Architecture for a New Food System- An Investigation into Healthy Eating through Architecture

ARCHITECTURE FOR A NEW FOOD SYSTEM

an investigation into healthy eating through architecture

A Thesis Presented

by

Emily Marie Gasperetti

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Emily Marie Gasperetti

Approved as to style and content by:

_____

Kathleen Lugosch, Chair

_____

Ray Mann, Member

_____

Kathleen Lugosch, Graduate Program Director
Architecture + Design Program
Art, Architecture and Art History

_____

William T. Oedel, Department Chair
Art, Architecture and Art History

DEDICATION

To my parents, Bob and Cheryl Gasperetti. It has been
a long hard road and I never would have made it to
this point without your unwavering love and support.
Thank you for everything you do.
xoxo, emg

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Thank you to my advisors, Kathleen Lugosch and Ray Mann for your profound wisdom, continuous encouragement and never-ending patience. It was an honor working with you.

Thank you also to Katie Wetherbee. This document is proof of your steadfast determination to finish what we started.
We did it!

ABSTRACT

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MAY 2013

EMILY MARIE GASPERETTI, B.A., HOBART AND WILLIAM SMITH COLLEGES

M.ARCH, UNIVERSITY OF MASSACHUSETTS AMHERST

Directed By: PROFESSOR KATHLEEN LUGOSCH

This thesis seeks to explore the impact that architecture can have on peoples' relationship with food. The industrialization of American society over the past two centuries has distance people from the source of their food; this distance has significantly contributed to an overall decreased in American health. The concept of this thesis is that architecture can have a positive impact on peoples' relationship with food and thereby help improve the health of a community.

I chose a site on the outskirts of Glens Falls, New York to locate my project, the Glens Falls Good Foods Collective. This site is ideal for bringing people and food together as a few miles to the West lays the city center, while abundant farmlands fan out toward the East. The Collective combines small-scale food processing facilities for farmers with a market place for consumers. Providing an environment in which these ever-distancing demographics can interact would help reduce the gap between people and food. The goal of this thesis is to design a building that fosters a meaningful and productive connection to food by bringing people closer to its source.

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CHAPTER I

CURRENT CONTEXT OF FOOD AND ARCHITECTURE

Why study the relationship between food and architecture?

There is a complex and substantive relationship between food and architecture. To begin with, they are both basic human needs; we need to consume calories and be protected from the elements in order to survive. We need to eat and we need shelter. This creates a relationship between food and architecture that warrants investigation and development for the betterment of each.

Food has had a significant impact on our built environment since the beginning of human life. The process of feeding oneself was most peoples' primary job for the greater part of human history. It is no surprise why food demanded so much manpower considering the amount of work required for its production. Consider what has to happen before you consume your food, it must be planted, cultivated, processed, transported, stored, bought/ sold, prepared, served, and then finally you get to eat it. Then, after all of this, there is clean up.

These processes are further complicated by the fact that human beings are omnivorous, meaning we have the capacity to eat both meat and vegetables. Carolyn Steel explains in her recent TED talk, *How food shapes our cities*, how much of the organization of cities is directly related to food access [1]. For example, streets have names such as "Bread Street" or "Cornhill" which convey, in clear terms the historic function of that specific street. Streets with specific food related functions were established at those locations because the raw goods that were required to produce that product could most easily enter the city along that street.

Not so long ago, people, whether they lived in the city or the country, had a very clear understanding of where their food came from. Because refrigeration was not available, as Carolyn Steel explains, animals consumed by city dwellers were herded into cities alive. They

1 Steel, Carol. (2009, July). Carolyn Steel: How food shapes our cities [Video file]. Retrieved from http://www.ted.com/talks/carolyn_steel_how_food_shapes_our_cities.html in April 2012

lived in these locations for a few days prior to being butchered for consumption. The threat of consuming rotten food necessitated these means of food delivery but it also educated consumers about where their meat came from. This system established a proximity of origins.

Advances in modern technology have changed a huge portion of how humans interact with food and therefore how we design with regard to food. It was not until recently that a portion of the human population was assigned the task of providing food while the rest were free to work at other tasks. Specifically, advances in transportation and preservation techniques have made it possible to acquire and execute previously unimaginable things with our food. While the ability of a small portion of the population to feed the nation has allowed others to pursue necessary and noble tasks, it has also had a distancing effect on our relationship with food. This distance has had a devastating effect on both our physical and mental health. This problem is taking place across the globe but this thesis will focus on the effects it has in the United States.

In recent years, information about how our food choices affect our health has started to emerge in popular society. The outrageous percentage of people suffering with diseases such as obesity, diabetes and asthma has people asking questions and looking for causes (and solutions). Television shows such as Jamie Oliver's Food Revolution, in which one ambitious English chef sets out to make the most obese city in America healthier, explains just how serious these problems have become. Society is beginning to see these negative health effects but many people do not understand their source. As the television show clearly demonstrates, the problem lies with our lack of knowledge about the food we eat.

The ease of access Americans have to food has nearly eliminated a consciousness about it. Part of this is due to not having a reliable forum for communicating food information. Classes such as home economics, where young people could learn the fundamentals about food and cooking, are rarely taught in public schools nationwide. Along with the loss of this institutional food education, much of the food we 'cook' at home only requires the application of heat. Gone from our kitchens (and therefore minds) are the grassy green tops and dirt that communicate

information about where carrots come from. Gone are the feathers and scales of the poultry and fish we consume leaving us with no means to understand its origins and importance. Our lack of knowledge about food has condemned us to an unhealthy relationship with it.

Figure 1- Lettuce. Gasperetti. 2013

Figure 2- Untitled. Porkfork6. 2008.

While this is a grim picture, the attention food has drawn in recent days has produced encouraging results. Dedicated people are working tirelessly to build the physical and intellectual infrastructure needed to relearn food information that is essential to our wellbeing. People are demanding healthier options from school cafeterias, buying organic meat and produce, and participating in community supported agricultures (CSAs). Others are supporting movements with titles such as the Locavore movement, in which people exclusively consume food that was produced within a 100-mile radius of their homes [2]. This emerging focus on food presents the built environment with an enormous opportunity. People want to solve these issues in their own communities and have thus started to take these matters into their own hands. Planting gardens on rooftops, establishing places for local markets and building community kitchens are just a few examples of efforts already underway.

In summary, our society currently faces a potentially pandemic problem: people are chronically unhealthy, due, in large part, to a lack of knowledge about and access to, good food. The premise exists that food and shelter are basic human needs. Finally, we have a sincere societal desire to remedy the situation. These three circumstances present an opportunity to contribute to the betterment of the human population through architectural design with food

2 http://www.locavores.com/

at its foundation.

Prior to design, a response to a number of questions needs to be investigated. First, how did we grow so far removed from our food in the first place? Specifically, how the chasm that separates Americans from their food developed? These are important questions because understanding the historical roots of these problems can give us better insight into potential resolutions. What roles do education and proximity play in our relationship with food? What kind of infrastructure is needed to foster a meaningful and productive relationship with food? And finally, how can architecture help rebuild humans' relationship with food?

CHAPTER II

CULTURAL BACKGROUND

Introduction

America has a long, complex relationship with food. The driving force over the last two hundred years has been industrialization. Industrialization has caused a dramatic shift in how people interact with food. Discovery and development of three specific technologies fueled this change, food preservation, refrigeration, and transportation. Ultimately, these three advances allowed Americans to store food longer, get it faster, and from further away. We became more and more distant, in body and knowledge, from the actual source of the food we consumed; it was in so much abundance that we took it for granted. Much of this continues to hold true even in the twenty-first century, perpetuated by the government subsidies and large corporations with monopolies on food business. Fortunately, change is on the horizon.

A Brief History of the Industrialization of food in America

The industrialization of food began around the turn of the nineteenth century. At this point, much of the population was farmers; everyone ate locally. Emerging technologies in farming practices allowed food to be produced more efficiently. This was accomplished through the use of machinery that both planted and harvested food much faster than humans. These machines reduce the need for human labor thereby reducing costs and increasing profits.

The ability to preserve food was a huge obstacle prior to the seventeenth century. The short amount of time that food would remain edible before perishing was extremely short. For this reason people needed to live close to their food source. This effectively limited the growth of cities and populations and kept most people working the land.

In 1804 Nicolas Appert, after many years of experimentation, opened the first food preservation factory in France [3]. Through his experiments, Appert discovered that in order to make food last, it needed to be sterilized. This led him to develop a process that, in modern terms, is known as pasteurization. Pasteurization allowed Appert to produce meat that could be transported great distances without the threat of spoilage. What's more, Appert did this on an industrial scale, employing fifty people to chunk, cook, can, hermetically seal and inspect the products for quality.

As with many new technologies, preserved food was not immediately popular. After all, much of France was characterized by their agricultural way of life and they were able to get fresh fruits and vegetables from the southern portion of the country as well as from their African colonies. Military leaders were the first to appreciate the great advantages that Appert's new food product afforded them. Such products provided the militia a rare security against food shortages that were common on oceanic ventures [4].

The Englishman William Underwood brought food preservation to the United States in the early nineteenth century. At this point, Underwood was able to preserve a variety of fruits, vegetables and sauces. Preservation continued on a small scale until about 1860 when Gail Borden erected a facility to can milk. While the milk that Borden produced was not considered good, it, and other preserved foods became extremely popular when the Civil War broke out in 1861 [5].

Around the same time that pasteurization technologies were using heat to preserve foodstuffs, other inventors were experimenting with an opposite technology, refrigeration. The concept of refrigeration has been in use since ancient times by means of collecting ice and snow throughout the winter months and storing it in insulated structures. This means of preserving food, while effective up until a point, had its limits. As the demand for ice increased in the first half of the nineteenth century scientists developed cooling techniques using the compression

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3 Flandrin, Montanari & Sonnenfeld. (1999). *Food : A culinary history from antiquity to the present* (to be referred to as *Food* from hence forth). Page 486

4 ibid.

5 *Food*. Page 489

and expansion of certain gases. By 1851, John Gorrie patented the first refrigerator in the United States. Twenty years later Charles Tellier advanced the technology to the point where he was able to install refrigerators on boats [6].

Amazing achievements in transportation were hugely influential in the food systems of the nineteenth and twentieth centuries. The expansion of roadways connected distant cities and towns. Canals made it possible to transport large quantities of food. Railways allowed for the rapid transportation of foodstuffs over long distances. And steamboats could move quickly enough to permitted the intercontinental exchange of food.

These three advances, preservation, refrigeration and transportation, had massive implications for our food systems. Ultimately, these technologies afforded humans three major opportunities with regard to food: speed, overcoming long distances and longevity. Now that food could be transported and stored over great distance and for long periods of time, the threat of starvation was minimized. While there were many other contributing factors, these new technologies fostered population growth. No longer needed as much on the farm, people moved away from the country and away from an understanding and appreciation of food. If living in the city was not already far enough removed from the land, Americans desired living in high-rise apartment buildings, hundreds of feet above the soil. So not only did Americans move away from the country, they also moved up, severing almost all connection they had with the land that fed them.

American Attitudes toward Food

When Americans began cultivating the New World, the soil was extremely fertile, allowing them the opportunity to grow bountiful crops of grain, fruit and vegetables. Americans were proud of the abundance of their land. They also had vast tracts of land on which they could raise animals. The oceans and interior bodies of water provided coastal dwellers with ample amounts of fresh fish as well. As the land was fertile so was the produce that came from it. Americans ate well and their health and physical bodies demonstrated this. "American soldiers

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were, on average, much taller than both the British soldiers facing them and the French troops who came to their aid" during the battles for independence in the 1770s[7].

It was noted early on by European travelers to the United States that Americans consumed an abundance of meat. There may have been many reasons for this. One logical reason was that animals could be butchered during times of the year when vegetable simply could not grow. But Americans were also skeptical of raw fruits and vegetables and preferred to cook them for long periods of time [8] (it was not yet known that preparing food in this way significantly reduced its nutritional value). Nevertheless, as time went on, more and more people immigrated to the United States, bringing with them many of their own food traditions and continually changing American food culture.

Modern Americans are no strangers to food-related health scares or the bombardment of claims from scientists and health professional telling us what [not] to eat. However, this trend is less contemporary than most might imagine. As early as the 1830s, advisors began cautioning consumers about the potentially detrimental effects of foods altered by science. Various men, with a range of backgrounds, preached reforms to the ever-evolving food system. Interestingly enough, the claims against the new industrialized food, made possible by advances in science, were themselves supported by science. Many of the suggested reforms told people which foods they should not consume. Some of these foods included white bread, alcohol, meat and spices. Many of these claims fit well with ideals of purism and found support from religious groups. Ultimately, these reforms were received to varying degrees by the different demographics of the population [9].

Around the turn of the twentieth century, another round of food reforms took place. This time the aim was to reduce the consumption of fried foods, meats and sweets in order to improve the health and moral state of the Americans. Surprisingly, this reform was not aimed at the potbellied aristocrats but rather at the immigrant workers. In true capitalist fashion, it was believed that if immigrant workers were to eat better than they would be more efficient at their

7 *Food*. Page 516
8 *Food*. Page 517
9 *Food*. Page 518

jobs. Efficiency would make workers more money and this would enable them to afford a better their way of life. A higher quality of life would help protect businesses from social movements that threatened the stability of production (including unionization, socialism and anarchism). But these suggested alteration to the immigrant diet fell on deaf ears as many of them had come to the United State hoping to enjoy the abundance (of meat) the country was known to possess[10].

Ultimately, the American middle-class began to listen to the reformers' suggestions. The restraint that the reformers were advocating for fit nicely into the budgets of the middle-class; eating less, costs less. Therefore, middle-class citizens could show off their knowledge food science by simply doing without. Eating less was soon understood as a refined thing to do and suggested upper class.

Another substantial contributing factor to the distancing of Americans from their food was that the people who were expected to cook meals, the women of the households, began entering the work force. Women began entering the work force in the nineteenth century but it was not until later in twentieth century that they represented a significant proportion of workers. World War II took many women out of the kitchen and into the workplace. With the majority of the men off to war and the need for supplies, women were given jobs that they might not have otherwise been available to them. As women entered the workforce, their traditional job of preparing food for their family remained, as far as society was concerned, their responsibility. (Much of this remains unchanged today) The time that women previously had to prepare meals was dramatically reduced by her responsibilities to her day job. It is therefore not surprising that women sought quick alternative means of feeding their families. A huge market for working women with little time and hungry children was born. Processed foods became a necessity. Food processors leapt at this opportunity to capitalize on this pressing demand.

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This might not have posed a problem if it were not for the fact that most processed foods are inordinately unhealthy. The extremely high quantities of salt, fat, sugar and calories present health risks to all who eat them. Sadly, the manufactures of these products neglected to pass this information on to the consumers. If the health risks weren't bad enough, this is what many mothers fed their children on a consistent basis. So not only were the children of the future eating harmful foods, that, undoubtedly, caused health problems later in life, they were also learning these malignant habits of consumption. Because of this, vast numbers of Americans have carried and propagated these habits with them, further aggravating the problem.

The scientific discovery of the existence and importance of vitamins also helped to morph our current relationship with food. As people became more informed about the importance of vitamins in the early twentieth century, their eating habits shifted. Exposure to earlier food reforms had already positioned upper- and middle-class Americans to think more with their brains than their taste buds when it came to food. This new scientific way of analyzing food was novel information, and, as with most new information, people were eager to get their hands on it. The industrial advances in food production furthered the interest and investigation into vitamins. Because industry had transformed food production into a highly mechanized system, vitamins could be inserted or extracted to make a product more marketable. As it turned out, vitamins became food producers advertising dream-come-true [11]. Food producers began marketing their products less as food, and more as convenient items of vitamin delivery. Because vitamins are tasteless, scentless, weightless and invisible, people had to rely on advertisements to know what was in the food they were buying.

Advertising, with a focus on vitamins, was able to change people's fundamental knowledge about what food they needed to consume. Food producers made claims of improved health, more energy and a magnitude of other things that any person would want. For example, in the 1920s, milk producers were able to successfully add vitamin D to canned milk. While milk had previously been understood as children's food, advertisers began to market it as an essential food for adults as well. These advertising efforts were so well received that

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the beverage preference of G.I.'s switched dramatically from coffee during World War I to milk during World War II [12]. The effects of this advertising can still be seen today in modern Americans' food choices.

World War II had lasting impacts on the American view of food both during and after the fighting. During the war, people in Americans were required to cut back on their food consumption due to shortages and rationing. This was a major blow to the idea that America was the land of abundance. After the war, when families were reunited, much time was spent on home-building. People wanted to spend time with their families and rekindle relationships and projects that had been put on hold. This meant that topics of food and health receive very little attention during the baby boom years between the mid-1940s and the mid-1960s. Instead, people tended towards foods of convenience, foods that had been engineered and pumped full of chemicals and additives to keep them edible. American's were extremely proud of their ability to extend the shelf life of their food but this further distanced people from healthy food.

The desire to eat foods of convenience greatly over shadowed most American's concerns for gastronomy [13]. It was generally accepted that food did not need to taste great so long as it did not take too long to cook and consume. What's more was that this held true for most all demographics. Maybe for the first time, food was no longer used as an indicator of class. People from all demographics were eating the same foods; hamburgers, fried chicken, potato chips, canned soup, soda and gelatin to name a few. And people believed that these were the right things to eat because scientists, educators and government officials told them so. Whether there was not yet enough information, or manufactures simply neglected to share it, these foods were harmful to consume in large quantities.

As all of this processed food was beginning to affect people's health, food reformers were faced with the difficult task of capturing the public's attention. With all of the convincing advertisements floating around, this task necessitated a tactical change. In order to make people care about the harmful effects of the food they were consuming, food reforms took to scaring

12 ibid.

13 Defined, per the Merriam-Webster Dictionary, as, "the art or science of good eating"

people. Instead of telling people what they should eat, food reformed started advertising the problems with specific foods, telling people to avoid them or their health was in danger. This might seem like a small change but it gravely changed American's relationship with food. Because some foods were knew to be harmful, it made people apprehensive about all food. Food was no longer understood as nutritious, full of necessary vitamins and minerals, but rather suspicious and full of toxins. People did not know who to trust and so food became people's enemy, setting up a enduring negative relationship.

The influences that helped define Americans' relationship with food included national pride, women entering the work force, scientific discoveries in the field of health (including vitamins), and attempts at food reform. These influences establish a population that is proud of the large quantities of meat they can raise and consume. Families that are too busy to prepare healthful meals so instead eat quick processed food devoid of nutritional value and full of chemicals. A population who cares more about the fine print on the packaging of their food than the actual taste. And a population that has a better sense of what they should *not* eat as opposed to what they should eat. All of this adds up to an overarching, unhealthy fear of food. The root of this fear continues to develop out of a widespread lack of accessible knowledge

The Result: Emerging Food-Related Health Issues

The health problems associated with America's industrialized eating habits are numerous, life threatening, and widespread. The most obvious problem caused by unhealthy and over eating is obesity. According to the Center for Disease Control and Prevention (the CDC), one in three adults and one in six children in America are obese. Obese people run a great risk of developing many health problems, the major ones being, "heart disease, cancer, and diabetes". The CDC estimates that the United States spends approximately 150 million dollars on obesity related medical expenses annually [14].

14 http://www.cdc.gov/CDCTV/ObesityEpidemic/Transcripts/ObesityEpidemic.pdf

Obesity is believed to be one of the causes of diabetes, "the seventh leading cause of death in the United States". People with diabetes have high amounts of glucose in their blood. In order for the body to process this glucose, it needs insulin, a hormone produce in the pancreas that helps glucose get into the cells so that body can use it for energy. Diabetics' bodies either do not produce enough insulin or cannot use their own insulin. Because the body is not processing the glucose, it builds up and can cause a multitude of other "serious health complications including heart disease, blindness, kidney failure, and lower-extremity amputations" [15].

Hypertension, otherwise known as high blood pressure, is a heart disease in which the heart is forced to work harder to pump blood. Putting this added pressure on the heart can potentially lead to heart failure. Hypertension is often associated with a diet consisting of foods that are high in salt. There is a clear connection between processed food and high blood pressure because most processed food is very high in salt.

Another problem associated with unhealthy eating is high cholesterol. While it is true that the human body needs good cholesterol, there is bad cholesterol that clogs the arteries. Clogged arteries restrict blood flow, putting the person in danger of a heart attack. Bad cholesterol often builds up when the person consumes many foods that are high in fat. Not surprisingly, many processed foods and fast foods contain high amounts of fat. With Americans consuming large quantities of these foods, whether out of financial necessity or convenience, it is no surprise that 13.5% of the population struggled with high cholesterol between 2009 and 2010 [16].

There is a momentous problem facing Americans and their relationship with food today, the food system is broken and it is killing people. The root of this problem stems from the fact that Americans are so far removed from their food that they cannot effectively make good decisions about what they eat. They are both physically and mentally distanced from their food due to a complex history involving science, technology, social and political factors. They are physically distanced because the majority of the population lives in urban areas. And

15 http://www.cdc.gov/diabetes/consumer/learn.htm
16 http://www.cdc.gov/nchs/data/databriefs/db92.pdf

mentally, because people are not being taught what they should and should not eat. Rather consumers are over burdened with flashy advertisements and conflicting reports conveying almost exclusively what big agriculture wants people to hear.

Architecture has the potential to play a huge role in helping to correct the roots of this problem. With the proper infrastructure, people can foster both the physical and mental knowledge they are lacking. With the appropriate resources people can come together to teach and learn the information that has been lost on much of the general public. The following design proposal for the Glens Falls Good Foods Collective strives to be this architecture; the catalyst that brings about this necessary service to the people and has a resoundingly positive influence on many aspects of human existence.

CHAPTER III

PRECEDENTS THAT CONNECT PEOPLE WITH FOOD

This chapter focuses on three examples of new and innovative designs that encourage people to interact with food in meaningful and educational ways.

Pavilion NoRa

A unique and exciting precedent that demonstrates the intersection of food and architectural is illustrated by the Pavilion NoRa, a collaboration of the Food College Denmark, students from the University of Aalborg- Department of Architecture and Design, the Culinary Institute of Denmark and the National Culinary Team of Denmark. This project endeavored to address the "performative and socializing" factors of food.

> "NoRa encompasses functions and activities of developing and preparing experience-related food, communication, and knowledge-production through an ambient exhibition environment as well as workshop facilities forming the outer frames around a "culinary experience-production unit"" [17]

Figure 3- Pavillion NoRa 1. Architizer LLC. 2009.

17 Fisker & Olsen. (2008). Food, Architecture and Experience Design. Page 68

The Pavilion NoRa was designed for the 10th International Architectural Biennale, which took place in Venice in 2006. The design of the structure was informed by analysis of the movement of light, shadow and people, including the visitor to the Biennale and the performing chefs, across the site. Using parametric design and fluid dynamics software, these inputs produced the volume of the pavilion. The pavilion was wired with sensors and had multiple satellite sensing locations around the site. These sensors gathered and analyze real-time information about the human experience of the pavilion and surround area. The information was then used to create "an ambient space of sound and light, responsive to human interaction". Furthermore, the pavilion was made of a translucent material and therefore communicated visually with the outside. The folded geometry of the pavilion adds strength to the "unfold[ing of] food activities and social events" that took place within the pavilion to the surrounding environment. The creators of the Pavilion NoRa took the idea of site sensitive architecture to a new level with this design. Here they were able to take a "digital space [and realize it as a] physical place" [18]. The physical place then allowed the spectators to enhance their personal relationship to food via architecture.

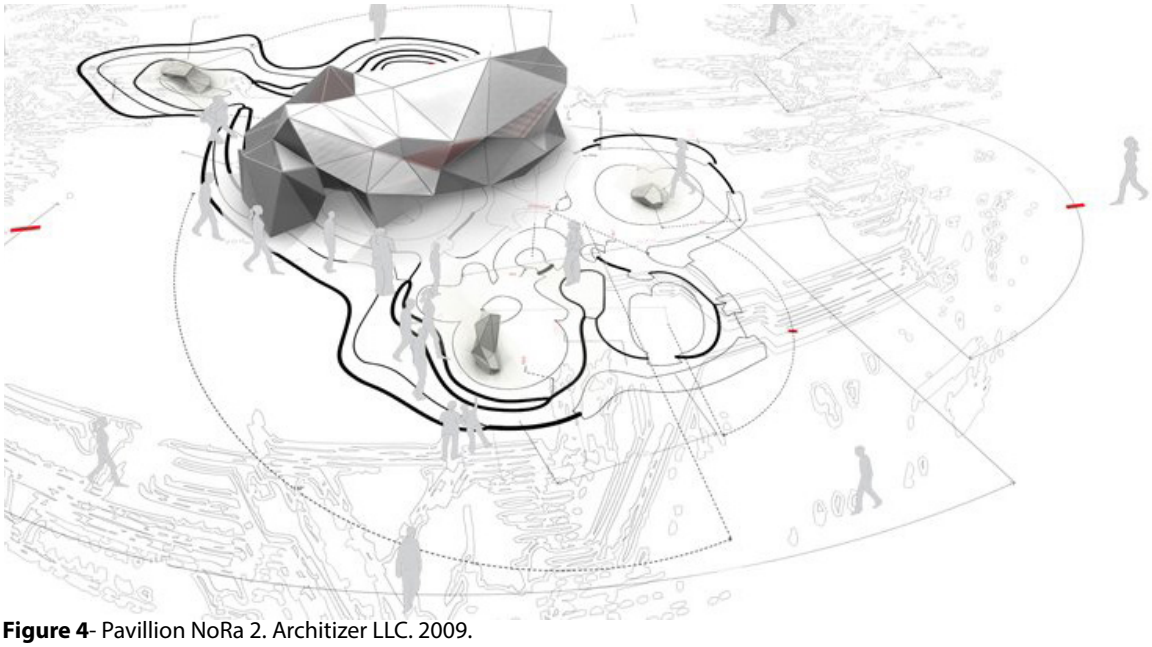

Figure 4- Pavillion NoRa 2. Architizer LLC. 2009.

18 Food, Architecture and Experience Design. Page 69

The way in which the Pavilion NoRa made its mark on the food scene via architecture was to create a pavilion that would was two-fold. One, they wanted their pavilion to spark a dialogue and a debate between all members involved in the food scene including consumers, educators, food manufacturers and corporate businesses. And two, they wanted to bring the exchange of knowledge and culture via the experience and communication of food to the city.

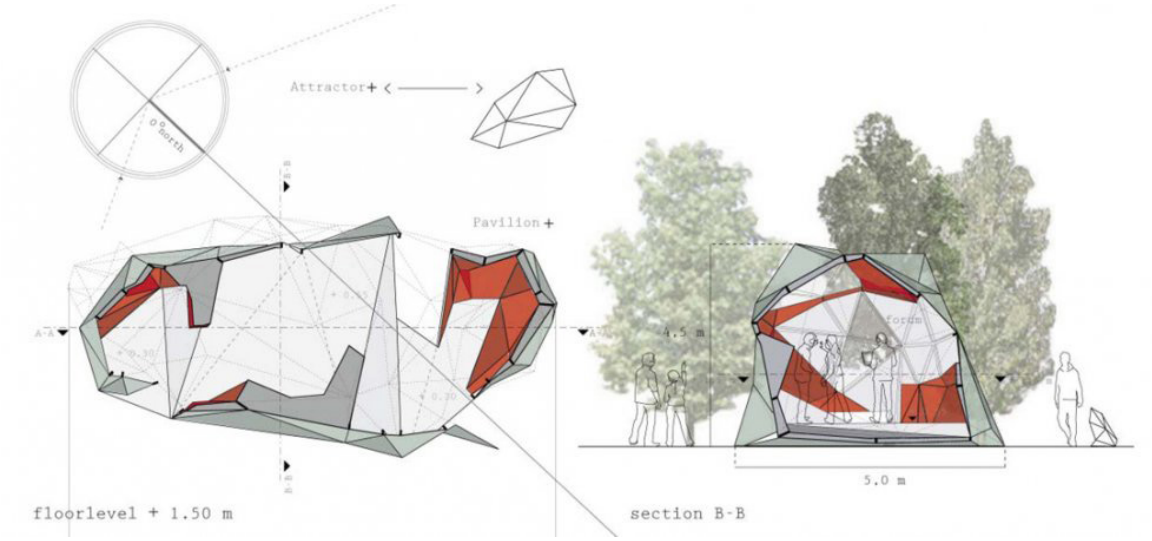

Figure 5- Pavillion NoRa 3. Architizer LLC. 2009.

The Pavilion NoRa was the physical manifestation of an idea about a portable food knowledge and experience center. The Pavilion NoRa was a place that integrated the characteristics and cultures of its immediate environment and used it to engage and inform people about food. The locality of this project allowed the visitors to it to formulate stronger, more meaningful connections to the information being communicated.

Ice-Aid

Ice-Aid was another interesting food related project that came out of Denmark in 2007. The idea was to create awareness of a pressing global crisis by means of a dramatic and memorable food experience. Ice-Aid was also the work of collaborative efforts, this time between the Aalborg University, local food manufacturers, the Food College Denmark and other outside designers.

Figure 6- Ice-Aid. Pedersen, Lesse. 2008.

The goal of Ice-Aid was to create awareness about global warming and by doing so, entice people to help address its causes. In order to do this the creators designed an experience, an experience that was understood by means of interaction with this specific product. The product was a single serving of high quality ice cream served in a bowl made of pure tap water [19]. The ice cream bowls were intended to be sold at public events such as festivals. The idea being, that you hold in your hand this wonderful (spherical) treat, but the ice bowl it sits in is freezing to the touch, creating a sensation of pain. The longer you hold the ice cream, the more the bowl melts, creating a mess and further discomfort. The event created by this ice cream is a tangible experience of the often-invisible consequences of global warming. Just as the ice melts in your hand, produces unwanted excess water, the polar ice caps are melting causing the sea level to rise. Just as the ice cream is a delicious treat for your taste buds, the earth is a miraculous

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place we are permitted to inhabit and yet we abuse it for our own personal satisfaction. Ice-Aid became a demonstration that people could understand and experience firsthand. This firsthand experience allowed Ice-Aid to craft a lasting impression on a potentially unaware audience.

This fascinating project was simple and yet extremely powerful. Ice-Aid was able to distribute knowledge, start a dialogue and rally support for a worthwhile cause through its design of a food related experience.

Vertical Farming

Vertical farming is a relatively new idea being championed by Doctor Dickson Despommier from the Department of Environmental Health Sciences at the Mailman School of Public Health, Columbia University. Despommier concept is still in the design phase and has not yet manifested into a physical construct but his idea puts forth some very ambitious claims. Despommier's basic idea is to erect three-dimensional farms, (a series of stacked greenhouses) to replace traditional, or "two-dimensional" farms. The plan relies on technologies that are still on the development phase.

Vertical farming claims, theoretically, to produce a much larger crop of edible produce per square foot of planted area. It can do this because vertical farming has the advantage of being completely indoors, protecting the crops from damaging weather conditions. The indoor climate would be carefully monitored and controlled to provide optimal growing conditions for each specific plant. Despommier also believes that he can do this without the input of massive amounts of fossil fuel-generated energy or chemical fertilizers thereby dramatically reducing current issues of run-off and green house gases.

Vertical farming hopes to incorporate both waste, water, and energy cycles into its system and by doing so make each system function more efficiently. The vertical farm would have a space dedicated to the processing of waste, both human and food waste (from restaurants). The decomposition of this waste can be done by natural processes reducing the need for chemicals and lengthy transportation. Byproducts of this system would be clean water and methane gas

both of which could be used to grow food or be put back into the grid. The water could be used to actually grow the plants and the methane could be burned to supply the vertical farm with necessary energy. Using these waste management techniques would aid in solving a multitude of problems related to waste that many cities currently face. Large cities often suffer from inadequate waste removal even in more developed countries. This allows vermin populations to thrive and in doing so poses heath threats to human populations. Less developed countries are notorious for having deficient sewage systems, thereby allowing sickness and disease to proliferate. Both of these problems, and potentially others, could be ameliorated with the implementation of vertical farms throughout all types of urban centers.

The vertical farm would be constructed in urban areas providing many benefits to the people in these commuities. This location would provide easy access of local, healthy food to large populations. The food would be much less likely to spoil before getting to people because it has very little distance to travel. Because the food is not being transported over large distances, the amount of fossil fuels burned for food transportation could be dramatically reduced. These vertical farms would be built on unused and otherwise undesirable lots, potentially revitalizing communities and alleviating social turmoil in these areas. Furthermore, these new farms will need to be managed, consistently and carefully, providing a range of rewarding jobs for local people.

One of Despommier's most significant claims is that by switching over to vertical farming, the land that is currently used (and abused) for farming purposes would be left fallow. Doing so would allow this land to naturally restore itself, prevent further degradation, and rebuild biodiversity. He cites multiple examples of how ecosystems that have been abandoned by humans, even in harsh climates, have rebounded to their pre-cultivation states. The restoration of these farmlands would help reverse much of the damage humans have caused and create a healthier planet for all [20].

Despommier's idea is extremely ambitious but has great potential for helping to mend humans relationship with food. A gleaming glass tower of food production in an urban center

20 Despommier, D. The vertical farm. Retrieved May, 2012, from http://www.verticalfarm.com/

Figure 7- "The Living Skyscraper: Farming the Urban Skyline". Blake Kurasek. 2009.

would bring food cultivation to the forefront of people's minds. It would no longer be a mystery as to where food comes from. It would be a great educational opportunity. Classes could take field trips to the farm to learn and appreciate the work that goes into the food they consume. Community groups could try their hand at physically growing food, encouraging them to take pride in their food as opposed to fearing it. It is important to note that Despommier's idea is not perfect. If vertical farms are built, there will likely be unforeseen ramifications and impacts, but as an idea, it has great power and potential.

CHAPTER IV

FOOD PROCESSING IN NEW ENGLAND

The Process of Food Processing

A major obstacle standing in the way of people consuming more local and healthy food is that many small farmers have a very difficult time getting their products to market. Small, and even medium sized farmers, are often not equipped to process the food they harvest for two major reasons. First, food-processing equipment is prohibitively expensive, preventing most farmers from purchasing their own. Second, food processing is tightly regulated, requiring licensure and inspections which imposes a significant financial burden on farmers.

For these and other reasons, small farmers are forced to sell their raw goods to large processors just to get by. The problem with this is that when food goes to a large processing plant it takes longer to get to market. Additionally, the food is likely treated with preservatives in order to combat the extra time it spends in transit. The longer theses raw goods sit around before being consumed, the more nutrients are lost. In this way, the health benefits of the food are compromised as is the environment because of the fossil fuels consumed in transportation.

Envisioning a New Food Process- The Food Hub

In order to avoid the above problems, it would make sense for farmers to process their own produce and bring it to local markets. This idea has manifested itself in recent years with the dramatic increase in the number of farmers markets that have started up all across the country. While farmers' markets work great for getting local, healthy food to some, they certainly have their limits. It is very difficult for many people to get to the location of these markets at the appropriate times. Many people do not have the time to go to multiple stores to get their weekly supplies; this is the convenience of the modern super market. People can get their potatoes, chicken, medicine and paper towel all under the same roof. Americans have grown up with this kind of convenience shopping and sadly, society does not provide much room for change in this

department. Finally, because of the small scale of many farmers markets, most can only cater to small scale consumers. This leaves out a large and lucrative portion of the food industry, places of commercial consumerism such as restaurants, cafes, and cafeterias.

Fortunately, there is a lesser know, but quickly growing, food movement that helps farmers combat the industrialization of our food system, the food hub movement. Food Hubs provide space for the aggregation and processing of food from many local farms. A typical food hub provides all the necessary processing equipment and takes care of the regulation. Farmers then pay a reasonable fee to use the space and equipment and do not have to manage with the regulation (provided they follow the rules set forth by the food hub). The food hub is a place for the sharing of resources and knowledge that carters to the specific needs of small, local farmers.

Many food hubs also offer additional resources to their patrons according to regional need. Most facilities have storage space on site. Storage is extremely important when processing food because food is sensitive to temperature, light, and humidity. Appropriate storage space allows food to be stored at optimum conditions, preserving the freshness and longevity of the food. Depending on what type of processing is taking place, different types of storage could be available including dry, cold, and freezer storage.

Two other services sometimes offered by food hubs are business development services and distribution services. Because most farmers know a lot about farming practices but maybe less about business management, the food hub can provide information to help farmers better manage their farm. A significant service that business developers can provide is connecting farmers with buyers (and likewise, buyers with local producers). Many small farmers do not produce enough food to satisfy the demands of larger retailers or commercial outlets. These buyers want to get their products from a small number of suppliers, so food hubs can facilitate the assemblage of goods from many small farmers in one location, reducing the burden on both farmer and buyer. In the same capacity, food hubs might offer to distribute their products to buyers. This is a great benefit to farmers because after they process their goods, the food hub takes care of getting the food to buyers, allowing the farmers to get back to growing food.

CHAPTER V

FOOD PROCESSING PRECEDENTS

This chapter looks at two food processing centers that cater to the needs of smaller farmers and food entrepreneurs in New England.

Western Massachusetts Food Processing Center

324 Wells Street
Greenfield MA

The Franklin County Community Development Corporation is an economic development non-profit organization that provides comprehensive business development education, access to capital, and commercial office and manufacturing space. They also started the Western Massachusetts Food Processing Center, a facility in Greenfield Massachusetts that helps guide specialty food entrepreneurs to manufacture food products.

> "The Western Massachusetts Food Processing Center's mission is to promote economic development through entrepreneurship, provide opportunities for sustaining local agriculture and promote best practices for food producers."

Since the center opened about ten years ago with the help of $800,000 in grants from the state Department of Agricultural Resources, the U.S. Department of Agriculture and Housing and Urban Development, some 230 food businesses have received assistance. The food-processing center acts as an incubator. Some businesses have flourished and moved into their own facilities. Others have continued to use the food-processing center for many years. But as with any incubator, some of the businesses didn't worked out and were discontinued.

This facility provides numerous benefits to local food businesses and the community. For the entrepreneurs, the beauty of the food-processing center is the low capital cost for startup; instead of buying needed equipment for thousands of dollars, they can rent it at the center for a reasonable hourly rate. For the community, the food-processing center has increased the

number of local businesses providing jobs and bringing in money.

The food-processing plant has made some changes over the years. "Initially, we had the facilities and the equipment, and we taught people to use them," said John F. Waite, executive director of the Franklin County Community Development Corporation. But the needs of businesses changed and now some businesses hire the corporation to make their products for them (co-packing).

The corporation also purchases vegetables from local farmers, processes, and then freezes them to sell to schools in the region. This benefits the farmers because they are paid for produce that might otherwise go to waste. The corporation makes some money on the processing of the food. Finally, the schools get healthy local food at a fair price. The food-processing plant made this healthful collaboration possible by building the necessary infrastructure and supporting those who need it.

On top of offering a place for production, food entrepreneurs can get help with the business aspects of their ventures. The support that is available includes business planning, recipe development, up-scaling, testing, referrals to labs for product testing and preparation (for license inspections), production assistance, marketing support and networking with distribution channels. This resource for convenient, dependable knowledge and support has helped make western Massachusetts a thriving place for food businesses. [21]

Mad River Food Hub
151 Mad River Canoe Road
Waitsfield, VT

There is a desperate need for meat processing facilities in the state of Vermont. Regulations stipulate that food processing takes place in a licensed facility but most small Vermont farmers so not have the means to build or license such facilities. The Mad River Food Hub recognized this demand and in 2011 opened a food processing facility for small-scale farms. It is fully equipped and licensed to process fruits and vegetables as well as produce USDA

21 http://www.fccdc.org/fpcabout.html

certified meat.

The shared meat processing space is the first of its kind in Vermont. The 4,000-square-foot facility gives farmers the space and equipment they need to process and preserve their products. The building has three processing room, a smoker and both dry and cold storage. Each processing room is available for rent by the day. The Food Hub also staffs experience people who provide business planning assistance, HACCP plan development, and access to a vast network of other food enterprises. Additionally, the Food Hub helps farmers get there product into the market place by offering weekly distribution services to retail markets throughout the Mad River Valley, Waterbury, Montpelier, and Burlington.

The Mad River Food Hub not only provides a needed service to farmers also to the local food industries because of the growing demand for local meats and produce. Erica Campbell, the director of the Farm to Plate program, explained, "there's an increasing demand for locally-grown meat, especially grass-fed, so as the demand increases, farmers would like to meet that demand, but they can't do it without some of the critical infrastructure that needs to happen." The construction of the Mad River Food Hub provides a valuable service to farmers, food sellers and consumer that encourages local healthy food to make its way into the market place and onto the tables of people throughout New England.

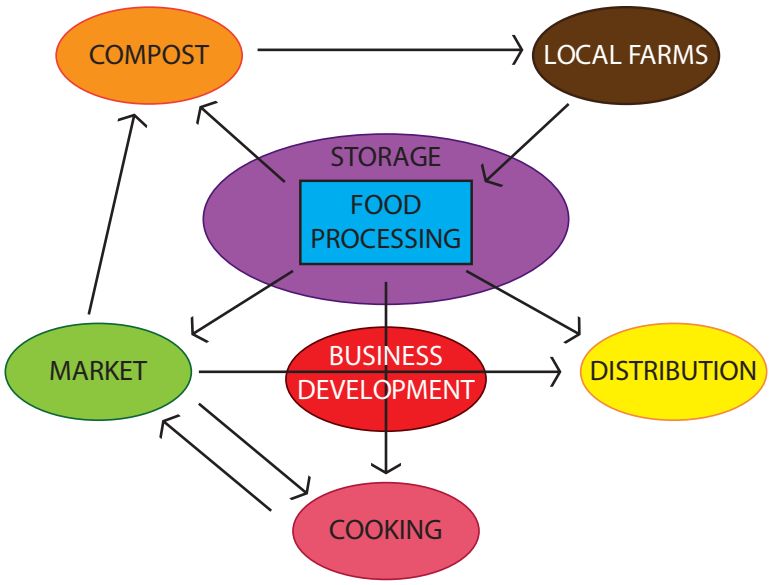


Figure 8- Food Processing Diagram

CHAPTER VI

PROGRAM AND REGULATION

Program of The Glens Falls Good Foods Collective

The Glens Falls Good Foods Collective is designed to facilitate the full range of food hub services while simultaneously offering elements of community involvement and outreach. At its core, the Collective is a food processing facility combined with a market. It is a lost opportunity that most food hubs do not offer to sell the goods produced at the facility, site. By combining the processing and the market, transportation costs are reduced, freshness is preserved, and, most importantly, people can see where their food comes from.

The are eight elements of the Glens Falls Good Foods Collective are:

- Food processing
- Composting
- Storage
- Distribution
- Market
- Cooking labs
- Business development and administration, and
- Multi-purpose space

The food processing space is made up of specialized kitchens and cleaning stations. Specifically, there are five kitchens, one each for: conventional raw processing, organic raw processing, co-packing, hot processing, and baking. Each kitchen requires approximately 750 square feet. While these kitchens are set up to facilitate specific tasks, some kitchens can be used for other tasks if there is such a demand.

The conventional raw processing kitchen is set up for farmers to prepare their raw fruits and vegetables for retail consumption.

The organic raw processing functions in the same way as the conventional raw processing kitchen except that is it reserved for processing food that was harvested from organic farms. It is important to have an organic kitchen because of the specific regulations surrounding the

certification of organic foods.

The co-packing kitchen provides farmers with the opportunity to hire the Collective do the processing for him. In this case, much of the co-packing involves freezing fresh produce to seal in its nutrients if it cannot be sold or consumed in a timely manner.

The hot processing kitchen is designed to facilitate the production of foods that require cooking. These foods including pasta sauces, pickled vegetables, relishes, salsas, dried fruits and vegetables, soup mixes, and other such food items.

The Collective bakery provides local food entrepreneurs with a space to produce baked goods or other bake-at-home type frozen items.

Essential to the smooth function of these kitchens is clean up. Therefore, there are two cleaning stations in addition to basic cleaning facilities within each kitchen. These cleaning stations are intended for use in cleaning large cooking instruments or sizeable quantities of dishes all at the same time. Each station measures approximately 200 square feet.

Food processing has the potential to produce a lot of waste; fortunately, most of this waste is compostable. Whether it is carrot greens or simply a tomato that has turned to mush, all of this food waste can be composted. Composting is a vital piece of any food production operation because growing food depletes the soil of certain nutrients depending on what is grown. Composting produces extremely nutrient rich soil that can then be used to replenish depleted soil. This soil has the ability to benefit surrounding farms or recreation areas if processed correctly. By composting, the Collective is also diverting a large amount of waste from landfills and reducing the problems associated with transporting and storing such waste.

Additionally, the importance of composting to our food system is something that much of the public does not understand or appreciate. By incorporating composting into the Collective, there is opportunity to familiarize, educate, and involve people in this important act. One final benefit of composting is that it does a lot of good with a very small amount of space, resources, and effort. For these reasons, composting is an important element of the Collective, occupying approximately 400 square feet.

An often-overlooked component to food processing is storage. As mentioned before, it is essential that food be kept at specific temperature, light, and humidity levels. Oftentimes farmers do not have enough control over these elements at their farms. The Collective recognizes these facts and conscientiously incorporates four different types of food storage into the design. Similar to most food hubs, the Collective has dry, cold, and frozen food storage. Each of these storage spaces requires approximately 800 square feet.

Unlike most food hubs, the Collective adds a unique type of storage, a root cellar. The root cellar relies on the simple properties of earth to keep the produce at the appropriate temperature and humidity and therefore does not require much in the way of energy input. Approximately 400 square feet will be used for root storage. A portion of each of these types of food storage will be reserved for the market but there is added space for their non-food related needs (such as bags and displays).

In order to make processing as efficient as possible, storage of kitchen tools and equipment was thought out and arranged accordingly. Kitchen storage takes up approximately 400 square feet. Composting has its own storage as well, approximately 60 square feet indoors and 120 square feet outdoors. Miscellaneous storage is also located throughout the facility.

The Collective will offer distribution services. A loading dock and staging space occupy approximately 800 square feet for this function.

The market place is one of the main pillars of the Collective. The market provides the public with a place to purchase locally grown, healthy food, 12 hours a day, year round. In order to make the hub a viable shopping destination, it will also sell a small selection of other healthy food items but the focus will be on the food that is produced on site. More information about the market is located in Chapter VI, The Design.

Another way the Collective will educate the public about healthy food is the inclusion of the cooking labs. These labs are smaller kitchens, approximately 500 square feet, that the public can use. These labs are indented to function in two ways. One, the Collective, or other community members, can offer cooking classes or demonstrations. These classes and demonstrations would

provide a fun, sometimes hands-on, way for people to learn about food while also building community and respect for food and farmers. Two, these kitchens could be rented out by food entrepreneurs to develop and refine their food products. Maybe a local woman has been told by all her friends that she should sell her amazing pesto sauce. She could rent out the cooking lab for a couple of hours or a day and produce her pesto on a larger scale than she could do from her own home kitchen. Alternatively, maybe a man has an idea for a special barbecue sauce but he does not have the space or resources to make it great. At the cooking lab, he could experiment with different techniques or ingredients until he got it perfect.

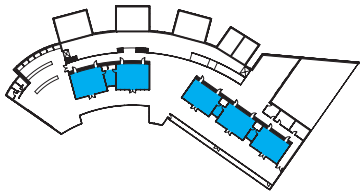
As there is a lot going on in the Collective, a significant amount of coordinating and management has to take place. For all of these tasks, the business development and administration suite has three offices at 100 square feet each, one workrooms at 100 square feet, and one conference room at 200 square feet.

Some of this space is dedicated to the smooth operation of the Collective itself while the rest is use for the business development. These spaces are mostly used for communication and research. The business developer and farmer might want to discuss how to get more out of their products, promote their brand, arrange distribution, or find buyers for their products. Additionally, the business development office offers help to the above-mentioned food entrepreneurs, with recipe development and production or technique.

Finally, one of the essential ways that people build community around food is to gather therefore, the Collective has an event space. This space measure approximately 1500 square feet and is very flexible. The multi-purpose space can be used for community suppers, celebrations, fairs, displays or an inclusive farmers market. The space is covered and protected making it a great location for events during inclement weather but can also be opened up to let in the surrounding environment.

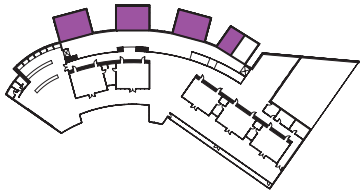
FOOD PROCESSING

Raw Processing- Conventional (800 s.f)
Raw Processing- Organic (800 s.f)
Co-Packing (800 s.f)
Hot Processing (800 s.f)
Bakery (800 s.f)
Cleaning (3 x 200 s.f)
Food Processing_ 4,600 s.f.



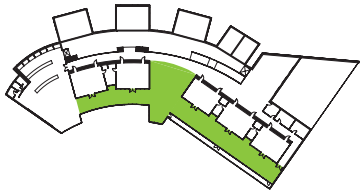
STORAGE

Dry (800 s.f)
Cold (800 s.f)
Freezer (800 s.f)
Root Cellar (400 s.f)
Equipment/ Utensil
Composting Materials
Storage_ 2,800 s.f.+



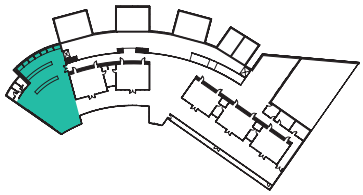
MARKET

Raw Fruits and Vegetables
Specialty Products
Dry Goods
Refrigerated and Frozen Goods
Market_ 1,500 s.f.



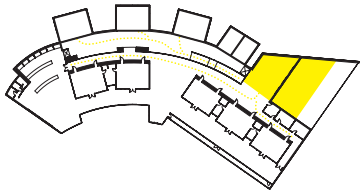
EVENT SPACE

Multi-Purpose Space for Work-shops/ Gathering/ Eating/ Farmer's Market/ Displays, etc.
Event_ 1,500 s.f.



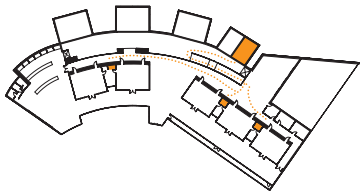
DISTRIBUTION

Loading Dock
Staging Area
Distribution_ 1,000 s.f.



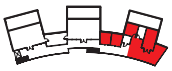
COMPOST

Decomposition Space
Collection Areas
Composting_ (400+ s.f.)



BUSINESS DEVELOPMENT & ADMINISTRATION

Offices (3 x 100 s.f.)
Conference Room (200 s.f.)
Work Room (100 s.f.)
BusAdmin._ 600 s.f.



COOKING LABS

Kitchens (2 x 600 s.f.)
Cleaning (200 s.f.)
Cooking Labs_ 1,400 s.f.

Figure 9- Program by Area

Important Regulation

The building regulations surrounding a building with so many different things going on, is quite complex. This is because the different programs have different use and occupancy group classifications according to the International Building Code. In total, there are six different use classifications in my proposed program. These include:

- Food Processing- Factory Industrial Group F-1 Moderate-Hazard
- Market- Mercantile Group M
- Storage- Low-hazard storage, Group S-2
- Composting- Utility and Miscellaneous Group U
- Multipurpose Space- Assembly Group A-3
- Business Development and Administration- Business Group B

Considering the importance of food safety, the food processing facilities require the largest attention. Most of the regulations pertain to making the space as easy to clean as possible. To this point, the International Building Code requires a food processing facility to abide by the following rules:

- Floors must be constructed of smooth durable material (such as sealed concrete, terrazzo, quarry tile, ceramic tile, durable grades of vinyl or plastic tile or tight-fitting wood impregnated with plastic)
- Floor drains are required and the floor shall be graded to drain
- Junctures between walls and floors shall be covered and sealed
- Exposed utility service lines and pipes shall be installed in a way that does not obstruct or prevent cleaning
- Walls shall be smooth, nonabsorbent and easily cleanable
- Light fixtures, vent covers, wall mounted fans, decorative materials and similar attachments to walls and ceilings shall be easily cleanable
- At least one service sink or curbed cleaning facility with a floor drain shall be provided for the cleaning of mops or similar wet floor cleaning tools and for the disposal of mop water or similar liquid wastes.
- Permanently fixed artificial light sources shall be installed to provide at least 20-foot candles (215 lux) of light above 30 inches off the ground in: food preparation spaces, sales areas, toilet rooms and equipment storage spaces. At least 10-foot candles (108 lux) of light is required in walk-in refrigeration units, dry food storage areas and in all other areas
- All rooms shall have sufficient ventilation to keep them free of excessive heat, steam, condensation, vapors, obnoxious odors, smoke and fumes
- Rooms for changing clothing shall be provided for employees (lockers or other

suitable facilities may only be located in the designated dressing rooms or areas, or in food storage rooms or areas containing only completely packaged food or packaged single-service articles)

- Hand washing facilities shall be installed and located in or immediately adjacent to toilet rooms or their vestibules, and in food preparation and ware washing rooms
- Equipment and utensils shall be stored at least six inches above the floor in a clean, dry location in a way that protects them from splash, dust and other means of contamination.
- Floor-mounted equipment, unless easily movable, shall be either sealed to the floor; or elevated on legs to provide at least a six-inch clearance between the floor and equipment,
- Aisles and working spaces between units of equipment, and between equipment and walls, shall be unobstructed and of sufficient width to permit employees to perform their duties readily without contamination of food or food-contact surfaces by clothing or personal contact.

CHAPTER VII

THE SITE

The Good Foods Collective is located in Glens Falls, New York, about 50 miles north of Albany. Glens Falls is a small city that sits on the Hudson River. The city includes about 3.9 square miles and is home to approximately 14,700 people . In the 1950s, the population of Glens Falls was close to 20,000 but in the 1960s the population began a steady decline. In 2010 the census recorded a population increase and the population has continued to grow over the past few years. The increase in population combined with the recent revitalization of downtown, suggests that Glens Falls is a growing city.

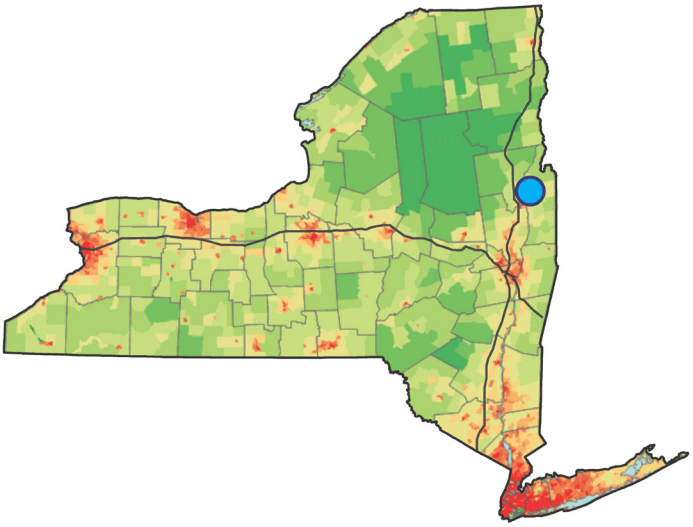


Figure 10- New York Population Density Map. US Census Bureau. 2010.

The parcel of land that the Good Foods Collective sits on was carefully chosen for its ideal location between the two groups of people the Collective is trying to connect. To the west sits the large population center of Glens Falls City and to the east, an abundance of fertile agricultural land. The Collective is designed to serve consumers and farmers within a 20-mile radius. By best estimate, this area includes approximately 25,000 people and 45 farms of varying sizes. By situating the Collective on this parcel, both farmers and consumers have equal access to the facility.

Figure 11- Site: Population Centers and Farmland

While the Collective has a market built into the fabric of the facility, it is necessary to distribute food goods to other area markets in order to have a greater impact on the community. Knowing that distribution was essential to making the Collective function, ensuring that the site had adequate access to transportation infrastructure was critical. The Collective is located at the juncture of Dix Ave, Route 254 and Route 32, all of which are main roads leading to different areas of the city. Figure 12 shows how farmers bring produce from their farms, the brown dots, to the Collective, the blue dot; here they process their goods and then these goods can be distributed to other markets within the area, the purple dots.

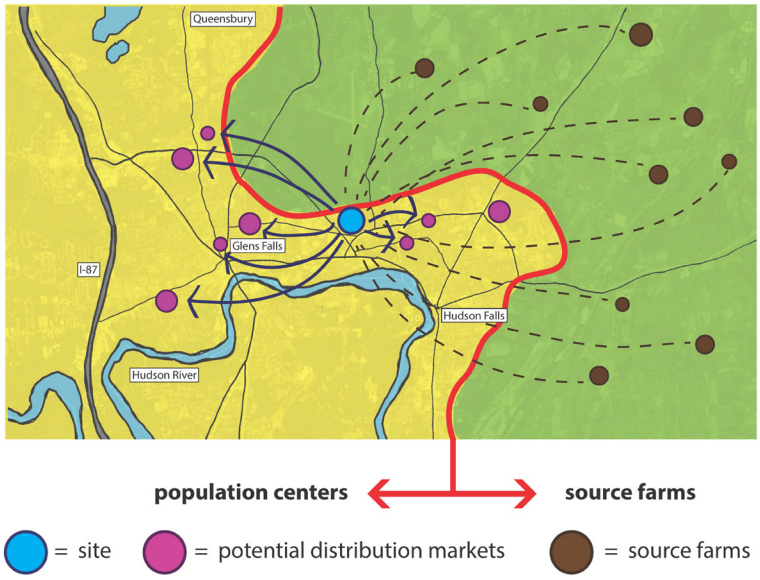


Figure 12- Site: Source Farms and Potential Distribution Markets

The parcel that the Collective sits on is approximately 15 acres. It is currently undeveloped and zoned for moderate commercial use. The surrounding parcels to the west are zoned for moderate and intensive commercial use. Some of the businesses include a garden center, fast food establishments, a department store, convenience market, gas station, and salon. The parcel feels like a boundary lot as the zoning shifts to neighborhood residential to the east. This parcel has about 400 feet of road frontage and a slight increase in elevation toward the center of the lot. The Collective sits on the souther portion of the lot while the northern portion will cultivated and used for demonstration gardens.

Figure 13- Site: Land Parcel and Immediate Context

Figure 14- Site: Panorama Looking North

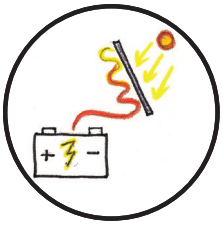
CHAPTER VIII

THE SYSTEMS

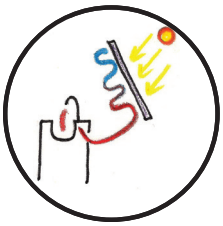
A New System for Food Processing

The Glens Falls Good Foods Collective uses a profusion of energy. Food processing itself is extremely energy intensive but so it conditioning the storage spaces and running the market. In order to help lessen the impact of the Collective on the environment and local utilities, a new building system was created. The many pieces of this new system eventually shaped the final design of the building.

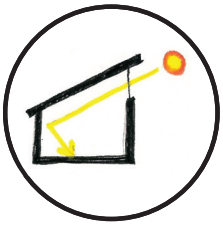
The basic premise behind this new building system is that one processes byproduct is another process' fuel. The reuse of these byproducts is both beneficial to the environment but all to the overall efficiency of the building. This system incorporates 12 interconnected pieces which are outlined below.



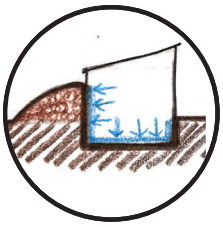
Solar Electric Panels- capture the suns energy to generate electricity. Good southern exposure and an adequately sloped roof are necessary for optimal gains.



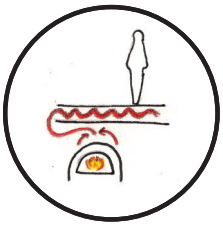
Solar Hot Water Panels- use the sun to heat water for use in processing and cleaning and have similar requirements as solar electric panels.



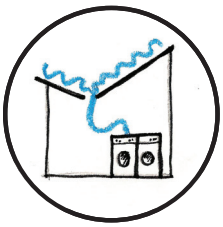
Clearstory- windows placed high on the northern wall bring soft, even, reflected light into the building. This reduces the amount of energy required to artificial light spaces with high lux demands.



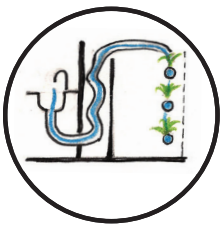
Earth Insulation- by sinking the storage portion of the building into the ground and mounding earth up around these spaces, the building takes advantage of the highly insulative quality of earth.



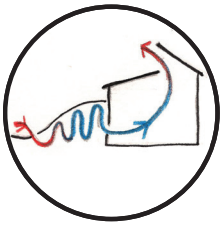
'Waste' Heat Reuse- collecting excess heat generated by many of the processes taking place in the building and recirculating it through radiant flooring.



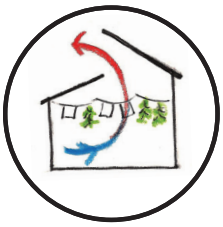
Rainwater Collection- to be used in applications such as towel washing in order to offset the demand for potable water from the city. A butterfly roof is efficient for rainwater collect.



Hydroponics- using nutrient rich water generated by many of the food processing processes feeds hydroponics growing on the south side of the build. These plants also provide needed shading.

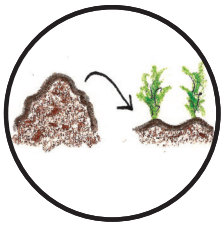


Ground Source Conditioning- using a ground source heat pump, air can be circulated through the 55˚F earth to provide both heating and cooling.



Natural Ventilation- proper vents encourage air to move through the building passively. This air movement also helps to dry items within the building such as herbs and towels.

Green Roof- part of the building is covered with a green roof which provides added insulation, helps with stormwater management and reduces the heat island effect.



Compost- collection of food waste throughout the building helps divert a massive amount of nutrient rich waste from the landfill. After the food waste breaks down, it is then used to grow more food.

Compost Preheat- in order to take advantage of the heat generated during decomposition, water is piped through the compost to preheat it for use in many of the water-intensive processes (such as dish washing) that take place in this building.

Figure 15- System Sketches

CHAPTER IX

THE DESIGN

The Glens Falls Good Foods Collective

The design for the Glens Falls Good Foods Collective was primarily informed by the systems it incorporates. Understanding those systems and the complicated connections between them was essential to a successful design. The process of working out these systems, and subsequently, the form, began with evaluating each program's climactic requirements. Specifically, each program has an ideal temperature, humidity, level, ventilation rate and quantity of light. Examining these needs helped to locate the programmatic elements in places that facilitated the most efficient access to these climatic factors. For instance, situating the storage spaces on the north side of the building protects it from the sun, and helps to keep light and temperature levels low in these spaces.

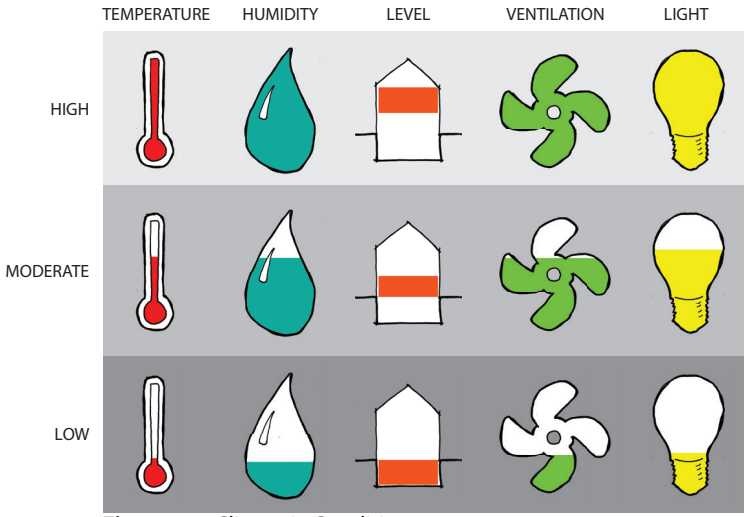


Figure 16- Climactic Conditions

The need to satisfy these climatic conditions was further complicated by the fact that Glens Falls experiences four very different seasons and each of these seasons changes the demands on the space. As most produce grown in the area is harvested during the summer months, efforts were forces on maximizing spaces for hotter, sunnier conditions. However, the Collective is meant to function year round and therefore both extremes were accounted for in

the design. One reason the processing kitchens, which generate a lot of heat simply because of the processes that take place within, are located in the center of the building is to protect them from overheating during the hot summer months.

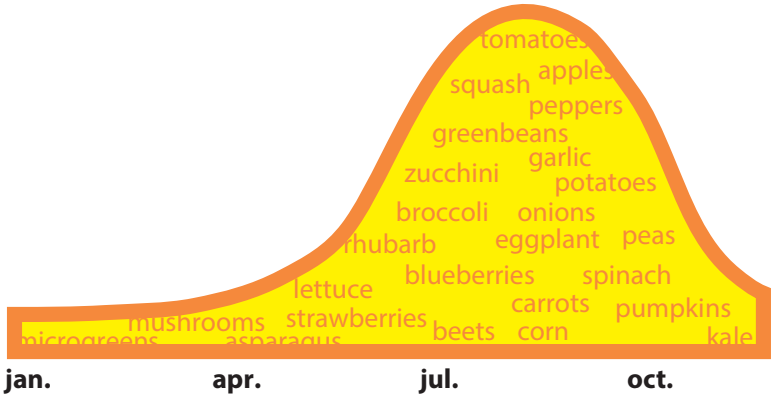


Figure 17- Seasonal Differences

The form of this building ultimately tries to combine the varied programmatic pieces, the complex interconnected systems, the natural resources available on site, and take into account that this system is constantly changing. In order to visualize how the all of these pieces could physically relate to each other, the dynamic model in Figure 18 was created. This model revealed trends, connections and productive adjacencies that determined the basic layout of the building.

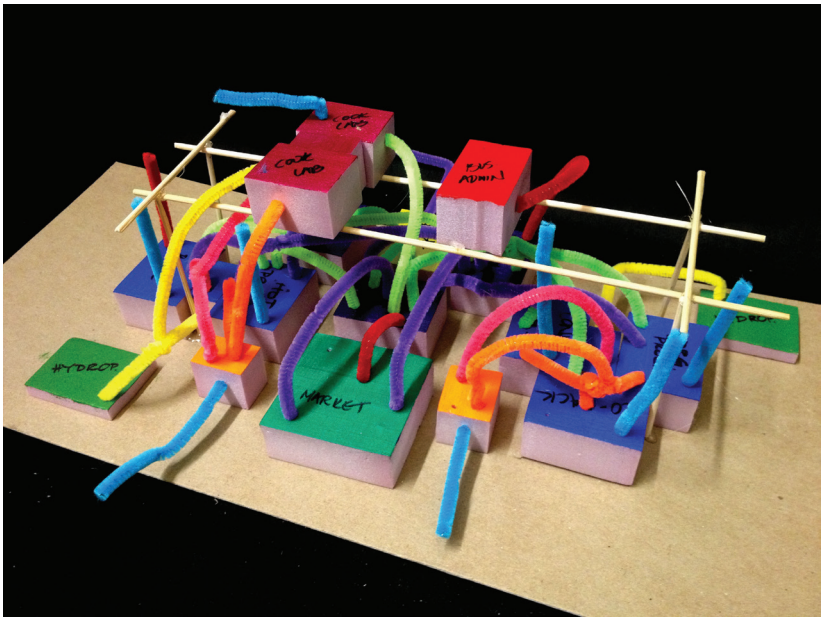


Figure 18- Systems Model

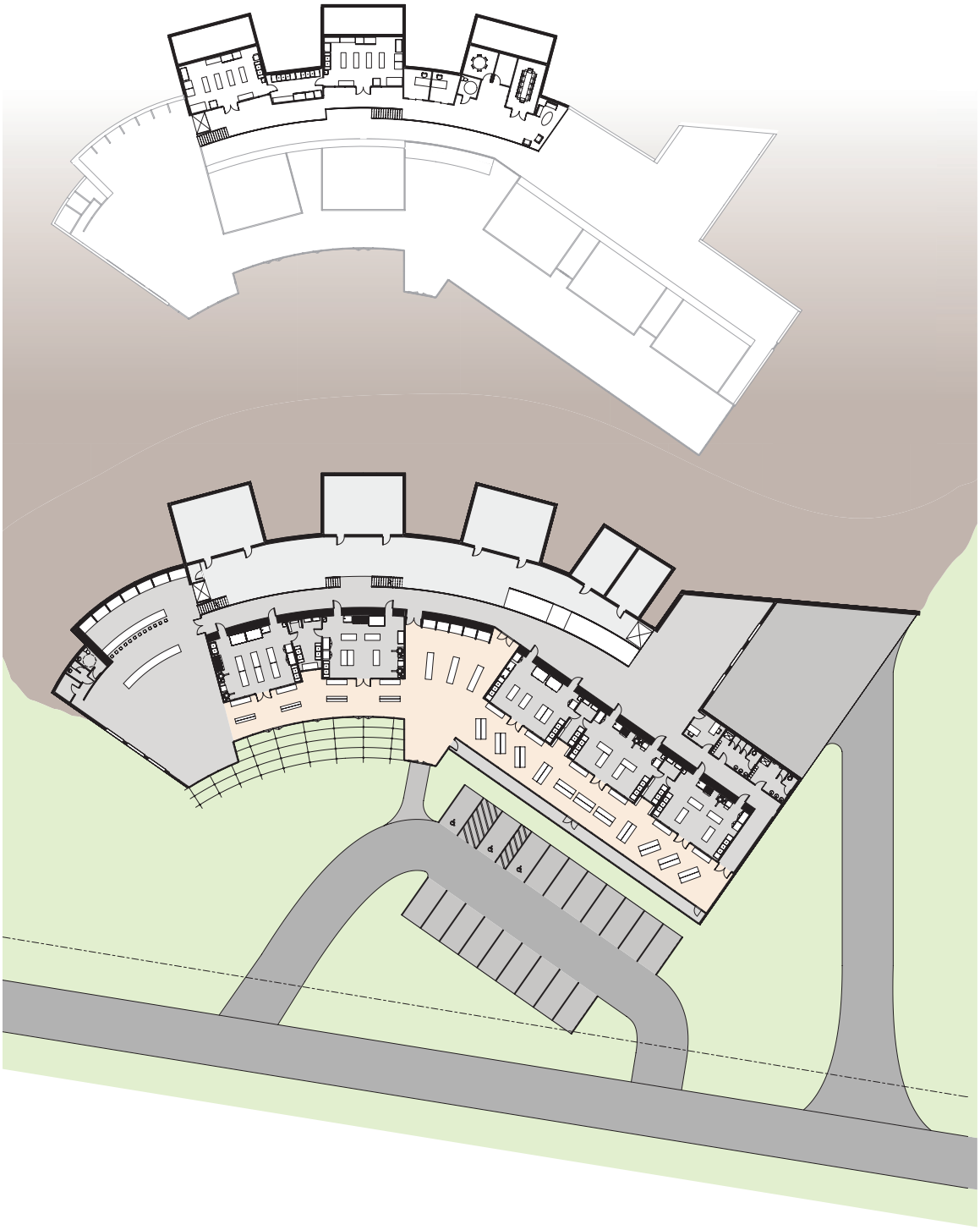


Figure 19- Plans of the Glens Falls Good Food Collective

The final plans for the Glen Falls Good Foods Collective is pictured in figure 19. The building was designed from the inside out, focusing on appropriate placement of program elements with respect to each other.

At the heart of the building are the food processing kitchens. These five kitchens, as laid out in chapter VI, are arranged in a string down the middle of the building. The three kitchens which generate less heat, the two raw processing kitchens and the co-packing kitchen, are grouped together on the east side of the building. These kitchens are located close to the distribution space, where the to-be-processed food will enter the building. In order to stream line production, it made sense to position these kitchens, the ones that deal specifically with raw produce, close to distribution. Likewise, the hot processing kitchen and the bakery are group together to the west. These kitchen use less of the raw produce coming in from the farms and more of the dry or refrigerated goods that come from storage.

Located between the kitchens are cleaning spaces. These area are dedicated spaces for washing and storing dishes and equipment. These spaces are not meant for washing produce, instead, that washing takes place within the kitchens. By pulling the southern walls of the cleaning spaces back, small alcoves were created that are used as specialty departments within the market.

All of the kitchens have ample glazing to the south as this is where the market is located. Making the walls between

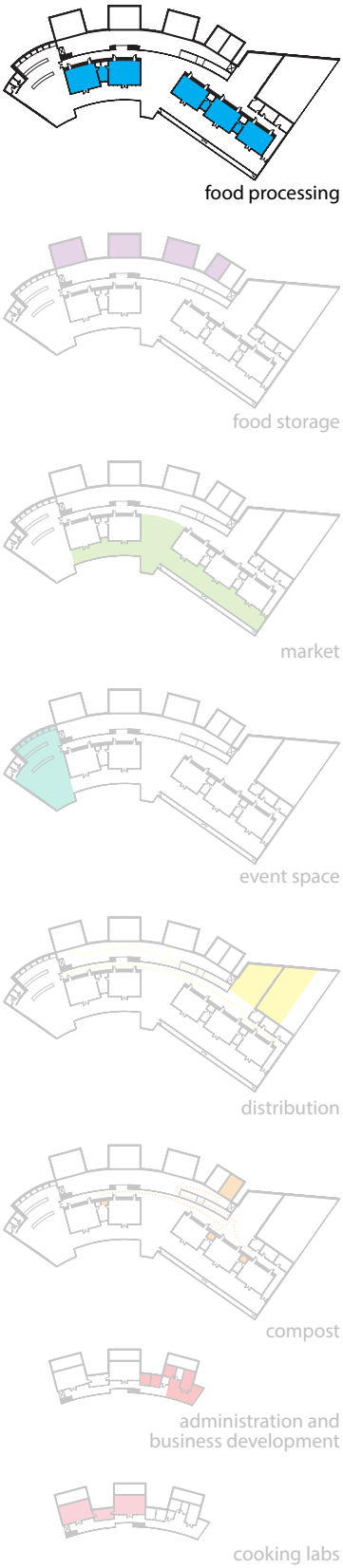


Figure 20- Program within Building

the market and the kitchens transparent encourages consumers to experience food processing as they shop. The kitchens also have doors leading directly into the market spaces allowing food to be transported quickly and easily onto the shelves.

The food storage spaces are anchored into the earth to the north. This piece of the building is sunk four feet below grade and has earth mounded up around it. Separating the different types of storage into individual fingers and burrowing them into the earth maximizes the surface area that is in contact with earth. Doing so provides efficient, simple, clean insulation to spaces that require an enormous amount of energy to condition.

Dry storage is located to the west, cold storage next to dry, freezer storage next to cold, and finally, root storage at the far east. The cold kitchens are closest to the storage they will access most, the cold, freezer and root storage. Likewise, the hot kitchens are located closest to the storage they will access most, the cold and dry storage.

The market is located along the southern facade of the building primarily because this is the side of the building that faces the street. Being that the market is the most public space withing the building, it made sense to place it where it could be seen and accessed mostly easily by the public. The market is intended to encourages patrons to explore the space. Ample glass lets shoppers see into the kitchens, angled shelves create views toward the kitchens and hydroponics, and small niches allow people to get close to the food processing action.

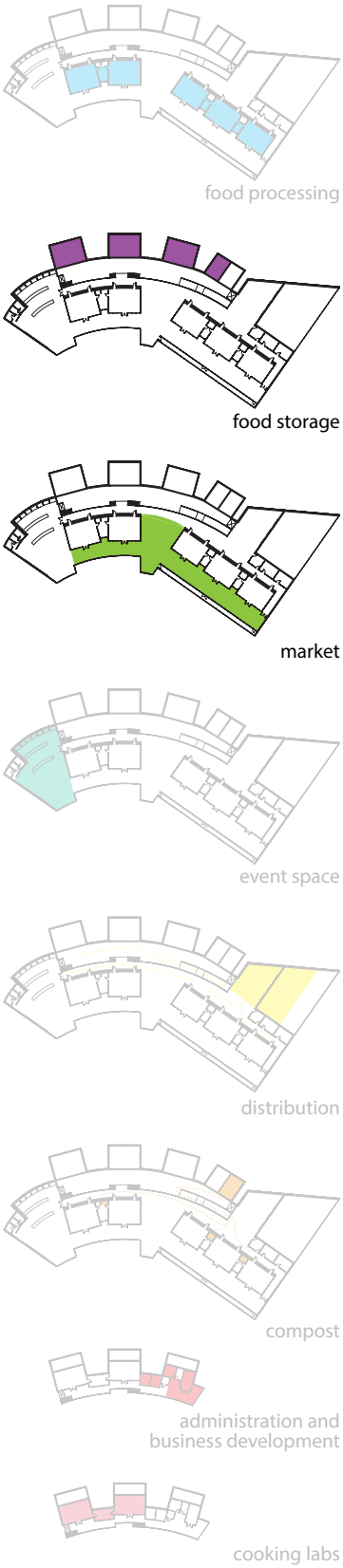


Figure 20- Program within Building

The market is organized with respect to the processing kitchens. The baked goods section is located just outside of the bakery, the produce is located directly in front of the raw processing kitchens, and the refrigerator and freezer sections are located just left of the co-packing kitchen. The checkout area is positioned at the center of the building. Here patrons can observe what is happening behind the kitchens without getting in the way of the actual processing.

The whole front facade is glass to bring an abundance of daylight into the market and glazed kitchens beyond. This glazing is inviting from the street and contributes to the overarching goal of encouraging exploration and learning. South facing glazing is great in the winter but during the summer it can over heat the space within. In order to prevent this over heating, the Collective employs two different strategies. To the east of the entrance there is a wall of hydroponics. The plants growing in this space block some of the light coming in while the second layer of glass surrounding the system, helps keep the heat out of the market. To the west of the entrance is a large trellis on the exterior which, in the summer, would have plants growing on it. Like the hydroponic system, these plant would block out some of the sun and provide an inviting shaded exterior space right in front of the building.

The event space is the western terminus of the building. Like the market, this is one of the major public spaces within the building and therefore it was appropriate to situated it on the more populated side of the building. The glass facade from

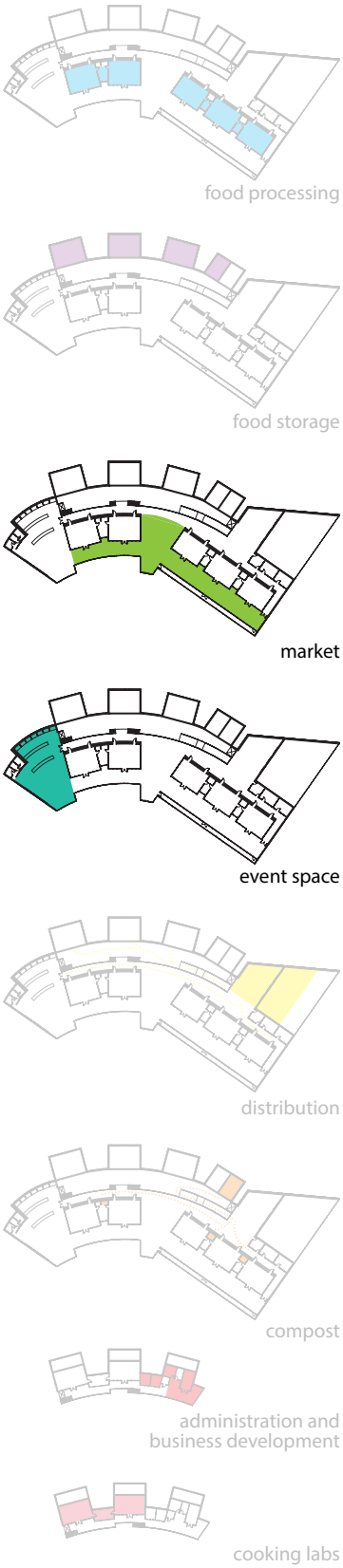


Figure 20- Program within Building

the front wraps around the side to bring in light and create an inviting atmosphere. There are three garage doors in the west wall that could be opened to allow trucks in to set up a farmers market or facilitate a dynamic indoor-outdoor event.

On the north wall of the building is a bank of storage space that is meant for use during events. This storage is intended to be flexible in order to accommodate different types of events. It is thought that some of this space would be refrigerated or conditioned as needed. Eating and drinking related event will make up the majority of events here so having a place to stage provisions in this space was very important. Examples of events that will occupy this space include wine and cheese tasting, harvest celebrations, and personal parties. Two bar-like structures are positioned near the storage in order to help facilitate these activities and encourage people to engage in food-related knowledge transfer.

The distribution space is tucked behind the eastern wing of the building. This is the logical side for the distribution space because most of the farms that this facility serves are located to the east. The space has three loading docks and ample space for assembling piles of goods that are either, arriving and waiting to be distributed throughout the building or, are getting ready to leave the facility to be sold at other distribution markets. Distribution is connected to storage via a wide ramp that allows for simple, fast, man-powered transportation of goods. Additionally, the roof cantilevers out over the adjacent exterior space, providing a covered workspace.

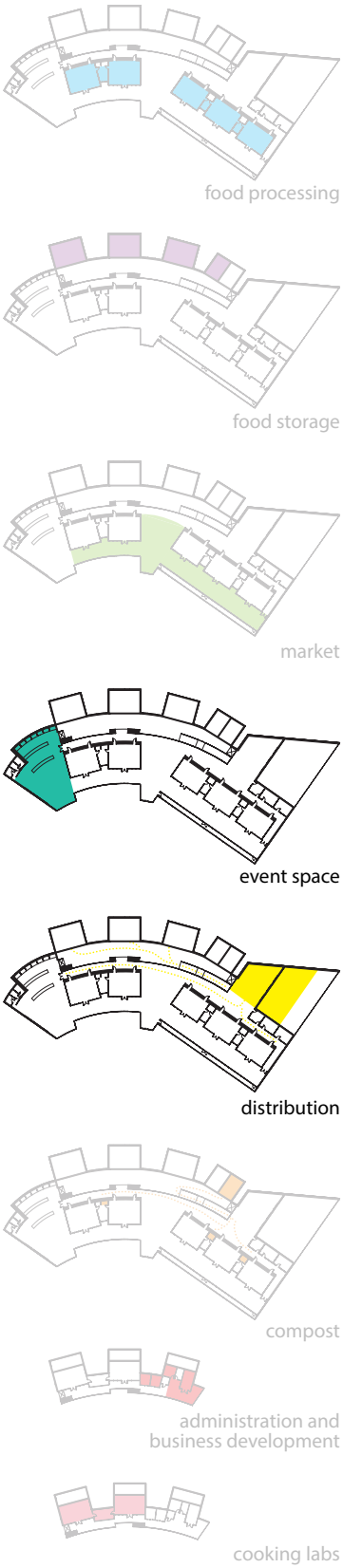


Figure 20- Program within Building

Compost is located throughout the building. Each of the cleaning spaces between the kitchens has a compost collection station. The compost is collected in large wheeled tubs that can be easily pushed through the hall and down the ramp to the compost storage space on the below grade level. It is here that decomposition takes place and water is preheated.

Above the storage level sits a second floor. Located on this floor are the administration and business development suite and the cooking labs. These spaces felt like the most intimate spaces within the building and therefore required some degree of separation from the hustle and bustle of the first floor programs.

In the case of the administration and business development, people will be having meetings and making phones calls so privacy is necessary. The cooking labs are places for instruction so minimizing distraction was the driving force behind locating them on the second level. This being said, the hallway that connects these spaces looks directly over the processing corridor and the central atrium (checkout) space so there is ample opportunity to engage in the happenings below if desired. It should also be mentioned that there is an office located right next to distribution on the first floor that will manage food entering and leaving the building. It was important to have this office on the first floor for efficiency and convenience.

A key feature of this building is the thick wall that runs along the north wall of the kitchens. This wall evolved from the

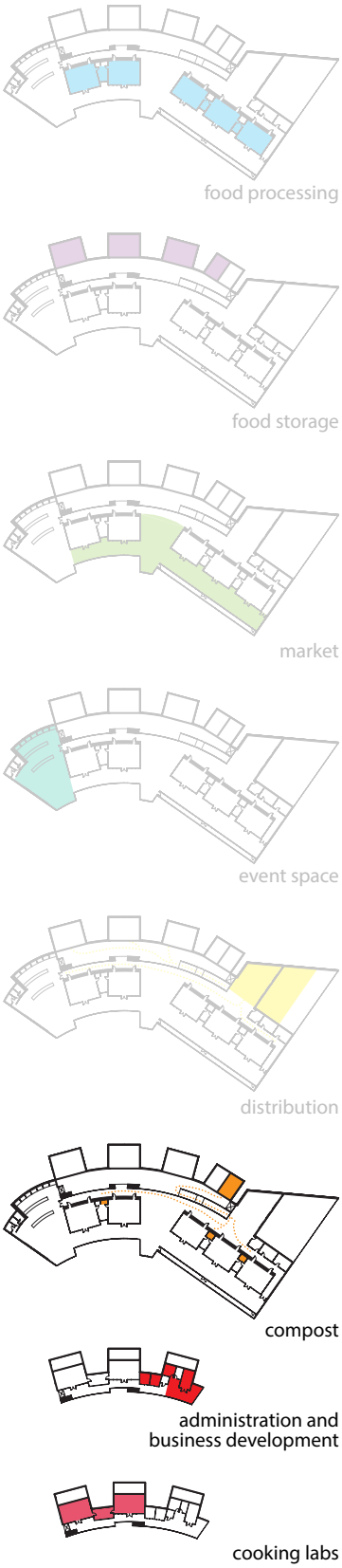


Figure 20- Program within Building

need to separate the kitchens, which generate a lot of heat, from the storage, which works very hard to evacuate heat. For efficiency purposes, it was essential to have these two opposing programs close to each other so a barrier was necessary. A thickened wall was designed to capture much of the heat from within the kitchens and transfer it up and out through the clearstory. This wall then became the systems core of the building. The compost tubs roll through from the cleaning rooms straight into the processing corridor so that they avoid the kitchens. The fume hoods are positions on this wall so that stove gases can be vented through the wall. And there is built-in equipment and supply storage carved into the entire length of north side of the wall.

The roof of this building went through many revisions but the final design utilized two different roof systems to shelter the Collective. The south portion of the building has a butterfly roof for a variety of reason. First, the butterfly roof collects water. This is important because food processing uses an abundance of water for everything from washing produce to boiling and steaming food to cleaning dishes and towels. Second, the way that the roof slopes up on the street creates a very open and inviting gesture. Finally, the larger south facing slope allows for great solar collection.

The event space and northern portion of the building are covered by a green roof. This roof gently slopes down to meets the land that is built up around the storage. A green roof made sense in this situation for a few reasons. One, sloping the roof down to the ground helps to smooth the mass created by the built-up earth. Using a green roof thoroughly integrates the building and the earth at this juncture. Two, using a green roof addressed some of the problems associated with stormwater management especially because the Collective has such a large building footprint. Additionally, much of the surrounding area is covered with non-pervious surfaces. In these ways, the green roof decreases the amount of stormwater that the municipality has to manage. Three, a green roof provides added insulation so it is fitting to position this over the storage. And finally, vegetation growing on the building is a symbol that helps to emphasize the idea of eating healthy, local food.

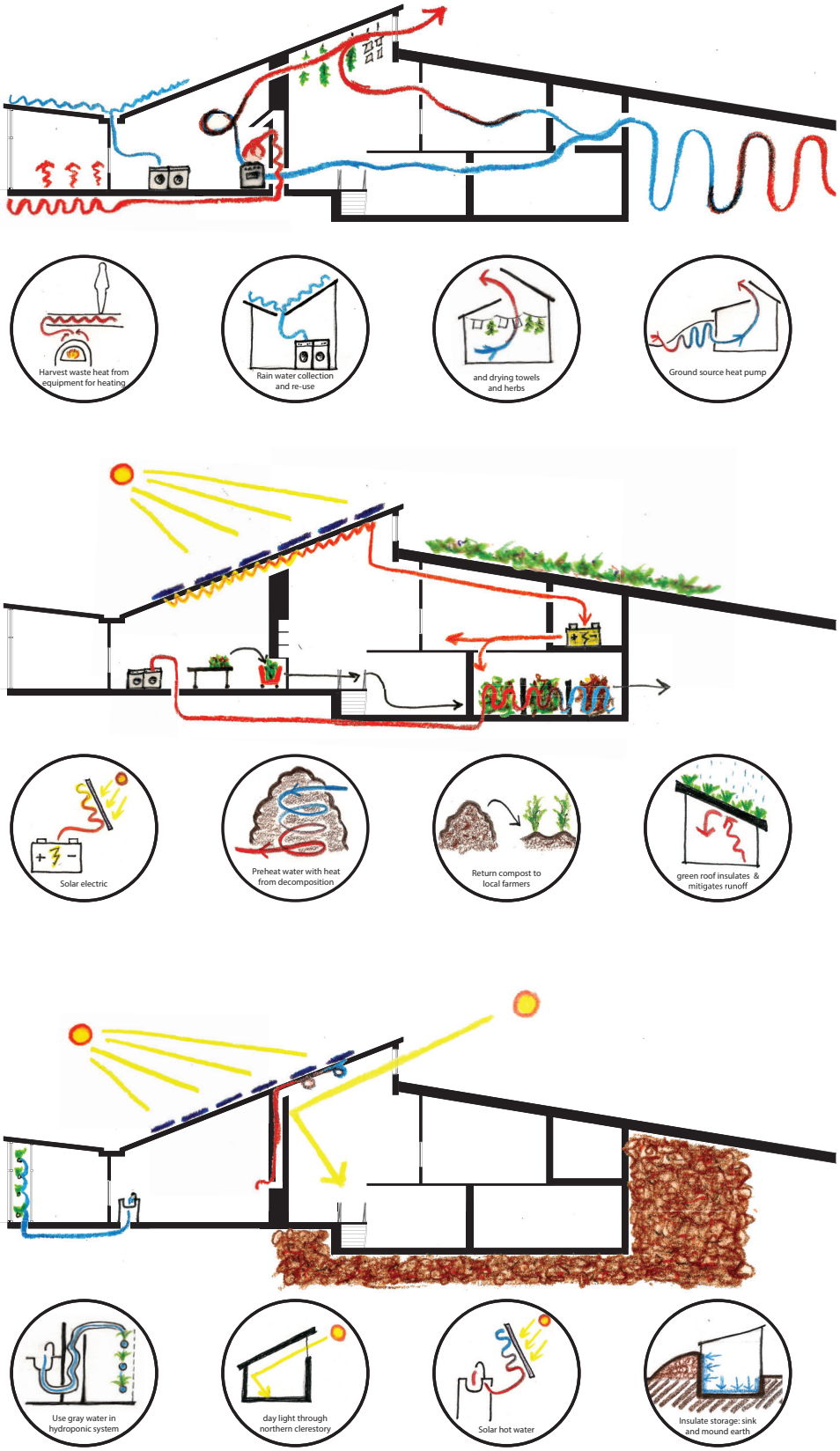


Figure 21- System Sections

CHAPTER X

CONCLUSION

The Glens Falls Good Foods Collective takes on the challenge of encouraging American people to start eating a diet full of nutritious food items. It does this by providing a service that benefits both actors in the food industry, the farmers and the consumers, and encourages them to learn from one another. The farmers need a convenient way to get their products to market therefore the Collective supplies the equipment, licensure, and knowledge to help them accomplish this. The public needs a reliable resource for healthy, local foods and information about eating well, therefore the Collective has a market, a flexible event space and instructional cooking labs. The abundance of glass and overall porous-ness of the building encourage fun and educational interaction with local foods.

Achieving the goal of encouraging healthy eating through architecture required the invention of a new kind of food system; a system that was respectful of the environment, local resources, and people. Matching up the outputs of building processes with the inputs requirements allows the building to function efficiently and fairly independently. This new system also acts as a teaching tool, educating people about the importance of conservation, recycling, and natural cycles. The innovative integration of environmental systems with the system of food makes the goal of reuniting people and food possible.

In conclusion, the Glens Falls Good Foods Collective is a facility that brings people closer to their food. It does this by providing necessary services to both consumers and small farmers. It teaches people about all measures food related topics including growing, processing, cooking, and the business of food. The porous nature of the space encourages the fluid transfer of ideas and information between all building users. These goals are all supported and facilitated by an interconnected new food systems that makes the best use of available resources. For these reasons, the Glens Falls Good Food Collective would help make Glens Falls a healthier place.

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