Paradigms of Parallel **Performance**

an investigation of educational design

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Paradigms of Parallel **Performance**

A design thesis submitted to the
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By

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Abstract

With this thesis design, *Paradigm of Performance*, I propose the reconstruction of a new 182,000 square-foot middle school facility for the city of Minot, North Dakota located on the north bank of the Souris river. The old Erik Ramstad Middle School was recently destroyed in the 2011 flood of the Souris river. As the city responds to this disaster, a new middle school design has the opportunity to represent progressive development. The design will exhibit beautiful, sensible space which utilizes old and new building technologies that are representative of sustainable design. The spaces created by this design will not only inform sustainable living strategies, but also reinforce an educational model that is dedicated to cultivating child creativity and preparing students for a 21st century world.

Problem Statement

The implementation or re-invigoration of architectural design is a means of changing human behavior; specifically, design can instill environmental stewardship, promote creativity, and inform a healthy lifestyle.

Statement of Intent

Theoretical Premise

It is possible to engender positive ecological decisions as a result of experiencing architectural space.

Typology

Middle School Educational Facility
Minot, ND

Claim

Architectural design can exert great influence on societal values, such as education and environmental awareness.

Premise

Human interaction with the natural environment has been fundamentally flawed. An improved relationship with the planet is necesary.

The traditional model of education cannot sufficiently prepare students for the challenges of the 21st century.

The goals of environmental and educational excellence have parallel and related interests.

Project Justification

In the last decade, global awareness of mankind's potentially detrimental and unalterable effect on the Earth's environment has substantially risen. However, the discussion for more responsible and sustainable resource consumption has been confused through irresponsible "green" marketing techniques and fear mongering by both the environmental advocates and its opponents.

Architecture is in a unique position to alter the perception of "green" living through a thoughtful and perhaps forceful suggestion of how an individual should interact with his or her built environment. This advantageous position is a result of the profession's ability to alter the built world, meaning that a collaboration of just a few individuals can influence the lives of hundreds, thousands, or more.

As an individual experiences his or her built environment, the decisions that person makes can indirectly or directly be influenced by the invisible hand of the architect who designed that space. In this manner, architects can advocate for green design by creating spaces that embody the "sustainable ideal." By making "green" living a convenient and obvious choice, people can be convinced to become more proactive supporters of a sustainable lifestyle without ever having to be admonished into "doing what's right."

Proposal

Narative

The world population does not need any more convincing that mankind's current resource consumption needs to be curbed. However, the population can benefit from a clarification of environmental issues, which is the impetus for an educational discussion on sustainable architectural solutions that are effective, convenient, farsighted, and are judged by an ability to improve quality of life.

It is important to allow people to decide to live in a sustainable manner without unintentionally making those people feel coerced; or perhaps, to allow people to live sustainably without ever having to make a decision at all. With this in mind, it is my hope to encourage ecologically responsible living by creating an architectural context that allows an individual to live conveniently and happily as they make decisions that have "green" consequences.

In order to allow people to be unconsciously green, it is necessary for architects to design in a manner that allows for green living, not as a luxury, or as some elitist display of environmental awareness; but rather, architects must show how green living can be the outcome of logical and rational decision making that improves quality of life, generates savings from reduced energy use, and improves building performance.

The specific project typology chosen to be representative of these concepts is a middle school in Minot, North Dakota. An educational facility is desirable because it allows students to learn concepts of environmental stewardship within a context that embodies those principles. The lessons learned within the school environment can inform positive habits that become second nature and carry through till adulthood. Additionally, schools are highly energetic creative atmospheres that have the potential to explore sustainable concepts in methods that other building typologies might not.

The loss of one of Minot's middle schools to the recent flooding of the Souris river makes the city an excellent location for this thesis research. Minot's history and culture are grounded in agriculture and energy development which establishe a good foundation for innovation in sustainable energy practices that operate in harmony with the natural context. Minot's healthy economy will be able to rebound from the damage caused by the flood, and it will be important for the city to establish a precedent of future growth as the city's population increases from nearby oil operations. The city will not want to rush into cheap, short sighted, and ultimately ineffective solutions for its current problems. A large project, such as a new middle school, has the potential to grab the attention of the community, and influence the manner in which future construction is conducted.

User/Client Description

Owner

This project will be owned by the city of Minot and the administration of the public school system.

Users

The users of this building will include, but not be limited to students, educators, janitorial staff members, administrative staff members, health and wellness professionals, chefs, and facilities management supervisors. The facilities provided by this school should engage the Minot community, provide venues for a multitude of activities, allow this building to not only be a community icon, but to also allow the citizens of Minot to engage with the architecture often.

Project Elements

Students

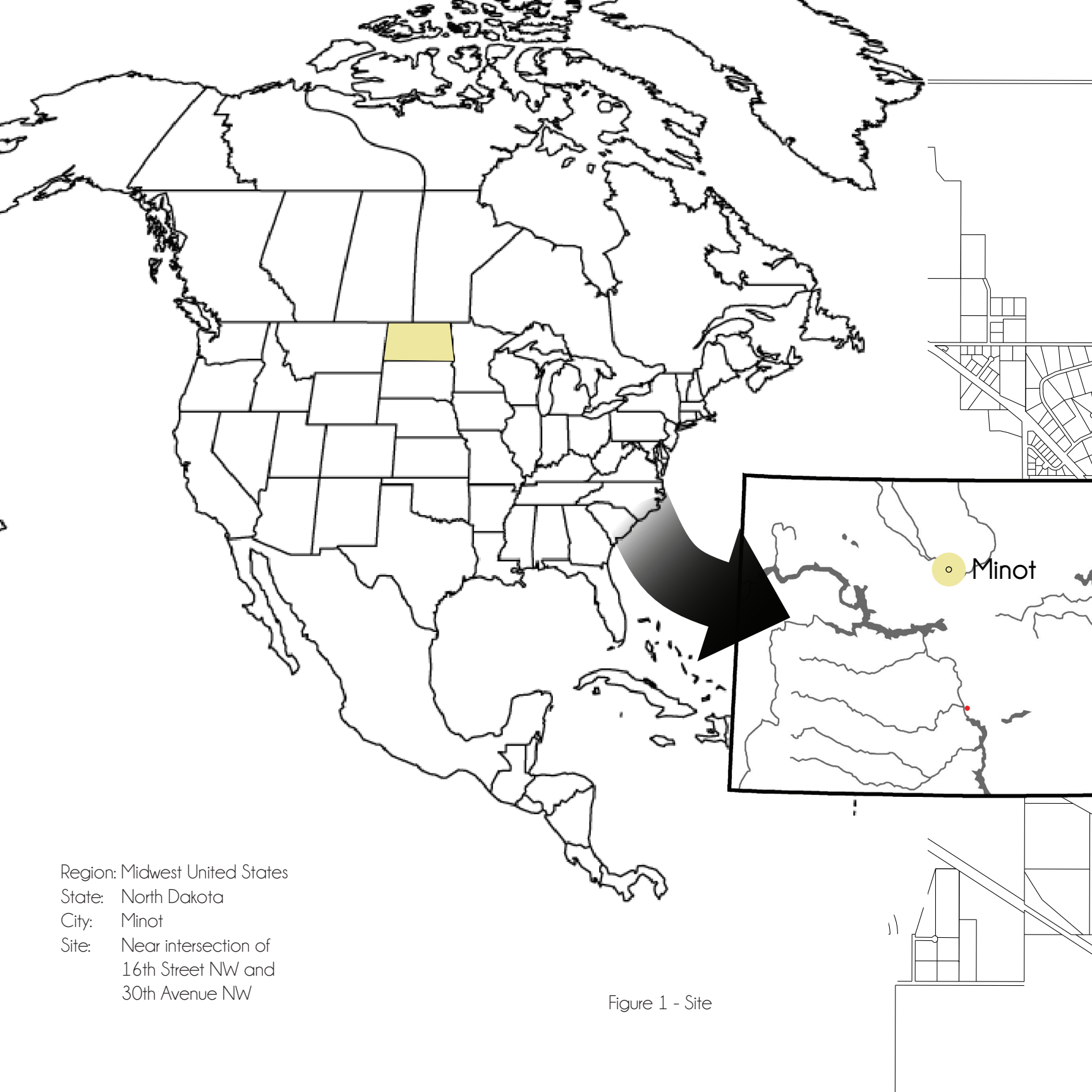
Number - 540

Educators/Staff

Number - 60

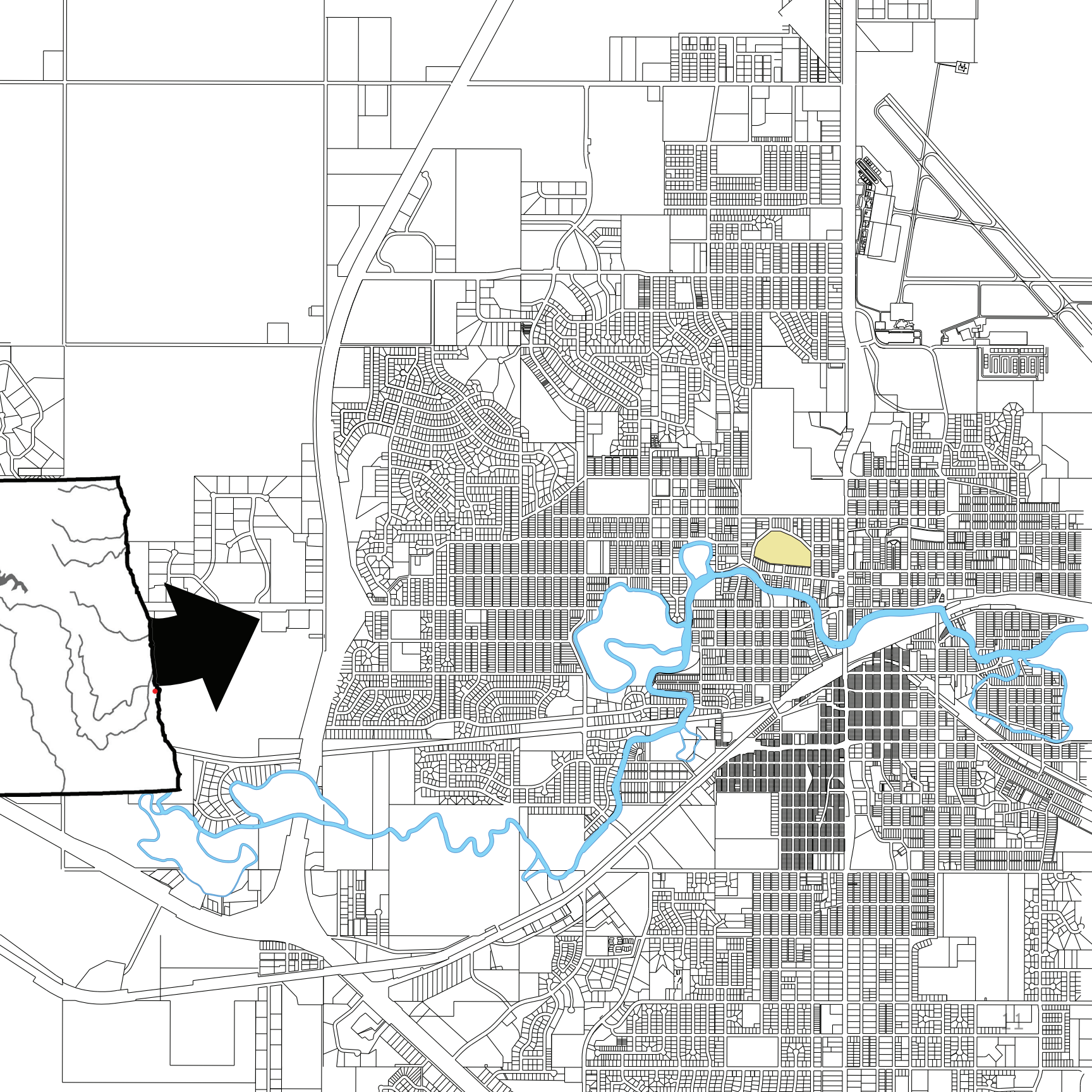
Requirements

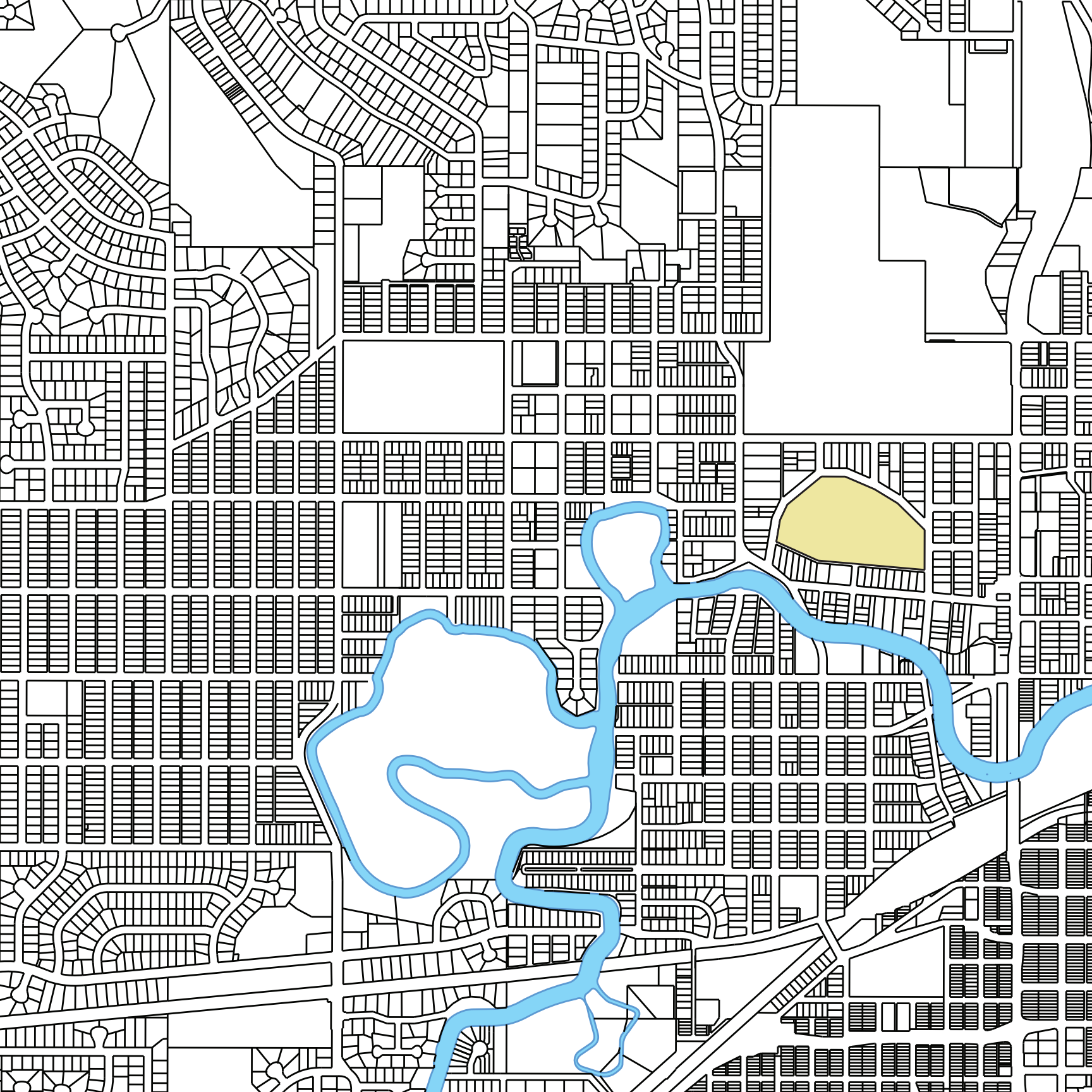
Classrooms, library, study lounge, cafeteria, auditorium, gymnasium, student storage, outdoor sports fields, administration center, medical station, bathrooms, bus pickup/drop off, common rooms, teacher's lounge, parking, janitorial space, mechanical space, service space, kitchens, and general storage.



Region: Midwest United States
State: North Dakota
City: Minot
Site: Near intersection of
16th Street NW and
30th Avenue NW

Figure 1 - Site



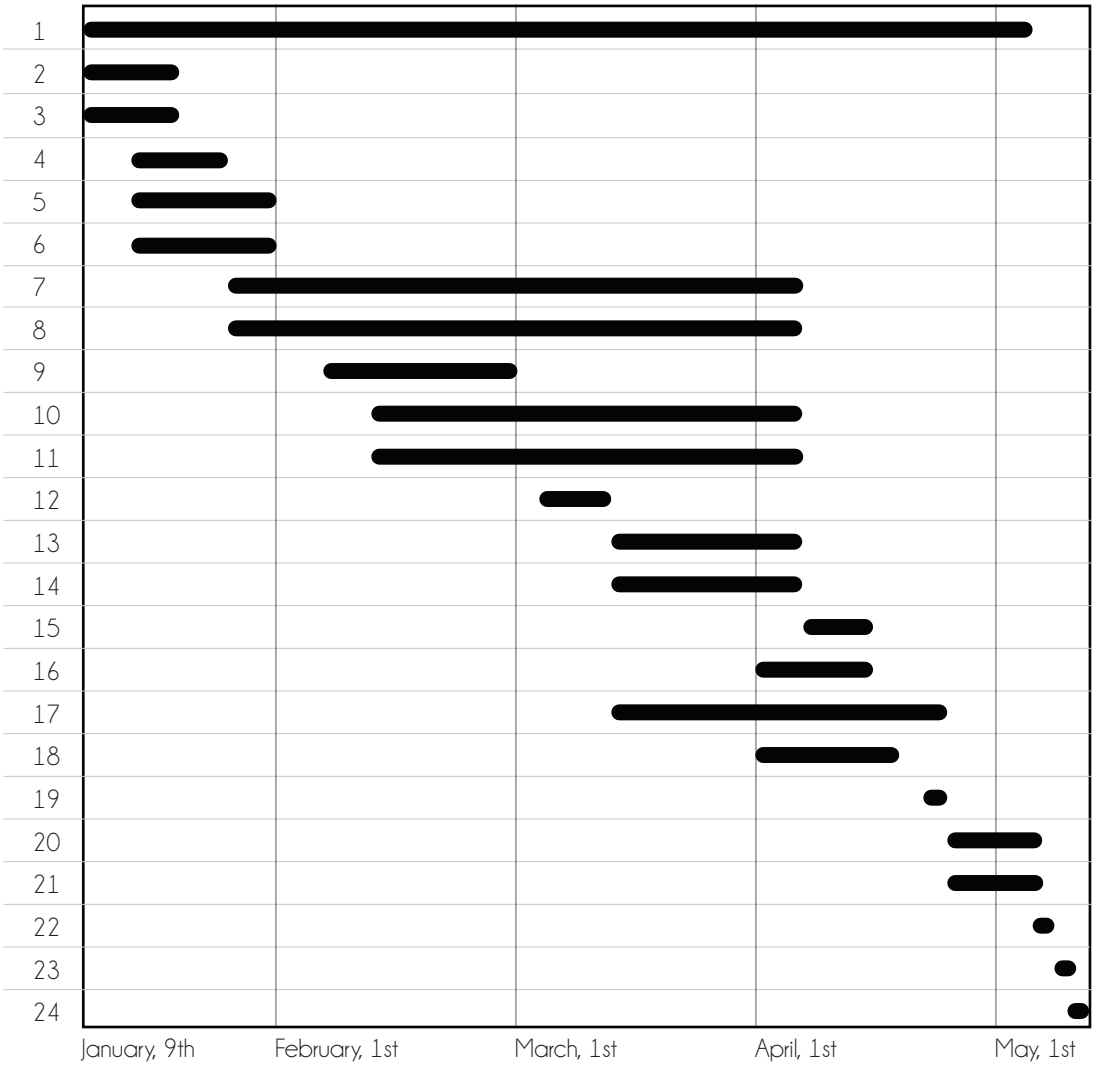


Site Narrative

In order to provide the most relevant architectural solution possible, the site location reflects the intentions of the Minot School District and the Federal Emergency Management Agency. Located near the center of the city, and at the heart of the area damaged by the recent flooding, the site is predicted to quickly re-develop over the next decade. The new middle school will be a cornerstone for the community in this location.

Figure 2 - Site

Procedural Calender



Schedule:

1 Project Documentation
2 Conceptual Analysis
3 Context Analysis
4 Spatial Analysis
5 ECS Passive Analysis
6 ECS Active Analysis
7 Floor Plan Development
8 Section Development
9 Structural Development
10 Envelope Development
11 Materials Development
12 Midterm Reviews

13 Structural Redevelopment
14 Context Redevelopment
15 Project Revisions
16 Presentation Layout
17 Plotting and Model Building
18 Preparation for Presentations
19 Exhibits Installed on the 5th Floor
20 Thesis Exhibit
21 Final Thesis Reviews
22 CD Due to Thesis Advisers
23 Final Thesis Document Due
24 Commencement

Figure 3 - Plan for Procedural Calender

Plan for Proceeding

This project will focus on creating beautiful and exciting educational spaces that are progressive in their approach to education and sustainable in their operation.

Research will focus on the exploration, discovery, and understanding of sustainable solutions that are appropriate for the climatic and typology in order to yield high energy savings, create healthy learning environments, and increase student comfort. Design solutions will not be limited to building methods that save energy, but include elements that make this project a lasting and valued structure in the public eye.

Studies will also be done in progressive education models so that they can be successfully applied to a 21st century school that will offer a relevant architectural solutions to the needs of the modern student.

Design will be conducted primarily through digital means. By conceptualizing and modeling the abstract relationships of the diverse middle school program early and often, a refinement of relationships and architectural possibility will occur. The design process will be guided by expert opinion from instructors, professionals, independent educators, and literary material. The design must also benefit from the experience of those who live in Minot so that it may best capitalize on opportunities unique to this time frame for the city.

The process of design will fluctuate from the loose format of hand sketching to the more rigid computer modeling aids, to critical critiques of progress and value, and back to sketching. The final exhibit of thesis material should emphasize a strong understanding of design technique and ability that showcases proficiency with computer aided design tools while also demonstrating a depth of skill sets related to the profession.

Process material over the duration of the project will be gathered and compiled weekly in organized folders. This will help maintain a clean work-flow and capture process made from collection date to collection date nicely.

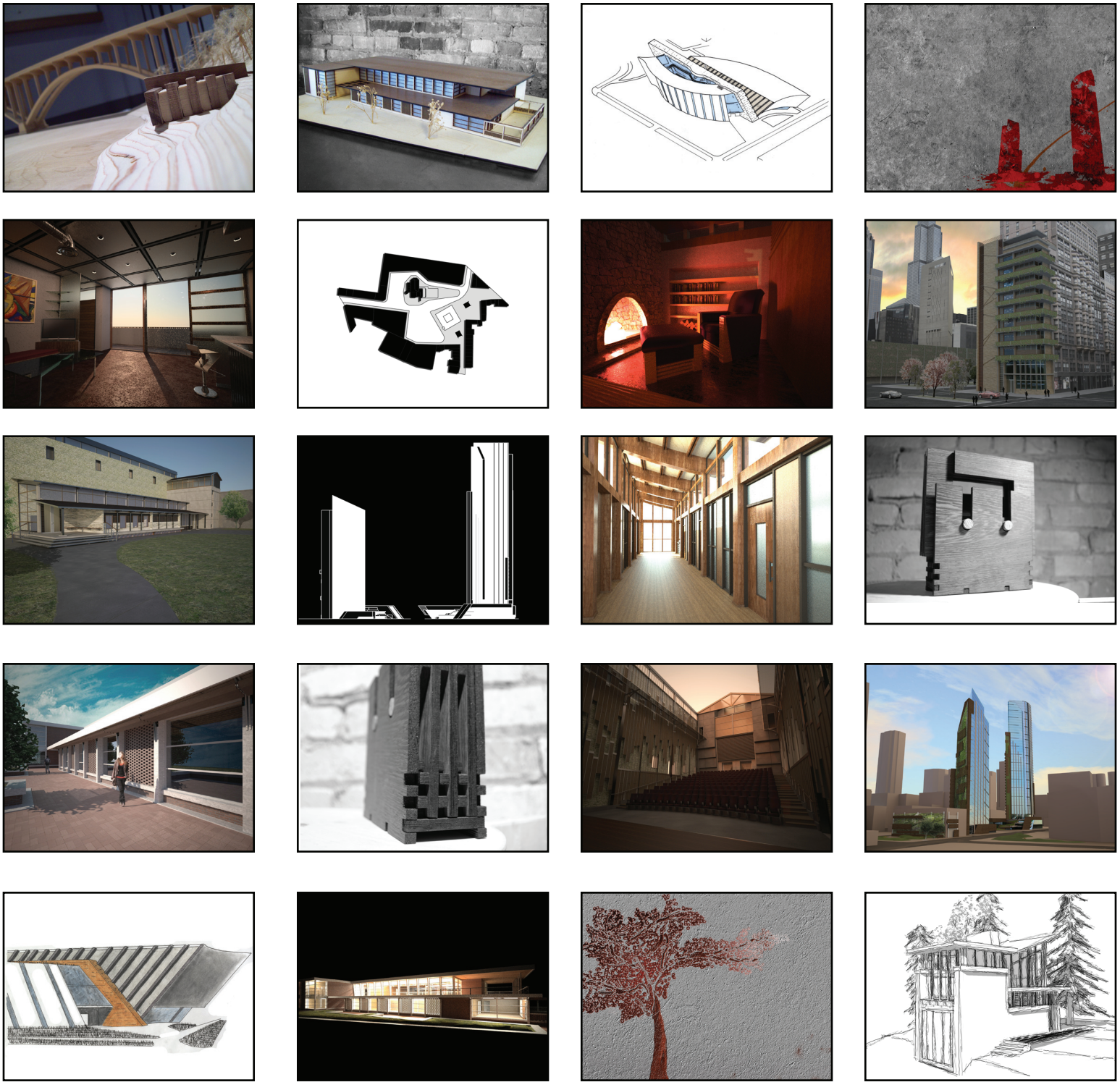


Figure 4 - Past Work

Studio Experience

Second Year

Fall 2008 - Stephen Wischer
- Tea House
- Rowing Club

Spring 2009 - Joan Vorderbruggen
- Dance Studio
- Cripple Creek Small Dwelling

Third Year

Fall 2009 - Cindy Urness
- ND Center of Excellence
- Health and Wellness Center

Spring 2010 - Ron Ramsay
- Shaker Barn
- Mid-Rise Chicago Apartments

Fourth Year

Fall 2010 - David Crutchfield
- San Francisco Highrise
- KKE Object Container

Spring 2011 - Paul Gleye
- International Urban/Architectural Studies
- Plaza Rihour Design

Fifth Year

Fall 2010 - Malini Srivastava
- Design/Build Project

Program Document

Research:

Introduction

The beginning of the twenty-first century marked a changing global perspective on resource consumption. Methods of natural resource collection and use mired in irresponsible industrialist mentalities are being acknowledged as detriments to the health and well being of the Earth's environments (Benyus, 2002). In general, the architectural profession has responded to this shift of thinking by initiating sustainable design solutions that focus on reducing the built environment's energy footprint. Some architects advocate for even more far-sighted goals, such as the elimination of humankind's dependence on unrenewable resources, and the creation of a human-resource from which the planet benefits. Unfortunately, the entire built environment cannot be transformed from a system predicated on the consumption of fossil fuel to a state of idyllic net-zero energy-use overnight. Nevertheless, it is important that designers advocate for this preferred direction.

Minot, North Dakota is a city which has an opportunity to embrace and support such sustainable ideals at this important juncture of the city's history. The 2011 flood of the Souris caused devastating damage to Minot. Over 4,800 structures were either damaged or destroyed during the course of the natural disaster. However, there is a silver lining. With so many structures destroyed or in need of repair, Minot has the exciting opportunity to rebuild itself. The rebuilding efforts will benefit from the economic prosperity brought to the region by the recent oil boom, allowing Minot to rise with the challenges it is facing and to over come them in a manner that demonstrates innovative thinking and leadership in the field of environmental responsibility.

The Erik Ramstad Middle School, named after the early settler who once owned much of the land that the city was built on, was one of the structures destroyed during the 2011 flood. The reconstruction of this school has the potential to establish an ecological standard from which the entire community can benefit. It is fitting that a school built in Erik Ramstad's honor should herald an exciting new era of growth and development for the city, much like Erik Ramstad initiated the historic settlement of Minot by selling his land to make room for the developing rail-road town.

Furthermore, the city of Minot has an economy rooted in agriculture and energy development. A school which synthesizes this rich history in a manner that engenders love and understanding of nature while also demonstrating ecological excellence in energy use is not only appropriate but necessary. A new Erik Ramstad Middle School has the potential to be an icon of the city, representing best practices for future construction at a time of regrowth and development, while simultaneously embodying a pioneering spirit in ecological and educational design.

Why build a sustainable middle school?

A sustainable middle school does more for the Minot community than simply provide an enclosure to educate young students. "The school can become a tool to illustrate a wide spectrum of scientific, mathematics, and social issues, making the school itself a building that can teach" (Mau, Muller, Syversten, 2010.) By representing these concepts the proposed middle school can instill pride within a community, and lead the way towards a more energy conscious future. The first step towards this progressive future is accepting and acting upon a simple statement, "It is about time for sustainability" (Gelfand, 2010).

Data have conclusively shown that humanity's activities as builders, farmers, producers, and consumers have changed the ecological composition of the world and continues to change the world at this moment. The United States alone produces 25% of the world's greenhouse gas emissions, and the built environment represents a substantial portion of the energy use contributing to that figure. In the United States buildings account for:

72% of electricity consumption
39% of energy use
38% of all carbon dioxide emissions
40% of raw materials use
30% of waste output
14% of potable water consumption

(Gelfand,2010)

Although the impact of a single building can be significantly reduced with today's technology, materials, and methods, the effects of reducing one building's energy consumption, even a large building, such as a middle school, is incrementally small when compared to the entire system (Gelfand, 2010). This reinforces the importance of acting upon every opportunity to create energy savings in new construction, as well as the renovation of existing structures, which is why the new Erik Ramstad Middle School must showcase such building methods to help the city of Minot transition towards a more sustainable future.

An advantageous aspect to school design is the ubiquitous relationship of the building's architecture with a child's learning. The effects of communicating environmental stewardship in an atmosphere where children learn societal values is incredibly important (Gelfand, 2010). David Suzuki, an award-winning scientist and environmentalist, recognizes the importance of a strong relationship with nature in early education and states, "The most important lesson you learn is that there isn't the environment out there and me in here. The environment is all around us; it's in us" (Mau,Muller,Syvertsen, 2010).

The capacity for sustainable schools to act as 3-D text books is not the only benefit to high-performance design. In fact, most of the advantages of such design can be attributed to a better learning environment. Some advantages include:

Daylit Classrooms

The importance of creating classrooms which have ample daylighting is just one example of how designers are able to create learning environments which are healthy and stimulating for both students and teachers, while also cutting back on energy costs by reducing the need for artificial lighting. According to an analysis of over 21,000 students in Colorado, California, and Washington conducted by the Heschong Mahone Group, natural daylighting through skylights and windows in classrooms contributes to higher student performance in reading and standardized testing. Students in classrooms with the best daylighting progressed 10% to 20% faster than students in the classrooms with the poorest daylighting conditions (Gelfand, 2010).

Improved Accoustics

Sustainable design requires a thoughtful selection of material choices, and, often times, sustainable classrooms have improved acoustic qualities as a result of this thoughtful decision making. Not only are materials being selected because they are environmentally friendly, but because they out perform old construction materials in almost every regard. Classrooms which exhibit green design inherently have improved acoustics for this reason. This is important because studies have shown a strong connection between improved student hearing and improved student learning. The organization Global Green's "Healthier, Wealthier, Wiser: A National Report on Green Schools," cited a study showing students in quiet third-grade classrooms to be a half a year ahead of peers who learn in noisy classrooms (Gelfand, 2010).

Reduced Energy Costs

Lower operating costs are also attributed to high-performance design. The money saved in more efficient mechanical systems, such as better ventilation systems or electrical systems, allows schools to spend more funding on student supplies, teachers, and books. Typically, a school will spend 2-4% of their yearly budget on energy alone. This is often more money then schools spend on textbooks (Gelfand, 2010). The substantial savings of sustainable energy systems allow schools to have more freedom to invest money in areas that continue to improve the quality of the educational spaces.

In addition to energy, water and landscape maintenance, as well as maintenance of equipment and materials, represent a substantial portion of operating costs. Sustainable design strategies allow for lower water use through the use of appropriate fixtures and regionally specific plant selections for landscaping. Good landscaping is essential because well designed school campuses create a strong sense of identity between the user and the place. This is a very important consideration when creating a good learning environment.

Healthier Environments and Healthier People

Many of the aspects that "green" schools address also create healthier environments. Benefits in worker health and safety, and reduction of mold issues through appropriate waterproofing and ventilation are a few of the factors which contribute to a healthier environment. Not only does this contribute to a greater sense of well-being within the space, but these conditions can actually save schools money regarding insurance.

Also, student attendance improves in a "green" educational facility. A healthier environment creates fewer sick days taken by both employees and students. An emphasis on better indoor air quality in sustainable design is a direct means of reducing asthma and other respiratory problems in schools. Additionally, the use of ventilation systems that are specific to the building program, size, and climate plays an important role in over-coming the sick building syndrome that many schools from the 60's and 70's suffer. In Howell Township, New Jersey, absentee rates declined 60% after an updated ventilation system was installed. Even small changes that reflect green ideology, such as a change in operation methods, creates significant impact. Charles Young Elementary School in Washington, D.C., increased average daily attendance from 89% to 93% due to such a change. These changes create a better quality of space within the learning environment, allowing students and teachers to feel healthier and happier within their schools, and consequently improving the learning atmosphere (Gelfand, 2010).

Happier Teachers

Enhanced teacher performance and satisfaction is yet another valuable characteristic of sustainable school facilities. Happier teachers are more likely to stay with a school, improving school teacher retention rates. The ability to maintain a consistent teaching staff affects both the quality and operating costs of education. Gregory Kats, the Director of Financing for the Energy Efficiency and Renewable Energy at the U.S. Department of Energy (1996-2001), says "the benefits of teacher retention alone exceeds the costs of "greening" a school" (Gelfand, 2010).

Extended Building Life

Increased building life is yet another benefit to constructing within a sustainable scheme. In addition to a durable selection of materials, systems, and assemblies, the commissioning, operations, and maintenance of sustainable buildings keeps the school running efficiently. The modern system monitors available in high-performance design create the opportunity to catch problems in filters, balancing, or controls before they cause damage to such systems. Preventive maintenance is built into the sustainable school, along with the design and monitoring features that make efficient maintenance easier to accomplish.

Greater Ecological Awareness

As mentioned before, a sustainable school has the ability to change attitudes towards ecologically intelligent decision making. The influence of schools extends beyond the classroom. Examples of how a sustainable school can impact its community are by reducing the need to drive, improving eating habits for both children and adults, or educating on energy savings behavior. These influences can be very strong. As students grow up in a sustainably run built environment, they will carry their learned habits and expectations into the workplace and into their homes as adults.

For the city's citizens who are unfamiliar or unresponsive to sustainable concepts, this school is a means of introducing important ideals that break away from traditional wasteful habits, such as the fixation on constantly discarding that which is old in favor for something "new", and the assumption of unlimited abundance. Sustainable schools can take part in readjusting these expectations and in resetting the base expectations of the new generation so that its members are more cognizant of their environmental impact on the world.

Going Beyond Energy

The above series of sustainable design benefits was outlined by Lisa Gelfand in her book *Sustainable School Architecture*. These benefits describe how a high-performance model of education can do more then just lower a school's environmental impact, but also create positive quantifiable social and economic outcomes. There are additional considerations to be made, however, when evaluating educational design that, in accordance with the 1987 UN Bruntland Commission Report, "meets the needs of the present without compromising the ability of the future generations to meet their own needs."

Sir Ken Robinson is an internationally recognized leader in innovation, and development of human resources. Robinson believes that the current educational curriculum that is endorsed world wide is squandering one of the most, if not the very most, important resource available to humankind, creativity. In a speech given at a TED conference in February of 2010, Robinson addresses the need to recognize the implications of global climate change, but goes on to describe a second climate crisis which is "as severe, has the same origins, and must be dealt with the same urgency." The crisis Robinson describes is the waste of human resource. He explicitly relates this loss to a failure in educational systems. He believes that education must undergo a fundamental transformation to prepare today's 21st century learners for tomorrow's creativity-demanding problems. Robinson references Abraham Lincoln's 1862 Annual Message to Congress to describe the severity of the situation,

> "The dogmas of the quiet past are inadequate to the stormy present. The occasion is piled high with difficulty, and we must rise with the occasion. As our case is new, so we must think anew, and act anew. We must disenthrall ourselves, and then we shall save our country."

In Robinson's view, disenthralling humankind's tyrannical perception of "common sense" in the field of learning is imperative to the establishment of a more appropriate model of education.

MIT lab professor Mitchel Resnik gives an example of one such limiting "common sense" conception encountered when visiting a school in Singapore. Professor Resnik is responsible for a LEGO-robotics educational learning program that allows young students to utilize math and science skills within an educational context constructed around designing, creating, experimenting and exploring. When invited to Singapore, Resnkik witnessed a national LEGO-robotics event where hundreds of student teams competed. Resnik was impressed by the students' robot designs during the competition; however, when he asked a teacher how the LEGO-robotics concept was being integrated in the curriculum, the teacher responded in astonishment, saying, "We would never do this during the school day. This is for after-school hours. During the school day, the students must drill their lessons. Like mathematics" (MIT World, 2010).

Resnik found this particularly ironic because he had been invited to Singapore by the Ministry of Education to erode a mentality that creative, collaborative exercises are somehow superseded by "more important" lessons in abstract mathematics. Apparently, businesses throughout Singapore had noticed a lack of creative problem solving skills from the graduates of their school system despite having some of the worlds leading scores in math and science exams. The local businesses want workers to be better prepared for the creative demands of modern business practice, but the educational institutions of Singapore are resisting change due to the "common sense" belief that a strong background in math and science can provide logical problem solving skills to handle such situational circumstances (MIT World, 2010).

The approach of linear, systematic, problem solving is often valuable, but is not comprehensive in its ability to react appropriately to the demands of the 21st learner who is preparing to participate in a 21st century economy. Sir Ken Robinson stresses this point, and calls into question the global "obsession" with a linear model of education that begins in elementary school and ends with a college degree (Robinson, 2010).

The roots of this linear preoccupation in education extend back to the industrial revolution. During this time, "production shifted and accelerated from the farm to the factory, higher levels of interdependency required collective efforts, higher specialized divisions of labor, coordination and integration of many different skills; from unskilled workers to an industrial caste system of technicians, secretaries, and clerks (Lackney, 2008.) To satisfy a need for adults who could operate as "obedient specialists," the public education system was devised (Mau, Muller, and Syversten, 2010). This institution proliferated successfully and was based upon a compulsory curriculum paid for by taxation, and free at the point of delivery (Robinson, 2010).

The industrial model of education manifested in response to the unique conditions of the late 19th and early 20th century and is no longer relevant. Unfortunately, education still perpetuates the interests of industrialization, and schools still exemplify many factory-like characteristics. The ringing of a bell to signify work periods, separated and specialized subjects, and the factory-line quality of graduating years are all indicators of an outmoded plan of education that focuses on the standardization of skill sets, and regardless of intention, destroys creativity and impoverishes spiritual energy (Robinson, 2010).

Christian Morgenstern captured the injustice of such learning facilities, stating,

> "It is an unfortunate truth that dignity and freedom of thought often depend on the proportions of a room, a delightful view out of the window, a certain measure of light and color, so that someone who has spent his whole life in a kind of oblong boxes and one day enters a room with noble proportions might wonder how much he might have been missing, spiritually, just because of the character of his living quarters" (Walden, 2009).

Schools must reconstitute a sense of ability and intelligence which has been degraded by an educational model that almost exclusively valued methods of deductive reasoning. The cultivation of aptitude and passion within a varying and diverse curriculum will curb growing disinterest in public education (Robinson, 2010.)

Sir Ken Robinson calls for a new model of education that is based upon the principles of agriculture, instead of a "factory-based" model. He states that human flourishing is an organic process, not a mechanical process. Elaborating on this point, he says that an educator cannot predict the outcome of human development, but instead must create the conditions under which development can flourish. This system should be customized to the people who are being educated, and sensitive to the place in which education is occurring. This develops an educational system where people can create their own solutions through external support based upon a personalized curriculum (Robinson, 2010.)

An emerging body of research known as complexity science can be applied to Sir Ken Robinson's call for educational revolution. "Complexity science is highly interdisciplinary including biologists, anthropologists, economists, sociologists, management theorists, and many others in a quest to answer some fundamental questions about living, adaptable systems" (NAPCRG, 2009). Through this lens of understanding, a complex adaptive system, such as the agriculture-based education that Robinson describes, can be understood as a living agent. This biological quality provides an opportunity to build systems which are sustainable because of their capacity to "live." "Complexity science provides the language the metaphors, the conceptual frameworks, the models and theories which help make the idiosyncrasies non-idiosyncratic and the illogical logical" (NAPCRG, 2009.)

"Existing models in economics, management, and traditional sciences were built on the foundation of Newtonian scientific principles. The dominant metaphor in Newtonian science is the machine" (NAPCRG, 2010). This machine-like system is also present in the Enlightenment period's factory-based education model. "The universe and all its subsystems were seen as giant clocks or inanimate machines. The clocks or machines can be explained using reductionism – by understanding each part separately. The whole of the machine is the sum of the parts" (NAPCRG, 2010).

There are limits to this perspective when understanding living systems and, in particular, human organizations. Clearly humans are not machine parts without choice, and so clockware is a necessary but insufficient way of understanding complex systems (NAPCRG, 2009). This disconnect between human interaction, characteristics, and decision making from Newtonian scientific principles perhaps explains why the industrial education model is unsuccessful. People are not machines.

Realizing Change Through Architecture

Randall Fielding, Jeffrey Lackney, and Prakash Nair are a triumvirate of progressive educational architects and planners who share Sir Ken Robinson's view on a need for educational transformation and have developed a method of school design that breaks from the rigid "clockware" thinking of educational systems. They, too, describe the limitations of the "factory" school by likening the current educational process to the creation of "widgets on a conveyor belt" (Fielding, Lackney, Nair, 2011.) These three individuals collaborated to write *The Language of School Design*, a book that describes design patterns to help actualize the creation of creative learning environments. These design patterns follow best practices for sustainable energy-use, create rich learning experiences, and are in keeping with the principles of complexity science.

For example, under the first design pattern, twenty learning modalities are listed representing the many learning environments that a physical school should provide:

1. Independent study
2. Peer Tutoring
3. Team Collaboration
4. One-on-one learning teacher
5. Lecture format – teacher-directed
6. Project-based learning
7. Technology with mobile computers
8. Distance learning
9. Internet-based learning
10. Student Presentation
11. Performance-based learning
12. Seminar-style instruction
13. Inter-disciplinary learning
14. Naturalist learning
15. Social/emotional/spiritual learning
16. Art-based learning
17. Storytelling
18. Design-based learning
19. Team teaching/learning
20. Play-based learning

(Fielding, Lackney, Nair, 2011)

The traditional classroom is structured to only support a single modality which is lecture format – teacher-directed learning. Nair, Fielding, and Lackney advocate for a more unconventional classroom settings that combine many of the above modalities. In their opinion, a school's classrooms do not need to be identical, but instead should be diverse and adaptive to the learning needs of the students. The differing combinations of modalities allow for holistic, multifaceted learning.

In terms of brain development, offering a maultifacted learning environment can have a dramatic effect. "There are about 10 billion neurons in the brain and about 1,000 trillion connections. The possible combination of connections is about 10 to the one-millionth power. An enriched learning environment can

contribute up to a 25% increase in the number of brain connections" (Mau, Muller, Syversten, 2010), which is why Howard Gardner, professor of cognition and education at Harvard Graduate School of Education and creator of the Theory of Multiple Intelligence, believes that, "in addition to the traditional school's prioritized linguistic and logical intelligence, learning environments should allow students to exercise their musical, spatial, bodily, naturalist, interpersonal, and intrapersonal intelligences" (Mau, Muller, Syvertsen, 2010).

Building upon Gardner's thoughts, Nair, Fielding, and Lackney call for the removal of the physical and conceptual barriers that have historically separated students' curriculum into a hierarchy of subjects. A Da Vinci studio is one example of how they suggest this can be done. "The Da Vinci studio is a "messy" work space that is able to provide for hands-on learning across all curriculum areas, and support practical work in the formal Visual Arts and Science curriculum" (Fielding, Lackney, and Nair, 2011). In this classroom setting, science and art classes are able to work symbiotically, separately, simultaneously, and/or spontaneously. This union of seemingly disparate classroom subjects is able to thrive on creativity and unknown possibility.

Karl Fisch, a mathematics teacher and Director of Technology at Araphoe High School in Littleton, Co, recognizes the importance of classroom settings that have this kind of creative potential. Mr. Fisch states, "We are currently preparing students for jobs that don't yet exist, using technologies that haven't been invented, in order to solve problems we don't even know are problems yet" (Mau, Muller, Syvertsen, 2010.)

The difficulty of designing a school that responds to these conditions is compounded by the rate at which technology advances. Jeffrey Lackney says, "Because of the way technology, like wireless communication, is rapidly developing, the U.S. schools of the near future may take on a design completely different from anything we have seen to date" (Walden, 2009). The traditional model of linear education will never flourish within this situational climate, and, in fact, is a disservice to the students it educates. The industrial model's dedication to standardizing education by teaching the same curriculum – one subject at a time, in the same way, in the same classrooms is a major handicap to the schools that implement that philosophy, causing the schools that follow the tradition style, even the new ones, to quickly become out-dated and obsolete (Robinson, 2010). The benefit to designing upon the models that Fielding, Lackney, and Nair endorse is the adaptability inherent to the design.

A school's potential to provide a high quality education for its students depends on the schools ability to adapt as an institution to the rapidly evolving conditions of the twenty-first century. This adaptability does not exist in the traditional school model, in part due to their outdated and inflexible architecture. The current model is rigid by intention. It is linear in its structure, and the psychological effects of the curriculum the architecture endorses perpetuates a notion that students are not to be trusted as they are "manufactured" into educated, and obedient workers.

Therefore, school architecture must undergo a sort of Darwinian evolution. Not just once, in some kind of major transition that is equally as solid and inflexible, but instead, the system should adopt a method that is organic in its ability to flexibly respond to the needs of its occupants. Relying again on complexity science to understand this, if schools are like organisms, then the classrooms and facilities within that school represent the genetic DNA of the building. Schools need more then a single sudden mutation instead, schools should imitate the consistent and much more responsive event of genetic crossover to generate unpredictable, but necessary, curricular adaptation.

In other words, allow the classrooms, facilities, and circulation spaces to interact, and restructure themselves spontaneously into ordered forms. Biological science indicates that the inter-relationships between genetic building blocks as they experience a crossover event is a million times more likely than mutation to create the necessary diversity required for an entities success. The building language of Nair, Fielding, and Lackney is an example of how schools can be architectural designed to promote such a dynamic modification that welcomes serendipitous and unexpected relationships. Such a model establishes the necessary framework for schools to successfully adjust to the pressures of the twenty-first century.

Summary

Based on the above research, three ideas are of particular interest: the predictable and unpredictable interaction between student and building, the response of educational practice to 21st century conditions, and the importance of adopting sustainable strategies for environmental health and well-being.

Creating beautiful spaces that children love to occupy which also foster learning and creativity is paramount. Architectural psychologist Rotraut Walden says, "A spatial composition that is esthetically pleasing, evokes functional curiosity, invites users to enter and stay, encourages work to be done, enhances the joy of learning and performance, offers firm support in the daily routines, but also opens avenues for self-actualization" (Walden, 2009). Henry Sanoff, another psychologist, echoes this belief, stating, "Besides teachers, parents, and other children, the school buildings themselves significantly influence performance, well-being, social behavior, and therefore also, in the end, grades as well as the knowledge and skills that pupils acquire for their future lives" (Walden, 2009).

But it is not enough to simply create beautiful architecture, school design should reinforce a new direction in education. To answer the call for change, it is time to develop an education system that does not ostracize students for failing to excel within a limited model of curricula, but instead promotes collaboration, creativity, and supports the aptitudes of all its students. This will create a social environment that is more educated, more empathetic, and better prepared to solve the twenty-first century's problems.

The condition of the Earth's environment is a fitting metaphor for this situation. If humans are considered the "favored students" in a classroom that holds the entire biosphere, than the degradation of the environment demonstrates what can occur when the success of one group comes at the expense of the health of the entire system. The diversity of the planet's life must be treated with consideration without placing disproportionate value on one species over another. Similarly, classrooms must move past an education system that is meant to promote the "worthy" and discard the rest. The richness of the environment is what maintains its balance and health, and the educational system should cultivate this kind of richness in its students.

Keeping the health of the environment in mind, successful implementation of sustainable design is crucial. The incorporation of sustainable concepts educates students in the value of environmental stewardship, while creating healthier spaces for learning,and generating substantial long-term ecological and monetary savings.

For the city of Minot, the implication of these concepts are important to consider. As a center of agriculture, energy, and rapid urban development, this city is able to capitalize upon a rare opportunity to rebuild itself in whatever fashion it desires to pursue. The new Erik Ramstad Middle School can be more than a learning center for the community; it can be a paradigm of ecological, economical, social, and educational excellence that sets a standard of pioneering development for this growing city.

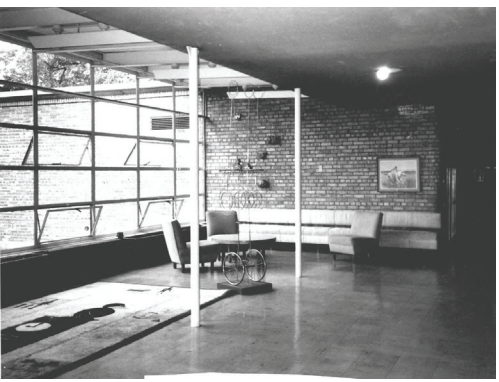
Case Study:

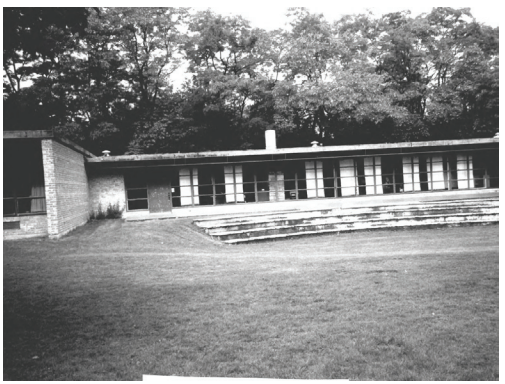
Crow Island Elementary School

"The school building that more than any other defines modern educational architecture in the Uniteted States is the Crow Island School in Winnekta Illinois" (Walden, 2009). Finished in 1940, the school was design by Perkins and Will in collaboration with Elliel and Eero Saarinen. The low lying elementary school stood apart from the the traditional multi-story school houses of its day and was demonstrative of a new kind of architecture for education. "The most significant contribution of the Crow Island School is the progressive and innovative educational program that is contains and supports to this day" (Walden, 2009).

At 48,000 sf, "the school emphasizes child-scaled environments throughout the building with classrooms designed to support a variety of learning activities and provides a sense of belonging. The classroom is designed in an 'L'-shape that provides for an entrance foyer with storage and an adjacent bathroom, a separate kitchen project area and a main semi-enclosed outdoor classroom. Crow Island served as a model for many schools after World War II when the baby boom began and thousands of new schools we needed" (Walden, 2009).

Figure 5 - Pictures of Crow Island Elementary School (Perkins and Will, 2011)





Case Study Continued:

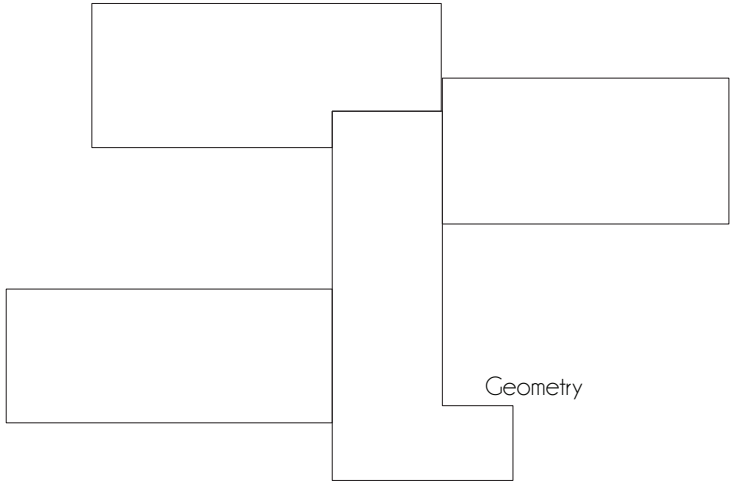
Crow Island Elementary School

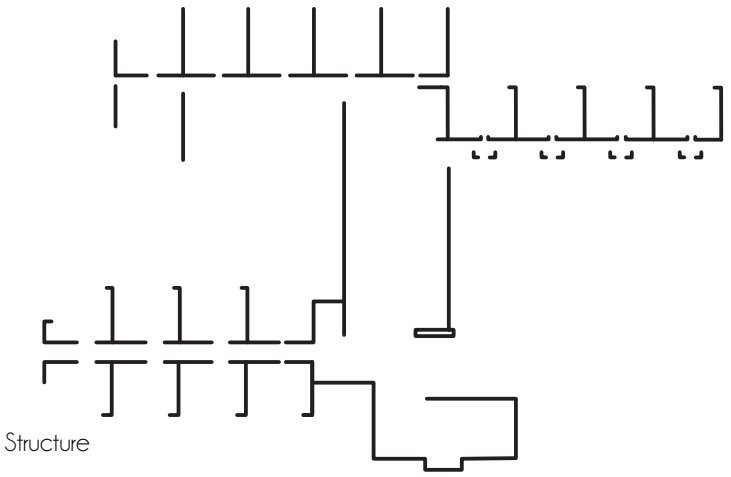
Crow Island is particularly interesting because of its adaptable classroom settings that are based on a format that allows for unconventional niche spaces for students to engage in. It is similar to Crosswinds Arts and Science Middle School in that its classrooms have less structured elements that allow for more creative learning opportunities. Crows Island Elementary school is the predecessor to Crosswinds in a progressive model of education that has exists since the 19th century, but has not been able to gain the endorsement of most learning facilities.

Crow Island Middle School was unique as a mid-20th century school. Its was the first school of its type to separate students into age group zones, which allowed for the different learning needs of first graders and sixth graders to have different micro environments within the same school.

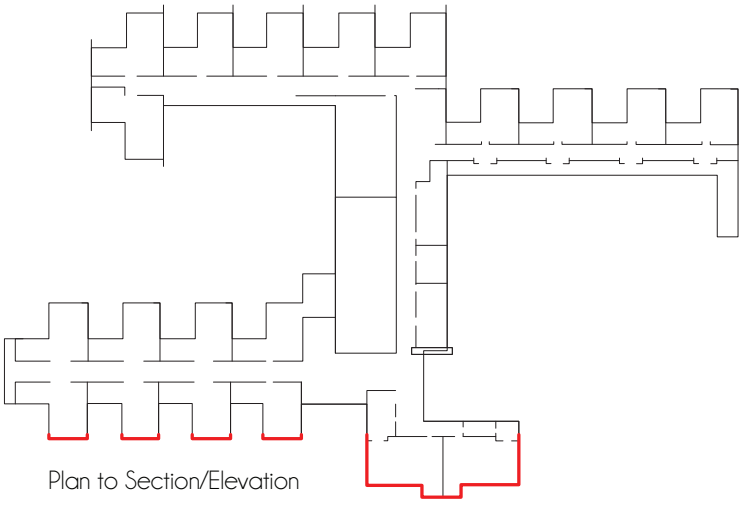
The school is a beautiful example of quality design, and the fact that it is still operating successfully after 70 years is a test amount to the longevity of not only its architecture, but the learning paradigms which that architecture embodies.

Figure 6 - Drawings and Analysis of Crow Island Elementary School

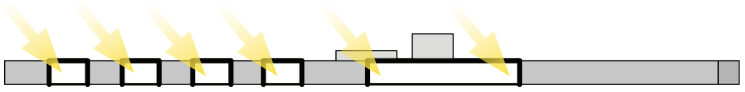




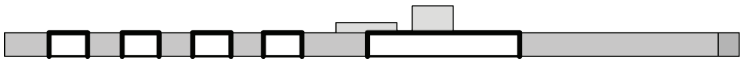
Structure

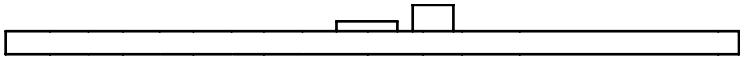


Plan to Section/Elevation

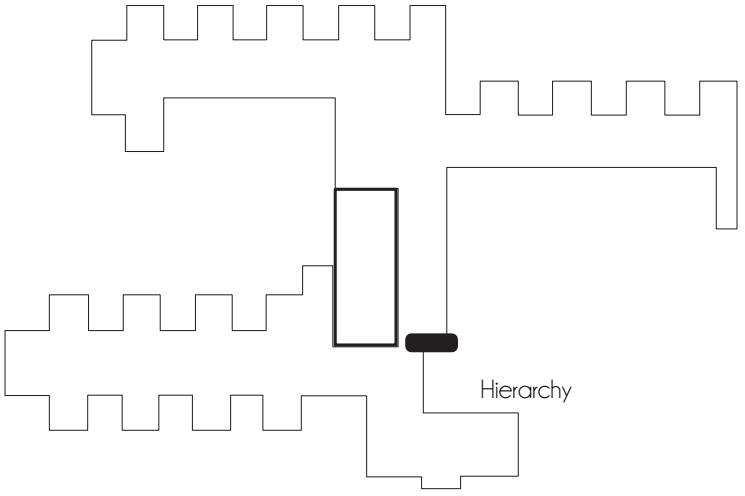


Natural Light

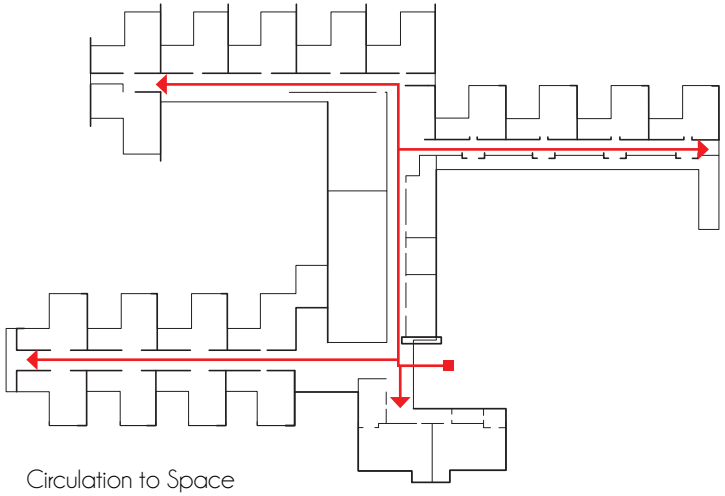




Massing



Hierarchy



Circulation to Space

Case Study:

Crosswinds Arts and Science Middle School

Crosswinds Arts and Science Middle School in Woodbury, MN is an example of a modern school which incorporates multi-age learning houses, or "home bases." Each home base if made up of about 100 students of mixed grade levels. The home bases are outfitted with labs and discovery spaces for self-paced or group learning. Also, spaces were created to support hands on project based learning, in addition to unique venues for presentation and performance opportunities (Lackney, 2008). There are six home bases total, and they surround a central core comprised of a dining and performance space, administration spaces, a media center, and gym.

Each house has variety of spaces to accommodate different learning groups such as individual workstations, small group rooms, project labs, seminar rooms, and resources areas. Individual workstations are grouped by 16 and each owned by a student, and a pair of groups shares a common work area. This variety of spaces enables students to learn individually and also to work with an interdisciplinary team of teachers. The school is located on a natural habitat and wetlands, creating a useful setting for outdoor learning laboratories (Cunningham Group Architecture, 2002.)

Figure 7 - Pictures of Crosswinds Middle School (Cunningham.com, 2011)

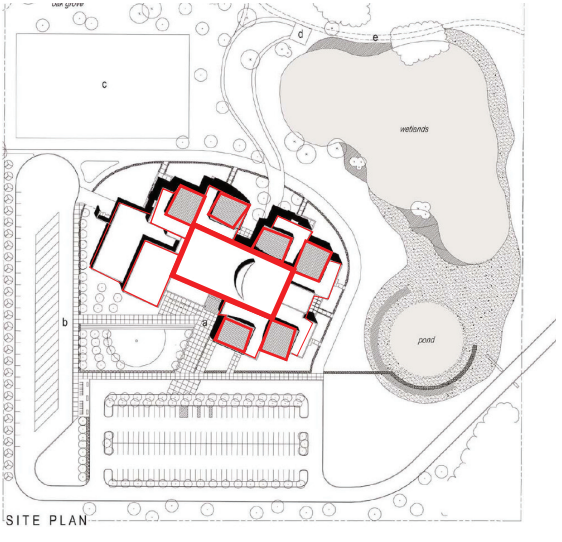


Figure 8 - Drawings and Analysis of Crosswinds Middle School

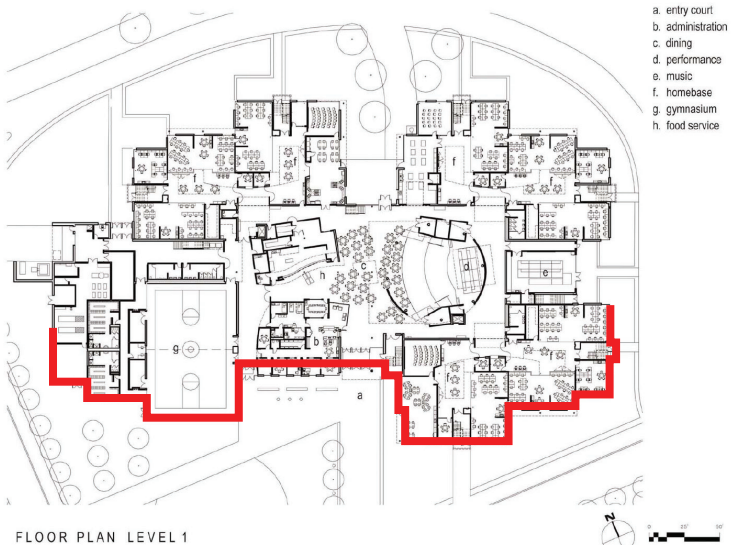
Case Study Continued:

Crosswinds Arts and Science Middle School

Crosswinds is an excellent case study because it gives a specialized curriculum that is tailored to its students. By morphing both the architecture and the educational material around the needs of the learner, a better, more holistic sense of creativity and self betterment is hopefully achieved. The design of the school around a central hearth creates a truly homelike atmosphere within a large and diverse learning environment. The mixing of age groups successfully is particularly interesting and challenges standard practice, perhaps rightfully calling into question some "common sense" principles in education.

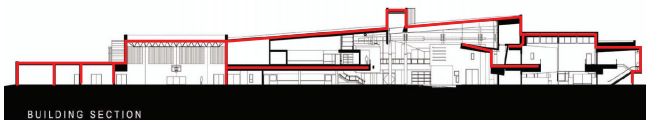
Another interesting way in which this design is breaking traditions is the incorporation of outdoor classrooms as a steady and consistent part of the curriculum. Environmental concepts are enhanced by a hands-on approach. This hands-on mentality exists throughout the entire building. Creative work spaces are placed throughout the entire design in an effort to engage learners in non-traditional methods.

This modern educational facility has clearly built upon the precedent set by the Crow Island Elementary School and is an exciting example of the potential of education in the 21st century.

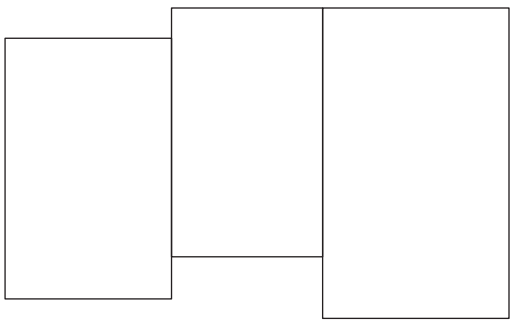


FLOOR PLAN LEVEL 1

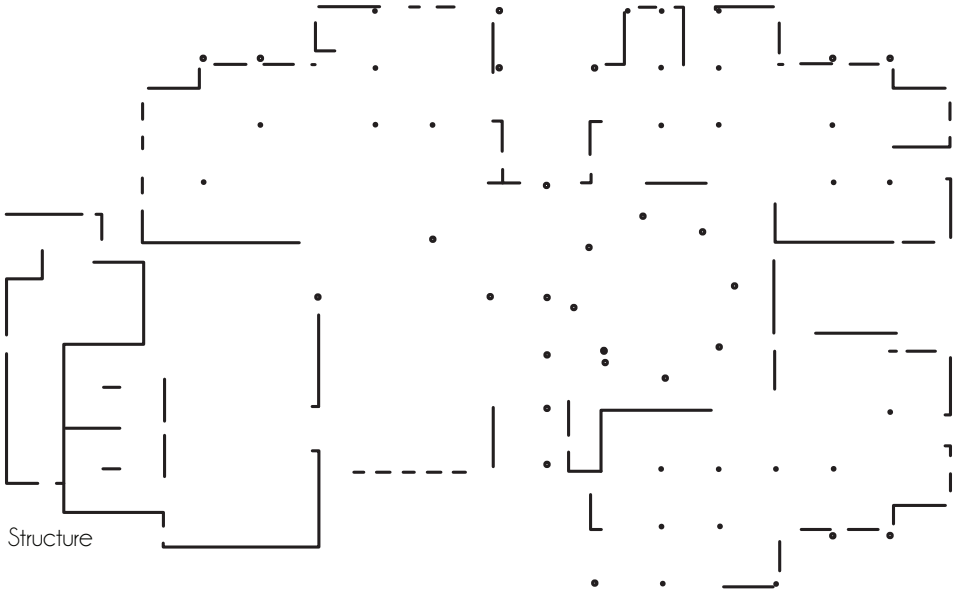
Plan to Section/Elevation



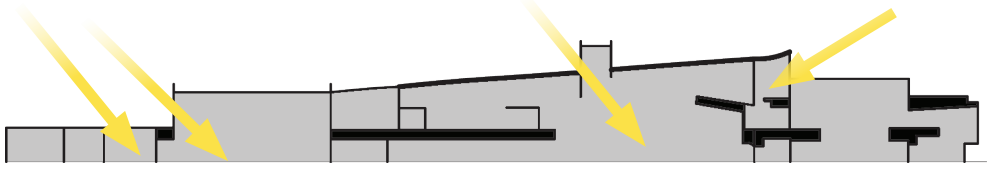
BUILDING SECTION



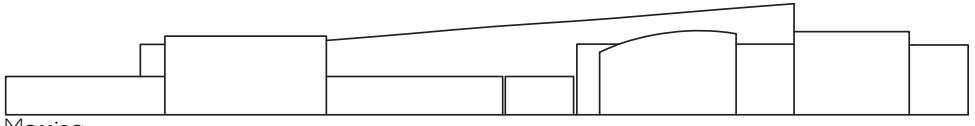
Geometry



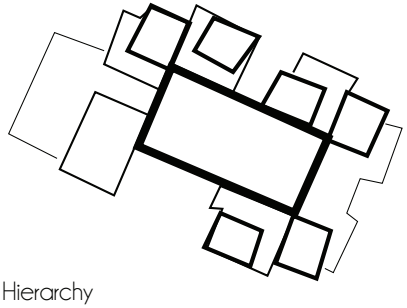
Structure



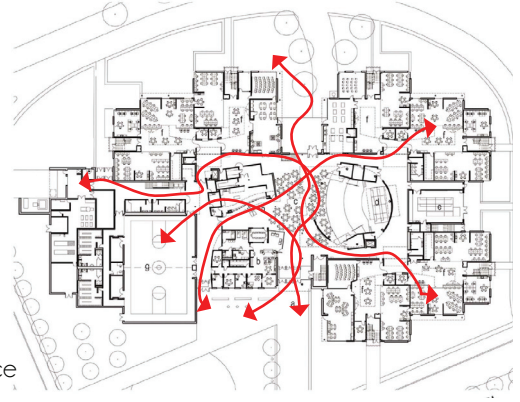
Natural Light



Massing



Hierarchy



Circulation to Space

Figure 9 - Drawings and Analysis of Crosswinds Middle School

Case Study:

Beck Academic Hall

The 125,000 square-foot newly constructed Beck Academic Hall for Gustavus Adolphus College in St. Peter, Minnesota is a beautiful example of university design that implements three specific themes:

"Foster excellence in the teaching and learning experience. Provide an attractive and beneficial asset to the campus. Promote sensitive stewardship of the environment" (BWBR, 2011).

"The core concepts of the design which were structured around these principels were context, commitement, connections, collaboration, and composition" (BWBR, 2011).

"The visual character of Gustavus Adolph's College is a blend of architectural styles from which the following patterns emerge: a uniform range of materials palettes and colors, common architectural elements and details, and consistent building scale. The college's Scandinavian heritage is reflected in expression of honestly, simplicity, and quality" (BWBR, 2011).

Figure 10 - Photographs of Beck Academic Hall (BWBR, 2011)

Case Study Continued:

Beck Academic Hall

Minot also has a Scandinavian history, and the approach BWBR takes to building a modern piece of architecture that still represents old values is very effective.

The implementation of sustainable concepts was similarly straightforward.

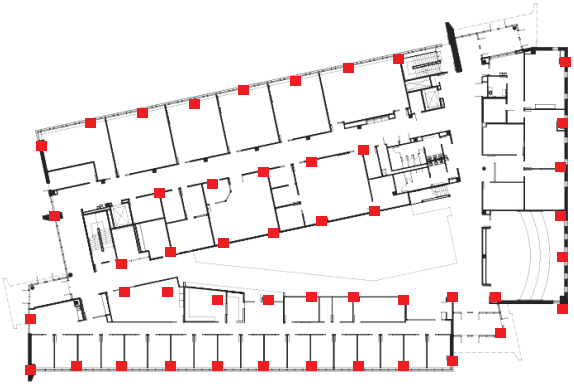
"Natural light is optimized for teaching and learning spaces by organizing classrooms along the north side of the building and by allowing light to penetrate the interior through a three-story atrium. High summer humidity is efficiently controlled by providing fresh air supply reheat utilizing roof-mounted solar thermal panels. Energy use is offset with a roof-top photovoltaic array on this building and others on campus.

The building is modeled to save 59.2% on energy and use 56.3% less water on base codes" (BWBR, 2011.)

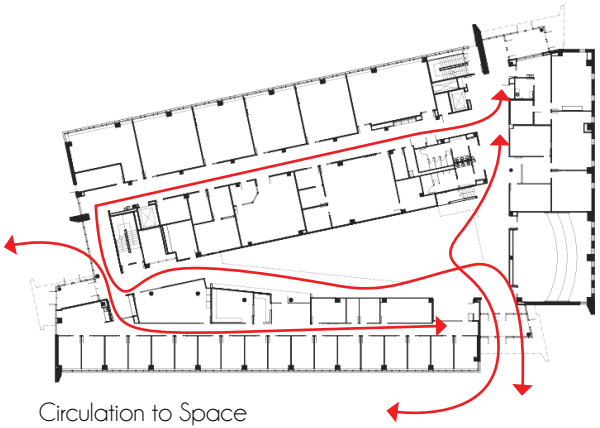
The architectural composition of Beck Hall is impressive, and the decisions made in the design are indicative of their dedication to creating excellent learning environments. What is perhaps most attractive to me about this design though, is its aesthetic. I simply like the way it looks. I believe that pursuing beautiful design is critically important when creating a learning environment. For instance, the wooden screen that follows the stairway up through the vertical circulation is particularly nice, and it offers a level of privacy for students who are moving around the facility during special events that often occur within the building.

Figure 11 - Photographs of Beck Academic Hall (BWBR, 2011)

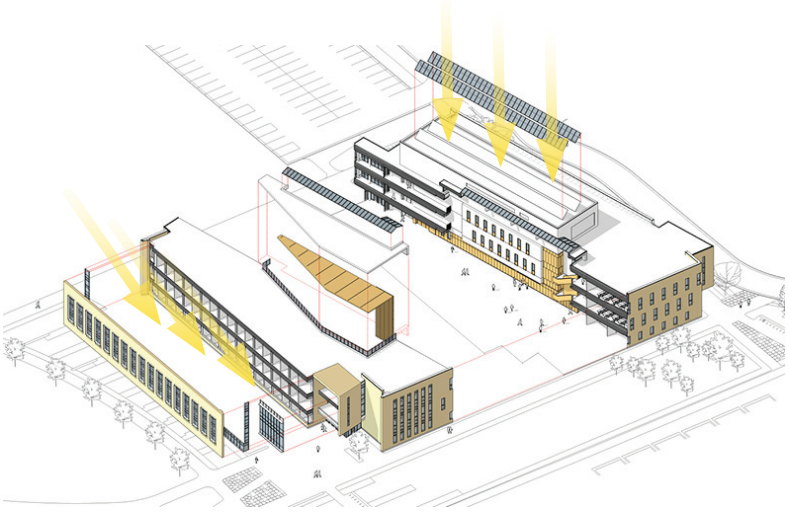
Figure 12 - Drawings and analysis of
Beck Academic Hall



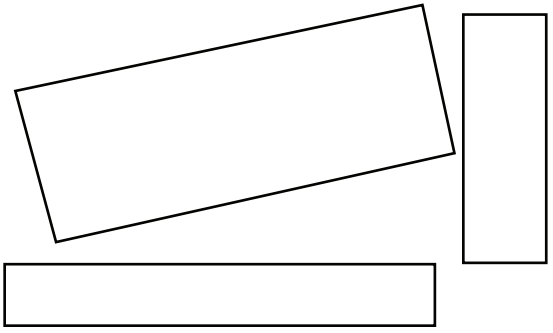
Structure



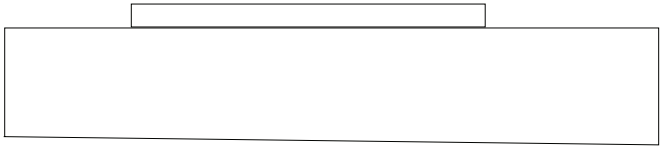
Circulation to Space



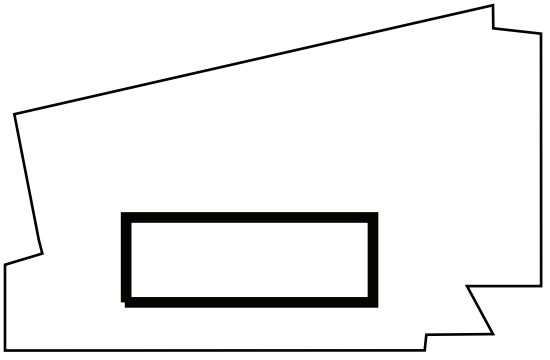
Natural Light



Geometry



Massing



Hierarchy

Case Study Summary

These case studies represent just a few of the designs which were investigated over the course of preliminary research. The High School for Recording Arts in St. Paul, MN, Druk White Lotus School in Ladakh, India, and Shitara Middle School in Shitara Town, Japan, are some of the other designs that influenced my understanding of educational design and architecture.

All of the chosen case studies shared a dedication to innovation in the field of education. Every design recognized the importance of incorporating progressive educational models into a student's curriculum. In the case of Crow Island, the school set the foundation for new developments in the field of educational design. Crosswinds was an exceptional example of entrepreneurial spirit in the name of educational progress. Beck Hall is an outstanding example of how sustainable concepts and beautiful design can be synthesized into a more traditional setting.

I believe that all three of these projects demonstrate the ability of architecture to create and perpetuate healthy environments. By holding environmental values as intrinsic concepts of design, the resultant architectural spaces almost always seem to celebrate a connection to nature and foster better environmental stewardship.

The three case studies were different in that each building was an educational facility for drastically different times in a student's education. The differences this created in the final realization of an architectural model, however, was not great. This is perhaps because good educational environments stimulate learning at any age.

Understanding the importants of education throughout a lifetime, not just during childhood years, can affect theis thesis design by suggesting that a school design built for middle school-aged students does not have to limit itself to only the education of young adults. Quite the opposite, after-hours learning opportunities can be provided for both adults and young children alike.

As Crow Island Elementary shows, good educational design can stay relevant for a long time if it is executed correctly.

One aspect of Crosswinds Middle School which was unique amongst the three case studies was the integration of small clustered group learning that operated independently of direct teacher supervision. Both Crow Island and Beck Hall incorporated this concept, but only as supplementary options that in all likelihood are not fully taken advantage of. In order for progressive design to flourish, it must be supported by both the architecture of an institution and the educators who oversee a curriculum. A tentative commitment will not create innovation.

On a similar note, the spatial organization of Crosswinds MIddle School eliminated circulation space known as a "hallway" altogether. Hallways did not exist in the design, instead those spaces were expanded and became breakout spaces, activity hubs, and presentation platforms or gallery space. This utilization of space seems like a great idea. Beck Hall used a more traditional double loaded hallway, as did Crow Island. Most schools have around 30-50% of there square footage dedicated to circulation alone. If those spaces can be transformed into learning environments that are just as useful as classrooms, the efficiency of school planning can increase incredibly.

Historical Context

Early settlement:

The Erik Ramstad Middle School is named after one of the most influential men in Minot's history. In the 1880's the Great Northern Railroad was making its way across North Dakota. At each major stop along the developing rail line "tent cities" sprang up made up of workers, drifters, gamblers, and hangers-on. The railroad's arrival to the Souris River Valley changed the entire character of the region. Previously, agriculture was the primary reason settlers were attracted to the area. The railroad brought with it an influx of new people, many of them being of a "rougher" variety. In 1886 Erik Ramstad agreed to relinquish 40 acres of his land south of the Souris river to two developers, Solomon G. Comstock and A.A. White, who had formed a company to develop the city. These 40 acres made up the majority of the city's original settlement, both the Minot business district and the Great Northern Roundhouse were built on this land (Brown, 2000).

In May of 1887, Minot officially became the center of the Great Northern Railroad's western development. The city was named after Henry D. Minot whose only connection to the city was his friendship with James J. Hill, a chief executive in the Great Northern Railway. The railroad made Minot accessible, and the city had a population boom. There was insufficient housing for the 5,000 some transient in the city, resulting in tent housing. All of the tent structures, and the suddenness with which the city grew, earned Minot the nickname "Magic City" (Brown, 2000).

The "rough and tumble" existence of early Minot was endured quite happily by some. Casper Sands, a local legend of the community and railroad conductor was reported to have been in the habit of entering the Minot station while saying, "Minot, this is M-I-N-O-T, the end of the line. Prepare to meet your God!" (Brown, 2000). Father Vincent Wehrle described the residents of the city in a similarly unflattering manner, "At this time Minot has three or four decent Catholics in town, the rest were gamblers, saloon keepers, escaped jail birds, men gone bankrupt in other places, men run away from their wives, and wives run away from their husbands." Minot's education problems were in evidence (Brown, 2000.)

Minot's first school opened in 1887. The building was 16 feet wide and 24 feet long, painted white, and constructed with light framing. In 1890, Minot became a special school district with its own school board, but it wasn't until 1903 that the first Minot High School opened. The high school only had four rooms filled by 26 pupils and two instructors. Minot gained a college in 1913, which was again built on land donated by Erik Ramstad. The curriculum of the college included 45 subjects with a teaching staff totaling 11. 50 students were enrolled. The addition of the Minot Normal school to the city was widely celebrated and marked a distinguished milestone in the city's history. By the second decade of the 20th century Minot's population had grown to over 6,000. The Minot Commercial Club released a publication calling Minot a "metropolis of the Northwest: sunstantial brick blocks

s of two to three stories, two banks, each with more than 2,000 dollars on deposit, half a dozen grain elevators, a flour mill of 200-barrel capacity per day, five lumber yards, four drug stores, half a dozen hotels, one with 110 rooms" (Brown, 2000). Minot made its mark in the rural Dakota's and continued to grow and develop to today.

Flood History:

Built on the banks of the Souris River, Minot has a history of flooding. Prior to 2011's flood, the flood of 1969 was considered the most damaging flood in the city's history, and may still be considered the most destructive today. Of Minot's 35,000 residents, 11,00 were evacuated from their homes and apartments. "Souris river floods in Minot do not do much damage from their high crests, but rather, its that those crests remain for weeks. Low-water slope of the river at Minot is about six inches per mile. With such a great volume of flood water to be moved by gravity through a valley of low fall, it takes a long time for the water to pass" (City of Minot, 2011). During the 1969 flood, there was 10,000 cubic feet of water per second flowing down the Souris. The Minot channel had capacity for 2,300 cubic feet per second, with a bottleneck of only 1,500. The flood caused an approximated 10 million dollars worth of damage at the time, with an additional $800,000 in diking expenses alone. That sum is equivalent to 71 million dollars today (City of Minot, 2011).

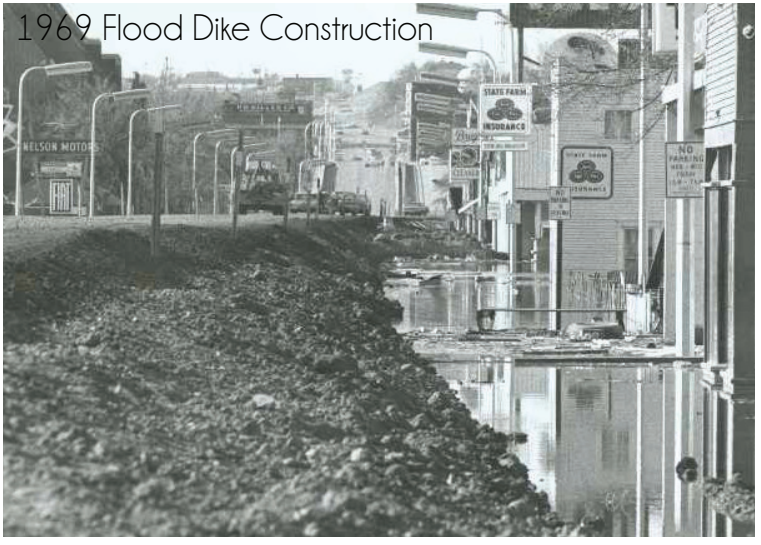


Figure 13 - Flood Photographs (Rally Minot, 2011)

An excerpt from a journal entry written on April 19, 1969 reads,

> "Minot dubbed 'Venice of North' as river crests at 20.44 feet, 3.44 feet over Des Lacs runoff crest and 6.44 over flood stage. Flow peaks at 6,300 cubic feet per second, well down from estimate but river channel becomes near predicted crest because of extensive diking reducing areas in the channel. Only 200 of nearly 12,000 displaced Minoters show up in shelters at three schools. Others are housed at homes of friends, in motels, hotels, vacant apartments, vacant trailers, and some leave town to stay temporarily with relatives or friends. Maj. Gen. Frederick J. Clarke, newly appointed chief of the Corps of Army Engineers heads inspection team checking on Mouse River flood" (City of Minot, 2011).

In response to 1969 flood, the Army Corps of Engineers straightened the path of the river through the city to increase flow rates and also built several flood control structures. These precautions successfully protected Minot from flooding until the 2011 flood.

The 2011 flooding of the Souris surpassed the 1969 flood in terms of water volume. At its crest, the 2011 flood had a csf of 28,000, and was eight feet higher than the 1969 watermark (City of Minot, 2011). Total damages from the flood are estimated to cost 63 million dollars. Many homes and schools were destroyed in the recent flooding, Erik Ramstad Middle School being one

Figure 14 - Flood Photographs (Rally Minot, 2011)

1969 Flood Gear

of them. Mark Vollmer, Minot's superintendent, recently declared the school a "total loss" (City of Minot, 2011). Luckily, Minot's economy is healthy, and is predicted to stay healthy. The local air force base, and growing energy development programs in and around the city contribute to the Minot's positive economic outlook. The prospect of creating a new sustainable middle school that is in touch with the land's agricultural and energy based roots is exciting.

Typological History:

Jeffery A. Lackney's states in his essay *History of the Schoolhouse in the USA,*

> "The history of the American schoolhouse reflects the history of education that in turn mirrors a plethora of contextual societal forces including social, economic, and political ones. The architectural form and layout of the school building has historically been influenced by the evolution of educational philosophy and goals, curricular objectives, instructional methods, and cultural values of schools. For example, the architecture of the small one-room country school building was an appropriate design response that served the basic educational and social needs of the small rural communities for well over 200 years in the United States.
>
> As the social problems associated the the rise of the Industrial Revolution increased in the mid and late 19th century, the need for education larger groups of immigrants in urban centers became central. Large multistoried classroom

buildings provided the necessary educational and architectural response at the time to the common school movement. It was at this time that schools became highly formalized and hierarchically designed to sort students who were eligible for promotion to a higher level in the system from those who were not.

After World War II, societal changes created by the baby boom created an enormous demand for school construction. Many schools were built too inexpensively, creating poorly insulated roofs and walls and poor-quality building systems. Like the building boom in the early 20th century, the 1950's saw a proliferation of standardized plans that has characterized educational architecture of that period.

New methods of school building construction allowed for experimentation in flexible and adaptable space for education. Innovations in educational delivery such as the Progressive Moement, lead principally by John Dewey in the United States, required school architecture to respond yet again with more child-scaled, flexible, and open environmental settings.

The general acceptance of various innovations and paradigms in educational design usually occurred several years following a specific innovation, and not without some social and political resistance. Many Colonialists did not see the need for a separate schoolhouse when they could teach their own children at home, since the objective was to learn how to read the Bible or be apprenticed in the family trade. The Progressive Movement in education beginning in the late 19th century did not significantly influence education or school architecture until the middle of the the 20th century, and school design today still responds to outdated modes of instruction."

A re-evaluation of acceptable educational models and methodologies has led the discussion for new school design. Barack Obama commented on the current failing standard, "And when they look around and see that no one has lifted a finger to fix their school since the 19th century; when they are pushed out the door at the sounds of the last bell... is it any wonder they don't think their education is important?" (Mau, Muller, Syvertsen, 2010). The architecture of new schools need to contribute to an effort to re-energize interest in public education. A new progressive and sustainable Erik Ramstad Middle School will signal to the students of Minot that their education is important to the community and can provide the city with valuable learning atmosphere.

Goals

Academic

It is my aim to to develop and ultimately display architectural work that meets and exceeds the expectations of graduate thesis work for students enrolled in North Dakota State University's architecture program.

I hope to become more proficient in visualization techniques in 3-D modeling, rendering, and presentation layouts.

I wish to become knowledgeable in the field of educational design.

I wish to become knowledgeable in the field of sustainable design.

I would like to explore new avenues of process development, leaving my comfort zone, in order to become a more well-rounded designer.

Professional

It is my aim to create contacts and relationships with several different professional architectural firms over the course of this project.

I hope to continue a correspondence with Minot city officials so that my work reflects the real world values of a client in need of a design solution.

I wish to develop my portfolio for future resumes.

I hope to realize an architectural solution that is capable of being implemented and meets the standards of professional practice.

Personal

To maintain health and well-being throughout the semester by sticking to a work schedule that is well paced, and allow for sleep, exercise, and food.

To finish my thesis work with an understanding of my best capabilities as a young architect at that point in time.

Site Analysis

Figure 15 - Pcitures of the Minot Prairie

Qualitative

The site of the proposed middle school is in the center of Minot. The site is surrounded by mixed-use residential development with possible access to the Souris river available to the south. The site is incredibly flat, but spatious, creating a unique opportunity to developed a beautiful school campus.

Views:

The gridded pattern of city's streets is in strong evidence around the site, creating the potential to build off this linear organization with strong axis lines. There are several nearby roads that support heavy traffic, but the site is sufficiently insulated from direct contact to these areas through a residential buffer and green space. Brick masonry and wood siding are the primary material selections for the facades of nearby structures. These materials should be taken into consideration when developing the middle school facades. The site feels open to the sky, but not exposed. The surrounding trees along the site's periphery and the smaller scale of the nearby residential houses gives the site a cozy and comfortable feel. I believe finding a way to access the river visually from the site could be quite powerful and beneficial for the school's learning environment.

Light Quality:

The open characteristics of the site allow for ample sun exposure. Few trees have been allowed to grow in the area directly on the site, so the sky and sun are vibrant, and on sunny days potentially distracting. This openness will cause warm days to be warmer and cold days to be colder for lack of protection from cold winter winds and warm summer sunlight.

Vegetation:

The tones and colors of Earth and sky dominant the landscape in equal measure. The browns and greens of the vegetation are disntinctly inorganic due to their linear placement along the nearby streets. Trees will likely need to be introduced to the site to create a better biofilic connection and provide the potential of creating community park space and an outdoor lab area.

Wind:

Wind is a major factor on the site. While never too strong when I was present, exposure to the wind will likely be an issue that needs to be addressed. Watching the wind kick up fits of loose snow amongst the stuble of grass left on the site was pleasant though, even on an overcast day.

Human Characteristics:

Due to its location near the center of the city, human activity is readily apparent on the site, but has been drastically affected by the recent flood. The adjacent housing has been destroyed by the flood, leaving empty shells and boarded up windows where a vibrant and healthy community atmosphere once was, and can again be recreated. The hum of automobile traffic is audible, although the sound is muffled thanks to the trees and buildings which seperate the site from the nearby large traffic arteries.

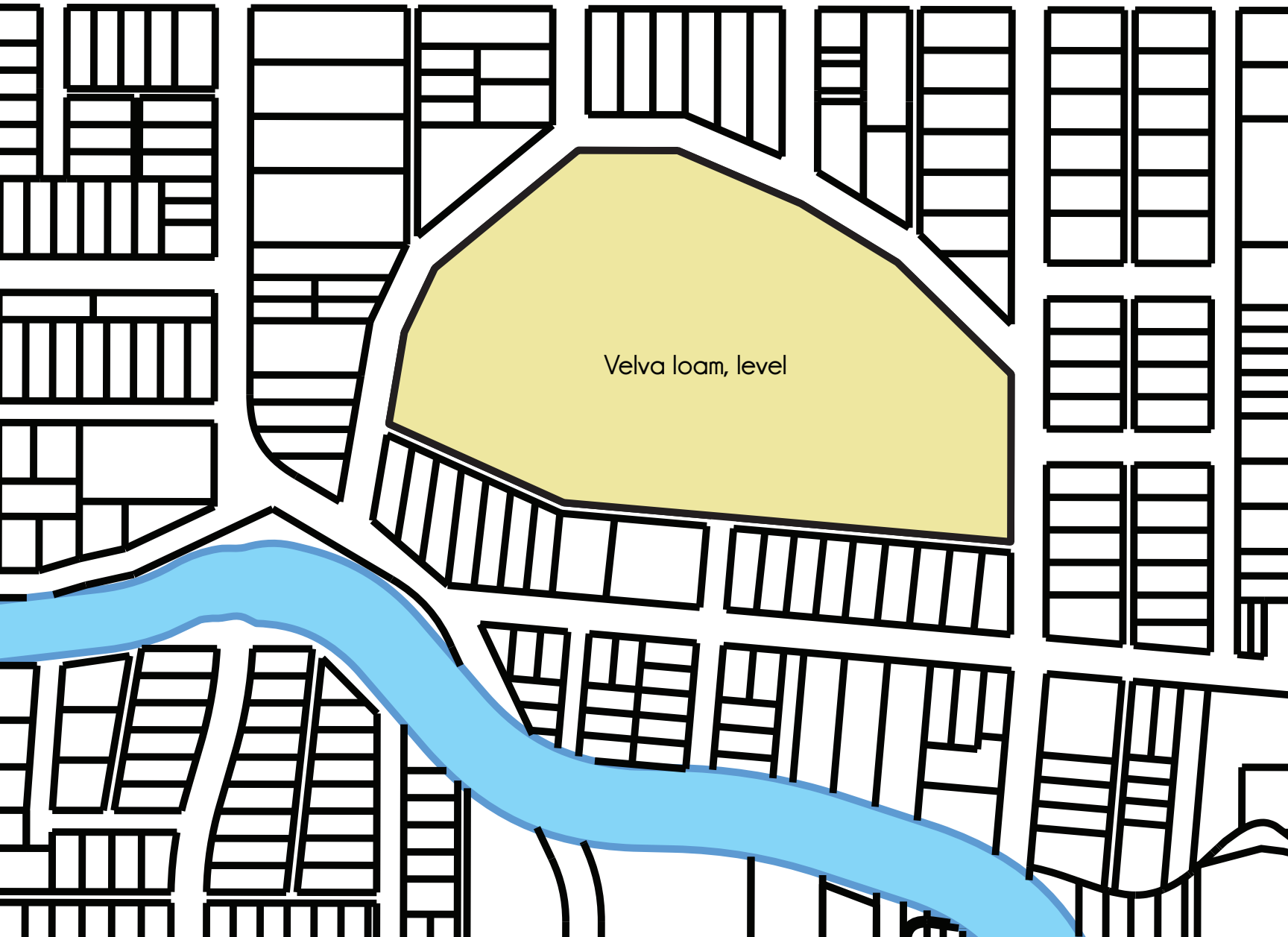
Distress:

In the wake of the recent flood, the site is in extreme disrepair. Empty Streets and empty structures surround the site. The entire area is still littered in detritus, and the existing middle school which existed on the site prior to the flood is a somber and disheveled caricature of an educational facility.

Site Analysis

Site Soil Analysis

Figure 16 - Site Soil Analysis



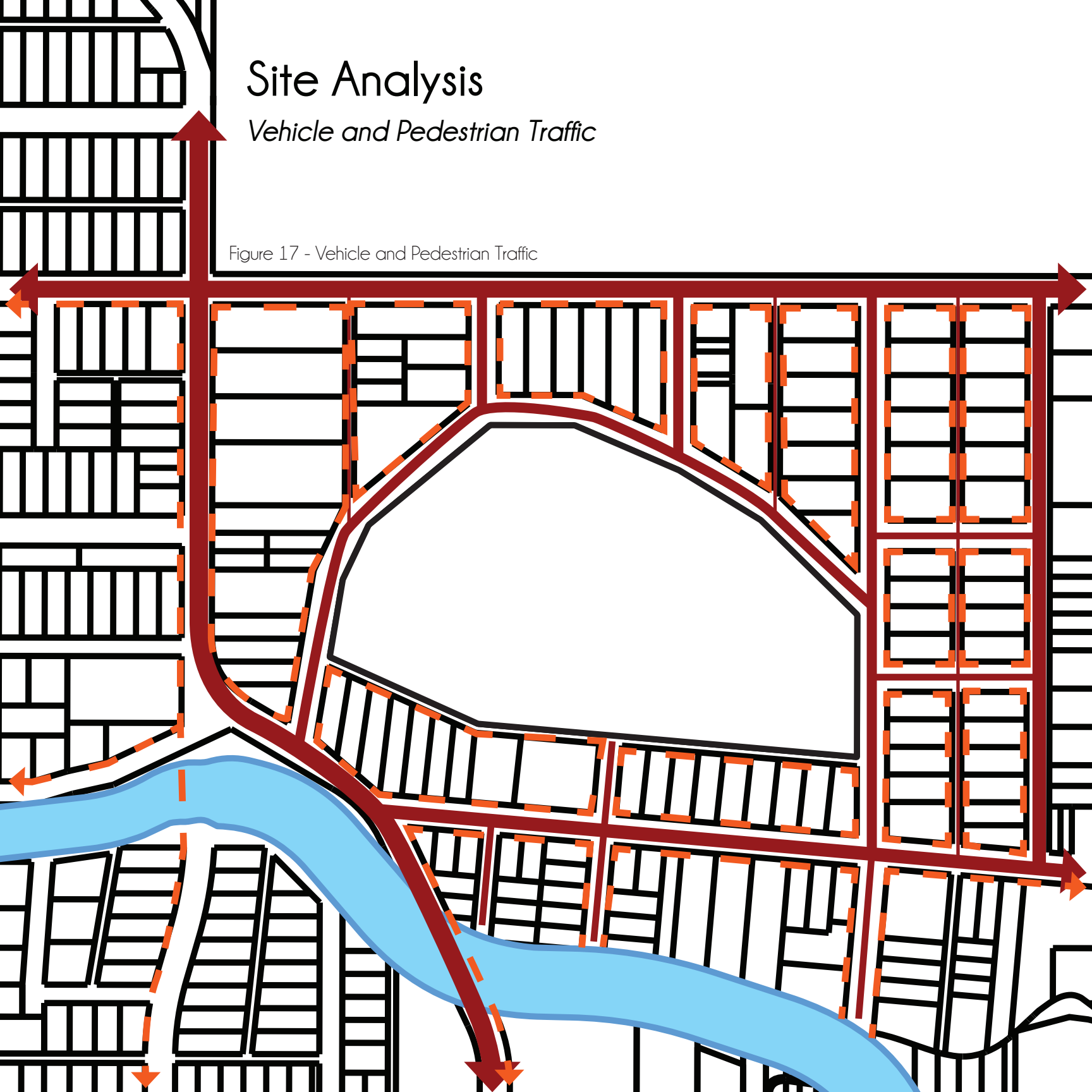
Water Table Analysis

Wayne Whitty, principle of a Minot architectural firm, stated in an interview that the water table of central Minot is very high, and sensitive to construction projects. Underground streams are found throughout the area, and new construction can often push water into places that previously did not have an issue. This means that controlling water table impact when building on the site is very important, so that other properties are not unitentionally damaged.

Site Analysis

Vehicle and Pedestrian Traffic

Figure 17 - Vehicle and Pedestrian Traffic



Vehicle Traffic:

Vehicle traffic is show with red lines of varying width. Thicker lines represent heavier traffic. The site has good access to roadways while still not lying adjacent to the busy streets. This will allow the design to manipulate vehicle entry in a manner that conveniently pulls traffic off of the main roadways and retains a safe distance from dangerous roads.

Pedestrian Traffic:

Pedestrian walkways, shown in orange, are plentiful in the area and surround the residential blocks. Making use of pedestrian traffic in the site development can help to establish the design as a center for community activity.

Site Analysis

Topographic Survey

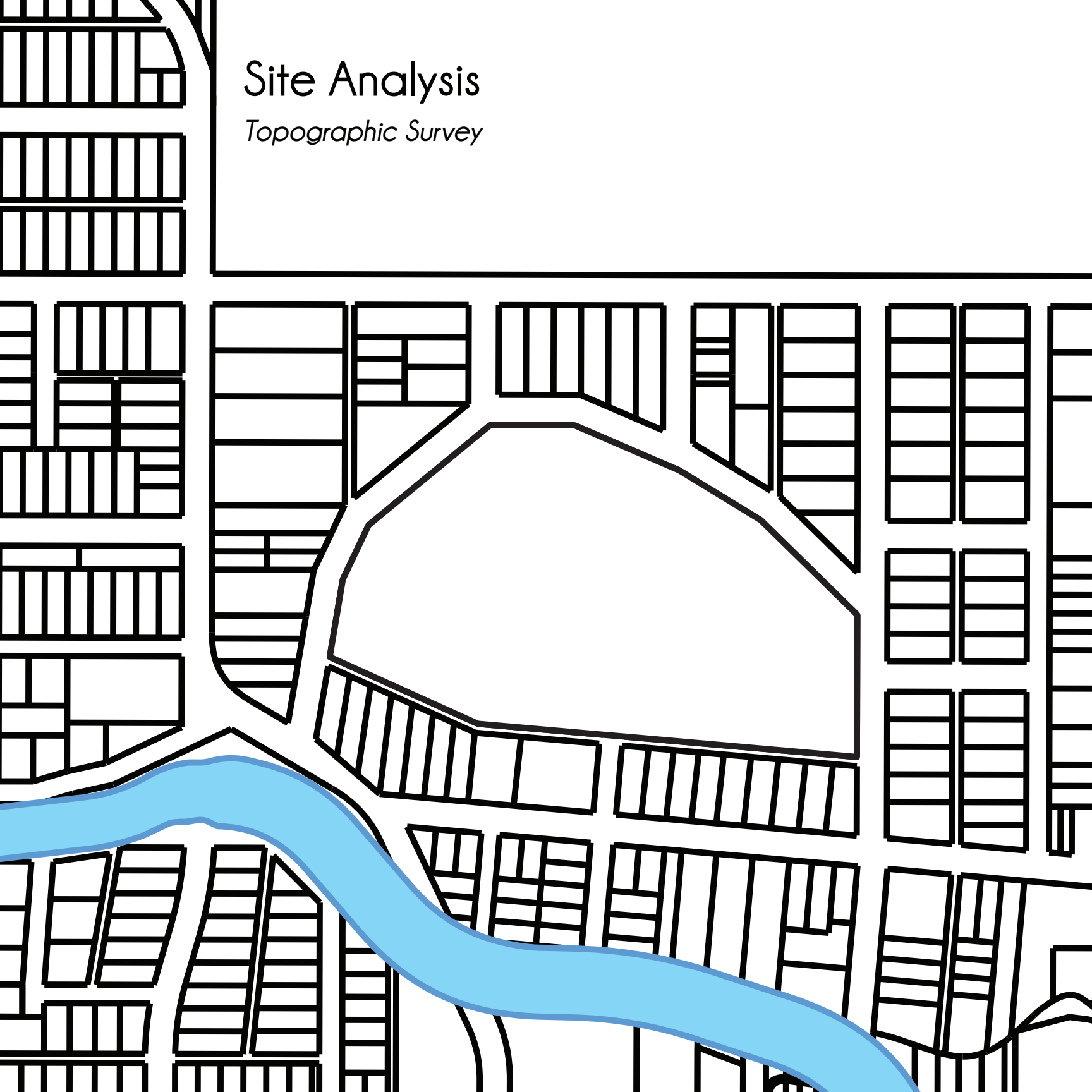
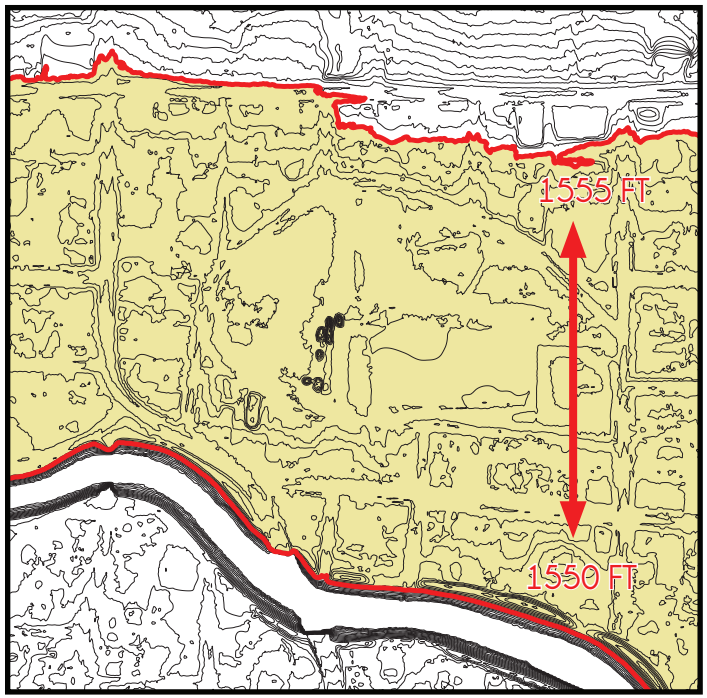


Figure 18 - Topographic Survey



Topography

The site's topography is very flat. The above highlighted region represents a quarter mile distance from the river bank where there is less then 3 ft of sporadic elevation change. After a quarter mile, more consistant and uniform changes of elevation can be scene.

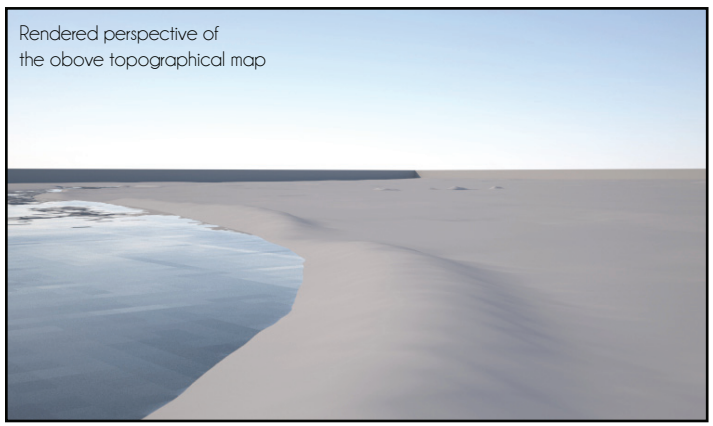


Figure 19 - Topographic Rendering

Site Analysis

Utilities

Located at the center of the city and on the site of the previous middle school, the site has access to all necessary utilities.

Figure 20 - Utilities

Site Analysis

Site Vegetaition/Site Character

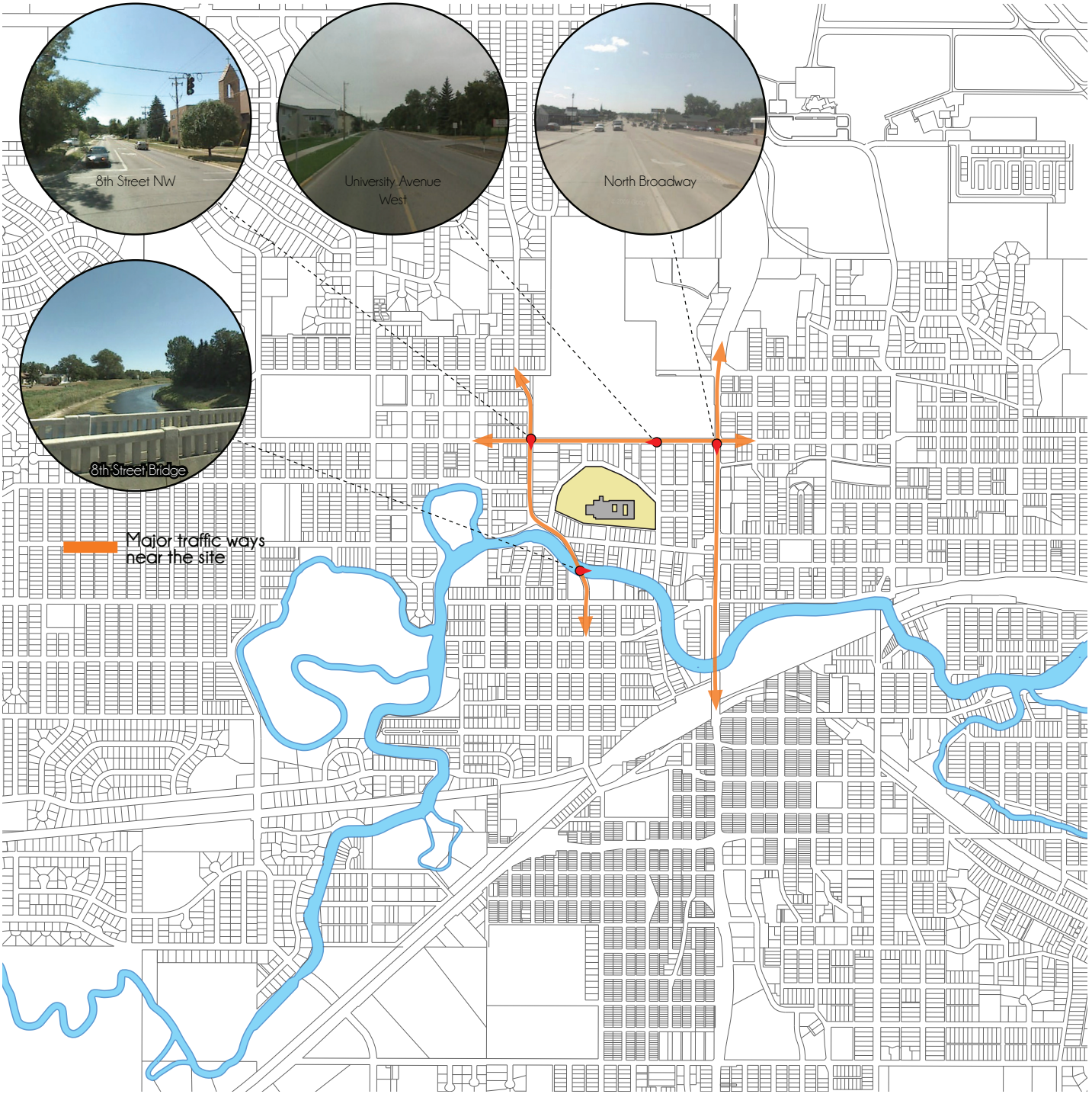
Yards and trees belonging to the residential properties surrounding the site provide plenty of green views. The damage to the landscape caused by the recent flood is evident, but the land seems to be recovering fairly quickly. The trees have weathered the flood well, and will likely survive. Tall grasses cover the river bank, and farther in, the groomed and maintained residential lawns continue to soften the landscape.

Figure 21 - Vegetation/Site Character

Site Analysis

Reconnaissance

Figure 22 - Reconnaissance



Site Analysis

Climate Data

Figure 23 - Temperature in Degrees Fahrenheit

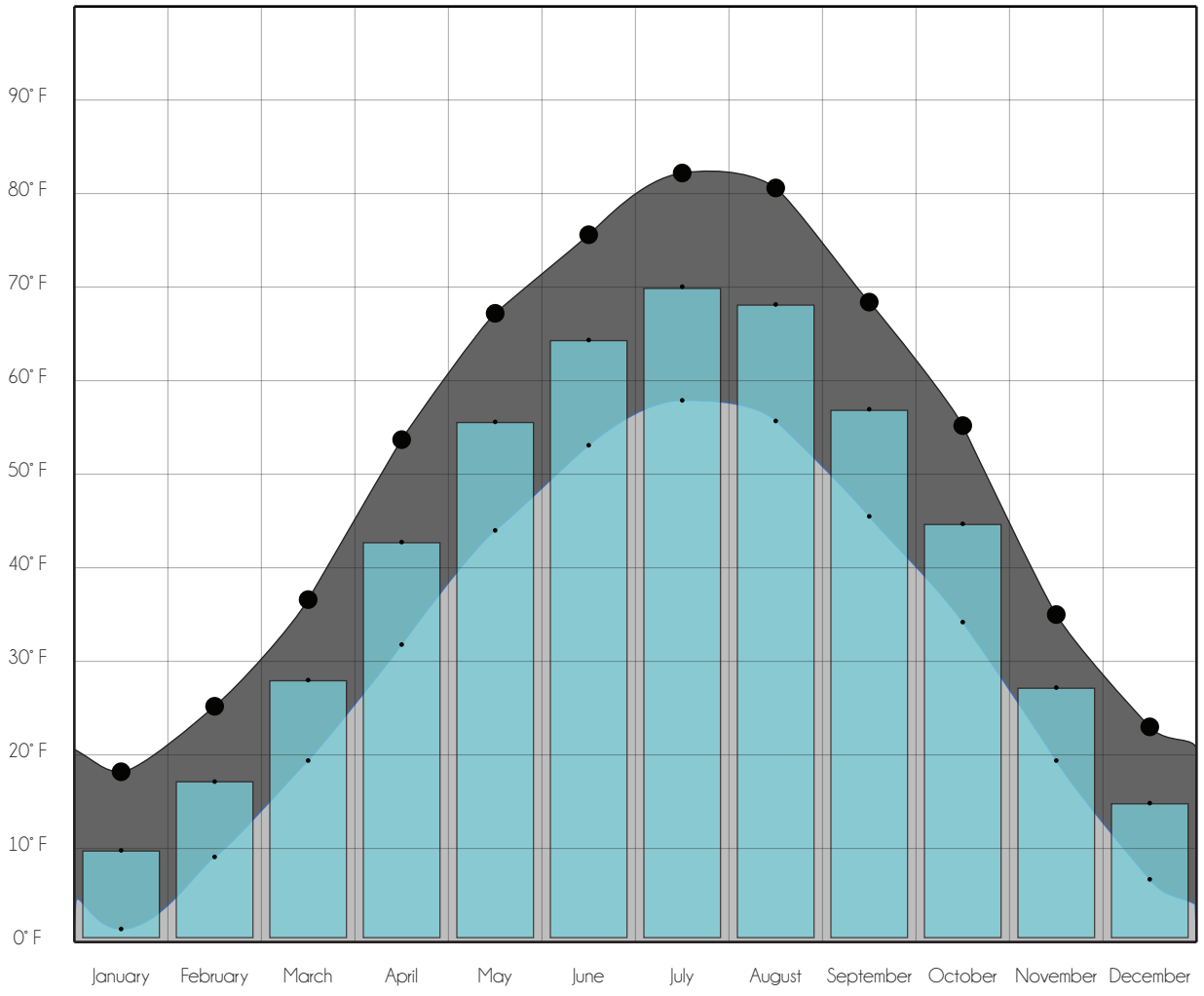
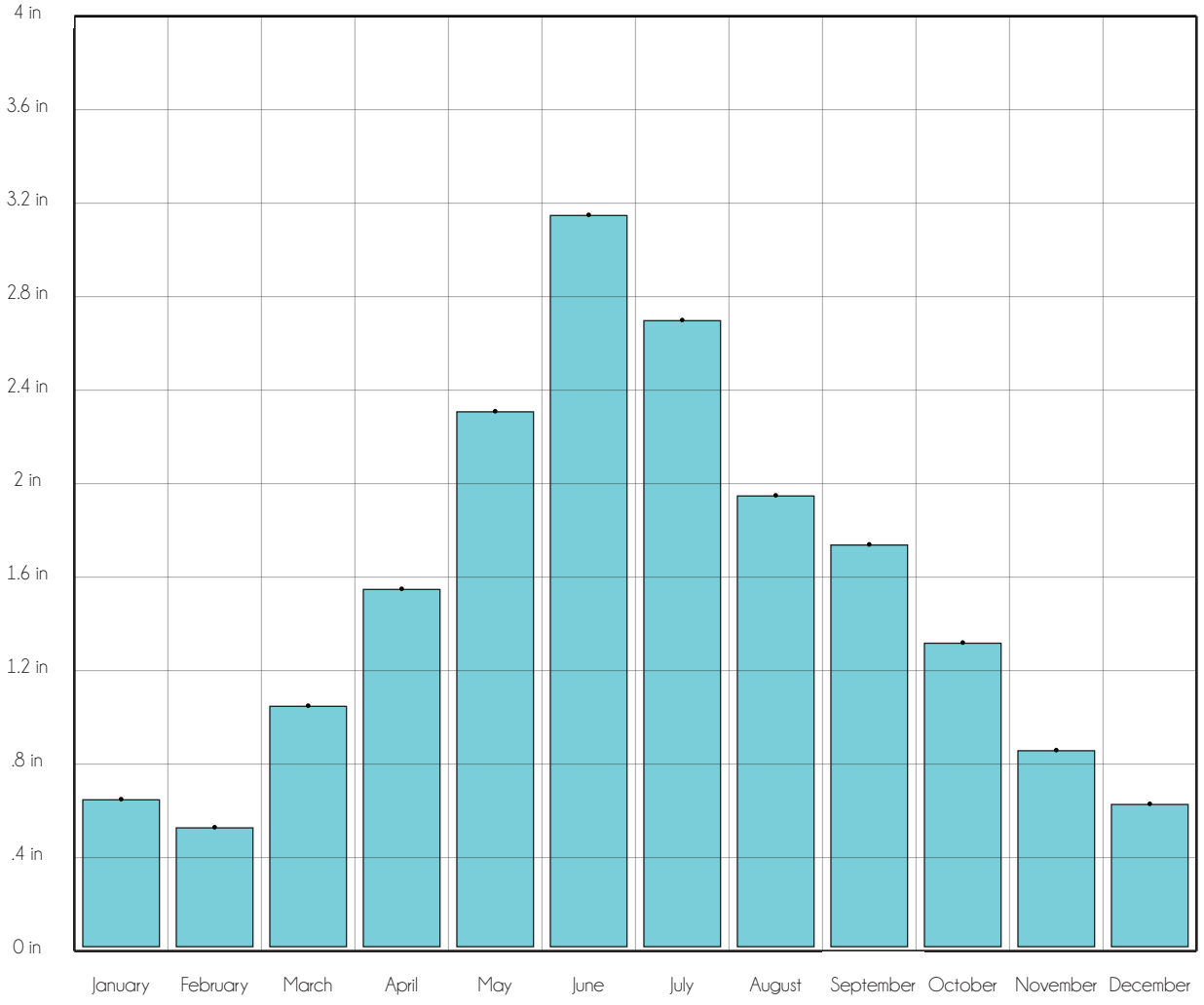


Figure 24 - Precipitation in Inches



Site Analysis

Climate Data

Figure 25 - Snowfall in Inches

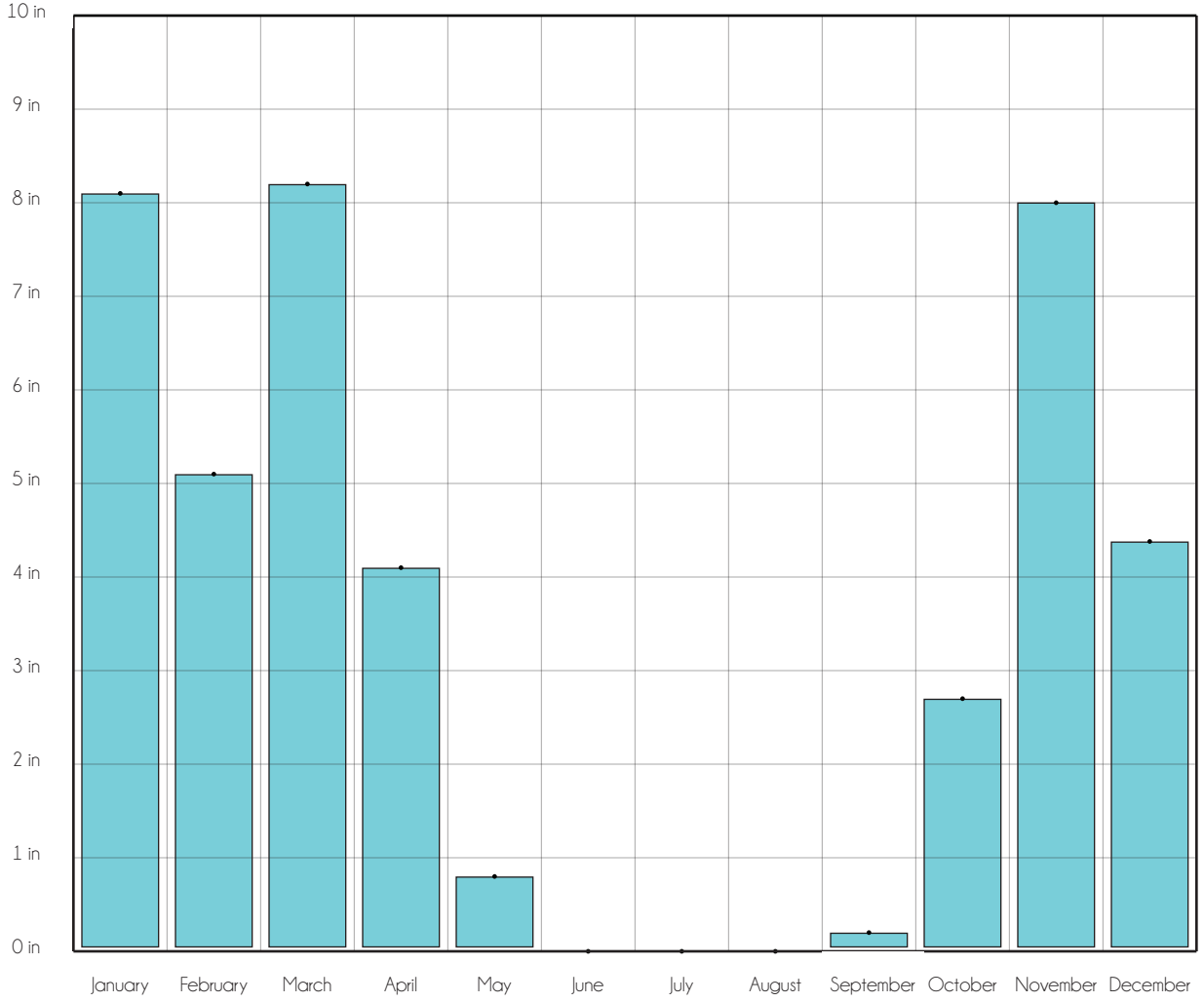
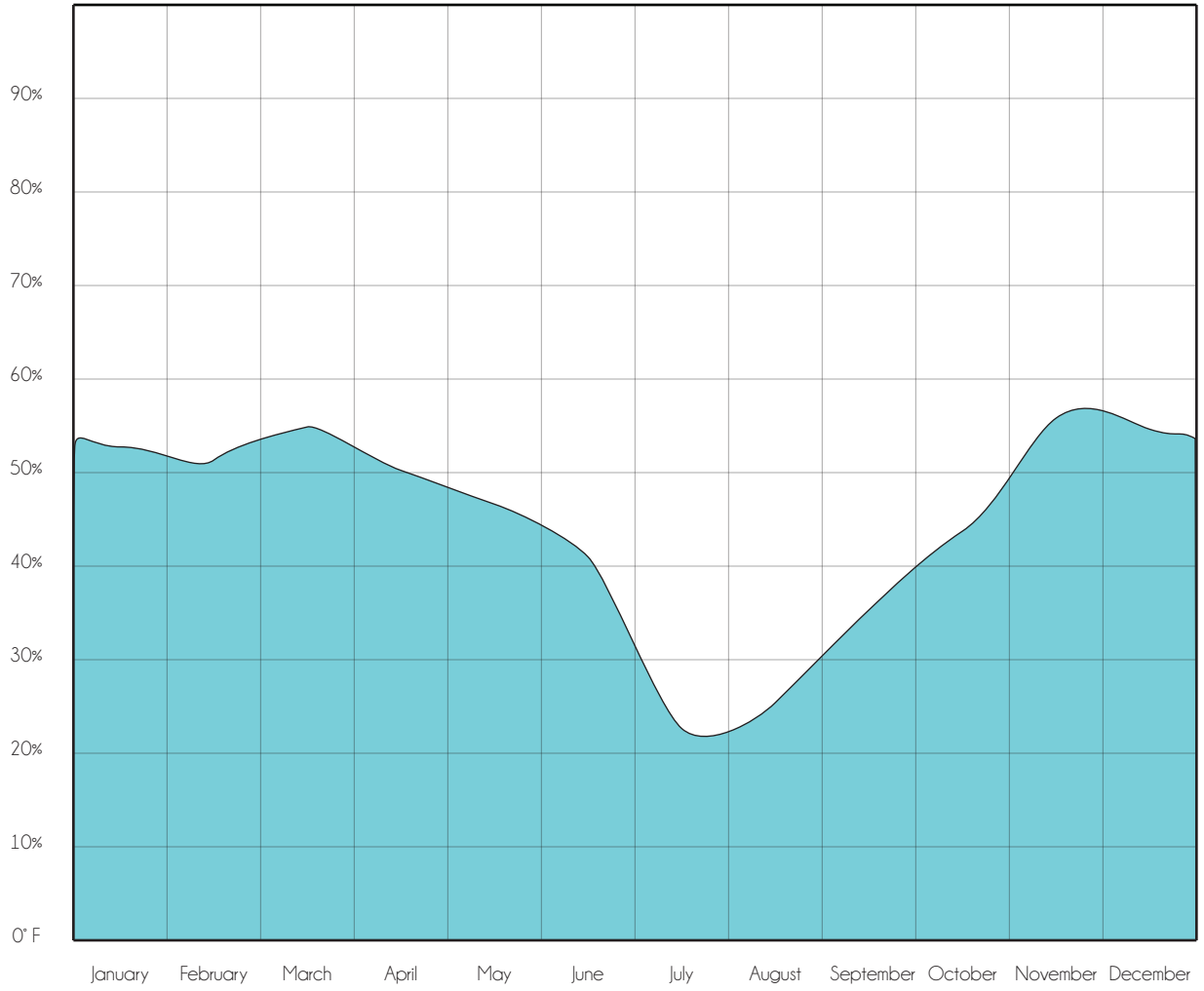


Figure 26 - Cloudiness



Site Analysis

Climate Data

Figure 27 - Humidity

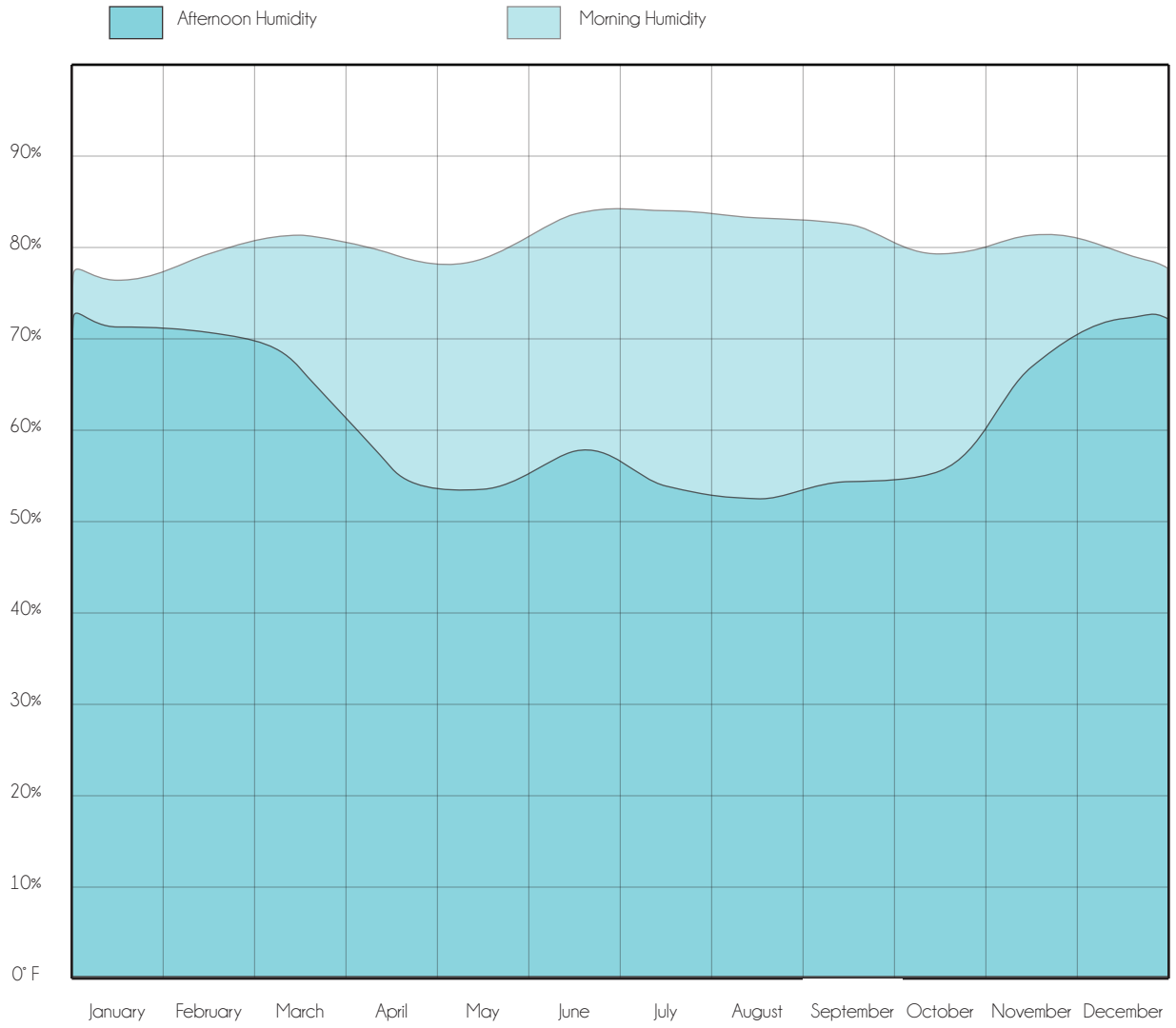
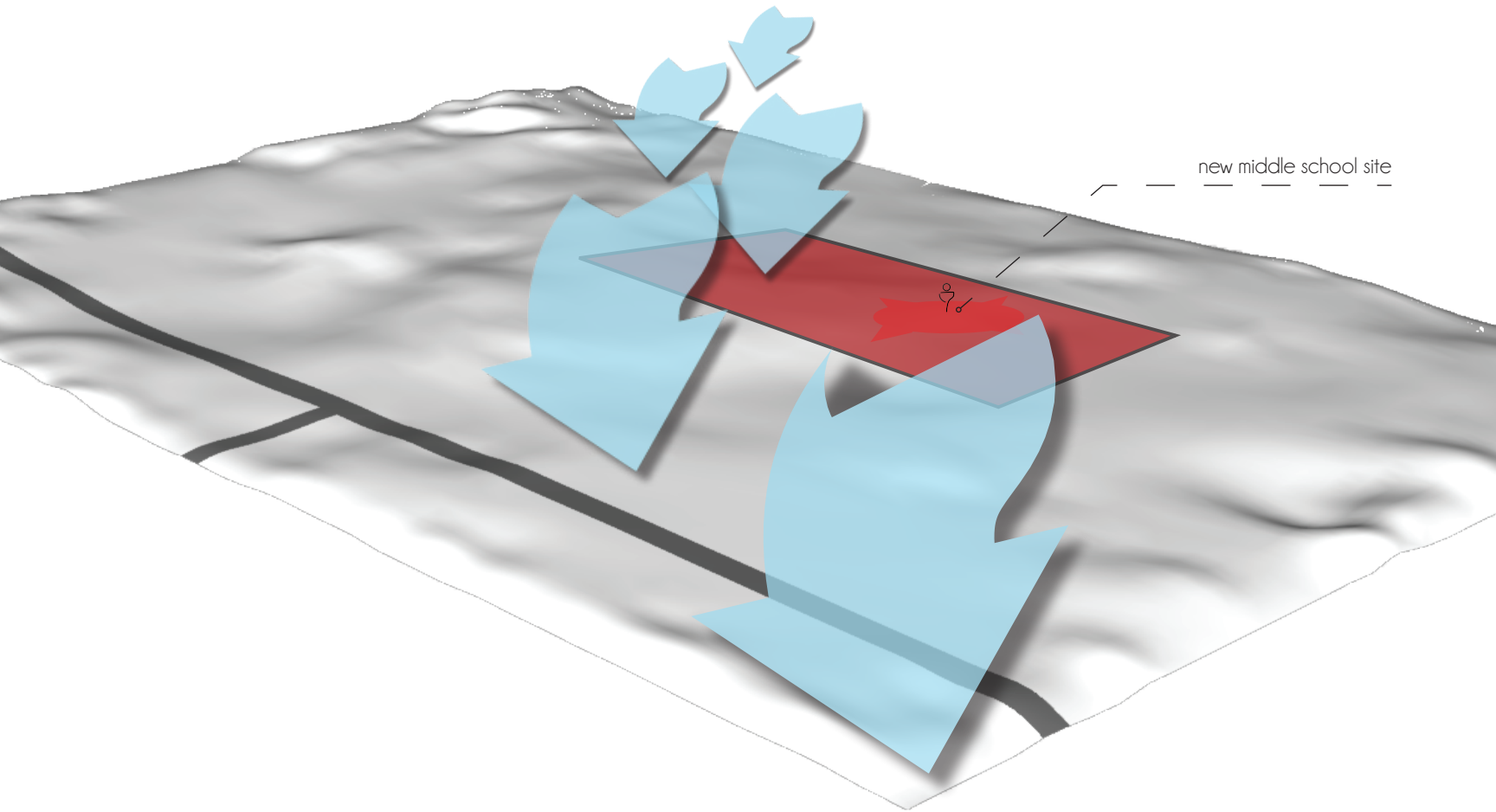


Figure 28 - Topography and Air Movement



Site Analysis

Climate Data

Figure 29 - Sun Path Diagram

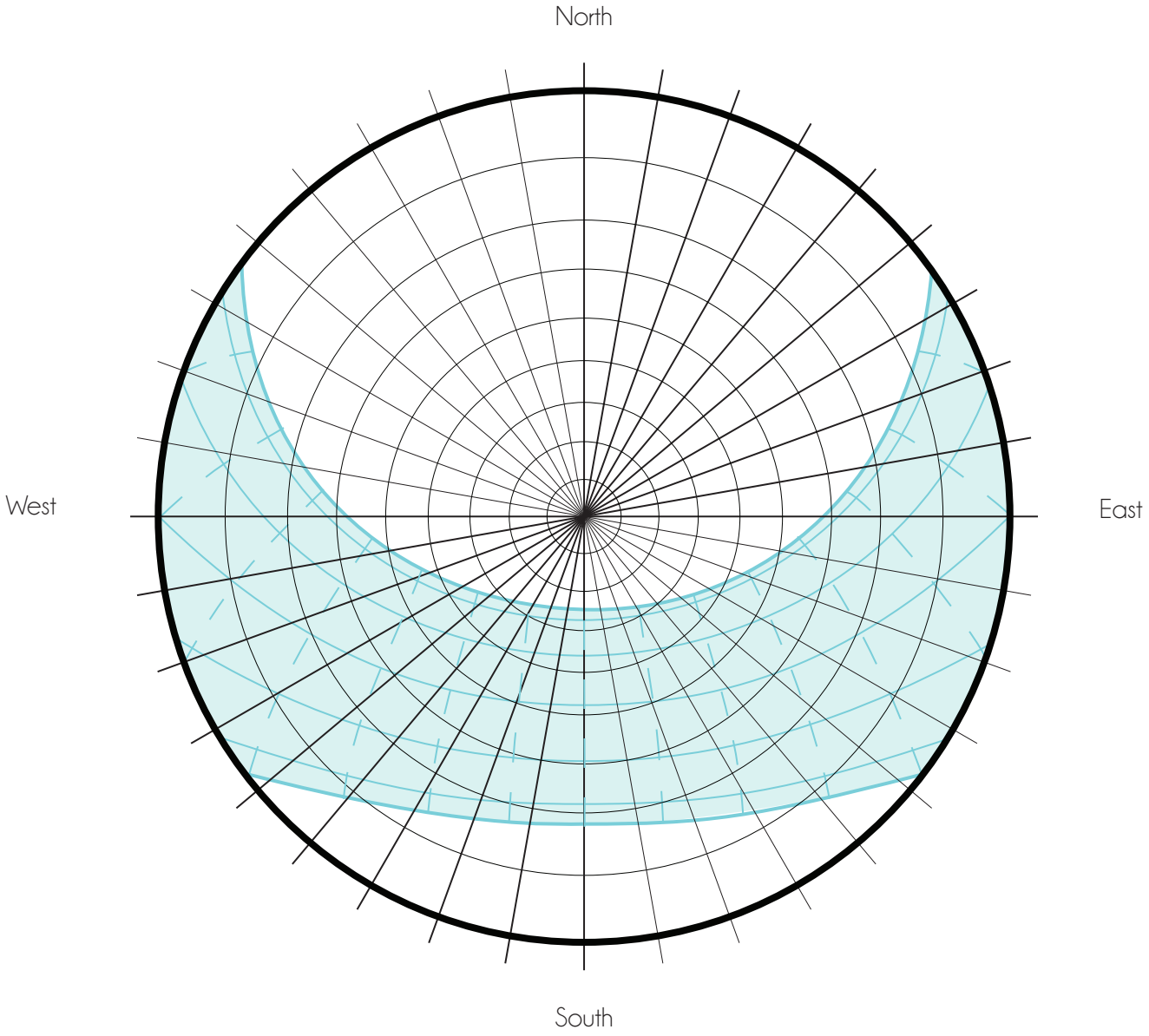
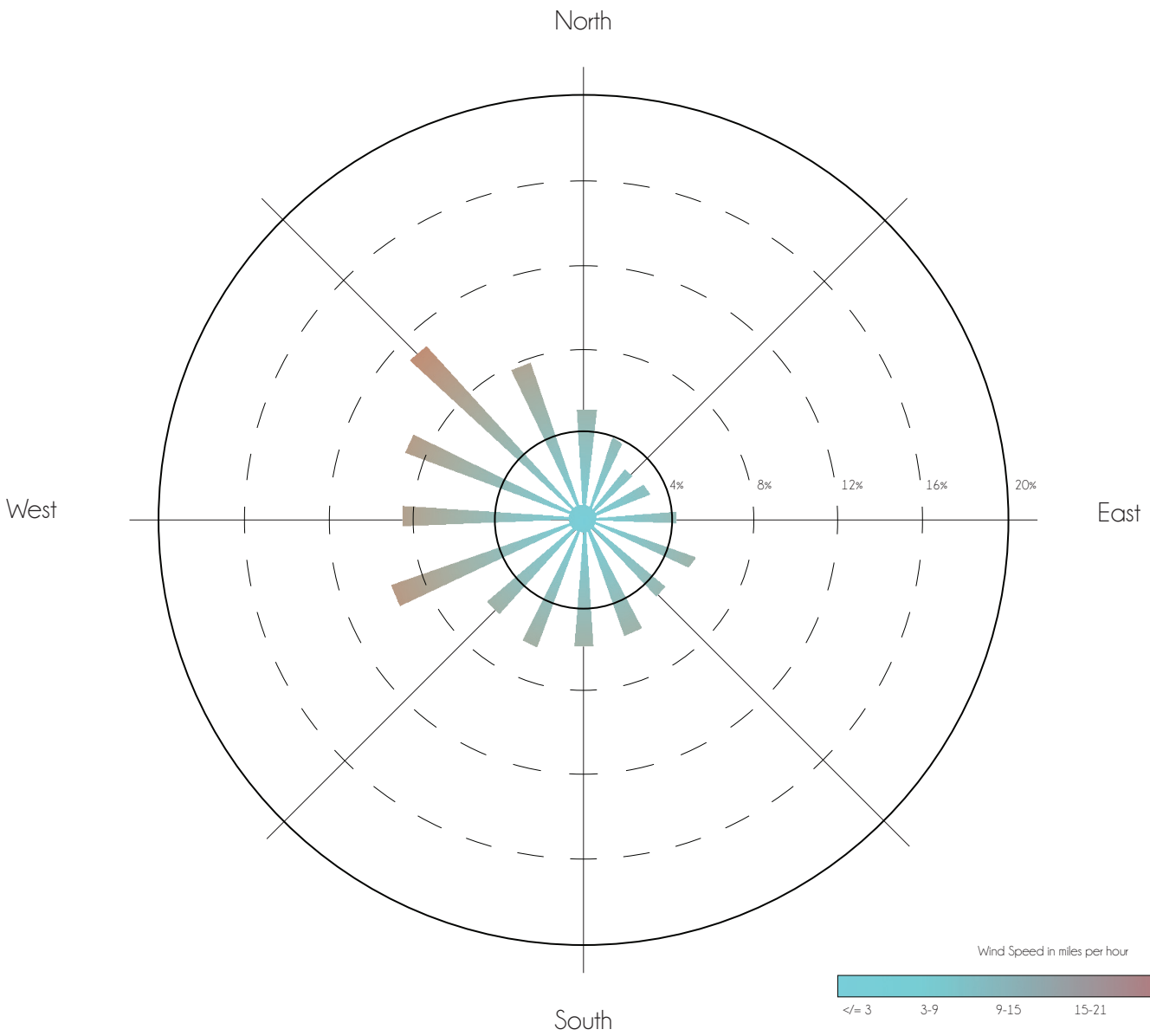


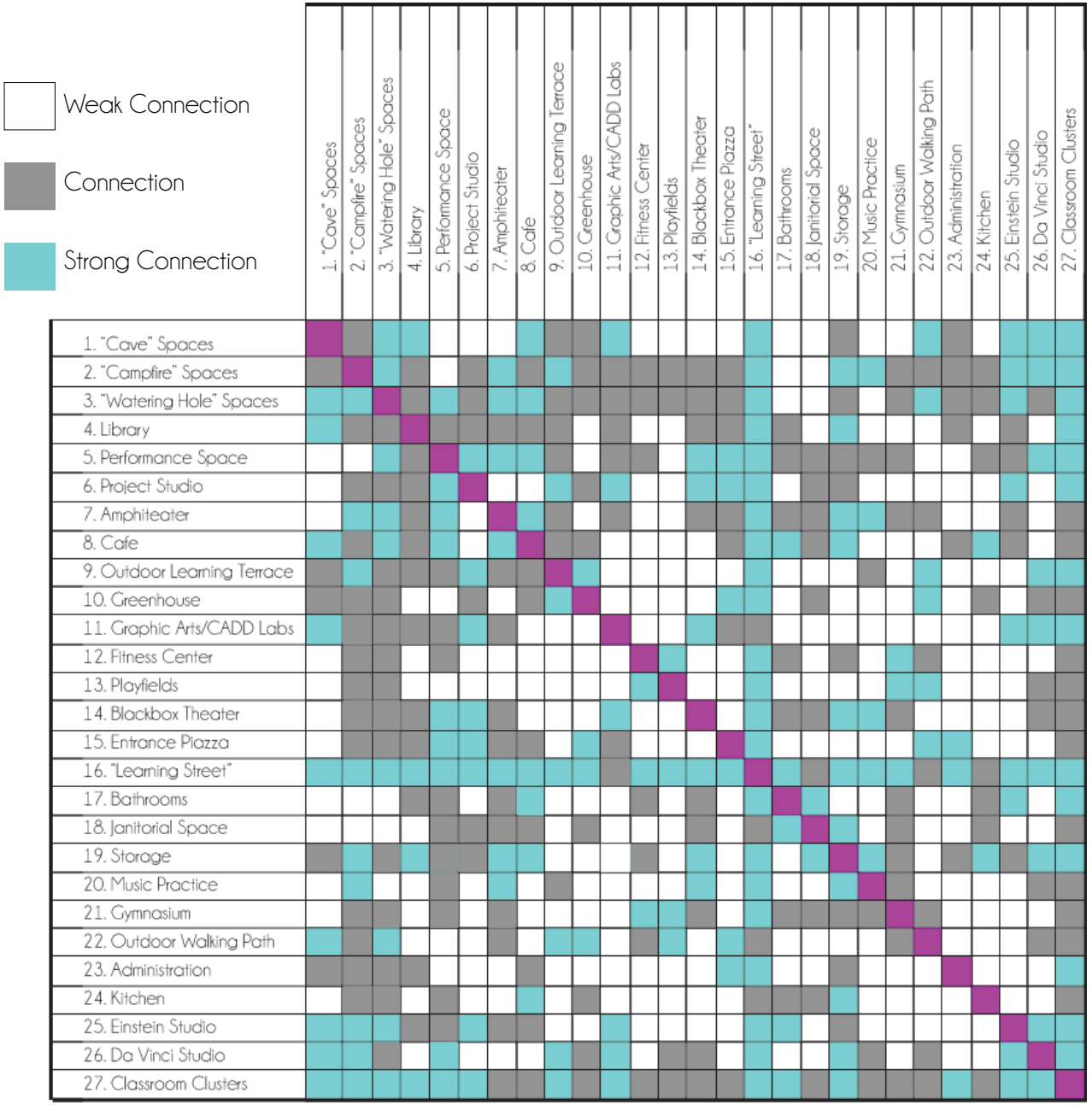
Figure 30 - Wind Rose



Programmatic Requirements

Interaction Matrix

Figure 31 - Interaction Matrix



Interaction Net

Numbering based on matrix values

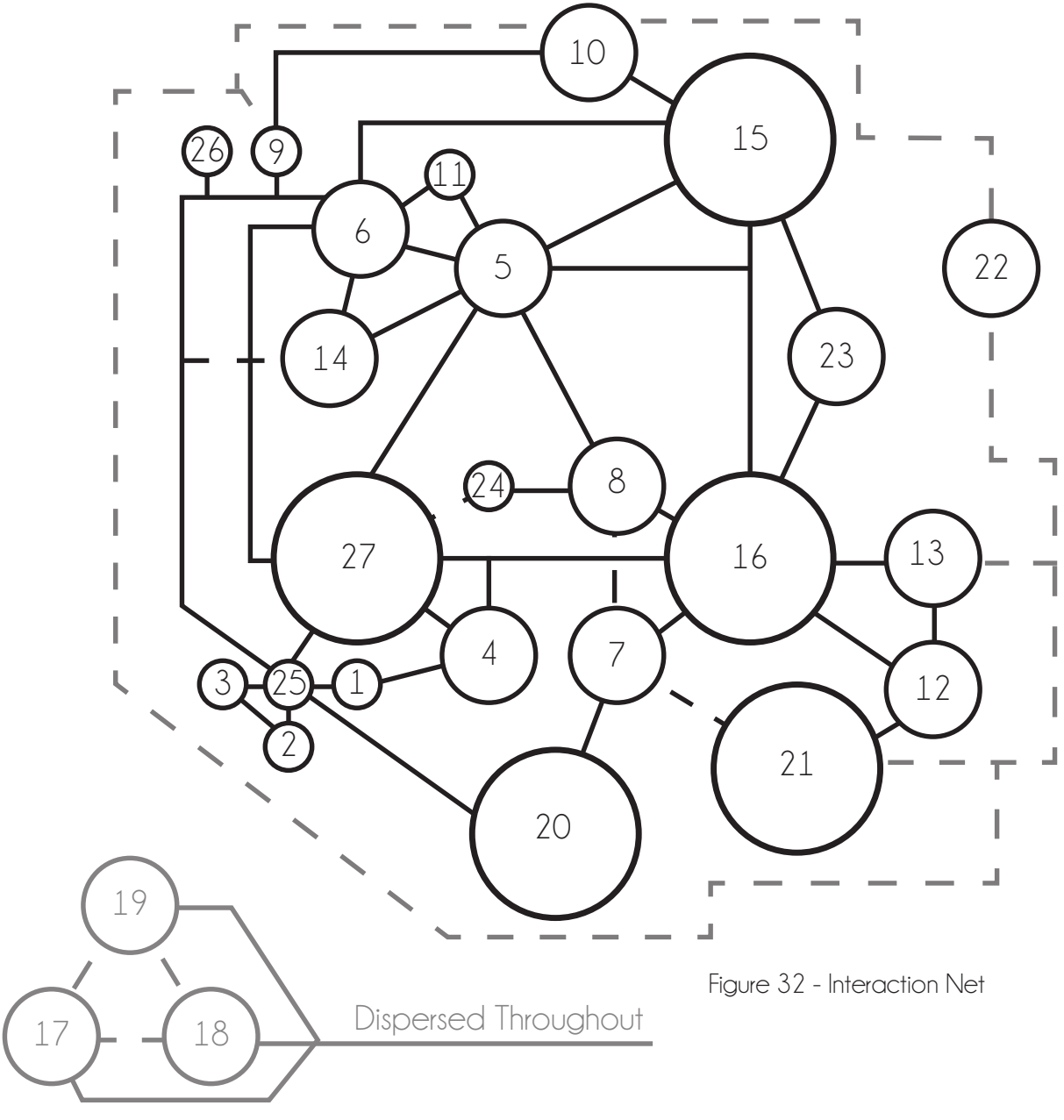


Figure 32 - Interaction Net

Primary Analysis of Programmatic Requirements

Administration - 3,000 sf
Food Service - 2,500 sf
Dining - 4,000 sf
Performance - 3,800 sf
Classroom Cluster - 10,250 st x 6 - 61,500

- Seminar Room - 700 sf
- Project Studio - 1,250 sf
- Classroom - 800 sf x 6 - 4,800 sf
- Advisory/studio space - 2,500 sf
- Lab - 600 sf
- Break out rooms - 400 sf

Gymnasium - 6250 sf
Locker rooms - 1500 sf
Music Rooms - 3,000 sf
Media Room - 1,500 sf

Total: 87,050 sf

\+ 40% for storage, mechanical, bathroom, and circulation

Revised Total: 121,870 sf

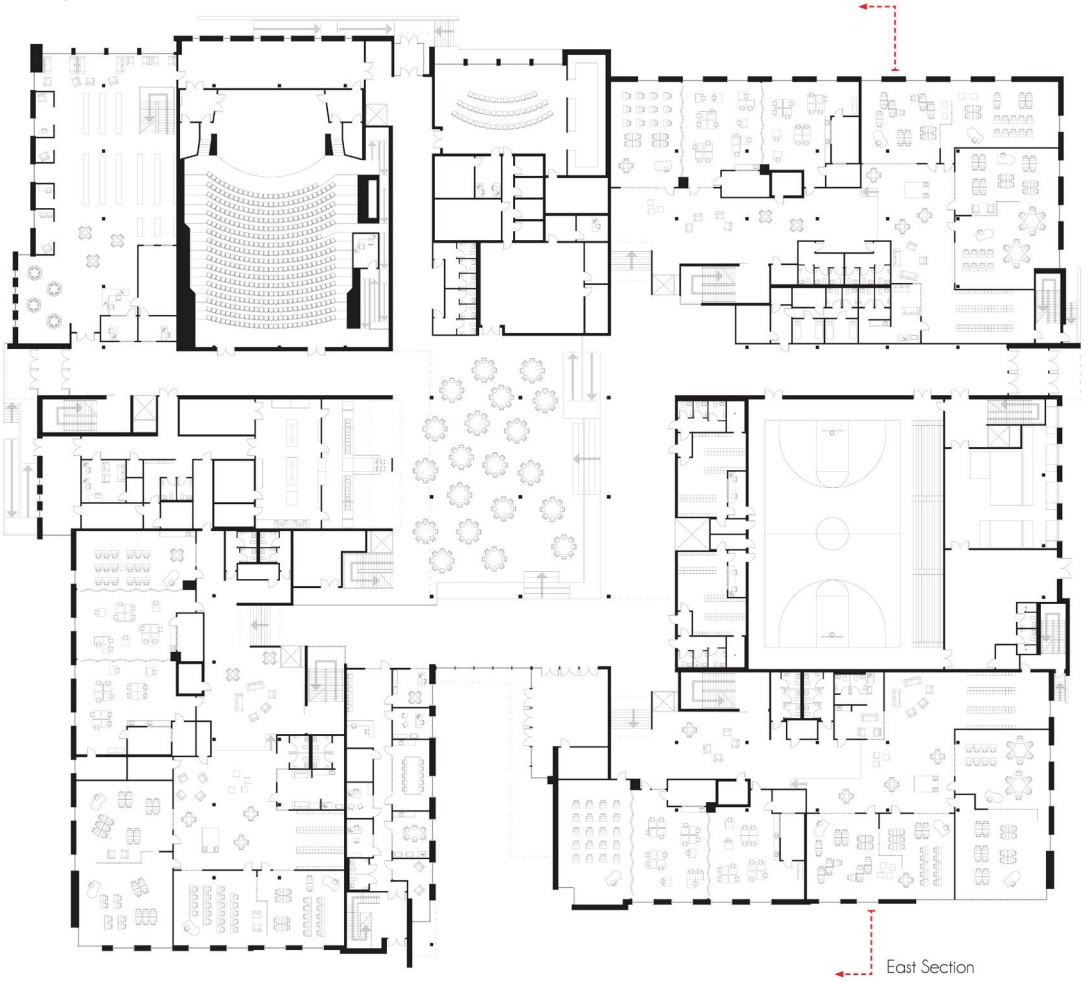
Project Drawings from Spring Semester

Figure 33 - Exterior Perspective of Main Entry

Figure 34 - Exterior Perspective of Sun Shader/Planter Boxes

Figure 35 - Interior Classroom Perpectives

Figure 36 - Floor Plans



First Floor Plan

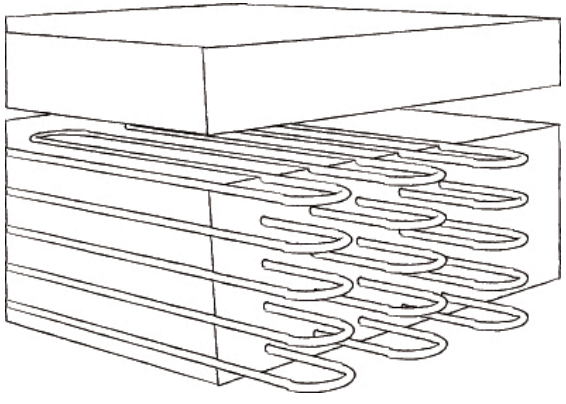
1. House 1
2. House 2
3. House 3
4. Music
5. Auditorium
6. Library
7. Kitchen
8. Social Commons and Cafeteria
9. Administration
10. Main Entry
11. Locker Room
12. Gymnasium
13. Gym Storage
14. Mechanical
15. Clinic

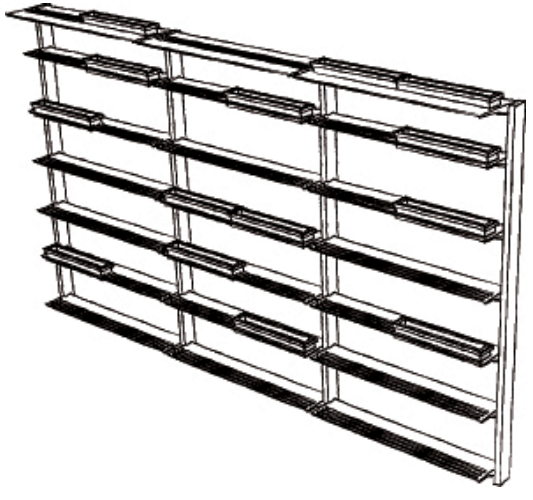
Second Floor Plan

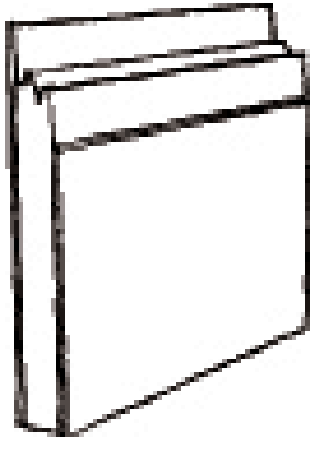
1. House 1
2. House 2
3. House 3
4. Auditorium
5. Library
6. Computer Lab
7. Walkway
8. Special Education
9. Life Sciences Classrooms
10. Green House
11. Outdoor Green Terrace
12. Mechanical
13. Aerobics and Fitness Lab

Two Story Space

Figure 37 - Detail Sketches







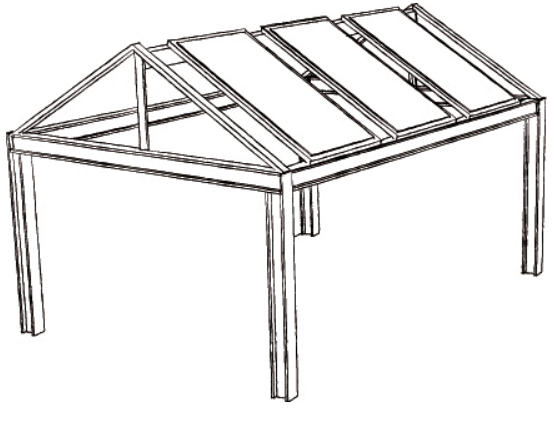


Figure 38 - Section Detail

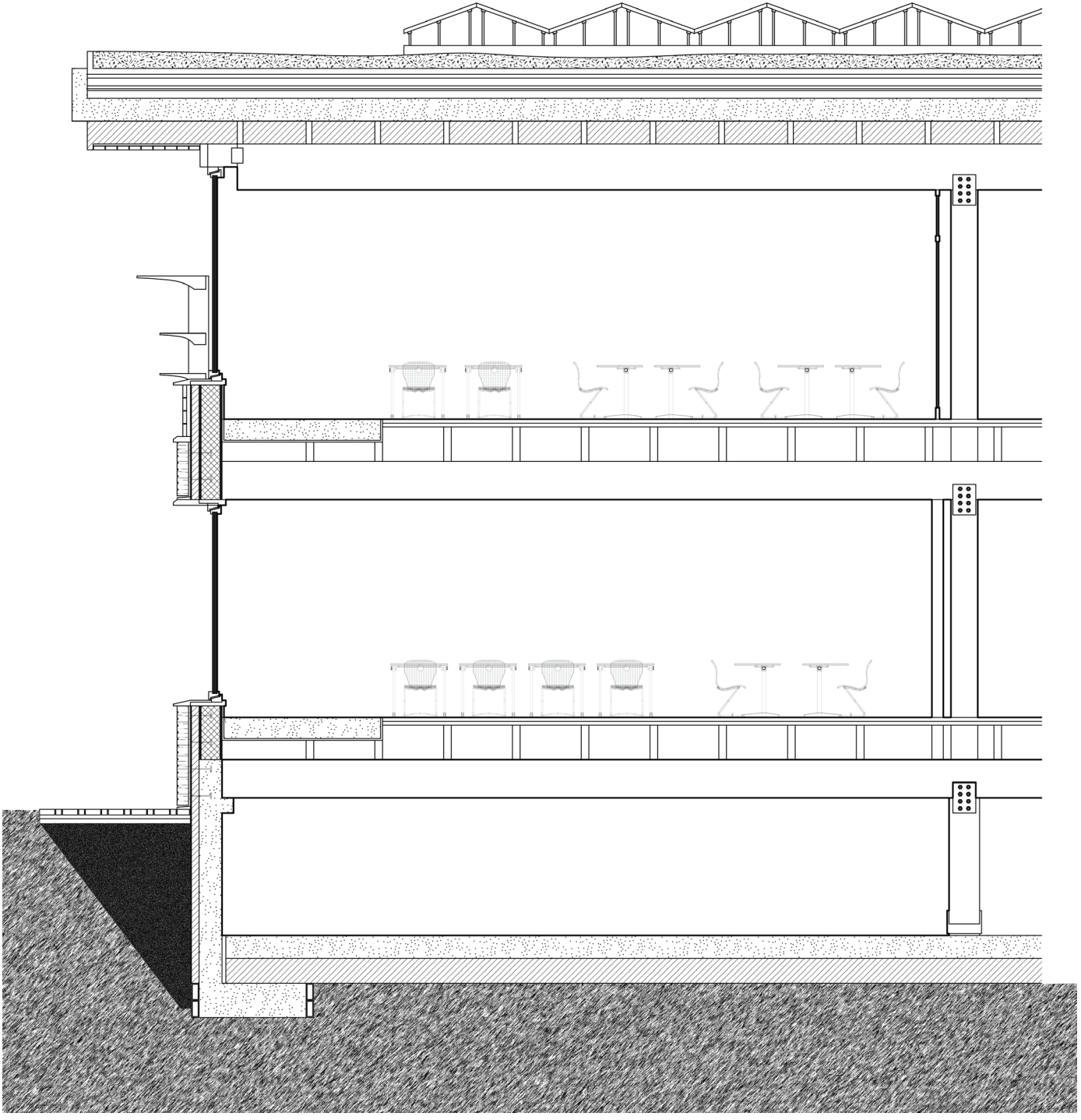
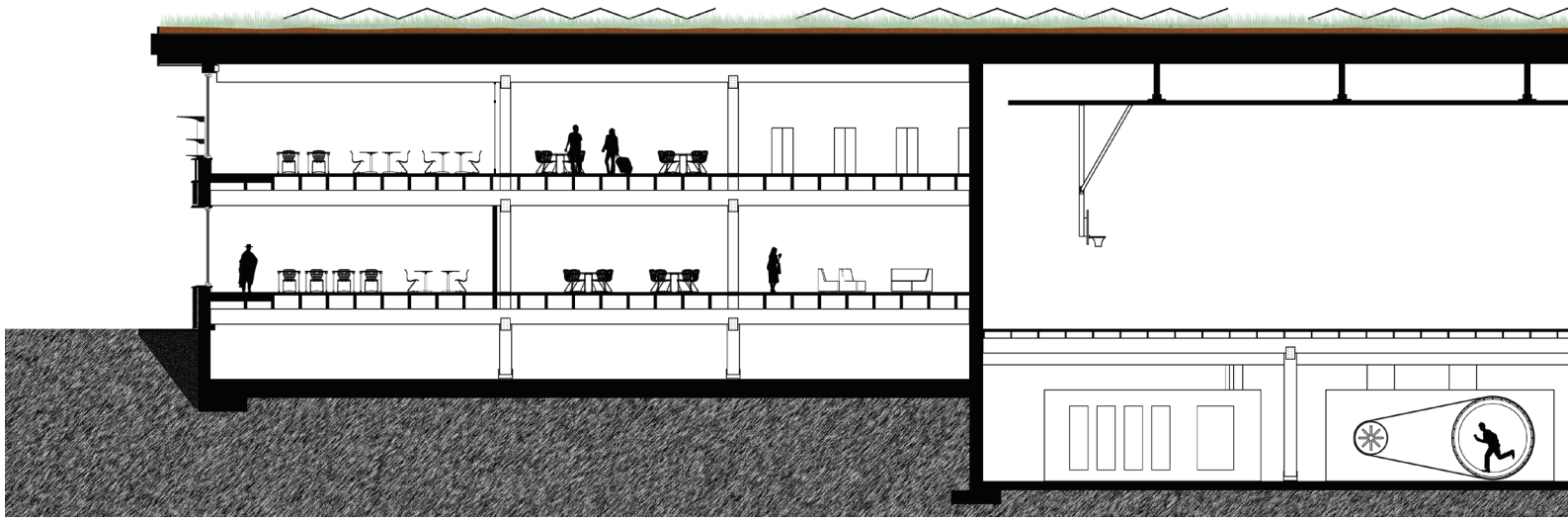


Figure 39 - Section



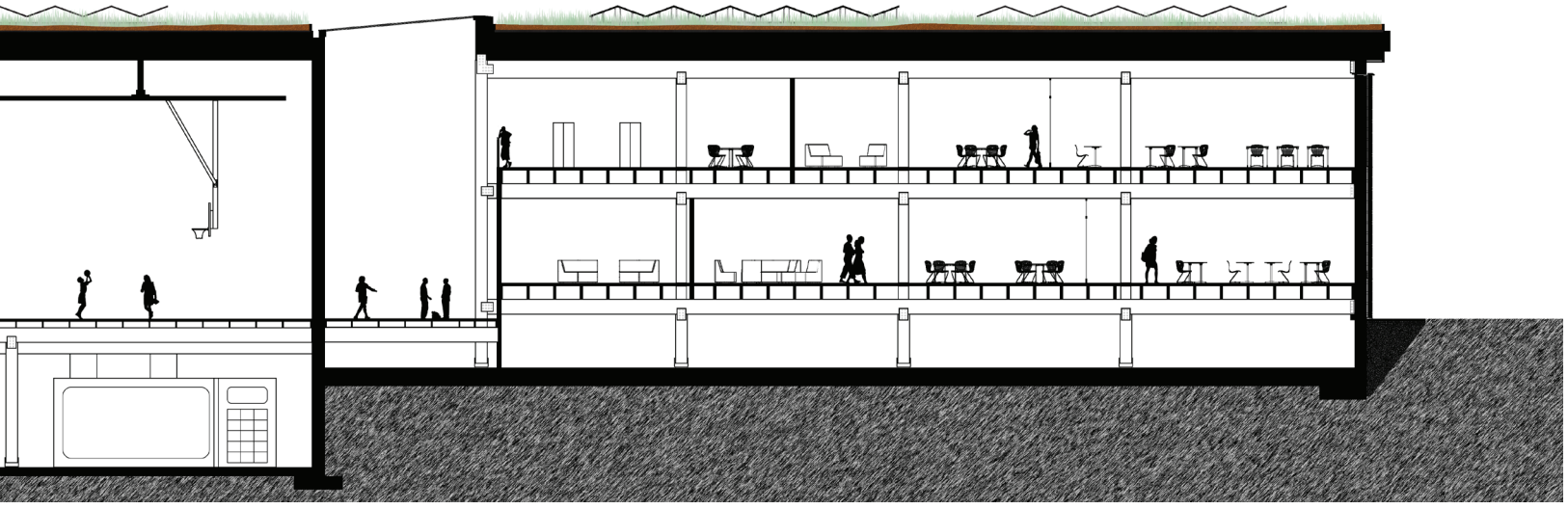
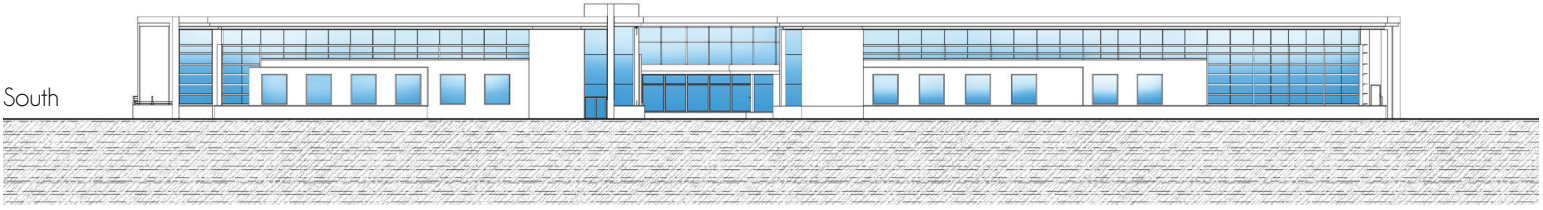
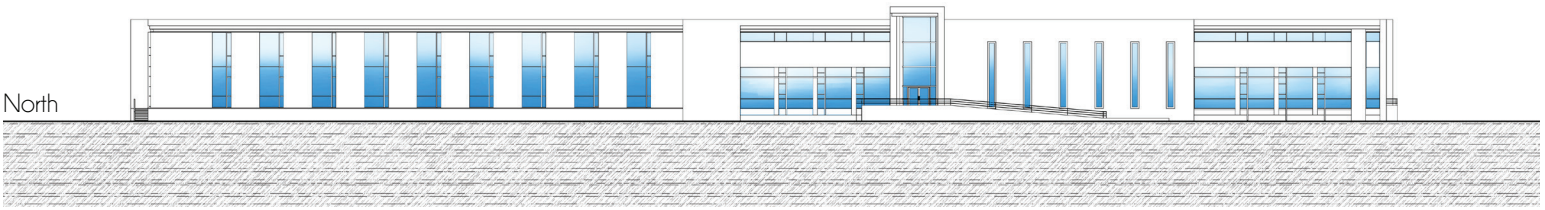


Figure 40 - Elevations





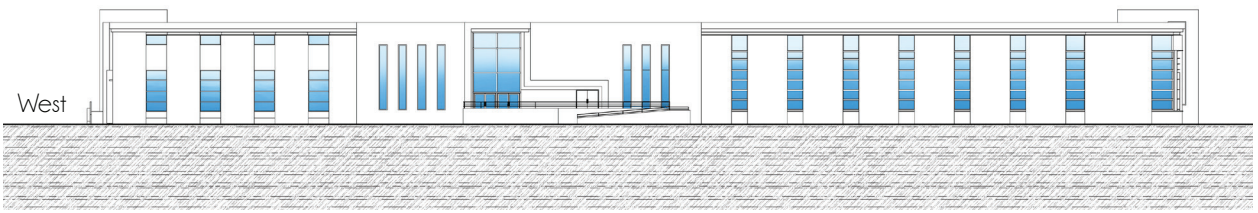


Figure 41 - Site Plan

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Figures List

Personal Info: