FEEDING A POPULATION AND HEALING THE ENVIRONMENT

Image 1

Mohan Pai

FEEDING A POPULATION AND HEALING THE ENVIRONMENT

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

By:

Mohan Pai

In Partial Fulfillment of the Requirements
for the Degree of
Bachelor of Landscape Architecture

Primary Thesis Advisor

Thesis Committee Chair

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THESIS ABSTRACT

The intent of this design thesis is to examine a sustainable solution for an urban plan in southwest Fargo that includes using urban agriculture as a tool to encourage recycling gray water and promoting a solution to the growing food and water shortage problem. Examining a city's need for implementing an urban agriculture policy into their city plan will help to create a sustainable and renewable food resource. The design solution for this thesis will include an urban farm as well as a plan for stormwater management in the area surrounding the farm. The design for this urban farm will also create a gathering place for people from a wide spectrum of social and economic statuses to increase community interactions.

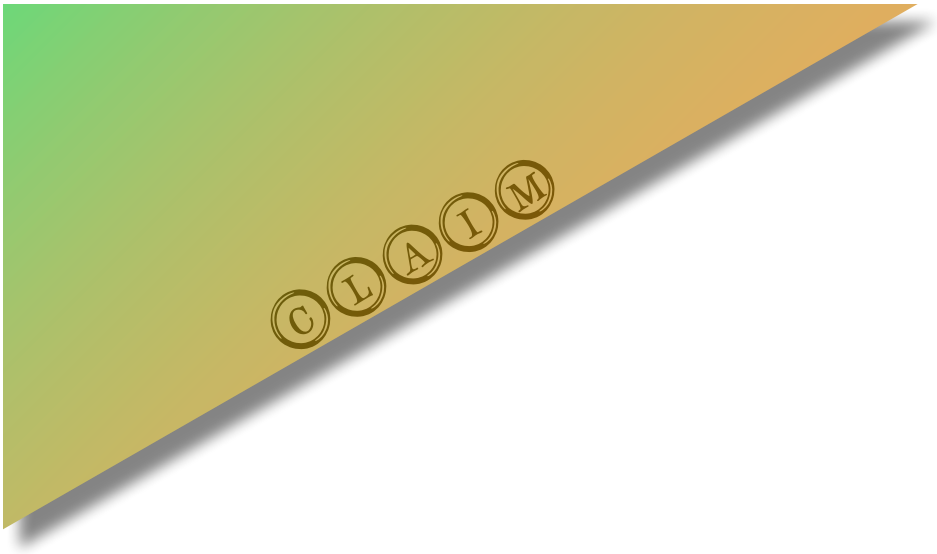
Keywords: **Urban Agriculture, City Planning, Food Shortage, Water Shortage, Sustainable, Community Planning, Policy, Urban Garden**

PROBLEM STATEMENT

Using sustainable design practices, how can urban agriculture change the political and social views of sustainability?

TYPOLOGY

This thesis will investigate the use of gardens and farms in an urban environment.



With growing water and food shortages that facing the world. We as designers will be asked to find solutions to protect the environment. These solutions will include creating renewable and sustainable food resources in the form of urban agriculture.

PREMISES

Urban planners and landscape architects will be the key players in this thesis. These individuals will be required to design and create urban plans to introduce urban farms into the evolving framework of urban design.

Cities and urban centers are the home to 50 percent of the world's population (Brook & Davila, 2000), and by making changes in the urban environment, sustainable ideas will begin to branch out to the entire world.

Urban cities will be at the forefront of the global change to a more sustainable lifestyle and healthier environment.

Developing a sustainable city plan that includes urban agriculture will help protect our limited and valuable water and natural resources and will help feed our growing world population. According to the Food and Agricultural Organization of the United Nations, "Estimates of the households engaged in urban farming that also preserve and store some of their production range up to 90 percent," (Issues in urban agriculture, 1999).

THEORETICAL PREMISE

Urban planners and landscape architects will help in the creation of a new age of sustainability that will protect our environment and its resources. Their roles in the creation of this new era will not only sustain and nurture our increasing population but find solutions to the increasing demand for food that is healthy and renewable.

PROJECT JUSTIFICATION

As a concerned citizen whose interests and hobbies involve being outdoors and being healthy, I am worried about the abject ignorance, apathy, and neglect of the health of the environment. If this trend continues, we will soon be trapped in an unforgiving situation in which we watch the degradation of our environment without being able to enjoy its beauty and are forced to eat expensive food and breathe unhealthy air. As citizens of the world, we have to be responsible stewards of the environment we live in. This is what makes me strive toward making this world a better place, one small urban farm at a time.

NARRATIVE

We live in a fast-food culture. Fargo-Moorhead is no different than most urban areas in our nation. Over the course of my collegiate career, I have eaten foods that were processed, unhealthy, and expensive. For a smaller metropolitan area, Fargo-Moorhead has a large college population. A number of my fellow college students and many families in the area are also in the situation where easy access to fast food and processed food have replaced healthy, balanced meals. The current economic situation has also contributed to many families resorting to eating cheaper, unhealthy meals because they cannot afford foods for healthy, balanced meals. In an effort to try to create a sustainable solution to this problem, my thesis will focus on a site in Fargo that will help to establish a renewable and sustainable food resource. The design will be an urban farm that will not only bring the community together to grow good and healthy produce, but will also address other environmental issues such as stormwater runoff and solid waste.

NARRATIVE

The goal of most urban farm policies across the United States is to promote healthier communities while providing inexpensive fresh produce. This produce is typically grown in areas that would otherwise remain vacant. An additional benefit of these urban farm policies is that they create a space for neighbors to gather and interact socially. My design will create this type of space for the City of Fargo and encourage a cultural exchange that will also promote recycling food waste in the form of compost and food for livestock and reduce our urban carbon footprint.

As our society becomes more environmentally aware and continues to evolve, water resources are another area that will need to closely watch. My design will use gray water resources to irrigate elements within the farm. The project design will serve as an example of how to harvest water resources that have previously been thought of as unusable for crop and livestock management.

USER/ CLIENT DESCRIPTION

Client:

This thesis will create a designed urban farm for community members and college students living in south-central Fargo.

This designed urban farm will be owned by the City of Fargo and regulated by the City of Fargo's Parks and Recreation Department.

Local community garden groups will also assist in the maintenance and regulation of the farm.

Users:

College students, local families, and tourists will be the primary users of the site.

As students move out of their campus residences and make alternative living arrangements, they have to make new choices for food. Having a renewable food source that provides fresh meat and produce will give students a new option for healthy food.

Local families and people who live in the nearby residences will have the opportunity to access the site.

The site for this sustainable urban farm is located within a half mile of the Fargo-Moorhead Convention and Visitors Bureau. Having a kiosk at the visitor's bureau explaining the farm's systems and community benefits will encourage tourists to visit and enjoy the site. Those same tourists will share sustainable ideas and methods being used in other communities.

MAJOR PROJECT ELEMENTS

Existing Conditions:

The site is located on a 17.3 acre plot with no existing structures. There is a drainage channel that flows east to west through the site. Beyond the drainage channel, the only existing human-created elements include six power lines and a sign promoting the West Acres Mall.

Proposed Elements:

Gardens

Individual plots will be available to rent or lease on a seasonal basis or for extended periods of time.

Parking Area

A sustainable parking lot will be implemented on the site to accommodate between 20 and 30 vehicles.

Small Storage Structures

Storage structures will be built and used for tool storage.

Composting Areas

Composting bins will be established for on-site composting of yard and weeding waste. Additional bins will be available for residents to bring appropriate home and yard waste.

Proposed Elements (Cont.):

Gathering Spaces/ Structures

The site will need plaza spaces and seating to accommodate gatherings and outdoor classroom spaces. Restrooms will be available to site users and visitors.

Water Collection/ Distributions Elements

The site has an existing drainage channel, and to provide irrigation, this system will need to expanded. A reservoir will be designed and pumps will be set up for irrigation purposes. The reservoir will collect and hold stormwater and the pumps will distribute it through the garden plots.

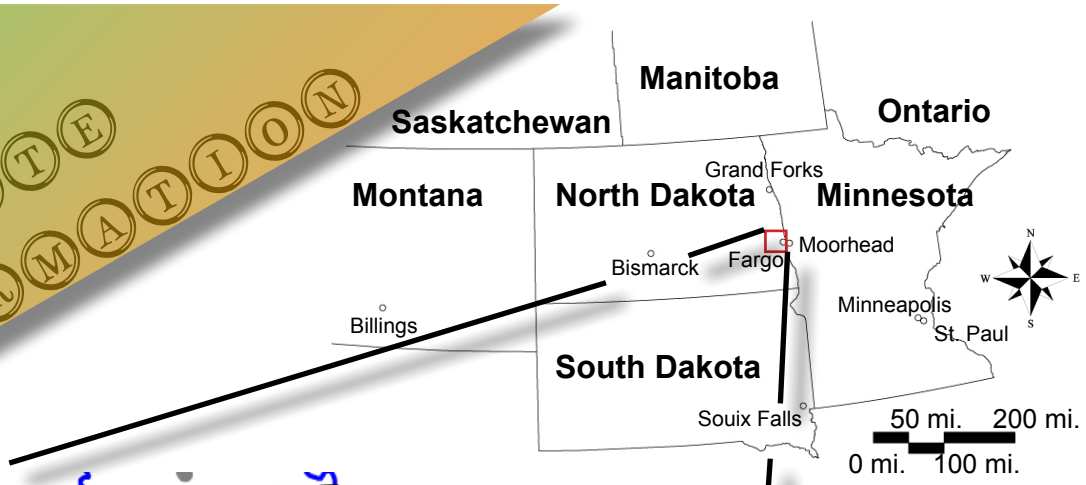
Animal Containment

Indoor and outdoor structures will be used to contain limited amounts of livestock that can provide meat, eggs and compostable manure.

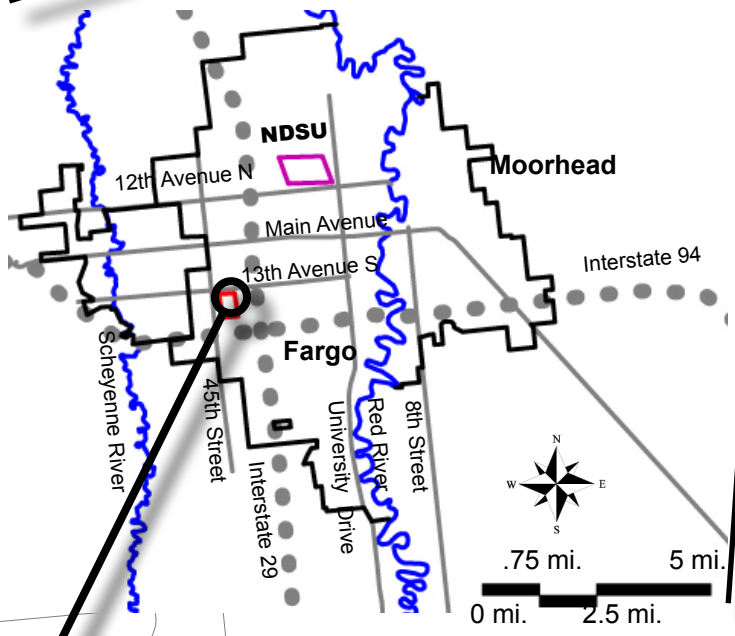
Accessible Accommodations

Water fountains, ramps (where needed), and appropriate ground cover will be implemented to provide all users with equal access to the site.

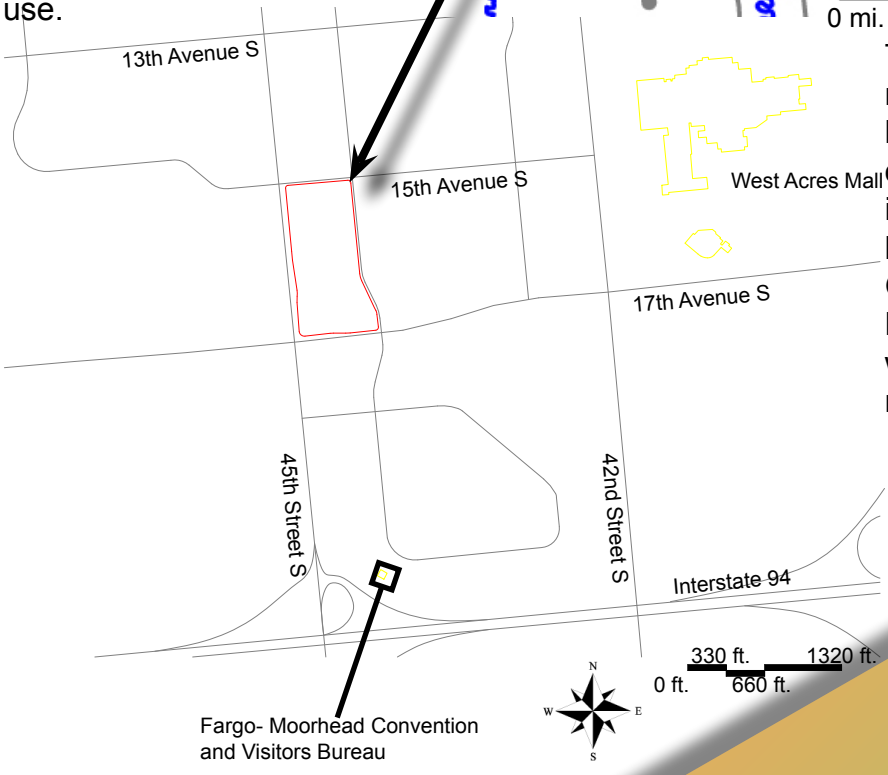
SITE INFORMATION



The site for this project will occur within the Midwest region.



The site is located on a 17.3 acre plot of open land on the northeast corner of 17th Ave S. and 45th St. I have chosen this site because it provides a large area for extensive agricultural use.



The area surrounding the site provides many large parking lots and “box”-style buildings from which stormwater run-off can be collected to help provide irrigation for the farm. The site is located between the Scheel’s Sporting Goods store on 45th St. and a US Bank Customer Service Center on the west and east sides of the site, respectively.

PROJECT EMPHASIS

The emphasis of this thesis will be to investigate the ability to create a sustainable urban farm within a growing urban setting. The farm will also answer questions of how stormwater can be recycled and managed. In addition, the farm will be an example of how people can profit from having a renewable food resource close to their homes. This design will provide a template for other growing communities on which to base their own urban agriculture plans in the future. The main area of focus of this project will be sustainable practices as a tool for design.

PLAN FOR PROCEEDING

Definition of Research Direction:

In an effort to further the research into the social aspects of this project I will exaimne Richard Louv's nature deficit disorder theory, which explores the growing trend of children spending less time outdoors and its effects on future behavioral problems (Louv, 2008). I will also further examine Professor Ahern's theory on stormwater management and its uses in urban settings (Ahern, n.d.). These theories will be examined and further theoretical research will also be sought out.

As I research my project typology further, I will look at other references for guidance, such as other city's urban agriculture plans, and interview people associated with local fresh produce cooperatives.

As an investigation into the historical context, I will examine how my design will help connect Fargo back to its agricultural history.

Site analysis research will examine current surrounding structural and parking lot square footages to help me understand how much potential stormwater will be available to harvest and use.

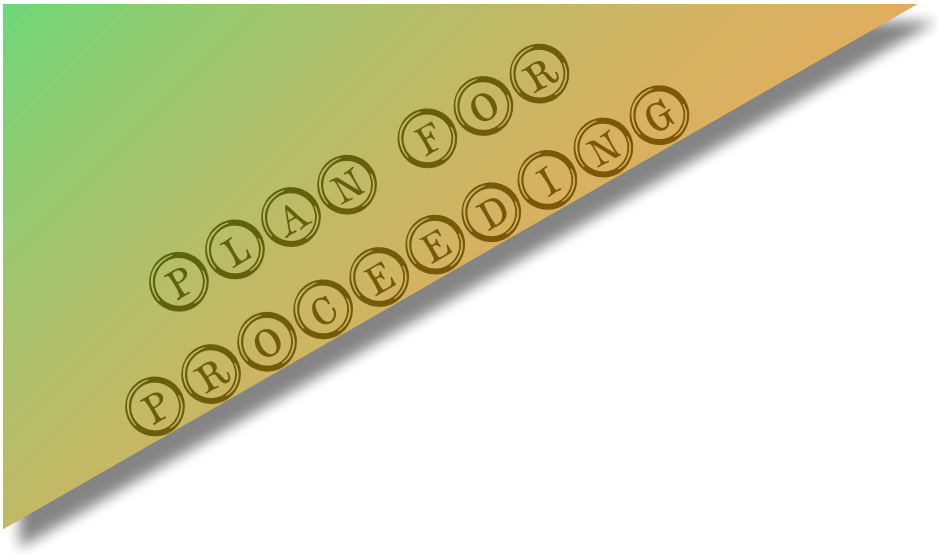
Additional research will be required in the following areas: surrounding site demographics, local park system, and sustainable stormwater practices.

Design Methodology Plan:

The design methodologies that I will employ include the following types: mixed method quantitative/qualitative analysis, graphic analysis, digital analysis, interviews with specialists and professionals, and meetings with applicable groups. Throughout my project, I will follow a mixed method quantitative/qualitative approach using a concurrent transformative strategy. This strategy will be guided by my theoretical premise and unifying idea. Qualitative and quantitative data will be collected concurrently, with priority given as required by the theoretical premise and unifying idea. All data relevant to this thesis will be gathered, analyzed, and reported throughout the entire research process. The results of all relevant data will be reported as either text or graphic representation when necessary.

Quantitative data, including statistical and scientific data, will be gathered and analyzed locally or obtained through archival searches.

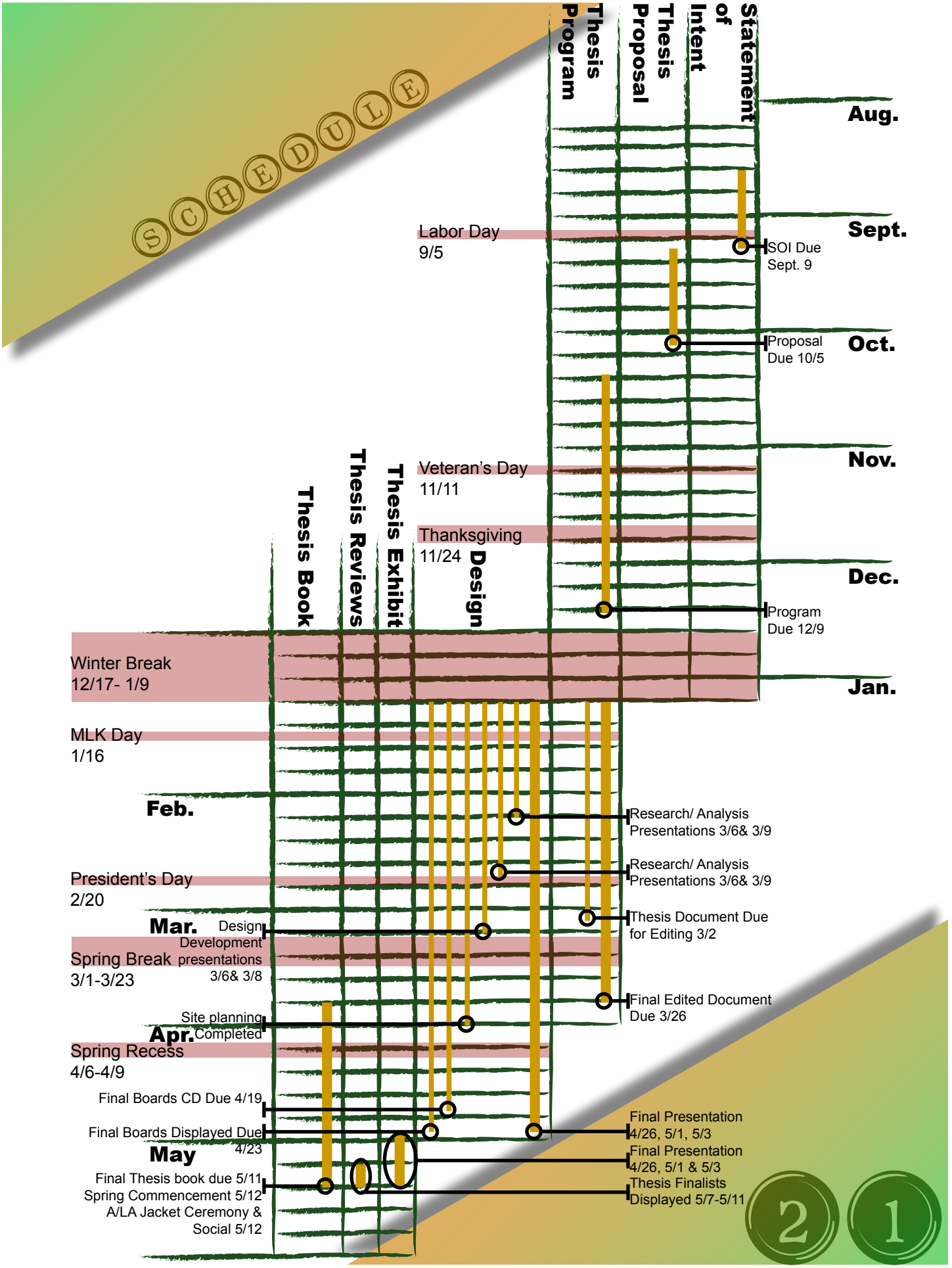
Qualitative data will be gathered through direct observations, site visits, local surveys, archival searches, and direct interviews.



Plan for Documenting the Design Process

This design thesis will be compiled for digital viewing. This project will be preserved in the NDSU Library's Institutional Repository. Scholars from other institutions nationally and internationally will be able to access this thesis from the Institutional Repository. At the conclusion of this thesis I will have a digital presentation to display my work.

SCHEDULE


Statement of Intent
Thesis Proposal
Thesis Program
Aug.
Sept.
Labor Day
9/5
SOI Due
Sept. 9
Oct.
Proposal
Due 10/5
Nov.
Veteran's Day
11/11
Thanksgiving
11/24
Dec.
Program
Due 12/9
Jan.
Winter Break
12/17- 1/9
Design
Thesis Exhibit
Thesis Reviews
Thesis Book
MLK Day
1/16
Feb.
Research/ Analysis
Presentations 3/6& 3/9
Research/ Analysis
Presentations 3/6& 3/9
President's Day
2/20
Mar.
Thesis Document Due
for Editing 3/2
Design
Development
presentations
3/6& 3/8
Spring Break
3/1-3/23
Final Edited Document
Due 3/26
Site planning
Completed
Apr.
Spring Recess
4/6-4/9
Final Boards CD Due 4/19
Final Boards Displayed Due
4/23
Final Presentation
4/26, 5/1, 5/3
May
Final Presentation
4/26, 5/1 & 5/3
Final Thesis book due 5/11
Spring Commencement 5/12
A/LA Jacket Ceremony &
Social 5/12
Thesis Finalists
Displayed 5/7-5/11

PREVIOUS STUDIO EXPERIENCE

2nd Year (Fall 2008, Kathleen Pepple)
Tea Garden Project
Halverson Park Community Service Project

2nd Year (Spring 2009, Mark Lindquist)
Winnipeg Design Project
Fargo One-way Corridors Project

3rd Year (Fall 2009, Stevie Famulari)
Snow Symposium Project
Defiant Gardens Project
Fargo Analysis Project
Regent, ND Master Planning and Design Project

3rd Year (Spring 2010, Kathleen Pepple)
Roosevelt Neighborhood Planning and Design Project
UTTC Campus Design Project

4th Year (Fall 2010, Jason Kost & Niki Carlson)
Duluth, MN Urban Design Project

4th Year (Spring 2011, Stevie Famulari)
Phytoremediation Research and Design Project
Jello Project
HESCO Basket Design Project

5th Year (Fall 2011, Dominic Fischer)
Red River Basin Research and Design Project

TYPOLOGICAL RESEARCH

This thesis will argue that a combination of good stormwater management practices and urban agriculture within our metropolitan infrastructure can change both political and social views on sustainability. These actions can lead to both a short-term goal of economic viability and a long-term goal of reducing the carbon footprint with many social, economic, and ecological benefits for the community.

Since the end of the 20th century, humanity has been involved in an unprecedented experiment: We are becoming an urban species. This transformation of rural areas into major metropolitan centers is occurring worldwide at an ever-increasing rate. This high concentration of people in cities has serious consequences for poverty rates and food security. The world's urban poor tend to lack the money to purchase food and lack the land and resources to grow their own (Kisner, 2008). More people living in cities, with limited access to food, will result in an increase in the level of urban poverty from 30 percent to a staggering 50 percent by 2020 (Kisner, 2008). This trend is no different in the United States. In 2010, 82 percent of Americans lived in cities; by 2050 it will be 90 percent. Cities are responsible for around 75 percent of all energy used, 60 percent of all water consumed and 80 percent of all greenhouse gases produced worldwide (http://www.usa.siemens.com).

As people around the world move from rural to urban settings in search of economic opportunities, the need for urban agriculture as a sustainable resource is beginning to grow. Currently in the United States, the amount of arable land acreage is decreasing due to soil and environmental degradation, surges in industrial development, and pressures on the metropolitan areas to expand to accommodate the growing populations of cities.

TYPOLOGICAL RESEARCH

According to Abiola Adeyemi (2000), modern urban sprawl patterns are leading to annual cropland losses equivalent to an area one kilometer wide stretching from New York to San Francisco.

Urban agriculture has been simply defined as the growing, processing, and distribution of food and other products through intensive plant cultivation and animal husbandry in and around cities (Bailkey & Nasr, 2000). In other words, it is the food and fuel grown within the daily rhythm of a city or town. To be termed urban agriculture, researchers have used a variety of criteria such as population sizes, density thresholds, official city limits, municipal boundaries of the city, agricultural use of land zoned for other use, and agriculture within the legal and regulatory purview of urban authorities (Mougeot, 2001). Yet, no matter the definition, urban agriculture today is critical to everyone as the world's population continues to grow and food resources become more scarce.

The challenges presented by sustainable urban development are immense. As rapid modernization and urbanization has put pressure on our fragile ecosystem, especially the degradation of riparian and aquatic areas, landscape designers are being asked to find solutions to protect the environment. Part of this solution will include creating renewable and sustainable food resources in the form of urban agriculture.

Urban agriculture includes cultivation in a number of areas. These include aquaculture in tanks, ponds, rivers, and coastal bays; livestock raised in backyards and other established structures; vegetables and other crops grown on rooftops, backyards, empty parcels, vacant lots or industrial estates, along canals, river banks, or small suburban farms; and orchards including vineyards, street trees, and backyard trees (Smit & Nasr, 1992).

These areas could include rooftop and vertical agriculture, community, basket, container and school gardening, and the use of vacant lots and brownfields.

While there is no official estimate of the total number of urban or community gardens, organizations such as the American Community Gardening Association estimate there are more than 18,000 community gardens in the U.S. and Canada (www.communitygarden.org/learn/faq.php). Organizations in many metropolitan areas manage garden plots for residents. In some cities, community gardens are managed by the parks departments, while in others, community gardens are managed by volunteer organizations affiliated with food banks or churches. According to the U.S. Department of Agriculture, the number of farmers markets increased by 6.8 percent from 2006 to 2008, and since 1994, the number of farmers markets has increased by nearly 3,000, to a current estimate of approximately 4,600 (Shaffer & Cox, 2008). Throughout the country, communities are responding to this trend by transforming contaminated properties into locations where communities can grow and buy food locally (“How does your,” 2009).

A major necessity in urban agriculture is rain. Rain or stormwater from impermeable surfaces found in cities collects debris, chemicals, sediment, and other pollutants that could adversely affect water quality. These contaminants usually find their way into local surface waters such as lakes, rivers, ponds, and other water collection areas as a result. Managing storm and surface waters protects and improves the quality of lakes, streams, rivers, and other floodable areas. It also prevents serious contamination of soils and surface waters from sewage due to sewer overflows. Combined sewer overflows occur when heavy rain or melting snow causes sanitary sewers to overflow into stormwater drainpipes.

This allows sewage to mix with runoff from buildings, parking lots, and streets before flowing, untreated, into the local surface waters.

As a sustainable practice, urban agriculture utilizes waste water and solid waste from the local community. By preventing these waste waters and solid wastes from entering local surface waters, urban agriculture reduces the stress on systems that humans and other living organisms rely on for their well being. Agricultural activities in cities can indirectly improve urban water management, because green spaces with permeable land surfaces allow rainwater and runoff to drain through the soil. Forward-looking communities – through community based leadership, design professionals and the public at large – play a vital role in enacting changes that would lead to the creation of more sustainable urban environments.

According to Robinson and Van Bers (1996), ecological sustainability refers to the ability of humans to maintain life support systems, protect biodiversity and use resources efficiently. Urban agriculture not only enables a community to maintain this type of sustainability, it also adheres to the three main principles of sustainability which require enhanced environmental health, economic profitability, and promotes social welfare within the community.

According to the Food and Agricultural Organization of the United Nations, “Estimates of the households engaged in urban farming that also preserve and store some of their production range up to 90 percent,” (Issues in urban agriculture, 1999). A good sustainable policy that includes urban agriculture, therefore, protects limited and valuable water and natural resources and helps feed the growing world population.

TYPOLOGICAL RESEARCH

There are many environmental health benefits of well-planned urban agricultural infrastructure. Good stormwater management leads to improved hydrological functioning through soil and water conservation, micro-climate improvements, avoid costly disposal of recycled urban wastes, improves biodiversity, and promotes greater recreational and aesthetic values of green space (Omoto, 2004). Urban agriculture is an effective way to increase vegetation in a city and helps clean up air and rain water. Through the use of rain barrels, rain gardens, and recycled irrigation, urban agriculture practices reduce the amount of waste water and solid wastes by collecting and recycling water.

In addition, urban agriculture also reduces wasted produce. “Food losses can be as high as 35 percent for perishable food products, while transportation costs can reach as high as 90 percent of the overall food marketing margin” (Mougeot, 2000). Urban agriculture significantly reduces the transportation of food and protective packaging costs, which in turn reduces the carbon footprint (Hamm & Baron, 1999). In addition, urban agriculture closes the nutrient loop by using composted domestic waste that is processed into the soil for added nutrients and soil structure (Nelson, 1996).

Pacific Lutheran University Assistant Professor of Economics Rachel Nugent asks several key questions concerning the socioeconomic impacts of urban agriculture in economic analysis (Nugent, 2001). Key questions include: who are the important stakeholders and how do they relate? What are the positive or negative impacts of urban agriculture on the community and how do they change over time? Are these impacts better than other uses of space, and how can choices be made about alternative choices? Finally, how do factors outside the community relate to the community and urban agriculture?

TYPOLOGICAL RESEARCH

Good sustainable policy should consider all of the previous factors. Positive, long term impacts occur when communities provide readily available markets and aggregate demand for urban agriculture (McLennan, 2004). Urban agriculture allows for reuse of parcels of land considered too small for major redevelopment. It reduces unemployment and underemployment and encourages entrepreneurism in under-represented populations. Urban agriculture also effectively puts to use parcels of land that lay vacant, often lowering property values in a community. Community gardens have positive effects on property values; in some cases values increase 9.4 percent five years after the garden was started (www.amazonaws.com). According to Rachel Nugent, “Community gardens improve the look and safety of neighborhoods. Areas of former drug dealing have evaporated. Property values have increased. Neighbors get to know neighbors because tilling the earth is a great equalizer" (Prichard, 1997).

At the household level, there are direct economic benefits and costs for urban households involved in the agricultural production. These include self-employment, income from processing, sales of surpluses, savings on food, disease prevention health expenditures and improved diets, and the exchange of agricultural products for other economic goods. At the city level, the benefits include diet improvements, disease prevention, recycling of organic waste and reusing inorganic waste, integrated management of stormwater, carbon sequestration, and reduction in costs associated with transporting food. Through the establishment of school gardens, urban agriculture can have educational and therapeutic purposes by inviting urban residents to reconnect with the cycles of nature. It promotes the preservation of biodiversity and agricultural knowledge that many people still have, and the possibility of greening, beautifying, and diversifying the urban environment.

Finally at the regional and national level urban agriculture can add to the gross domestic product and can affect the efficiency of the national food system (FAO Occasional Paper, 2007). Urban agriculture provides products that rural agriculture cannot supply easily (e.g. perishable products, products that require rapid harvest), and can be a substitute for food imports, releasing rural lands for more export-based production (Mougeot, 2000).

Food insecurity or the perceived risk of food insecurity is a common concern among almost all urban farmers. Households across the income spectrum engage in urban gardening (with some country exceptions and commodity variation), but income level does influence the amount of effort devoted to urban farming. Even in non-poor populations, a household's perception of food insecurity risk will affect its farming effort because of the insurance value of their own food production (Seeth et al., 1998). The FAO report states some of the other indirect positive and negative effects of urban recycling. On the positive side, recycling of wastes, greening of the community, fewer health problems due to nutrition of the urban poor, mitigation of the effects of HIV-AIDS, and landscape care can occur in a community (FAO Occasional Paper, 2007). On the negative side, there could be issues such as water pollution caused by agrochemicals, erosion, other health problems and associated risks. All of these issues can be quantified. The positive effects of urban agriculture bring an added value to the city, such as enhanced income or reduced costs, that outweigh the negative effects such as extra investments or tax payments.

TYPOLOGICAL RESEARCH

Urban agriculture benefits both individuals and neighborhoods, and thus contributes to overall community health. The benefits of food production transcend the physical, mental, and emotional health of the individual to leave lasting changes on others and on the physical and social space of the community. Gardening is a lifetime activity, and because recreation is of great importance to people involved in urban agriculture, its health advantages span generations of gardeners (Wolf & Jansen, 2010). It is associated with satisfying labor, physical and mental relaxation, socializing, and a means to produce food and beauty. Gardening can be a key element in successful health intervention programs because it addresses simultaneously the physical, mental, spiritual, and social health of individuals and their communities (Bellows et al., 2004).

Urban residents are concerned violent crime. Those that commit crimes, or are predisposed to commit crimes, often list a lack of activities and/or meaningful work as one of the main reasons for engaging in criminal activities. Urban agriculture has proven to be successful as a method for deterring would-be criminals and turning them into productive citizens by providing constructive work. One success story is with Los Angels' inner-city youth, who are growing a variety of salad herbs and spices and produce a commercial salad dressing (Smit & Somrners, 1994).

Many participants enjoy giving back to the community. Regularly, community gardens are affiliated with organizations such as food banks, churches, and other organizations that realize the benefits of urban agriculture and seize the opportunity to expand their community outreach programs by including a garden. It is a reciprocal process (Hall, 2000).

Other social benefits of urban agriculture include education, recreation, and cohesion. People, in particular children, in urban areas become more aware of agriculture, how plants need to be tended and the general economics of buying seeds and other products needed in urban agriculture and the eventual sale of the harvest. It also addresses nutritional needs of urban residents who may be living near or below the poverty level (McGuiness et al., 2010). Another important social benefit is the conversion of brownfields which often attract blight and lower property values, into healthy, viable parcels of land. In the United States, the Environmental Protection Agency will work with municipalities to ensure that contaminants are removed, capped, or contained in ways that limit exposure risks before brownfields can be developed. Urban agriculture projects can help bind contaminants while providing further benefits to the property and surrounding community (http://www.epa.gov/brownfields/urbanag/index.html).

An urban farm or community garden can improve the environment, reduce greenhouse emissions and improve access to healthy, locally grown food. Before a property can be redeveloped, contaminants must be removed, capped or contained in ways that limit exposure risks. Urban agriculture projects can help bind contaminants while providing further benefits to the property and surrounding community. An urban farm or community garden can improve the environment, reduce greenhouse emissions, and improve access to healthy, locally grown food.

Finally, urban agriculture draws people from different parts of the community together. Local agriculture projects create solidarity and purpose among neighbors, sustaining morale and building community pride.

TYPOLOGICAL RESEARCH

One obvious example of the urban farming movement's racial dynamics can be seen at Eastern Market on Saturdays at the Grown in Detroit Farm Stand. There, youth who are mostly Black and Latino work for a stipend under the supervision of community educators and farmers and sell produce that is grown organically on city land. The youth who work at the Saturday market are part of the Garden Resource Program's Youth Farm Stand Initiative, a collaborative effort between Wayne State University's extension program, The Greening of Detroit, and Earthworks Urban Farm. The initiative aims to educate youth about the work and benefits tied to urban agriculture (Forman, 2009).

Urban agriculture can raise patriotic attitudes when the nation is at war. During both World War I and World War II, Americans responded to the call of making the country not only self-sufficient, but also produced food to help the Allied nations in their war effort. Gardens provided productivity that citizens on the home-front needed. A garden plot feels much more useful, productive, and important than a vacant lot or lawn. With loved ones off to war, it greatly improved morale to have an outlet for the patriotism, fear, and anxiety that many Americans felt about the war (Basset, 1981).

Regardless of the motivation – whether it's the need to provide food for a city's poor, a desire to reduce our carbon footprint, or to encourage sustainable practices, good stormwater management and urban agriculture is both logical and beneficial. It uses otherwise wasted, neglected spaces, such as vacant lots or roofs, and helps cancel the concrete jungle effect, in which temperatures rise, polluted air isn't filtered, and rainwater isn't absorbed into the ground. In the future, urban areas will be home to more than half of the world's population and urban agriculture will become a global necessity.

TYPOLOGICAL RESEARCH

By bringing plants back into cities, urban agriculture can become an important reminder to people of the inherent value of preserving nature and of the invaluable services that the environment performs. As metropolitan areas continue to grow, urban agriculture will be essential in balancing environmental consideration with the needs of future generations.

The literature review investigated relevant urban agricultural issues, and established that community-based urban agriculture is a large, complex topic that can be analyzed through four general characteristics to determine its manifestation in the urban landscape. These four characteristics — physical, economic, social, and ecological — illustrate the far-reaching implications of the practice of urban agriculture and its relevance to the creation of sustainable cities.

TYPOLOGICAL RESEARCH: SUMMARY

As more members of industrialized societies move to urban areas, agriculture has become almost exclusively a rural activity, with emphasis on large farms with mechanized operations. These farms also rely on third parties to carry produce to urban centers or to ports for export to countries all over the world. In spite of several attempts in the late 19th century and the first half of the 20th century to bring agriculture to urban areas, this vital activity has, for the most part, stayed in the rural sector.

However, in the final quarter of the 20th century, as nations began to see some of the dramatic effects unchallenged industrialization has had on the environment, a 100-year trend that separated farming and human settlements has begun to reverse itself. As municipalities and civic leaders become aware of the benefits of urban agriculture through its relationship to other urban activities and local, national, and global food systems, it has begun to influence city and regional policies. Many progressive local governments are rediscovering urban agriculture as a means to recover and utilize resources such as space and energy, and as an important activity with the potential for long term sustainability.

As evidence of environmental degradation mounts, there is a strong movement by civic organizations and municipalities to return to community-based production due to distrust and a lack of control of modern food infrastructure. With the emphasis in modern societies on the bottom line, the industrialization of agriculture has, in many cases, overridden factors of climate, landscape, and human culture that previously produced regional differences.

TYPOLOGICAL RESEARCH: SUMMARY

As cities continue to modernize, residents have become prisoners of the success of industrialization, which in turn has influenced their perception of food, how food is grown, processed, transported and marketed, prepared and consumed. Busy family schedules have made it necessary to eat on the run. Fast and processed foods rule the marketplace, with our urban landscapes dotted with fast-food shops. Monolithic supermarkets have been our temples to modern consumption linked by highway networks catering to our fast-paced lifestyles.

Given this state of affairs, it is clear that continuing down this path of unchallenged modernization will lead to irreversible environmental damage, food insecurity, and disregard for the quality of our urban spaces. All of these issues need to be addressed in a viable, holistic manner. Neither sustainable agriculture nor sustainable settlements are viable without urban agriculture. Urban agriculture will allow for environmentally friendly practices that will reduce the participant's carbon footprint, conserve resources such as fossil fuels, and improve the physical and financial health of the community.

Since the 1970s, urban agriculture has become a common denominator for millions of people from diverse walks of life throughout the world. City planners and activists are carefully reviewing past and present programming lessons from around the world to refine efforts to spread the benefits of urban agricultural activities. As these benefits become obvious, the push for potential technologies and policies for safer, fairer, profitable, and sustainable urban agriculture will only grow stronger.

TYPOLOGICAL RESEARCH: SUMMARY

Urban agricultural success depends greatly on the kind of agriculture practiced. Sustainable agriculture produces the food needed by people in a way that preserves or improves fertile soils, maintains or expands clean water supplies, protects and regenerates the biological diversity of ecosystems, reduces the amount of purchased fertilizer and energy expended, and supports the role of the farmer as a producer and steward of natural resources. Many urban agriculturists also practice water conservation and composting.

Urban agriculture provides fresh, affordable, and nutritious produce, contributes to green space, helps reduce landfill filling, reduces the influx of stormwater and waste products into our local water surfaces and waste treatment plants, and reduces household organic waste. Yet there are many who fight this idea because they view urban agriculture as unproductive, wasteful, and problematic in an urban setting. Today, a great deal of urban land is available for agrarian uses. If this unproductive land is put to work using good environmental processes, the landscape in many urban areas can be significantly changed for the better.

The preceding background information on current issues surrounding urban agriculture introduces its potential to change the landscape in a of myriad ways. Urban agriculture is a complex topic that can roughly be divided into two areas: social and environmental. For the sake of this thesis design, urban agriculture has been separated into four characteristics to illustrate how it manifests itself in the landscape physically, economically, socially, and ecologically in current research and literature.

CASE STUDY:
TEAL FARM

Teal Farm is a project developed by Ben Falk's Whole Systems Design firm and Living Future Foundation, a non-profit organization that works toward the development of a truly sustainable human society. Teal Farm is a 1,600 acre project in Vermont that includes a wide spectrum of agricultural uses, ranging from intensive use to completely unmanaged. The farm is an example of an attempt to create an agricultural ecosystem. “The site goes beyond organic farming to a type of farming that does not used outside inputs at all” (Arvidson, 2011). Three years of planning and planting were involved in the initial creation of the project and has resulted in eight acres being planted with 2,500 plants of 250 species (Arvidson, 2011). The farm has areas that are populated with fruit and nut trees, fuel wood trees, perennial vegetables, medicinal herbs, and nectar flowers.

The design of the farm included a regrading process that Falk coined, “cheap oil now,” which refers to design as a tool to keep the use of oil to a minimum throughout the life of the project. By designing the farm in the way that Whole Systems Design did, the plots provide better control of stormwater and keep the microclimate at a warmer temperature, thus allowing more diverse crops to be grown.

Teal Farm is an excellent case study to be used in conjunction with this thesis project because it is a sustainable project. With the use of site regrading, Teal Farm collects, stores, and uses stormwater and does not need to draw external water to irrigate the project. The design goal of being able to transition the planting locations on a yearly basis is another aspect that makes it a successful project for this thesis to draw inspiration from. Crop rotation is a widely practiced method of soil nutrient protection and will be an important design feature in this thesis as a tool to keep the site renewable over time.

CASE STUDY: TEAL FARM

One important aspect of Teal Farm is that it is also used as an educational tool for aspiring design students looking to expand their knowledge about sustainable design. Similarly, this thesis project will be used to educate people, from design students and elementary students to adults who visit and tour the site. Education is a very important aspect to this project because I want to show visitors and users that creating a sustainable and renewable food system will promote a healthier community. Like Teal Farm, the aspects that will promote a healthier community start in the design. Teal Farm designed wind breaks that serve dual purposes. Besides protecting the farm, the windbreaks are also a practice in agroforestry. Agroforestry is a design technique whereby crops that can handle reduced sun exposure are planted near trees and shrubs that produce fruit and berries. The windbreaks are one component being used to promote a healthier community by protecting the ecology of the site and adjusting the micro-climate to make the site more comfortable for users and visitors.

Another design feature of the farm is the retention of stormwater and how it is being held on the sloping site longer through a method that uses shallow ditches and grazing animals to remove crop biomass. This process stimulates plant vigor and increases the soil quality by accumulating compostable leaves and plant growth above ground and deeper root penetration below ground. Teal Farm provides evidence that regardless of the quality of the land, simple and sustainable steps can be taken to remediate the land and also be used as a tool to educate the public and professionals about the ability to create a sustainable and renewable food source.

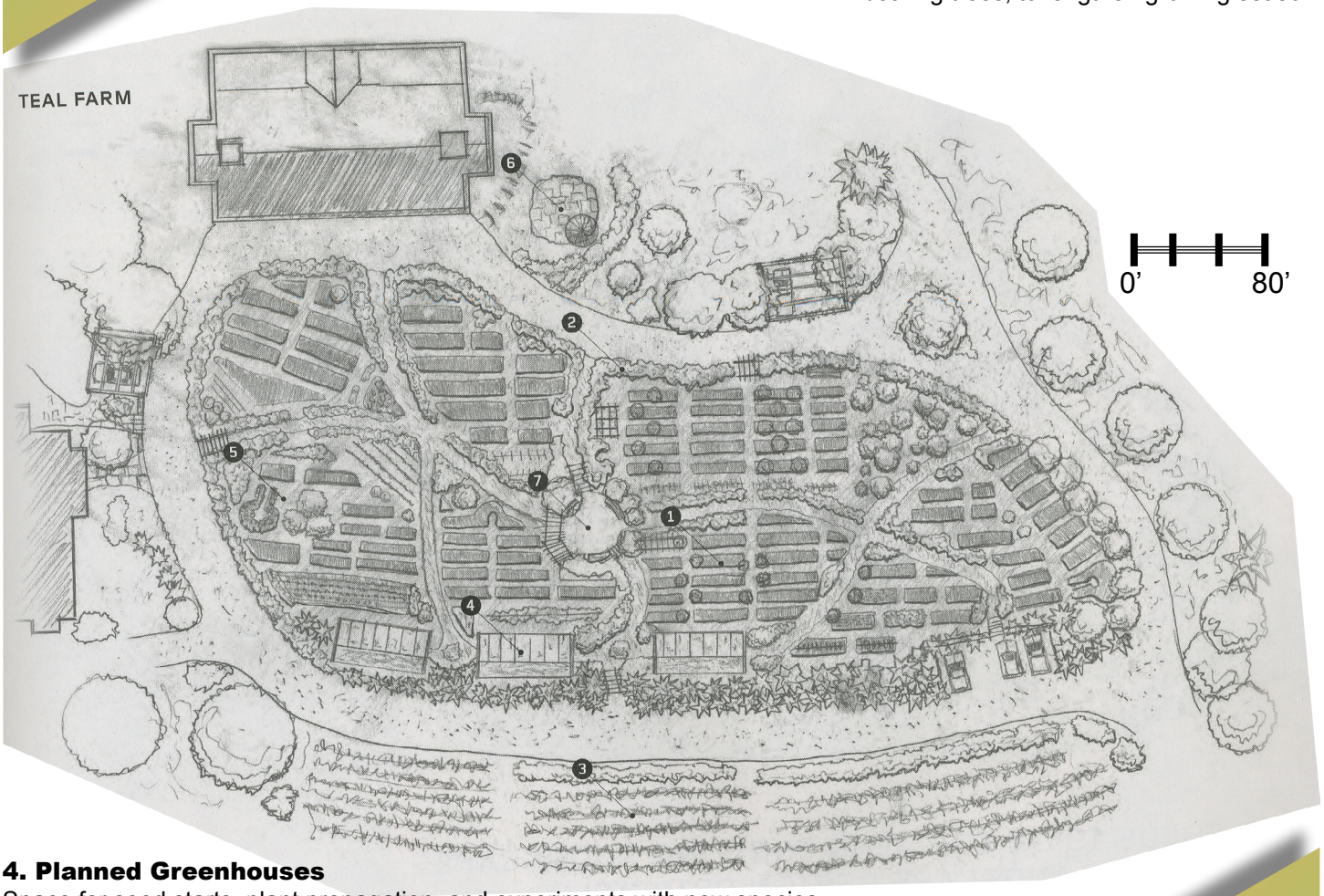
CASE STUDY: TEAL FARM

(Image 2) Teal Farm

1. Intensive Gardens
High-yield annual and perennial food crops with compost heaps scattered throughout to increase fertility.

2. Borders
Perennial shrubs and dwarf fruit or nitrogen-fixing trees

3. Shelterbelt
Evergreen and deciduous windbreak, including some nut-bearing trees, to lengthen growing season



4. Planned Greenhouses
Space for seed starts, plant propagation, and experiments with new species

5. Demonstration Garden
Showcase methods for small space cultivation, including trellised and espaliered fruits

6. Outdoor Eating Area
Buffered from prevailing winds and featuring edible shrubs and trees

7. Central Gathering Area
The heart of the garden, where workers can relax, talk and socialize

CASE STUDY: TREASURE ISLAND

Treasure Island is a 486-acre artificial island located just off the coast of San Francisco, California. The island was formerly a U.S. naval base that housed servicemen and their families and was created with sandy fill that was dredged from the San Francisco Bay. Treasure Island is connected to a natural island, Yerba Buena Island, by a narrow constructed isthmus. After the naval base was closed in 1997, the city of San Francisco created the Treasure Island Development Authority to oversee the redevelopment of the land. For the last ten years, the city has worked closely with Treasure Island Community Development, which is a coalition of members from the private sector that have been working to create a master plan and develop the island.

The most recent plan has seen little change since it was developed in December 2005. This plan came from collaborative work done by architects from Skidmore, Owings & Merrill (SOM), landscape architects from CMG Landscape Architecture, and planners from SMWM (now Perkins+ Will). Sustainability, engineering, and architectural consultants have also contributed to this project. The plan was peer-reviewed by William McDonough + Partners at the city's request.

The design of the island plans to house 15,000 people on roughly 90 acres of land in high density residential structures. The residential development will be supported by shops, restaurants, hotels, a school, a police station, and a fire station. The residential zoning will provide a variety of residential options and will even include an iconic 60 story skyscraper. Unlike mid-century housing projects, these residential towers will not be set into their own little niches of the city, but rather, they will relate to the urban context and streetscape. The entire development is reminiscent of an Italian village.

CASE STUDY: TREASURE ISLAND

With its city-country divide, the entire development is surrounded by parks. In comparison, the 300 acres of parkland are about equivalent to one-third of Central Park in New York City. Founding partner of CMG, Kevin Conger, noted, “three hundred acres is a lot of open space for 15,000 people” (Jost, 2010). As a result, the parkland and the island are being planned as a regional, or possibly a national, attraction. Some of these attractions will include a sculpture garden, wetlands, sports fields, and a 20-acre organic farm. These attractions will provide tourist destinations and give visitors a wide variety of experiences.

The Treasure Island case study supports this thesis by providing evidence of development of a community that uses sustainable practices, including stormwater collection and urban agriculture. By prioritizing pedestrians, bicycles, and mass transit over vehicular use, the community will emphasize reducing its carbon footprint. Ninety percent of the residential development will be located within a 15 minute walk of the new ferry terminal. The higher the density of residential zoning, the closer its location to the ferry terminal, with the tallest skyscrapers only a five to ten minute walk. To encourage walking and mass transit, CMG designed shared public ways. A public way is like woofner, a dutch term that describes “a street where cars are allowed but pedestrians and cyclists have priority” (Jost, 2010).

Another sustainable feature that the island will use is a wetland area. This area will treat the majority of the stormwater that falls on the island and will provide a habitat for migratory birds. Introducing the wetlands as a habitat for migrating birds will become a destination for dedicated bird-watchers and tourists. The wetlands will be part of a system that includes a small sewage treatment facility that will provide irrigation for the organic farm.

CASE STUDY: TREASURE ISLAND

The island's sustainable policies, which are unique to the island, will require that food scraps and grass clippings be composted and used as fertilizer for the farm. This idea of using vegetative yard waste and composted food scraps will be used in this project and prove a successful example of how a sustainable plan can benefit a community.

A Wastewater Treatment Plant

B Wetland

C School

D Organic Farm

E Job Corps

F International Hub

C School

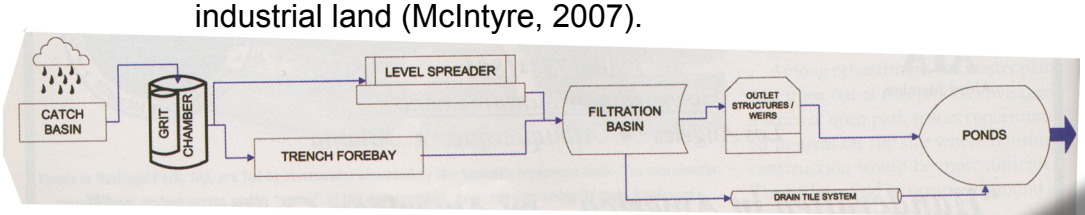
Treasure Island Master Plan

(Image 3)

CASE STUDY: HERITAGE PARK

Heritage Park is a 140-acre site located in Minneapolis, Minnesota. The park and surrounding neighborhood were originally designed in the late 19th century on land that was predominantly swamps, bogs, and the former bed of Bassett Creek. Although the neighborhood and park were extensively drained and filled, the structures, sidewalks, and streets were structurally precarious and vexed by differential settling. The reasons for these problems were due to exceptionally poor soil conditions. By the 1960s the neighborhood consisted of “superblock”-style public housing projects, partially encompassed by concrete noise walls. In 1993, the residents of the neighborhood's lawsuit against the city was settled with the requirement that the city pledge to undertake an inclusive planning operation aimed at redeveloping the site (McIntyre, 2007).

Minneapolis-based SRF Consulting Group led the design team that included landscape architects, engineers and community members for the public component of the project (McIntyre, 2007). The design team decided that beyond simply managing stormwater, they wanted to make the system, collection, retention, and infiltration a central focus of the design. Dubbing the system the “spine” of the project, the team literally maneuvered the system's design through the site along Van White Memorial Boulevard. The design's intention is not to collect stormwater that falls only on the site's 140 acres, but also to collect stormwater from over 300 surrounding acres that include residential, commercial, and industrial land (McIntyre, 2007).



(Image 4) Heritage Park Treatment “Train,” removes sediments during storm events before reaching the site’s ponds as a final destination.

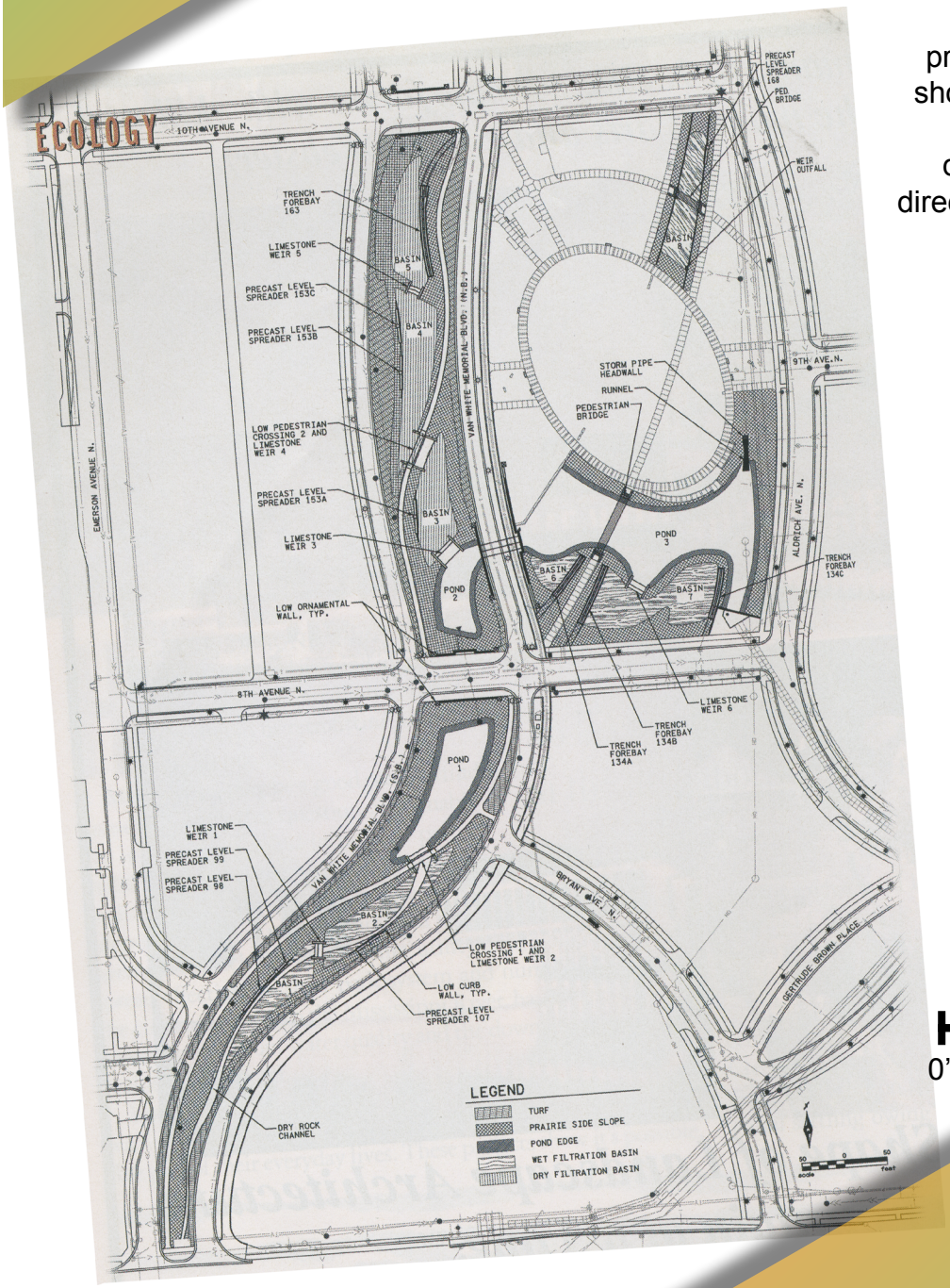
CASE STUDY: HERITAGE PARK

The project has three permanent ponds and an additional eight basins that catch and hold stormwater from the site and the surrounding area. Initially, the city wanted to daylight the original stream bed of Bassett Creek, but found that it was an extravagantly expensive and difficult operation. After determining that daylighting the creek bed was not an option, the design team found a way to reconnect the site to its historical roots by unearthing limestone bridges buried many decades ago and using the stone as a material for some of the design features. The bridges were discovered and excavated during the construction phase. Pieces of limestone were laid on pea gravel, preventing soil compaction, to create a dry channel along the former path of Bassett Creek.

In an effort to educate the public about how the system works, everyone who lives in the development is given a brochure that explains how the system works and how the components will be affected before, during, and after a storm event. Darrell Washington, the city's current project manager for Heritage Park, expressed concerns that the education process will be an ongoing effort because, while residents of Minneapolis's south side are more aware of ecological systems, recent projects on the north side involve residents who are less familiar with these types of landscapes (McIntyre, 2007). As a result of the notion that residents will not accept the project due to sustained periods of time when plants appear dead because of dormancy, the city has expanded the educational brochure component to include signage throughout the park.

CASE STUDY: HERITAGE PARK

Stormwater management and public education are both components of this thesis project and are both items that are highlighted in the Heritage Park development project. The education of the public of proper sustainable practices will increase the success of this thesis's design. The stormwater management practices used in this case study show that collecting and retaining on and off-site stormwater is a documented precedent and will directly relate to this thesis project.



(Image 5) Heritage Park Master Plan, showing arrangement of ponds and basins.

CASE STUDY: SUMMARY

Summarizing the case study analysis, three important elements were needed to support this thesis project. The first element was stormwater management and reuse in a public project. The second element was the successful use of an urban agriculture project. The third element, and possibly the most important, was to find samples that displayed a connection between urban agriculture, community, and education. The three case studies that were used to support this thesis displayed portions of each of these elements and, taken together, provide enough evidence to support moving forward with the project.

The case studies that were used to support this thesis included projects from all over the United States. The sites included San Francisco, Vermont, and Minneapolis. This thesis needed projects from various climates, similar to and different from the site that is being proposed for this project. Teal Farm is located in Vermont, and with the harsh winter climate of the northwest, it was important to find features that provided evidence of its success and how that would relate to a site in Fargo, North Dakota. Treasure Island is described as an eco-city that is located in San Francisco. The important features from this study showed how a community can harvest stormwater and successfully use it to provide irrigation to an organic farm. Heritage Park in Minneapolis, connected and educated a neighborhood about a project that collects, retains, and infiltrates stormwater from on and off-site locations.

Teal Farm was successful in providing evidence that sustainable practices, such as stormwater harvesting and multi-tiered planting systems, are possible in a cold weather climate. With the use of agroforestry, a system in which edible crops are planted among trees and are used as part of a windbreak system, Teal Farm shows that there are creative ways to use spaces that may typically go to waste.

CASE STUDY: SUMMARY

The windbreaks also show that implementing design features to protect crops and soil conditions have been successful for farms in similar climates. A process referred to as keylining, which uses shallow ditches around the planting beds to direct captured stormwater for irrigation purposes and maintaining good soil quality, helps retain stormwater for future use. In addition to these two important design features of Teal Farm, the use of the farm to educate young designers in sustainable practices is an important tool in demonstrating that sustainable and renewable design is successful in achieving its goals. Overall, the use of sustainable design practices and the education of future landscape architects provide evidence that Teal Farm is successful precedent for this thesis project.

To successfully connect a large community to a sustainable design, the development of Treasure Island in San Francisco is implementing many design features to assist in reducing carbon emissions. Through recycling stormwater for irrigation purposes and using various design features that cut back the dependency on automobiles, the plans for Treasure Island's development put it in line to become one of America's first eco-cities. The development plan for the community proposes a 20-acre organic farm that will provide some of the produce for the residents, whose population is planned to reach approximately 15,000. Additionally, the plan calls for public ways that will require automobiles to share the space with pedestrians and bicyclists and therefore result in additional reduction of carbon emissions. At 486 acres, Treasure Island, needed to address stormwater management, and this was successfully done with a series of designed wetlands and a water treatment plant that provides irrigation. Irrigation is required for the organic farm as well as additional designed landscapes on the island.

CASE STUDY: SUMMARY

Treasure Island successfully demonstrates the use of these features as elements that will lead to the community being named one of the pioneers in sustainability as it becomes an eco-city.

In Minneapolis, the majority of the affluent population lives on the south side of the city and is more aware of sustainable practices such as stormwater management. Heritage Park is located on the north side of the city and is being used as a tool to educate residents of the use of stormwater management. By creating ponds and basins to retain and infiltrate stormwater, the park provides an opportunity for the public to see how stormwater can be cleaned and then reused. The park's main purpose is to collect and infiltrate stormwater. The source of the stormwater is the 140-acre site, as well as 300 acres of adjacent property including residential, commercial, and industrial use. The project's mangers soon realized that residents unfamiliar with stormwater management practices might be confused. The confusion was caused by plantings that appeared to be dead because they were in a dormant stage. The mangers made it a task to educate the residents and visitors to the site through the use of brochures and improved signage was put up to explain the park's significance. The educational component and the stormwater management practices being used in this project are very relevant to this thesis and are the reason this case study was chosen to be examined further.

CASE STUDY: SUMMARY

As this thesis develops, three topics will continue to be the motivating features that will inspire the design. Stormwater management, education, and sustainable urban agriculture practices were the major elements that were showcased in the case studies. By studying these elements in detail these precedents will only help to guide the design portion of this project. The sites in the case studies and their respective projects hold significant relevance to the future of this project. Differences in the case studies help to define each of their strengths in relation to this thesis.

HISTORICAL CONTEXT

According to United States Senator Gaylord Nelson, the idea for Earth Day evolved over a period of seven years beginning in 1962, leading up to the first Earth Day in April 1970. This was the first popular renaissance of the current 'going green' era in the United States (Nelson, n.d.). The era began a new grassroots movement to bring environmental issues – the degradation of the land, rivers, lakes, and air-to the forefront, and the concept of conservation was re-introduced to an increasing urban population that was contributing to urban sprawl. Thus began the modern renewal of urban agriculture.

Urban agriculture, however, has been practiced in the world for thousands of years. While some scholars claim that urban agriculture can be traced back to the "Hanging Gardens of Babylon" (Smit, n.d.), others believe that the world's oldest gardens were found in the Indus Valley civilization of the Indian subcontinent ("Mohenjo-daro, Pakistan," 2008). Indus Valley cities like Harappa and Mohenjo-Daro began as riverside farming villages about 5,000 years ago. The first city-civilizations grew powerful. Their kings lived in palaces. Rich people enjoyed gardens, games, music, dancing, and feasts ("Indus valley: Land," 2011).

Many scholars claim that modern urban agriculture in North America began with the economic depression of the late 19th century which drove many poor and unemployed residents in large cities to push for urban gardening in vacant plots to grow vegetables for subsistence. However, Thomas Wessel (1976) argues that popular and historic concentration on the dramatic horsemen of the plains has clouded the significance of agriculture in Native American history. When Native American agriculture receives attention, most dismiss it as a form of nomadic gardening or horticulture and thus unworthy of further consideration.

HISTORICAL CONTEXT

Ironically, even after feasting on maize, squash, pumpkins, and a variety of beans, most contemporaries and later commentators described Native Americans as a culture of hunters bound to the trail of the deer and buffalo (Wessel, 1976). Wessel (1976) further states that Native American agriculture fed the first colonists at Jamestown and Plymouth and were largely responsible for their survival. Native American crops and farming techniques sustained the early settlements and provided the United States, and part of the world, with its most prolific feed grain.

Jamestown, or Fort James as it was called, was the first permanent settlement of English settlers. The fertile soil and warm weather of the area around Jamestown proved worth the gamble, and the first crop of tobacco that went to England that didn't come from Spain was worth a fortune that would have been well over a million dollars by today's standards. The following year, in every garden in Jamestown, a small plot of tobacco was grown. Inside a mere 20 years, more than 20,000 had come to the Virginian colony to pursue their own chance at fortune with the tobacco crop (Ray, 2011).

Agriculture in the first 200 years of American history was woodlands farming. Pioneer farmers routinely avoided the open areas, presumably with the belief that the absence of tree growth suggested a lack of fertility. The idea, while logical on the surface, had a hint of rationalization; the lack of capital and implements needed to prepare the dense soils luxuriating in tall grass were probably the main reason. In addition, the frontier farmer arrived equipped with the skills and tools suited to the woodlands and an inclination to keep risk to a minimum.

HISTORICAL CONTEXT

Girdling trees and planting corn after grubbing out the underbrush dominated western agriculture until well into the 19th century (Wessel, 1976). As European immigrants began to flow into the United States in the 19th century and the settlers began to inhabit the southern, central, and western parts of the country, and commercial and farming interests began to take root and the emphasis on subsistence farming began to dwindle ("A history of," 2000).

Modern forms of urban gardens in the United States are believed to have their roots in England. English gardens, commonly referred to as allottments, evolved throughout the late 1700s and into the 1800s due to “agricultural transformation, urbanization and industrialization” and related social changes (Warner, 1987). It was not until the economic depression between 1893 and 1897 that a renewed demand for urban agriculture grew in large urban centers (Williamson, 2002). One such city hard hit by the economy was Detroit, where Mayor Haze S. Pingree asked that owners of vacant lots allow the unemployed to grow vegetables for subsistence to help alleviate some of the hardships faced by these residents. These lots were nicknamed “Pingree’s Potato Patches” after Mayor Pingree (Lochbiler, 1998). Close to 1,000 families participated in the food gardens in Detroit in the first year, with that number almost doubling as the food garden movement began to spread to other cities such as Buffalo. Many other cities in the country experimented with community gardens but were not as successful as Detroit or Buffalo (Basset, 1981). Some of the issues that prevented successful community gardening included plot sizes, location of vacant lots, reluctant landlords, and distances people had to travel to get to an available vacant lot (Warner, 1987). This movement lasted from 1890 to 1930.

HISTORICAL CONTEXT

About the time potato patches began to take off in the United States, another movement, known as the City Beautiful Movement, began as the nation's population burgeoned with the mass influx of immigrants in the late 1800s. This movement lasted about two decades (1890-1910) as new immigrants began to fill the cities. Urban sprawl was occurring as some of the cities' wealthy residents began to move out of the inner cities. Vacant lots and uncultivated backyards abounded and were seen as eyesores (Basset, 1981). Civic leaders in many cities pushed for elegant and classic-style parks and promenades to be built to counter rising issues of sanitation, crime, and over-population. Ultimately, this movement would fade away as the nation suffered an economic depression and became involved in World War I.

The next four decades, the nation was on an economic rollercoaster. World War I and II and the Great Depression took an enormous financial toll on the country. During both of these wars, gardening became a patriotic and fulfilling activity for all Americans. Although the United States did not get involved in World War I until 1917, it was acutely aware of the food shortages in Europe and began a national effort to produce food to help the nations of the Allied Forces. Community gardens began to spring up everywhere as it became clear that an increase in food production was essential. In order to coordinate this effort, Charles Lathrop Pack founded the National War Garden Commission "to arouse the patriots of America to the importance of putting all idle land to work, to teach them how to do it, and to educate them to conserve by canning and drying all food that could not be used while fresh" (Pack, 1919).

HISTORICAL CONTEXT

The next wave of community gardening in the United States was known as the Depression Relief Gardens. This movement began to grow as the world's economy began to falter toward the end of the 1920s and hundreds of thousands of people lost their jobs and found themselves in serious financial trouble. Cities across the nation reacted to this economic loss by putting together relief or welfare gardening plots to combat hunger, poverty, and emotional stress (Williamson, 2002). These plots served the same purpose as the potato patches of the 1890s and served to improve the health and spirit of participants by creating feelings of usefulness, productivity, and importance while also providing opportunities for food and work (Tucker, 1993).

As the United States got involved in World War II, the nation's well-known ability to grow and distribute enough food was challenged. Millions of farmers and farm laborers had either joined the military effort or had moved to cities to take high paying defense industry jobs, leading to a severe farm labor shortage. At the same time, the United States had the additional responsibility of providing vast amounts of food to allies, such as Britain, China, and the Soviet Union, hoping to prevent their collapse. To boost production and ease the strain on the transportation system, Victory Gardens sprouted across the country, as many Americans learned the pleasure of getting dirty for a patriotic cause ("Cultivating for the," 2008).

The War Food Administration created a National Victory Garden Program, which set five goals of lessening demand on commercial vegetable supplies and thus make more available to the Armed Forces and lend-lease programs (Bassett, 1981).

HISTORICAL CONTEXT

These goals included reducing demand on strategic materials used in food processing and canning; easing the burden on railroads transporting war munitions by releasing produce carriers; maintaining the vitality and morale of Americans on the homefront through the production of nutritious vegetables outdoors; and preserving fruits and vegetables for future use when shortages might become worse (Bassett, 1981). These goals had a great effect on removing the stigma of community gardening which, until this point, had been seen as a symbol of the poor and the unemployed. Gardening became popular not only for food security, but for its mental and physical health benefits and its impacts on the community. The United States Department of Agriculture, USDA, estimated that more than 20 million garden plots were planted with an estimated nine to 10 million pounds of fruit and vegetables grown a year, which is 44 percent of the fresh vegetables in the United States (Basset, 1981).

THESIS GOALS

The process of compiling and completing this thesis brings to summation the long journey that a student endeavors upon to attain an accredited Bachelor's Degree of Landscape Architecture (BSLA) from North Dakota State University. Future plans of the students who successfully attain their BSLA degree will be different and unique but will likely fall into one of two categories. The two paths that the majority of my fellow students and I will likely choose to follow include continuing with academic endeavors or joining the professional world and attempting to secure a job in the profession. The objectives of completing the thesis process are to develop abilities in analysis and problem solving using a strict systematic process. Being able to solve problems as a designer requires an ability to visually portray information through imaging and appropriate text. Tying these objectives together spans across three important disciplines, which include the academic, the professional, and the personal.

Academic

Academic goals for my thesis project include a multitude of lessons that I have learned, that I am currently learning, and also hope to learn as I pursue my dream of being a successful and environmentally-responsible landscape architect. My project will tie together relevant information that I have been taught over the past six and a half years at North Dakota State University. The intent is to develop and manipulate information that I have gathered and use it to frame and develop a project that is both academically informative and visually appealing. It is my goal to continue to learn throughout the process of developing this design thesis project and use that knowledge toward my project and my future endeavors. As a result of furthering my education, I believe that I will improve my chances of finding and building a career in the profession of landscape architecture. I will also channel the growing base of knowledge towards leading me to career opportunities in the academic world.

THESIS GOALS

Professional

As I look forward to having a successful career in landscape architecture, I hope that the academic knowledge and social maturity I have gained at North Dakota State University will give me the tools to be the best landscape architect I can possibly be. My professional goal, when I complete my thesis, is to have produced enough work to be sought out by an established firm or government agency to work for them. The professional level at which I will be required to create and present my thesis project will also assist in building the necessary skills to work with clients, coworkers, management, and eventually others that I may be charged with supervising. This project requires me to use all available resources, including approaching and talking with landscape architecture professionals and handling these situations in the highest professional capacity. Completion of my thesis project will increase my confidence and bring about a self-awareness of my ability to successfully create and develop a life-sized project with real-world implications and carry it to fruition.

Personal

At a personal level, I have laid out many goals for my thesis. As long as I can remember, my parents have tended a small personal garden that we harvested to put fresh vegetables on the dinner table. After leaving home for college, I have witnessed many families that have not taken advantage of the space that is available to create a small garden that would provide healthy supplements to their meals. After seeing other cities creating and using large scale urban agriculture projects to provide families and individuals with healthy and inexpensive food alternatives, I have gained an interest in the subject of urban agriculture, food security, and urban food systems. My interest was further peaked after taking a seminar class pertaining to urban agriculture and listening to a guest speaker, Novella Carpenter.

THESIS GOALS

Novella Carpenter wrote *Farm City*, and the book is an actual account of her experience creating an urban farm in her backyard in a “ghetto” neighborhood in Oakland, California. After reading the book, I feel encouraged to pursue the topic and use the subject as the starting point for my thesis project.

The research that I have done on the subject prior to embarking on my thesis have exposed me to additional issues related to urban agriculture and sustainability. I hope to highlight them in my thesis and will to continue work on these issues as I transition into the professional world. The completion of my thesis project will bring great personal satisfaction and give me the necessary momentum that I hope will carry into my future endeavors in the profession of landscape architecture.

Personal

A final personal goal that I have for my project will be for it to motivate others – fellow students and professionals – to take a serious look at their own work so that they can incorporate sustainability of our communities in their own work to influence and create new laws and policies that will reduce the carbon footprint, so we can leave a lasting legacy for future generations to come.

SITE ANALYSIS: NARRATIVE

My first visit to the site was on a cold and blustery day in early October. The sky was overcast and the papers on my notepad were trying to escape my tight grasp because of the blowing wind. As I walked across a field that was littered with random trash, I began to envision how I might approach designing an urban farm that the public would be able to use and appreciate as much as I would. As I examined the soil and features of the site, I made note of the surrounding area and realized that there were acres upon acres of parking lots that drain directly into Fargo's stormwater system. It was at that time that I hatched the plan to add another component to my project, in the form of a stormwater management design that would be used to irrigate the farm.

Around me I could hear cars and other automobiles driving along busy 45th Street. There was honking of frustrated holiday shoppers leaving Sheel's Sporting Goods store coming from the west. It was then that I became acutely aware of an eerie feeling, mental silence. I struggle to explain how I felt, but on the large, vacant site, I found that I was suddenly alone and able to find a moment of relaxation in a busy urban area. Walking along the perimeter of the site, I could see the businesses and apartments that surround the site. Seeing these buildings started a thought in my mind of who the potential users will be.

Other elements I notice as I look out from the site are the expansive parking lots of the multitude of big-box buildings located on the adjacent property. What makes these parking lots most noticeable for me is their near emptiness at 5 p.m. on a Saturday afternoon.

SITE ANALYSIS: NARRATIVE

I also noticed as I arrived at the site was a large sign facing southwest at the corner of 17th Avenue. S. and 45th Street. S. The sign advertised the West Acres Shopping Center, which I found odd because it is nearly a mile away. I was also aware of some very large electrical poles that ran from the south end of the site to the east side of the site.

Subsequent visits to the site and the surrounding area have lead me to further investigate how the site could be used and who would use it. Within walking distance are a number of high density residential buildings that showed me that users will be available to appreciate the site. With the close proximity of the Fargo-Moorhead Convention & Visitors Bureau, as well as other local tourist destination and hotels (e.g. ferris wheel inside the Fargo Scheels sporting goods store on 45th Street and the Hilton Garden Inn & Convention Center on 44th Street), I began to formulate thoughts of how I could spread my project's ideas of sustanability. The possibility of proposing a partnership with the Bureau to inform visitors coming to Fargo of a nearby sustainable and renewable food system will help promote the farm and its methods. As I walked back to my car after each of my visits, a thought stood out in my mind: "how, am I going to take what seems so simple and barren and propose something that will be beautiful and be used in my effort to share my ideas on sustainability?"

SITE ANALYSIS: VIEWS

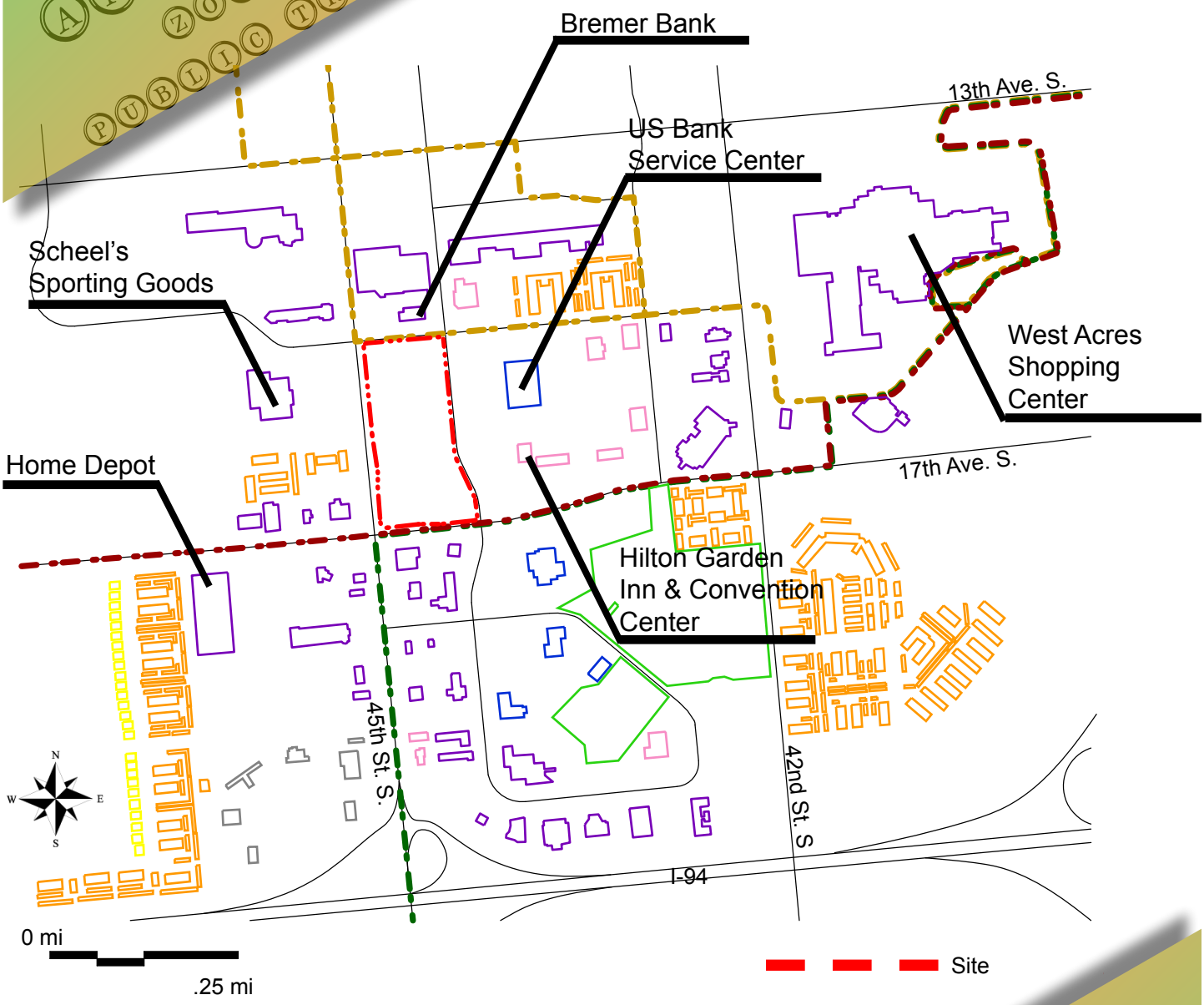
(Image 6)
Picture looking north at Bremer Bank. Also visible is one of the soil storage pits on site

(Image 7)
Picture looking at Scheel's Sporting Goods store directly to the west of the site

(Image 9)
east of the site is the US Bank Service Center and the Hilton Garden Inn and Convention Center
(Image 10)

(Image 8)
Picture looking south toward Johnny Carino's Restaurant and Interstate Batteries automotive shop

SITE ANALYSIS: ZONING/ PUBLIC TRANSIT



Zones

- High Density Dwelling
- Limited Commercial
- General Commercial
- General Office
- Public Institutional
- Limited Industrial
- Single Family Dwelling

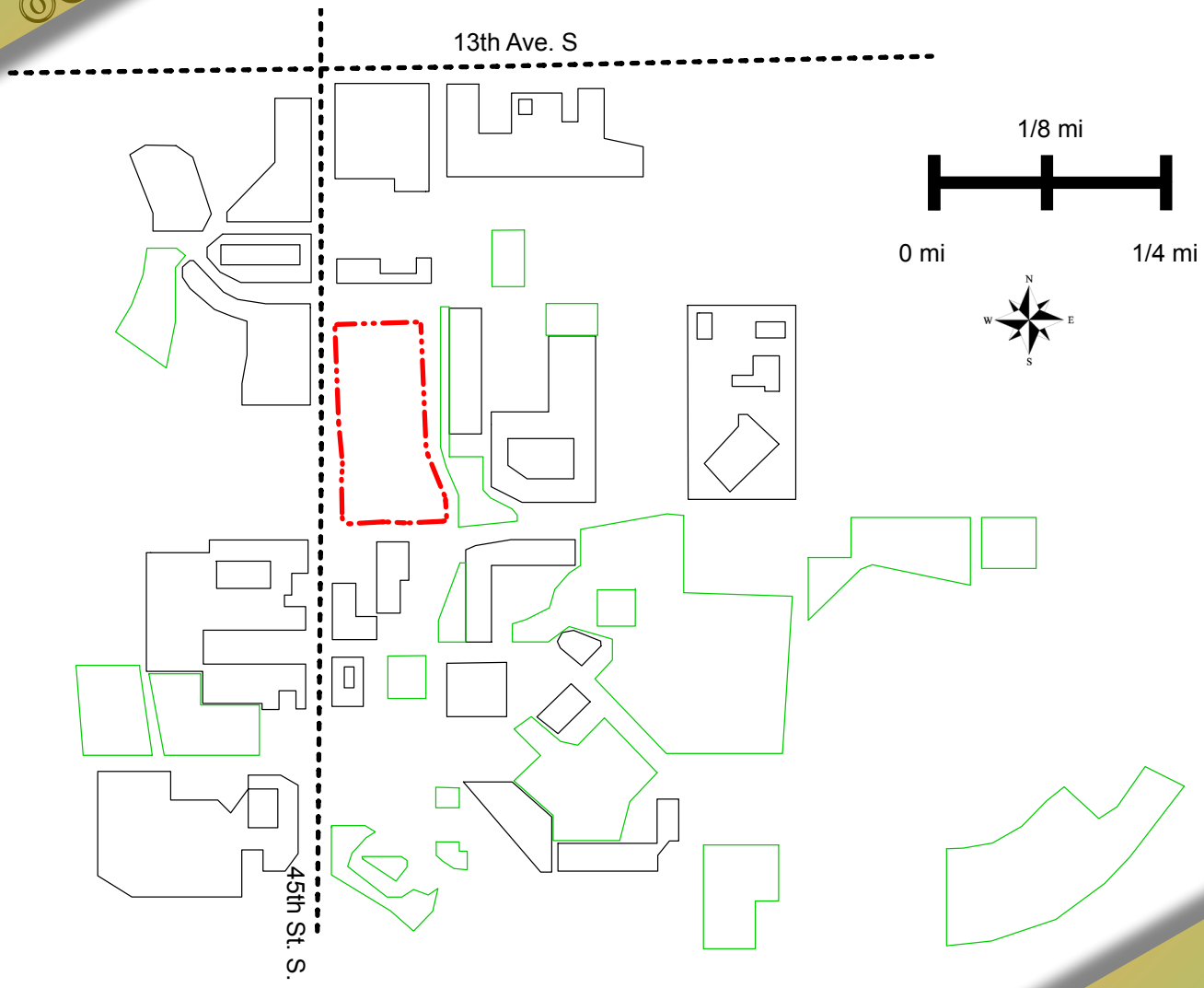
Area Bus Routes

- Route 15
- Route 21
- Route 22

(Figure 1)

SITE ANALYSIS: OPEN SPACE STUDY

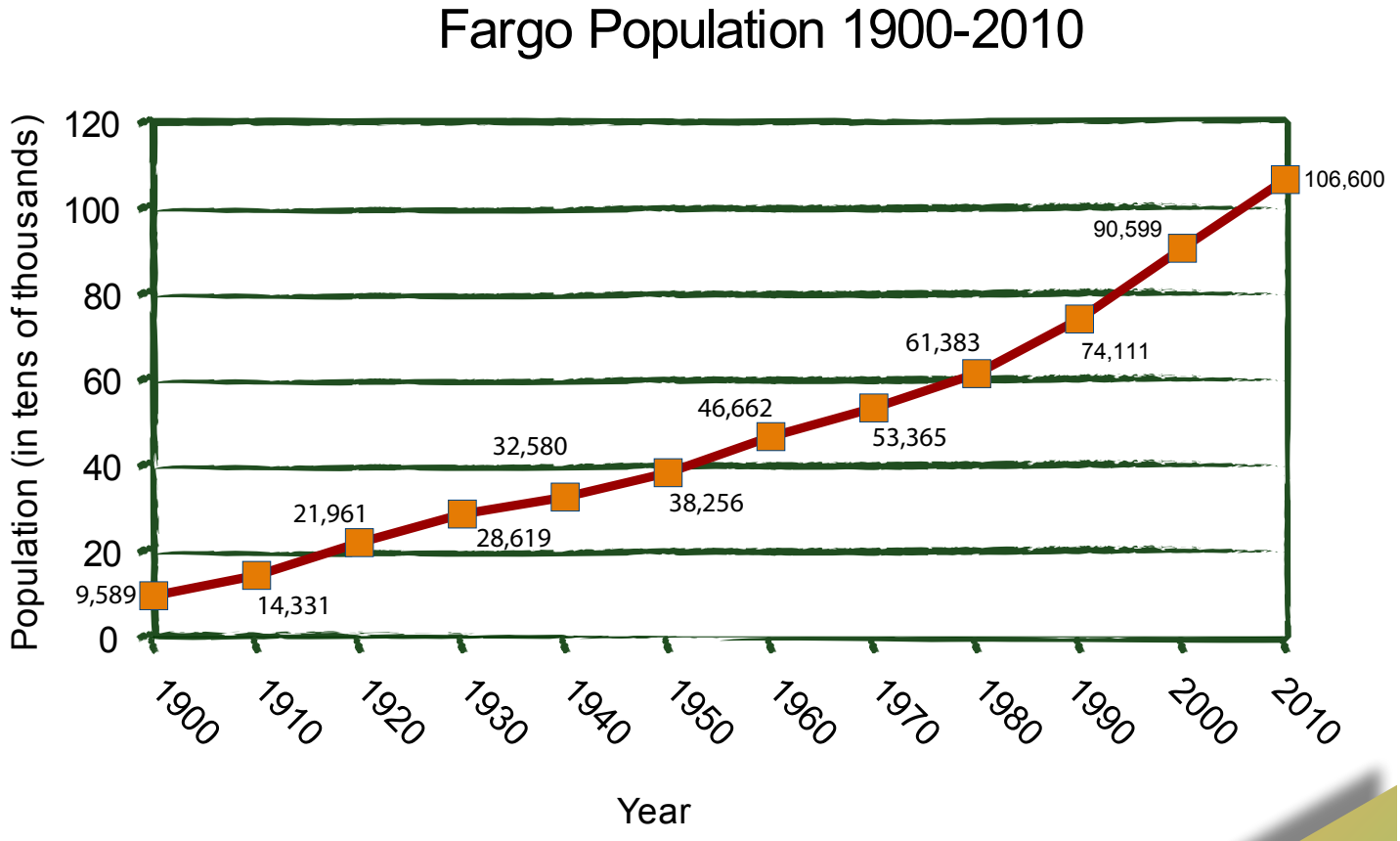
This map documents approximately 94.5 acres of open spaces that have permeable surfaces (i.e. unused green space) in the area surrounding the site.



This map shows approximately 128 acres of impermeable surfaces (i.e. parking lots, rooftop, etc.) in the area surrounding the site.

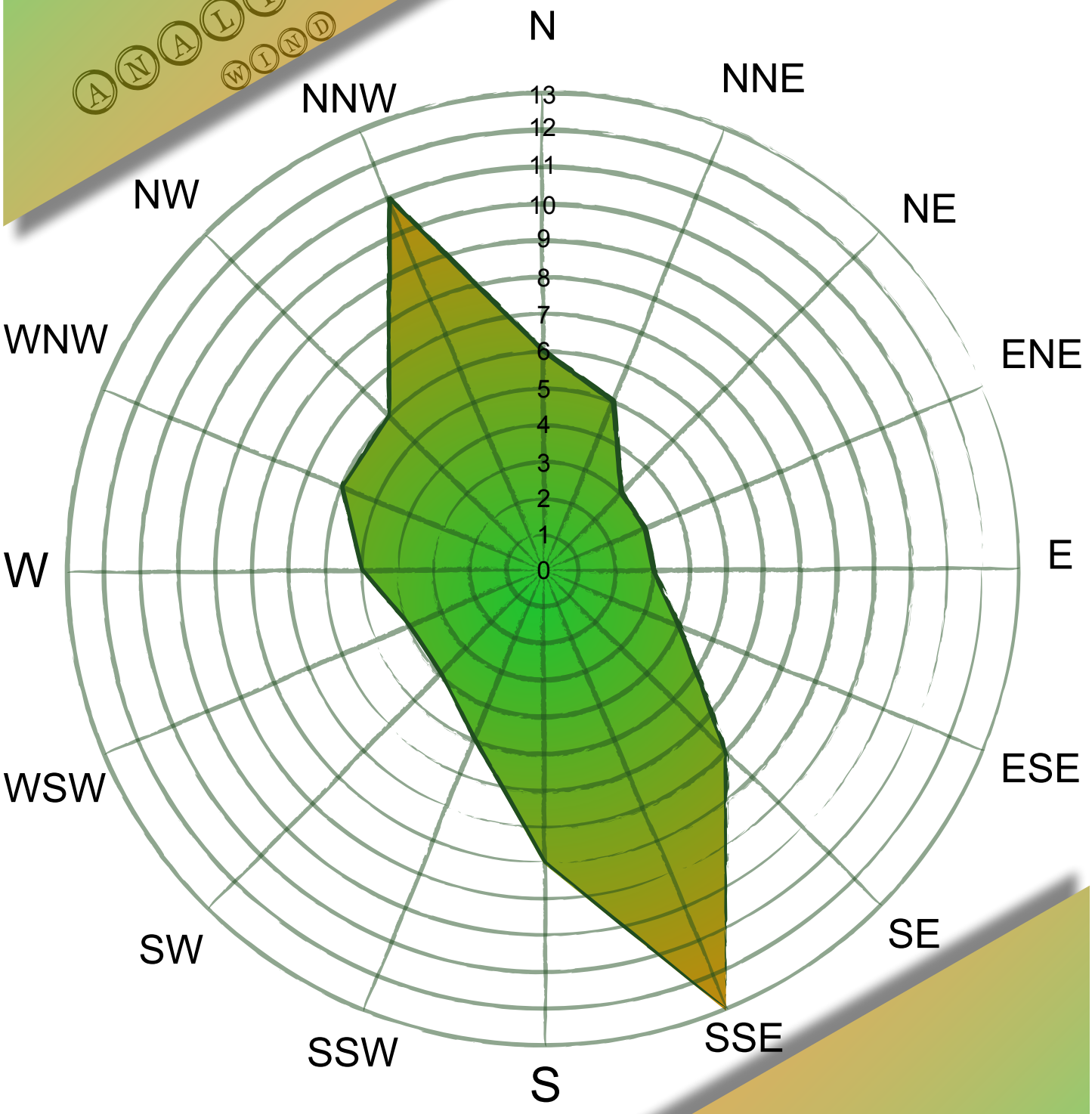
(Figure 2)

SITE ANALYSIS: POPULATION BY YEAR



(Figure 3)

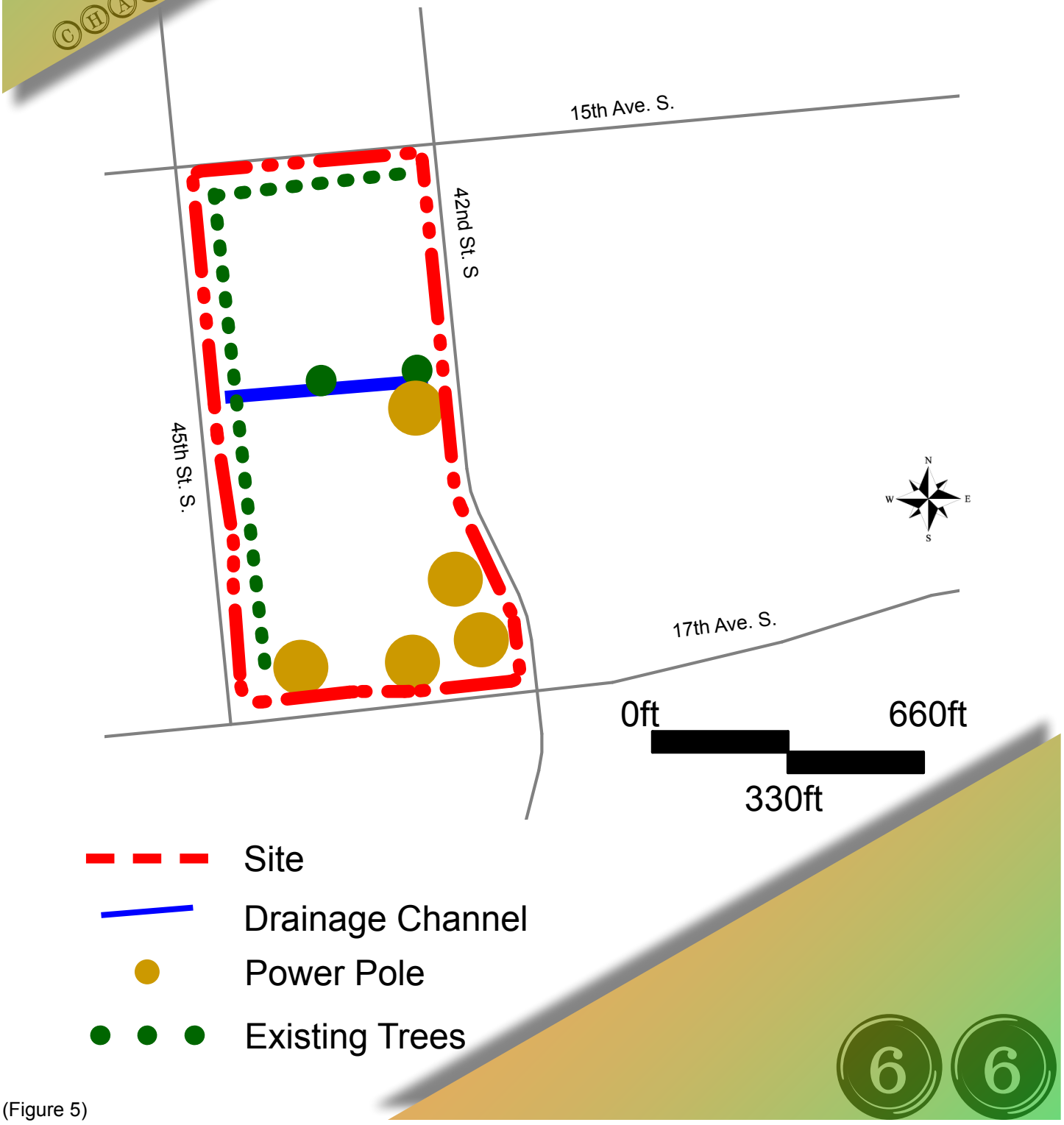
SITE ANALYSIS: WIND



Annual Wind Direction Distribution (%)

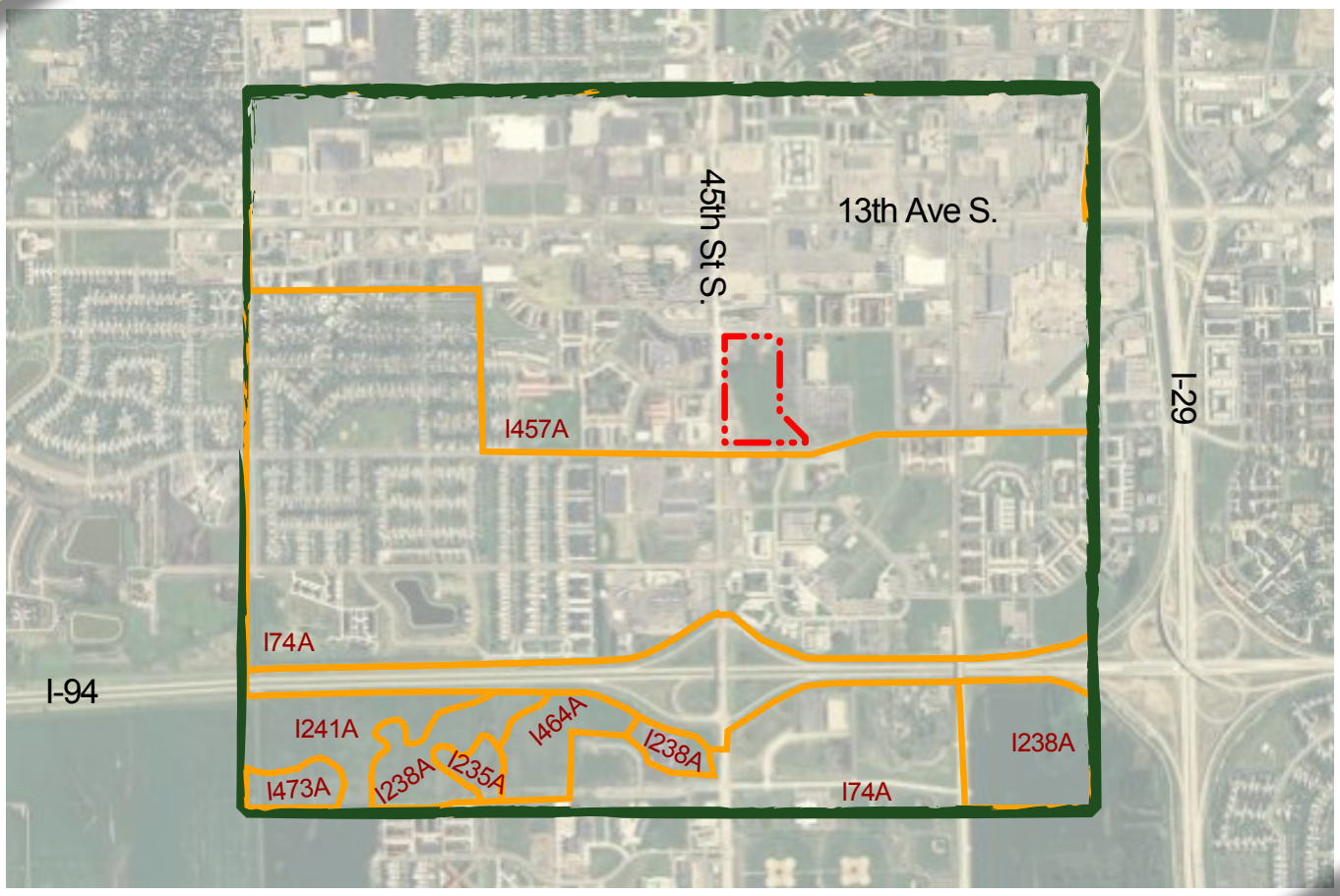
(Figure 4)

SITE ANALYSIS: HUMAN CHARACTERISTICS



(Figure 5)

SITE ANALYSIS: SOIL SURVEY



(Figure 6)

SITE ANALYSIS: SOIL SURVEY DEFINITIONS

I74A Urban land-Endoaquents complex
0 to 3 percent slopes
Landforms: Lake plains
Parent material: Variable soil material
Drainage Class: Somewhat poorly drained
Frequency of flooding: None
Frequency of ponding: None

I238A Fargo-Hegne silty clays
0 to 1 percent slopes
Landform: Flats
Parent material: Clayey glaciolacustrine deposits
Drainage class: Poorly drained
Frequency of flooding: None
Frequency of ponding: Frequent

I457A Urban land
0 to 2 percent slopes
Landform: Flats
Parent Material: N/A
Drainage class: N/A
Frequency of flooding: N/A
Frequency of ponding:N/A

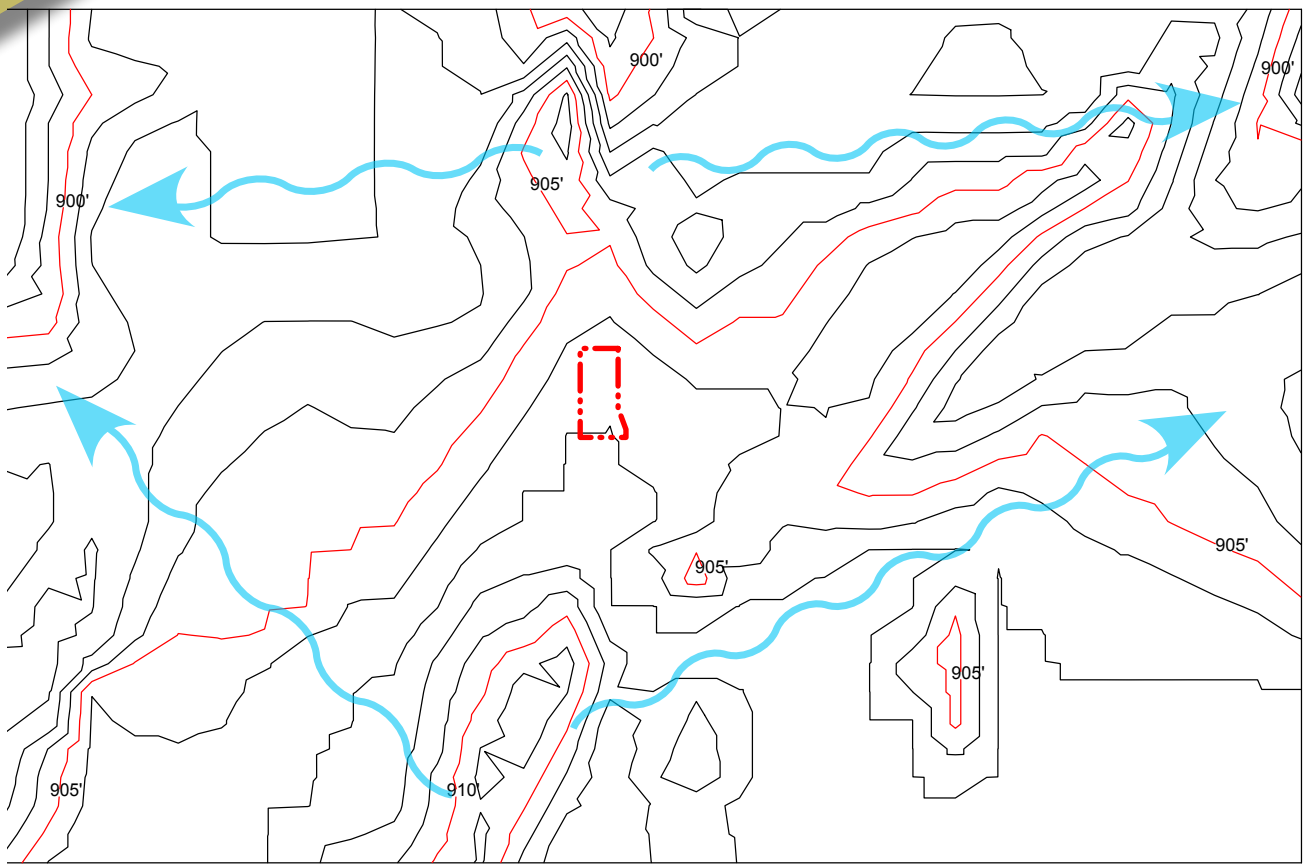
I241A Fargo-Ryan silty clays
0 to 1 percents slopes
Landform: Flats
Parent material: Clayey glaciolacustrine deposits
Drainage class: Poorly drained
Frequency of flooding: None
Frequency of ponding: Frequent

I235A Fargo silty clay, depressional
0 to 1 percent slopes
Landform: Swales
Parent material: Clayey glaciolacustrine deposits
Drainage class: Very poorly drained
Frequency of flooding: None
Frequency of ponding: Frequent

I473A Hegne-Fargo silty clay loams
0 to 1 percent slopes
Landform: Flats
Parent material: Clayey glaciolacustrine deposits
Drainage class: Poorly drained
Frequency of flooding: None
Frequency of ponding: Frequent

(Figure 6)

SITE ANALYSIS: TOPOGRAPHY/ DRAINAGE SURVEY



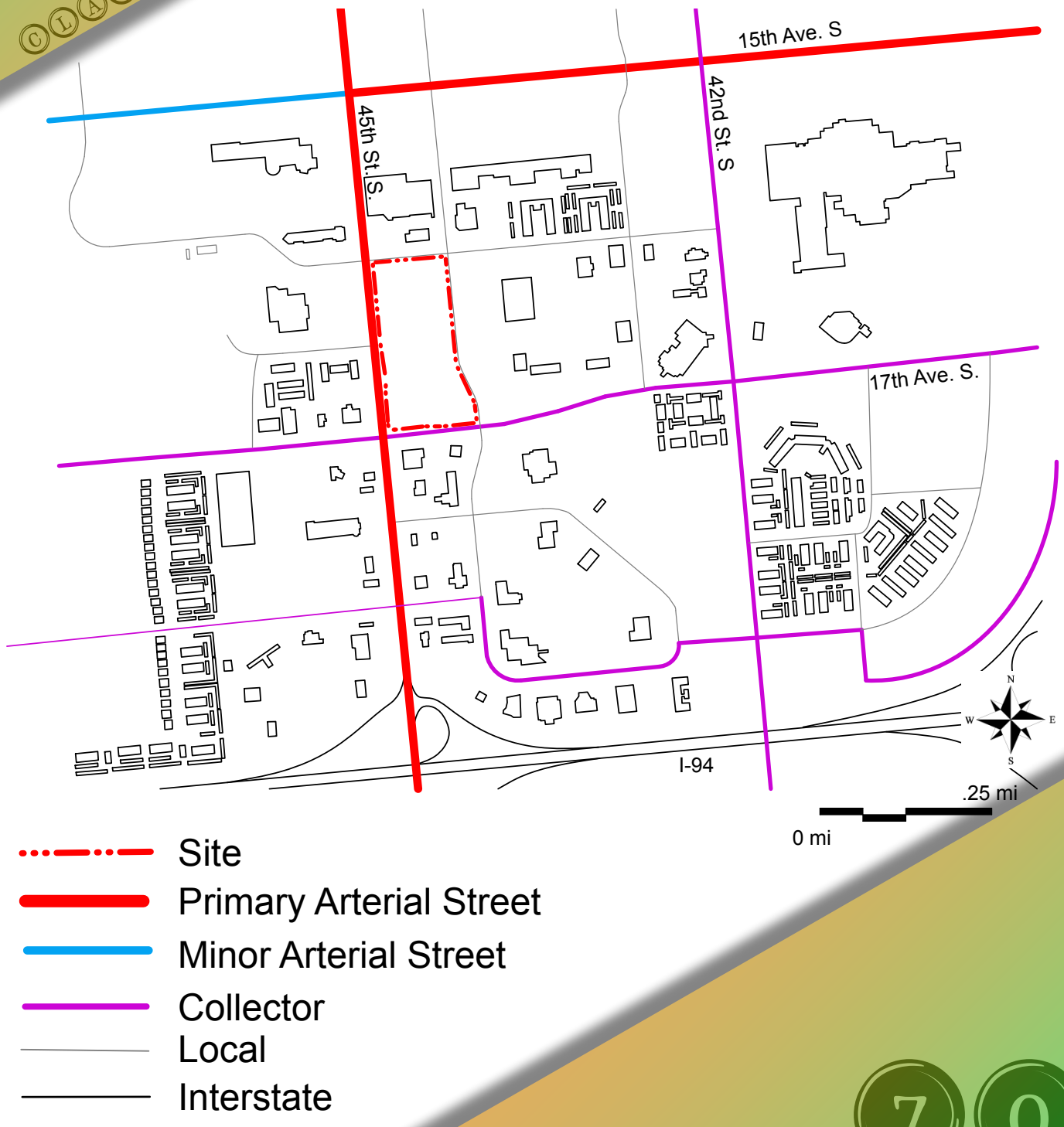
Site

1' & 5' contour

Drainage Pattern

(Figure 7)

SITE ANALYSIS: ROAD CLASSIFICATIONS



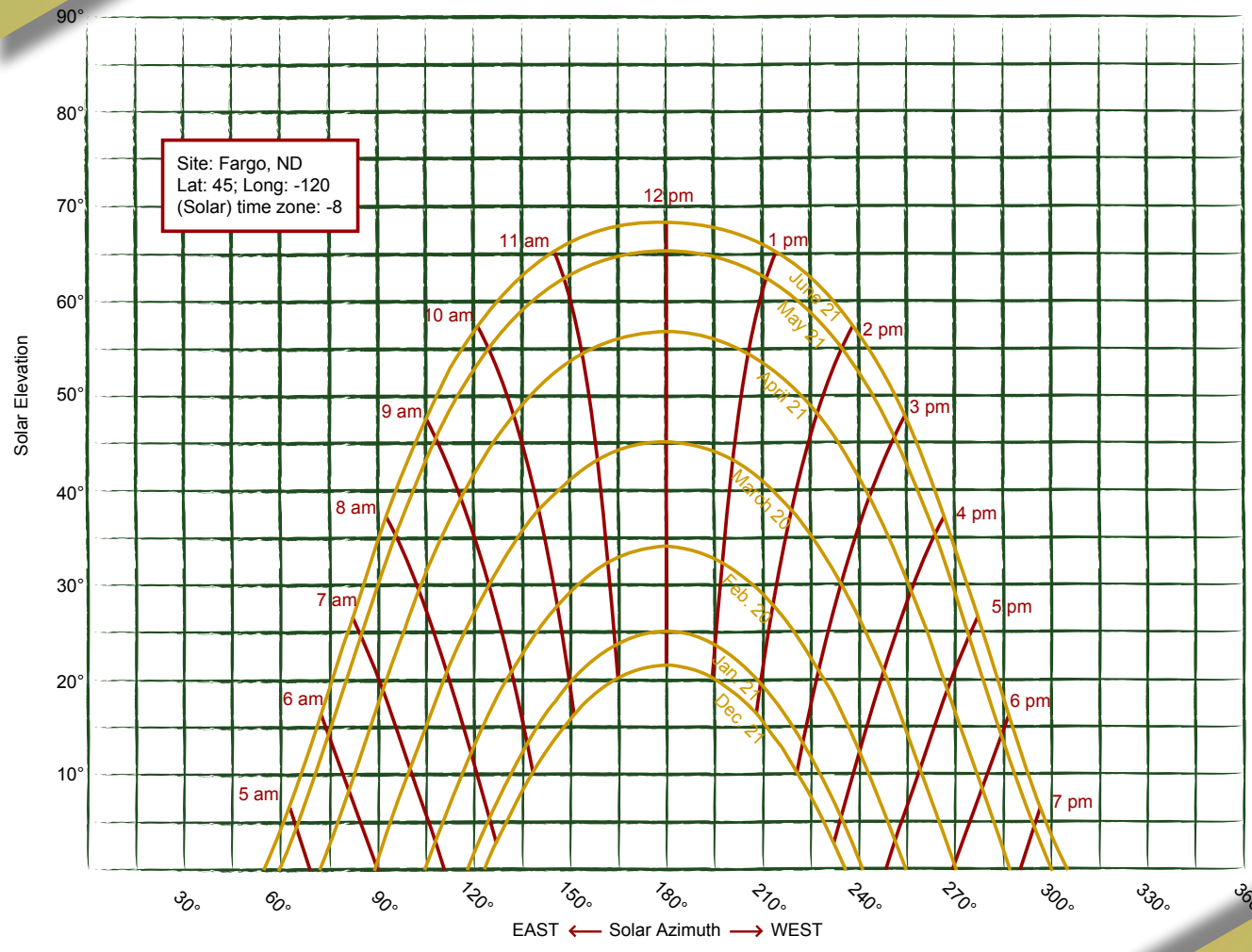
(Figure 8)

SITE ANALYSIS: CLIMATE DATA

Month / Data	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Yearly Avg.
					Traditional Growing Season								
Average Temp. (°F)	6	12	26	43	56	66	71	69	58	46	28	13	41
Average High (°F)	15	21	34	54	69	77	83	81	70	57	36	21	52
Average Low (°F)	-3	3	17	32	44	54	59	57	46	35	19	4	31
Record High (°F)	52	66	78	100	98	100	106	106	102	93	74	57	106
Record Low (°F)	-36	-34	-34	-7	20	30	36	33	19	5	-24	-32	-36
Average Precip. (In.)	0.6	0.5	1	1.7	2.3	3.1	3.2	2.4	1.8	1.5	0.8	0.6	19.6
Average Snowfall (In.)	8.6	5.9	6.7	3.1	0.1	---	---	---	---	0.7	5.8	7.1	38
Avg. # of Cloudy Days	17	15	17	15	14	13	8	9	12	14	18	18	168
Avg. # of Clear Days	7	6	5	6	7	6	10	10	9	9	6	6	88
Avg. AM Humidity (%)	75	77	82	79	77	82	50	47	85	80	81	78	81
Avg. PM Humidity (%)	70	71	67	51	45	53	59	56	49	51	65	73	57

(Figure 9)

SITE ANALYSIS: SUN PATTERNS



(Figure 10)

PROGRAMMATIC REQUIREMENTS

Paths:

Walking paths will be no less than 36” wide, and a 10’ access gate will be available for limited automobile or machinery use.

Parking Area:

A sustainable parking lot with permeable paving will be implemented on the site to accommodate between 20 and 30 vehicles.

Small Storage Structures:

Storage structures will be built and used for tool storage.

Composting Areas:

Composting bins will be established for on-site composting of yard and weeding waste. Additional bins will be available for site users to bring appropriate home and yard waste.

Gathering Areas:

Small gathering areas of various sizes will be incorporated throughout the farm. A large plaza will be established near the parking lot and can be used for formal gatherings and/or large events (birthdays, wedding photos, meetings, parties). This plaza can be used by farm members or rented to non-members. Bathroom facilities will be located nearby with access to water and electricity. The size of the plaza will allow between 50 and 75 guests to use the space comfortably. Part of the plaza will have a covered, open-air shelter.

PROGRAMMATIC REQUIREMENTS

Gardens (vegetable plots and perennial plots):

Vegetable plots will be available for rental on a single or multi-season basis. The plots will be between 200 and 625 sq. ft. Perennial garden plots will be of various sizes and be intermixed in the vegetable garden plots. These plots will be maintained by the City of Fargo's Parks and Recreation Department. Another reason for the perennial plots being mixed in with the vegetable plots is to allow for plot rotation to protect the soil quality. A demonstration garden will be planted near the entrance for educational purposes.

Water Access:

Water access will be available at the main plaza/shelter. There will also be access to water within 50'- 75' of garden plots.

Water Storage:

A series of retention basins and ponds will collect and filter water before the water is stored in a large retention pond on site. The water stored in the pond will be available for irrigation purposes only.

Animal/ Insect Storage Structures:

This farm will house and raise animals that will be cared for until they are the proper size for slaughter. Animal housing and enclosures for chickens, geese, ducks, pigs, and bees will be required. Raising animals on-site will require a city-wide policy change, while keeping bees will not. Having hives of bees will provide pollination of all plantings on site and provide pollination of off-site plantings.

PROGRAMMATIC REQUIREMENTS

Barriers

Vegetative and constructed barriers will be used throughout the site to separate various areas from one another. The entire farm will be fenced with a decorative/functional barrier to protect it from vandalism and theft of crops, animals, and property. The garden plots will be separated from the animal storage area to prevent animals from damaging the garden plots.

Signage:

Signage will be erected advertising the site on the north and southwest corners of the site along 45th Street. Signage will also be posted within the farm to explain certain perennial plantings and direct users and visitors. A bulletin board will be available for announcements and other postings.

Greenhouses:

Greenhouse structures will be installed to extend the growing season and be available on a rental basis to grow plants, such as tea, that are not hardy enough for the cold climate of Fargo.

Artwork:

Local artists will be welcomed to contribute pieces to add to the beautification of the farm. Artists' works will be displayed using a rotational system. Seasonal installations will be welcome, such as snow sculptures and ephemeral art pieces.

PROBLEM STATEMENT

Using sustainable design practices, how can urban agriculture change the political and social views of sustainability?

DESIGN GOALS

- Community Garden with rentable plots for public use
    - Rentable
    - Different styles for different users' abilities

- Demonstration garden

- Storage for 75,000 ft^3 of stormwater
    - Ability to convert into skating rink during the winter.

- Shelter with restroom facilities and gathering area
    - Restroom facilities
    - Office for full/ part-time staff
    - Open-air gathering space

- Pumpkin Patch

- Composting area

CONCEPT MASTER PLAN

Vehicular Path

Pedestrian Path

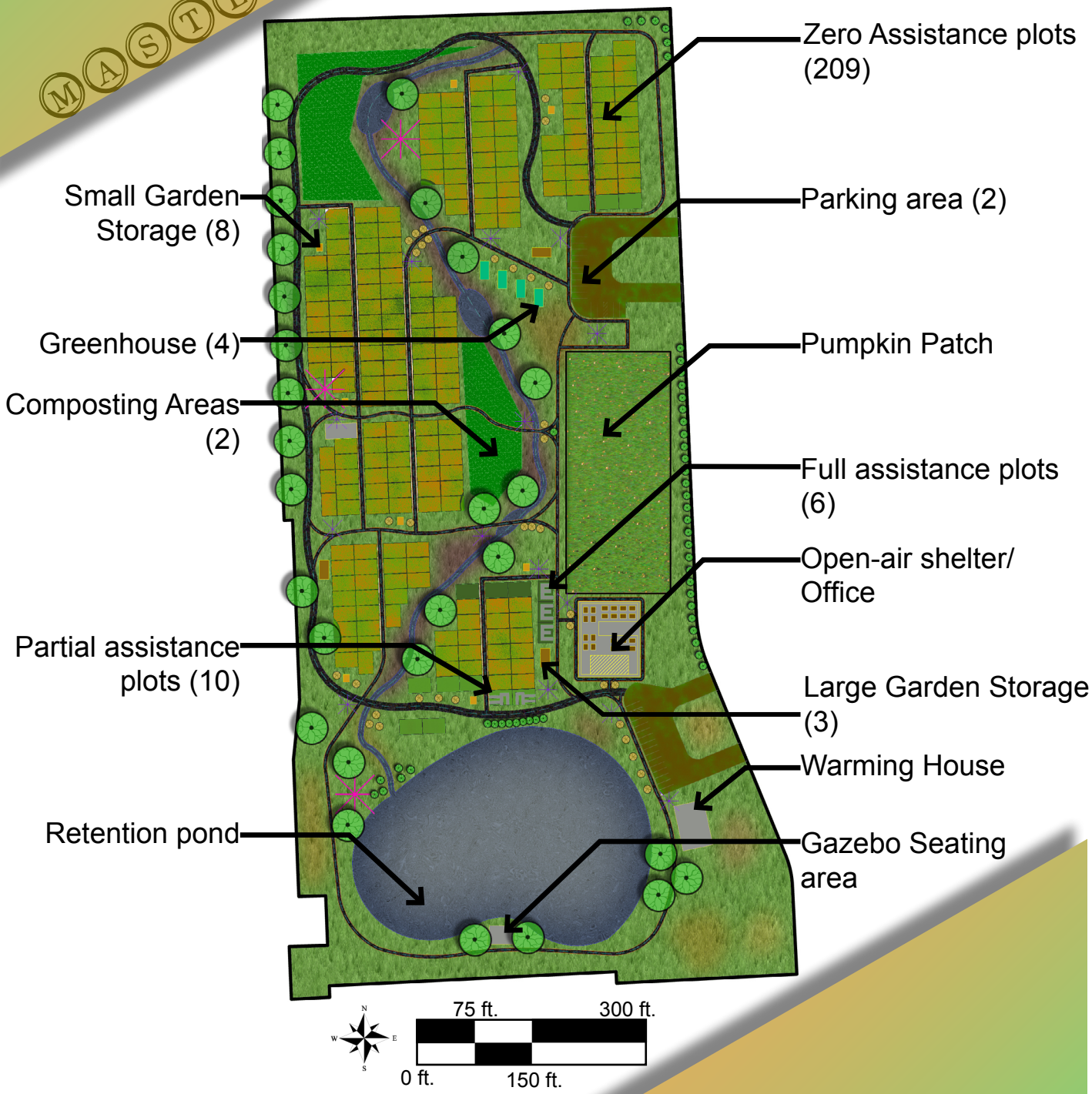
Art Installation

Signage

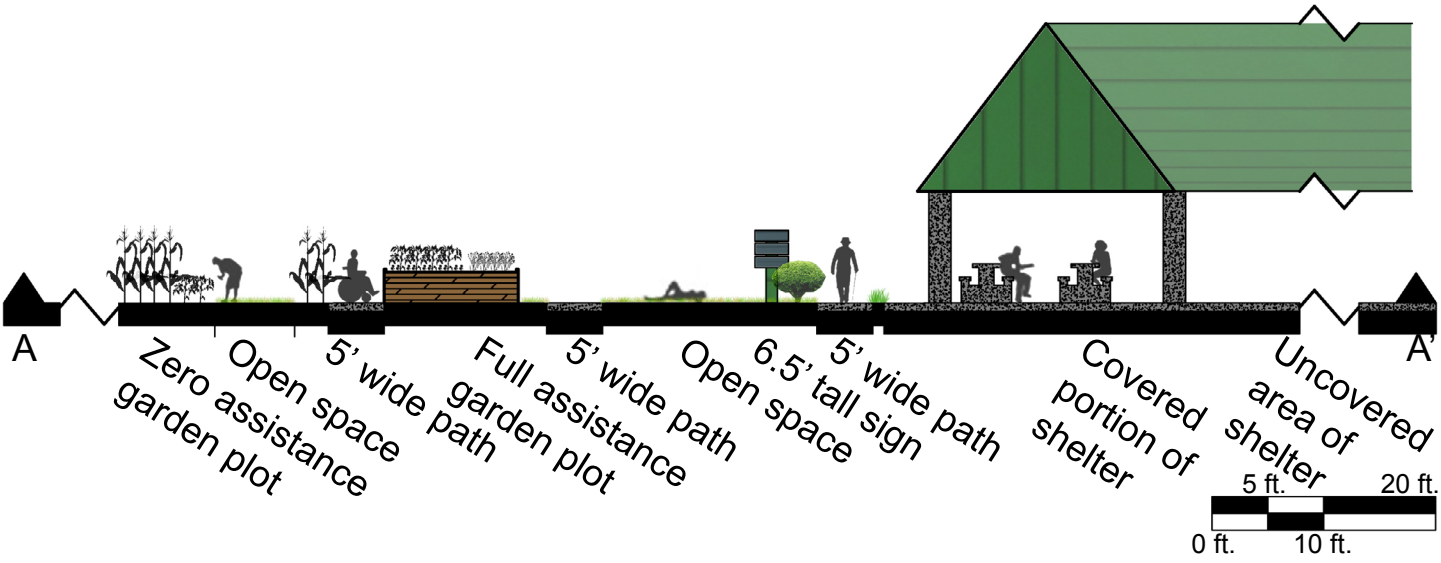
Built Element

Pumpkin Patch

MASTER PLAN

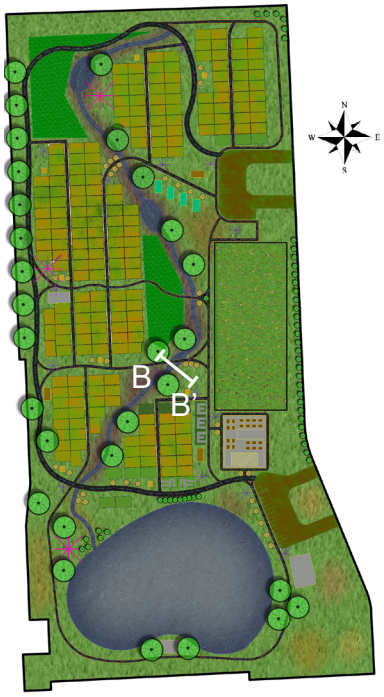

Zero Assistance plots (209)
Small Garden Storage (8)
Parking area (2)
Greenhouse (4)
Pumpkin Patch
Composting Areas (2)
Full assistance plots (6)
Open-air shelter/ Office
Partial assistance plots (10)
Large Garden Storage (3)
Warming House
Retention pond
Gazebo Seating area
N
W
E
S
75 ft.
300 ft.
0 ft.
150 ft.

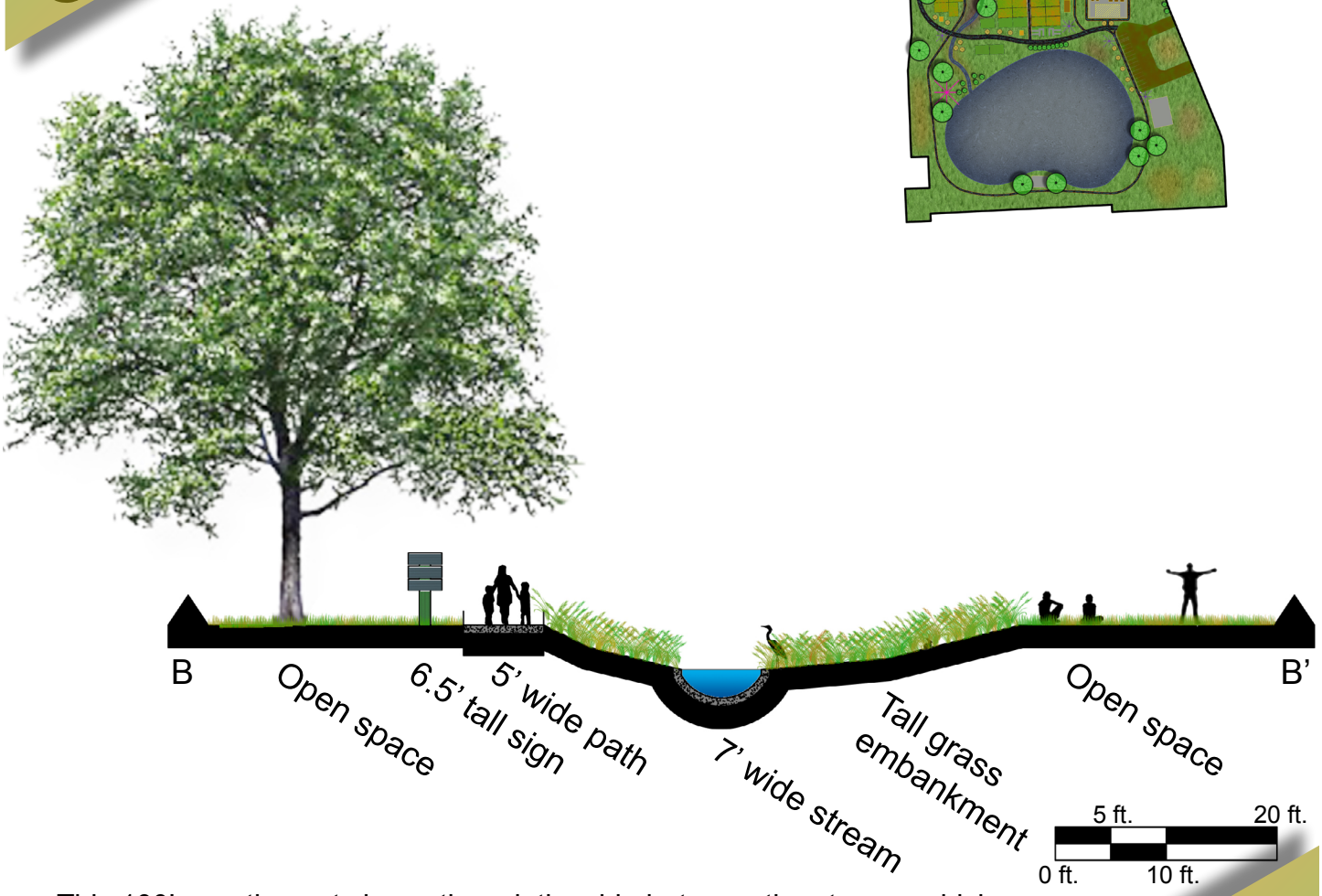
SECTION CUT: A-A'



This 100'+ section cut shows the relationship between the covered shelter and the open spaces and the nearby garden plots.

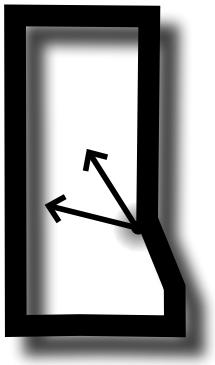
SECTION CUT: B-B’





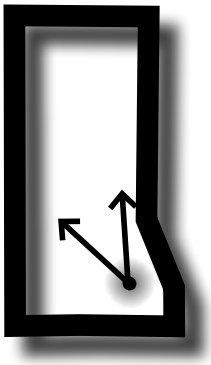
This 100’+ section cut shows the relationship between the stream, which carries water from surrounding parking lots to the retention pond in the south end of the site, and the surrounding open space.

PERSPECTIVE: 1/7



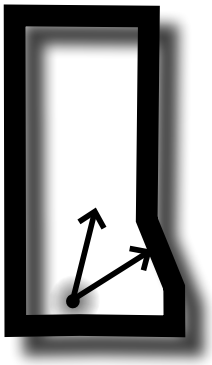
View looking northeast through the shelter, showcasing the open air design, the nearby pumpkin patch, and nearby assisted garden plots.

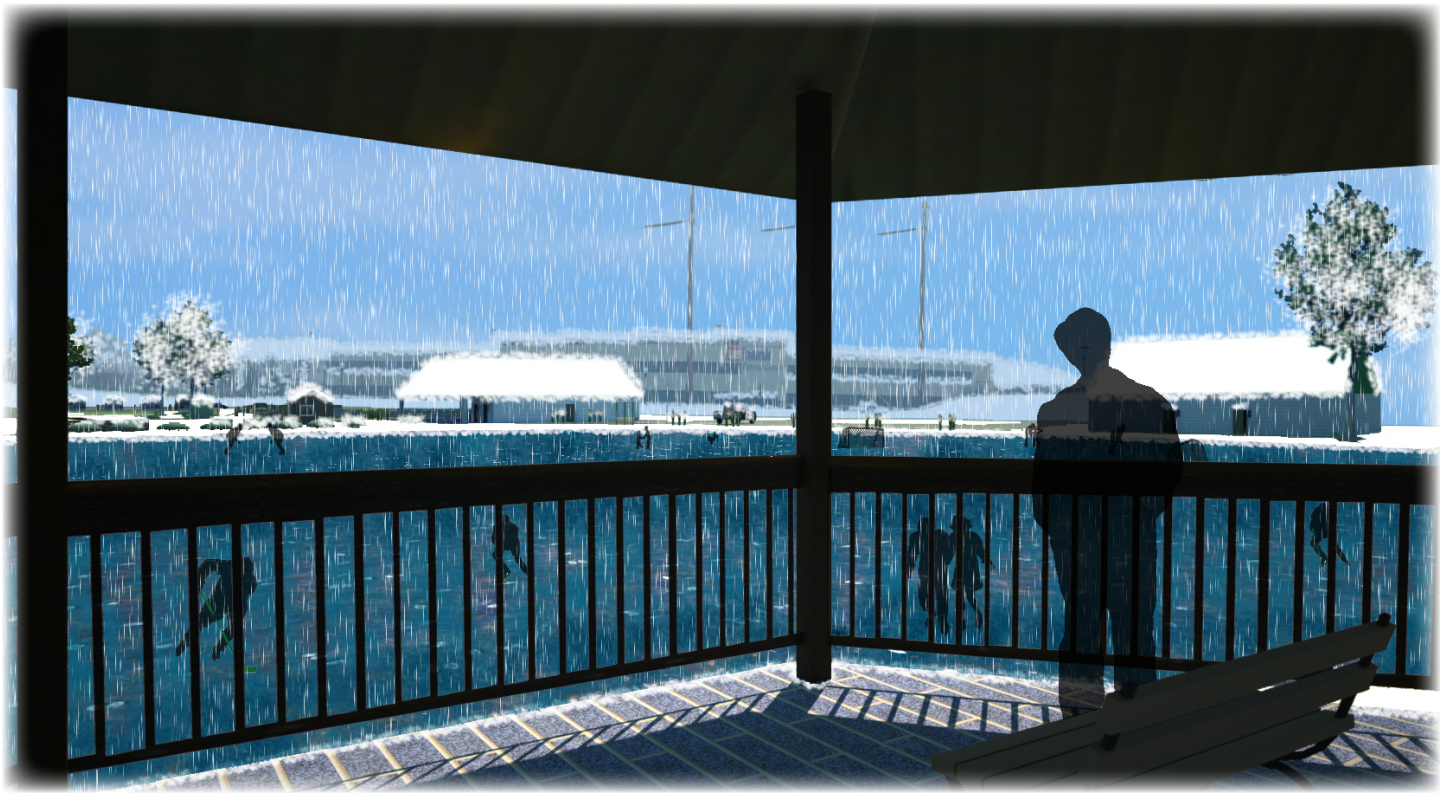
PERSPECTIVE: 2/7



View looking northeast, showcasing the shelter, and its relationship to the nearby assisted garden plots.

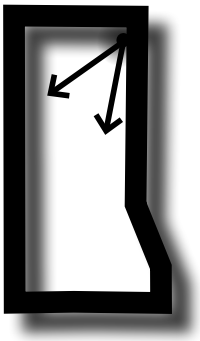
PERSPECTIVE: 3/7





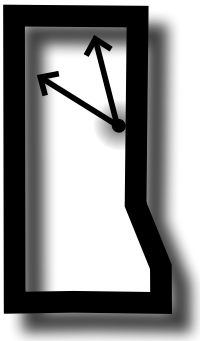
This 100'+ section cut shows the relationship between the covered shelter and the open spaces and the nearby garden plots.

PERSPECTIVE: 4/7



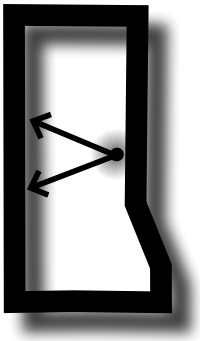
View looking southwest. View shows the zero assistance garden plots. In the background of the image a large storage shed can be seen as well as the greenhouses which are for users to have access to.

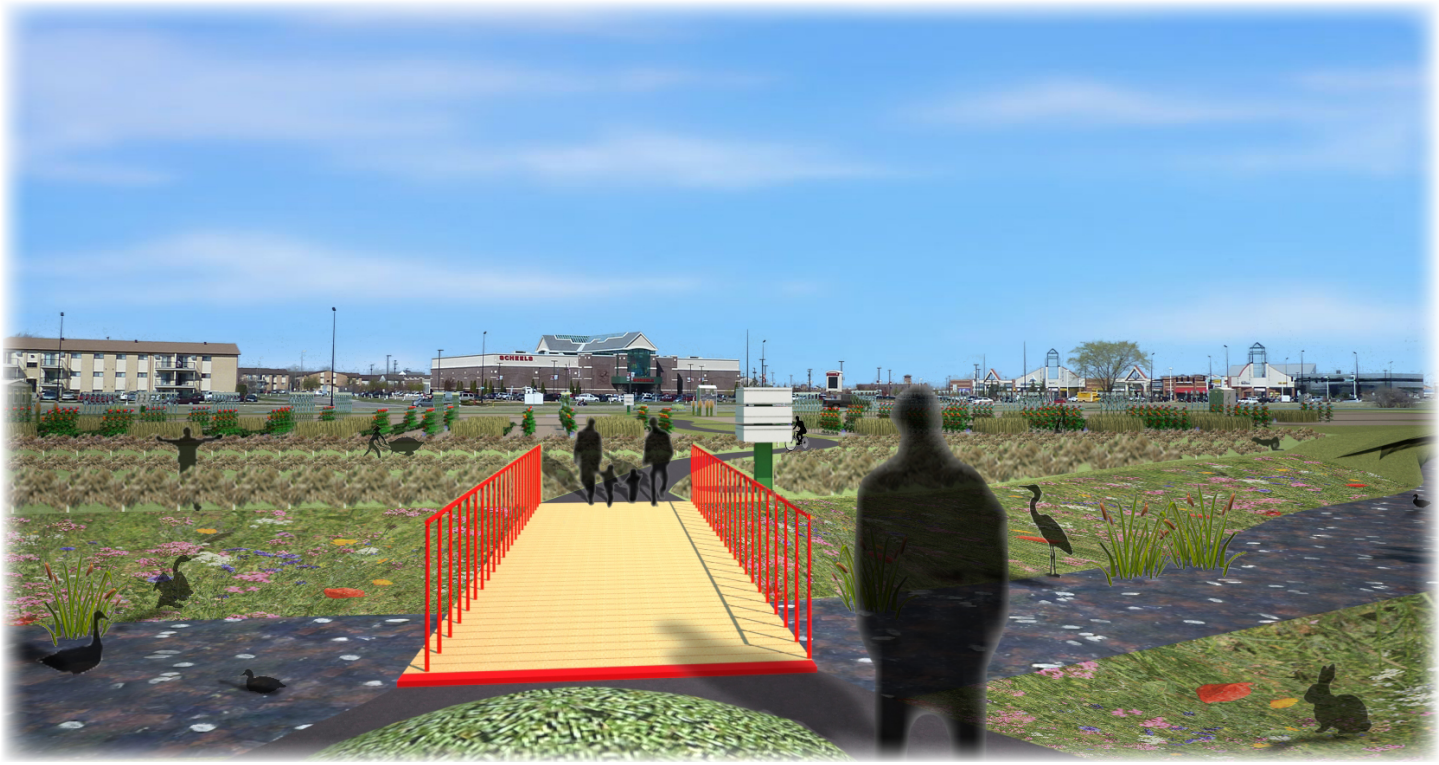
PERSPECTIVE: 5/7



View looking northwest through the north parking lot. View shows the permeable paving used in the parking lot and greenhouses and large storage structure.

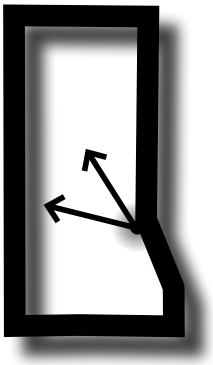
PERSPECTIVE: 6/7





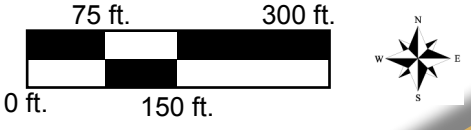
View looking west across the site. In the foreground is one of the three bridges crossing the stream on site. The stream will have remediative processes designed into it that will clean the water so that it may be used for irrigation on the farm.

PERSPECTIVE: 7/7



View looking northwest and showcasing the one acre pumpkin patch designed into the site.

PLANTING PLAN



PLANTING PLAN

http://www.treesdirect.co.uk

Golden Weeping Willow

Zone 1 (around lake):

- Golden Weeping Willow, *Salix alba* 'Tristis'
- Quaking Aspen, *Populus trmuloides*

+ Grass: Shorline Wildflower Mix*

http://www.prairieresto.com

Shoreline Wildflower Mix

Zone 2 (Along stream):

- Pagoda Dogwood, Cornus alternifolia 'Argentea'
- Eastern Cottonwood, Populus deltoides
- Cricket Bat Willow, *Salix alba* ' Caerulea'

+ Grass: Tall/wet wildflower mix*

http://bioweb.uwlax.edu

Cricket Bat Willow

* Seed mixes provided by http://www.prairieresto.com

http://www.homelandscape.net

Pagoda Dogwood

PERSPECTIVE: 7/7

http://www.prairieresto.com

Mixed Height/ Mesic Wildflower Mix

Zone 3 (Along 45th St.):

- Autumn Blaze Maple, *Acer* X freemanii
- Greenspire Linden, Tilia cordata 'Greenspire'
+ Grass: Mixed Height/Mesic Wildflower Mix*

Zone 4 (Along 44th St.):

- Almey Crabtree, *Malus* X 'Almey'
- Boxelder, *Acer negundo*
+ Grass Mixed Height/Mesic Wildflower Mix

Zone 5 (Southeastern Corner of Site):

+ Grass : Mixed Height/ Mesic Wildflower Mix

http://search.linders.com

Autumn Blaze Maple

* Seed mixes provided by http://www.prairieresto.com

http://www.ontarioplants.ca

Almey Crabapple

CONCLUSION STATEMENT

Revisiting my initial thesis question, how can using sustainable design practices in conjunction with urban agriculture, change political and social views on sustainablilty? This project has demonstrated through four design features that urban agriculture can and will have an impact on the way that society views sustainability.

As the population of the world continues to grow, food availability will become a real threat to the existence of life on the planet. By providing a local food source that can a healthy alternative to boxed meals and fast food, residents throughout the region will be able to take the ideas learned from the design of this project to their communities to start their own local food source.

Providing composting teaches site users the importance of recycling organic waste. The recycling will then provide the nutrients to allow the site to remain sustainable and renewable.

Rerouting stormwater as a way to provide irrigation to the site forces the hand of the local government to acknowledge that stormwater is a valuable resource that can be harvested and used in a productive manner.

Finally, all these components combined create the fourth and final design feature. Education, while not something that is tangible, is a design hallmark by providing hands on features and venues for that provide the education that a layperson or youth will need to maintain the site as well as make it productive and provide a sight to the future of food availability and sustainability.

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Image and Figure References:

Image 1:
Painting, Corn field, Linda Callaghan accessed from http://fineartamerica.com/featured/corn-field-linda-callaghan.html, 9/7/2011

Image 2:
Arvidson, A. R. (2011, March). Post-oil groceries. *Landscape Architecture Magazine*, 101(3), 54-62.

Image 3:
Jost, D. (2010, April). Planning: America's ecocity. *Landscape Architecture*, 100(4), 48-63.

Image 4 & 5:
McIntyre, L. (2007, January). Ecology: At home with stormwater. *Landscape Architecture*, 97(1), 52-63

Image 6,7,8,9: Personal Photographs by Author

LIT. & IMAGE REFERENCES

Figure 1:
Data retrieved from:
media.cityoffargo.com/maps/zoning_36x68.pdf, http://www.matbus.com/images/MATBUS%20-%20Fargo%20-%2008152011.pdf

Figure 2:
Data retrieved from:
Google Earth Pro

Figure 3:
Data retrieved from:
www.cityoffargo.com/CityInfo/, http://factfinder2.census.gov/faces/

Figure 4:
Data retrieved from:
www.windfinder.com/windstats

Figure 5:
Data retrieved from:
Site Visit

Figure 6:
Data retrieved from:
http://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx

LIT. & IMAGE REFERENCES

Figure 7:
Data retrieved from:
Google Earth Pro via AutoCAD Civil 3D 2012

Figure 8:
Data retrieved from:
http://gis.cityoffargo.com/FargoGIS/Default.aspx

Figure 9:
Data retrieved from:http://www.weatherbase.com/weather/weatherall.php3?s=35727&refer=&units=us

Figure 10:
http://solardat.uoregon.edu/SunChartProgram.html

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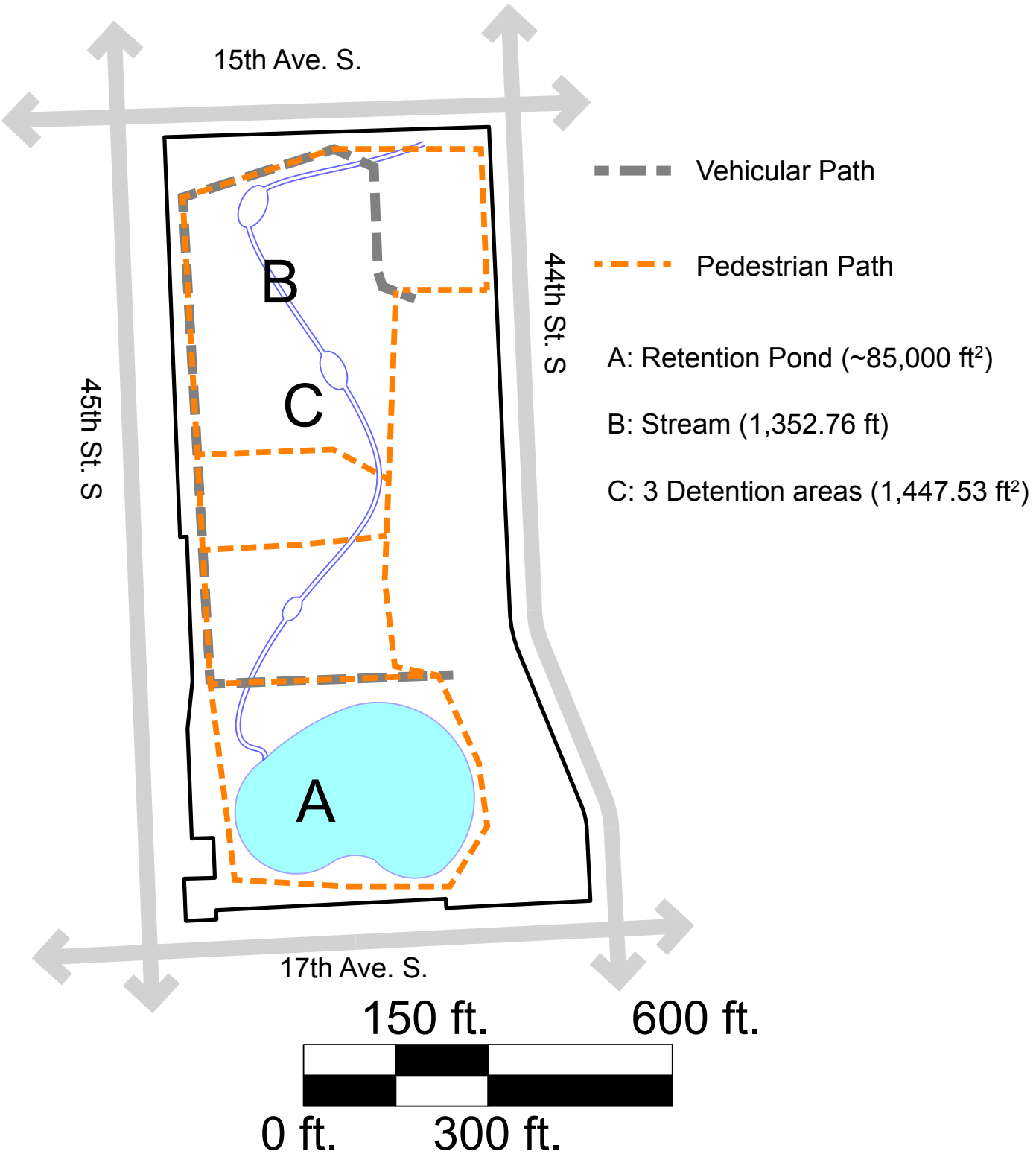
(Image 9)

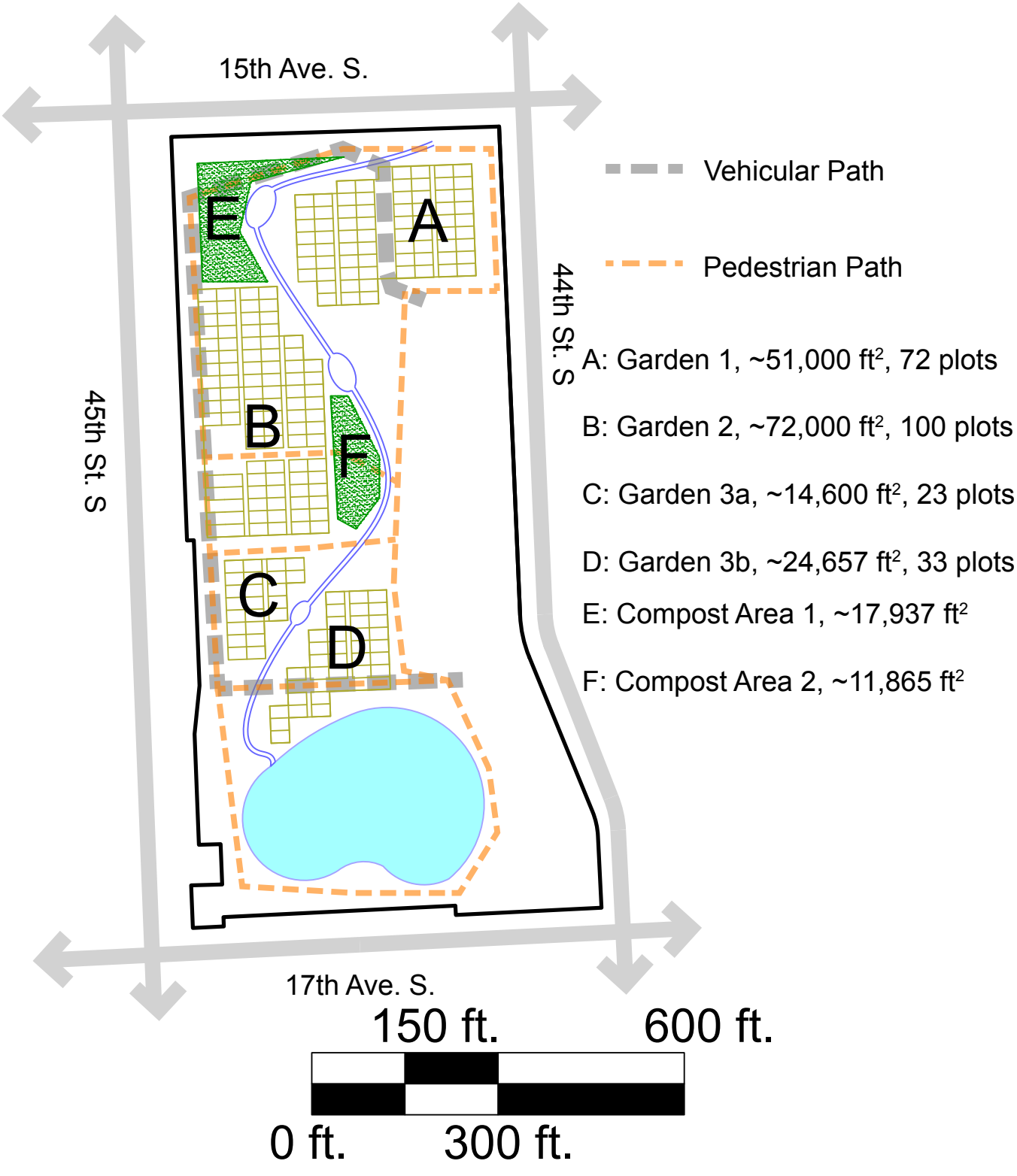
My time spent at North Dakota State University has been a great learning experience both academically and socially. Many good friends and instructors will be missed as I leave the world of academia and enter the professional world.

Appendex

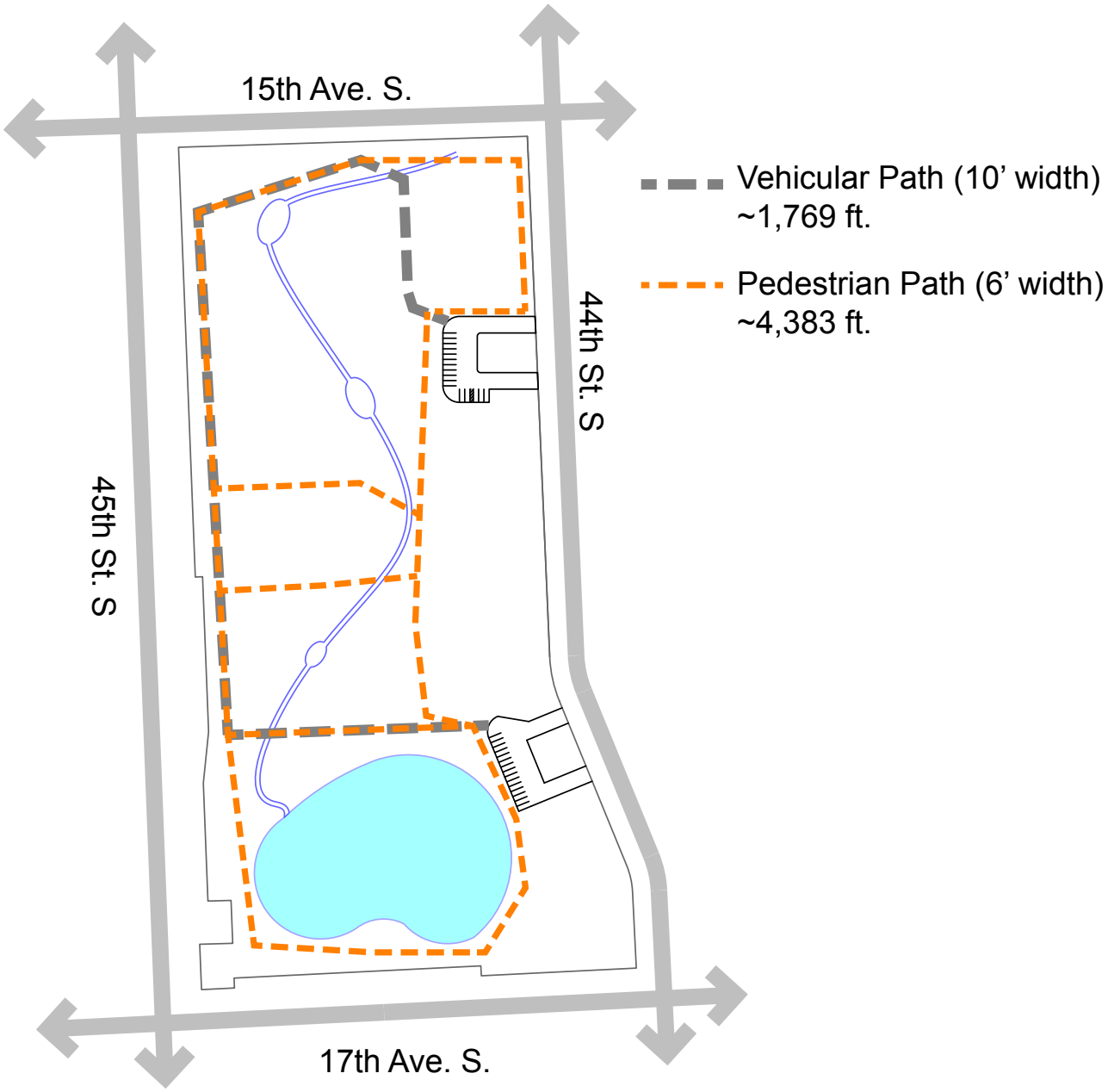
Stormwater Detention & Retention

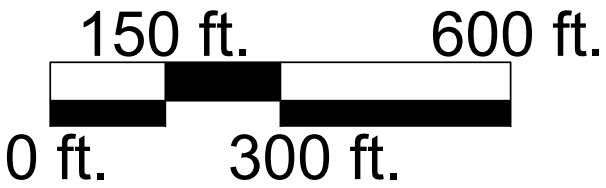


Gardens & Composting

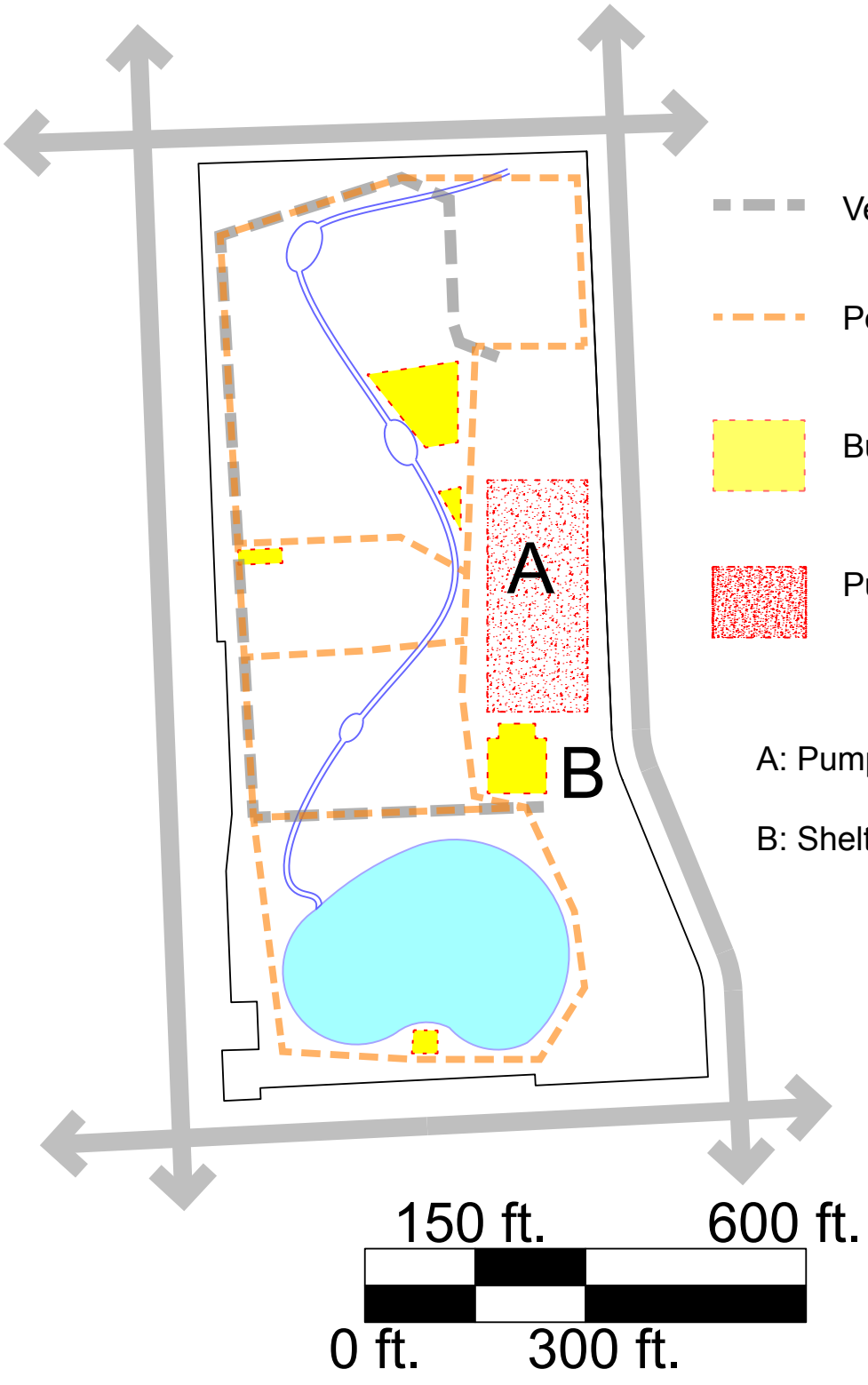


Parking & Trails

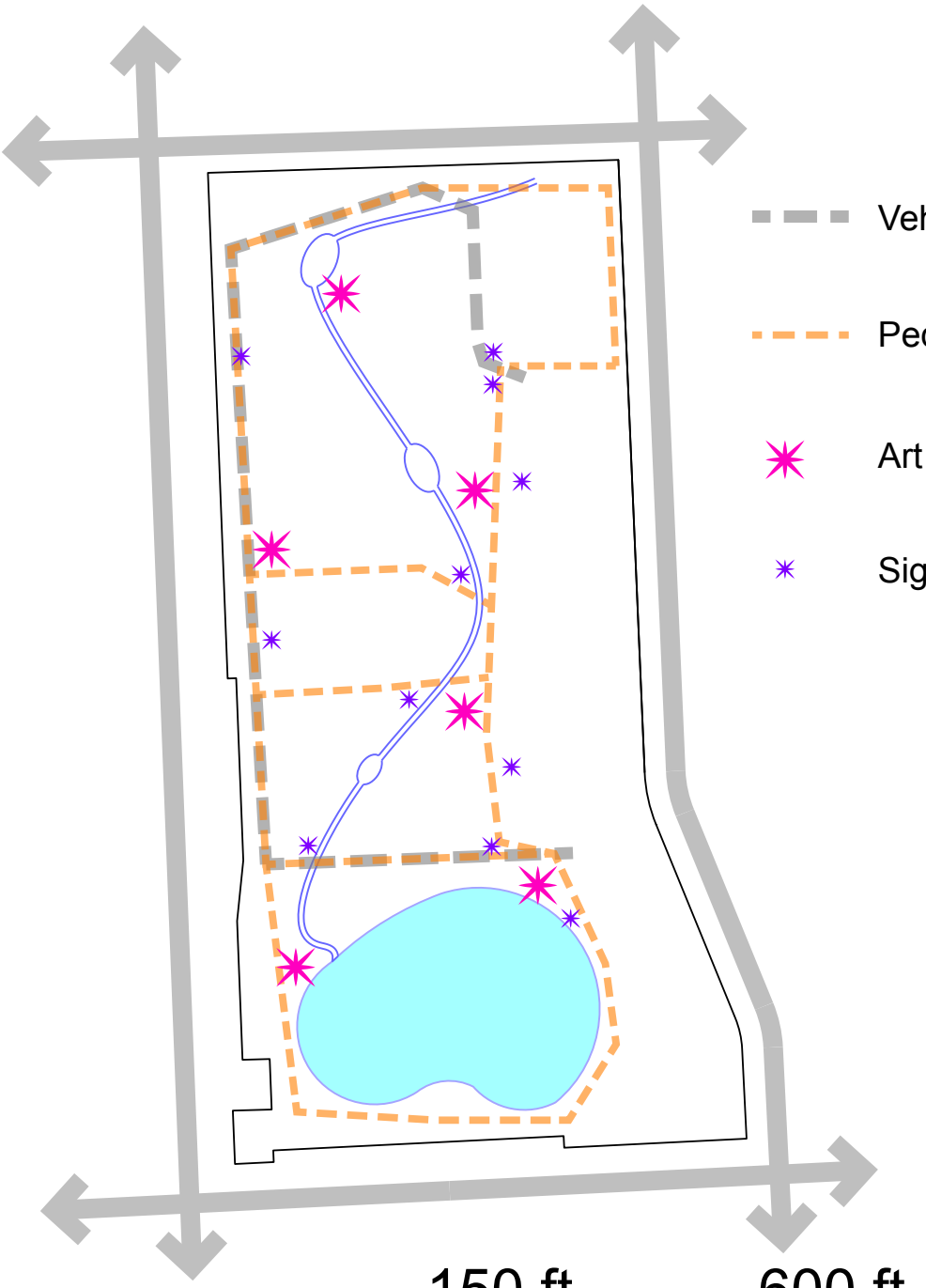


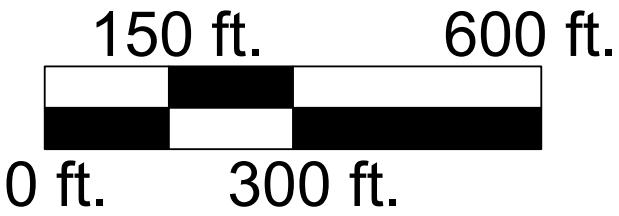


Pumpkin Patch and Built Structures

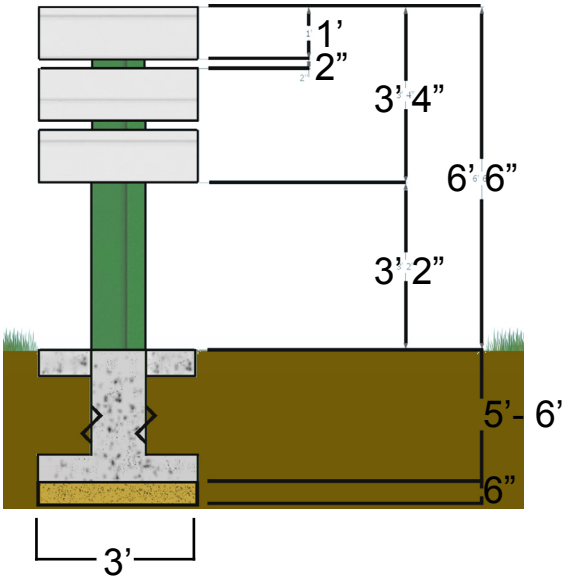


Art Installation & Signage





Material Inspiration & Sign Detail



Typical Sign

http://edenmakersblog.com

A-Frame Trellis

http://www.simplyplanters.com

Wooden
Planter Box

http://www.tiletechpavers.com

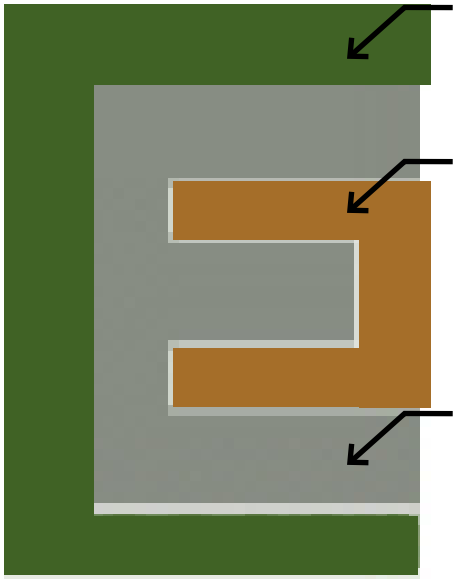
Permeable Pavement

http://www.virtualtourist.com

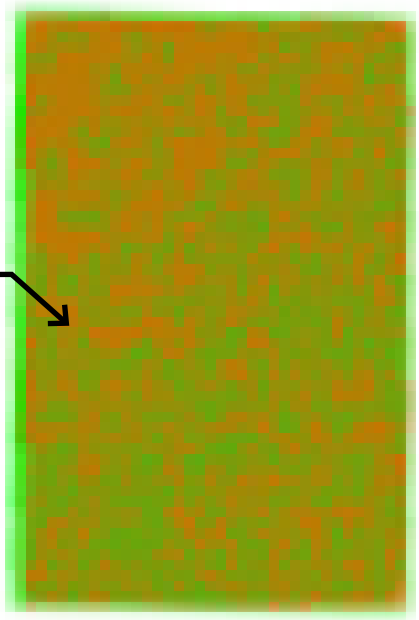
Fargo- Moorhead Visitor’s Center

Garden Plot Plans

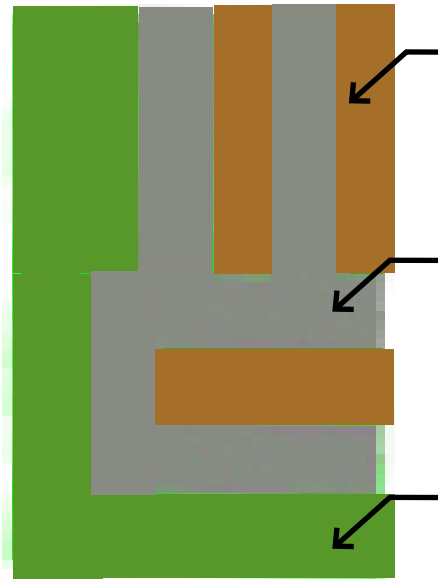
Full assistance Plot



Zero Assitance Plot



Partial Assitance Plot



* meets ADA requirements

VII