GI JOE

green infrastructure
for the average joe

Zachary W. Swanson

GI JOE

green infrastructure
for the average joe

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

By

Zachary W. Swanson

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

_____
Primary Thesis Advisor

_____
Thesis Committee Chair

May 2012
Fargo, North Dakota

non-exclusive
distribution license

By signing and submitting this license, Zachary W. Swanson, grants to North Dakota State University (NDSU) the non-exclusive right to reproduce, translate (as defined below), and/or distribute my submission (including the abstract) worldwide in print and electronic format and in any medium, including but not limited to audio or video.

I agree that NDSU may, without changing the content, translate the submission to any medium or format for the purpose of preservation.

I also agree that NDSU may keep more than one copy of this submission for purposes of security, back-up and preservation.

I represent that the submission is my original work, and that I have the right to grant the rights contained in this license. I also represent that my submission does not, to the best of my knowledge, infringe upon anyone's copyright.

If the submission contains material for which I do not hold copyright, I represent that I have obtained the unrestricted permission of the copyright owner to grant NDSU the rights required by this license, and that such third-party owned material is clearly identified and acknowledged within the text or content of the submission.

IF THE SUBMISSION IS BASED UPON WORK THAT HAS BEEN SPONSORED OR SUPPORTED BY AN AGENCY OR ORGANIZATION OTHER THEN NDSU, I REPRESENT THAT I HAVE FULFILLED ANY RIGHT OF REVIEW OR OTHER OBLIGATIONS REQUIRED BY SUCH CONTRACT OR AGREEMENT.

NDSU will clearly identify my name as the author or owner of the submission, and will not make any alteration, other than as allowed by this license, to my submission.

_____   5/10/2012
Author's Signature   Date

CONTENTS

thesis abstract

Zachary W. Swanson

Title

GI JOE | Green Infrastructure for the Average Joe

Summary

The landscape that supports our cities is often invisible to its inhabitants. This thesis examines how landscape infrastructure can communicate in our lives. The fabric of our cities stitches together the intricate systems we need to sustain our communities. Transportation of goods and services is made possible by a collection of roads, sewers, pipes, power plants, and wires that make up this fabric. How can we integrate green infrastructure into the existing ecological functions of the city? How can these functions intertwine and work cohesively?

Suburban environments have the potential to reflect the new urban systems of high-performance landscapes. These suburban environments are becoming increasingly appealing to homebuyers; however, consumers would currently have to give up some of that walkability, public spaces, and parks when moving into a suburban environment. Designing towards a sustainable suburban environment through green infrastructure and the implementation of high performance landscapes would enhance the ergonomics, making that suburbia more attractive than ever.   Implementing this plan will result in developing a guideline for suburban environments that will be a sustainable and suitable implementation for further suburban environments.

Keywords

Green Infrastructure. Low Impact. City Ergonomics. High Performance Landscapes. Behavior. Environment. Economic. Social.

This thesis investigates suburban development located near a downtown central corridor. With an increasing population density, downtown suburban environments are becoming increasingly in need of new green infrastructure. The actors of the project would consist of landscape architects, urban designers, architects, and also ecologists. The action to take place would consist of development of green infrastructure systems that enhances suburban downtown environments. Suburban communities living in engineered grey-structured environments would serve as the elements that are essentially acted upon.

High performance landscapes optimize performance throughout the fabric of a city. Landscapes store and clean storm water, cool and clean the air, enhance wildlife habitat, trap carbon emissions, improve quality of life, and stimulate the economic condition of the city.

Improving social and environmental aspects within a city will tremendously alter the future wellbeing of not only the cityscape but the habitat that occupies that environment. It is the duty and obligation of 21st Century design, to enhance not only the physical and psychological health, but also to enhance the beauty of the existing grey infrastructure of yesterday's engineered structures and systems.

Infrastructure can be defined as the basic physical and organizational structures and facilities (e.g. buildings, roads, power supplies) needed for the operation of a society or enterprises social and economic infrastructure of a country, (Oxford University, 2011)

problem statement

Can suburban stormwater infrastructure enhance ecological functionality of a civic space rather than become an environmental liability?

STATEMENT OF...

statement of intent

① Project Typology

Suburban streetscape development near a downtown central corridor

② Claim

With an increasing population, downtown suburban environments are becoming increasingly in need of new green infrastructure to protect the natural environment.

The actors of the project would consist of landscape architects, urban designers, architects, and also ecologists.

The action to take place would consist of development of green infrastructure systems that enhance suburban downtown environments.

Suburban communities living in engineered grey-structured environments would serve as the elements that are essentially acted upon.

③ Theoretical Premise

High performance landscapes optimize performance throughout the fabric of a city. Landscapes store and clean storm water, cool and clean the air, enhance wildlife habitat, trap carbon emissions, improve quality of life, and stimulate the economic condition of the city.

④ Project Justification

Improving social and environmental aspects within a city will tremendously alter the future wellbeing of not only the cityscape but the habitat that occupies that environment. It is the duty and obligation to enhance the physical, psychological, and the beauty of the existing grey infrastructure of yesterday's engineered structures and systems.

PROPOSAL

project narrative

Currently the suburban form entails designating parcels of land for a specifically zoned site seperated by their use and separated by built or hard edges, like streets, sidewalks, or vegetation. In more urban environments, this practice has pushed itself, integrating together an array of uses in order to achieve more than one function in a small area. We should focus on bringing the suburban communities the same level of attention and the same techniques as the urban environments.

Design concepts and the everchanging language seems to work itself across the U.S., jumping from large city to large city. These practice trends always have a way of working from the coasts in towards the Midwest.

This thesis looks to jump-start some new innovative techniques in a more suburban environment in the Midwest and work its way across the landscape from the inside out. Similar to fashion trends, you can find yourself waiting on the newest trends coming from somewhere else in the country. Change; start a trend of your own and realize how liberating and rewarding it is.

client description

1 Residents

The city of Saint Michael, Minnesota, has over 16,000 residents, according to the 2010 US Census. It is comprised of an array of different residents, ranging from young families to elderly singles. Many of the users commute to larger cities in the area allowing the city to hold onto that rich feeling of a 'small town'. The Saint Michael community, as well as other communities in the area would benefit from a designed intervention in the downtown area.

2 Surrounding Communities

Saint Michael is a centrally located community in between Minneapolis and St. Cloud. All around the city are suburbs that follow the interstate. These other suburbs spill into Saint Michael to shop at, Albertville Premium Outlets, one of the largest outdoor malls in Minnesota. This attraction is one of the main ways St. Michael currently has booming economic development. Another reason for this boost is many residents residing in larger cities are looking outward to some of these smaller communities to live and raise a family. Saint Michael is known for having a very good public school system and has many small families looking to move into the area to raise a family.

3 Business Owners

Over the past few years Saint Michael has been opening up new business all along Main Street. The owners of these stores and restaurants are hoping that the population of Saint Michael continues to increase. This increase in density combined with urban infrastructure will increase walkability, thus increasing economic growth. The city of St. Michael strives to create an attractive environment for new and existing businesses. Over the past few years they have introduced businesses like CVS, Anytime Fitness, Wallgreens, and various new and exciting restaurants.

major project elements

1. **Scope**

   A majority of the needs of Saint Michael have to do with developing a master plan of the city. This will be a reflection of the analysis and planning in relationship to the towns overall growth plan. In order to meet the needs of the community meetings will be necessary with both city officials as well as community members. The master plan will allow the city to regulate the rate and scale at which it would like to grow to. It will map out the future for the city and bring an energy and excitement to the community. The goal being that it would benefit existing community members in the same ways.

2. **Infrastructure**

   The existing infrastructure in the area is all newer than 2001. The library above is in the area of potential development. This style of architecture depicts the overall feel of the new infrastructure in the area. Materials include steel, brick, and natural stone. None of the buildings in the downtown area exceed five stories.

3. **Public Open Space**

   There is a network of trails along the river however there are no public open spaces. The town as of now is potentially walkable for it is in the center of assisted living, downtown, the Crow River, and the residential neighborhoods. Often times residents can be seen walking along the paths and through the potential Town Center plaza. There is a corridor that is in the need for public open spaces for the residents to stop and enjoy. This could change the overall pace of the community and become a focal point for the downtown.

4. **Transportation**

   Transportation has changed from two way traffic to one ways in the last five years. This has changed the dynamic of the downtown setting it apart from the rest of the city.

5. **Residential**

   There is an exorbitant amount of new residential in the city of Saint Michael. Having had very few homes existing, the towns construction has provided non-stop activity, from new homes to roads and other amenities.
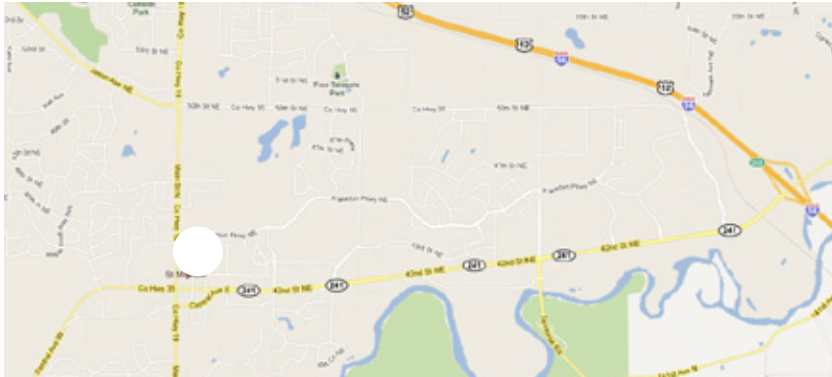
site information
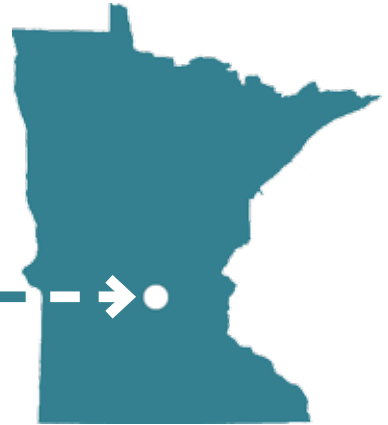
1 **Saint Michael, Minnesota**
Wright County

2 **Relative Location**
Saint Michael, MN is 30 miles from downtown Minneapolis. It is located along Interstate 94. It is surrounded by Rogers, Albertville, and Maple Grove.

3 **Potential Site**
This site currently houses the city library. It is the main area of potential development in Saint Michael, MN.

project emphasis

The unifying idea of this project is water. The idea is to study the city as it has grown over the last few years and stitch the fabrics that makeup the community into a self sustaining suburban environment capable of maintaining wildlife and ecological functions that existed pre-development and continue to become a part of the built environment as much as we are a part of theirs, capturing water's importance and displayed in a way for generations of the city to appreciate and coexist.

plan of procedure

① Research Direction

In order to design something new, it is necessary to truly understand how and why the form was shaped in the first place. Learning about the form's conception will reveal the limitations or restrictions that drove that design to exist the way it does. Then in the comparison of today's modern day limitations and restrictions designs have the opportunity to be pushed to new heights. Research of the grey systems that were previously in place will help pinpoint the limitations cities were faced with, and by comparing the environment in which we live in now, we can push past the design constraints of yesterday and lead into green infrastructure practices for the future.

② Design Methodology

High-performance landscapes are becoming increasingly popular in the United States. Originating in New York City, this standard sets new principles for landscape design within urban communities. New York has an extensive program involving whole series of green networks and sustainable practices from wastewater and storm water to green roofs and median standards. This implementation of new green infrastructure is pushing into urban communities across the coasts. However, there is a lack of acknowledgement for suburban communities across the U.S. Why should the suburban areas be forced to sit back and wait for the sprawl of ideas and practices to reach them. This design would be a proactive implementation for the growing populations of suburban communities.

③ Design Process Documentation

I plan to document every phase of the design process. It is always important to communicate the process taken from identifying a problem to finding a solution. When a scientific discovery is made the research is all taken into consideration in order to become a theory. Therefore seeing as how scientists practice this documentation process, so too should architects and landscape architects.

previous studio experience

07 Introduction to Environmental Design
- Don Faulkner | Fall 2007
- City Planning, urban design, architecture , landscape architecture, interior design, visualization, visual analysis, imagination.

08 Drawing for Environmental Designers
- Heather Fischer | Spring 2008
- Traditional freehand methods and graphic exploration as employed in architecture and landscape architecture.

Environmental Design Fundamentals
- Karen Lindquist | Spring 2008
- Representational media and techniques, graphic communication, visual abstraction, visual literacy, problem-solving, visual resolution of form.

Introduction to Landscape Architecture
- Kathleen Pepple | Spring 2008
- Surveying the profession of landscape architecture and problem solving through design process, graphic and oral presentation skills.

History of Architecture
- Ronald Ramsey | Fall 2008
- History of architecture from ancient times through renaissance, design connections across cultures and across the globe.

Landscape Architecture Graphics
- Mark Lindquist | Fall 2008
- Two- and three-dimensional computer skills, traditional computer graphic, written design, communication techniques.

Landscape Architecture I
- Kathleen Pepple | Fall 2008
- Design generation methods, concept formation, site inventory and analysis, programming, site planning, model development.

09 History of Architecture II

- Don Faulkner | Spring 2009
- History of architecture from the Baroque to present, global perspective placed on design.

Design Technology

- Mark Lindquist | Spring 2009
- Problem solving through technology, two- and three-dimensional graphic communication skills.

Landscape Architecture II

- Mark Lindquist | Spring 2009
- Continued development in site organization and planning, design issues in natural resources, land reclamation, construction.

History of Landscape Architecture

- Stevie Famulari | Spring 2009
- Landscape developments from prehistoric civilizations through the 20th century, analyze historic places and locations.

Site Development & Detailing I

- David George | Fall 2009
- Visual problem solving, large-scale site planning, comprehensive visual inventory and analysis, immediate application of site planning.

Site Planning & Design

- Stevie Famulari | Fall 2009
- Investigate site planning and design development, site design integration, technically-related concepts.

10 Site Development & Detailing II

- David George | Spring 2010
- Fundamental site landscape and engineering issues within construction process, site grading and storm water management.

10 Community Planning & Design

- Kathleen Pepple| Spring 2010
- Cultural and environmental design issues as they relate to large-scale land planning, site design, residential communities.

Site Development & Detailing III

- Jesse Riley | Fall 2010
- Computer-aided design as part of the landscape architecture construction documentation process.

Urban Design

- Jason Kost | Fall 2010
- Analysis techniques, methodologies, problem solving through computer modeling development, urban studies, site planning.

11 Remediation & Planting Design

- Stevie Famulari | Spring 2011
- Natural resource and land reclamation management techniques, contemporary design, presentation, communication.

Advanced Landscape Planning

- Dominic Fischer | Fall 2011
- Theories and practices facing landscape architects and planners in design of urban, suburban, and rural landscapes.

Environmental Planning Studio

- Dominic Fischer | Fall 2011
- Environmental systems and implementation of complex design problem, graphic, computer, modeling techniques.

12 Digital Media

- Nathan Booth | Spring 2012
- Mass entertainment, educational material, and forms of interaction from picture and video editing, to creating new works of art with different tools and programs as well as sharing information.

PROGRAM

research and goals

Rethinking Landscapes

In Rethinking Landscapes, Ian Thompson focuses on the philosophy and the notion that our landscapes are forever changing along with the way in which we design them. The book focuses on the aesthetic, social, cultural, and environmental aspects. Ian Thompson carefully selects readings that help illustrate new thinking in landscape architecture. He describes the process of human nature and the relationship between that and the built environment.

Thompson's concepts are not biased or relative to place. They can be utilized in any environment through any medium. His ability to critically think and analyze the process of design and planning is due to the level of experience and detail he has put into the profession.
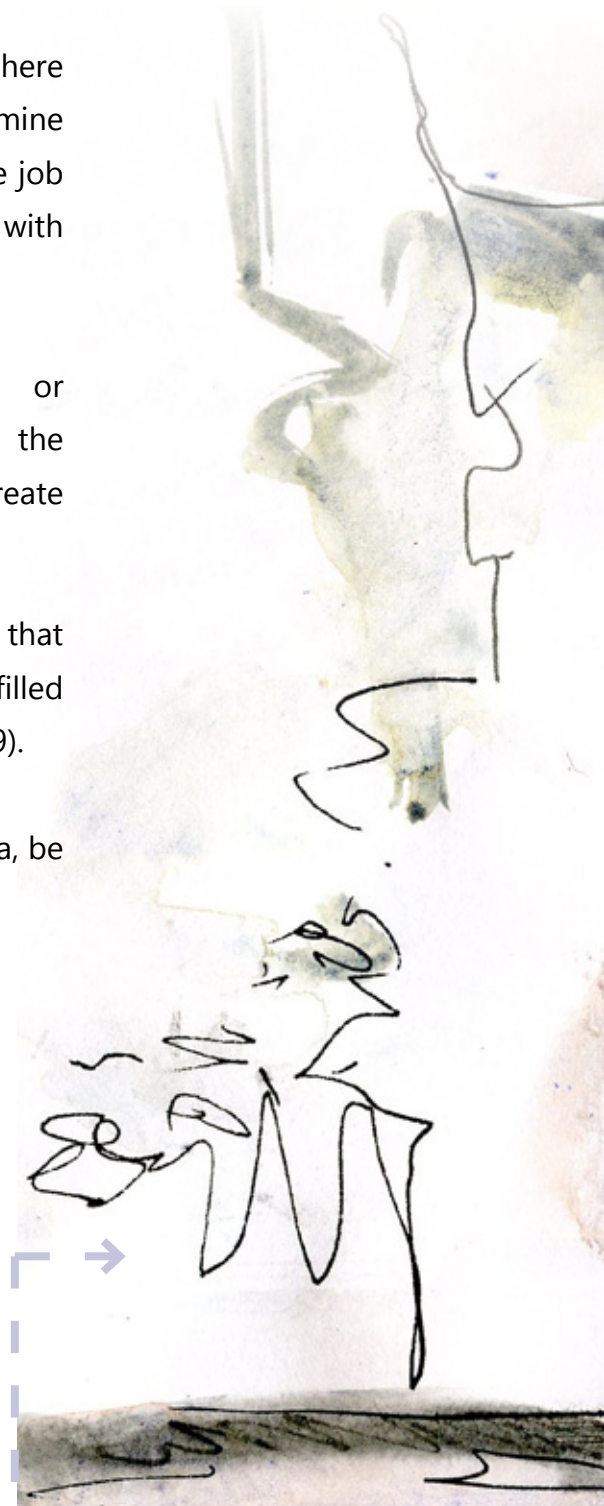
Public Open Spaces

Are we a product of our environment entirely, or are there just things set in place when we are born that predetermine who we are and what we do? Thompson does a nice job flirting with religious aspect and blending them with psychology in the built environment.

He describes everything as 'multi-layered' or 'multidimensional', meaning that we should study the philosophy of the environment in order to truly recreate and appreciate it, (Thompson, 2009). (p. 38).

John Locke, a philosopher in the late 1600s, suggests that the mind at birth is a tabula rosa, clean slate, later filled with marks of experience (as sited in Thompson, 2009).

How then can that idea of a clean slate, or tabula rosa, be translated into the language of design?

Public Open Spaces

Designing for the urban environment requires a unique school of thought. When creating designs in urban settings a large quantity of people are going to experience and utilize the designed aspects. It is important to design with an edge and think outside the box. Designs that are bold tend to get noticed more throughout the busy landscape. Functionality is just as important. There is no room for nonsense in a busy urban setting. Making your design simple and effective will be much appreciated.

The same concepts apply in a suburban environment. Designing with a bit of an edge in a rural or suburban edge can be quite difficult for some due to the preconceived notion of what a rural environment is supposed to entail.

Most urban environments have an energy about them. This is shown when designed spaces such as open spaces allow the occupants to bring that energy.

http://img815.imageshack.us/img815/8355/archinspire.png

Behavior in Public

Innovation is key. Keeping the public up to date is really important. Many people look to the coasts or overseas for design trends. Details down to the very last detail need to be addressed and updated. Signage is extremely important. No longer can we depend on traffic signage to tell us where to go or what is in the area.

Site furniture is also a way to explore new ideas and trends. Landscape furniture can now be more than simply park benches, it means a wide array of open space seating and movement. Forms of the amenities can shape the overall feeling of the project, giving it unique character.

The design of public spaces directly influence pedestrian behavior. Designs intrigue pedestrians, and entice them to explore the space. Their behavior is manipulated indirectly by the architect. Not always are these spaces used as intended. However, exploring the character of the site and taking note of sex, gender, race, and age, can help prepare for unplanned uses and explore possibilities.

Urban is an area to truly test the boundaries. Christopher Dell describes it best, saying, "I believe that urban is an experimental field where we can test what is possible and what the boundaries are of our creative ability," (as sited in Erlhoff 2008). The mistake architects made when designing from scratch was that they designed a grid in order to create movement, when in actuality movement arises from itself.' Rhythm analysis will replace psychoanalysis,' meaning that no longer does one thing happen in one place and something else happens in another place and there is movement in between, but rather that everything is in a constant state of transformation, (Erlhoff 2008).

Form of Landscapes

Composing landscapes : analysis, typology and experiments for design, highlights the systems that make up a landscape design. The diagrams illustrate the relationship between the designs and the surrounding context. The book stresses the relationship between various elements in design, stating, "The expressive potential of the design lies not only in the articulation of the various design themes or layers, such as the form of the place, the space, the metaphorical elements of the programme, but also in the way in which they work together in a meaningful way," (Steenbergen, 2008).

The relationship between elements in the designed landscape begin to create the form. It can be organic in nature of geometric elements such as wind, water, and soil, help to form these boundaries.

Urban landscapes differ from natural landscapes in that they lose that natural form and tend to become more grid off and patterned.

The book covers two methods of investigation. The first is an analysis of existing design precedents, and the other is a formulation of new designs. The design research done in this book highlights the plan analysis and typology. The book gives good site context and framework for the design.

The various types of drawings in the book offer a unique look at a comparison between analytical drawings, experimental drawings, and the overall drawing process.
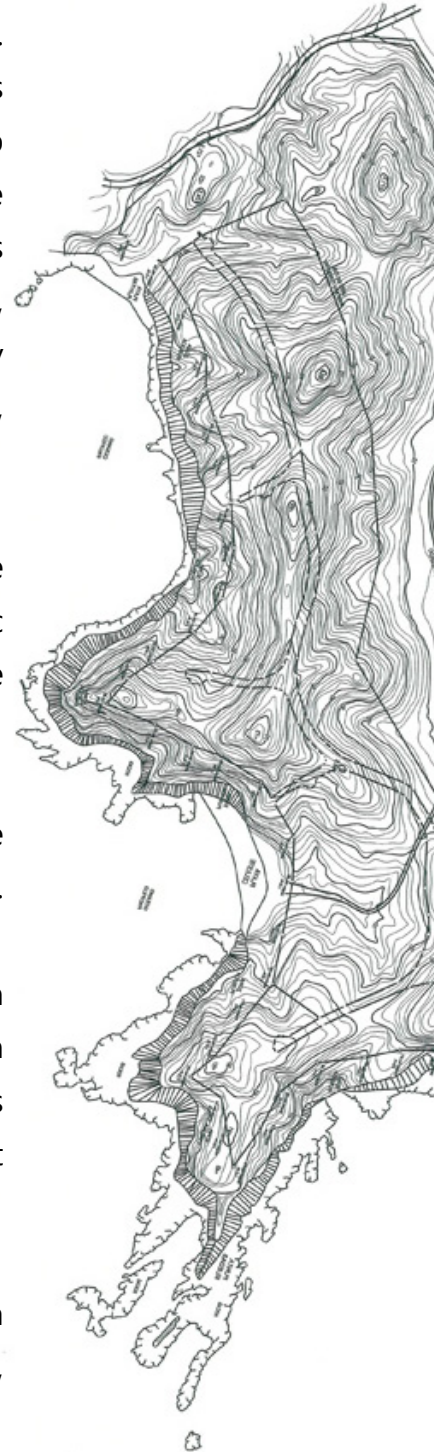
How it Applies

These three books are among a list of books that I am currently combing through. The books I have selected are all 21st Century novels, and offer a new look at the design process and give a unique perspective and voice. They are all fairly easy to read and I find myself relating some of the literature to my current project.

Moving forward, I hope to use this information to strengthen my overall design premise. The books that I have selected focus primarily on urban design. I would like to take from the material, how designers solved specific problems on their site.

The overall philosophy is something that has really intriguing me throughout the readings. John Locke described the blank canvas in a way that deals directly with my suburban site. The site I have selected is urban and although it may not be a clean canvas entirely there is an untapped potential that will surely change the way pedestrians live their lives there.

I believe that the material covered in these books has provided my with a better understanding of how urban environments function and how they are formed in order to function. Understanding is a key step in the design process. Now it is time to put those elements to use and apply the philosophy and techniques learned to my designs, giving them substance while staying cuttingedge.

case studies

1

Main Street Streetscape
Greensburg, Kansas

Completed in 2009, this four-block downtown redevelopment reclaimed the town that was swept away by a tornado two years prior. The town people refused to let the devastation of the tornado destroy their spirits; they chose to redevelop the town for a sustainable future.

2

Green Plan Philadelphia
Philadelphia, Pennsylvania

This project focused on combining elements into small areas of open space. These spaces would have a multitude of different uses and amenities. The designed community was given a true identity through a system of shared porches.

3

Habitat Trails
Rogers, Arkansas

This 17-dwelling neighborhood is located in a rural community and focuses on green design with an emphasis on water systems. The restored wildlife as well as community health is apparent through the techniques of walkability and ecological restoration.

Main Street Streetscape

① Implementation

Pedestrian amenities with vegetated planters, mid-block crossings, innovative materials, and storm water management all contribute to a welcoming pedestrian experience. In most rural or suburb communities, the problem having pedestrians spend time in the downtown area. These amenities greatly increase desire to not only spend time in the community but spend money as well.

The town of Greensburg had a clean slate and made an executive decision to look into what would be best for the future of their city. They studied the ergonomics of the city and how they could implement LEED certification and green infrastructure to improve economic and ecologic aspects for the future of the city.

Saint Michael has a very similar demographic to Greensburg, Kansas. Moving forward, this project will serve as another example of a sustainable plan in a suburban community.

1 Green-up Greensburg

A small farm town of 1,400, Greensburg was hit with an F5 tornado that destroyed 90% of the town. They saw an opportunity to rebuild a more sustainable community for future generations. The Sustainable Comprehensive Master Plan helped the town regenerate the community and reintroduce commerce to the town.

The Comprehensive Masterplan includes 27 infiltration basins, four raingardens, storm water collection, irrigation system, high efficient lighting, reclaimed wood furniture, reclaimed brick pavers, community gathering nodes, eight underground cisterns, native plantings, and milled and re-used materials. The streets and sidewalks were paved with over 78,000 cubic feet of re-used asphalt, and 10,400 cubic feet of re-used concrete paving.

The community decided to create a tight urban core in place of the previous Main Street. The previous design allowed for semi-trucks and farm equipment, the newly designed corridor features a narrow road pavement width. This design gives hierarchy to the main corridor and provides easier walkability, and aesthetic visibility, through the reconstruction of about 40% of the sidewalk frontage.

① Vision

The tornado destroyed the town of Greensburg, Kansas, but it also created an opportunity to create a streetscape focused on pedestrian experience and community interactions.

The design of a tight urban corridor with narrow streets and vegetative planters would stimulate places for the people in a lively business district. The form of the design is driven by the functionality of the water management system. Because the 22 inches they receive comes on three or four events, there was a great need for implementing a storm water management system. This storm water system was the major theme of the design. The design featured infiltration basins with a unique six inch multi-flow drain along the back wall of all the planters. After the water has been collected and filtered naturally in these infiltration basins, it then migrates to the drain and is piped to one of the eight cisterns. Excess water moves along the curb and is poured into a series of rain gardens if the infiltration basins are full.

The overall philosophy is something that has really intrigued me throughout the readings. John Locke described the blank canvas in a way that deals directly with my suburban site. The site I have selected is urban and although it may not be a clean canvas entirely there.
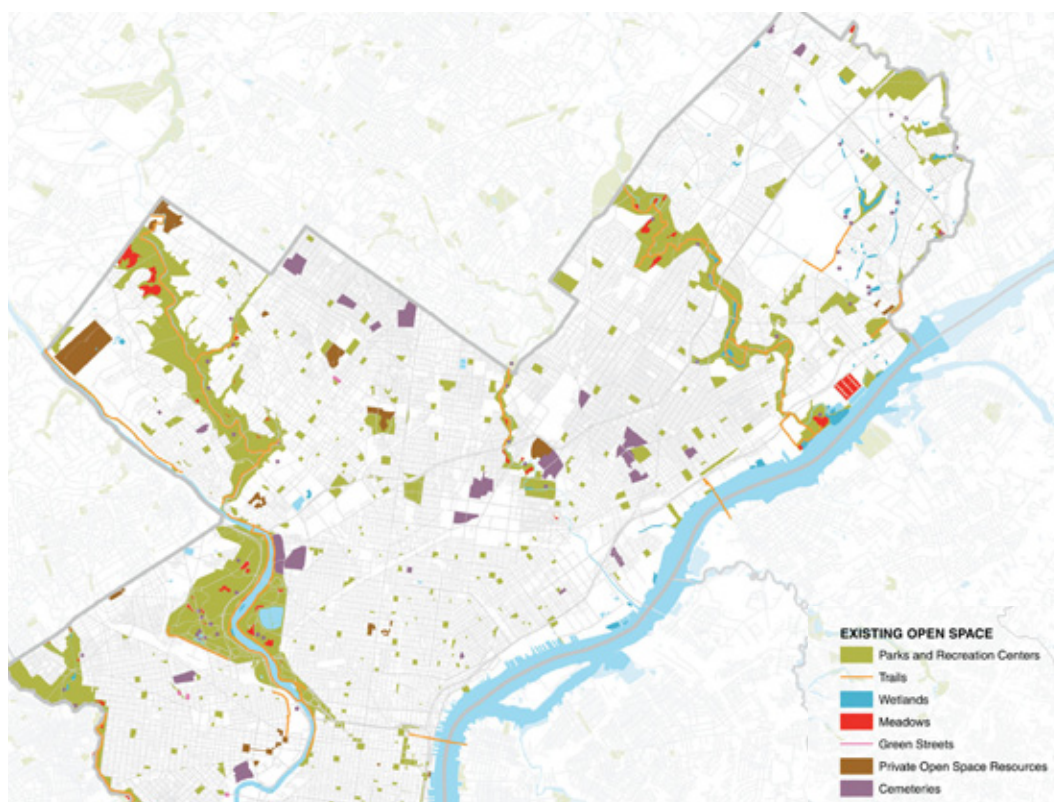
GreenPlan Philadelphia

② **Open Spaces**

Instead of focusing on solely open spaces like parks or streets, GreenPlan Philadelphia focuses on a range of networks including environmental, economical, and social. The combination of these factors creates a cohesive master plan for the entire city of Philadelphia.

GreenPlan coordinates policies for vacant land and structures, sensitive lands, and municipal support facilities. The plan calls to include trees, storm water management tools, meadows, trails and bikeways, wetlands, urban agriculture and community gardening, high performance surfaces, and renewable energy. The overall plan focuses on combining these elements in the same area and calling those areas 'green places'.

EXISTING OPEN SPACE
- Parks and Recreation Centers
- Trails
- Wetlands
- Meadows
- Green Streets
- Private Open Space Resources
- Cemeteries

2 Green Places

The 'green places' include parks and recreation, vacant spaces, schoolyards, waterfronts, streets, and plazas. This multitude of places gives Philadelphia to implement a cohesive plan while maintaining a unique variety of genus loci, or feel of the place.

There are quite an array of benefits that accompany a green plan including economic, environmental, and overall quality of life. Open spaces enhance economic development through tourism and housing development. These spaces provide healthy green environments that would not only promote individuals health but also the natural environment around us.

② **Survey Says...**

The PennFuture environmental survey found that proved that more of a focus needs to be put on open space and environmental issues. In fact, the PennFuture survey found that "ninety-two percent Philadelphians believe that environmental and infrastructure improvements are necessary to improve the area's economic competitiveness and growth," (GreenPlan Philadelphia, 2011). It's no surprise that communities are in dire need of open spaces. For years these very open spaces have served as locations where important activities and exchanges take place. We have all but forgotten this concept until recently and now large urban communities, like Philadelphia, are finding themselves lacking or without common spaces (PennFuture, 2011).

Philadelphia takes an innovative approach to solving the problem through strong trends of quantifying the costs and returns. Not only are they going to improve their infrastructure but they developed a system to evaluate what is economically viable. At the end of the day if the return on their investment is underachieving, there is no sustainability. By calculating realistic goals of tree coverage and storm water management the city can better understand how to tailor to their city's ergonomics.

http://www.asla.org/2011awards/images/largescale/610_02.jpg

Habitat Trails

Green Streets Solution

The plan for this 17 dwelling unit development set out to establish itself as a model for other affordable developments. The design addresses environmental, economic, and social issues. The dwellings would be part of a system including hydrology, bioswales, infiltration swale, storm water, wetlands, and filter strips.

The site for the project is located on a 5-acre greenfield, former agricultural site. Similar to the community in Saint Michael, Minnesota, the farmland is accompanied by suburban housing. The neighboring development includes a nearby church and affordable housing. The area adjacent to the proposed site in Saint Michael also incorporates low income housing. Nevertheless, these communities are both rich in amenities.

Given the current economic state of Rogers, Arkansas, it was imperative to derive a feasible water management solution. The community decided to develop a ecologically-based water management solution. The non-profit investors were able to use more real estate, being that the return on their investment, accounts for multiple beneficiaries, including social and environmental.

(3) **Green Model**

The project is successful due to the function of the infrastructure.   Successful design means that everything in the design has a purpose. The Green Neighborhood Model incorporates a wide range of conservation planning strategies that work together to solve water treatment with green infrastructure.

Often unsightly civil "pipe and pond" methods serve as the main water treatment method, whereas Green Neighborhood Model places focus on the street to treat and transport water throughout the space. The European-style shared street solves water treatment through bioremediation as well as social concerns through promotion of accessible porches.

The concept of shared porches has become increasing popular, for it brings families back into the front yard to reclaim the street as a social corridor.   Suburban sprawl has limited interaction between neighbors, but the implementation would greatly increase dialogue and community movement.

to wet meadow
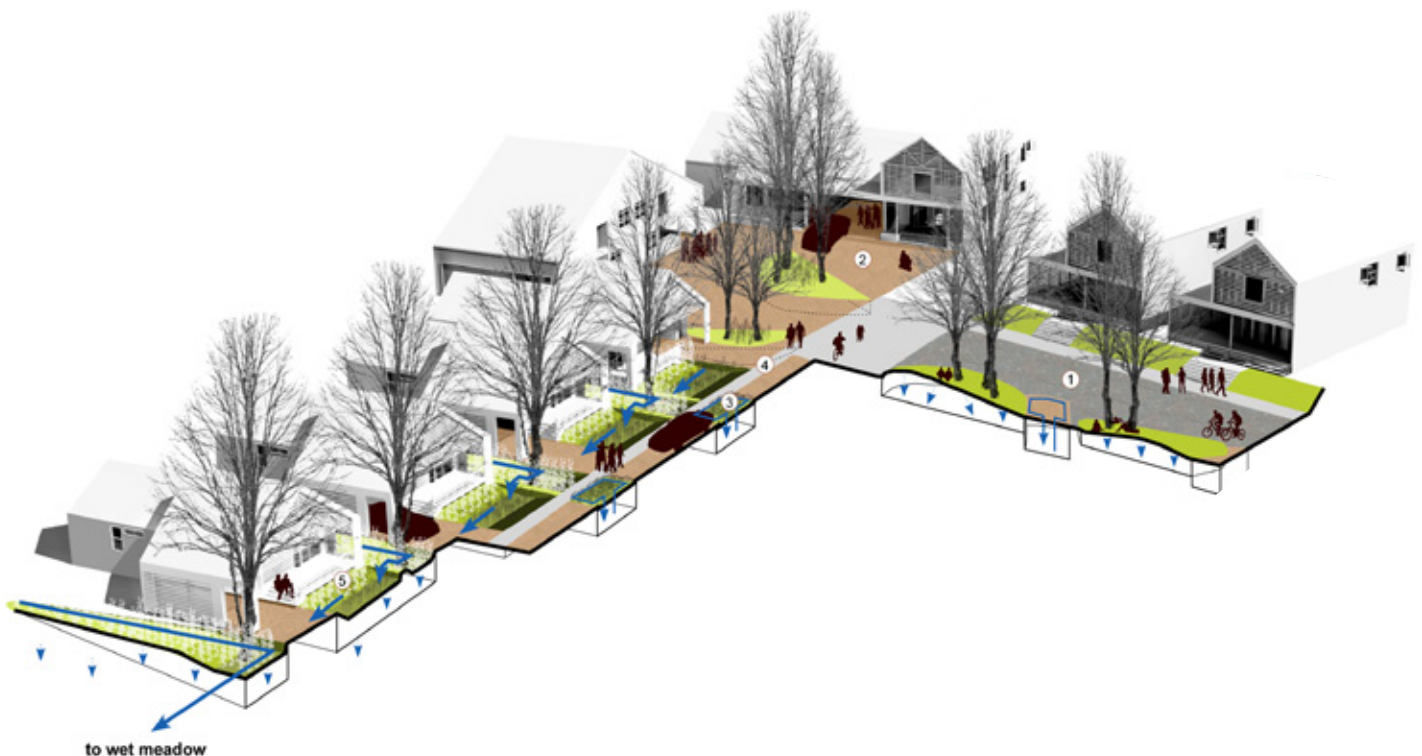
historical context

Break it Down

Ask any successful designer and they will all tell you, in order to effectively design and redevelop a subject, that subject must first be broken down and studied. It is crucial to understand where it derives from as well as what was forcing it to behave in the current state.

Dissecting piece by piece, we may then remove the unnecessary and transform the new makeup of the design. Understanding not only the history of the site, but also understanding the history of various aspects of the site.

Why are the roads where they are? How do people move in this type of an environment? What do people behave like in the existing environment? These are just a few questions that begin to define the historical content and return that element of design to bare bones.

From Schwinn to Smart Car

Just as smart phones and wi-fi hot spots are popular today, so too were the telegraphs and railroads in the late 19th Century. Steamships, canals, railroads, and telegraphs were the only means of transporting people and ideas at the time. Although we often automatically assume that the automobile was the driving factor in road production, it was ironically the invention of the bicycle, (Mary Bellis, 2012)

This two-wheeled phenomenon became so popular in the 1880s and 1890s that it created interests in roads. This new idea of roads was different from the traditional trails used before by the wagons and coaches. The Duryea Brothers invented a gasoline-powered motor engine, a motor wagon later known as the car, while the Wright brothers launched aviation to new heights, (Mary Bellis, 2012). What did all these men have in common? They were all bicycle mechanics in the late 1800s.

Not long after, Henry Ford came into the picture introducing the famous Model T. The Model T was a car that could be produced so cheaply and efficiently that the government had to try to stay ahead of the curve by developing a system of roads.

Minneapolis, MN ----- 30.83 miles -----> **St. Michael, MN**

1901: 200 minutes
2011: 40 minutes

After World War II federal projects including interstate highways, were built in order to create jobs and provide roads for military use. This then led to the development of rural and urban express highways, (Mary Bellis, 2012). It would have taken a traveler over 200 minutes to travel 30 miles in the early 1900s. Today it takes only 40 minutes, making it easier than ever to work in the city and live in the suburbs.

Bicycles are a perfect example of critical pieces of our history that have stood the test of time. The overall shape and function of a bicycle has not changed too drastically. What has changed is everything around it; cars, roads, paths, parks, neighborhoods, etc.

superblock
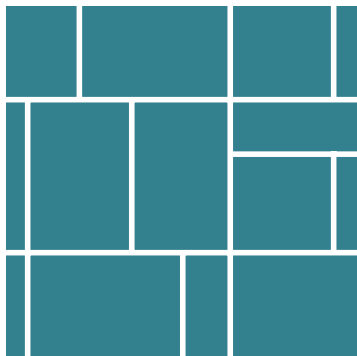
1930's

Along with the growing popularity of automobiles, the growing size of lot and thus block size forces a 'superblock' form that discourages walkability and is not friendly to pedestrian movement and interaction, (Ron Shiffman, 2009).

ladder

1940's

The poorly planned era that followed World War II included the ladder form. This development allowed for minimal connectivity and created planning nightmares for the generations that followed, (Simmons, 2000).

interchange

1960's

Increasing the highway speeds also increased the need for interchanges. These forms claimed a lot of real estate, but they also allowed for quicker transportation of goods and services out of a downtown area., (Tom Wetzel, 2009).

downtown grid

rural arterial
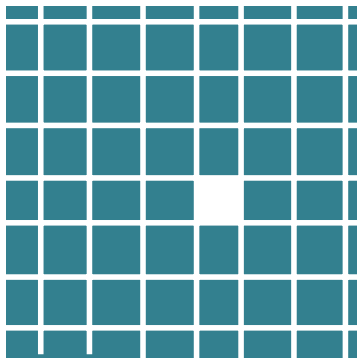
today

today

The downtown grid has stood the test of time. The grid form allows for easy connectivity and transportation. Open spaces are then shared among the four adjacent blocks. The form gives an identity to a downtown, (Street Connectivity, 2012).
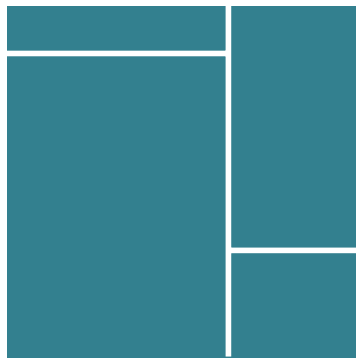
The functionality of this block form has never changed. The roads simply follow agricultural land and connect rural developments. It is the source of much of the activity surrounding the agricultural economy, (USDOT, 2011).

Let the Good Times Roll

From 1870 to 1920 there was a lot happening in the United States. Road transportation was about to see a face lift with a new material called tar. This material would change the ability to safely dive at higher speeds and cover more distance. The water ways were also being transformed. Canals like the Panama were being dug out in the early 1900s to make international trading and transportation possible., (MAFC, 2011).

Telephones were invented in the late 1800s, introducing the world to a word we would grow to learn, network. This new technology placed everyone with a phone on a network that could stream ideas faster than ever before. Not long after, electricity was invented, making Americans' way of life exorbitantly greater, (Steve Johnson, 2012).

Since there was an ability among men and women to now live longer, there were increasingly more populated areas of the world. Sewers were introduced in London and retrofitted to the United States. This growing population density called for a growing need for more infrastructure. Therefore, there have been needs for various amenities throughout history. Today there is a further need for not one idea or another specifically, but rather the integration of the two ideas. There are some urban environments that have adopted the concept of green infrastructure, including Minneapolis; however, the idea seems to get lost when designing more suburban environments, (Burian, S., & Edwards, F., 2010).

How can we develop a form that is taylored to the 21st century and to more specifically the suburban community of St. Michael?

goals of the project

1. Compile a document of research that encompasses the information and designs derived from this project.

1. Visualize and design concepts that are innovative and applicable to today's practices of architecture and landscape architecture

1. Utilize various skills and programs to convey graphically and accurately through a variety of mediums.

1. Carry the project farther than simply the typical final presentation for peers and faculty, but also for City of Saint Michael, CELA, and ASLA.

① Academic

The design thesis is an opportunity not only to showcase skills that have been sharpened throughout one's academic career, but also a chance to work at skill sets that have proven to be a weakness. It is a time for personal reflection, as well as a time for personal identification as an individual and as a designer. The work that is produced should not only represent the individual's theoretical premise, but also his or her ability to become a professional.

② Professional

The thesis document should be planned, constructed, and presented in a professional manner. The level of professionalism can be measured by how suitable the final product is for an outside perspective in architecture or landscape architecture. The work should be able to stand by itself however the designer should be able to stand behind his/ her work confident in every way.

③ Personal

As a designer, I believe that you are never truly done learning, but rather continue as student of design for life. Everything in life has a purpose and just as elements around us are changing every day so too should the designs that form those elements. Places and spaces define humans, but it is until we define those places and redesign those spaces that we can truly change the outcome. Moving forward I wish to continue my education through the professional practice of Landscape Architecture and Environmental Design.
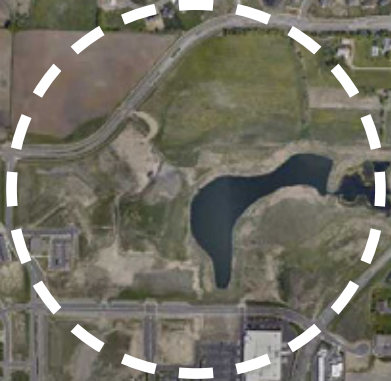
site context

Interstate 94

Main Street

Highway 241

Crow River

programmatic requirements

① **Space Allocated**

The entire 80-acre site is zoned as commercial. The surrounding areas to the north are single-family residential and assisted living. The area to the east consists of primarily industrial while the area to the south and the west are made up of a multitude of different districts. These districts include general business, multiple family, and single family residential.
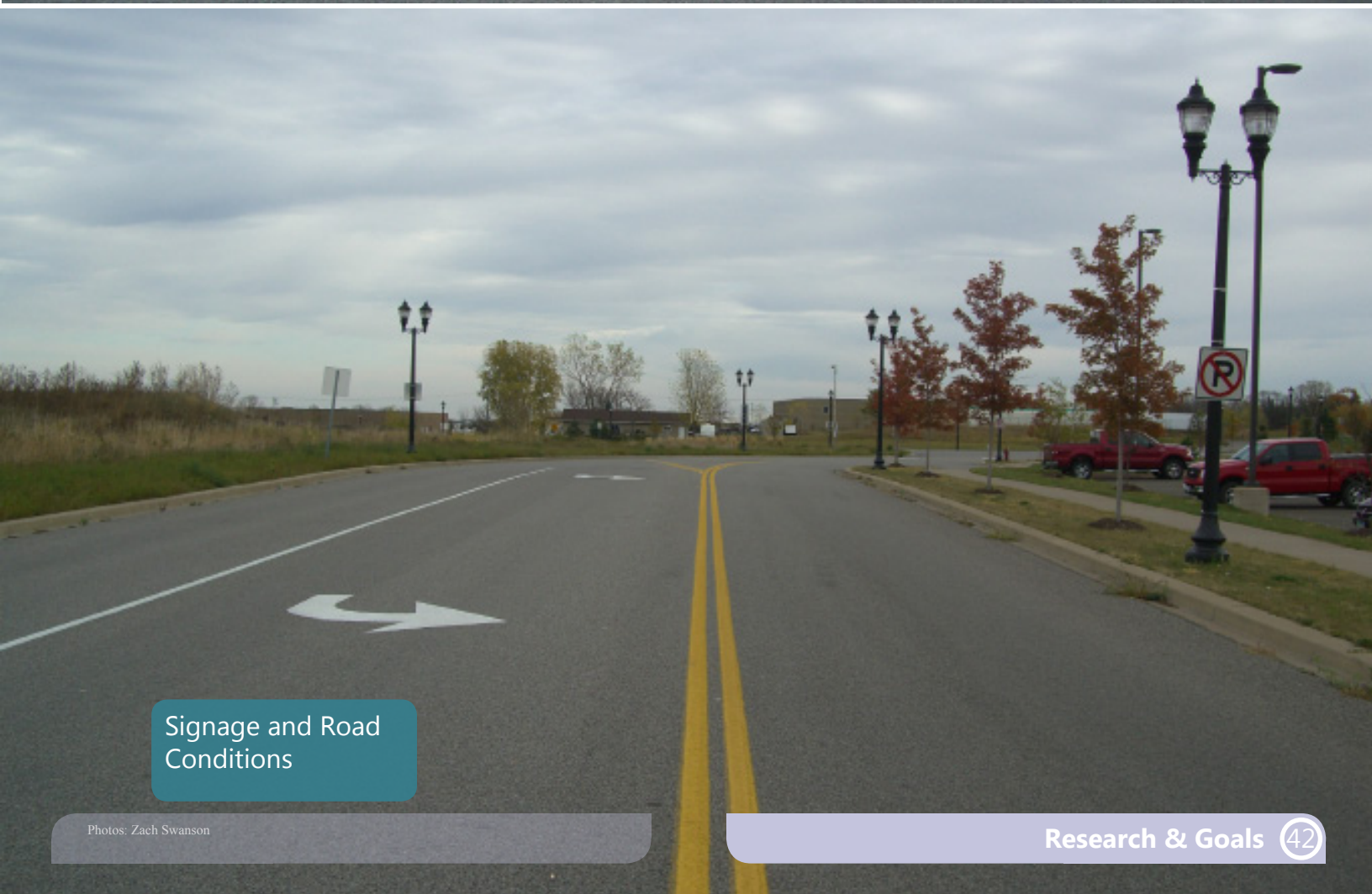
This 80 acre site is centered around mixed districts bringing an opportunity to design towards a variety of users, with the city hall and the assisted living center offering a wide range of users.

Abandoned Homes
Economic Struggle

Sense of Place and Pedestrian Scale

Signage and Road Conditions
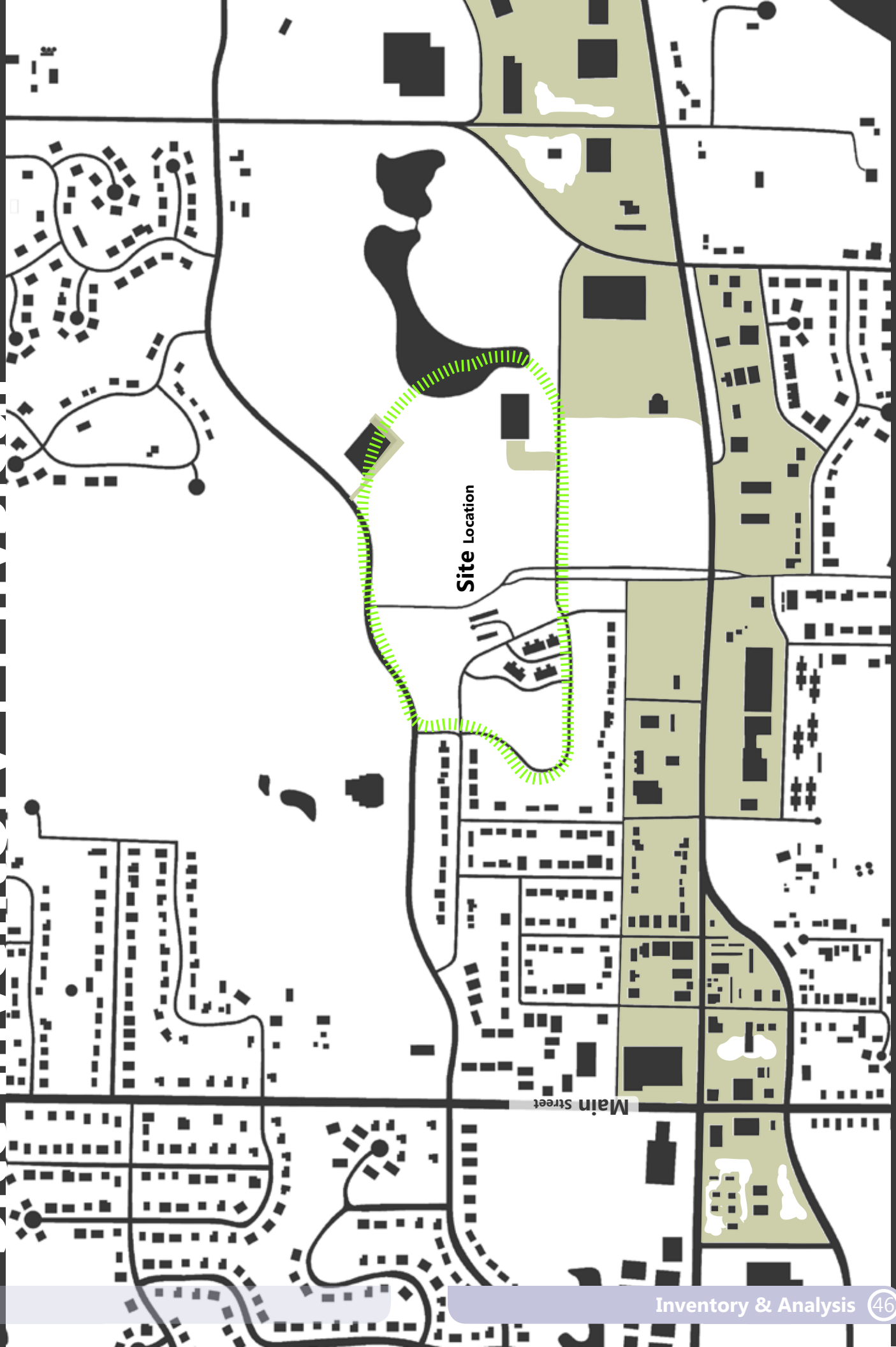
Details and
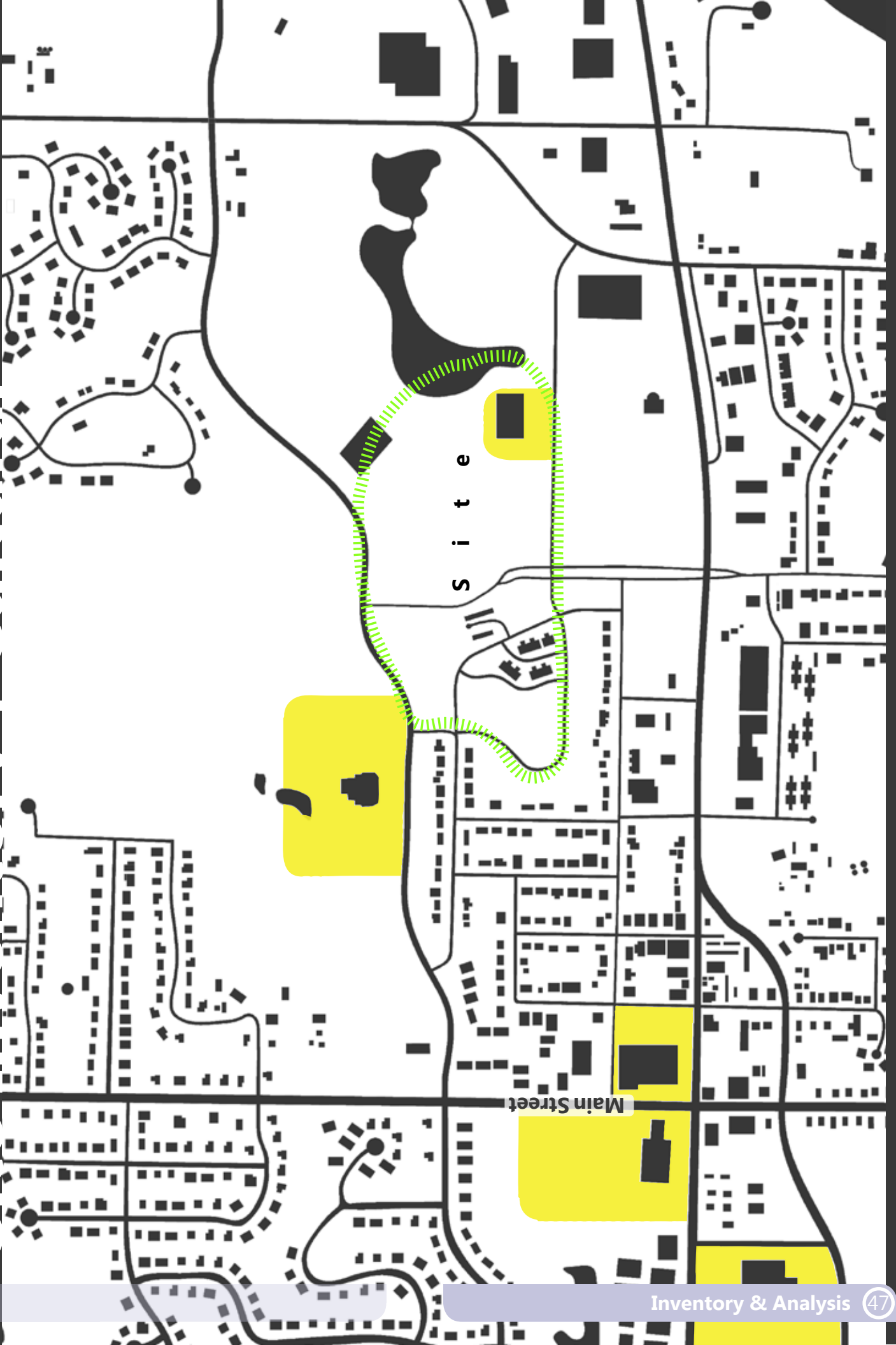Amenities

Details and
Amenities

2.1
miles to mall

site

Main Street

Site Inventory | Physical

Site Location

Main Street

site

Main Street

Site Location

Main Street

Site Inventory | Biological

Site Location

Main Street

Site Inventory | Biological

Site Location

Main Street
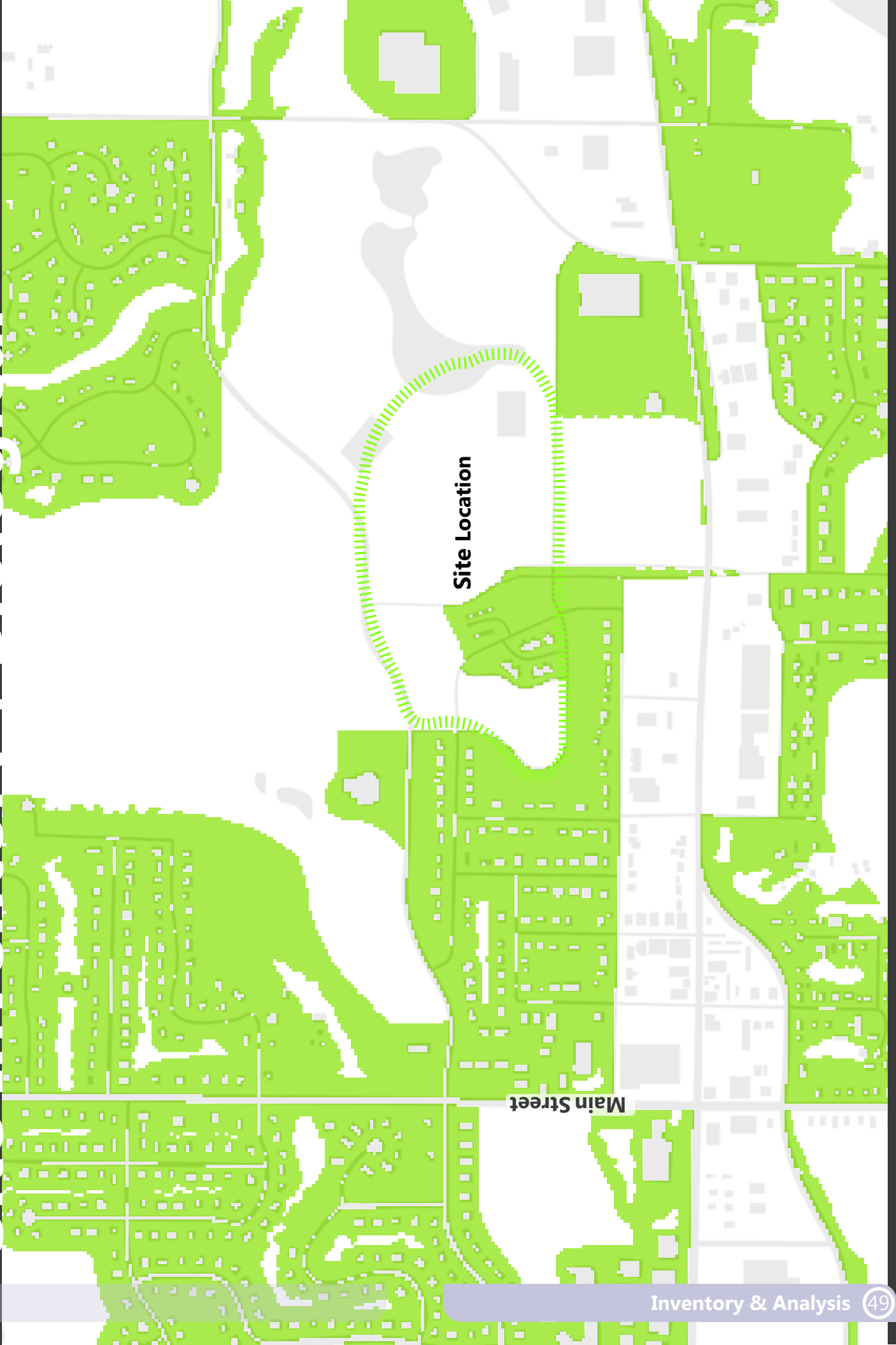
What is GI?

Green Infrastructure (GI) is a network of natural areas and other open spaces that conserves natural ecosystem functions, sustains clean air and water, and provides an array of benefits to people and wildlife.
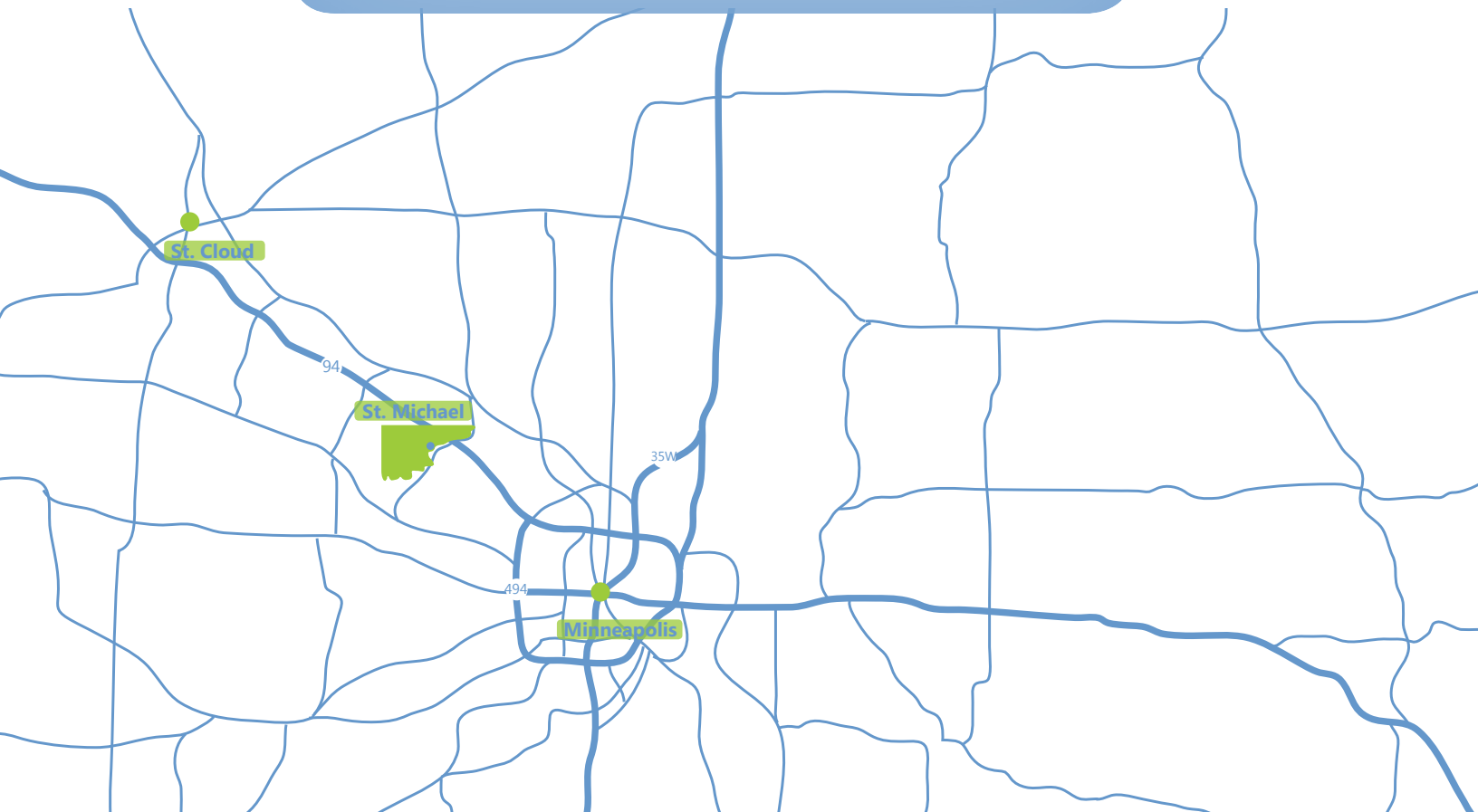
social
economic
environmental

North Fork Crow River

Minnesota has 81 major watersheds. North Fork Crow River Watershed covers over 949,000 acres. This watershed covers dozens of important wetlands, lakes and streams.
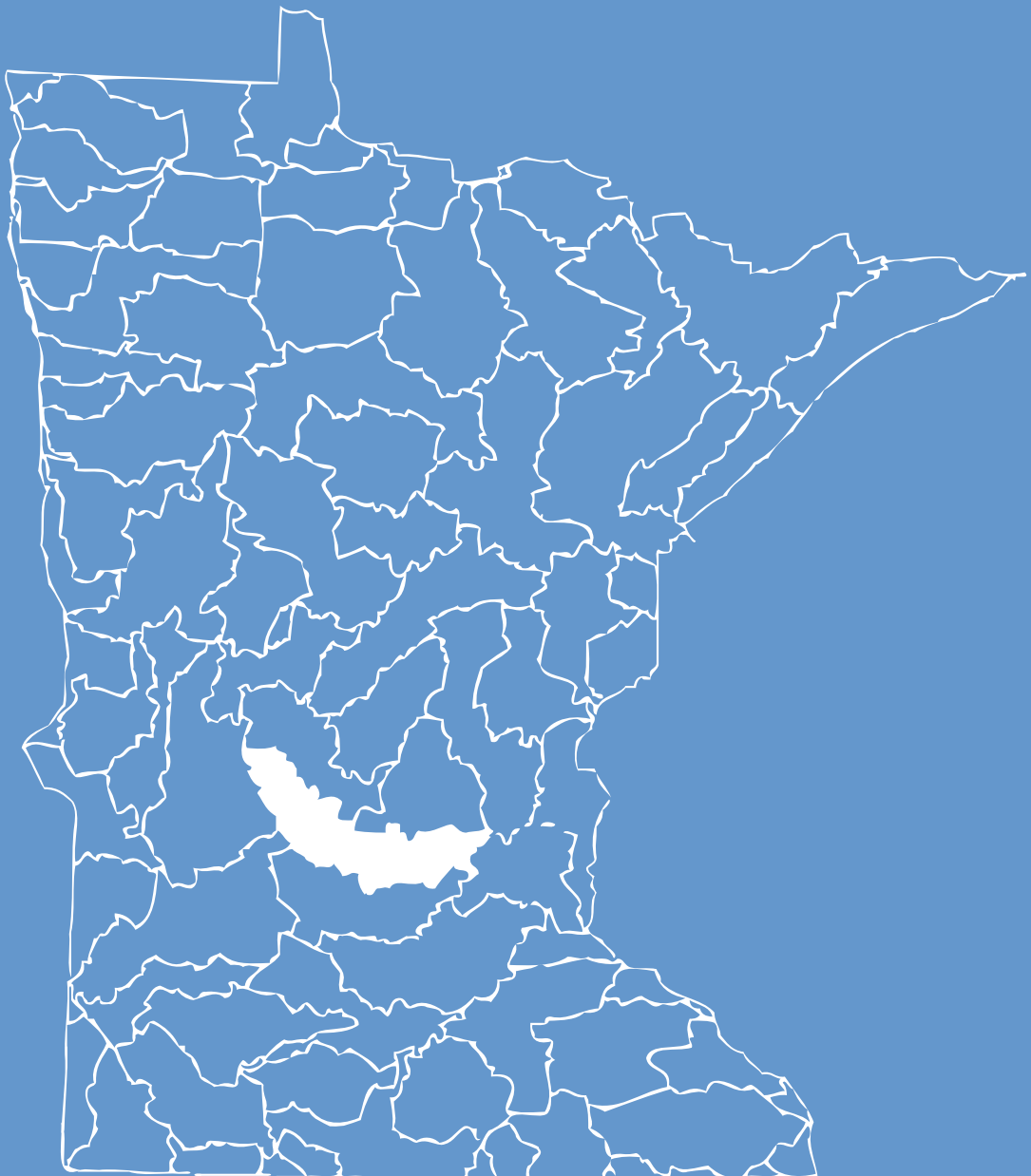
St. Michael Minnesota is exactly 1/2 way between St. Paul & St. Cloud MN [38 miles]

St. Cloud

94

St. Michael

35W

494

Minneapolis

97.8%

St. Michael's residents commute to work and shopping in a private vehicle.

-2,447 per day to commute away

Hard engineering

moves pollution from one site to another

Soft engineering

remediates pollutants on site

School comes first

A vast majority of the new population growth is due to the increasing interest in St. Michael's public and private schools.

Open space hubs consist of both public and private land. **Community** creates a 'quilt' of spaces which consist of large and small pieces **stitched** involvement together
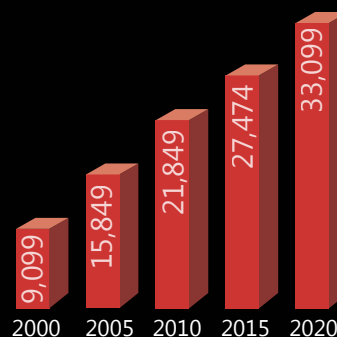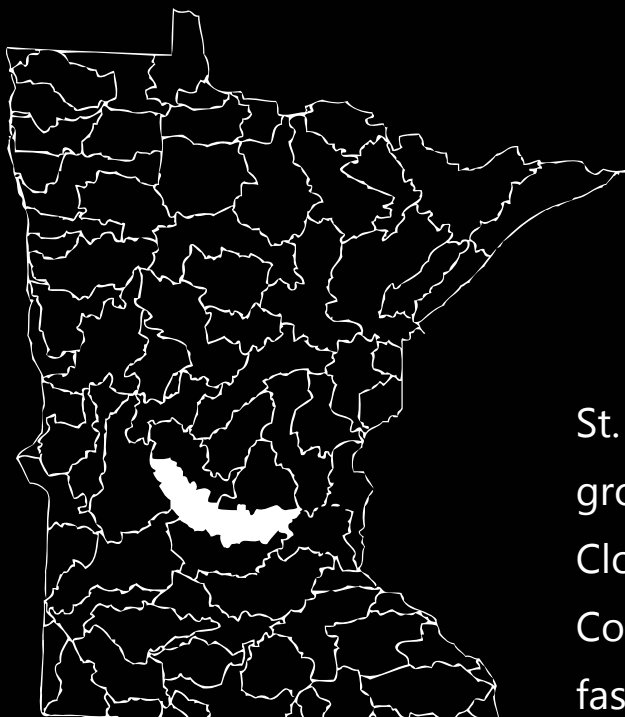
why GI?

2002 study in science concluded that the demolition of habitat costs the world

$ 250 billion/yr

Estimated that a network of global nature reserves would provide an annual net benefit of over

$ 4.4 trillion/yr

why St Michael?

2000	2005	2010	2015	2020
9,099	15,849	21,849	27,474	33,099

St. Michael has experienced significant growth due to its location between St. Cloud, MN and St. Paul, MN. Wright County has emerged as one of the fastest growing counties in the state.

Metro Area Population

150,000 to
1 million
1 to 3 million

6 million +
3 to 6 million

2008 Regional Plan Association

The 2008 Regional Plan Association has identified the following locations as having significant population growth within the last five to ten years. Areas in the midwest like St Michael are marked with this population boom.

St. Michael

POP 16,399

St. Michael has a small town feeling with easy access to larger city amenities and services. It is a place where neighbors know one another and one can easily become involved in the community. We are caretakers of our environment, protecting and preserving the river, lakes and open spaces for future generations. Our business community is vibrant and growing, providing places to shop, work or own a business. More than a shopping area, our Downtown includes places where people gather together. Quality public and private schools make St. Michael a desirable place to raise a family and provide opportunities for learning at all ages. The diversity in housing ensures affordable, quality living for everyone, including families, seniors and our grown children who are ready to return to the community. Neighborhoods are surrounded by parks and open spaces offering recreational opportunities and natural views. Trails and sidewalks provide safe connections within and between neighborhoods, schools, parks and shopping areas. Our convenient location makes it easy to access the employment, shopping, entertainment and recreational opportunities of the Twin Cities and St. Cloud Metropolitan Areas.

St. Michael

POP 16,399

St. Michael has a small town feeling with easy access to larger city amenities and services. It is a place where neighbors know one another and one can easily become involved in the community. We are caretakers of our environment, protecting and preserving the river, lakes and open spaces for future generations. Our business community is vibrant and growing, providing places to shop, work or own a business. More than a shopping area, our Downtown includes places where people gather together. Quality public and private schools make St. Michael a desirable place to raise a family and provide opportunities for learning at all ages. The diversity in housing ensures affordable, quality living for everyone, including families, seniors and our grown children who are ready to return to the community. Neighborhoods are surrounded by parks and open spaces offering recreational opportunities and natural views. Trails and sidewalks provide safe connections within and between neighborhoods, schools, parks and shopping areas. Our convenient location makes it easy to access the employment, shopping, entertainment and recreational opportunities of the Twin Cities and St. Cloud Metropolitan Areas.
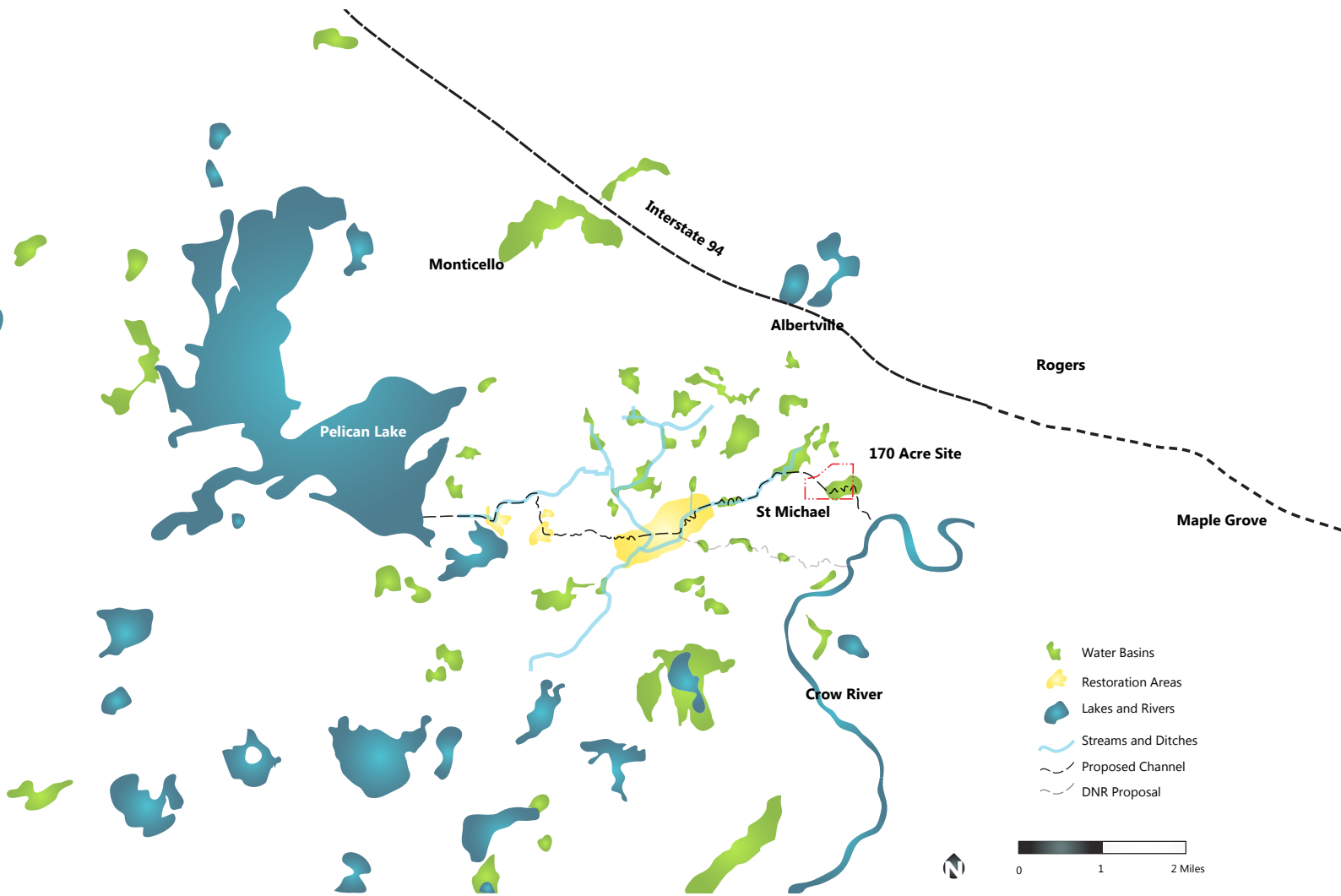
1991 | pre sprawl

I94

Pelican Lake

Crow River

2003 | development explosion

Pelican Lake

I94

Crow River

N

2012 | current state

Pelican Lake

I94

Crow River

N

2012 | DNR's interest

Monticello

Interstate 94

Albertville

Rogers

Pelican Lake

170 Acre Site

St Michael

Maple Grove

Crow River

Legend:
- Water Basins
- Restoration Areas
- Lakes and Rivers
- Streams and Ditches
- Proposed Channel
- DNR Proposal

N

0   1   2 Miles

biological
elements

physical
elements

cultural
elements

Ducks Unlimited

DNR has identified Pelican Lake as the home to hundreds of bird species, making it extremely important to regulate the level and quality of the water.

Native to live

Native species emphasise the unique location of a city. Parks function as resilient 'lungs' of the city improving air quality.

Biological Elements

Relocating parking allows storm water to function as well as a field runoff to be cleaned in the same system.

Ice Cream Social

Create events all throughout the year throughout all demographics.

Pave the Way

Roadways will need to manage projected traffic volumes

Marketing the Town

Businesses in the area should thrive of the population of the town and the visiting members of local communities.

Re-Routing Pelican

Pelican Lake's level needs to me managed in order to protect precious local habitat.

Amphitheater

Outdoor amphitheaters are perfect ways to get large groups of people together regularly. Outdoor concerts help bring in large volumes of visitors as well.

Let your rural roar

Connection versus interdependence within a system of other cities.

Reveal History

History of a city gives it authenticity. It reflects local culture, local knowledge, and reinforces a sense of place and local identity.

Who Are You

Everyone in the city is included, has rights, and is entitled to a better life. Elderly, disabled, and poor are seen as potentially valuable social capital.

Home is Where You Hang Your Heritage

Parks and other forms of natural heritage are important for culture as it creates a memory, and sets up a sense of place.

site & surrounding

The 170 acres of land outlined in blue is currently in the 'heart' of the downtown. The site is accessibe from every direction with a variety of age groups and current uses.

bio ditch

Drainage ditches are a large part of agriculture. This system maintains both peak ditch drainage capacity, and minimum net pollution and nutrient transportation.

Main Avenue

Central Avenue

Crow River

N

retention tension

Retention basin responsible for runoff of the entire Town Center area. It is also home to wildlife including Canada Geese. The basin is constantly relieving erosion and flooding in the Crow River and helps to improve water quality. It is also an aesthetic amenity providing an opportunity for a fountain.

crow river

Crow River was once lined with "big woods," a thick forest of maple, basswood, elm and other hardwoods. Today the river is now bordered by agriculture, prairie and hardwood vegetation. The he river is generally smooth flowing with a minimal rapids, classifying it as a wild and scenic river.

Main Avenue

Central Avenue

Crow River

N

farmland

St Michael's rich physical quality is displayed through agricultural land. These lands promote sustainability by maintaining productive soil quality and decreasing loss of prime agricultural land.

Main Avenue

Central Avenue

Crow River

N

open for ~~business~~ spaces

The preservation of open spaces throughout the community will be a key to preserving the rural character so highly prized in the community.

Main Avenue

Central Avenue

Crow River

N

firm foundation

An important characteristic of St Michael is the religion which it was founded on. The town prides itself on the architectural detail of the church as well as what it stands for.
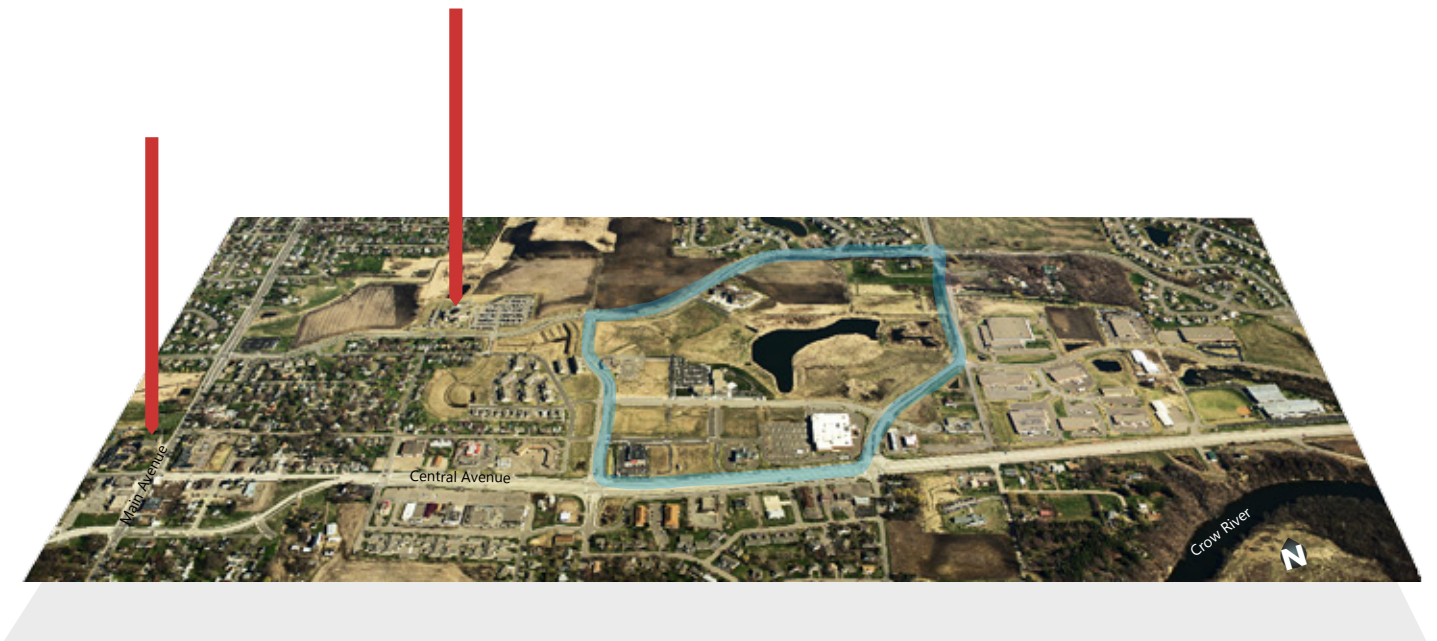
school in session

The new population growth is largely due to the increasing interest in St. Michaels public and private schools.

Main Avenue

Central Avenue

Crow River

N

shopping

St Michael promotes the retention and expansion of existing businesses while attracting new businesses to the community in order to promote a diversified tax base, job opportunities, and convenient shopping for residents. The city plans with the business community in mind making it an attractive environment for new and existing businesses.

Main Avenue

Central Avenue

Crow River

N

hot spots

The new Great River Regional was a part of a multi-use civic structure constructed in 2010. The building is an example of the architectural vision the city shares for the future of Town Center. Another hot spot in the area is the local Marketplace grocery store. Both buildings have been heavily utilized making the area a busy energetic hub.

inspiration

Historical footprints of the site reveal a network of various roads and paths utilized on the site. The footprints also uncover a prominent drainage ditch, that once transported water for agriculture and for stormwater purposes. Breathing life into these existing bones restores the history and sustainability the city once possessed.

Constraints

No form of public transit system.
Chosen lack of government funding.
Overall feeling of population constraints.
Housing market stopped growth since 2008.

Opportunities

Diversity in age groups.
Pride in being a self sustaining city.
Outdated & obsolete city master plan.
DNR's ongoing interest in Pelican Lake.
Community feels like a family 'protective'.

design is a process

Through collaboration with members of the community, city planners, and engineers, a series of Town Center alternatives was developed. Revisions were made based on impacts on pedestrian and vehicular movement, land use, business development and the physical character of Downtown.
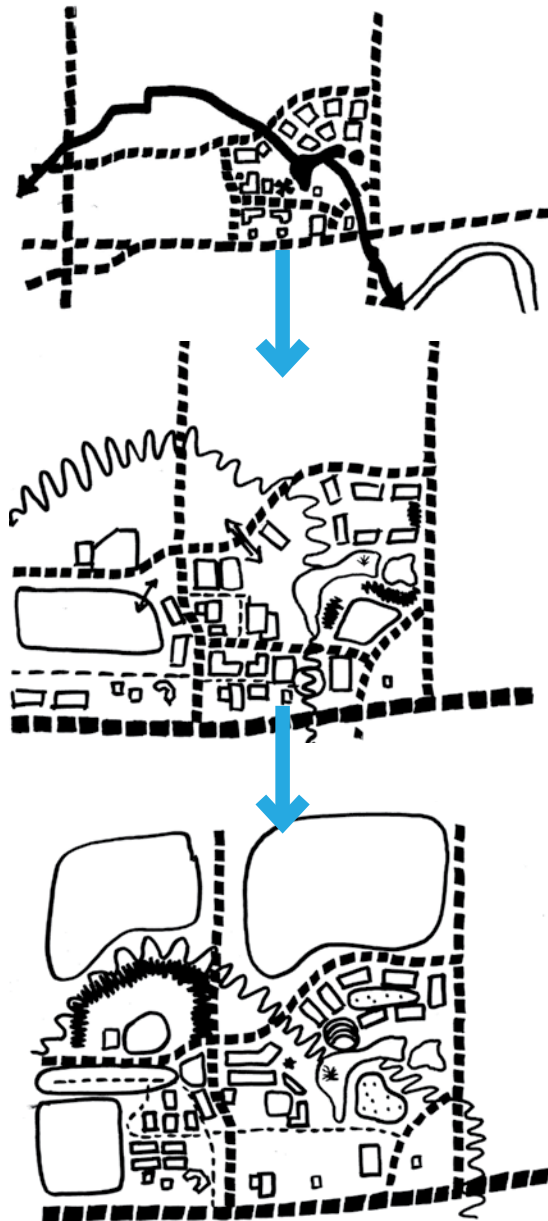
design is a process

Through collaboration with members of the community, city planners, and engineers, a series of Town Center alternatives was developed. Revisions were made based on impacts on pedestrian and vehicular movement, land use, business development and the physical character of Downtown.

Frankfort Pkwy NE
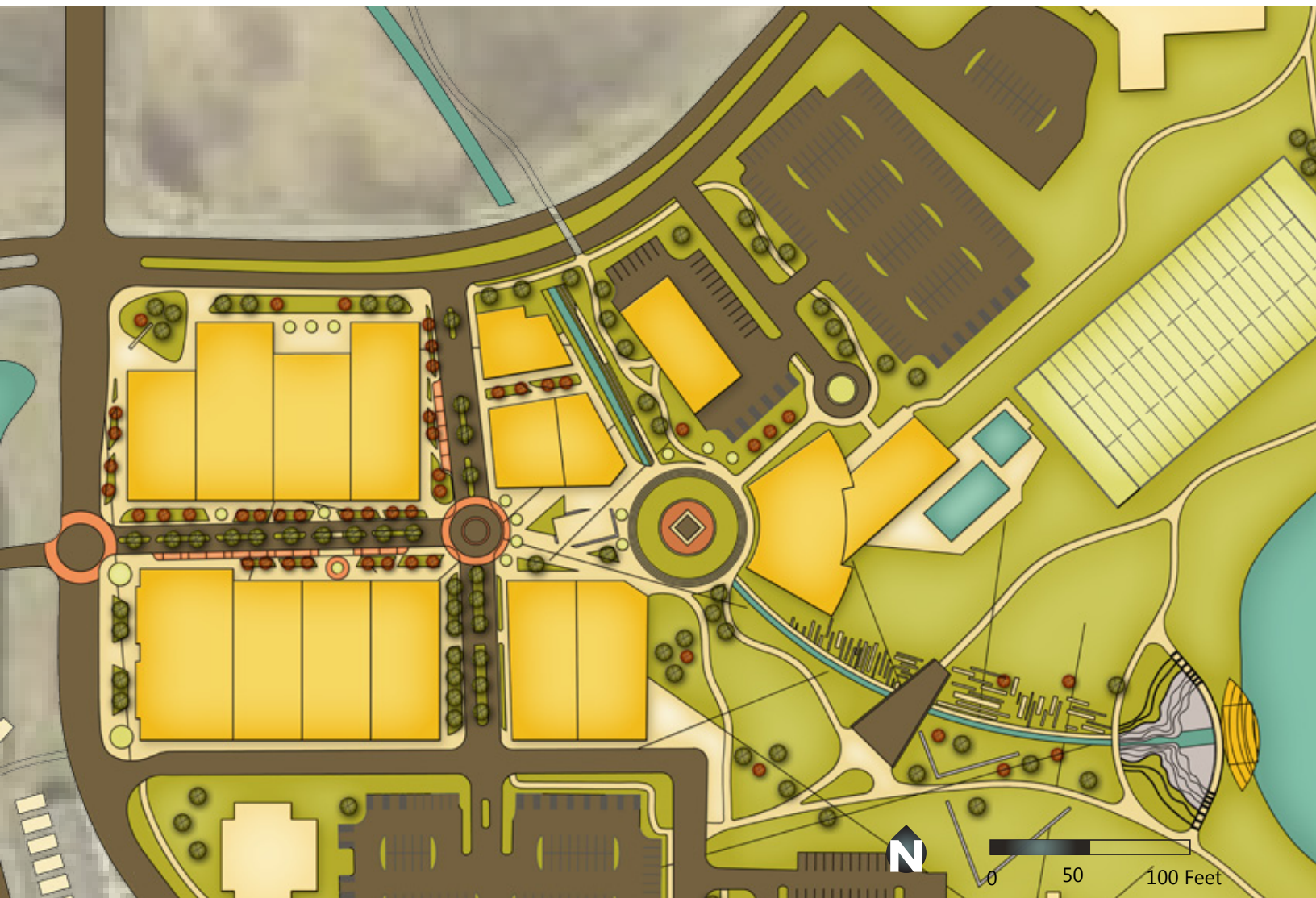
Maciver Ave NE

Town Center Dr

Edgewood Drive

Highway 241

nue

N

0   500   1000

focus area plan

The plan focuses on transformation of the Downtown into a dense, diverse, walkable city center composed of businesses, housing and community institutions.

N

0   50   100 Feet

ampitheater

This open-air venue would attract visitors to the downtown area. The theater would bring life and energy, and stimulate economic growth for new and existing businesses.
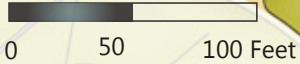

Creates a connection to assisted living and single family residential

Water retention is vital to maintaining Pelican Lake's level as well as restoring clean water to Crow River.
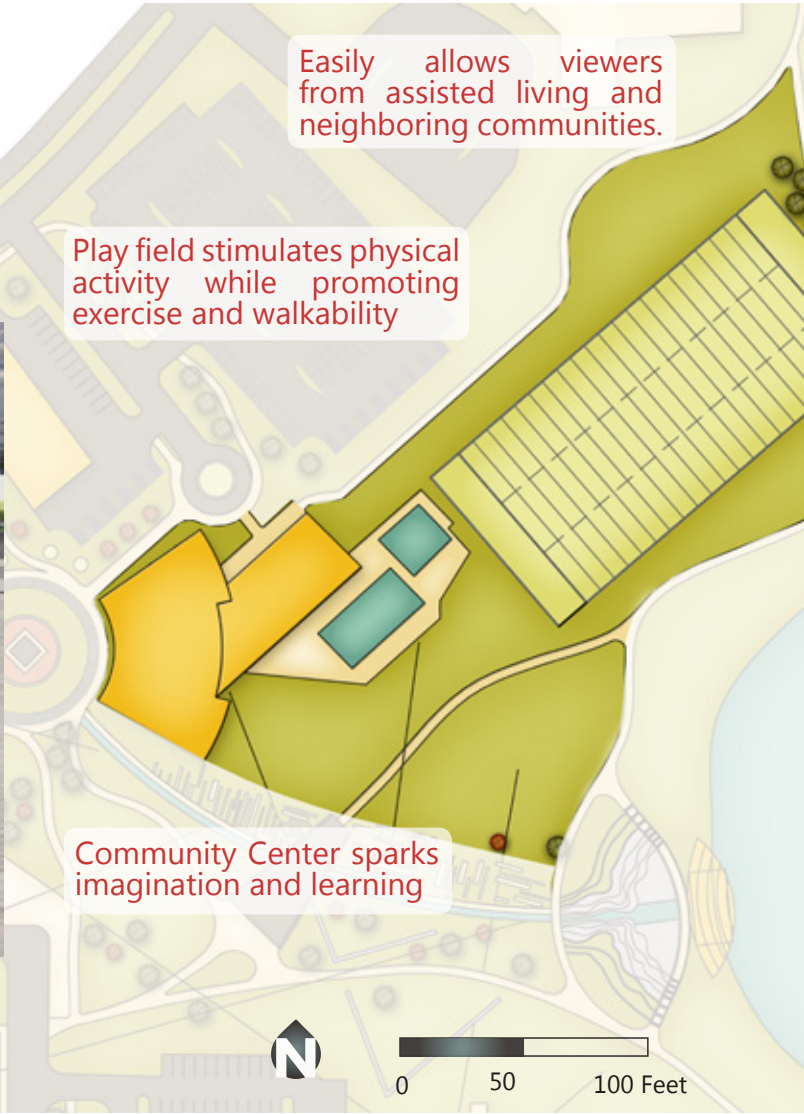
Everyone is invited to join the weekly festivities along the waterfront ampitheater

A unique amphitheater creates a focal point of the entire area not just the city
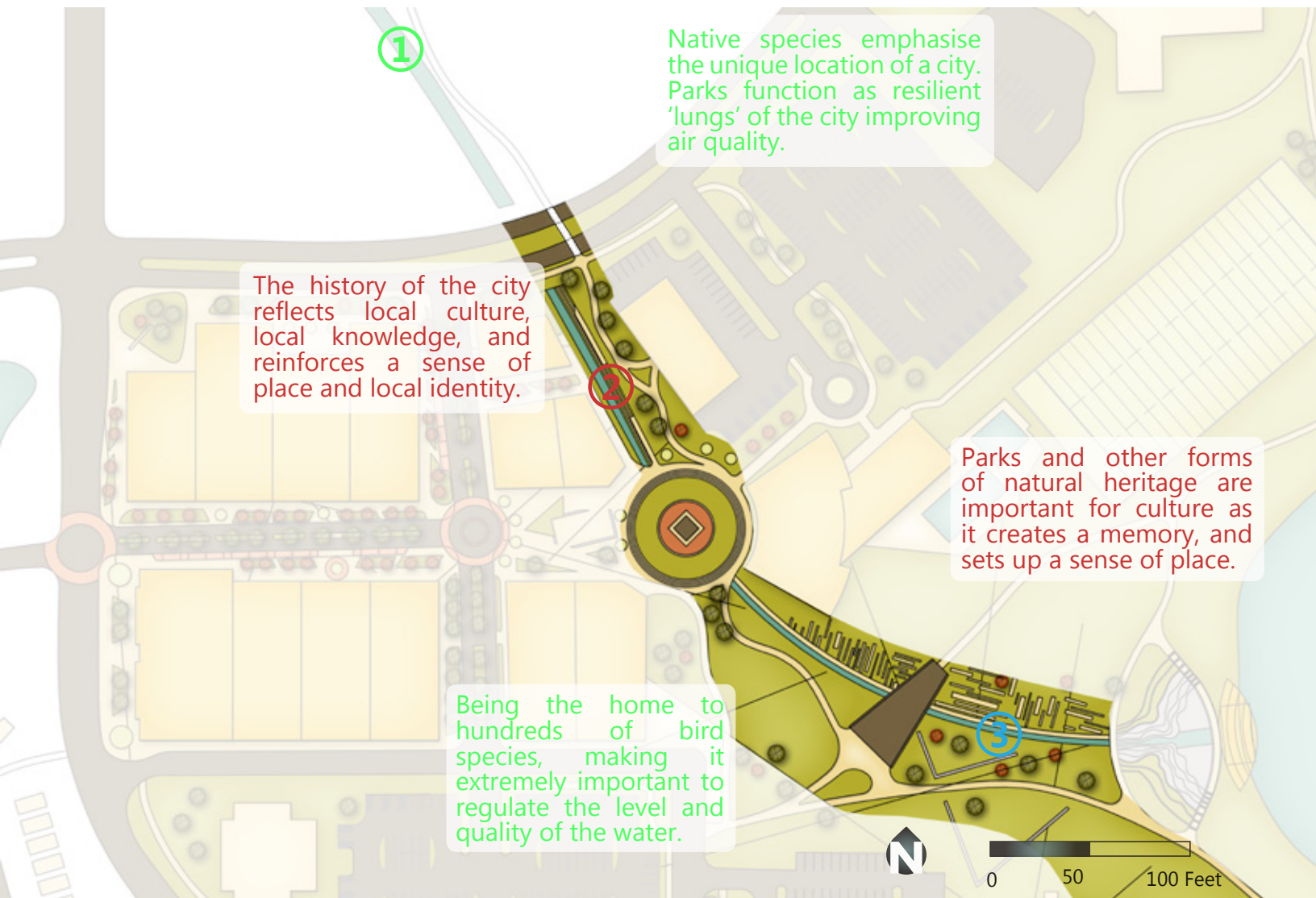
0   50   100 Feet

overall wellness

Placing the Community Center in the center of the plan allowed for it to become the nucleus and source for all the energy taking place in Town Center. Open space promotes activity and physical wellness.

Easily allows viewers from assisted living and neighboring communities.

Play field stimulates physical activity while promoting exercise and walkability

Community Center sparks imagination and learning
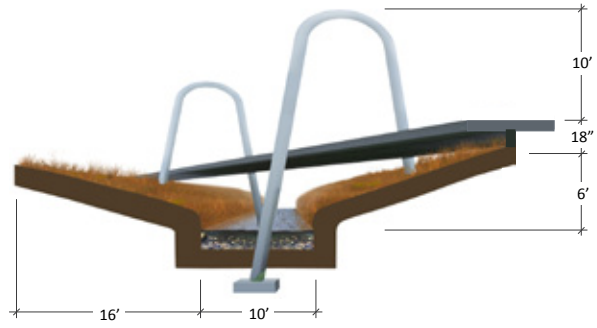
0   50   100 Feet

down the drain

History reveals that there once was a drainage ditch similar to this one in this exact location over thirty years ago. Celebrating that history creates ornamental form designed functionality.
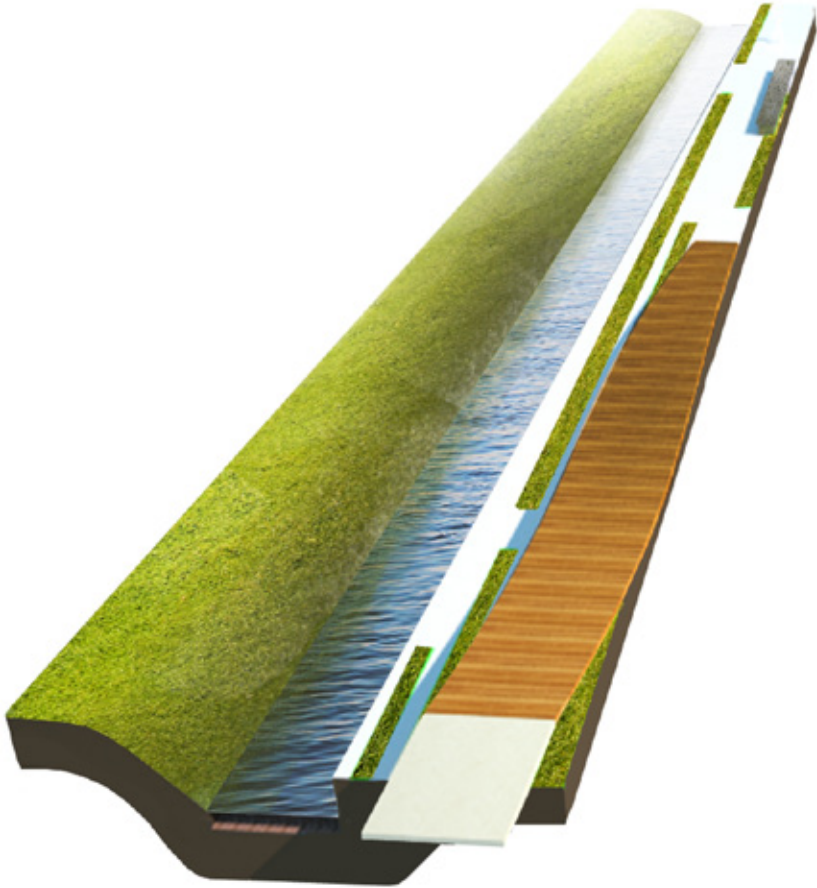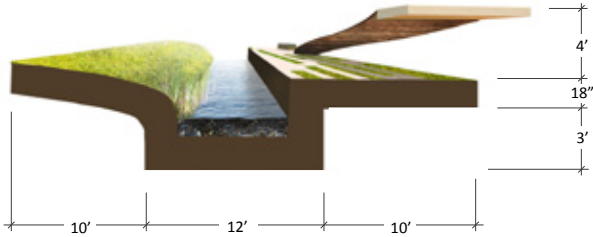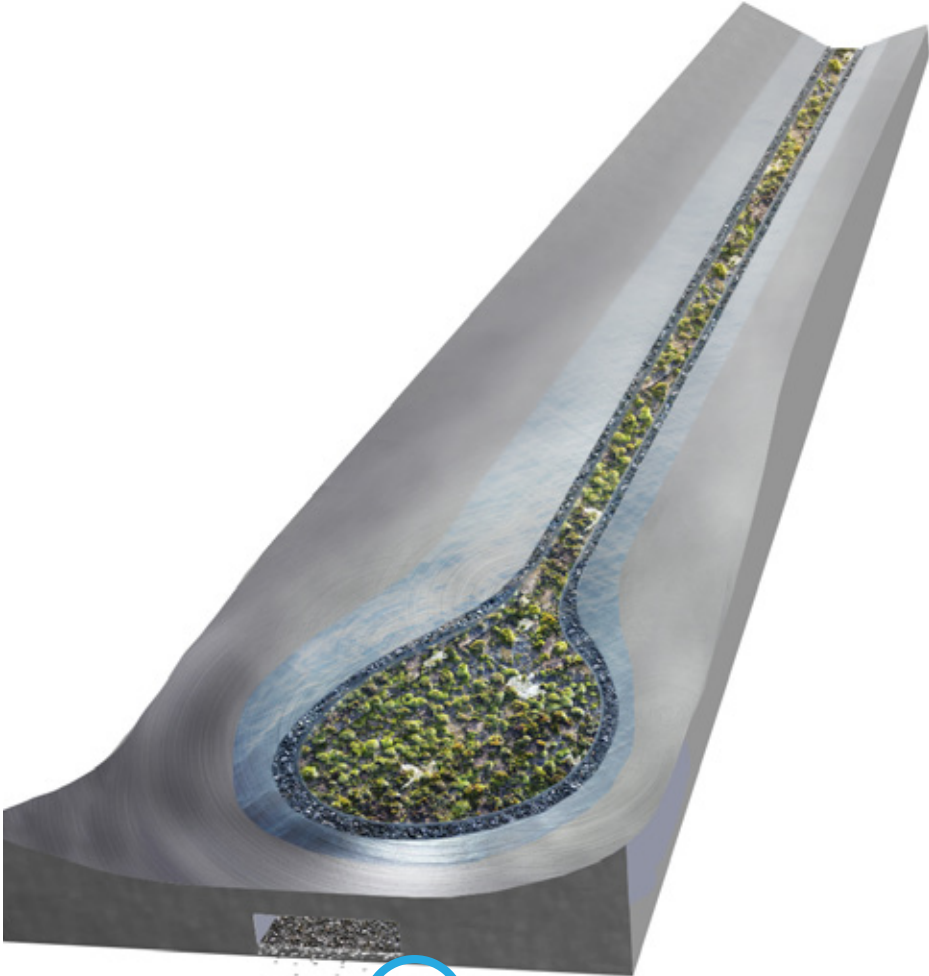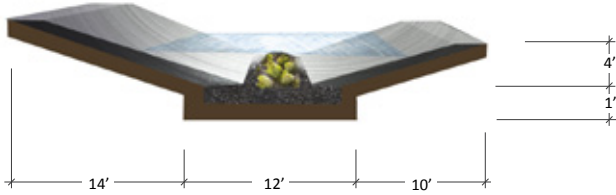
Native species emphasise the unique location of a city. Parks function as resilient 'lungs' of the city improving air quality.

The history of the city reflects local culture, local knowledge, and reinforces a sense of place and local identity.

Parks and other forms of natural heritage are important for culture as it creates a memory, and sets up a sense of place.

Being the home to hundreds of bird species, making it extremely important to regulate the level and quality of the water.

0   50   100 Feet

rural road

10'

18"

6'

16'   10'

①

subURBAN

4'
18"
3'

10'   12'   10'

②

grey to green

4'
1'

14'   12'   10'

③

town center plaza

Mixtures of rain gardens and swales surround the impervious surfaces. This system eliminates the need for transporting polluted stormwater.

Businesses in the area should thrive of the population of the town and the visiting members of local communities.
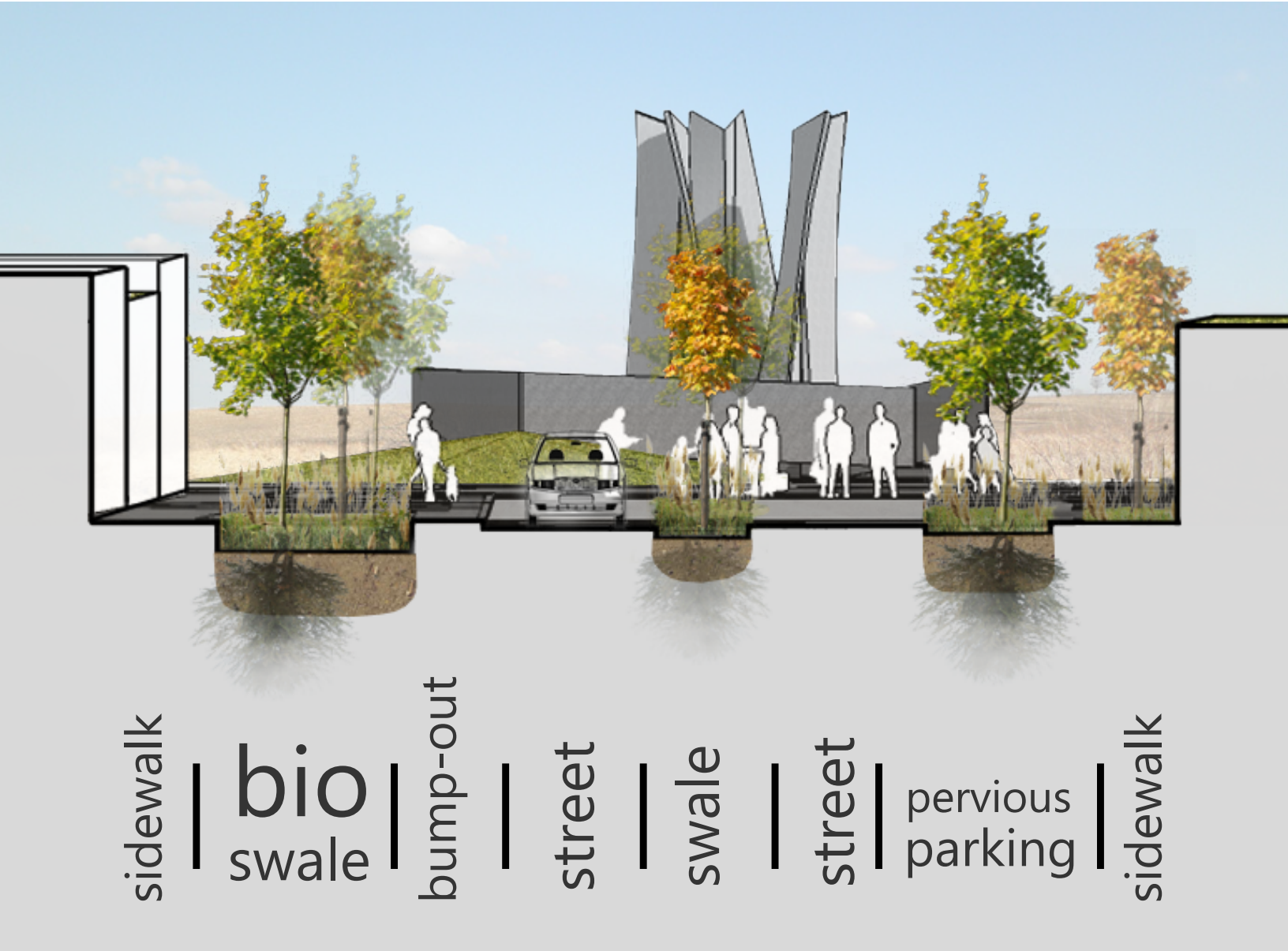
Create events for all demographics throughout the year.

Relocating parking allows storm water to function as well as a field runoff to be cleaned in the same system.

0   50   100 Feet

town center plaza

sidewalk | bio swale | bump-out | street | swale | street | pervious parking | sidewalk
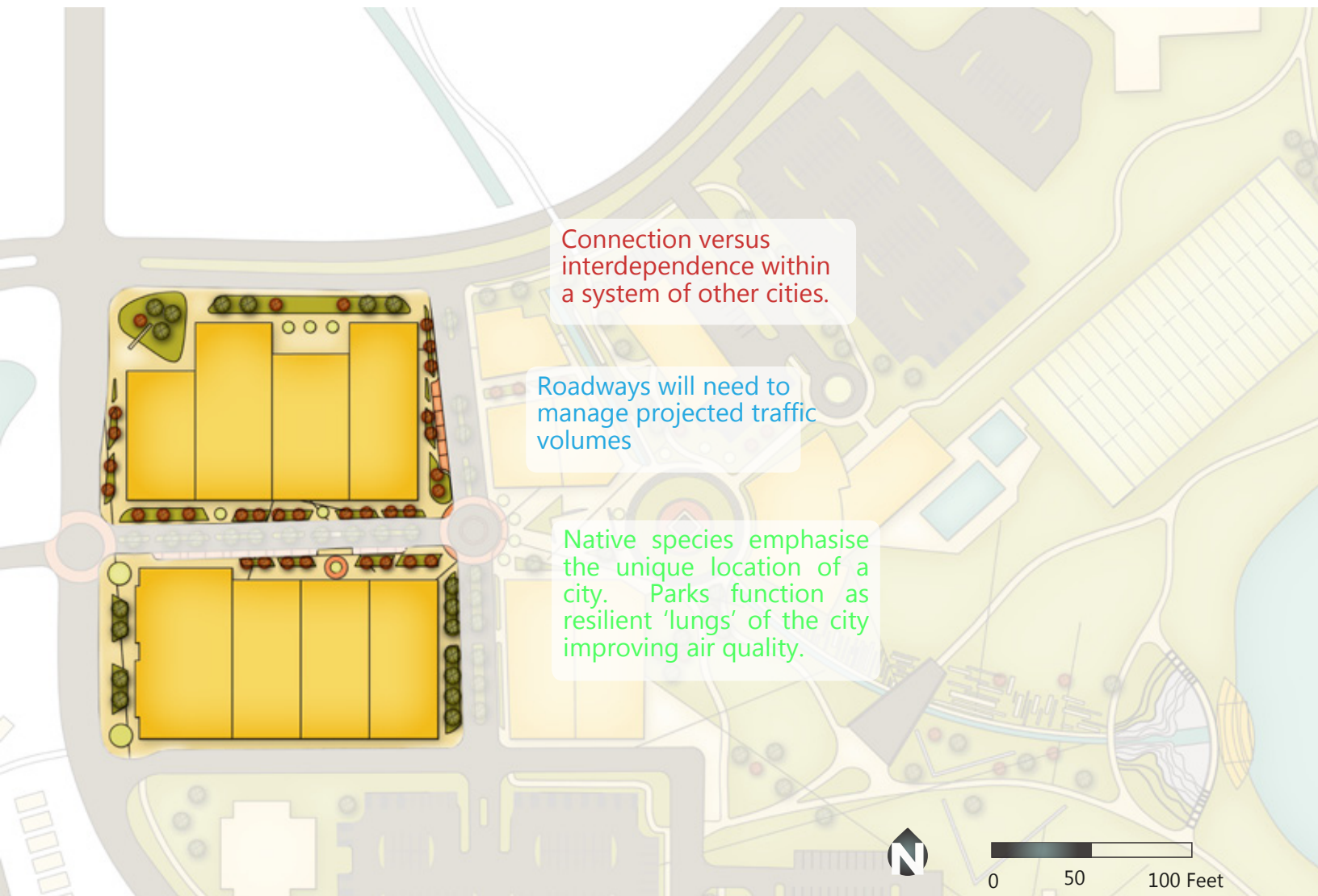
shoppes of STM

The Town Center corridor minimizes surface runoff while achieving calmer traffic flows. The softscape creates downtown ecologies that serve as hubs in the overall system.

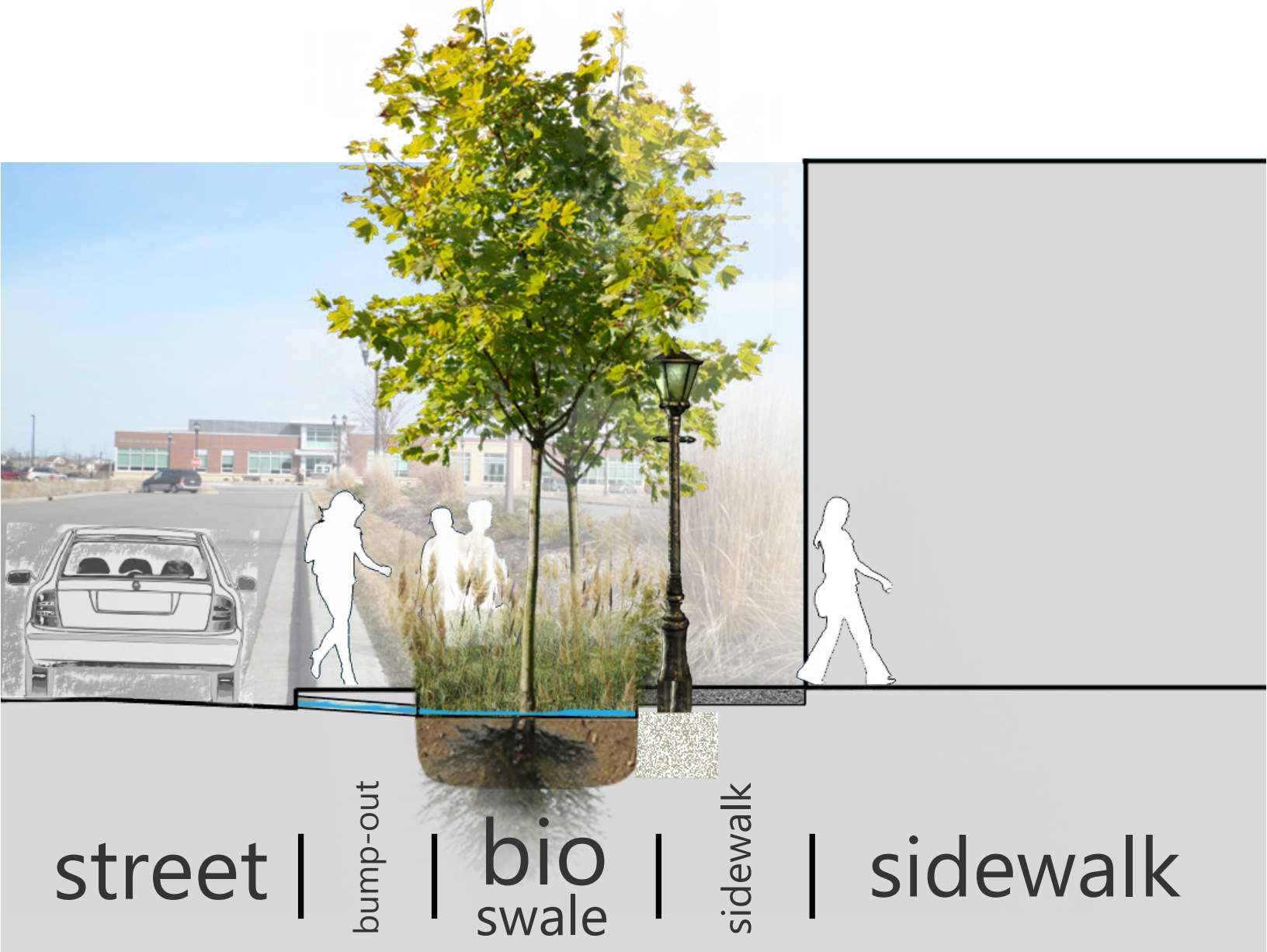Connection versus interdependence within a system of other cities.

Roadways will need to manage projected traffic volumes

Native species emphasise the unique location of a city. Parks function as resilient 'lungs' of the city improving air quality.

0   50   100 Feet

shoppes swales

street | bump-out | bio swale | sidewalk | sidewalk

GI JOE | St Michael

A vegetated treatment network of swales allow soft engineering to naturally manage rainfall on site. Ecological based stormwater management is highly productive, aesthetically pleasing, and remediates polluted runoff through infiltration and evapotranspiration.

treatment

evapotranspiration

treatment

pedestrian scale

evapotranspiration

runoff

walkability

infiltration

permeable

curb cuts

runoff

infiltration

personal information

My name is Zach Swanson. I am a graduate of North Dakota State University with a Bachelors in Landscape Architecture and Environmental Design and an emphasis in Business Administration. The architecture program at NDSU has shown me a lot about design, and I know now that I will forever be a student in life.

zach swanson

11161 33rd Circle NE. Saint Michael, MN 55376

zachary_w_swanson@yahoo.com

763.742.7198

references

Administration. (2010). History of American Roads and the First Federal Highway. Inventors. Retrieved November 16, 2011, from http://inventors.about.com/library/inventors/blcar3.htm

Bellis, M. (2011). The Duryea Brothers - Automobile History. Inventors. Retrieved August 9, 2011, from http://inventors.about.com/od/dstartinventors/a/DuryeaBrothers.htm

Burdett, R. (2007). The endless city: the urban age project by the London School of Economics and Deutsche Bank's Alfred Herrhausen Society. London: Phaidon.

Burian, S., & Edwards, F. (2010). Historical Perspectives of Urban Drainage. University of Arkansas, 1, 7-10.

City of St. Michael. (2012). City of St. Michae. Retrieved May 9, 2012, from http://www.ci.st-michael.mn.us/

Duran, S. (2008). Contemporary landscape architecture. Cologne: Daab.

Google Maps. (2012). Retrieved from http://maps.google.com/maps?hl=en&gs_upl=2930l6849l0l7 151l15l10l1l2l2l0l254l2028l0.5.5l12l0&bav=on.2,or.r_gc.r_pw.,cf.osb&biw=1400&bih=795&q=st michael mn&um=1&ie=UTF-8&hq=&hnear=0x52b35c4fe1880ebb:0x24fee9be010b4469,St Michael, MN&gl=us&ei=VDjiTuSYKvChsQKz_sWiBg&sa=X&oi=geocode_result&ct=image&resnum=2&ved=0CEE Q8gEwAQ ¬

Hayes, D. F. (2004). Wetlands 2001 wetlands engineering and river restoration. Reston, Va.: American Society of Civil Engineers.

MAFC. (2011, March 16). The Far Reaching Effects of Canal Expansion — Mid-America Freight Coalition. Mid-America Freight Coalition. Retrieved November 18, 2011, from http://midamericafreight.org/2011/03/panama-canal-expansion/

Matandhal. (Designer). (2011). Urban water needs: Can we keep up?. [Web Graphic]. Retrieved from http://www.visualizing.org/full-screen/16656

Miller, C. (2009). Water in the 21st-century West: a High country news reader. Corvallis: Oregon State University Press.

references

Miller, D. A. (2008). Urban sprawl. Detroit: Greenhaven Press.

Oxe Journal. (Photographer). (n.d.). Retr¬ieved from http://blogs.opb.org/oexjournal/files/2010/12/a2004-0021104-sw-3rd-ave.jpg

Peck, S. (1998). Planning for biodiversity: issues and examples. Washington, D.C.: Island Press.

Putman, R. J., & Wratten, S. D. (1984). Principles of ecology. London: Croom Helm. ¬

Steenbergen, C. M. (2008). Composing landscapes: analysis, typology and experiments for design (English ed.). Basel: Birkhäuser.

Shiffman, R. (2009, November 19). Superblocks | Streetsblog New York City . Streetsblog New York City . Retrieved October 28, 2011, from http://www.streetsblog.org/category/issues-campaigns/superblocks/

Simmons. (2000). Rural Settlement Study. Orange County Planning Division, 1, 14.

Street Connectivity | NPLAN. (n.d.). NPLAN - National Policy and Legal Analysis Network to Prevent Childhood Obesity | NPLAN. Retrieved May 9, 2012, from http://www.nplanonline.org/nplan/pfd-element/street-connectivity
Thompson, I. (2009). Rethinking landscape : a critical reader. 2008: Island Press.

Urban squares: recent European promenades, squares, and city centres.. (2002). Basel: Birkhäuser ;.Johnson, S. (2011). The Inventions in the Late 1800s | eHow.com. eHow | How to Videos, Articles & More - Discover the expert in you. | eHow.com. Retrieved November 25, 2011, from http://www.ehow.com/info_8301025_inventions-late-1800s.html

USDOT. (2011). FHWA Highway Functional Classification System: FHWA Guidelines Section II-1 - Statewide4 Planning - Planning - HEP - FHWA. Home | Federal Highway Administration. Retrieved May 9, 2012, from http://www.fhwa.dot.gov/planning/fcsec2_1.htm

Wetzel, T. (2011). What explains the demise of the Pacific Electric Railway?. UncannyNet Home Page. Retrieved November 18, 2011, from http://www.uncanny.net/~wetzel/pedemise.htm

Wolf, K. (2011). Ergonomics of the City: Green Infrastructure and Social Benefits. College of Forest Resources, University of Washington. Retrieved October 28, 2011, from www.idl.idaho.gov/bureau/community_forestry/techtreeinfo/socialbene/wolf/ergonomics-of-city.pdf

Ziegler, R. Scott, and Ziegler Cooper Architects. Suburban Sprawl Loses its Sizzle | Multi-Housing News Online. Multi-Housing News | Multifamily, Property Management, Real Estate Market Data, Multimedia and more!. N.p., n.d. Web. 9 Dec. 2011. from http://www.multihousingnews.com/features/suburban-sprawl-loses-its-sizzle/1004024108.htm

references

ASLA Student Awards. (Designer). (2011). Leading by example. (2011). [Print Photo]. Retrieved from http://www.asla.org/2011awards/images/largescale/480_05.jpg

ASLA Student Awards. (Designer). (2011). Mainstreet spine. [Print Photo]. Retrieved from http://www.asla.org/2011awards/images/largescale/480_09.jpg ASLA Student Awards. (Designer). (2011). Redesign. [Print Photo]. Retrieved from http:/www.asla.org/2011awards/images/largescale/480_05.jpg

ASLA Student Awards. (Designer). (n.d.). A unified vision. [Print Photo]. Retrieved from http://www.asla.org/2011awards/images/largescale/610_01.jpg

ASLA Student Awards. (Designer). (2011). Retrieved from http://asla.org/awards/2006/06winners/images/largescale/079_06.jpg

ASLA Student Awards. (Designer). (2011). Repurposing underutalized corridors. [Print Photo]. Retrieved from http://www.asla.org/2011awards/images/largescale/610_14.jpg

ASLA Student Awards. (Designer). (2011). Cooling and draining a small street. [Print Photo]. Retrieved from http://www.asla.org/2011awards/images/largescale/610_14.jpg

ASLA Student Awards. (Designer). (2011). Green streets solution. [Print Photo]. Retrieved from http://asla.org/awards/2006/06winners/images/largescale/079_03.jpg

ASLA Student Awards. (Designer). (2011). Urban vernacular. [Print Photo]. Retrieved from http://asla.org/awards/2006/06winners/images/largescale/079_09.jpg

(2011). Retrieved from Image Source: Wright County, MN Beacon

(2011). Retrieved from http://www.ci.st-michael.mn.us/vertical/sites/{B38B49FF-2E8E-4C5F-AB24-D151A5DAB43E}/uploads/{E5D0C007-ACEF-4DC8-A821-62AC10055749}.JPG

(2011). Retrieved from http://wwwdelivery.superstock.com/WI/223/4029/PreviewComp/SuperStock_4029R-282012.jpg

(2011). Retrieved from http://i.pbase.com/g6/53/688553/2/90327905.ma7uYEcB.jpg

(2011). Retrieved from http://upload.wikimedia.org/wikipedia/commons/thumb/2/2f/I-280_and_SR_87_Interchange.jpg/640px-I-280_and_SR_87_Interchange.jpg

(2011). Retrieved from http://i.pbase.com/g6/53/688553/2/90327905.ma7uYEcB.jpg

(2012). Retrieved from http://www.aerialphotographymissouri.com/keyword/rural/2/74#!i=764532466&k=MaDn3