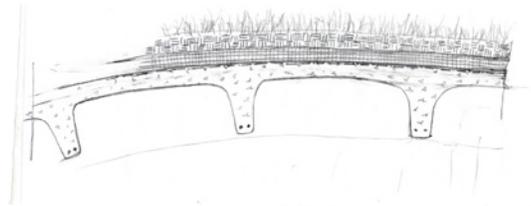
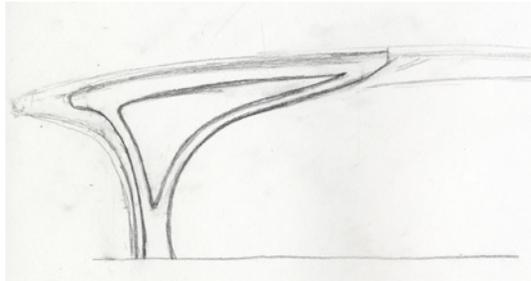
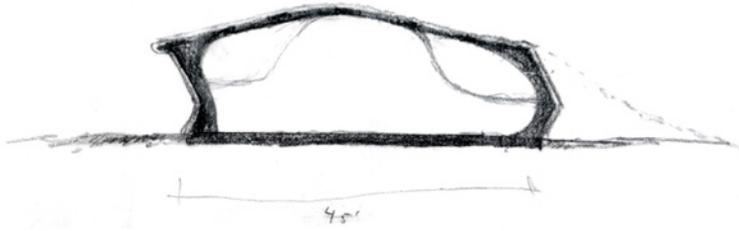
Hoop structures for the turkeys at the garden site



Portable greenhouse for the plants

Sketch of the road going to the farm





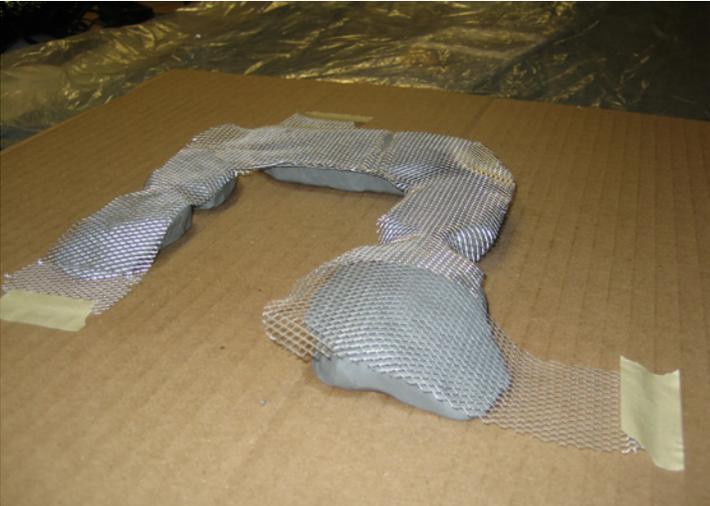
SECTION

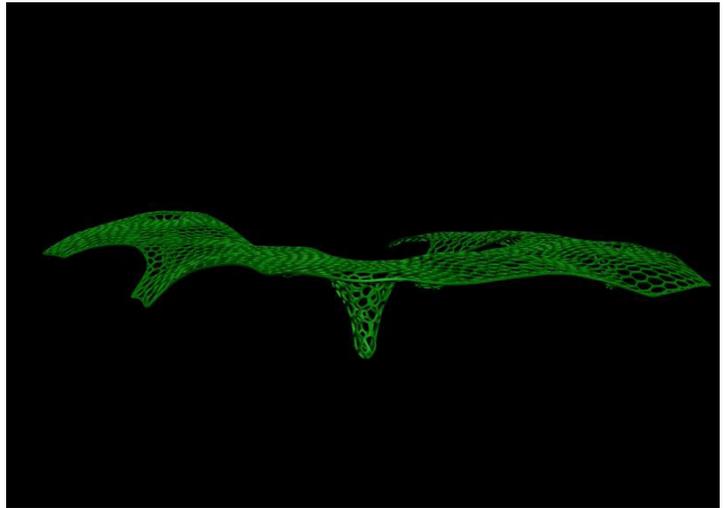
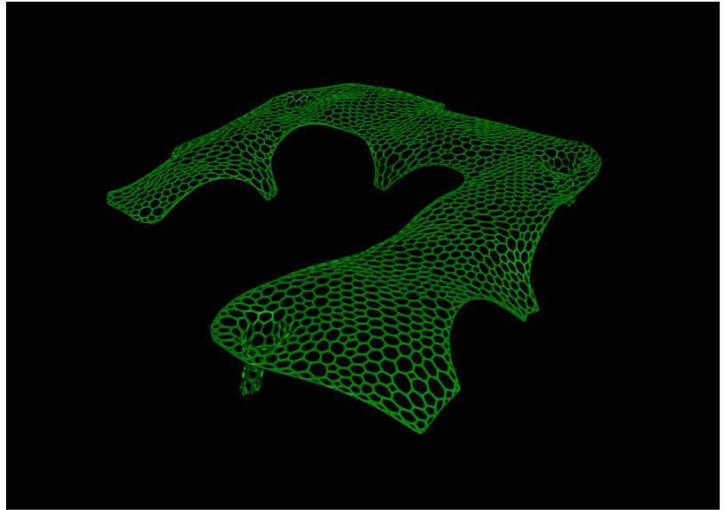


ELEVATION

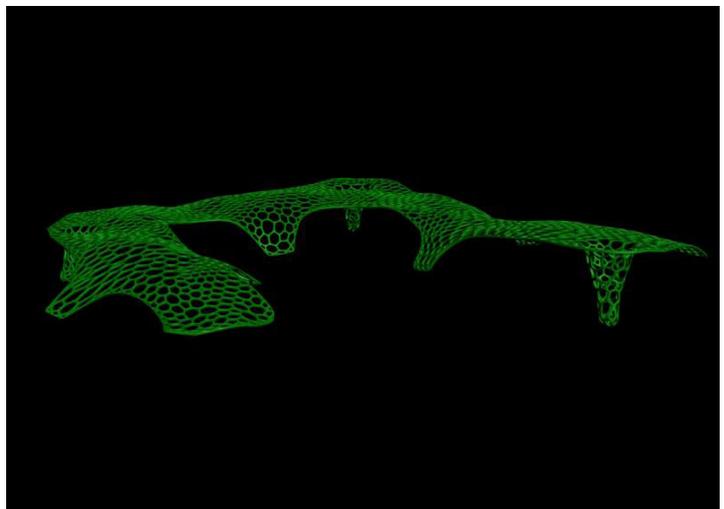








The superstructure developed into a cellular lattice form that dropped down in certain areas touching the ground for stability. This idea was quickly tossed because it seemed to be more of an urban expression.



3ds max model

What kind of farm is this?

More Research



Michael Pollan: The Botany of Desire, The Omnivore's Dilemma



Joel Salatin: Polyface Farms



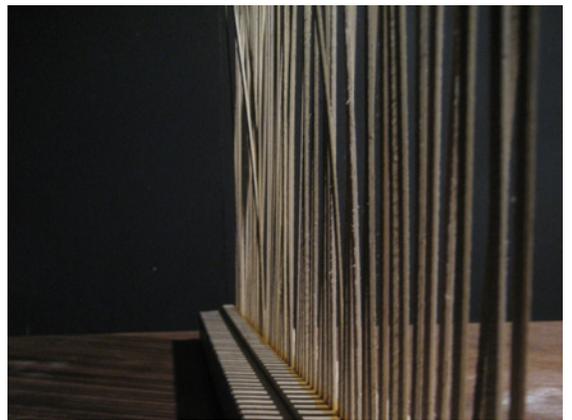
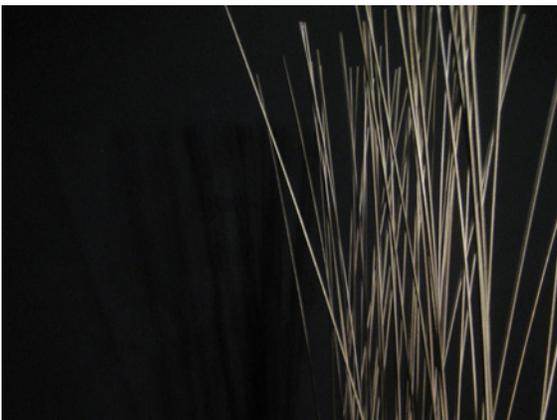
Reading Omnivore's Dilemma lead me to a farm in Virginia called Polyface Farms. The extensive research into this farm helped me to find the true identity of my farm design.



It's a **grass** farm!

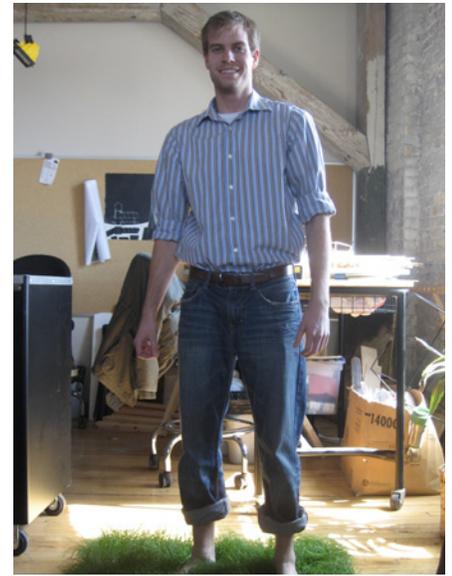
Grass inspired studies

Parti

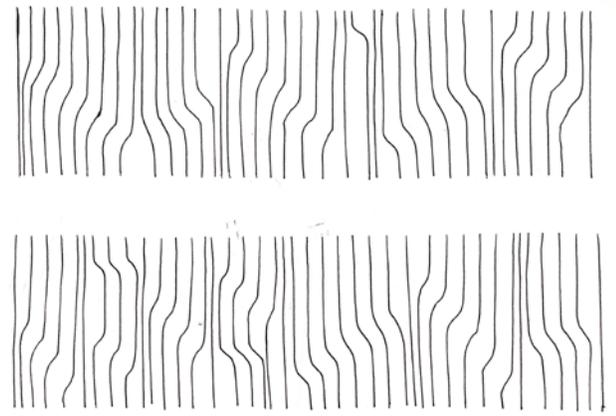
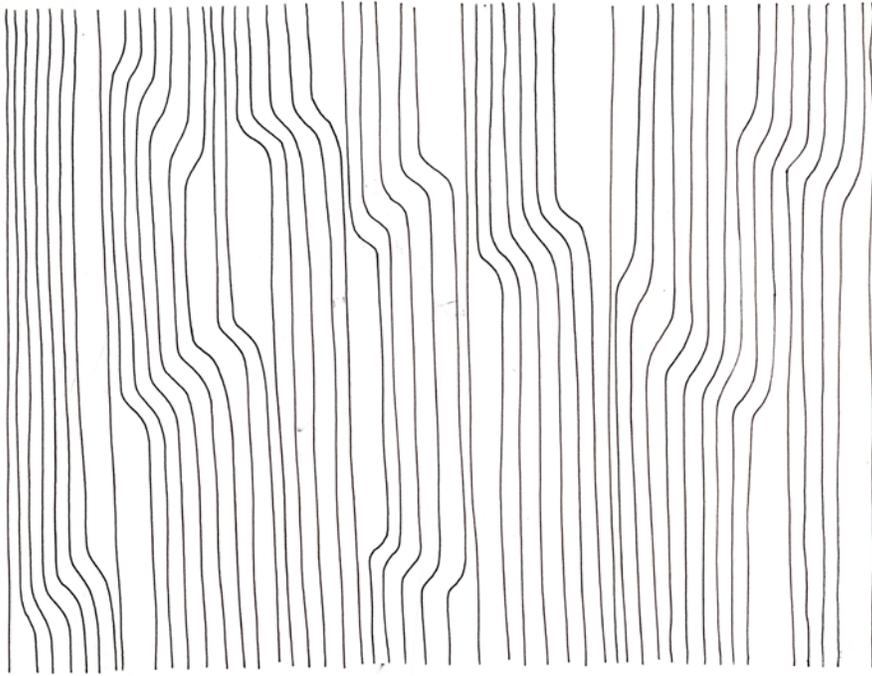


GROWING GRASS

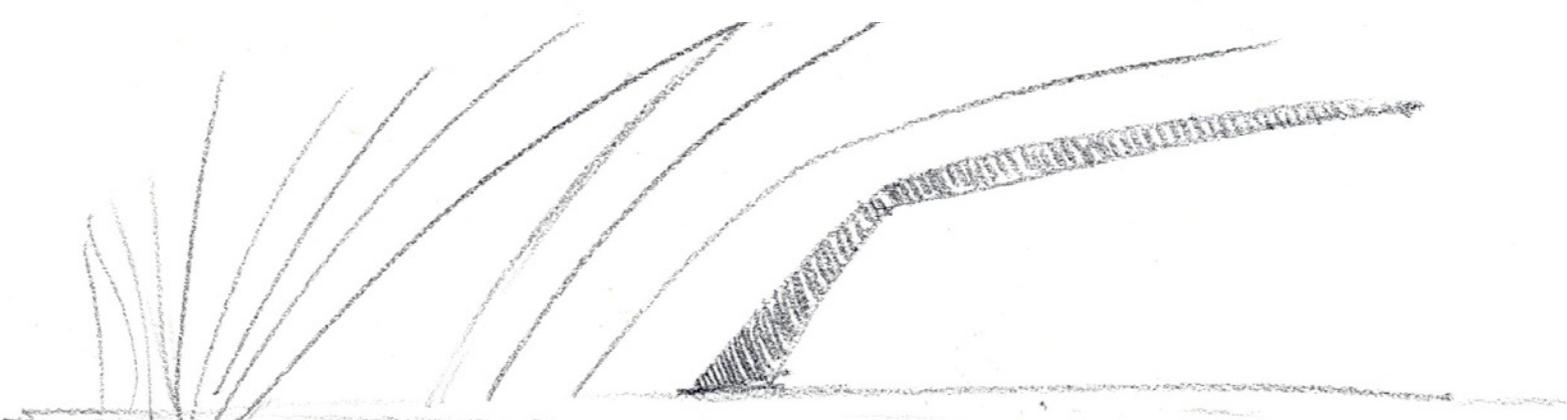


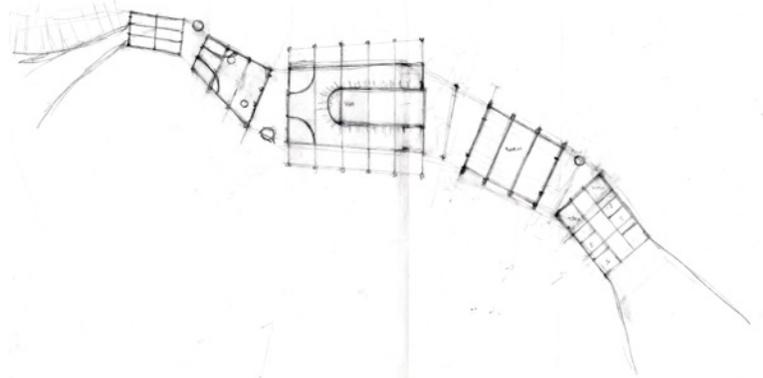
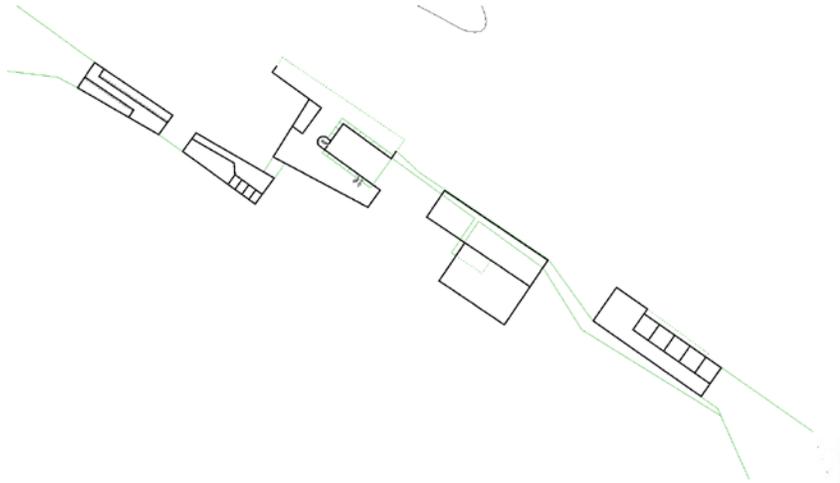
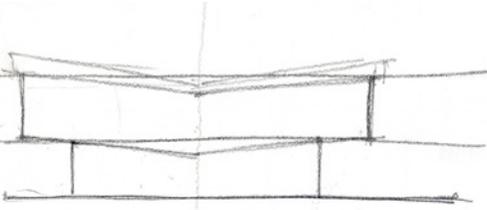
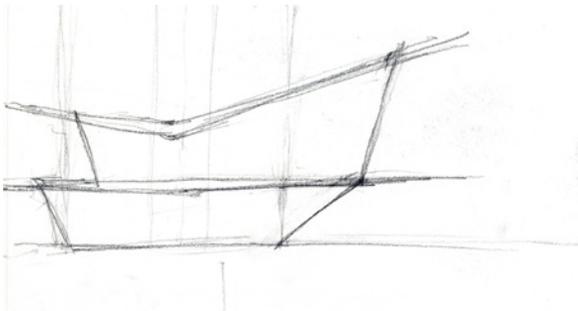
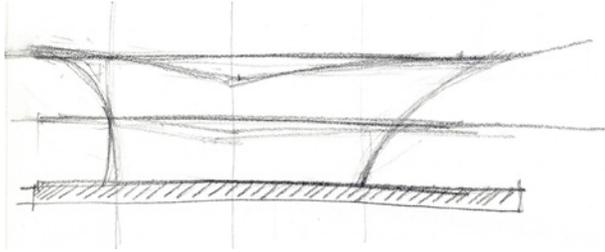
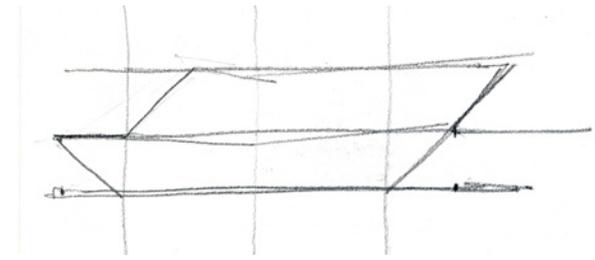


Grass inspired drawings from studies

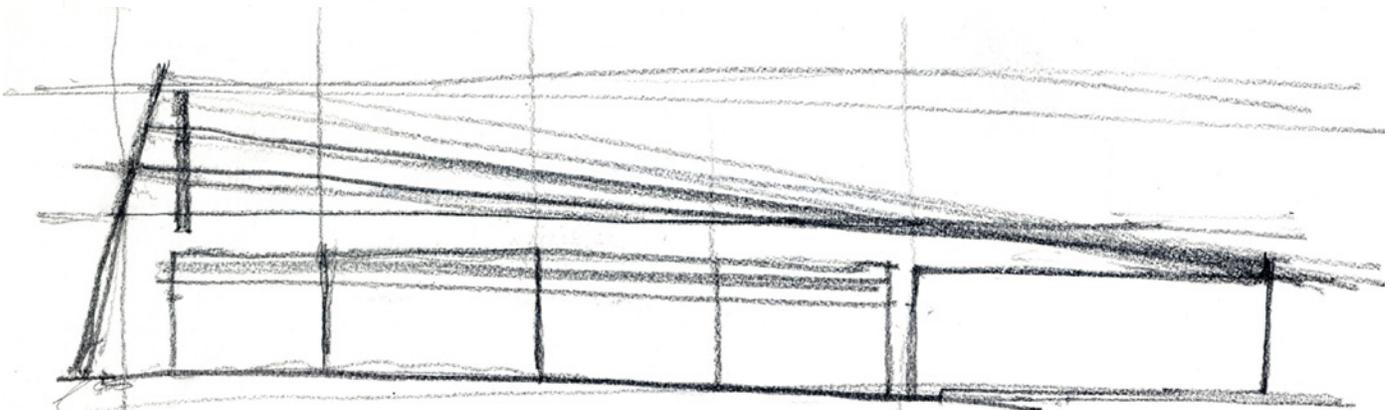


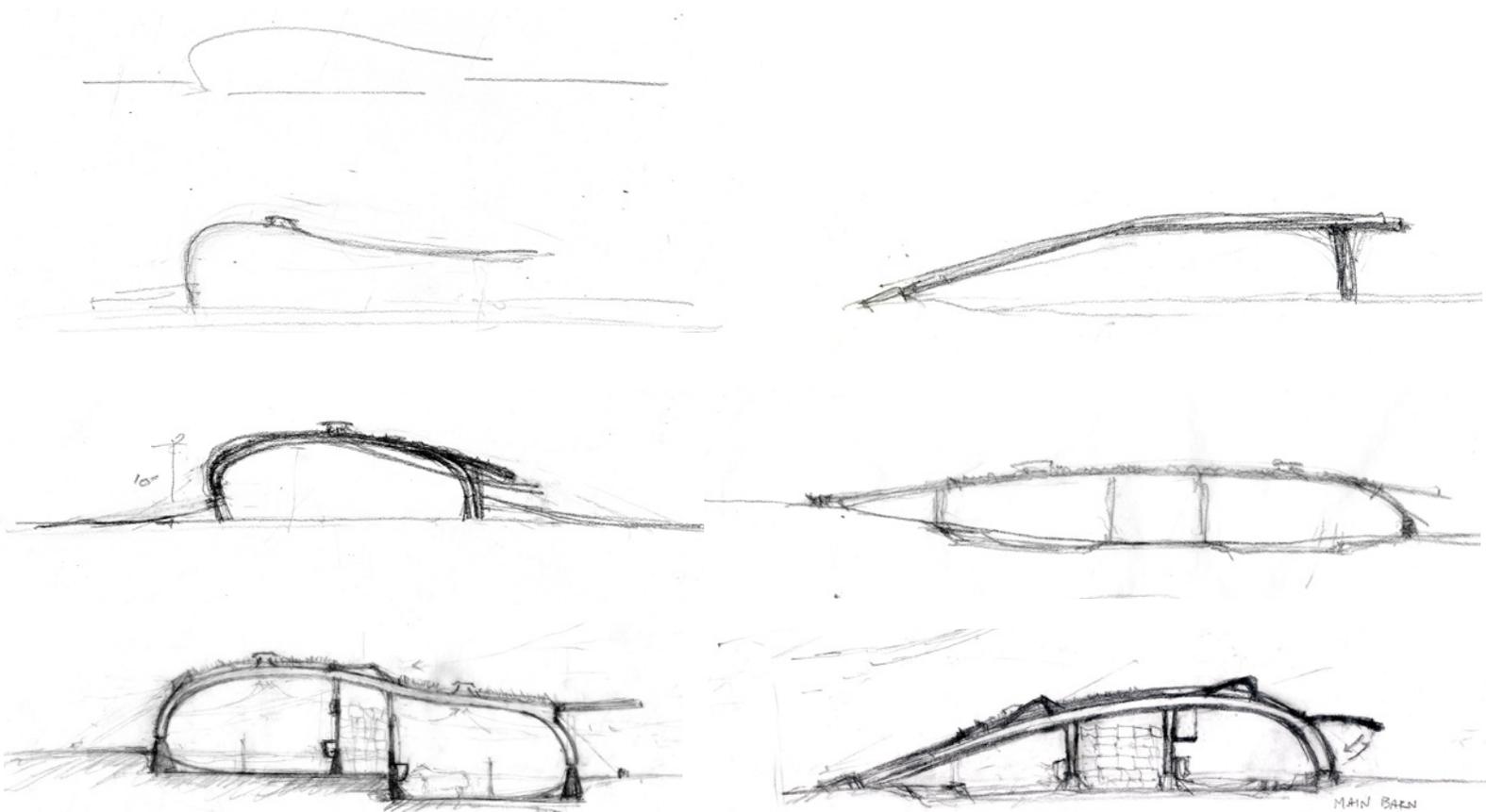
One blade of grass amongst millions blowing in the wind provides the illusion of waves rolling on the landscape.





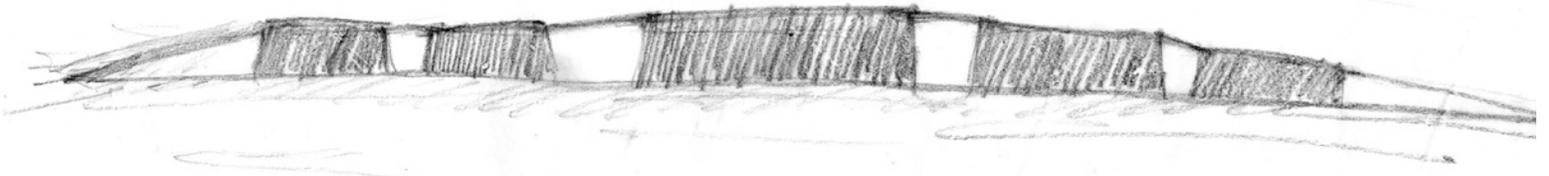
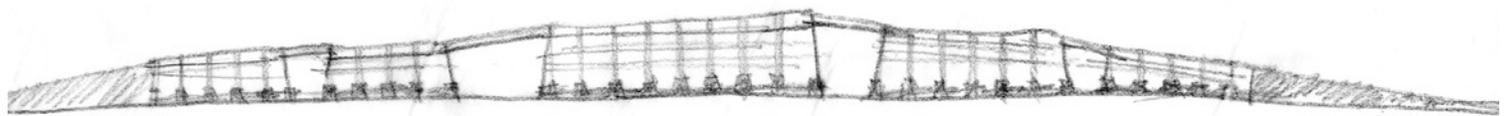
The design pushed forward thinking more in terms of wind driven forms, locavore architecture, regenerative farming methods, and animal comfort

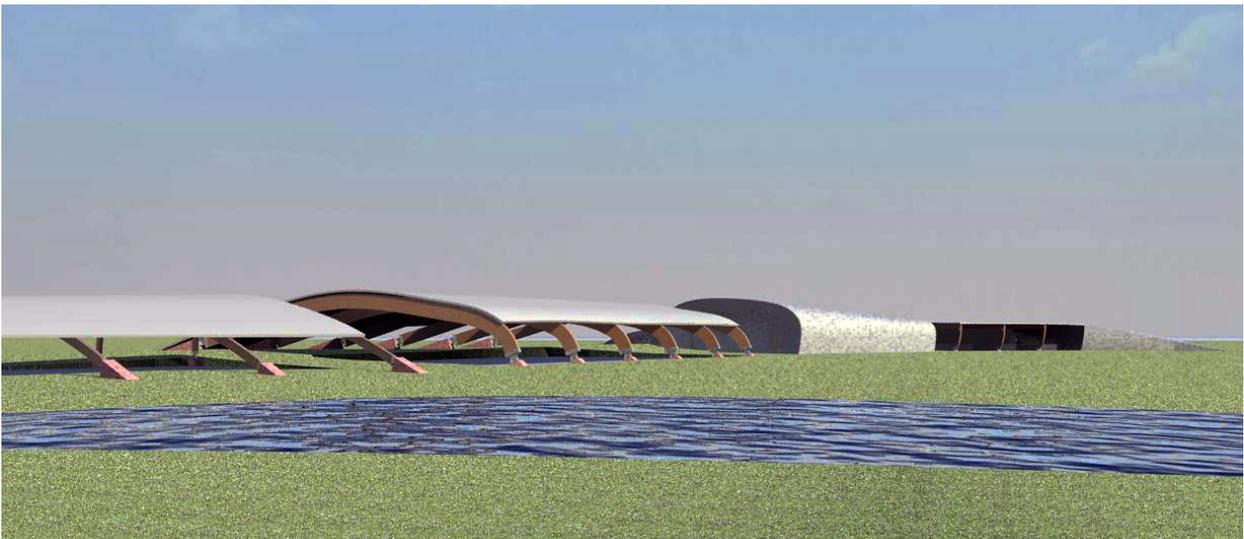
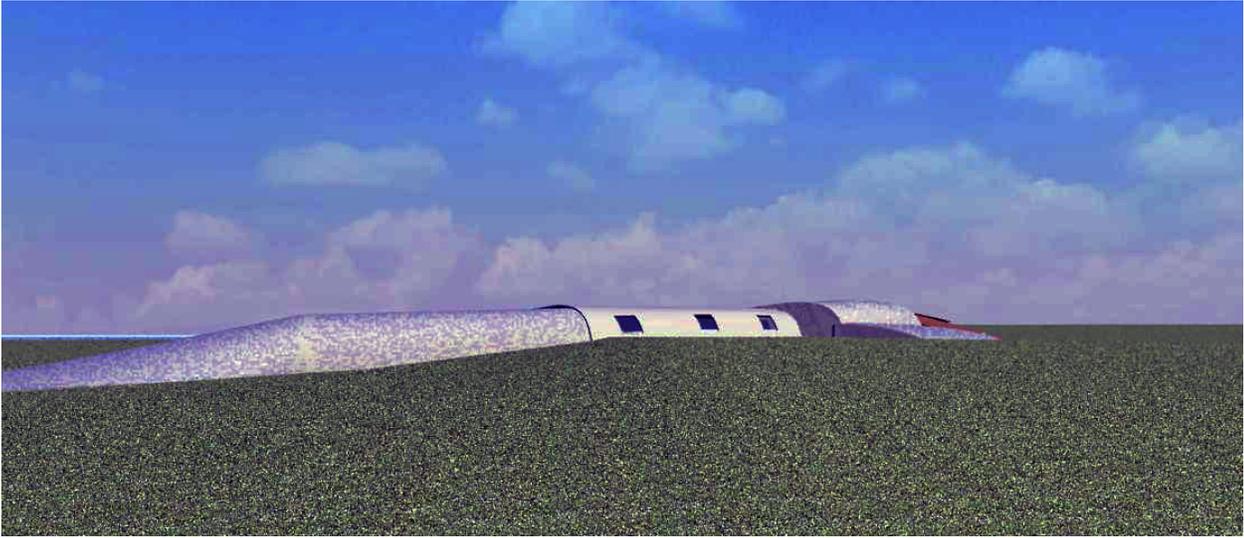




MAIN BARN

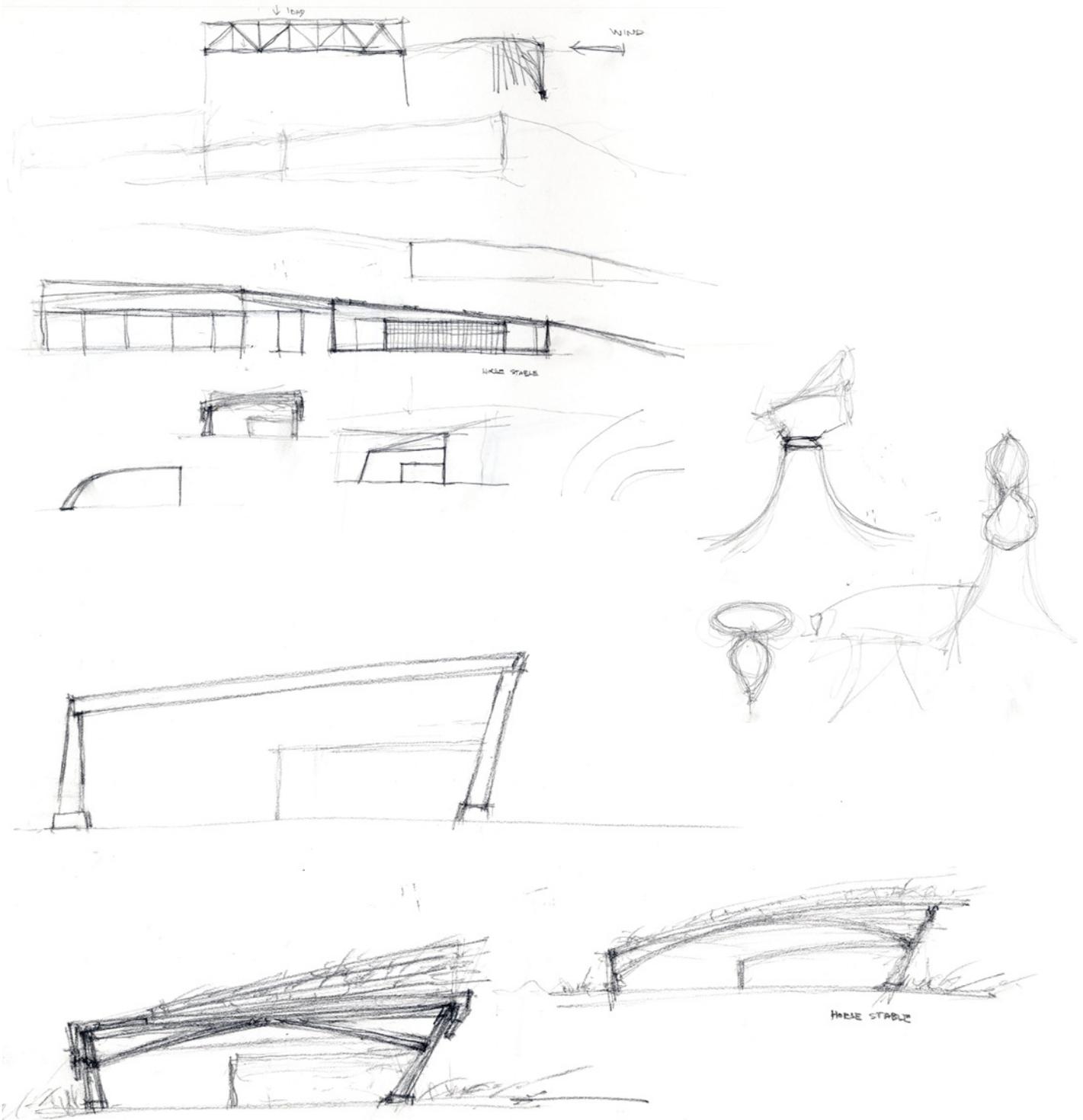
Hay barn sketches





Midterm point

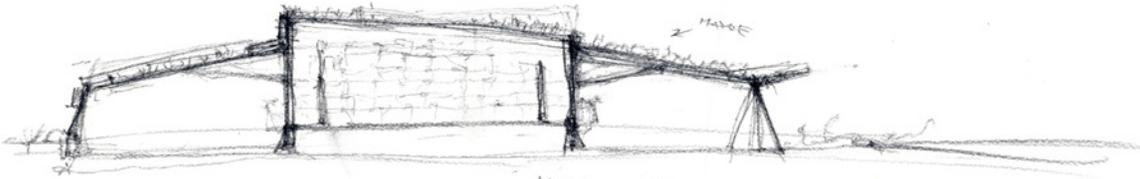
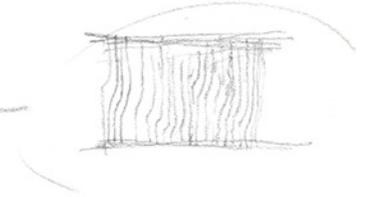
Finalizing the design



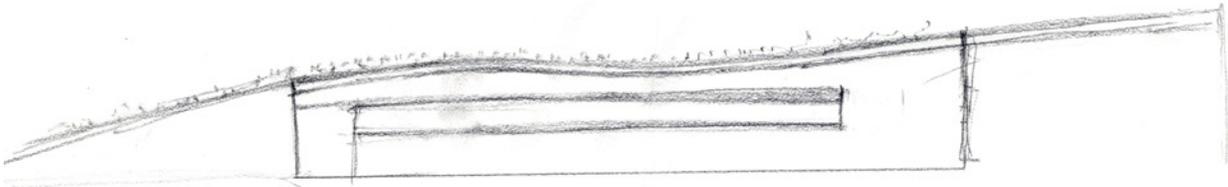
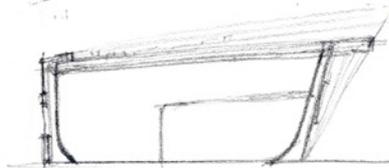
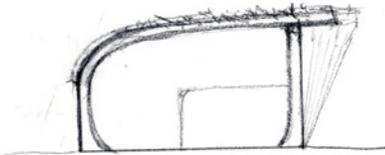
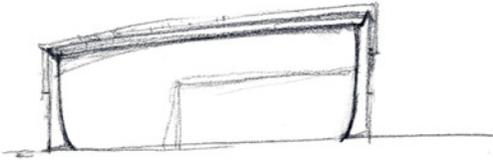
WOOD MOVEMENT!



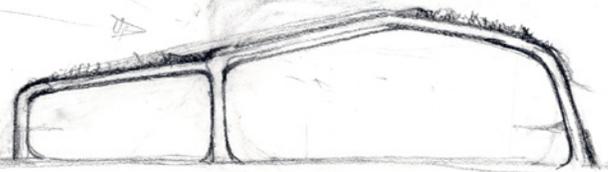
MAIN BARN



HAY BARN / COW BARN

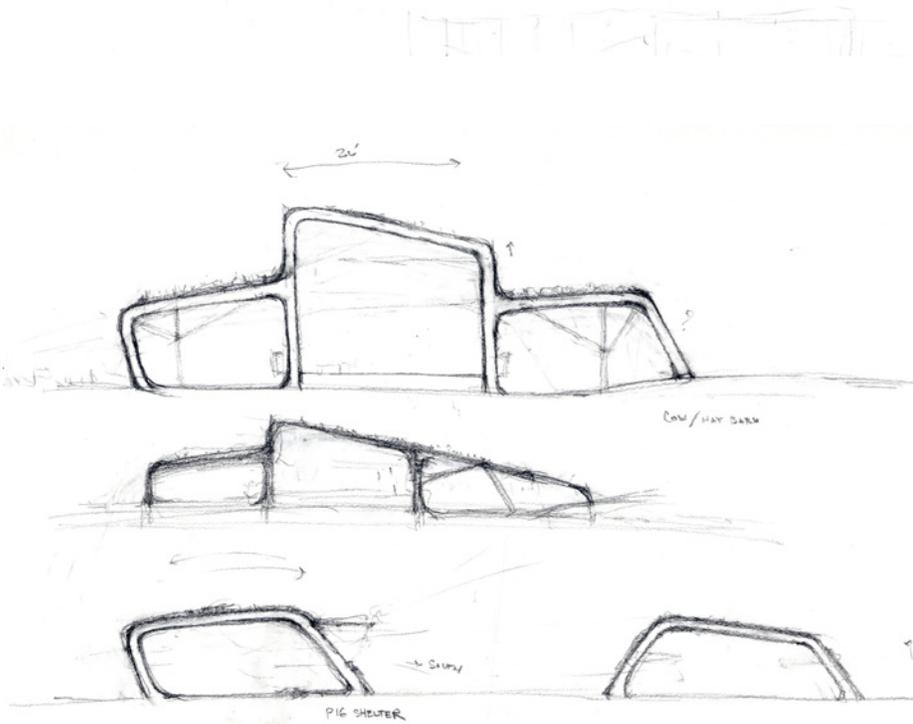
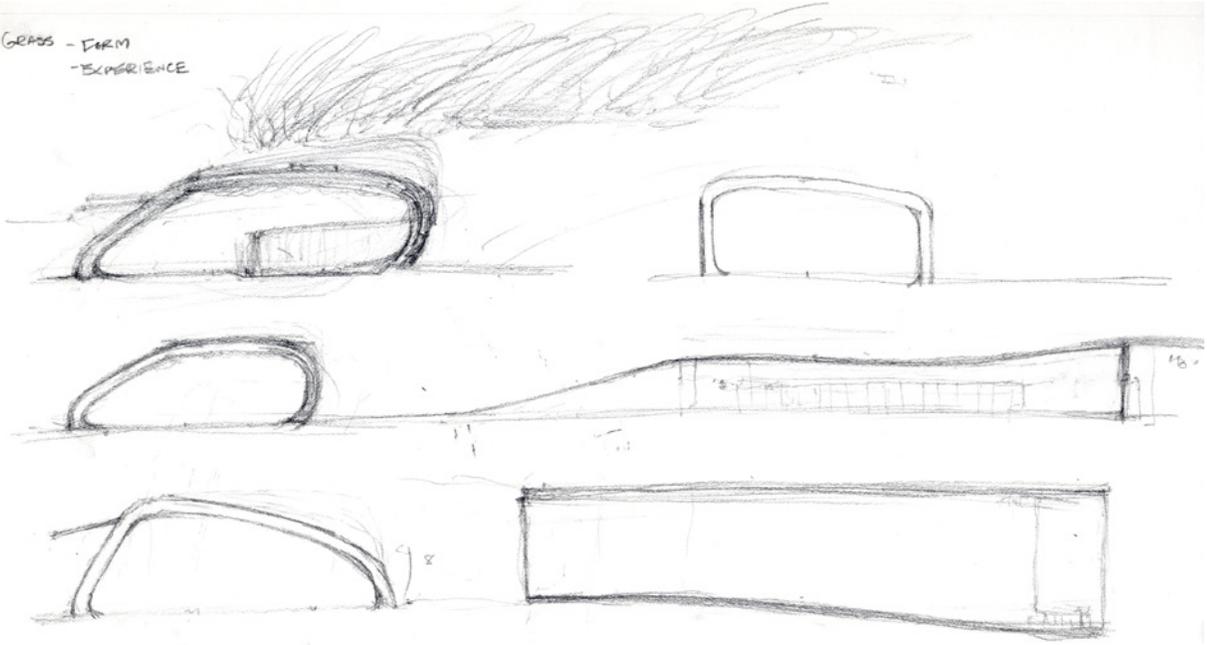


HORSE STABLE

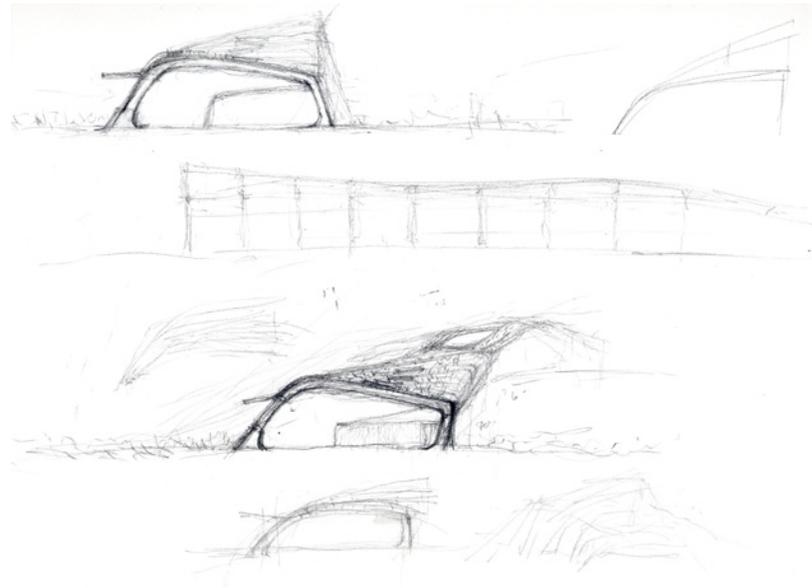
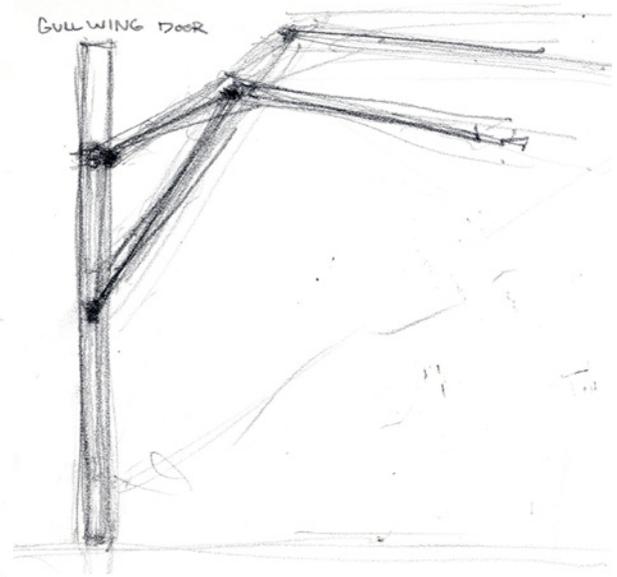


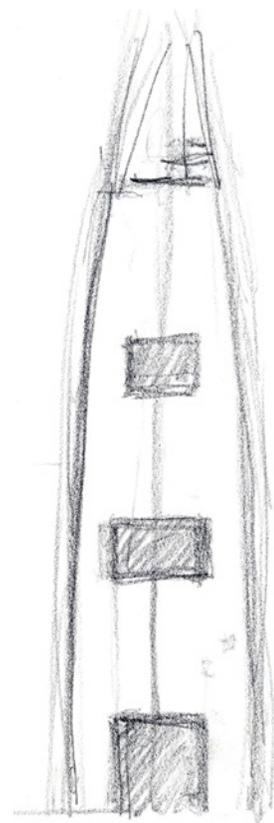
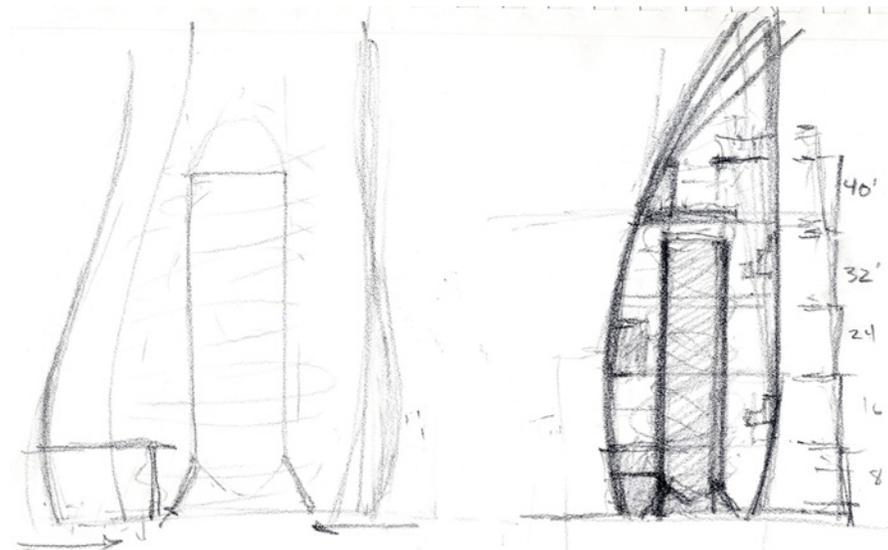
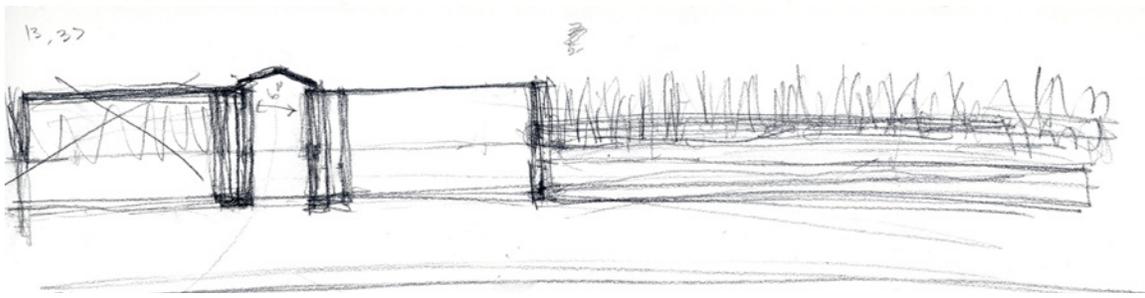
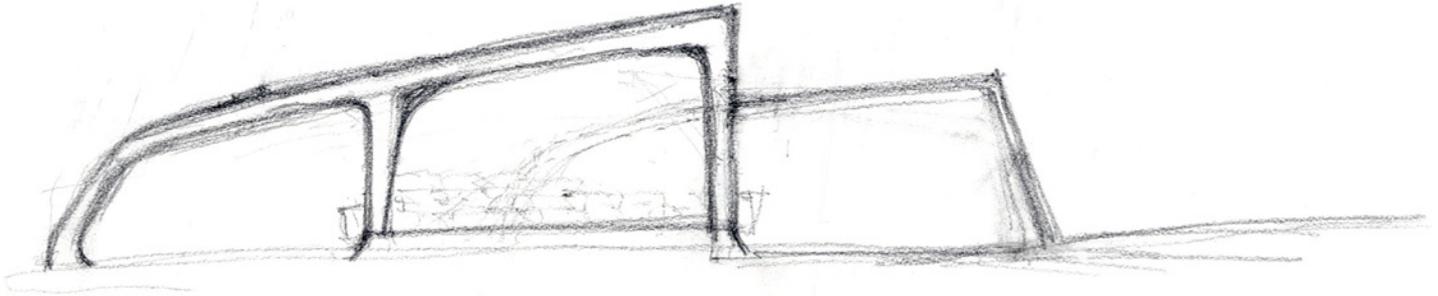
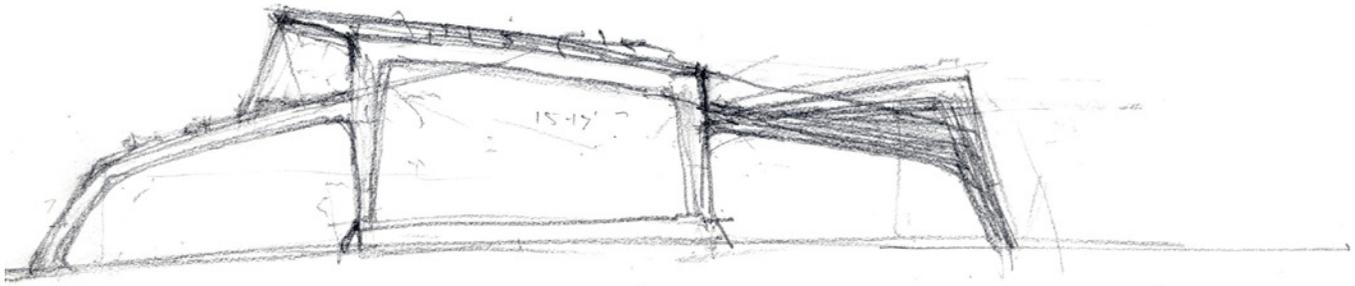
MAIN BARN

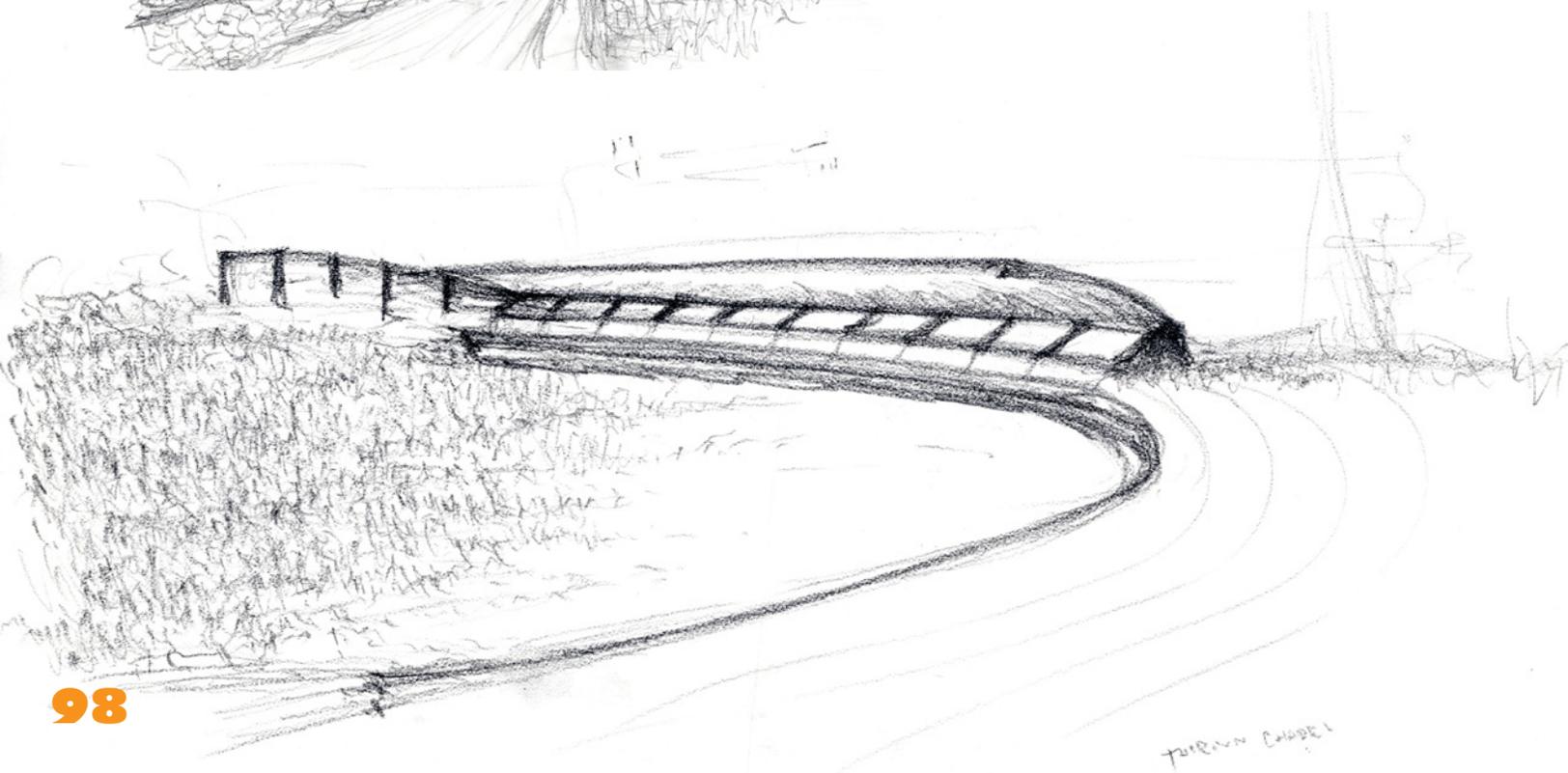
GRASS - FORM
- EXPERIENCE



GULLWING DOOR

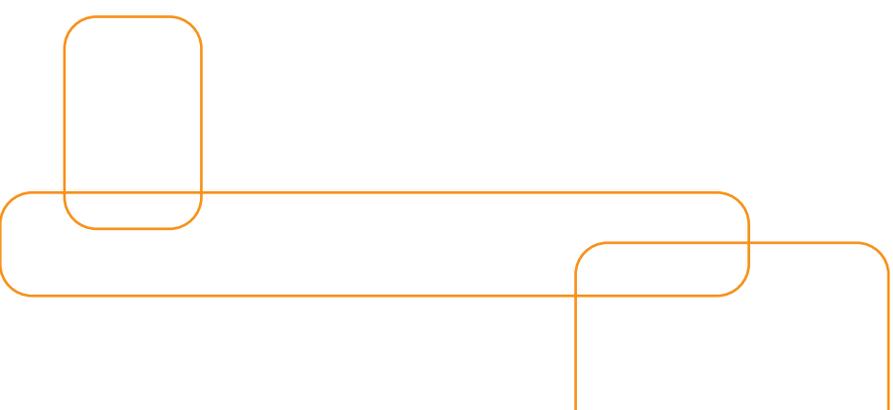








Project Solution



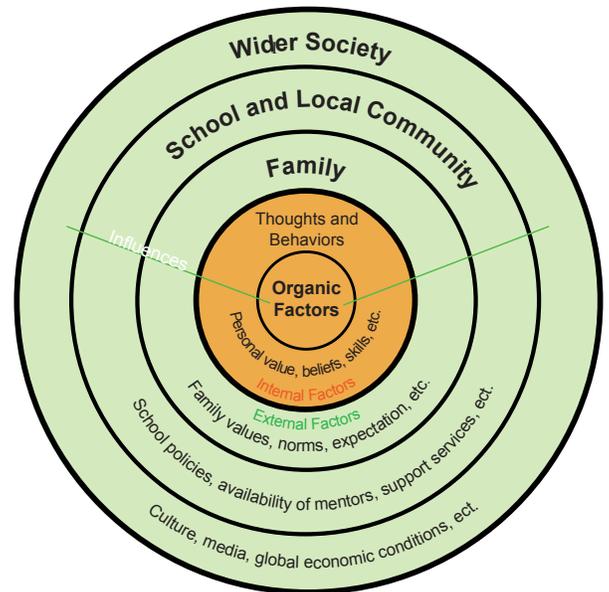
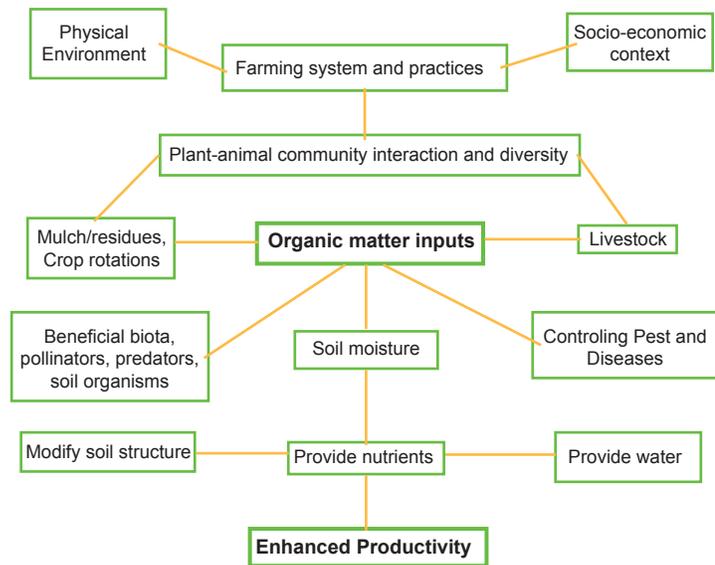
How does the farm work?

The premise of this farm is to enhance biodiversity, fertility, and growth in plants and animals by understanding the intricate symbiotic system nature has to offer. The important principle is that every organism is contributing to some sort of ecosystem service. This natural model heals the land, thickens the forage, reduces weeds, stimulates microorganisms, reduces pathogens, and increases nutritional qualities in plants and animals. The mission is to create an ecologically, economically, and emotionally enhance agricultural prototype and facilitate it around the world.



The grass takes care of the animals and the animals take care of the grass

Industrial Farming	Eco-friendly Farming
Industrial	Pastoral
Annual species	Perennial species
Monoculture	Polyculture
Fossil energy	Solar energy
Global market	Local market
Specialized	Diversified
Mechanical	Biological
Imported fertility	Local fertility



The goal is to capture as much solar energy and grow as much grass as possible. There is an all out effort to take the nutrients produced by the animals and put it back to feed the soil that would then more effectively capture solar energy and produce biomass in the form of grass.

Symbiotic Relationships



The farmer moves the cows in a different quarter acre paddock every day by electric fencing. The idea is to mimic the moving, mobbing, and mowing of herbivorous herds in nature (for example, the American buffalo or the wildebeest on the Serengeti). When the herd is fenced in a small area the cows will instinctively graze on all species of grass. This is important because cows are selective grazers when left to an open pasture. This gives the chance for the lower successional plants to grow and get stronger leaving the pasture to debilitate to unpalatable species instead of succeeding and healing to better species. Creating an equal opportunity for plants is significant for a well-rounded diverse micro-ecosystem.



Examples

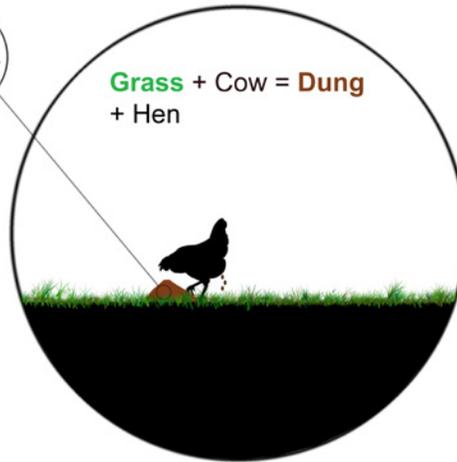
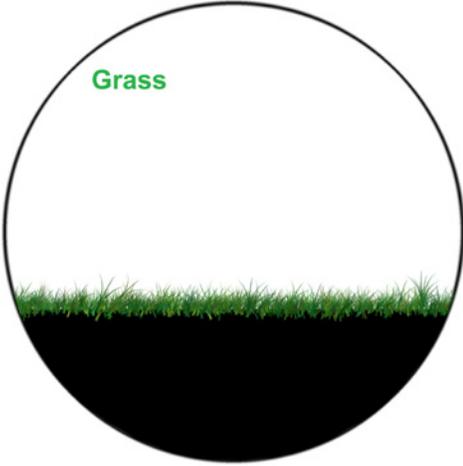
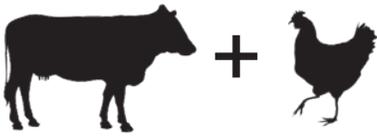
Wildebeest on the Serengeti
Caribou in Alaska
Bison on the American range
Reindeer in Lapland

The Salad Bar

white clover, orchard grass, timothy, blue grass, red clover, ground ivy or violet, wide leaf plantain, dandelion, narrow leaf, queen anne's lace grass.

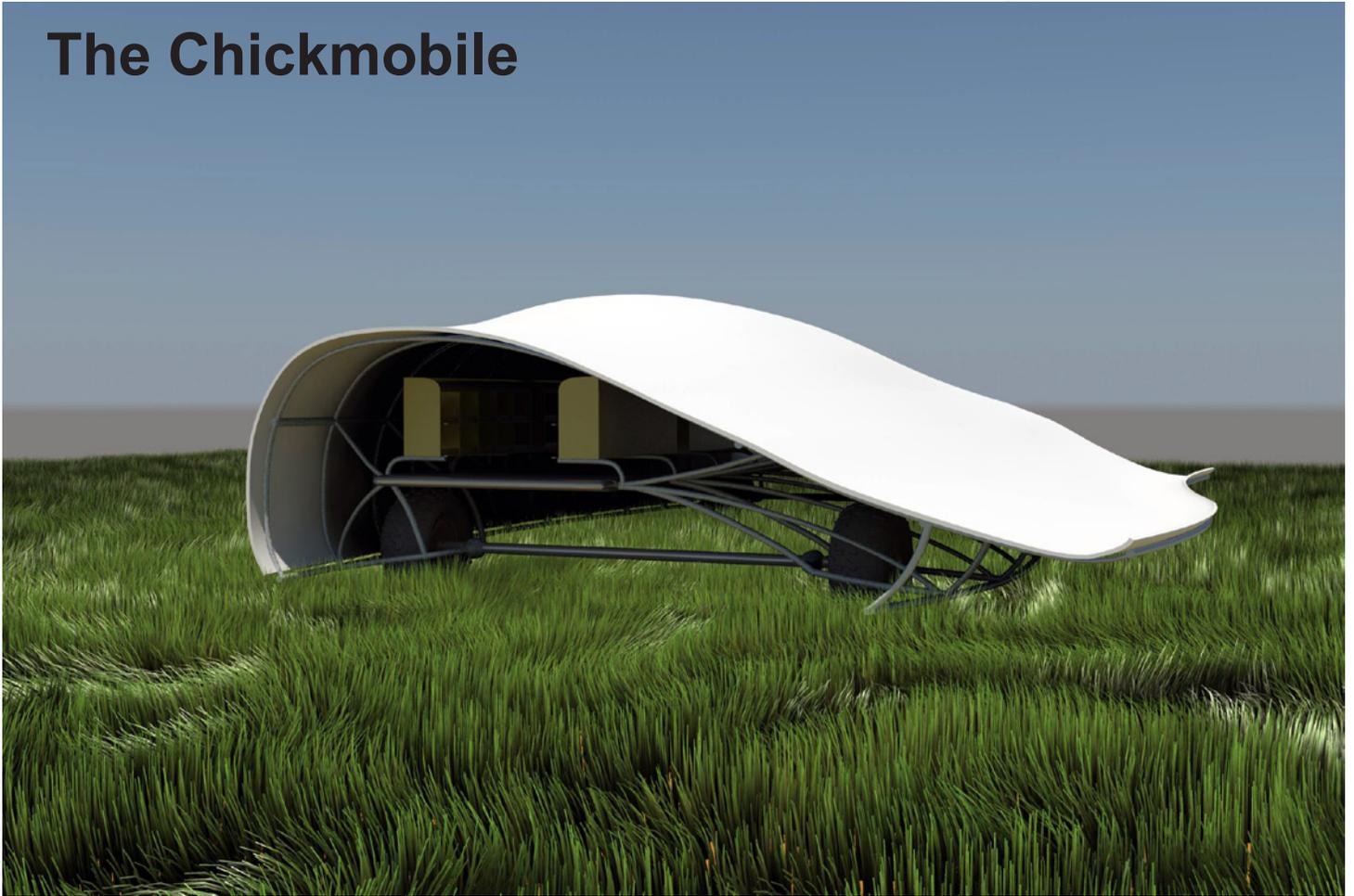


Portable electric fencing

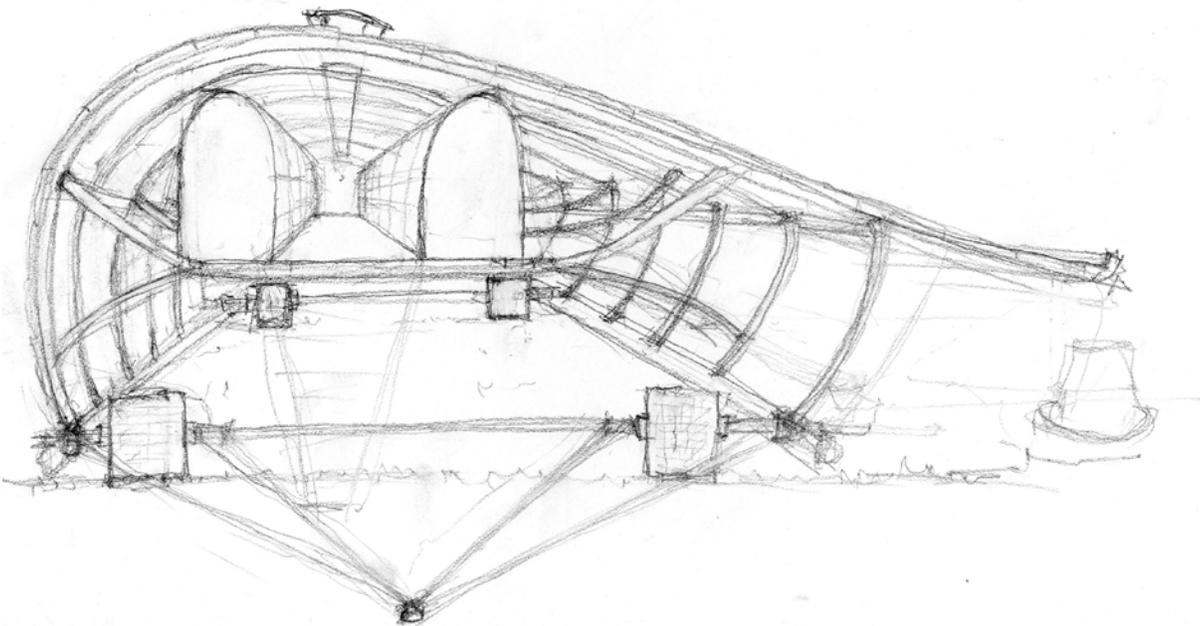
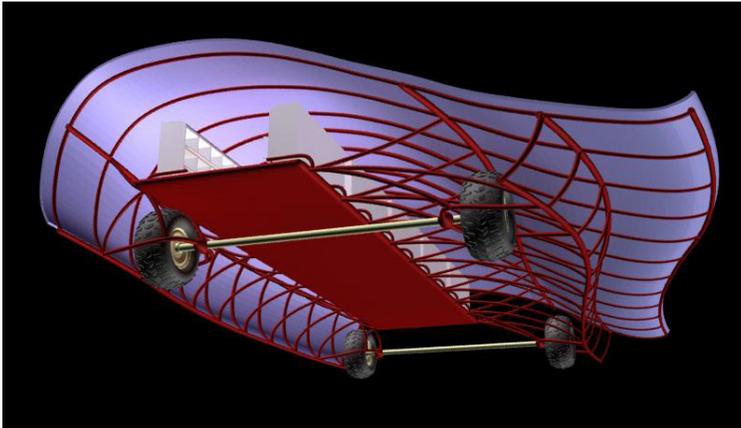
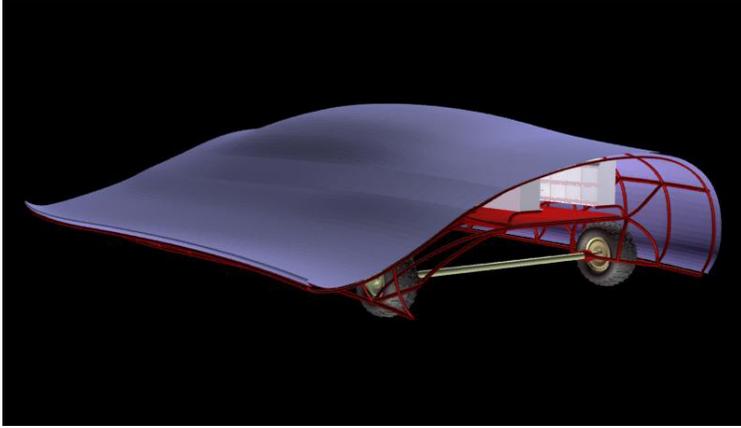
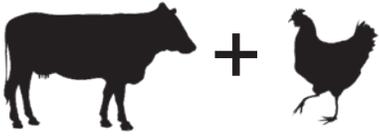


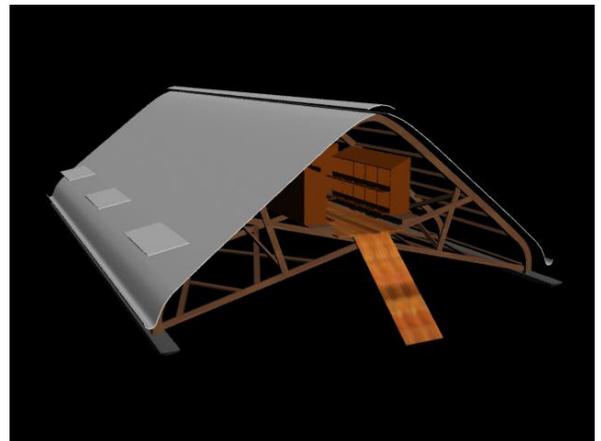
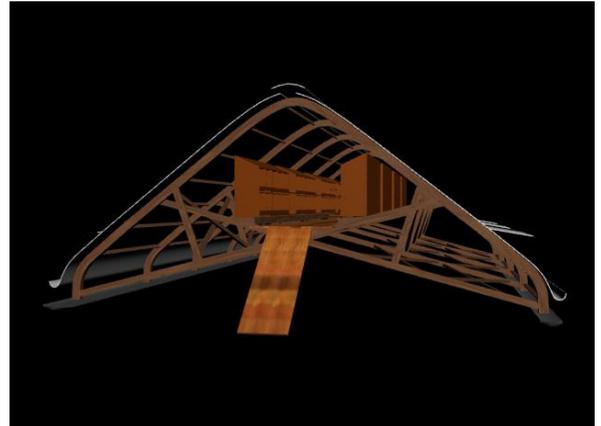


The Chickmobile

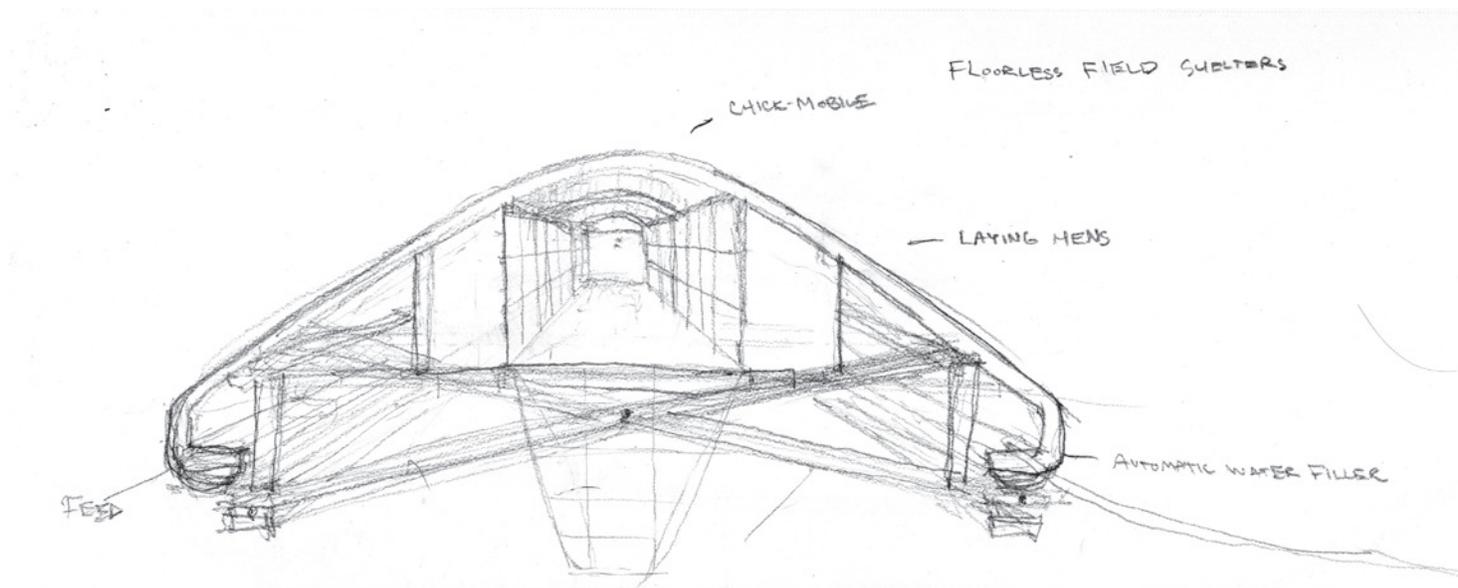


The laying and broiler hens travel in their mobiles three days behind the cows in the same vacated paddocks. They act as the sanitation crew on the farm. When the hens are moved into the paddock they are let loose to dig into the cow patties to find a tasty lunch consisting of protein rich fly larvae that has accumulated and fattened after the third day. Not only are they eating 20 percent of their diet for free, but also spreading the manure out on the pasture land, sanitizing and reducing repugnancy zones, producing their own nitrogen rich manure, and controlling the fly population on the farm.



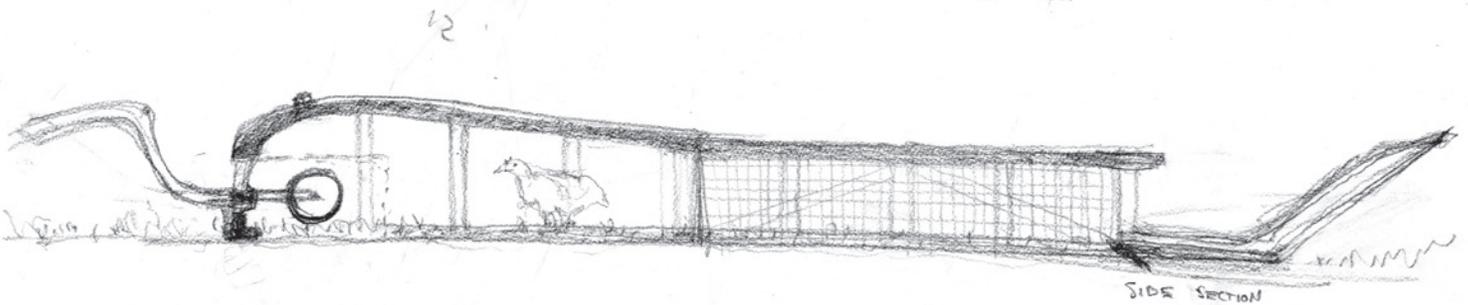
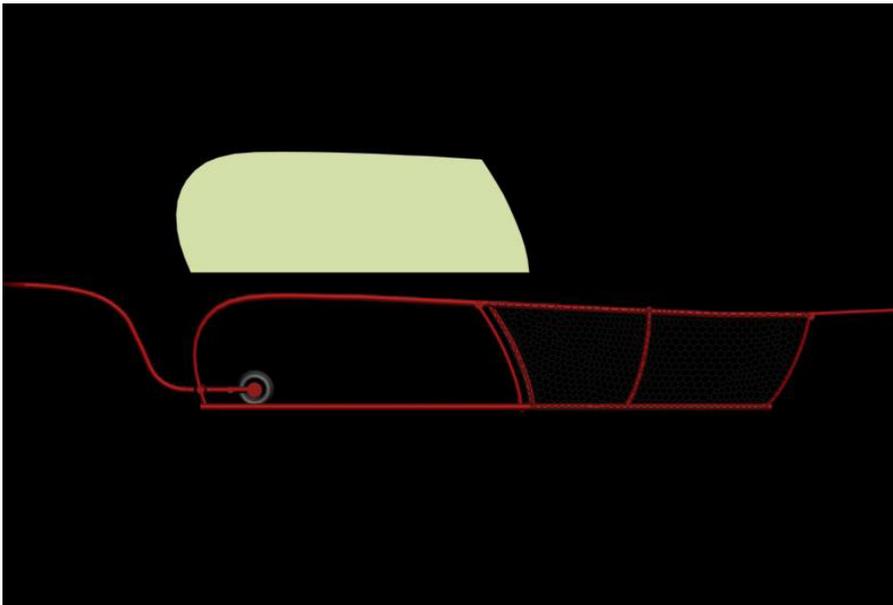
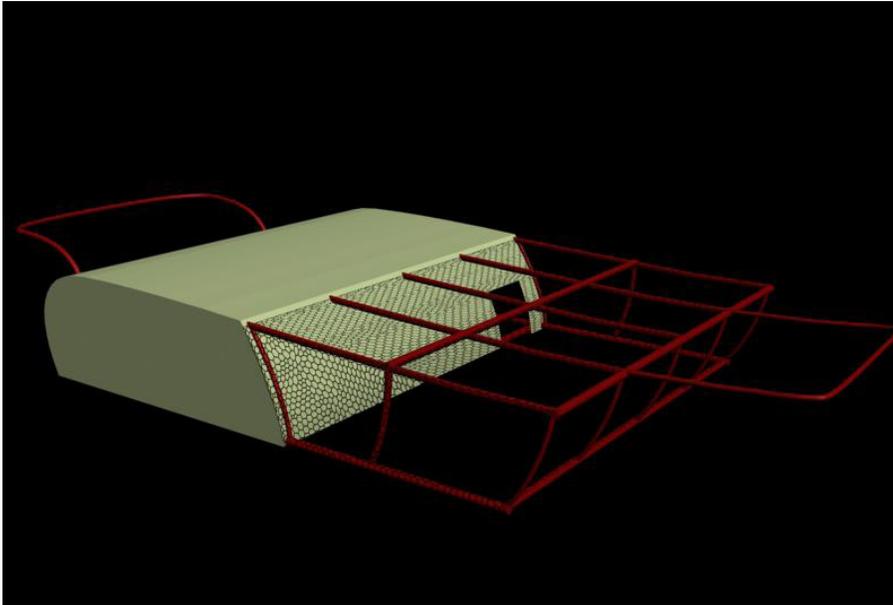


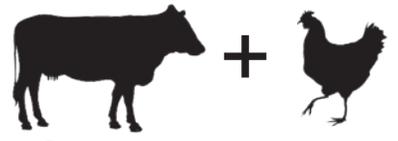
Conventional Chickmobile





The Broilermobile

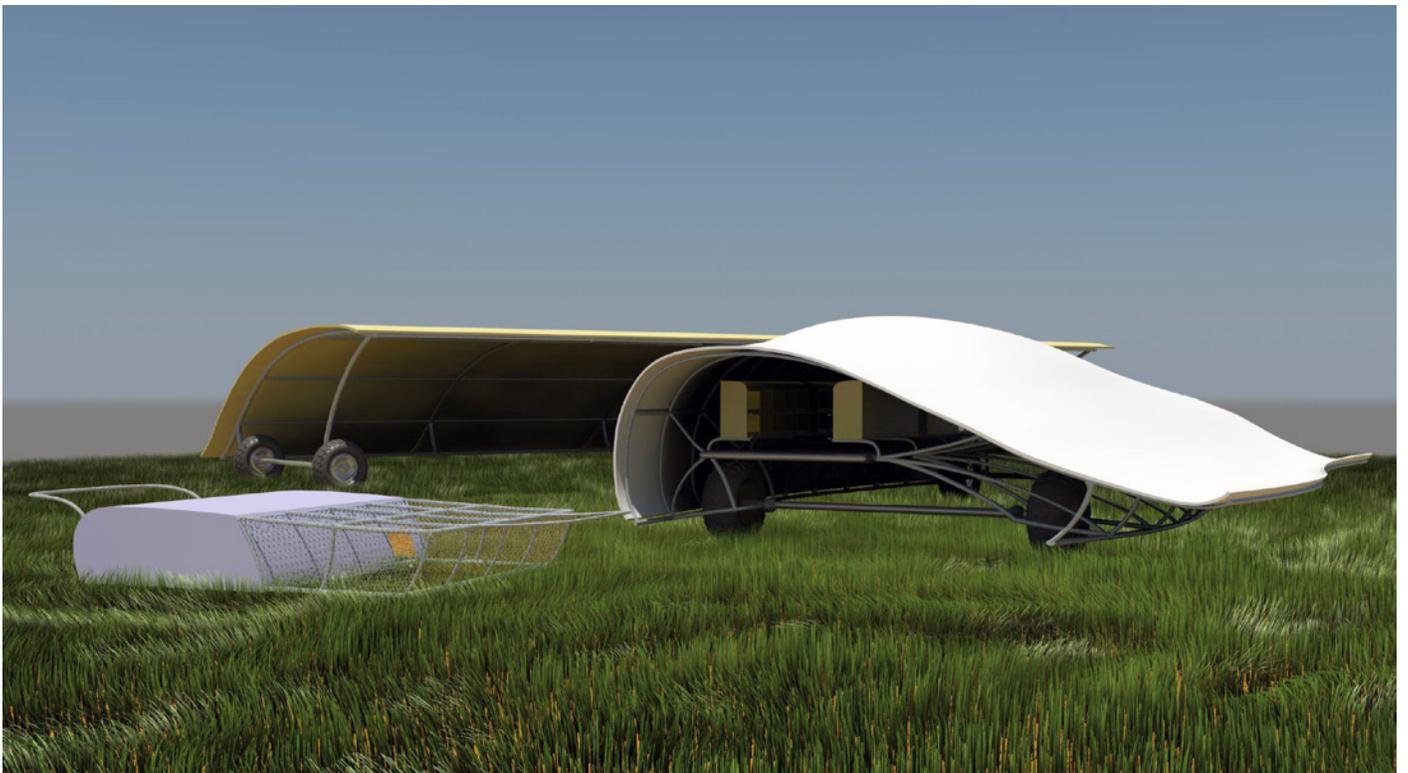
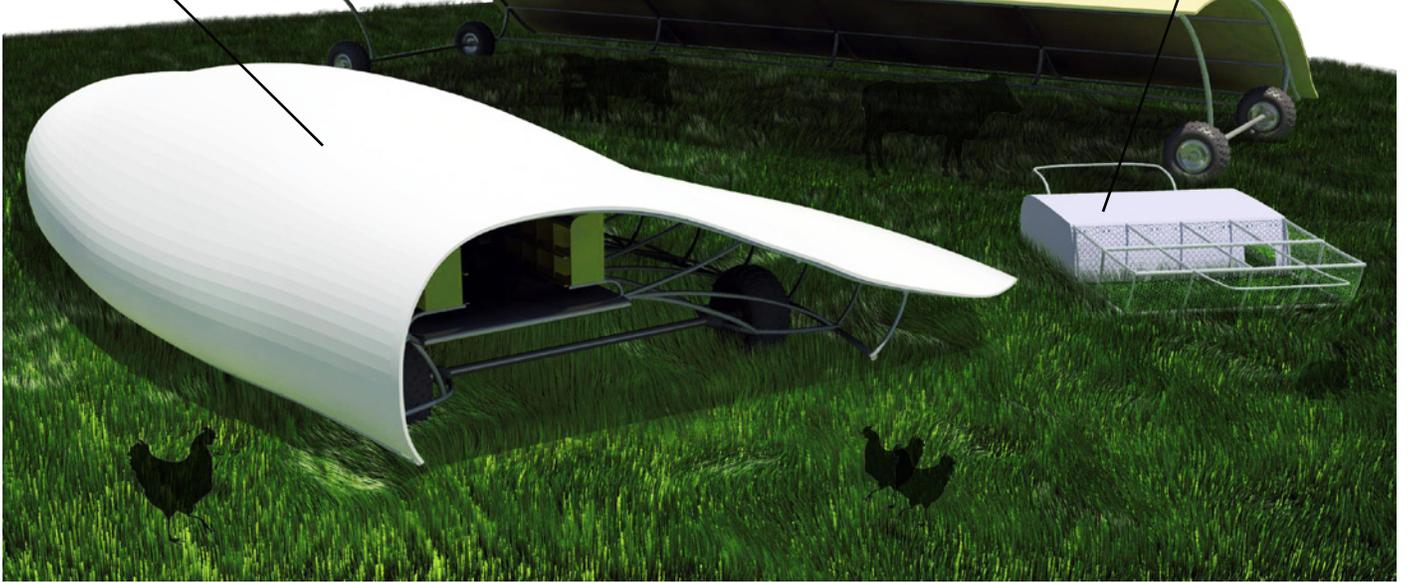


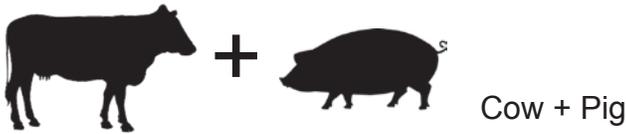


Chickmobile

Shademobile

Broilermobile

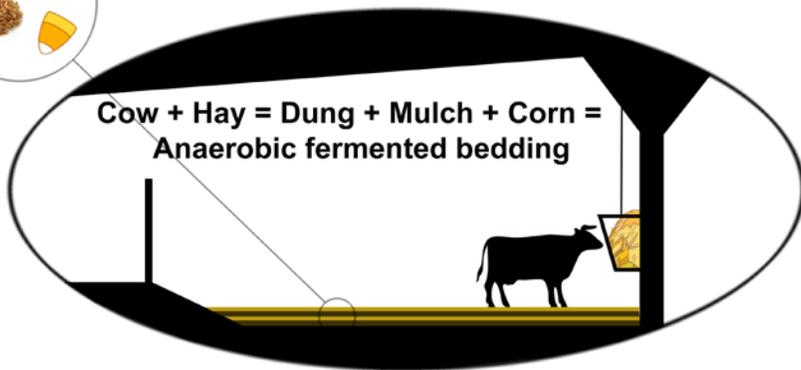
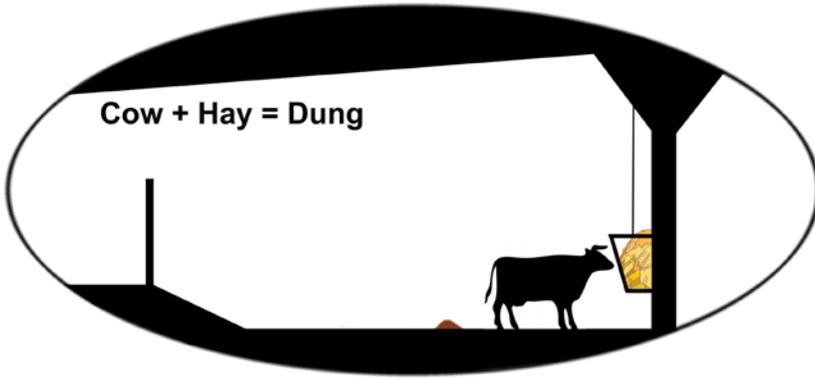




“The Pig-aerator”

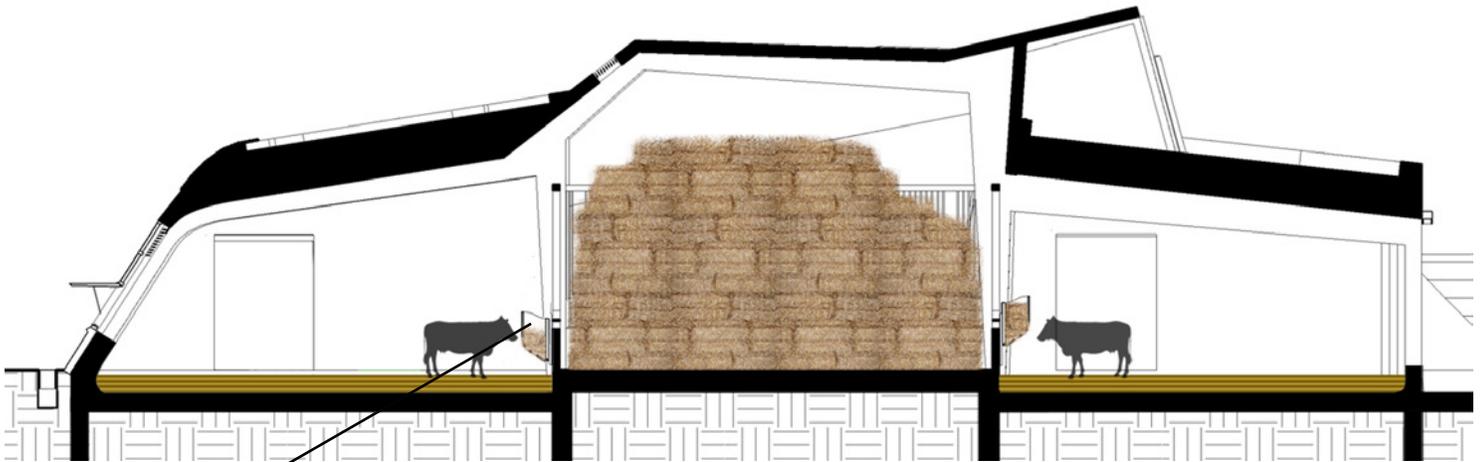
- Joel Salatin

During the winter months when the soil becomes dormant the manure from the animals must be treated in a different way than spreading it on the land. The idea is to take the winter generated nutrients in the manure and contain it with a carbonation “diaper” until the right time to use it as fertilizer in the spring. When a layer of manure begins to accumulate in the hay barn the farmer will spread anything carbonaceous (wood chips, old hay, sawdust, leaves) on top that will soak up the nutrients. Corn is also added to the mix. As the bedding builds up and the cows hooves stomp the oxygen out, it simply becomes an anaerobic fermenting pack that is warm, dry, clean, and biologically active. Once spring arrives and the cows are back to grazing, the pigs are moved into the hay barn. The pigs use their nose as a plow and turn up the bedding in search for the yummy fermented corn. In doing this, it turns the fermented bedding into a fresh aerobic compost pack. The pigs do the work! They become a fellow laborer, a co-contributor to the great land healing process. The compost will be spread on the field in the appropriate time to feed the soil.



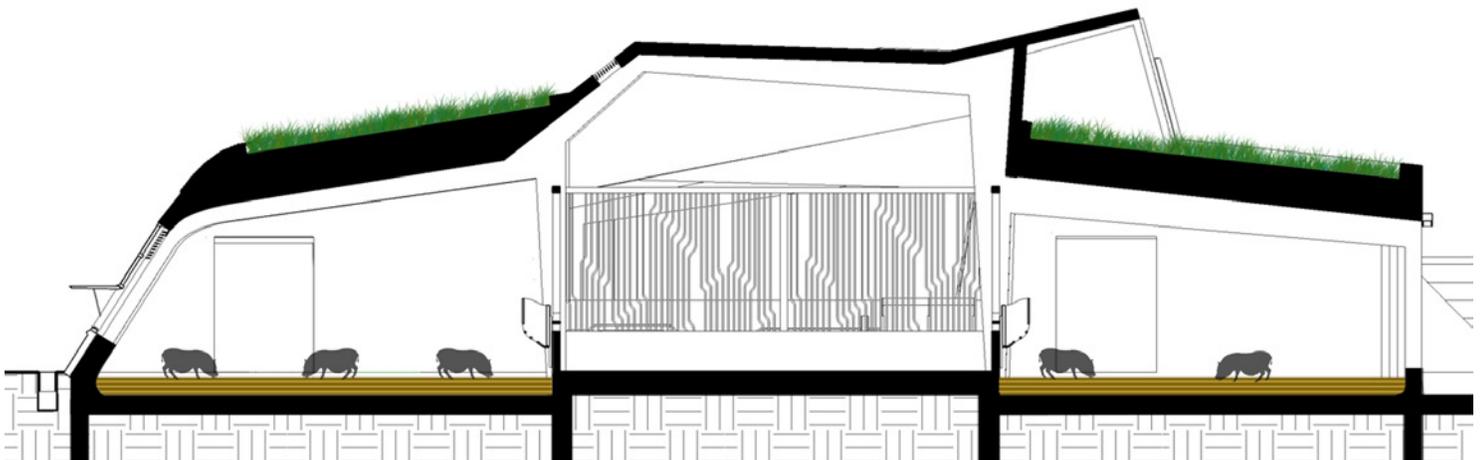


Winter



The fermented bedding can climb to a foot and half by the end of winter. To accommodate the extra feet the feedboxes are set on tracks and are adjustable to correlate with the accumulation during the winter.

Spring





+



Pig + Forest

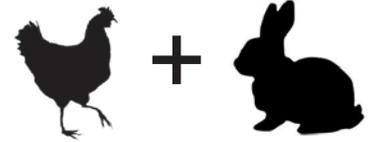


The pigs are in the forest for one month only. While in the forest rooting, eating bugs, weeds, forage, etc it creates a temporary disturbance in the woods that helps indigenous grasses to germinate on the forest floor. This disturbance actually renovates and freshen the forest to higher successional species. It also supports more soil building, forage reconstruction, and diversified plants.

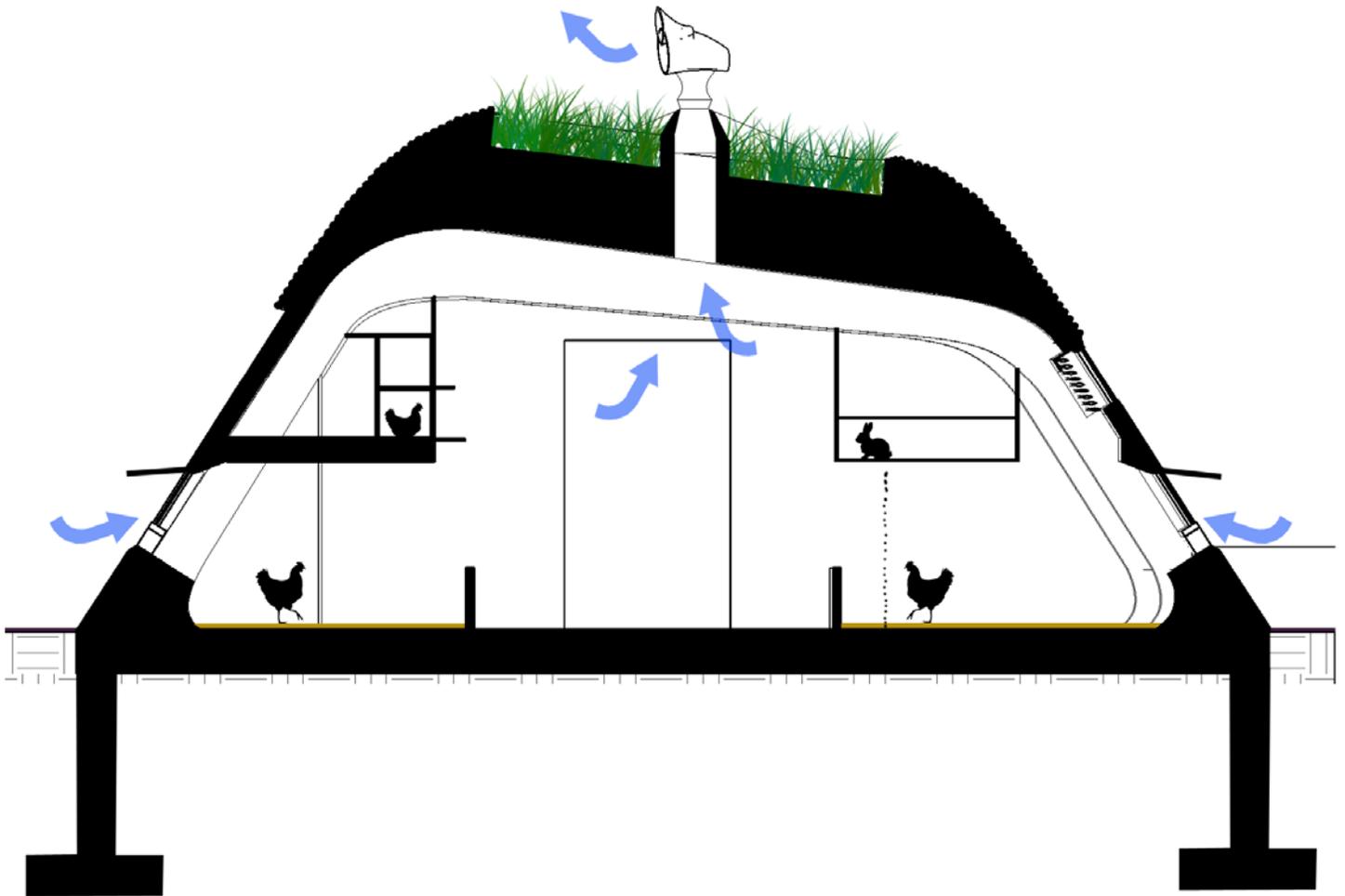
Forest advantage:

- Promotes wild birds for pest control
- Creates shade for the animals.
- Helps hold moisture in the grassland .
- Blocks strong winds.
- Helps create a rich savanna like environment that encourages biodiversity.
- Used to make carbon material: woodchips, sawdust, mulch

Hen + Rabbit



Wind cowls are utilized for maximum ventilation



When the hens and rabbits are sheltered during the winter the two animals work together to benefit the farm. When farming rabbits indoors the farmer must be aware that the urine from the rabbits can become toxic to their bodies. Breathing in the high levels of ammonia in the urine can damage their lungs and leave them vulnerable to illnesses. To address this problem the rabbit cages in the barn are raised above the floor over a bedding of carbonaceous material in which the broiler hens are free to scamper. The rabbit's urine is able to sprinkle down from their cage onto the carbon bedding. Meanwhile the hens are constantly scurrying about and turning the bedding which helps induce the carbon material to soak up the nitrogen rich rabbit urine. It also helps to capture the nutrients from their manure while at the same time defending against pathogens. The carbon bedding is stored and turned into a fresh compost to give back to the land at the right time



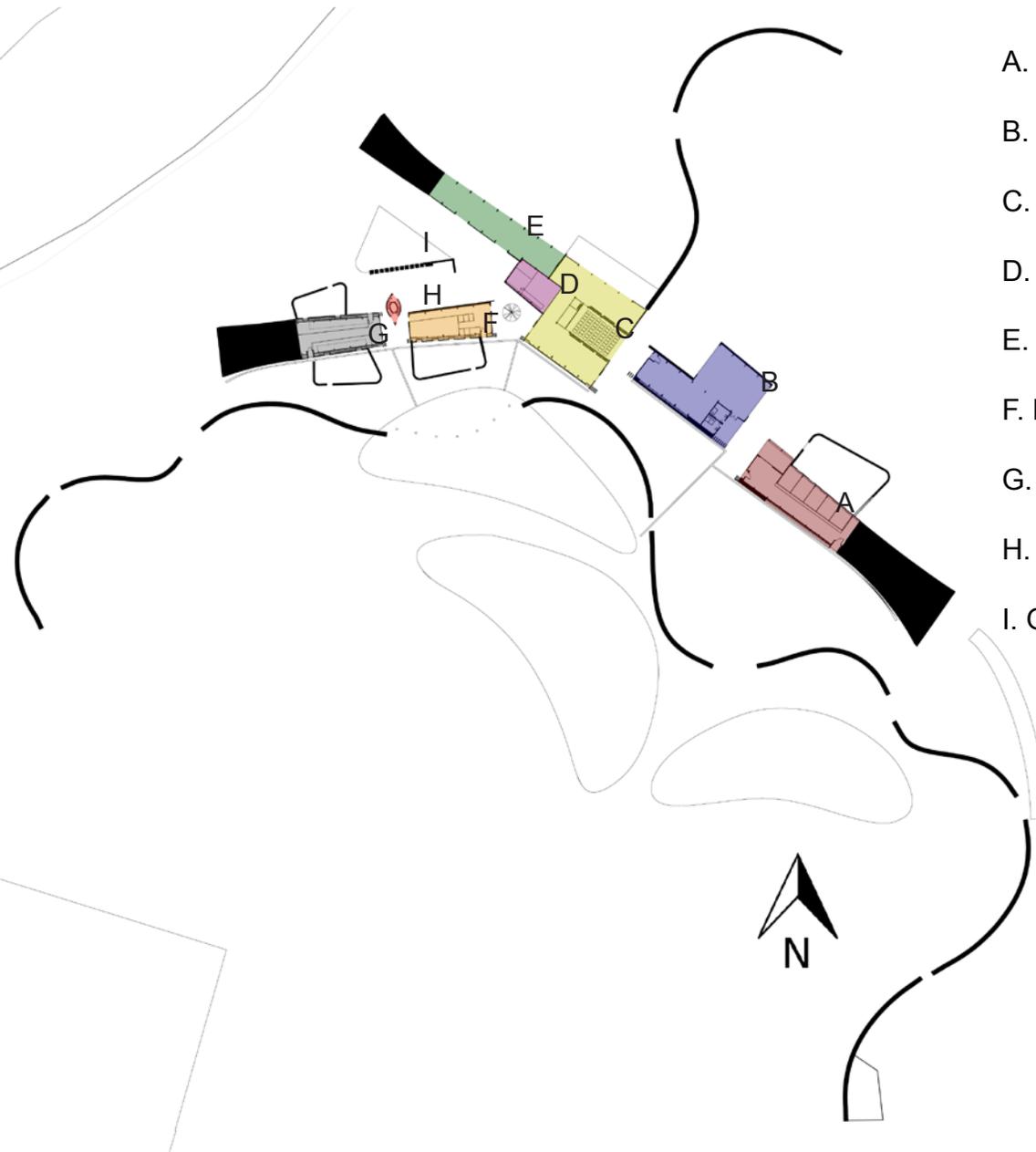
The Ponds



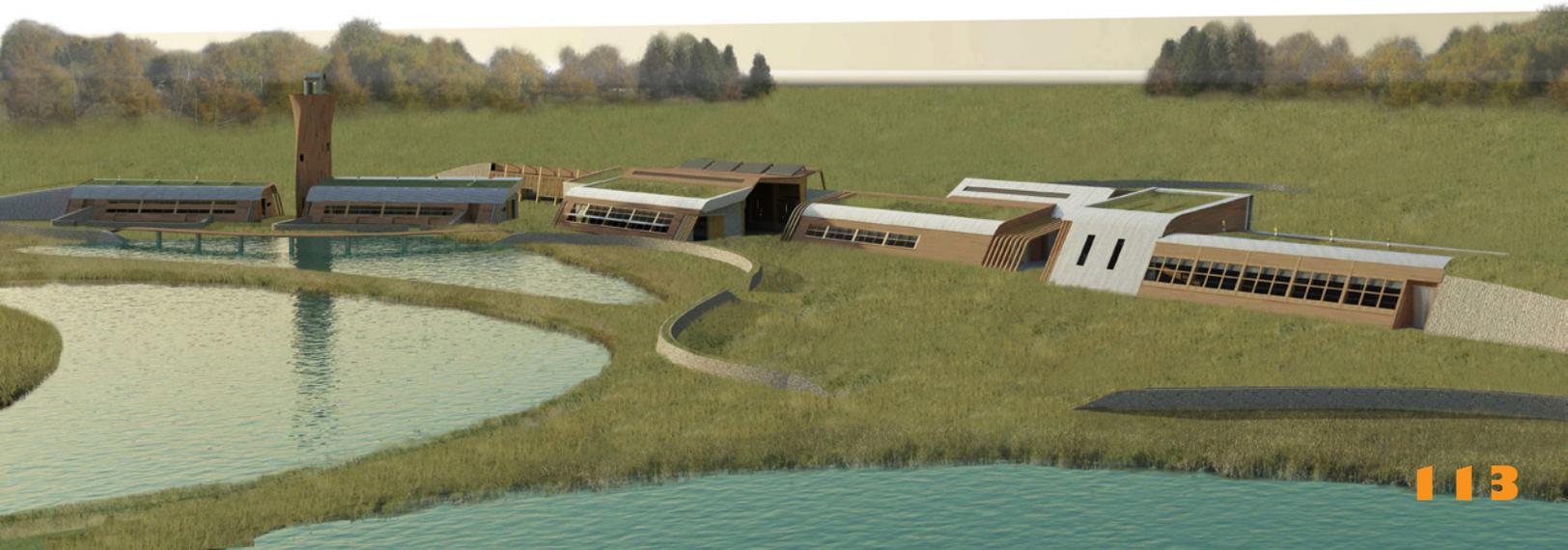
Pond advantage

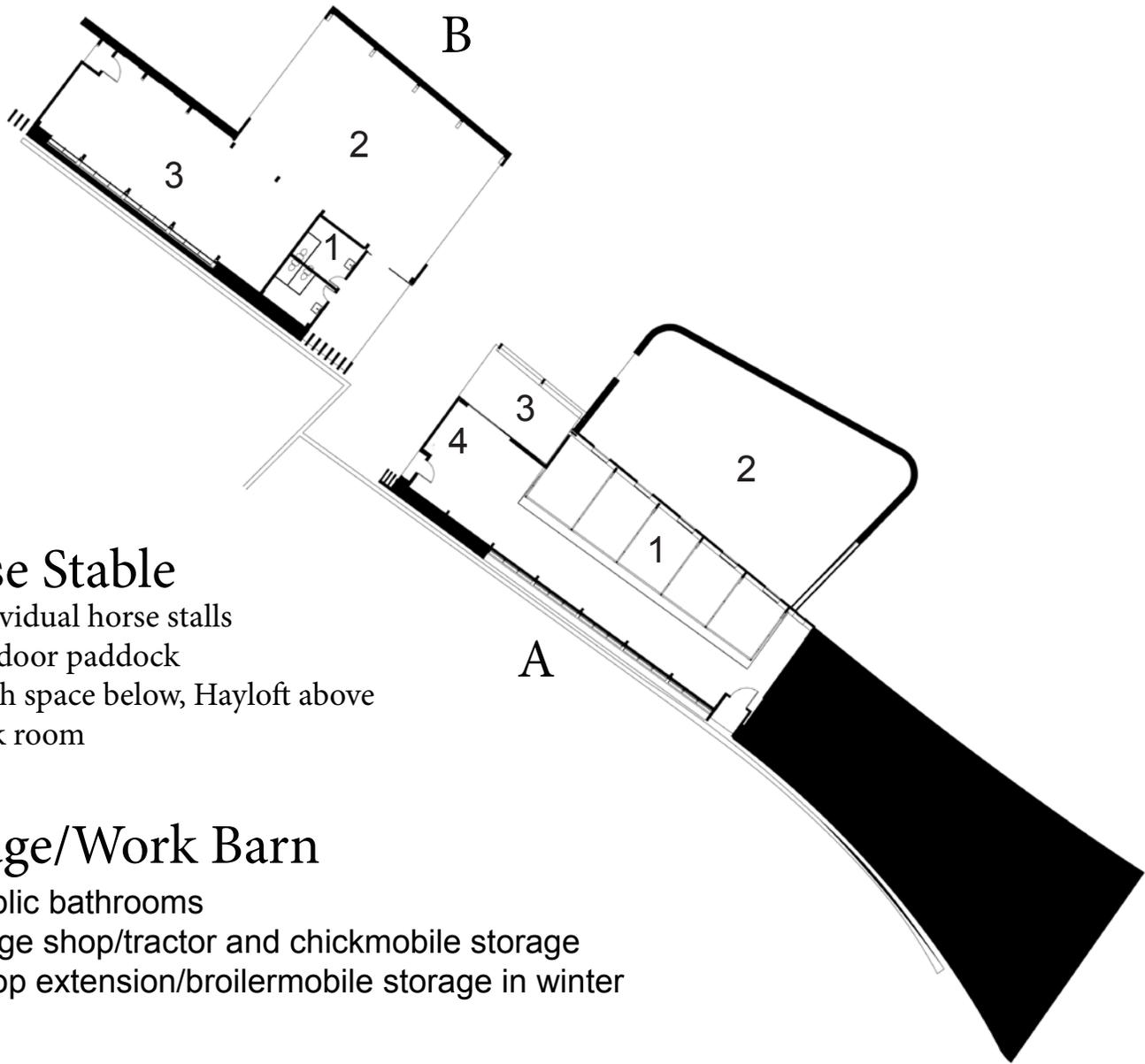
- Living Machine to naturally clean water
- Gravity feed water systems are used for the animals and farm.
- The aquatic environment fosters biodiversity.
- The greater the variety of plants and animals the greater the stability.
- Ponds encourage frogs and toads which are great insect predators.
- Birds that eat bugs are drawn to the ponds.
- Cattails and other hydrological plants filter out toxins from surface runoffs.
- Cooler in the summer and warmer in the winter. Water protection.

Final Solution



- A. Horse Stable
- B. Storage/Work Barn
- C. Hay Barn
- D. Milking Parlor
- E. Summer Shelter
- F. Pig Shelter
- G. Hen/Rabbit Shelter
- H. Silo/Water Tower/Viewing deck
- I. Outdoor Court



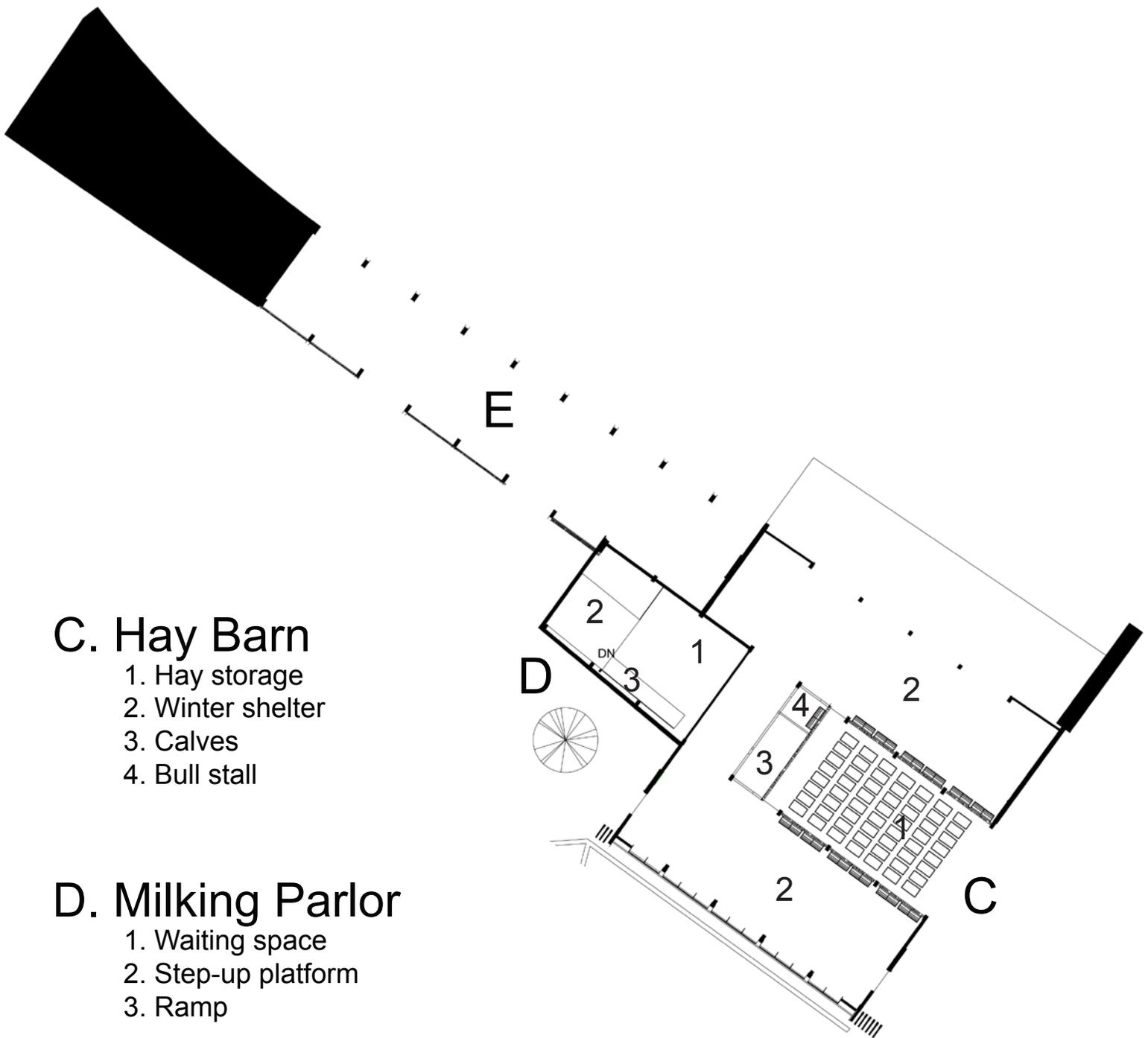


A. Horse Stable

1. Individual horse stalls
2. Outdoor paddock
3. Wash space below, Hayloft above
4. Tack room

B. Storage/Work Barn

1. Public bathrooms
2. Large shop/tractor and chickmobile storage
3. Shop extension/broilermobile storage in winter



C. Hay Barn

1. Hay storage
2. Winter shelter
3. Calves
4. Bull stall

D. Milking Parlor

1. Waiting space
2. Step-up platform
3. Ramp

E. Summer Shelter

F. Pig Shelter

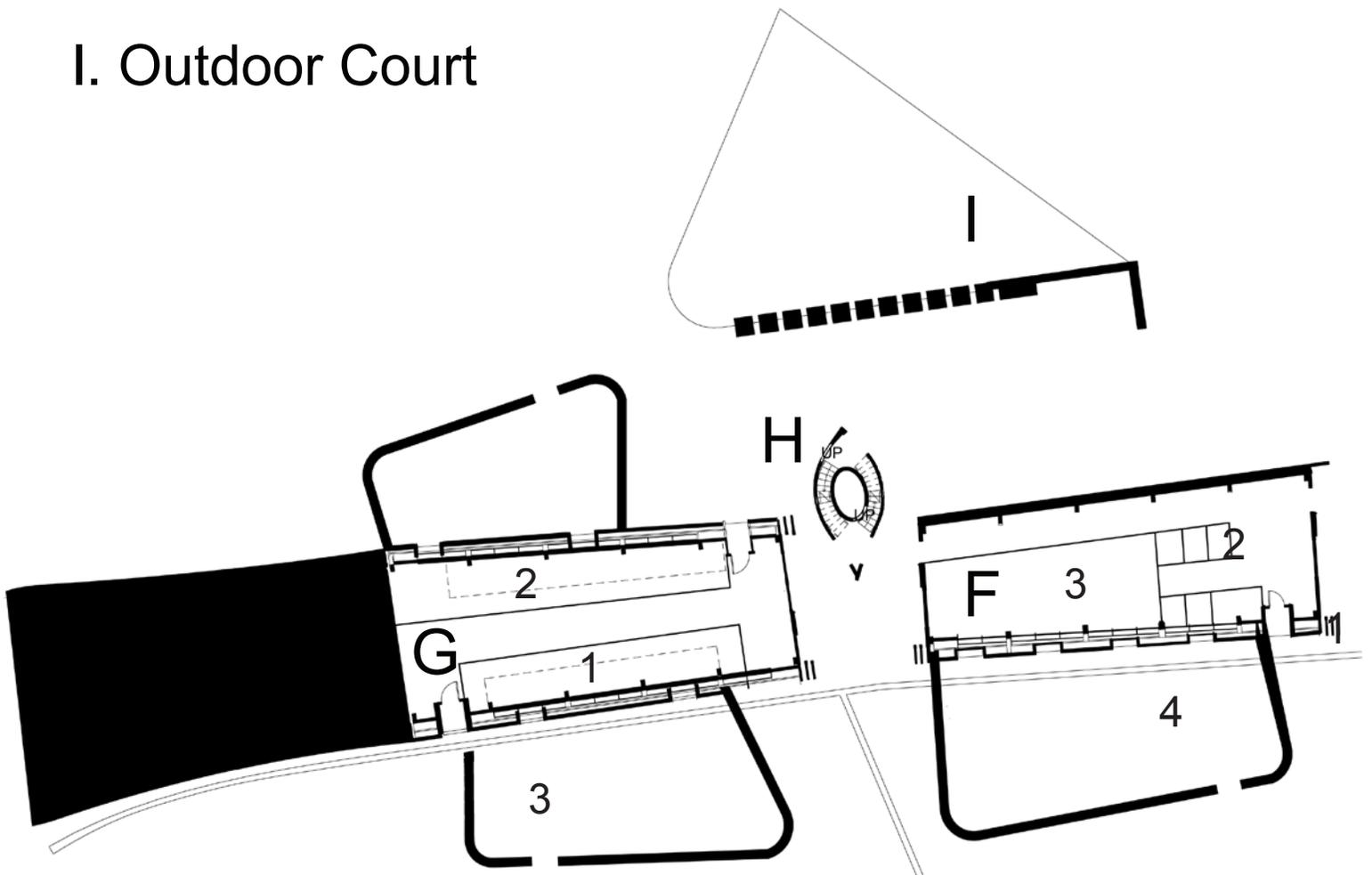
1. Entry storage
2. Sows and their piglets individual stalls
3. Large free stall
4. Outdoor paddock

G. Hen/Rabbit Shelter

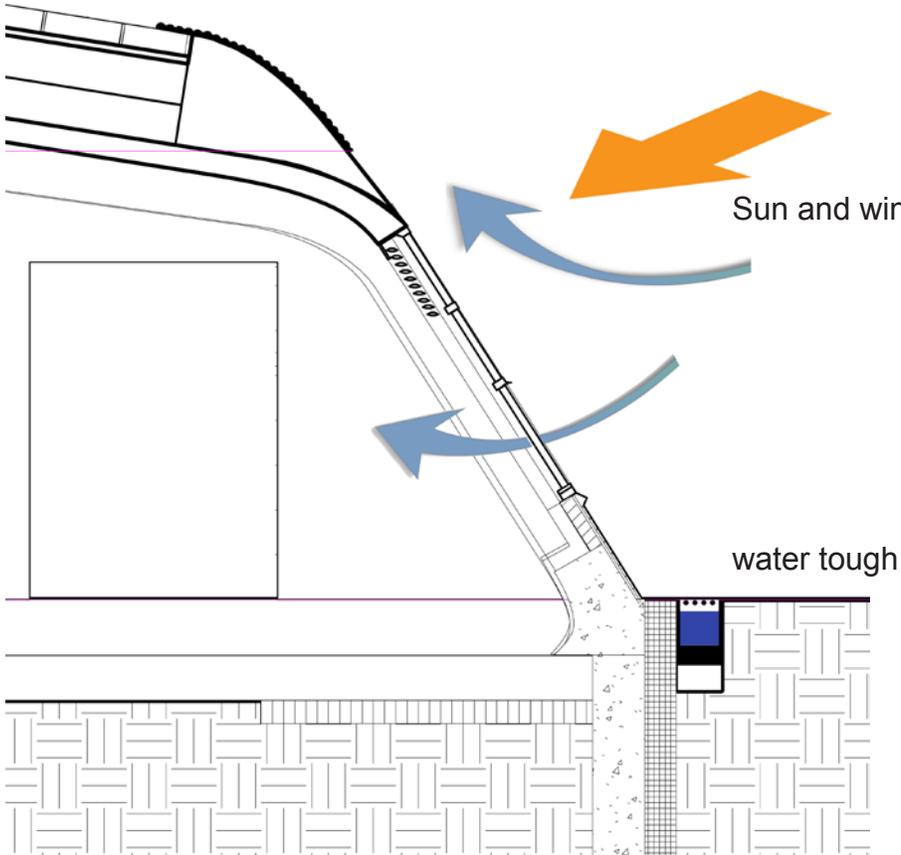
1. Broiler hens at floor level and rabbit cages above
2. Broiler hens at floor level and Laying hens above
3. Outdoor paddock

H. Silo/Water Tower/Viewing deck at top

I. Outdoor Court



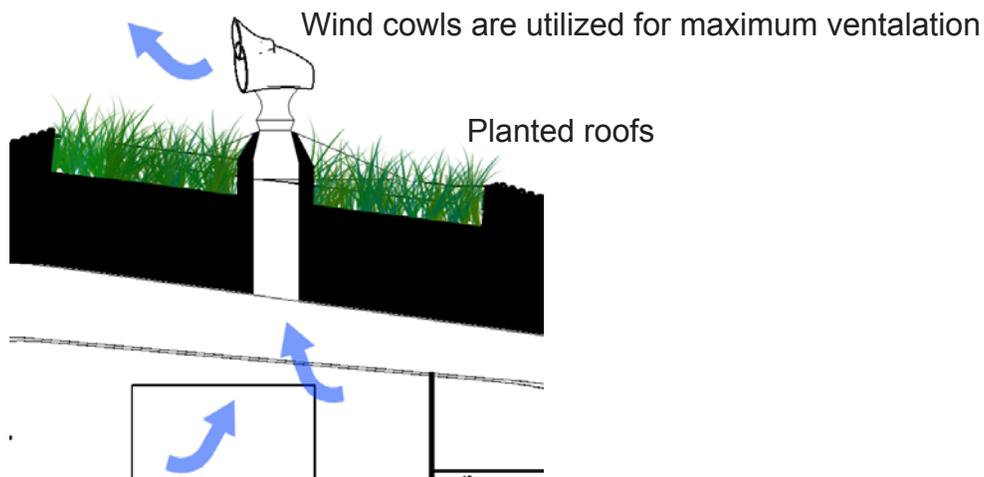
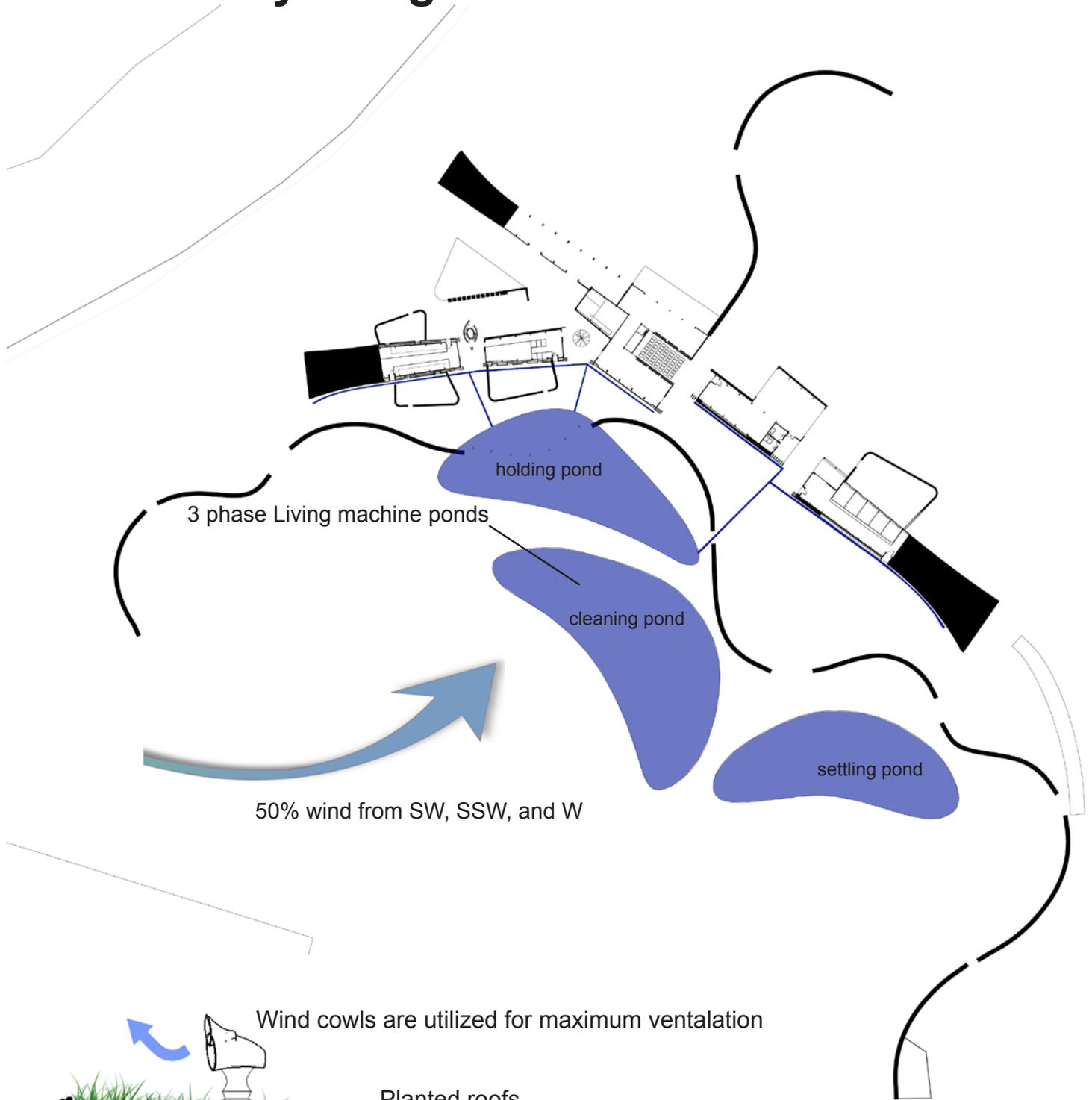
Eco-friendly design



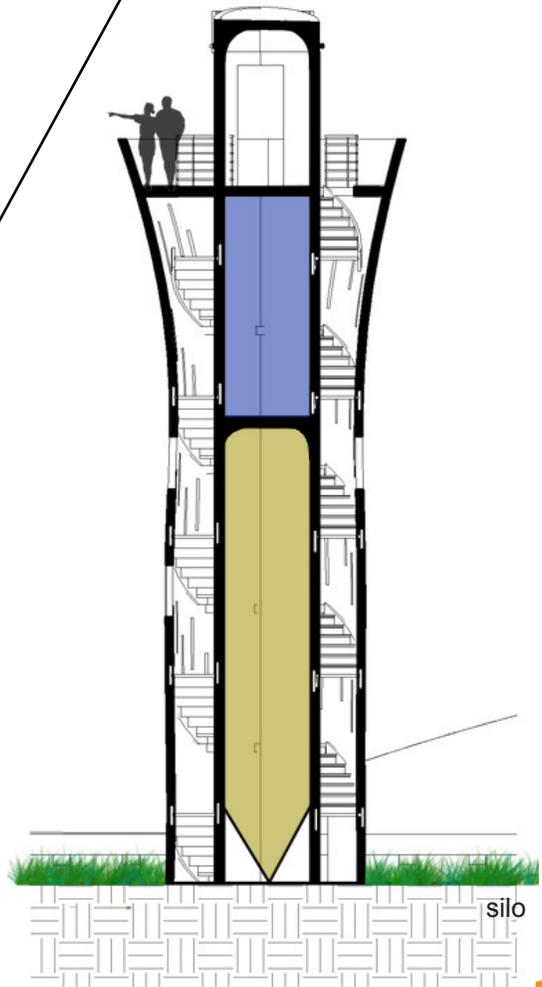
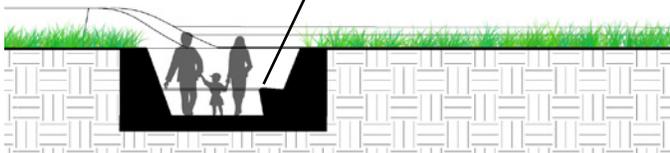
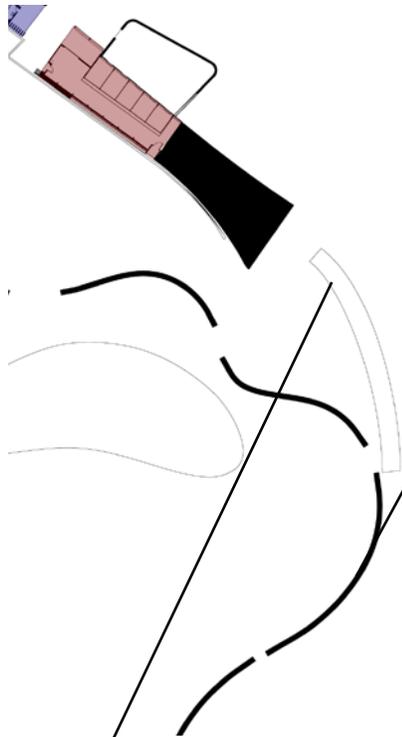
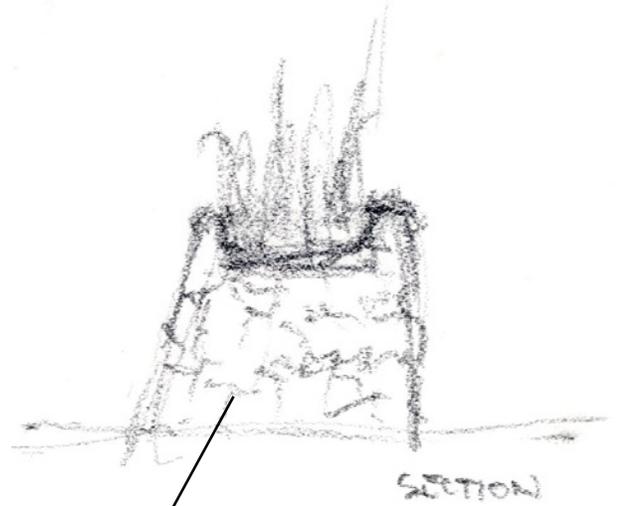
Local Materials



Eco-friendly design



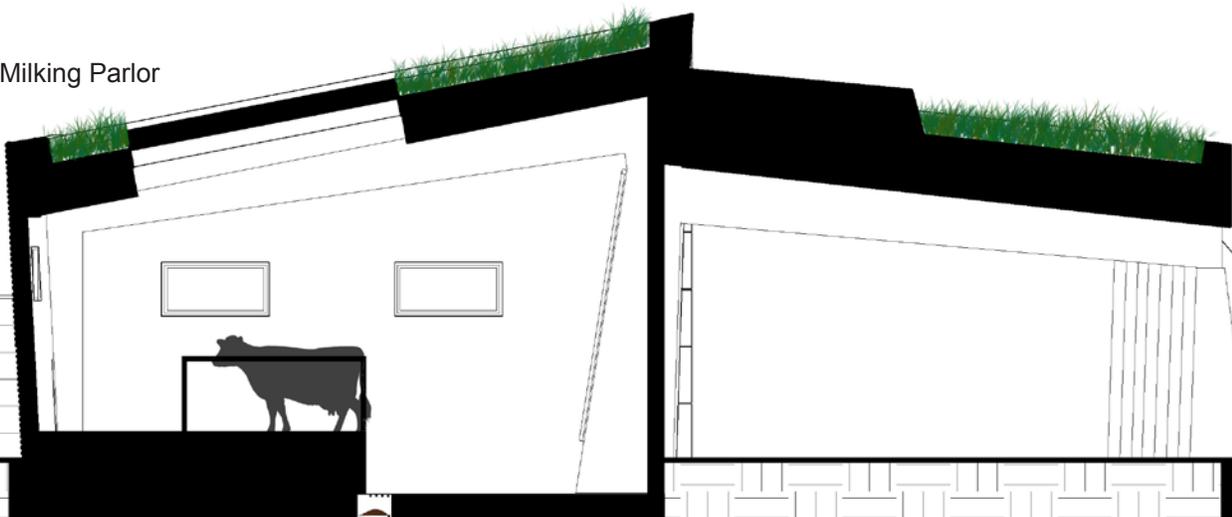
The Grass Experience





birdseye view

Milking Parlor





horse paddock view



summer shelter view



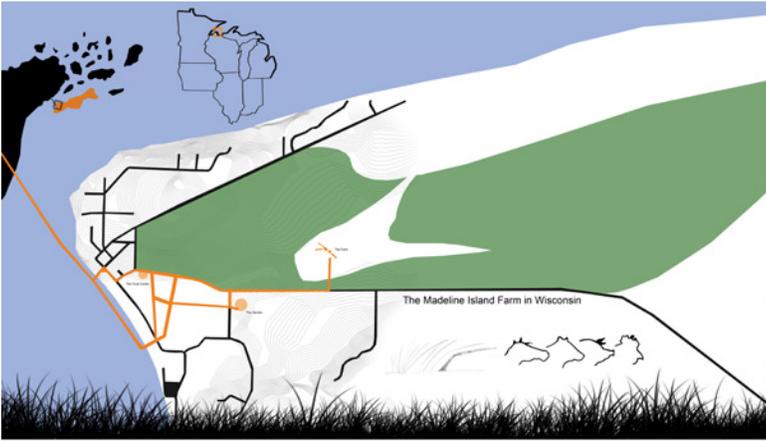


horse stable interior



outside court view

Biodynamic Farming : Between the Plate and the Planet



The Madeline Island Farm in Wisconsin

The premise of the project is to present a farm that enhances biodiversity, fertility, and growth in plants and animals by understanding the intricate ecological system nature has to offer. The important principle is that every organism is contributing to some sort of ecosystem service. The natural world feeds the land, thickens the forage, reduces weeds, stimulates microorganisms, reduces pathogens, and increases nutritional qualities in plants and animals. The mission is to create an ecologically, economically, and aesthetically effective agricultural enterprise and facilitate it around the world.

The goal is to capture as much solar energy and grow as much grass as possible. There is an all-out effort to take the nutrients produced by the animals and put it back to feed the soil that would then most effectively capture solar energy and produce biomass in the form of grass.



Cow + Pig
 During the winter months when the soil becomes dormant the manure from the animals must be treated in a different way than spreading it on the land. The idea is to take the winter generated nutrients in the manure and combine it with a carbonation "layer" until the right time to use it as fertilizer in the spring. When a layer of manure begins to accumulate in the hay barn the farmer will spread anything carbonaceous (wheat straw, old hay, sawdust, leaves on top that will soak up the nutrients. Corn is also added to the mix. As the bedding builds up and the cows huddle along the oxygen out, it simply becomes an anaerobic fermenting sack that is warm, dry, clean, and biologically active. Once spring arrives and the cows are back to grazing, the pigs are moved into the hay barn. The pigs use their roots as a probe and turn up the bedding in search for the yummy fermented corn. In doing this, it turns the fermented bedding into a fresh aerobic compost pack. The pigs do the work they become a fellow laborer, a co-contributor to the great land healing process. The compost will be spread on the field at the appropriate time to feed the soil.

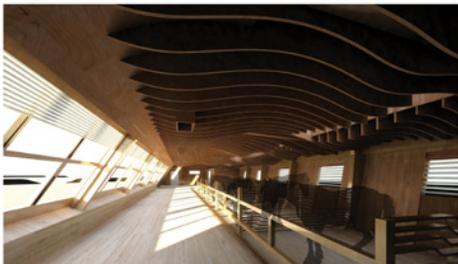


The fermented bedding can climb to two feet by the end of winter. To accommodate the extra feed the feedboxes are set on tracks and are adjustable to correlate with the accumulation during the winter.



- A. Horse Hub
- B. Storage/Walk Bays
- C. Hay Barn
- D. Pig Shelter
- E. Hen/Rabbit Shelter
- F. Silo/Water Tower/Viewing deck at top
- G. Outdoor Court

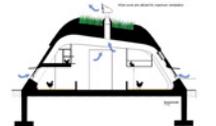
The farmer moves the cows in a different order as paddocks every day, electric fencing. The idea is to mimic the morning, nocking, and moving of herbivores herds in nature (for example the American bunnies in the wilderness in the Serengeti). When the herd is located in a small area the cows will destructively graze on all species of grass. This is important because cows are selective grazers when left to an open pasture. This gives the chance for the lower succession plants to grow and get stronger having the pasture to defoliate to sustainable species instead of monoculture and herbivore species. Creating an equal opportunity for plants is significant for a well rounded diverse micro-ecosystem.



Cow + Hen
 The relationship between the cow and hen is crucial for the farm's success. The laying and broiler hens travel in their mobile three days behind the cows in the same natural paddocks. They act as the sanitation crew on the farm. When the hens are moved into the paddock they are left alone to dig into the cow pasture to find a fresh batch consisting of protein rich fly larvae that has accumulated and fattened after the third day. Not only are they eating 20 percent of their diet for free, but also spreading the manure out on the pasture land, sanitizing and reducing nitrogenous wastes, producing their own nitrogen rich manure, and controlling the fly population on the farm.



Hen + Rabbit
 When the hens and rabbits are sheltered during the winter the two animals work together to benefit the farm. When farming rabbits indicates the farmer must be aware that the urine from the rabbits can become toxic to their bodies. Breeding in the high levels of ammonia in the urine can damage their lungs and make them vulnerable to illnesses. To address this problem the rabbit cages in the barn are raised above the floor over a bedding of carbonaceous material in which the builder ferns are free to decompose. The rabbits urine will seep down into their cage onto the carbon source as well as separate down into their cage onto the carbon source as well as separate down into their cage onto the carbon source. It also helps to separate the manure from their manure while at the same time deterring against pathogens. The carbon bedding is moved and turned into a fresh compost to give back to the land at the right time.



Full board layout



“The professors have so much energy!” – quote by Kyle Lunke in NDSU Ask Me Commercial 2008



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Cow + Pig

During the winter months, when the soil becomes dormant, the livestock manure is taken to the winter generation cropland in the fields and composted as a 'soil of manure' before being returned to the fields in the spring. These manure and composted manure piles are not covered, however, so that the soil will be able to absorb the nutrients. Com is also added to the soil. All the building materials for the winter house are made from recycled materials. The house is made of untreated wood and the roof is made of untreated wood. The house is made of untreated wood and the roof is made of untreated wood. The house is made of untreated wood and the roof is made of untreated wood.

The farmstead building can serve to be fed by the end of winter. To accommodate the winter feed, the feedlines are set on tracks and can be adjusted to comply with the automation during the winter.

- 1. Greenhouse
- 2. Winter House
- 3. Pig House
- 4. Cow House
- 5. Feedlines
- 6. Winter House
- 7. Winter House
- 8. Winter House
- 9. Winter House
- 10. Winter House

The house serves the cow in a different manner as compared to the other buildings. The idea is to create the feeling of being in a house, not a barn. The house is made of untreated wood and the roof is made of untreated wood. The house is made of untreated wood and the roof is made of untreated wood. The house is made of untreated wood and the roof is made of untreated wood.

Cow + Man

The house serves the cow in a different manner as compared to the other buildings. The idea is to create the feeling of being in a house, not a barn. The house is made of untreated wood and the roof is made of untreated wood. The house is made of untreated wood and the roof is made of untreated wood. The house is made of untreated wood and the roof is made of untreated wood.



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