Sustainable Engagement

Promoting healthy choices

Sustainable Engagement

A Design Thesis Submitted to the
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of North Dakota State University

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Abstract

In the heart of Minneapolis, museum visitors learn about specific ways to help the environment and inspire individuals for a healthier lifestyle. Exhibits will show everything that is affected when you turn off a light switch or simply recycle. The museum site is located on Hennepin Island in the heart of the richly historic city of Minneapolis, Minnesota. The museum features interactive exhibits promoting sustainability, a healthier way of living for today and the future. It also provides classes for individuals and groups that want to improve the lifestyle of themselves, employers, clients and the environment. The museum is also a desirable place for banquets and social events because of the location, surrounded by the Mississippi river as well as famous landmarks all within one half mile of the site. Landmarks will also serve as off-site education aids that partner with the museum to increase interactive learning.

Problem Statement

Sustainability: a social change involving individuals, businesses and government law to support a higher standard of ethical consumerism and healthful choices.

How can architecture influence individuals to learn and live in a sustainable environment that excites its users?

Proposal

Project Narrative

"The words 'Sustainable Development' are frequently used very lightly, to the extent that they have lost their meaning. Sustainability has been incorporated in the objectives of many studies. According to some analysts, this path represents the model for global prosperity. However, a number of growing parallel literatures recognize the importance of diverse development pathways in achieving an environmentally and socio-economically better world. The term sustainable development does not bring forward all aspects of development. A new term that incorporates the wellbeing of all citizens through economic development and the preservation of the environment is needed. A 'Worth-living Integrated Development' could be a term that combines economic development, social development and environmental protection. A Worth-living Integrated Development may be achieved only when human societies decide to create necessary presuppositions, at the educational, research, economic, social, political, technical and environmental levels, for a better world, based on the human values of peace, justice, solidarity, political, economic and social democracy and ethics, respect for nature and for the variety of cultures of all human beings."

This statement from an article of 'Sustainability' defines the need for worth- living integrated development as a term where a group of people make choices based on many levels of healthy and economical ethics. The word, 'sustainability' is immediately limiting in who can understand the term. It means different things to different people. In an interview with a resident of Northern Minneapolis, they said they felt it was a negative term. Using a new phrase to describe the informative decisions made by a collective and diverse group of people to develop healthy decisions is a fresh start to a word that now has complete positivity.

My student role in the United States Green Building Council and intern experience in a sustainable based firm has grown my interest in going green and healthy choices for me, my surrounding environments and our planet. While I have only begun my education with sustainable choices, I am inspired to learn more about how I can help myself and others to care about choices that will impact themselves and others to create a healthier lifestyle.

58 percent of Americans want to live a healthier lifestyle and 45 percent of them say they feel overwhelmed to even start. A solution to help motivate individuals is getting them excited about their choices. By visiting an inspiring and interactive museum people can learn everything that is involved with consciously thinking about our actions and their positive or negative repercussions. Museum exhibits will showcase ideas such as recycling and walking the three blocks to work instead of driving. Exhibits will explain how our actions affect a bigger picture and not just tell you an action is better.

The act of learning is a continuous process. It is one of the crucial life skills that we never stop practicing. Even when we are not actively studying material in a formal setting, we are absorbing information and insight from all around us. It is important to engage visitors with every sense to fully emerge them in an experience. People learn in all different ways and the museum will be a place that appeals to all different learning levels. What makes this learning experience different from other classrooms and museums are the off-site teaching aids that partner with the museum to increase interactive learning. Famous landmarks all within one half mile of the site such as the Stone Arch Bridge, Mill City Museum, Guthrie Theatre and St. Anthony Falls. They are not only beautiful but also showcase how the lessons taught in the museum can be applied in real world situations.

In addition to the exhibits and classroom settings there is also a peer pressure component that is used in a positive way to pull motivation from within individuals and use it for feedback and innovation for the future. We are constantly comparing ourselves to others, our businesses to our competitors and accomplishments to others awards. If we make sustainability about a positive competition to reach goals then it becomes a desirable race to a new healthy standard. The museum offers classes to adults and businesses

Project Narrative

in addition to children because adults are the ones that complete the learning experience. When students see adults making healthy choices they will mature looking up to the decision those adults made and continue to make them themselves. Physically seeing adults and peers walk, recycle and turn off lights will create a social example. Thinking in a worth- living integrated development mind set will take a change. Just having the opportunity to make these decisions isn't enough; we need to physically make a change.

The steps that will be illustrated throughout this thesis to make the change to worth- living integrated development will be based on a cycle of education, opportunity, engage, track progress, communicate and celebrate results.

Project Typology

Project Typology

Interactive Learning Center

Size

9,148sf

Location

Hennepin Island, Minneapolis, Minnesota

Typological Precedents

This museum is an educational facility that teaches with its architecture as well as exhibits, classes and workshops. Sustainable architecture increases awareness of healthy choices while advertising positive results. Utilized in an educational environment, it has the power to make an impact on individuals, businesses and surrounding communities.

An interactive museum allows community members to come together and recognize their strengths as well as improve the health of themselves, their personal goals and environment. This recognition of ideas has the power to influence the culture through the physical and intellectual experience between the built and natural environment while promoting a healthy community.

Typological Research

figure 2.0 Perot Museum of Nature and Science

Case Study #1

Perot Museum of Nature and Science
Morphosis Architects

figure 3.0 gloria marshall

Case Study #2

Gloria Marshall Elementary
SHW Group

Case Study #3

Chicago Center for Green Technology
Farr Associates

figure 4.0 chicago center for green technology

Case Study #4

Buckingham Elementary
VMDO Architects

figure 5.0 buckingham elementary

Typological Research: Case Study #1

figure 2.1 Perot Museum of Nature and Science

Perot Museum of Nature and Science

Architect	Morphosis Architects
Location	Dallas, Texas
Typology	Museum
Size	180,000 SF
Year Completed	2012
Major Project Elements	Communal Spaces Galleries Theater Cafe Merchandise Store Rock/Landscape Classroom Offices Classrooms

Typological Research: Case Study #1

1. Lobby
2. Classroom
3. Children's Museum
4. Children's Courtyard
5. Light Well
6. Auditorium
7. Temporary Gallery
8. Sports Gallery
9. Mechanical
10. Main Entry
11. Main Lobby
12. Cafe
13. Museum Store
14. Terrace
15. Ramp
16. Kitchen
17. Solar Collection
18. Skylight
19. Gallery
20. Stair
21. Atrium

figure 2.2 first floor plan

figure 2.3 section

figure 2.4 section

Starting at the top floor, a precast-concrete curvilinear vertical assemblage, suspended from the roof, alternately narrows and widens into a tornado-like whorl to embrace staircases and escalators. Nearby a poured-in-place concrete shaft contains glass elevators for those who succumb to vertigo in glancing over perforated powder-coated aluminum balustrades or by peering down 99 feet through the metal grate floor of the fourth floor bridge. The escalators only go up so visitors are encouraged to start at the top, where an 85-foot-long dinosaur's skeleton is held. Large concrete Vierendeel trusses on the floor above allow the dinosaur to have sufficient headroom. Lower down, where the cube seems to hover above the lobby level on the plinth, large V-shaped concrete columns supplement a grid of round concrete ones, and transfer girders adjust loads at the perimeter. In this light-filled space, a limpidly curving glazed wall relies on a tension-cable-supported system to stabilize its organic flow. The lobby's mesh ceiling partially conceals the concrete deck above and carries slender rods of LEDs. The

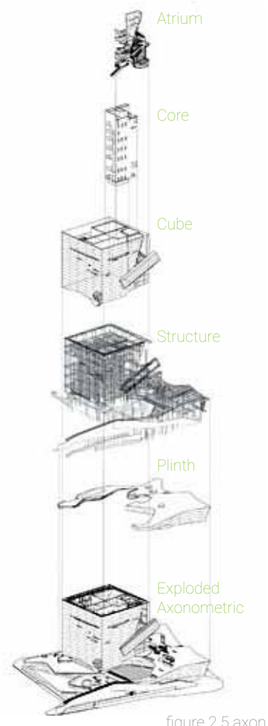


figure 2.5 axon

Typological Research: Case Study #1

figure 2.6 exterior

figure 2.7 gallery

solid mass of the building can look intimidating from the outside but the lobby floor is scaled so visitors feel comfortable in the space.

Museums provide a societal experience and cultural expression to present new ways of interpreting the world. They contain knowledge, preserve information and transmit ideas; they stimulate curiosity, raise awareness and create opportunities for exchange. As instruments of education and social change, museums have the potential to shape our understanding of ourselves and the world in which we live. From the outside the Perot museum looks windowless and seemly dark inside but when you walk into the vast lobby you are met with a floor to ceiling curtain wall. The windowless upper floors provide shelter to the 11 permanent galleries creating the elephant-like skin exterior. Classrooms and children's facilities are located on the first floor and exterior natural material courtyards placed on the 4.7 acre site surrounding the museum.

Although the museum doesn't boast their sustainable features they certainly aren't hiding them. Rainwater rolls down the slanted roof into two cisterns which recycle up to 50,000 gallons for irrigation and flushing while three solar collectors on the plinth roof help heat water. The Perot museum breaks the mold of common sustainable building facades and still provides an innovative and exciting learning experience for visitors of every age.

figure 2.8 rock garden

Typological Research: Case Study #2

figure 3.1 courtyard

Gloria Marshall Elementary

Architect	SHW Group
Location	Spring, Texas
Typology	Elementary School
Size	105,391 SF
Year Completed	2010
Major Project Elements	Communal Spaces Cafeteria Gymnasium Auditorium Garden/Outdoor Classroom Classrooms Library Music Room Computer Lab Indoor “tree house”

Typological Research: Case Study #2

figure 3.2 garden

figure 3.3 lounge

Energy efficiency and water conservation were the requests that teachers, residents and parents gave the SHW group when it came to design a new elementary school in Spring, Texas. Gloria Marshall Elementary is a high- performance school designed as a teaching tool that will educate generations of students about resource conservation. The facility received LEED Gold and was the first school in the Houston area to use geothermal heating and cooling, which is currently saving almost 50% in energy consumption. Additional green features are incorporated throughout the building to save the district in energy costs and provide learning opportunities. The SHW Group conserved natural resources and increased daylighting with their design. They provided an exemplary opportunity for the school to integrate environmental teaching tools into the building and grounds.

figure 3.4 first floor plan

1. Kitchen
2. Serving Line
3. Dining
4. Lobby/ Commons
5. Administration
6. Classrooms
7. Eco Pond
8. Gymnasium
9. Music Lab
10. Library

Although the building is mostly one rectangular mass, it shows hierarchy in the entrance gardens that look up to bright colored windows on the second story. The low butterfly garden grasses and plants relate to student scale. There are private and public groups of spaces throughout the building that can be seen in the floor plan above. The symmetry in the plan and elevations are offset by the size of spaces within the building that compliment each other to create a more interactive learning experience.

1. Computer Lab
2. Library
3. Dining
4. Lobby/ Commons
5. Resource Room

figure 3.5 east

figure 3.6 south

figure 3.7 section

Typological Research: Case Study #2

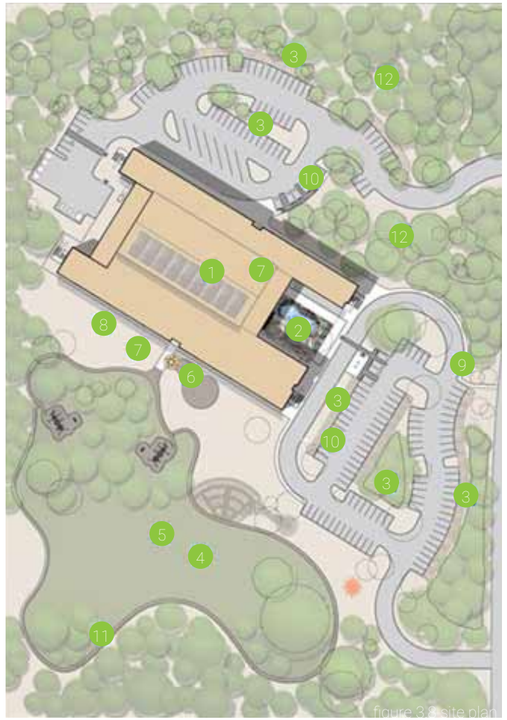


figure 3.8 site plan

Gloria Marshall is a two story rectangle to reduce the school's footprint and wall area, and to keep the concrete and steel structure simple and economical. The base of the building has a concrete block and brick facade that blends into the natural landscape, which transitions to metal panel toward the top to reduce the load on the structural system. The school to relies on daylight for much of the day so SHW Group oriented the building to take advantage of northern and southern light. The south facing classrooms have aluminum sunshades and, light shelves inside the structure that bounce and diffuse light via angled ceilings. Throughout the building, the architects blended activities with teaching opportunities. A large slide in the commons has a helix shape, the oak- planked tree house doubles as a platform for measuring the velocity of dropped objects and a series of small colored rectangular windows on the second level scatter the floor with blocks of light cast different light patterns so students can observe seasonal changes in the sun's position. To give students a glimpse into the building's operations, the architects made many of the school's features visible such as the elements in the photo to the right of the library space. Gloria Marshall even features a wind turbine and photovoltaic panels to not only power the building but to make students aware of what natural elements can do.

Students of Gloria Marshall are not only educated in the classrooms but also while walking and playing throughout the building. The curriculum is so deeply integrated in the building that students don't realize they are learning about sustainability as they constantly encounter opportunities to explore.


figure 3.9 library


figure 4.0 cafeteria

Typological Research: Case Study #3

Figure 4: Center for green technology

Center for Green Technology

Architect	Farr Associates
Location	Chicago, Illinois
Typology	Institutional
Size	32,000 SF
Year Completed	2003
Major Project Elements	Communal Spaces Resource Center Garden/Outdoor Classroom Classrooms Offices

Typological Research: Case Study #3

figure 4.2 solar panels

figure 4.3 materials

Farr Associates worked with the city of Chicago to turn an abandoned site into a teaching aid for the community and visitors. This sustainable renovation was the third LEED Platinum building in the nation and the only one in the Midwest. Developed through an integrated design process, it demonstrates a variety of innovative technologies including solar panel electrical generation, bio-swale filtered parking lot runoff, high reflectance hardscape to reduce the "urban heat island" effect, high performance insulation, low-VOC paints and sealants, a geothermal HVAC system and recycled materials. The employees of the center work with home owners, workplaces and communities to enhance the quality of urban life. They work to facilitate this through educational programming and training, research and demonstration and by acting as a reliable resource network. Located within 1/2 mile of a Metro Rail station and within 1/4 mile of two bus lines, the majority of the materials accumulated on the site was recycled or salvaged for reuse.

The facility includes bike storage, showers, and changing facilities for bicycle commuters. Recharging stations are available for electric vehicles and preferred parking for carpools. The brownfield site, which had been turned into a dumping ground for construction and demolition materials, was cleaned by the city at a cost of nine million dollars. The site includes four water storage cisterns to catch rainwater used for irrigation, reduce flow into sewers, and have a combined capacity of 12,000 gallons while native plants minimize maintenance and water needs The large green roof on a portion of the project also reduces storm water runoff and is a popular education aid.

figure 4.4 lab

figure 4.5 resource center

Typological Research: Case Study #3

figure 4.6 first floor plan

figure 4.7 second floor plan

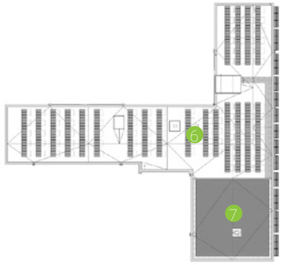


figure 4.8 roof plan

1. Lobby
2. Classroom
3. Offices
4. Gathering Room
5. Resource Center
6. Solar Panels
7. Green Roof

The building has an automation system which takes information from building thermostats, the ground loop temperature, and the peak electric demand to optimize the running of the heat pumps. The building operator has complete control of the HVAC from a PC station located in his office. There is no active or passive connection between the windows and the mechanical system. Occupants are free to open/close windows at their own discretion. The building site is a calming place to relax and learn. The three wings of the building utilize a wayfinding system that lets visitors know where they are at all times. This building is a great resource for visitors and designers that are interested in a healthy lifestyle.

figure 4.9 site

Typological Research: Case Study #4

Figure 5.1 cafeteria

Buckingham Elementary

Architect	VMDO Architects
Location	Dilwyn, Texas
Typology	Elementary School
Size	134,015 SF
Year Completed	2012
Major Project Elements	Communal Spaces Group Learning Labs Library Cafeteria Outdoor Student Gardens Classrooms Media Lab Teaching Kitchen Food Lab Scratch Bakery

"Our school has the wonderful opportunity to set an example for the community by showcasing the benefits of good nutrition and exercise. Our use of the outdoor spaces for gardening and the food lab and teaching kitchen for hands-on learning related to nutrition will provide real problem solving experiences for kids that will result in unforgettable learning."

Pennie Allen, Principal
Buckingham County Elementary

Typological Research: Case Study #4

Buckingham Elementary is LEED Gold certified and is proud of their new curriculum including using all local materials for construction and finishes. Hierarchy in this structure is centralized in clerestory windows that open up to the South facade welcoming you into the space. An additive method works in conjunction with the interior grad-based wings.

1. Administration
2. Community Meeting Room
3. Dining Commons
4. Food Lab
5. Kitchen Lab
6. Dining Terrace
7. Music
8. Art
9. Gymnasium
10. Library
11. Reading Terrace
12. Media Lab
13. Woodland Hub
14. Grade Breakout Spaces

figure 5.2 first floor plan

VMDO teamed with two public health scientists to study how health-promoting educational design strategies can support active communities and reduce incidence rates of childhood obesity. The impact of these guidelines is expected to improve schools' ability to adopt healthy programming and overall support the well-being of healthy children. By designing the school from a holistic perspective that includes the dining experience as an educational opportunity; the school cafeteria, kitchen, and servery have been reconsidered as an important educational experience while retaining the key food service functions. They took a high interest in natural daylighting and color throughout the interior and exterior of the building. Clerestory windows bring light into the center of the building and create a very open and fun learning experience.

1. Entry Courtyard
2. Naturalized Meadow Grass
3. Picnic Knoll
4. Frog Bog & Observation Deck
5. Tot Lot Natural Play Area
6. K-2 Play Terrace
7. 3-5 Play Terrace
8. Walking Paths
9. Large Playfields
10. Composting & Dirt Lab
11. Dining & Classroom Terraces
12. Edible Gardens
13. Academic Gardens
14. Pollinator Garden
15. Rain Gardens
16. Sonata Music Garden

Typological Research: Case Study #4


figure 5.4 classroom


figure 5.5 library

VMDO Architects worked corroboratively to design a learning environment that supports the whole child. Natural daylight and color palette were carefully considered and modulated to express nearby natural context and is integral to reinforcing grade-level identity, identifying colors that effect moods and learning experiences as well as promoting psychological health and wellbeing. The K-5 campus incorporates new and renovated spaces meant to inspire students and promote inquiry and exploration. Each grade level has access to two small-group learning labs that transform circulation paths into "learning streets." Child-centered learning areas, reading nooks, and breakout spaces inspire exploration through intimately scaled furniture and beautiful colors that activate thought and play while reinforcing grade-level identity within open learning spaces.

"Preventing childhood obesity and helping to educate 'food smart' children is so important in today's society...."

Todd B. Haymore
Secretary of Agriculture & Forestry

Communities are making healthy choices a priority in early education, promoting children to make healthy choices for the rest of their lives.

figure 5.6 lab


figure 5.7 buckingham elementary

Typological Research: Summary

The case studies examined earlier focused on innovative education that was influenced from the architectural setting they were taught in. The case studies examined take worth- living integrated development to the next level. The four specific case studies examined include a Museum of Nature and Science by Morphosis Architects, two progressive elementary schools respectively by the SHW Group and VMDO Architects, and Chicago's Center for Green Technology by Farr Associates. Each individual project incorporates the flexibility and adaptability required in building design, material choices and site positioning that will be explored further in this thesis project.

The case studies examined have provided the concepts and ideas that will allow for this thesis project to better incorporate the meaning of program, health, occupancy and sustainable building to a new level. My thesis typology is a mix of all the previous case study typologies and it is important to study those typologies to combine them into one smooth operation and successful interactive museum in which visitors are inspired to make change happen and influence others around them.

The Perot Museum was an important typology to study because it captured the delicate requirements for sensitive galleries as well as create a learning environment for children and families. It explored the traditional museum curriculum with natural materials and element that highlight the emphasis in nature of the museum. I did find a contrast between this museum and my thesis in the programs and groups of people my thesis wishes to target but it was still beneficial to study a working museum that has great sustainable influence.

Gloria Marshall and Buckingham Elementary schools were both very inspiring for me because of their dedication to educating the young mind with innovative educational aids that go beyond the traditional elementary programs. I was impressed by the passion the community has for sustainability and would love to live in a community that is so focused on healthy living. These case studies made an impression on me for the interior usage of circulation and spaces. I appreciated that each space has at least a dual use and allows the building to be occupied with no wasted space. Education at a young age has the power to sculpt the world influence and I can't wait to see the results these students accomplish later in their lives.

The Center for Green Technology made a statement by being the first LEED Platinum building in the Midwest and is still an exquisite landmark and baseline for sustainability support today. The way the building is surrounded by supporting landscape is a beautiful way to illustrate how nature and built environments co-exist. After studying this building typology I realize how important support is for new ideas and it gets me excited for the growth of sustainability around the world. I will continue to closely examine this support center to achieve my thesis goals and personal passions.

These case studies all provide in-depth reasons as to why a building should be sustainable, environmentally friendly and respond to the health, safety and welfare of the building users and community in which it resides. This thesis will take full advantage of the innovative ideas and recommendations provided by these case studies and provide a healthy foundation to build upon.

Major Project Elements

Exhibition

Galleries
Classrooms
Breakout Areas
Dining Hall
Social Commons
Conference Rooms
Outdoor Spaces

These consist of spaces utilized primarily by the youth student user group along with other targeted educational class occupants. These spaces are utilized primarily 8am- 4pm during the year with some use by the community outside of those hours.

Educational

Galleries
Classrooms
Breakout Areas
Social Commons
Conference Rooms
Cafe
Offices

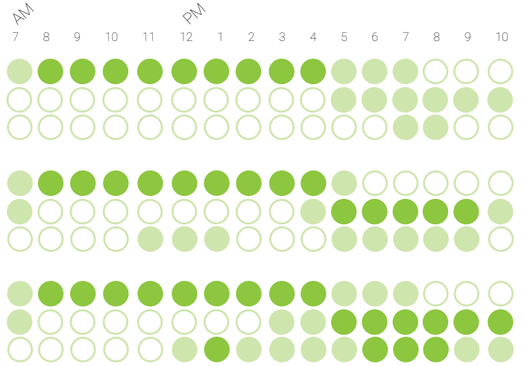
These are to be used primarily by targeted education students, educators and additional community classes. They will be primarily utilized from 5pm- 9pm throughout the year with extended hours May- August.

Community

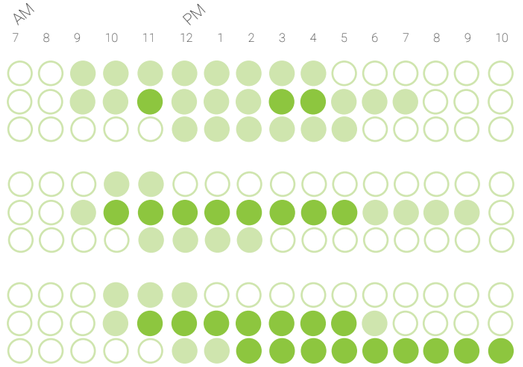
Dining Hall
Social Commons
Banquet rooms
Outdoor Spaces
Cafe

Community spaces include larger spaces for banquets and galas as well as smaller social gathering and breakout spaces. They will be occupied primarily Friday- Sunday and occasional weeknights throughout the year.

Monday- Thursday Analysis



Friday- Sunday Analysis



Not in Use
Light Use
Heavy Use

Table 1.0 usage analysis

User/ Client Description

Owner

Hennepin County

User Groups

Users of the museum will consist of students, business professionals, community members, educators, janitorial staff, administrative staff, targeted skills professionals, chefs, and facilities management supervisors. The spaces utilized by these users will overlap and be mutually used. Parking is located on surrounding streets for all user groups.

Youth Students

The main audience for the museum will be grades 9-12 student classrooms from surrounding schools that come to experience the activities inside the museum. Adults will also benefit and learn from activities and surrounding architectural components. They will utilize the building mainly between 8am- 4pm. They have full access to the exhibits, classrooms and community space throughout the entire year.

Targeted Students

Classes and workshops will be available for youth and adults who have a desire to learn more about sustainability through LEED and professional settings that can help individuals and businesses save money and create a healthier experience for themselves, employees and clients. They have access to classrooms and community space throughout the entire year with targeted programs held during the evenings and weekends.

Community

The facility will also be an ideal setting for large gatherings for educational and recreational purposes throughout the year such as gala and wedding events. These larger events will have access to community spaces and be primarily used Friday- Sunday.

Site Information: Macro

Region

Located in the Great Lakes Region, Minnesota is located in the upper Midwest of the United States. Minnesota is bordered by North and South Dakota to the west, Iowa to the south, Canada to the north and Wisconsin to the east.

City

Minneapolis is the 14th largest metropolitan area in the United States, containing approximately 3.8 million residents. Minneapolis lies on both banks of the Mississippi River, just north of the river's confluence with the Minnesota River, and adjoins Saint Paul, the state's capital. The city is abundantly rich in water, with twenty lakes and wetlands, the Mississippi River, creeks and waterfalls. It was once the world's flour milling capital and a hub for timber, and today is the primary business center between Chicago and Seattle,

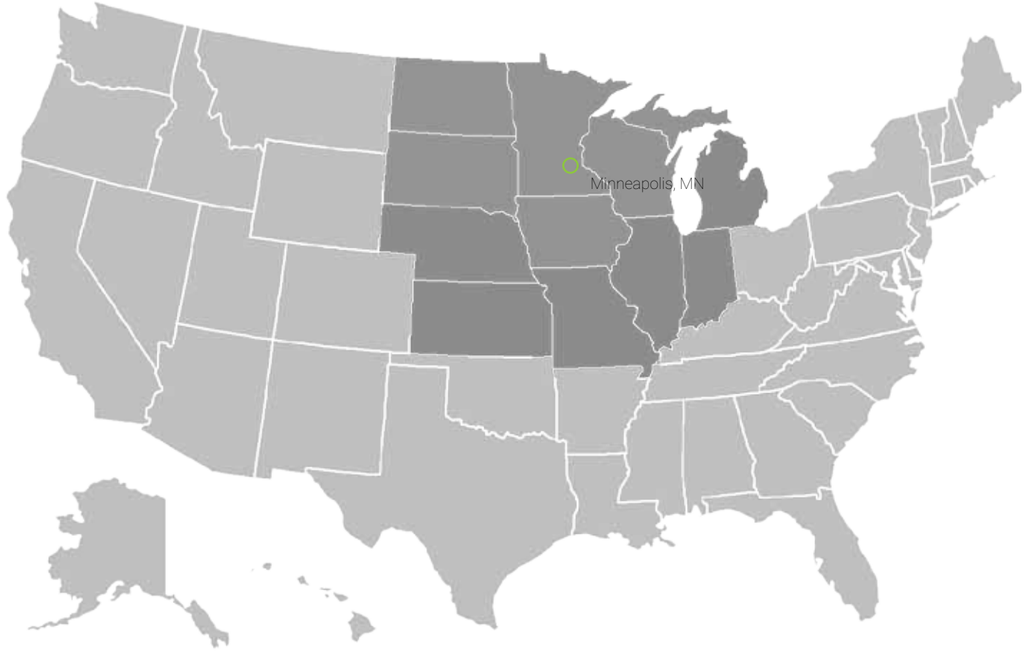


figure 6.0 region

Site Information: Micro

Address

Hennepin Island
Minneapolis, MN
55414

Neighborhood

Industrial District

Site Area

271,950 sq. ft. (6.25 acres)

Boundaries

Hennepin Island is bordered on three sides by the Mississippi River and Hydroelectric plant to the Northwest. Currently the site does not get any pedestrian or vehicle traffic.

Current Zoning

Limited Industrial

Proposed Zoning

Institutional

Importance

figure 7.0 mill city ruins

The proximity to the Mississippi River, downtown residence and activities makes this site an ideal place for interactive learning. St. Anthony Falls, the Stone Arch Bridge, Mill City Museum and many other rich Historic Landmarks aid in the experience for a place that teaches sustainability through interactive lessons that make an impact on residents, visitors and educators. Located within the Mississippi National River and Recreation Area, this site has the opportunity to bring more pedestrian traffic into the St. Paul area and continue the highly sought after activity of the Minneapolis area across the river.

Site Information: Micro

figure 8.0 site


figure 8.1 site

figure 8.2 landmark

figure 8.3 site

Top photos showcase the East Bank, Minneapolis skyline and Hydroelectric plant in the background. Views face Northwest, surrounded by the Mississippi River. The site is densely vegetated and will be minimally disturbed with design. A footbridge connects the island with Hennepin Father Bluffs. A photo of the canal is on the left separating the island from East Bank. During the winter the water completely freezes in this area.

Site Information: Micro

Site location was chosen for multiple surrounding historical landmarks and educational developments. The Stone Arch Bridge in the photo to the right is located 100 feet from the South bank of the Island. Mill City museum is to the Southwest behind the bridge and the Minneapolis Hydroelectric plant is Northwest of the site and will serve as an interactive aid located off site. The Mississippi River and St. Anthony falls will also serve as interactive aids.

figure 8.4 landmark

figure 8.5 landmark

figure 8.6 landmark

Site Information: Views

The area north of the site is the hydroelectric plant and vehicle access road. The primary energy source for the museum will come from the existing plant because of its proximity to the site and sustainable practices. The existing access road will remain for vehicle and pedestrian access to the entrance to the museum. Visitors will be encouraged to approach the museum from the East but are welcome to enter from the North if there are accessibility concerns. To the East of the site are multiple walking paths that curve around the site and natural formations along the river. These paths are currently populated by residents, tourists and also very popular for photos. The path in the photo to the right leads directly up to the site and will be the main entrance point to the museum. Metered parking is located on the streets above the bluffs and will be the main source for visitors to the museum.


figure 8.7 North


figure 8.8 East

Site Information: Views

figure 8.9 South

figure 9.0 West

The site in entirety is located South of the existing hydroelectric plant owned by Xcel energy. It is currently a turn-a-round for service vehicles from the plant. There is a tower on the very Southern tip of the island which can be seen from any side of the Mississippi River. This can help visitors find the site easily and will serve as an educational aid for the museum. The dirt area that will become the museum is currently unowned. On the west of the site is scrap materials that would be disposed of properly to highlight the additional views across the Mississippi River. Views to the West of the site include the Guthrie, St. Anthony Falls and the Minneapolis skyline. All existing trees and grasses will be preserved as much as possible and will be replaced if removed. The construction of the site will be as least invasive as possible and will focus on maintaining the habitats of natural vegetation and wildlife.

Project Emphasis

This thesis seeks to explore the relationship that architecture has on the ability to engage all members of a community in lifelong learning through the use of sustainable architecture in interactive educational spaces. The project will focus on creating spaces that recognize the importance of select sustainable practices that will engage and inspire individuals to make healthy choices. Emphasis will be placed on understanding the benefits of sustainability, ease of implementing these choices, student interactive learning and community connectivity.

Thesis Project Goals

Academic

My thesis project will be a comprehensive design that I am passionate about and is an accurate representation of my skills as a student, designer and professional. I look forward to receiving my masters degree and continuing to learn through professional experience.

Professional

My short term goals will be to work for a firm that promotes sustainability and provides experience that will help prepare me to take the ARE licensing tests. I want to establish a relationship with this firm that will give me motivation to keep pursuing more skills and knowledge throughout my career. From that relationship I wish to establish a specialized understanding of sustainable practices and eventually work directly with LEED and other organizations to promote and encourage all individuals to get excited about making healthy choices.

Personal

I am excited to design a program that is a part of me and my passions. This project allows me to explore and discover what matters to me most as a designer. I will indulge myself in research and exploration throughout the entire design process and will not forget how grateful I am to have the opportunity to explore my passions. Many of my personal goals are integrated with my academic and professional ones because they are all centered around what I am passionate about. I will use this project to discover additional academic, professional and personal goals that I will continue to pursue throughout my architectural career.

Plan for Proceeding

Research Direction

Research for this thesis project will be performed throughout the entire thesis process. Research will be more extensive early on in order to gain greater understanding of the project typology, historical context, proposed theoretical ideas, program requirements and site analysis. Resources to be used include books, periodicals, online journals, case studies of existing buildings and interviews with local residents and professionals.

Design Methodology

Research and design processes will include active and passive interaction with the site, city of Minneapolis, community members, archival and city resources. The process of analyzing, Interpreting, and reporting of results will occur throughout the research and will be presented through text and graphics. All quantitative and qualitative data will be integrated into the project on weekly basis.

Design Documentation

All quantitative and qualitative data will be integrated into the project on daily basis and all work will be scanned and documented to the proper place on my personal computer for easy access. Documentation will be made available for others through the institutional repository.

figure 10.0 mill ruins park

Plan for Proceeding

Task	Days	Completion
Project Documentation	119	5.11.2015
Context Analysis	21	2.02.2015
Conceptual Analysis	14	2.02.2015
Spatial Analysis	7	2.09.2015
ECS Analysis	28	3.09.2015
Context Development	14	3.09.2015
Structural Development	7	3.02.2015
Digital Model Development	84	4.22.2015
Floor Plan Development	21	3.02.2015
Envelope Development	14	3.11.2015
Material Development	7	3.11.2015
Midterm Reviews	7	3.13.2015
Project Revision	21	4.22.2015
Rendering	14	4.15.2014
Presentation Layout	7	4.22.2015
Board CDs	3	4.23.2015
Plotting	7	4.24.2015
Model Building	14	4.26.2015
Exhibit Installation	3	4.27.2015
Thesis Exhibit	20	5.15.2015
Final Thesis Reviews	8	5.07.2015
Final Thesis Documentation Due	1	5.11.2015
Commencement	1	5.16.2015

Weekly Schedule

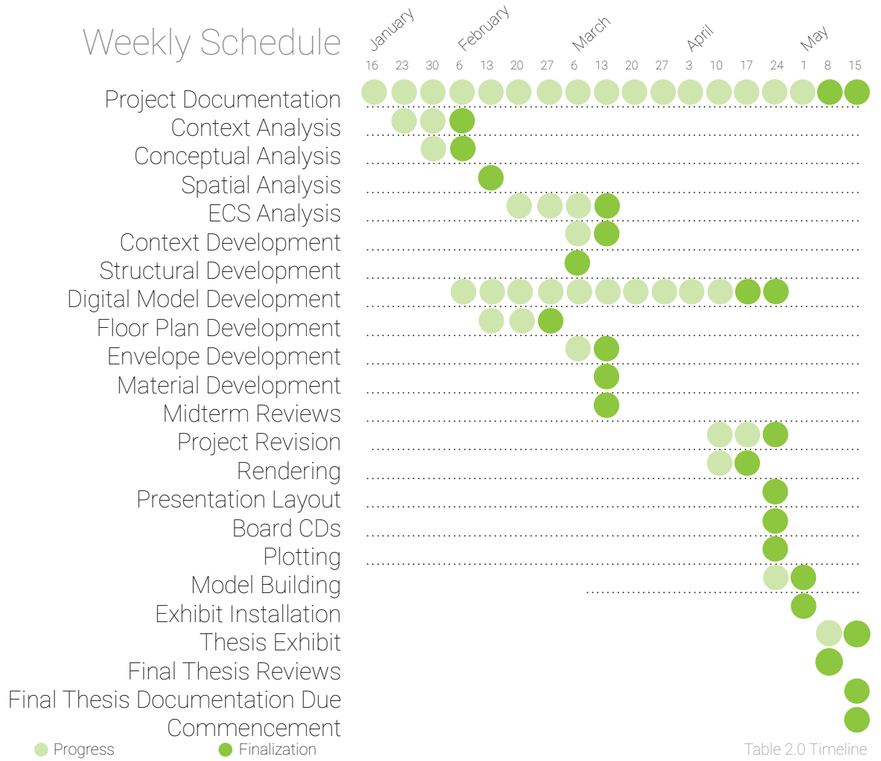


Table 2.0 Timeline

figure 11.0 south mississippi

Program

Unifying Idea Research

The goal of this thesis project is to examine the impact that sustainable architecture has on individuals and the choices they make because of their interactions. This thesis seeks to understand the physical and social impact of sustainability in terms of experience and learning. Research will be conducted to understand how worth- living integrated development impacts healthy choices in both the built and intellectual environments.

Power of Choice

The average amount of conscious decisions an adult makes each day equals about 35,000. In contrast, young children only make about 3,000 decisions each day. According to research from Cornell in 2012 about brain capacity, they found that people make an average of 226.7 decisions about food alone. Of the 400 billion bits of information per second that reach the brain, only 2,000 bits are utilized and make us aware of our surroundings. Based on this are impulsive and logic thinking, where more complex decisions are made. The study goes on to discuss the conscious designs we make that are learned, observed and discovered.

Every individual experiences things in different ways and develops their own way of strategizing. Decisions and thoughts get grouped into general ideas such as normal, progressive and taboo. Through society we are brought up to think and act a certain way but if given the choice would we really do things the way we do them? The Cornell discussion talks about a social template that we follow and the positive repercussions that follow when we don't. Being a positive instigator in our own lives leads to happiness and a higher standard of living.

Having the power to make our own decisions and using it are two separate actions. Søren Kierkegaard, a 19th century philosopher, proposed that each individual, not society or religion, is solely responsible for giving meaning to life and living it passionately and sincerely. These extentialism beliefs confirm that individuals are solely responsible for our environment and can provide outcomes that we choose. Most people regard having choices as a good thing, though a severely limited or artificially restricted choice can lead to discomfort with choosing and possibly an unsatisfactory outcome. In contrast, a choice with excessively numerous options may lead to confusion, regret of the alternatives not taken and indifference in an unstructured existence. As a society we crave support of our decisions and that often leads to falling into step with other individual's choices to avoid negative outcome of branching out on our own.

Healthy decision making is a planned process in order to solve a problem or set a goal. Healthy decision making allows individuals to feel empowered, realize their goals and change unhealthy habits. While this thesis program caters to both youth and adult students, it takes both groups to reflect off one another to make a societal change. While some youth may exhibit problem solving abilities that are comparable to adults, their brains are not as developed in the areas of regulating impulsivity and stress. Given that adolescence is a time of great change and development, stress in their lives is inherent.

Unifying Idea Research

The ability of youth to make healthy decisions often plays a role in risk-taking behavior. Because youth are more likely to engage in risk- taking behavior than adults (due to their brain development and the social environment) the ability to develop healthy decision making habits during this time becomes very important. While youth are more at- risk for making unhealthy decisions, adults have had more time to solidify their routines and can be harder to adjust to new choices. Learning to make healthy decisions sometimes means individuals need to unlearn previous unhealthy decision making habits.

figure 12.0 relearn

Making the Change

There are many opportunities for individuals to practice decision making in their everyday lives. Practicing decision making in context of specific goals helps gain the self- confidence to take control of their new routines. Using sustainable architecture as a healthy first choice in design, it sets the atmosphere to cater towards additional healthy choices made in and out of the museum. Each individual has the power to make their own decisions and feel good about them. This thesis reflects worth-living choices in both the research and design processes. From the beginning, a choice was made to research successful case studies that reflect sustainable design to achieve a new standard of design that influences anyone who interacts with the design. Design choices are reflected from the city's history and desire to preserve it. Once the design process for this thesis begins, an integrated team of community members, residents and design professionals will identify the need for a program that will engage visitors and learners. A new standard towards worth- living integrated development starts now.

At the Greenbuild North Dakota 2014 conference. It focused on sustainability in schools and making a change throughout the community. At first the elementary schools started practicing more sustainable practices throughout their daily routine such as turning off the lights, recycling and basic information about healthier choices. These students then went home and started doing these things at their homes. When other people in the household did things the 'old' way, the students showed them what they had learned in class. After a few years these select communities are now more involved in healthy choices and are encouraging more education about it in schools. This is coming from a community that has voiced their opinions about sustainability as 'a waste of time.' Changing a routine will receive some resistance but in these cases presented at the conference are proof how it only takes one individual to make a larger change in a community . It will be interesting to look at these communities again in a few years and look at how many other communities they have inspired.

Another part of the process for change is to share and celebrate results. The North Dakota State University U.S. Green Building Council students organization has increased awareness for sustainability by displaying the names of students who have passed their LEED Green Associate degree. A plaque is mounted in the lobby of the Architecture building that intrigues visitors and students. Having a program that encourages healthy change doesn't do any good if no one knows about it. Sharing results also creates a support system that gets more individuals involved.

Unifying Idea Research

To subconsciously get individuals thinking about healthy habits will rely heavily on the design of the museum. The progression through the spaces and materials chosen throughout the design will guide visitors to experience sustainability subconsciously at first, then it will become part of their conscious thoughts over time. Long term students especially will have more time to experience the design and the struggle will be to influence visitors that frequent less often, even just in a single visit. Having interior spaces that feel like they are exterior is especially important in our Midwest climate. The winters are a tough time to promote exterior historical and sustainable landmark visits so having interior spaces that showcase these features will be a constant reminder. Interior spaces like the one in the photo below are important because they integrate everyday tasks and activities with healthy accents that also add to the materiality and diverse materiality of a space to make it unique.

"Design is thinking made visual."

-Saul Bass

picture 12 | mill towns park

Experiencing Change

As stated earlier in the narrative, the act of learning is a continuous process. It is one of the crucial life skills that we never stop practicing. Therefore, It is important to engage visitors with every sense to fully emerge them in an experience. To understand the basic theory of sensory experience I researched the study of empiricism and found new information on sensory experience that will be further implemented into the design portion of the my final thesis design.

Empiricism is a theory which states that knowledge comes only or primarily from sensory experience. Empiricism emphasizes the role of experience and evidence, especially sensory experience in the formation of ideas, over the notion of innate ideas or traditions. Empiricism also believes that in order to make a change you must experience with all your senses to relearn relations of previous sense experiences. Empiricism in the philosophy of science emphasizes evidence, especially as discovered in experiments. It is a fundamental part of the scientific method that all hypotheses and theories must be tested against observations of the natural world rather than resting solely on a priori reasoning, intuition, or revelation. Empiricism, often used by natural scientists, asserts that "knowledge is based on experience," and that "knowledge is tentative and probabilistic, subject to continued revision and falsification."One of the epistemological tenets is that sensory experience creates knowledge. The scientific method, including experiments and validated measurement tools, guides empirical research. This theory ties together up my unifying idea that the physical

Unifying Idea Research

environment can indeed influence our intellectual experiences. Architectural design is an important part of the learning process and I will be sure to engage all senses throughout the program and design aspects of this thesis.

Below is a photo of a sensory experience in Hamburg Germany where a group of architecture students from NDSU received the opportunity to experience itself without using our sight. This technique will be used on a smaller scale to heighten senses that are weaker than ones we rely on most.

figure 12.2 senses

Using the Empiricism strategy of verifying results, a great way to test the hypothesis of sustainable architecture influencing healthy choices is to participate in a green rating system such as LEED; leadership in energy and environment design. The LEED system not only predicts and measures the design process but also evaluates how well spaces function after the building has been occupied. I have completed a LEED rating scorecard to identify goals to be reached throughout the design process and reached a projected rating of the highest award, platinum.

LEED 2009 for New Construction and Major Renovations

Project Checklist

Interactive Museum for Sustainability

2015

Y	?	N			
23			**Sustainable Sites**	**Possible Points:**	**26**
Y			Prereq 1	Construction Activity Pollution Prevention	
1			Credit 1	Site Selection	1
5			Credit 2	Development Density and Community Connectivity	5
		x	Credit 3	Brownfield Redevelopment	1
6			Credit 4.1	Alternative Transportation—Public Transportation Access	6
1			Credit 4.2	Alternative Transportation—Bicycle Storage and Changing Rooms	1
1			Credit 4.3	Alternative Transportation—Low-Emitting and Fuel-Efficient Vehicles	3
2			Credit 4.4	Alternative Transportation—Parking Capacity	2
1			Credit 5.1	Site Development—Protect or Restore Habitat	1
1			Credit 5.2	Site Development—Maximize Open Space	1
1			Credit 6.1	Stormwater Design—Quantity Control	1
1			Credit 6.2	Stormwater Design—Quality Control	1
1			Credit 7.1	Heat Island Effect—Non-roof	1
1			Credit 7.2	Heat Island Effect—Roof	1
1			Credit 8	Light Pollution Reduction	1
10			**Water Efficiency**	**Possible Points:**	**10**
Y			Prereq 1	Water Use Reduction—20% Reduction	
4			Credit 1	Water Efficient Landscaping	2 to 4
2			Credit 2	Innovative Wastewater Technologies	2
4			Credit 3	Water Use Reduction	2 to 4
30			**Energy and Atmosphere**	**Possible Points:**	**35**
Y			Prereq 1	Fundamental Commissioning of Building Energy Systems	
Y			Prereq 2	Minimum Energy Performance	
Y			Prereq 3	Fundamental Refrigerant Management	
15			Credit 1	Optimize Energy Performance	1 to 19
6			Credit 2	On-Site Renewable Energy	1 to 7
2			Credit 3	Enhanced Commissioning	2
2			Credit 4	Enhanced Refrigerant Management	2
3			Credit 5	Measurement and Verification	3
2			Credit 6	Green Power	2
10			**Materials and Resources**	**Possible Points:**	**14**
Y			Prereq 1	Storage and Collection of Recyclables	
		x	Credit 1.1	Building Reuse—Maintain Existing Walls, Floors, and Roof	1 to 3
		x	Credit 1.2	Building Reuse—Maintain 50% of Interior Non-Structural Elements	1
2			Credit 2	Construction Waste Management	1 to 2
2			Credit 3	Materials Reuse	1 to 2

Y	?	N			
			Materials and Resources, Continued		
2			Credit 4	Recycled Content	1 to 2
2			Credit 5	Regional Materials	1 to 2
1			Credit 6	Rapidly Renewable Materials	1
1			Credit 7	Certified Wood	1
15			**Indoor Environmental Quality**	**Possible Points:**	**15**
Y			Prereq 1	Minimum Indoor Air Quality Performance	
Y			Prereq 2	Environmental Tobacco Smoke (ETS) Control	
1			Credit 1	Outdoor Air Delivery Monitoring	1
1			Credit 2	Increased Ventilation	1
1			Credit 3.1	Construction IAQ Management Plan—During Construction	1
1			Credit 3.2	Construction IAQ Management Plan—Before Occupancy	1
1			Credit 4.1	Low-Emitting Materials—Adhesives and Sealants	1
1			Credit 4.2	Low-Emitting Materials—Paints and Coatings	1
1			Credit 4.3	Low-Emitting Materials—Flooring Systems	1
1			Credit 4.4	Low-Emitting Materials—Composite Wood and Agrifiber Products	1
1			Credit 5	Indoor Chemical and Pollutant Source Control	1
1			Credit 6.1	Controllability of Systems—Lighting	1
1			Credit 6.2	Controllability of Systems—Thermal Comfort	1
1			Credit 7.1	Thermal Comfort—Design	1
1			Credit 7.2	Thermal Comfort—Verification	1
1			Credit 8.1	Daylight and Views—Daylight	1
1			Credit 8.2	Daylight and Views—Views	1
3			**Innovation and Design Process**	**Possible Points:**	**6**
1			Credit 1.1	Innovation in Design: Specific Title	1
1			Credit 1.2	Innovation in Design: Specific Title	1
1			Credit 1.3	Innovation in Design: Specific Title	1
		x	Credit 1.4	Innovation in Design: Specific Title	1
		x	Credit 1.5	Innovation in Design: Specific Title	1
		x	Credit 2	LEED Accredited Professional	1
4			**Regional Priority Credits**	**Possible Points:**	**4**
1			Credit 1.1	Regional Priority: Specific Credit	1
1			Credit 1.2	Regional Priority: Specific Credit	1
1			Credit 1.3	Regional Priority: Specific Credit	1
1			Credit 1.4	Regional Priority: Specific Credit	1
95			**Total**	**Possible Points:**	**110**

Certified 40 to 49 points Silver 50 to 59 points Gold 60 to 79 points Platinum 80 to 110

figure 12.3 leed scorecard

Unifying Idea Research: Summary

The following summary will first examine the above research and apply it specifically to this thesis, followed by the importance of sharing and celebrating results, the last steps in making a change.

Through the above research, as well as continued research throughout the design process, an understanding of the impact that sustainable architecture has on individuals and ideas of a community is achieved. The previous research examines the physical and social impact of sustainability in terms of experience and learning. In pursuit of this understanding, the research revealed three distinct areas: a background on how decision making is influenced by society and the process of relearning, the psychological impact of making a change, as well as what it means to be sustainable in both a physical and intellectual manner. A record high 71 percent of Americans consider the environment when they shop, up from 66 percent in 2008. 7 percent consider the environment every time they shop while 20 percent consider it regularly. Even as thinking "green" is increasingly at the forefront of consumers' minds, Americans still struggle with their role in the life cycle of products with an environmental benefit. Nine in 10 respondents say they believe it's their responsibility to properly use and dispose of these products and are showing an inclination to learn more. Americans report they regularly read and follow instructions on how to properly use or dispose of a product. Some 41 percent said they perform additional research to determine how best to utilize and discard a product for maximum benefit. Nearly all respondents want companies to educate them on how to properly use and dispose of products. But they identify significant barriers to doing so. Almost 71 percent of consumers wish companies would do a better job helping them understand environmental terms. Although this was conducted with products, it shows there is a want to learn more about healthy choices. The classroom portion of the museum program would include classes that benefit users of products as well as classes for retailers that will increase awareness right on the packaging of products as well as classes for retailers that will increase awareness right on the packaging of a product as well as save the company money by using other sustainable practices throughout their manufacturing and waste management.

The design of the building will also include recycled and local materials so visitors can experience what happens to their products when they recycle and reuse. This is also a category in the LEED rating system that was completed in above research. Each category was researched and points were awarded on how many areas of specific healthy decisions were made toward the project design. This is an exciting system to use throughout the design process. It starts with preliminary thinking to create an innovative and collaborative design that holds the best experience for anyone involved in the design process and users of the building.

After construction of the building the rating system will continue to monitor and examine results that come with occupancy. The educational programs will also be examined to make sure they are creating awareness and progress throughout the community. Sharing results is an important way to receive peer feedback and to cater to the users of the program. Celebration of success is the last step in making a change and this thesis will continue to explore the desire to keep learning.

Project Justification

Importance

Our Society

An average of 300 jobs related to sustainability are available in the Minneapolis metropolitan area each day. The City of Minneapolis prides itself in being a leader in developing efficient and sustainable practices. They encourage everyone from residents, businesses and institutions to take action and protect the opportunity, equity, and our environment now and for future generations. The location and specialized subject of my thesis will encourage pedestrians across the Mississippi River to explore innovative ideas and bring them further along the richly historic path into the St. Paul area. Historic flour mills along the river bank are being developed into mixed use residencies that will help St. Paul turn its previously industrial feel into learning, caring and growing communities.

Individual

I am constantly researching new projects, developments and efforts that drive me to become more passionate about sustainability. I want to improve my lifestyle as well as raise awareness in my community and beyond. My thesis is just the beginning of ideas that I look forward to sharing with others. I will continue to be inspired and proud of my thesis throughout my professional career.

Application

Extensive research was completed throughout my thesis to create a polished project that is an excellent example of the quality work I am capable of producing. Healthy design is becoming a standard for innovative companies and I look forward to participating in those movements. I am a great candidate for these firms because of my passion and will to continuously learn and evolve traditional design strategies.

Historical Context

Minneapolis is the largest city by population in the state of Minnesota and the county seat of Hennepin County. The origin and growth of the city was spurred by the proximity of Fort Snelling, the first major United States military presence in the area, and by its location on Saint Anthony Falls, which provided power for saw and flour mills.

Fort Snelling was established in 1819 at the confluence of the Mississippi and Minnesota Rivers. When land became available for settlement, two towns were founded on either side of the falls: Saint Anthony, on the east side, and Minneapolis, on the west. Early development focused on sawmills, but flour mills eventually became the dominant industry. This industrial development fueled the development of railroads and banks. Through innovations in milling techniques, Minneapolis became a world leader of flour production, earning its name "Mill City".

In 1680, French explorer Daniel Greysolon explored the Minnesota area on a mission to extend French dominance over the area. While exploring the St. Croix River area, he got word that some other explorers had been held captive. He arranged for their release. The prisoners included Michel Aco, Antoine Auguelle and Father Louis Hennepin, a Catholic priest and missionary. On that expedition, Father Hennepin explored the falls and named them after his patron saint, Anthony of Padua. He published a book in 1683 entitled Description of Louisiana, describing the area to interested Europeans. As time went on, he developed a tendency to exaggerate. describing the falls as having a drop of fifty or sixty feet, when they really only had a drop of about 16 feet.

figure 13.0 st anthony falls

The Hennepin Avenue Bridge, a suspension bridge that was the first bridge built over the full width of the Mississippi River, was built in 1854 and dedicated on January 23, 1855. The bridge had a span of 620 feet and roadway of 17 feet. The toll was five cents for pedestrians and twenty-five cents for horse drawn wagons. The early settlers of Minnesota were anxiously seeking railroad transportation but insufficient capital was available after the Panic of 1857. Rails were finally built in Minnesota in 1862, when the St. Paul and Pacific Railroad built its first ten miles of track from the Phalen Creek area in St. Paul to a stop just short of St. Anthony Falls. The railroad continued to grow across the Iowa border and met up with the McGregor & Western line. This connection gave Minneapolis rail service to Milwaukee, Wisconsin, with through service beginning on October 14, 1867. During this time, St. Anthony, on the east side, was separate from Minneapolis, on the west side. As a result of inferior management of the water power, St. Anthony found its manufacturing district declining. Some people and organizations started to talk about merging the two cities. A citizens' committee recommended merging the two cities in 1866, but a vote on this issue was rejected in 1867. Minneapolis incorporated as a city in 1867 and found itself competing with St. Paul, which had a larger population, head of Mississippi and more access to railroads.

Historical Context

Business & Industry

St. Anthony Falls

1848- 1887	Minneapolis led the nation in sawmilling
1867	Vote to merge Minneapolis and St. Anthony declined
Oct. 4, 1869	Tunnel under Hennepin and Nicollet Island collapsed
April 9, 1872	St Anthony and Minneapolis merged
May 2, 1878	Washburn "A" Mill exploded; destroyed 1/3 capacity of the milling district
1880- 1930	Minneapolis led the nation in flour production
1882	First U.S. hydroelectric power plant built on the falls on Upton Island
1883	Stone arch bridge opened to provide material transport to and from mills
1884	Rehabilitation of St. Anthony falls completed
1884	Minneapolis surpassed Budapest as the world's leading flour miller
1906	Hennepin Island Hydroelectric Plant construction began
1915- 1916	flour production peak; 20,443,000 US dry barrels annually
1930	Mills gradually began shutting down
1950	Construction of dam locks began
1963	Locks completed; Mississippi river navigable above the falls
1965	Last 2 mills shut down, Washburn "A" Mill and the Pillsbury "a" Mill
1969	Partial collapse of the falls leads to concrete reinforcement
1994	Stone Arch bridge opened to pedestrian traffic
2008	Xcel collaborated with U of M, created new outdoor steamlab
Today	hydroelectric plant is the only industrial draw on the falls' power proposed second hydro plant to be built on opposite bank of the Mississippi next to the Stone Arch Bridge

table 3.0 historic timeline

Population

From about 200,000 in the 1900 Census, Minneapolis soared to its highest population recorded in 1950 of over 521,000 people. The main growth of the city was in part due to an organized private streetcar system. With 140 million passengers by 1920, the streetcars ran down important roads extending from the Downtown Minneapolis AREA. Neighborhood residential development out of the core mostly dates around the turn of the century as a result of this system. This growth also allowed Minneapolis to annex land from neighboring villages and townships which subsequently pushed the incorporation of today's inner ring suburbs.

Year	Population	Change
1860	5,809	—
1870	13,066	124.9%
1880	46,887	258.8%
1890	164,738	251.4%
1900	202,718	23.1%
1910	301,408	48.7%
1920	380,582	26.3%
1930	464,356	22.0%
1940	492,370	6.0%
1950	521,718	6.0%
1960	482,872	7.4%
1970	434,400	10.0%
1980	370,951	14.6%
1990	368,383	0.7%
2000	382,618	3.9%
2010	382,578	0.0%

table 3.1 population

Physical Context

During the Great Depression, buildings suffered from a lack of maintenance. A decade later, downtown and surrounding areas would be reshaped radically by urban renewal and freeway construction. After World War II, businesses and residents started moving to the suburbs, and downtown Minneapolis, along with downtowns across the nation, was perceived as dying. Urban planners, such as Le Corbusier, were advocating radically rebuilding downtowns by complete rebuilding and forcing out manufacturing and warehousing. The Federal Housing Act of 1949 provided funding for clearing blighted areas, and city officials interpreted the definition of "blighted" liberally. The Federal Aid Highway Act of 1956 provided funding for an interstate highway system, which would also transform Minneapolis. The Gateway district, centered around the intersection of Hennepin and Nicollet Avenues just west of the Mississippi River, was the major casualty of urban renewal. The neighborhood had become known as a slum with cheap hotels and flop houses. In 1955 when General Mills announced they were moving their corporate headquarters to Golden Valley, city planners decided to implement a large-scale Gateway district plan that included demolishing a large number of buildings. Between 1957 and 1965, one- third of downtown Minneapolis had been leveled.

Reshaping Minneapolis

While the destruction of the Gateway district left a large gap in downtown Minneapolis, other developments would reshape it and transform the skyline. One of these developments was the building of the Nicollet Mall.

Historical Context: Physical

Previously known as Nicollet Avenue, the portion within the central business became a tree lined mall for pedestrians and transit. The mall forms a linear park with trees, fountains and a farmers' market in the summer. It also boosted the city's retail trade.

The most dramatic change to the skyline came in 1974, when the IDS Center was opened. At a height of 775 feet when built, it dwarfed the previous highest building, the Foshay Tower. The Hubert H. Humphrey Metrodome, opened in 1982 and demolished in 2014, served as the home of the Minnesota Vikings and previously hosted the Minnesota Twins and the Minnesota Golden Gophers football team. The site is now being reconstructed as the new Vikings Stadium. In the 1990s, the last wave of downtown development filled in parcels around the skyscrapers with 40 story towers.

As industry and railroads left the Mississippi riverfront, people gradually became aware that the riverfront could be a destination for living, working, and shopping. The Minneapolis Park and Recreation developed properties with trails

figure 13.1 minneapolis skyline

and parkways. This spurred the development of private land adjacent to the riverfront, creating the new Mill District neighborhood. The Stone Arch Bridge was opened to pedestrian traffic in 1994, creating a link in the trail system and providing spectacular views of St. Anthony Falls. Old commercial buildings were adapted to new uses. The Whitney Hotel was built in what used to be the Standard Mill, while the North Star Lofts was a new use for the former North Star Woolen Mills building.

Urban archeology along the riverfront has uncovered remnants of the flour mills built in the 1860s and 1870s, along with the tailrace canal that once supplied water to the mills and the trestle supports for the Minnesota Eastern Railroad. These ruins, which had once been buried with gravel and fill, are now open to the public as Mill Ruins Park. The park has signs interpreting the history of the area and the buildings that had once been there. The Washburn "A" Mill, severely damaged by a 1991 fire but now stabilized, now hosts the Mill City Museum, opened in 2003 by the Minnesota Historical Society. The museum presents a history of flour milling and industrial development along the river and an eight story elevator ride shows the various steps that turned wheat into flour. The Guthrie Theater also moved to a new building along the riverfront in 2006, just southeast of Mill City Museum. Light rail made its debut in Minneapolis with the opening of the Blue Line on June 26, 2004. The system starts in downtown Minneapolis and progresses southeastward along Minnesota State Highway 55 (also known as Hiawatha Avenue), passes Minnehaha Park on the west side, and serves the Minneapolis– Saint Paul International Airport before its termination at the Mall of America in Bloomington. In 2014, service began on the Green Line which connects downtown with the University of Minnesota and downtown St. Paul.

Historical Context: Cultural

Cultural Context

Minneapolis' cultural organizations draw creative people and audiences to the city for theater, visual art, writing and music. The community's diverse population also continues to manage a long tradition of charitable support through progressive public social programs and volunteering, as well as through private and corporate philanthropy.

Philanthropy and charitable giving are part of the community. More than 40% of adults in the Minneapolis– Saint Paul area give time to volunteer work, the highest such percentage of any large metropolitan area in the United States. Catholic Charities is one of the largest providers of social services locally while the American Refugee Committee helps one million refugees and displaced persons in ten countries in Africa, the Balkans and Asia each year. The oldest foundation in Minnesota, the Minneapolis Foundation invests and administers over nine hundred charitable funds and connects donors to nonprofit organizations. The metropolitan area gives 13% of its total charitable donations to the arts and culture.

figure 13.2 minneapolis library

The Hennepin County Library system began to operate the city's public libraries in 2008. The Minneapolis Public Library, founded by T. B. Walker in 1885, faced a severe budget shortfall for 2007, and was forced to temporarily close three of its neighborhood libraries. The new downtown Central Library designed by César Pelli opened in 2006. At recent count 1,696,453 items in the system are used annually and the library answers over 500,000 research and fact finding questions each year.

Minneapolis Public Schools enroll 36,370 students in public primary and secondary schools. The district administers about 100 public schools including 45 elementary schools, seven middle schools, seven high schools, eight special education schools, eight alternative schools, 19 contract alternative schools and five charter schools. Students speak 90 different languages at home and most school communications are printed in English, Hmong, Spanish, and Somali. About 44% of students in the Minneapolis Public School system graduate, which ranks Minneapolis the 6th worst out of the nation's 50 largest cities. Besides public schools, the city is home to more than 20 private schools and academies and about 20 additional charter schools.

In contrast to the staggering low graduate levels, Minneapolis is America's third-most literate city. Minneapolis was the city in which Open Book, the largest literary and book arts center in the U.S., was founded. The Center consists of the Loft Literary Center, the Minnesota Center for Book Arts and Milkweed Editions. The Center exhibits and teaches both contemporary art and traditional crafts of writing, paper making, letterpress printing and bookbinding. With the addition of alternative education programs, graduation levels can rise to be another thing Minneapolis has to offer.

Historical Context: Cultural

The Minneapolis park system has been called the best designed, best financed and best maintained in America. Foresight, donations and effort by community leaders enabled Horace Cleveland to create his finest landscape architecture, preserving geographical landmarks and linking them with boulevards and parkways. The city's Chain of Lakes, consisting of seven lakes and Minnehaha Creek, is connected by bike, running, and walking paths and used for swimming, fishing, picnics, boating, and ice skating. A parkway for cars, a bikeway for riders and a walkway for pedestrians runs parallel along the 52 mile route of the Grand Rounds Scenic Byway. Today, 16.6% of the city is parks with 770 square feet of parkland for each resident, ranked in 2008 as the most parkland per resident within cities of similar population densities. In its 2013 ParkScore ranking, The Trust for Public Land reported that Minneapolis had the best park system among the 50 most populous U.S. cities. The organizers of Earth Day even scored Minneapolis ninth best overall and second among mid- sized cities in their 2007 Urban Environment Report, a study based on indicators of environmental health and their effect on people. The park systems play a large part in connecting resources for education and experience in my thesis project.

figure 13.3 riverfront parkway

Historical Context: Social

Social Context

In addition to providing outstanding examples of how urban growth has helped transform ecosystems both local and distant, the Twin Cities offer compelling examples of how society has drawn upon nature to initiate and sustain urban growth, as well as how social values have guided urbanites as they have built and rearranged the world around them. The following are projects that use the history of Minneapolis to create a fun learning experience while preserving its background.

A- Mill Artist Lofts
Oct. 2015

The combination of restoring Pillsbury's largest flour mill and converting it into affordable housing units makes this a great residential example of historic reuse along the riverfront. It is a part of the growing developments that are helping to pull residents and visitors over to the East bank of the Mississippi.

figure 13.4 'a' mill lofts

Historical Context: Social

Mill City Museum
2003

Owned and run by the Minnesota Historical Society in Minneapolis, the museum is built in the ruins of the Washburn "A" Mill next to Mill Ruins Park on the banks of the Mississippi River. The museum focuses on the founding and growth of Minneapolis, especially flour milling and the other industries that used water power from Saint Anthony Falls. The photo to the right is taken from the top observation space at the Guthrie Theatre. It looks out over the Mill City museum and Mississippi river.

figure 13.5 mill city museum

North Star Lofts
1997

Located on the West bank on the corner from the Mill City Museum, the North Star Lofts is definitely an identifiable building in the historic Mill District. It used to serve as a wool blanket factory before the decline of the mills. Its tower sign is a signature in the neighborhood which brings attention to the building's upper end properties and modern interior spaces. Ceilings are as high as 24 feet and the Stone Arch Bridge is located just beneath the structure. Window space is ample for looking out over the neighborhood, the skyline and nearby Mississippi River.


figure 13.6 north star lofts

Historical Context: Demographics

Demographics

Dakota Sioux were the region's sole residents until French explorers arrived around 1680. Nearby Fort Snelling, built in 1819 by the United States Army, spurred growth in the area. The United States government pressed the Mdewakanton band of the Dakota to sell their land, allowing people arriving from the east to settle there. New settlers arrived during the 1850s and 1860s in Minneapolis from New England, New York, and Canada and during the mid-1860s, immigrants from Finland and Scandinavians began to call the city home. Migrant workers from Mexico and Latin America also interspersed. Later, immigrants came from Germany, Italy, Greece, Poland and Southern and Eastern Europe. These immigrants tended to settle in the Northeast neighborhood, which still retains an ethnic flavor and is particularly known for its Polish community. Jewish individuals from Russia and Eastern Europe began arriving in the 1880s and settled primarily on the north side of the city before moving in large numbers to the western suburbs in the 1950s and 1960s. Asians came from China, the Philippines, Japan and Korea. Two groups came for a short while during U.S. government relocations: Japanese during the 1940s and Native Americans during the 1950s. From 1970 onward, Asians arrived from Vietnam, Laos, Cambodia and Thailand. Beginning in the 1990s, a large Latino population arrived, along with immigrants from the Horn of Africa, especially Somalia. The metropolitan area is an immigrant gateway which had a 127% increase in foreign- born residents between 1990 and 2000. Today, White Americans make up about three- fifths of Minneapolis's population. This community is predominantly of German and Scandinavian descent.

Historical Context: Demographics

In education, 15.0% of African American and 13.0% of Hispanics hold bachelor's degrees compared to 42.0% of the Caucasian population. The standard of living is on the rise, with incomes among the highest in the Midwest, but median household income among minorities is below that of Caucasians by over $17,000. Regionally, home ownership among minority residents is half that of Caucasians though Asian home ownership has doubled. In 2000, the poverty rate for Caucasians was 4.2%; for African Americans it was 26.2%; for Asians, 19.1%; Native Americans, 23.2%; and Hispanics, 18.1%.

Racial Composition	1950	1970	1990	2010
Caucasian	98.4%	93.6%	78.4%	63.8%
African American	1.3%	4.4%	13%	18.6%
Hispanic or Latino	na	.9%	2.1%	10.5%
Asian	.2%	.4%	4.3%	5.6%
Other Race	na	na	na	5.6%
2+ Races	na	na	na	4.4%

table 3.2 demographics

Historical Context: Summary

Although the sawmills and the flour mills are long gone, Minneapolis remains a regional destination. The city's efforts to revitalize the riverfront, which now hosts expansive parkland, the Mill City Museum and the Guthrie Theater is a major attraction throughout the city and directly surrounding my thesis site. Residents and visitors of Minneapolis are aware that the riverfront is a destination for living, working and entertainment, and adding an interactive museum that focuses on the nature that surrounds it is an excellent addition to the parkway paths. The Minneapolis park system is praised by multiple organizations across America, and an innovative museum promoting healthy choices is just what it's missing. The park system paths and museum would work off each other, each arousing awareness for the other. Although the design does not add to the skyline, it would be the first of its kind and add to the existing rich culture Minneapolis already has. Healthy transportation surrounds the site with the light rail, metro transit system and a bike station only three block form the entrance to the museum. New communities are developing just across the street from the site just waiting for family friendly entertainment to cross the Mississippi to the east bank. Citizens have a unique and powerful influence in neighborhood government and if they knew about this project they would consider it to benefit cultural, social and intellectual development. Providing a fun learning environment for all ages will encourage education and raise the graduation and literacy levels. AN interactive museum highlighting sustainability and healthy choices would be an excellent addition to Minneapolis culture while highlighting the rich historical background that the site is emerged in.

Site Analysis: Narrative

The site is one of the most important elements of this thesis to establish connections in the program with the residents, visitors and culture of the area. This thesis program caters to the people of the surrounding area and provides a beautiful backdrop for the physical building.

Throughout the site research it became apparent how much the building and site will reflect off each other and compliment what the other has to offer. I was immediately struck with an overwhelming desire to spend more time in these neighborhoods around the riverfront the moment I entered the vicinity. People were everywhere laughing, talking, eating, relaxing and enjoying the environment around them. The history in the old buildings makes you think back to when the mills were running at their peak with the not so distant train whistles in the background. So much has changed since then and I am eager to provide a new amenity to benefit the growing community while still preserving the character of an old era. Light, wind, water, distress and character are the most present features that greet you first. Walking the existing parkway paths that lead directly to the site are filled with texture and sensory materials that will be incorporated into the physical design. The heavy presence of human activity above the paths become non-existent once you descend down the first few steps towards the lower trail pathway. Vegetation surrounds you in vibrant colors that each has their own character yet blend together in a blanket wrapping around you. Distress is visible yet blends into its surroundings. No physical paths have been made besides the first wooden steps and a small footbridge that crosses a trickle of water that fills to a rushing pool in spring. The paths you walk along are made from the constant steps people take through this natural riverfront area. Research was conducted of the surrounding landscape and analyzed in comparison to the specific site in order to recreate the imagery in the physical design of the museum. The following research goes in depth with each element that affects the site and makes it a unique area to showcase the benefits of making healthy choices and the education of sustainable practices.

The most prominent research that is related to all sections is the vegetation. The trees, shrubs and land are factors in most of the key data discovered. Light, precipitation, shade and wind are all effected by the thick vegetation surrounding the site. The information collected is for the Minneapolis area and has been altered to approximate how it effects the site specifically.

figure 140 minneapolis skyline

Site Analysis

The Approach

1. Begin your journey by reading plaques along the parkway that inform about landmarks and historical events that happened in the area.

2. From SE Main St., follow the paved path towards the lower river walk.

3. Worn wooden steps lead down the steepest part of the parkway as you submerge yourself in nature.

4. The path turns to beaten earth as you view other people enjoying the paths lining the riverfront.

5. Breathe in the sights and sounds as you stroll across the footbridge.

6. You are lifted above a trickling brook of clean water from the Xcel hydroelectric plant that flows out into the Mississippi.

7. Standing at the entrance to the site, look back at the beautiful path you traveled on to reach your destination.

figure 14.2 paths 2

figure 14.1 plaque 1

figure 14.3 steps 3

figure 14.4 paths 4

figure 14.6 creek 6

figure 14.5 footbridge 5

figure 14.7 entry 7

Site Analysis

Views

The site is completely surrounded by vegetation but if you peer over the tops of the bushes you can see the Minneapolis skyline through the brush. The Guthrie Theatre is framed by the colorful vegetation in the photograph to the right. The photograph on the bottom shows a small clearing on the South side of the site that gives you a view of the Stone Arch Bridge and all the pedestrians interacting and viewing the sight above the flowing Mississippi River.

The panoramas on the opposite page spread showcase the visibility of the site from the Stone Arch Bridge. The paths along the riverfront are hidden but it is a great opportunity for the museum to be visible by the active community surrounding the site. The vast amount of vegetation is also an added benefit for sun shading and privacy.

figure 14.8 guthrie

figure 14.9 stone arch brdige

figure 15.0 panorama

figure 15.1 panorama

Site Analysis

North

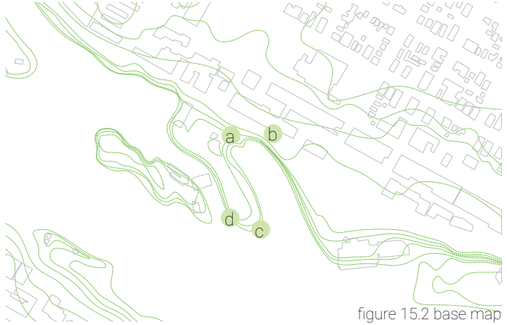


figure 15.2 base map

figure 15.3 north a

East

figure 15.4 east b

South

figure 15.5 south c

West

figure 15.6 west d

Site Analysis

Character

Although the riverfront parkways are beautiful in themselves, the architecture and destruction over time add to the beauty as a backdrop. Behind all the vegetation and growth are pieces of structure left and deteriorated over time. Besides the old flour mills that line the streets there are rails and foundation left from the old railroad tracks. The photograph to the right is a remnant of the tracks and retaining wall that used to hold dry storage from the mills. At the top right of the photo you will see a door that is no longer accessible but once had a purpose and is a constant reminder of the history of the Minneapolis area. There is graffiti in few places around the site but not enough to be distracting from the true beauty of the natural elements. The graffiti only adds color and texture into an already intricate environment.

figure 15.7 character

Human Characteristics

The site currently serves as a utility vehicle turn- around point and is not utilizable by regular traffic. The paths surrounding the site however are filled with visitors that come to the area to work, play and relax. Walking throughout the paths, people are relaxing, playing and gathering. There were also multiple wedding photos taken throughout the riverfront.

figure 15.8 turn around

figure 15.9 park

Site Analysis

Vegetation

The site is submerged in vegetation of different textures, heights and colors. When you approach the site you can't even see it until you are five feet away. The photo to the right is taken from the expected entrance of the museum looking back at the path that would guide visitors there. The Pillsbury 'a' mill that is being renovated into lofts is in the background.

figure 16.1 entry

figure 16.0 tree canopy

The Minneapolis Park and Recreation board surveyed the city and created a map of where tree canopy expansion could occur. Currently, Hennepin island is at 10% coverage and has the capability to expand to 20%. The neighborhood to the east has an opportunity for 10% coverage while on the west bank, has an expectance of 5%, Although 5% doesn't seem like much, every tree adds texture, color and variation to the community.

Distress

When the snow melts in the Spring and the Mississippi River level rises, these muddy crevices become filled with running water but fallen trees and branches block a smooth path into the Mississippi. During the Fall and Summer they dry up and barely hold water. The photo on the bottom is run off from the busy streets above the paths. In the design portion of this thesis I will explore options to aid these areas surrounding the site.

figure 16.2 water runoff

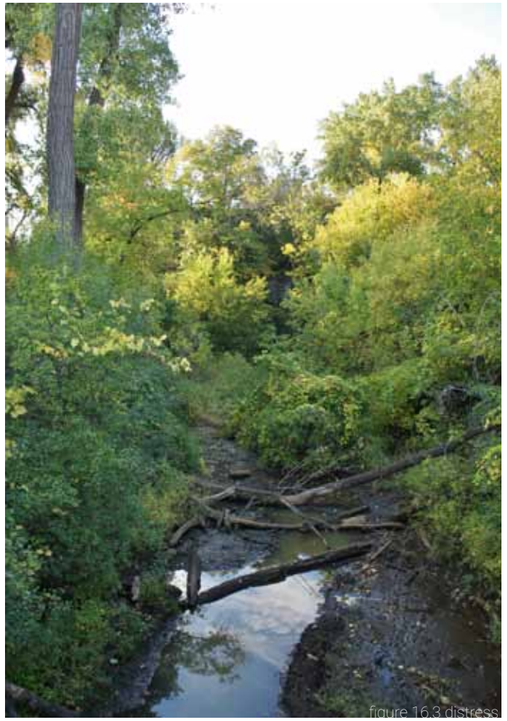


figure 16.3 distress

Site Analysis

Traffic

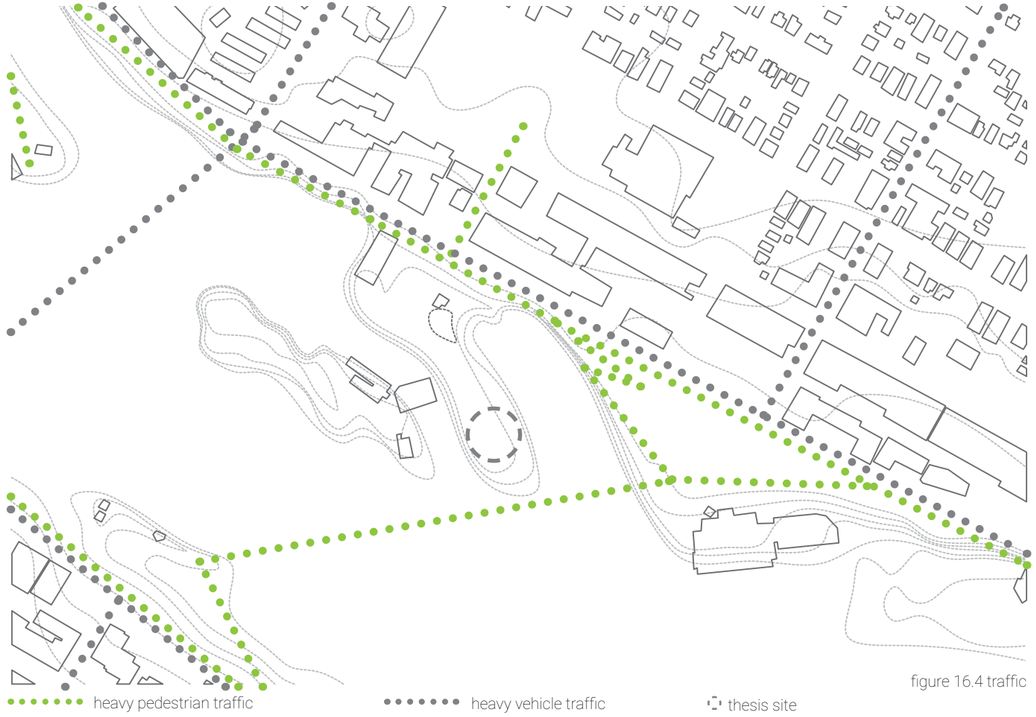


figure 16.4 traffic

Public Transportation

Located three blocks from two different bus routes, four blocks from a bike sharing station and 100 feet from the historical trolly cars, the site is centrally located in a web of public transportation. The two main bus routes are a seven minute bus ride into the heart of Minneapolis while 150 different bike stations are located from Robbinsdale to the St. Paul airport. Bus stops are located every block within three blocks of the site, spanning 6 blocks apart in a 30 minute walk radius away from the site. Other transportation spotted along the parkway streets and paved paths are horse drawn carriages and segways. Bike racks litter the streets and add color to the streets with the bikes locked there. The site is extremely accessible by multiple modes of transportation and will be a great asset to the program.

figure 16.5 bike share

figure 16.6 trolley

Site Analysis

Building Use

figure 16.7 building use

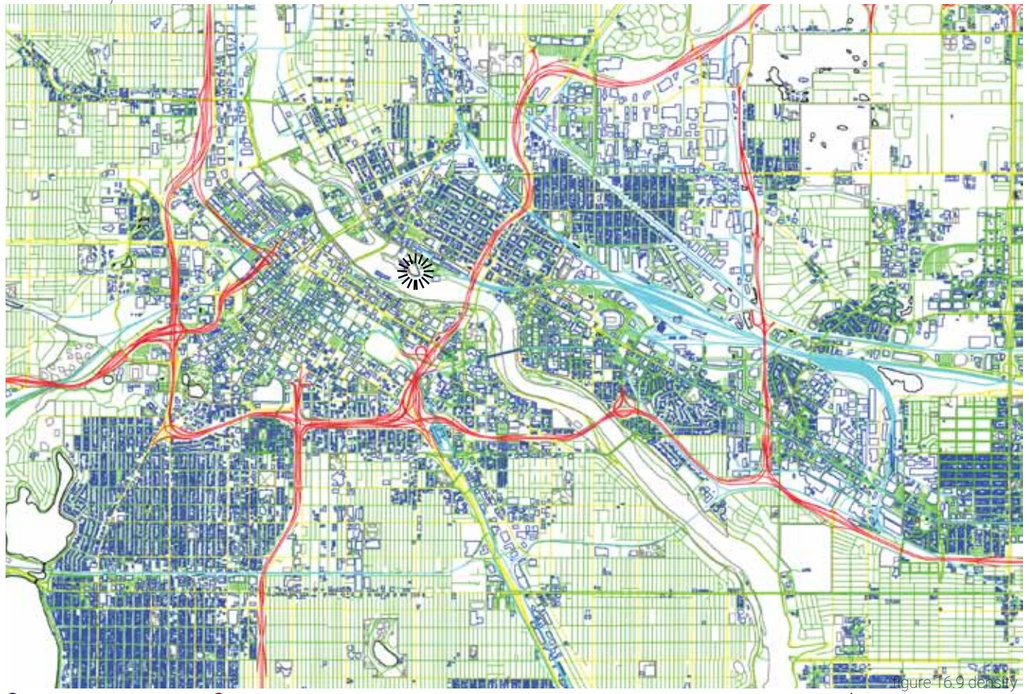
Utilities

The site currently does not have power utilities running to the site but large power towers are located above ground on the south edge of the site. During the construction phase of project development, lines would be connected to these utilities and buried underground into the building. The biggest energy source is the hydroelectric plant only 300 feet to the northeast. Solar energy will also be utilized as well as water treatment gardens to reduce wastewater into the city system.

figure 16.8 utilities

Site Analysis

Density



densely populated
major roadways
arterial roads
streets
railways
thesis site

figure 16.9 density

Noise

positive noise
negative noise
thesis site

figure 17.0 noise

Site Analysis

Built Features

The Stone Arch bridge is one of the main attractions that is adjacent to the site. It is a special built feature because its current purpose is different that its original one. Both bridges in these photos were originally built to connect rail lines that brought mill supplies in and out of the city. There purposes have changed but they still remind users of their original use and the success they brought the area. The Stone Arch Bridge also provides a beautiful place to observe the Minneapolis skyline and as you can see in the photo, provide for gorgeous wedding photographs. The bridge in the bottom photo is Merriam Street Bridge that spans the east channel of the Mississippi River between Nicollet Island and the east bank of the Mississippi. The truss is purely decorative; the bridge is supported by a beam from underneath.

figure 17.1 skyline

figure 17.2 merriam

figure 17.3 guthrie

As mentioned previously, the Guthrie Theatre is a popular site to visit not only because its shows but also because of the breathtaking views from any of the lookout platforms. The photo to the right shows construction on the Pillsbury 'A' mill that is being renovated for affordable housing lofts. The incorporation of the old mills into artist lofts help keep the culture and history connected in an ever changing society.

figure 17.4 pillsbury

Site Analysis

Community

Throughout the riverfront paths there are a multitude of plaques and information areas that educate visitors about the history and current landmarks in the area. Each one has different information and are placed about a mile apart. There are three total along the East bank with information about the growth of the Mississippi, neighborhoods and of course mill production.

Whether the people milling around the parkway are residents or visitors it is clear this is an important park in the community. All research conducted about the parkway has confirmed the location for my thesis and I look forward to creating design that highlights the park features as well as creates a beautiful entrance towards the museum that promotes the nature growing around it.

figure 17.5 information

SE Main Street is the main artery along the riverfront parkway system. It is populated with an old theater and many restaurants that boast patio seating. While strolling around the area there were many more people walking and biking than driving. This is a growing community that has construction sites littered around developed areas but it is part of the process of turning a previously commercial zoning district into a thriving mixed use one.


figure 17.7 se main st


figure 17.6 bike


figure 17.8 community

Site Analysis

Topography

thesis site

figure 17.9 topography

Soils

The most abundant soil region in Minneapolis and St. Paul is Mollisol with surrounding regions of Entisol.

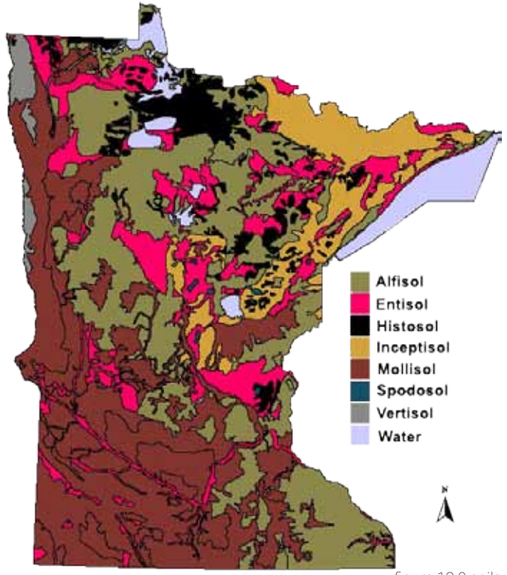


figure 18.0 soils

Bedrock

Minneapolis is distinguished by its bedrock valleys, both active and buried. At the surface, the entire region is Moraine terrain. North of the metropolitan area is the Anoka Sandplain, a flat area of sandy outwash from the last ice age.

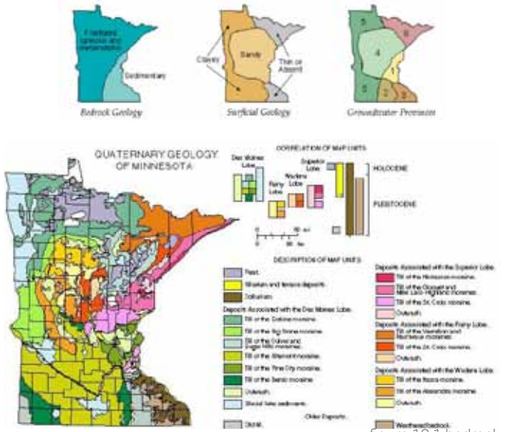


figure 18.1 bedrock

Site Analysis

Water

In Minnesota, the water table is generally close to the land surface, typically within 0- 30 feet in much of the state. Much of Minneapolis was originally wetlands, so the issue crops up throughout the city. Tim Cowdery, a hydro geologist at the U.S. Geological Survey, explains that the chain of lakes and creek represent an old river valley about as big as the current Mississippi River Valley that runs through downtown.

Those most prominent body of water along the site is the Mississippi river. The Minneapolis area is in the headwaters region of the river, 493 miles from the source to Saint Anthony Falls. Saint Anthony Falls is the only true waterfall on the entire Mississippi River. The water elevation continues to drop steeply as it passes through the gorge carved by the waterfall.

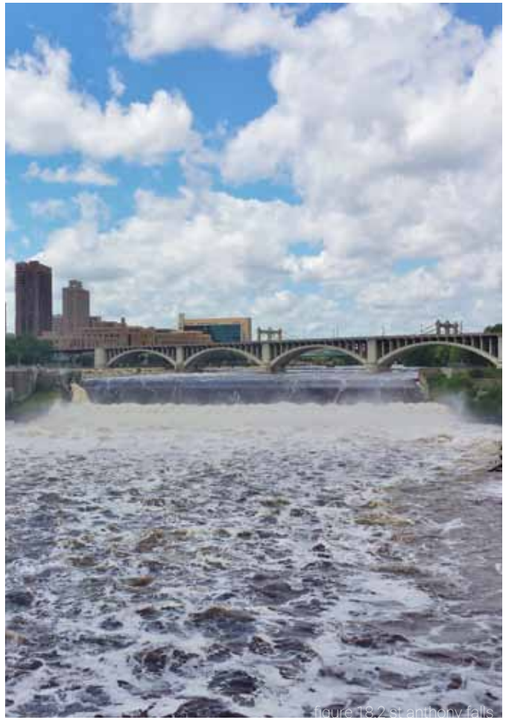


figure 18.2 St anthony falls

Precipitation

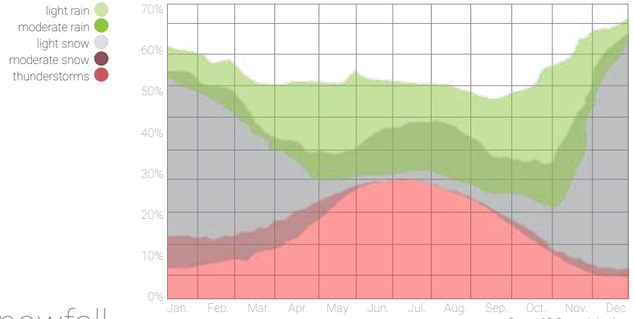


figure 18.3 percipitation

Snowfall

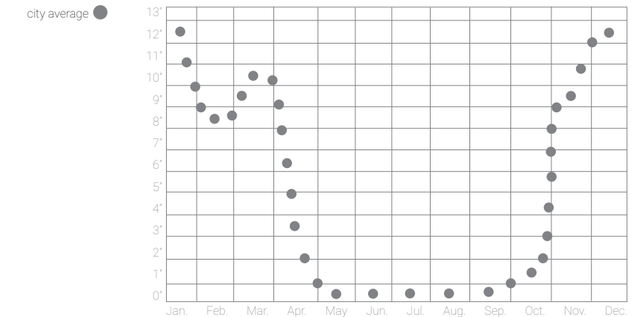


figure 18.4 snowfall

Site Analysis

Temperature

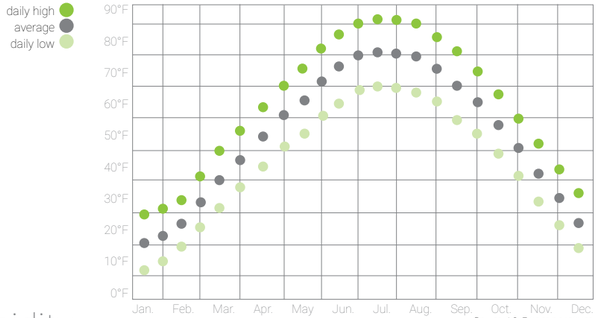


figure 18.5 temperature

Humidity

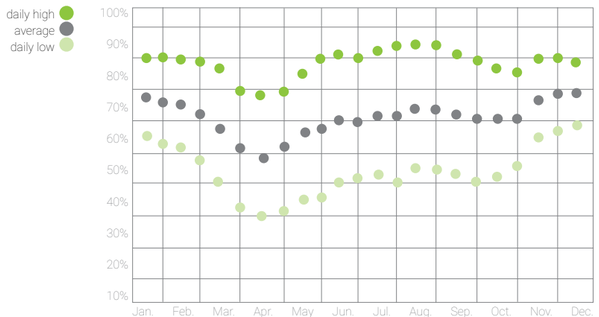


figure 18.6 humidity

Sunshine

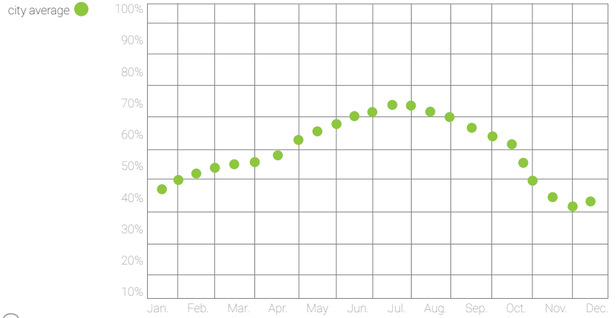


figure 18.7 sunshine

Cloud Cover

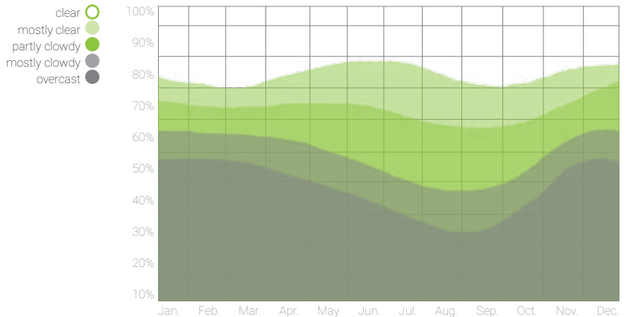


figure 18.8 cloud cover

Site Analysis

Sun Path

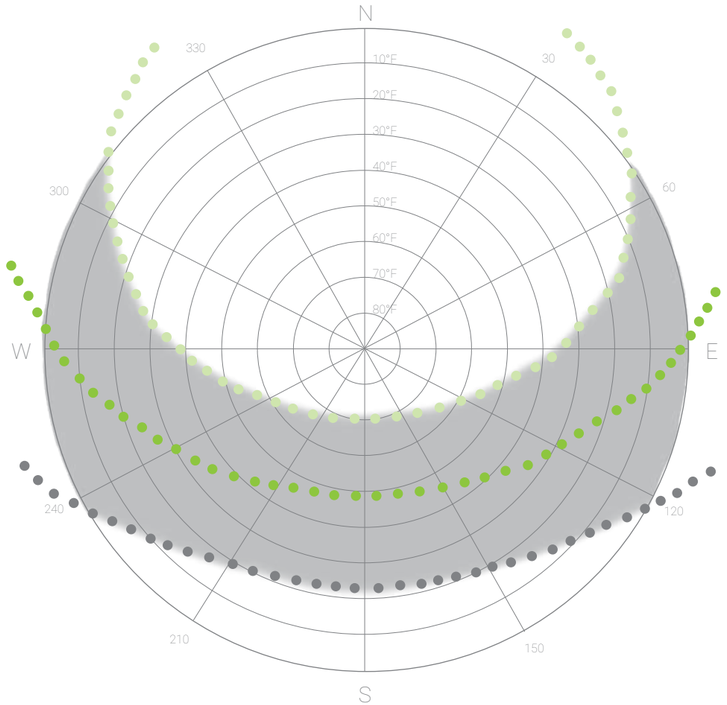


figure 18.9 sun path

Light Quality and Shading

The tree canopy covering the riverfront parkway paths is a great natural shading system that last through every season. In the warmer months the trees have full foliage and provide refuge from the sun. These are also the months where rain is the heaviest and the canopy also serves as an umbrella. In the colder months where more light is wanted, the foliage falls and finally in the winter opens the area up to allow maximum sunlight through its bare branches. In contrast to the park area along the riverfront, my specific thesis site is perimetered by short to medium brush that doesn't canopy over the ground like the foliage to the east. Once a physical structure is in the site the shorter brush and trees will shade the first floor but leave anything above that open to the elements. The roof especially would be a great opportunity to use solar panel or a green roof to protect heat gain and loss from entering the building structure.

The biggest shadows cast over the site other than smaller shadows from vegetation are two large towers for electricity that loom over the site. Although utilities are usually not considered an amenity to a site, these towers carry the power made from the hydroelectric plant and are yet another learning aid surrounding the site. Their shadow is cast from the northeast to the southwest corners but does not provide much shade because of their minimal structure.

The final physical building design will attempt to mimic these strategies with sun shading, orientation and placement within the site.

Site Analysis

Wind Direction

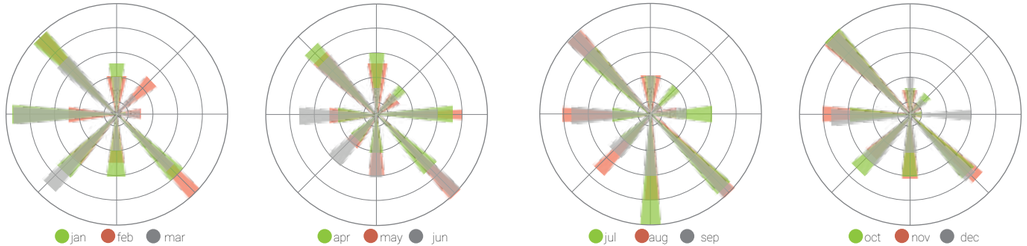


figure 19.0 wind direction

Wind Speed

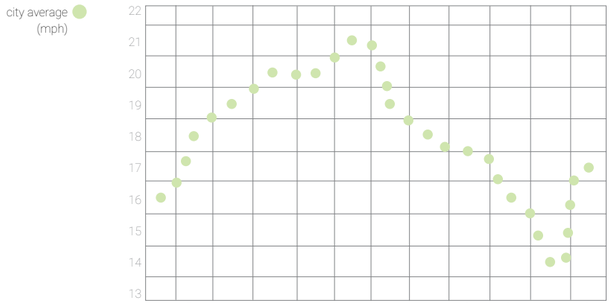


figure 19.1 wind speed

Air Movement

figure 19.2 air movement

Building Program

Public Spaces

- Administration
  - reception
- Exhibition
  - galleries
  - breakout Areas
- Cafeteria
  - seating
  - servery
  - kitchen
  - storage
- Social Commons
  - breakout spaces
- Media Center
  - technology lab
  - storage
- Restrooms
  - 1/ 50 occupants
  - shower/ locker stalls
- Parking
  - street parking
- Community Garden

Private Spaces

- Administration
  - record storage
- Offices
  - shared Faculty spaces (4)
  - volunteer shared spaces (2)
- General Classrooms
  - divided among areas of study (3)
  - conference room
- Media Center
  - technology lab
  - storage
- Parking
  - 3 spaces/ 1,000sf of gallery
- Green Roof
- Mechanical/Electrical
- Custodial

		Maximum Occupancy
Exhibition		
Galleries	2,000sf	55
Breakout Areas	100sf	4
Green Roof	1,970sf	50
Educational		
Classrooms	1,330sf	80
Breakout Areas	160sf	8
Conference Room	190sf	12
Offices	590sf	14
Media Center	340sf	9
Mechanical/ Electrical	100sf	n/a
Community		
Dining Hall	700sf	30
Social Commons	800sf	15
Administration	50sf	2
Restrooms	600sf	14

Gross Total SF: 9,148sf

Maximum Building Occupancy: 293

Building Program: Interaction Matrix

table 4.0 matrix

Building Program: Interaction Net

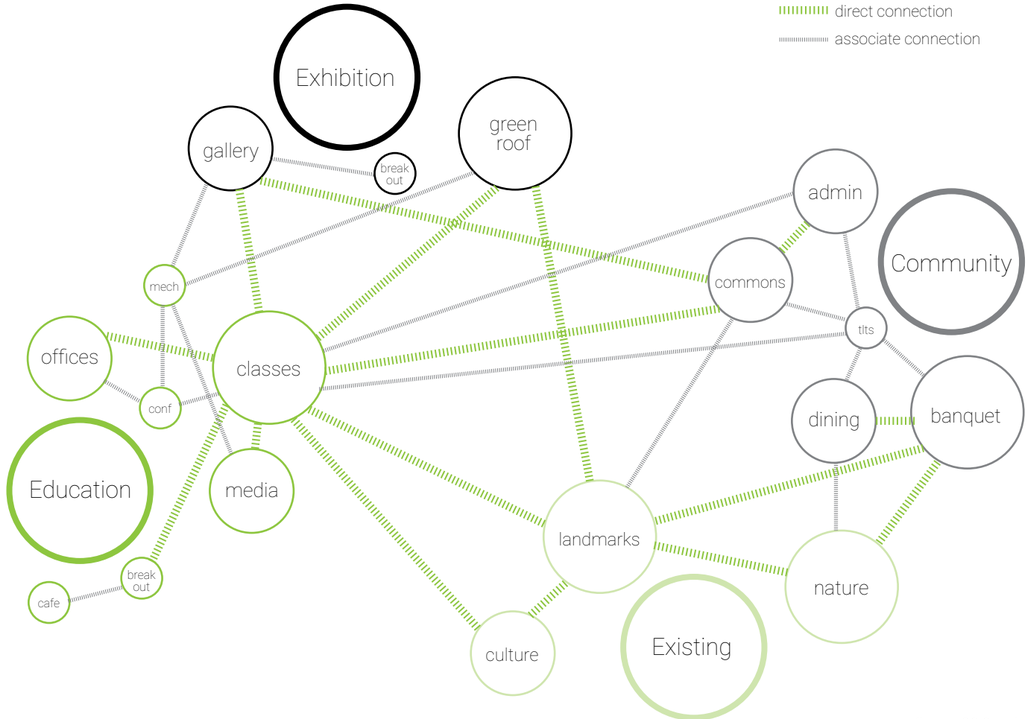


figure 20.0 web

Building Program: Environmental Data

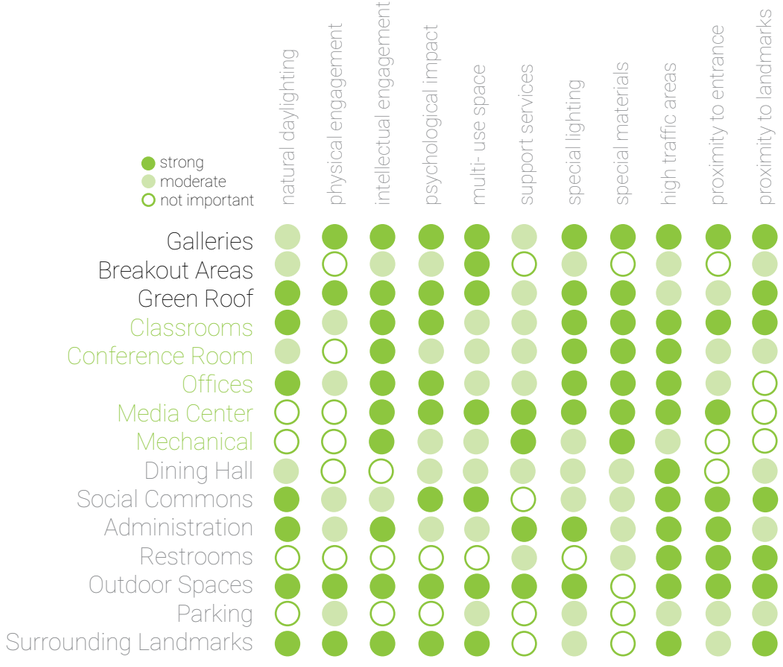


table 4.1 data

Building Program: Cost Analysis

Life- Cycle Strategies:

alternative energy

Natural Daylighting- existing resource
Thermal Comfort Controls
Hydroelectric energy- existing resource
Fiber Soil Parking
Rain Water Collection
Reduced Building Footprint
Living Machine- water recycle and reuse

Construction Cost:

based on average museum construction cost
Minnesota, 2012

$4,140,000 - $450/ sf

Comparable Projects:

Project: Chicago Green Tech. Center
Area: 32,000sf
Construction Cost: $14,400,000

Project: Eastman Nature Center
Area: 13,600sf
Construction Cost: $4,000,000

Project: Westwood Hills Elementary
Area: 22,000
Construction Cost: $6,800,000

Building Program: Construction Timeline

Implementation Plan

Bonding Approval:	2 month
Designer Selection:	2 months
Design:	6 months
Bidding:	2 months
Construction:	9 months
Commissioning:	1 month
Occupancy:	1 month

Implementation Schedule

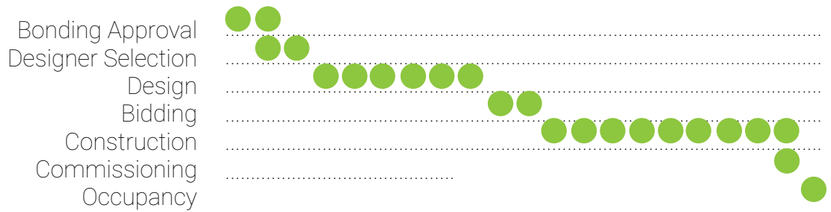


table 4.2 schedule

Total time until occupancy: 21 months

Building Program: Summary

The design & function of the building spaces are carefully considered to create core gathering spaces at the center of private and public areas such as the galleries, social commons and natural elements. Central learning spaces will encourage interaction beyond immediate spaces. Surrounding landmarks, architecture and nature are the fundamental teaching aids that influence the lessons taught within the building. The experience is initiated when an individual begins their journey to the site. The conscious decision to walk, ride bike or use public transportation instead of driving is the first choice they make towards a healthier lifestyle. Once they arrive on Main Street above the site, there are multiple paths that lead them down to the museum. Visitors have an opportunity to enjoy the paths along the river that lead them directly to the front door of the museum instead of taking the accessibility road that has direct parking in close proximity with the building. The paths surrounding the site are a great opportunity to observe St. Anthony Falls where the museum gets most its power from hydroelectricity. From the entrance of the museum there is a hierarchy of spaces that encourage each sense to engage in an experience that challenges their normal routine to think about how each choice they make can affect the environment around them now and for the future. The gallery space and classrooms are part of an in-depth experience that lets the learner understand new ideas before going out and physically experiencing them. Materials, lighting and atmosphere will be studied and chosen based on the emotional, psychological and intellectual experience in each space. Sustainability will be reflected in the architecture, programs and details of the design.

figure 21.0 site panorama

Design Solution

Thesis Exhibit

figure 21.1 final board

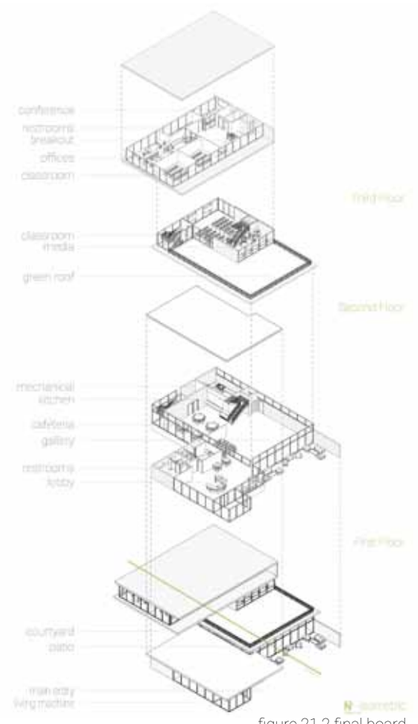


figure 21.2 final board

When the visitor first enters the building they are met with a friendly face at the reception desk that guides them through the programs offered and helps them choose the best learning options for what they are interested in. Interior plaques surround the building and illustrate the different systems and design implemented into the building design to benefit the user and environment such as interior living machine and living wall right in the lobby. Materials for finishes and construction are also highlighted as being reused and local materials that implement texture and interest into each space. The building's exterior wood planked rain screen system is a double-wall construction that uses an outer layer to keep out the rain and an inner layer to provide thermal insulation, prevent excessive air leakage and carry wind loading. The outer layer breathes like a skin while the inner layer reduces energy losses. Restrooms with showers are located directly behind the desk for the intended use of visitors that utilize the hiking trails or bicycle commutes throughout all seasons. The exhibit space is just beyond the lobby and welcomes visitors with its 12' high ceilings and inviting exhibits.

Thesis Exhibit

Exhibits are created to involve the user through multiple senses to encourage different types of learning styles. A typical exhibit would include textured visual displays that encourage touch and sound displays that users would interact with. The cafeteria is located beyond the gallery which features healthy food and ingredients from local providers. In the warmer months, visitors are encouraged to venture to the permeable courtyard adjacent to the cafeteria where tables are continued and frame a beautiful view of the Stone arch bridge and Mississippi river. This would be an ideal location for larger parties and banquets. An interactive stair exhibit encourages visitors to take the stairs instead of the elevators to bring visitors to the second floor. When a user steps on a stair tread, the stair lights up and generates a small amount of electricity that is stored and used throughout the building. The second floor features a large classroom framing the hydroelectric plant, St. Anthony falls and downtown Minneapolis skyline. The hydroelectric plant serves as an inspiring aid to the class programs and exudes positive results of clean energy. The plaque in the classroom talks about the use of low e glass and how it can impact users own homes. By choosing to take additional classes and workshops an individual is making a change to their routine and therefore reaching the second step in making a positive change. The media room is mainly for student use and looks out over the path in which they came to the building. The mixed use buildings and history of the East Minneapolis Skyline is a reminder of its history as well as its progress. The green roof will also be popular learning aid through all programs. The third floor contains faculty and volunteer offices, two smaller classrooms and a conference room with more outstanding views. The third floor is cantilevered 25' and is an important part of the design. While the previous two floors focused on the framing of certain landmarks and views, the third floor is open on three sides opening the users to unlimited sight and knowledge. The cantilever continues the steel structured building with triangulated girders and heavy gusset plates. At the fulcrum point, there are 24" steel columns to support the cantilever that continue down to the foundation and a shear wall on the north to prevent twisting and racking.

When users continue to experience the building and its offered programs they have successful reached the third step in the change making process. Experiencing change is important to feel how routines and choices might be different and evaluate negative and positive results. Even when a user doesn't come to the building looking to make a change, they are still a part of an experience that could benefit them. The final step in making a change is to celebrate results. The building's programs recognize that making changes to a lifestyle isn't always easy and will reward users with recognition of their accomplishments. Programs and buildings would constantly change to meet the needs of its users and compliment the growing need of the community to live and learn in a more sustainable environment that inspires them to spread the idea of more healthful choices.

Through the experience of site, architecture and interactive programs, individuals can grow to create a support system within their communities of leaders that can share their inspiration and excitement for a more healthful future.

Thesis Exhibit

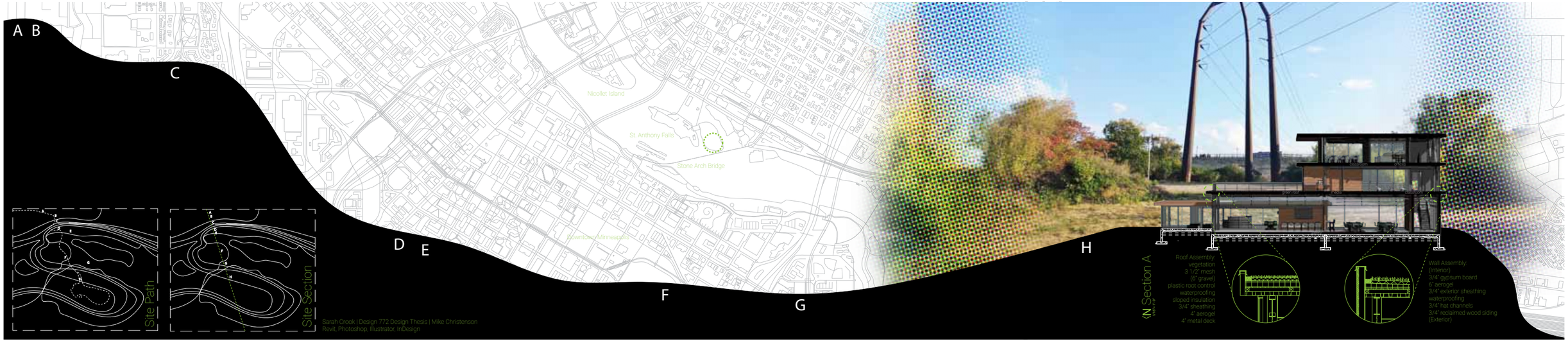


figure 21.3 final board

Thesis Presentation

figure 22.0 final presentation

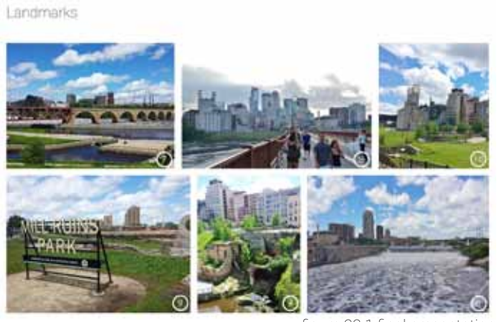


figure 22.1 final presentation

figure 22.2 final presentation

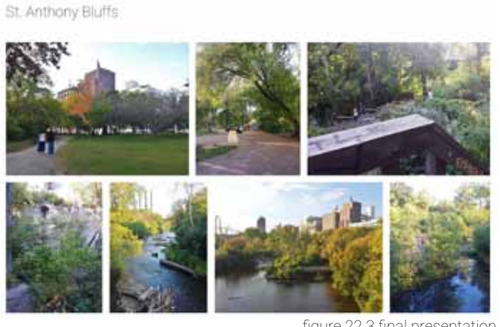


figure 22.3 final presentation

figure 22.4 final presentation

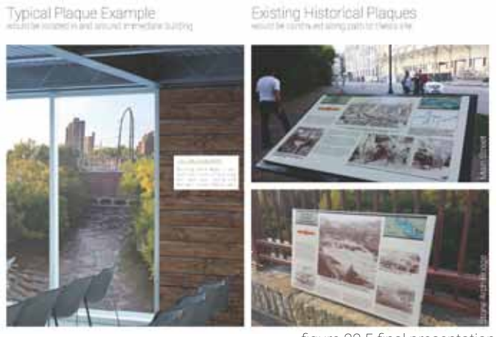


figure 22.5 final presentation

figure 22.6 final presentation

figure 22.7 final presentation

Thesis Presentation

figure 22.8 final presentation

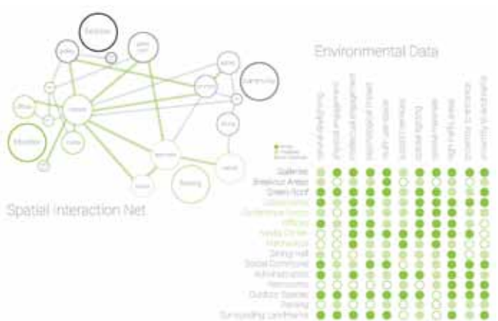


figure 22.9 final presentation

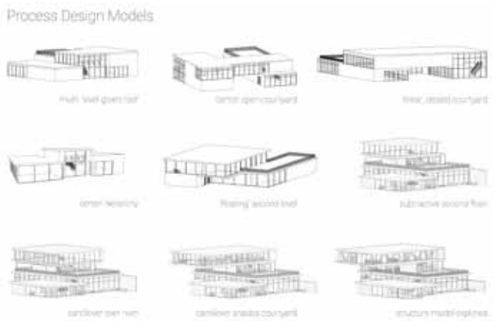


figure 23.0 final presentation

figure 23.1 final presentation

figure 23.2 final presentation

figure 23.3 final presentation

figure 23.4 final presentation

figure 23.5 final presentation

Models

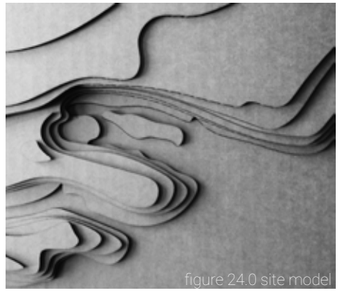


figure 24.0 site model

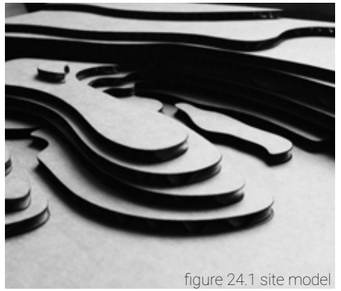


figure 24.1 site model


figure 24.2 site frames


figure 24.3 site frames

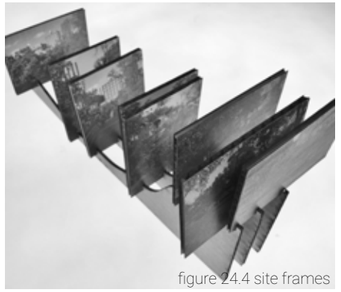


figure 24.4 site frames


figure 24.5 building model


figure 24.6 building model


figure 24.7 building model


figure 24.8 building model

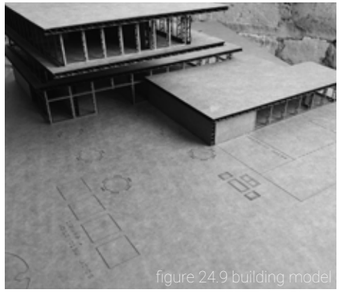


figure 24.9 building model

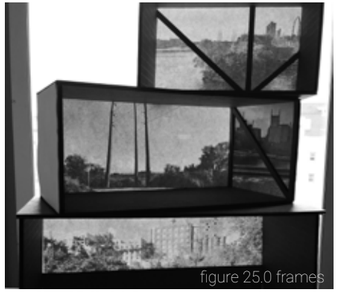


figure 25.0 frames

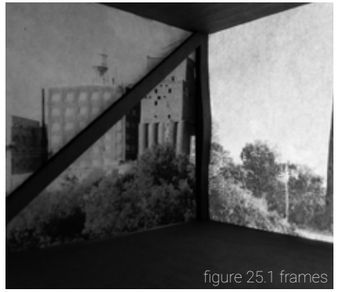


figure 25.1 frames

Thesis Installation

figure 26.0 thesis exhibit

An average of 300 jobs related to sustainability are available in the Minneapolis metropolitan area each day. The City of Minneapolis prides itself in being a leader in developing efficient and sustainable practices and encourage everyone from residents, businesses and institutions to take action and protect the opportunity, equity, and our environment now and for future generations. The location and specialized subject of my thesis will encourage users across the Mississippi River to explore innovative ideas and bring them further into the St. Paul area. Minneapolis's East bank has already begun to evolve its previously industrial blocks into mixed use, including renovating the Pillsbury A Mill into lofts, that will grow its existing historically rich milling history into learning, caring and growing communities.

I am extremely grateful to have had the opportunity to explore how sustainability can influence architecture and will continue to pursue my passions throughout my professional career. Sustainability is not just an architectural passion but also a standard to many other choices and decisions I make every day.

figure 26.1 presentation

figure 27.0 stone arch bridge

Appendix

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Design Studio Experience

Fall 2011: tea house, mpls rowing club
Instructor: Joan Vorderbruggen

I learned the importance of multi-use spaces and seasonal impact of architecture which influenced the materials and overall square footage of my thesis building.

Spring 2012: dance studio, a place for birds, dwelling
Instructor: Darryl Booker

The dwelling project was influential to my personal life and thesis through my passions of simple living and sustainability.

Fall 2012: askanase hall
Instructor: Mike Christenson

Working with physical models helped me understand the spaces I created instead of merely counting the areas. I used model making throughout my thesis to examine interior and exterior spaces throughout my buidling design.

Spring 2013: oil visitor center, piano dwelling
Instructor: Milt Yergens

I focused on the details of construction materials that prepared me for a better understanding of structure and material usage for my thesis and professional career.

Fall 2013: high rise
Instructor: David Crutchfield

Systems and passive strategies learned this semester were a large part of understanding my thesis to a high level of completion.

Spring 2014: senne river rejuvenation
Instructor: Paul Gleye

Traveling abroad was an unforgettable journey through new styles of architecture and experiences that continue to inspire me daily.

Fall 2014: wetland research laboratory
Instructor: Mark Barnhouse

The wetland typology was a great way to expand my knowledge to new systems and construction that influenced my thesis site and program.

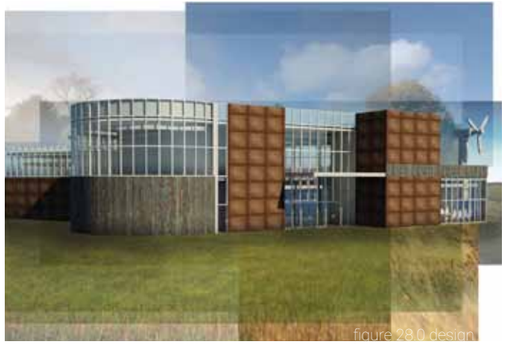
figure 28.0 design
Oil Visitor Center


figure 28.1 design
High Rise


figure 28.2 design
Senne River Rejuvenation


figure 28.3 design
Wetlands Research Laboratory

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I am passionate about sustainability and traveling the world. NDSU's caring faculty has inspired me to pursue my goals and I look forward to my future in architecture.

figure 29.0 greenbuild