



TECHNOLOGY PAST
AND
PRESENT:

AN EXPLORATION
IN AGRICULTURAL
ARCHAEOLOGY

ADAM D. BARNETT

TECHNOLOGY PAST AND PRESENT:
AN EXPLORATION IN
AGRICULTURAL ARCHAEOLOGY


title page


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

By

Adam Barnett

In Partial Fulfillment of the Requirement
for the Degree of Master of Architecture


Primary Thesis Advisor 4/7/2010


Thesis Committee Chair 4/7/2010

September, 2009
Fargo, North Dakota

permission rights

NON-EXCLUSIVE DISTRIBUTION LICENSE

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

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

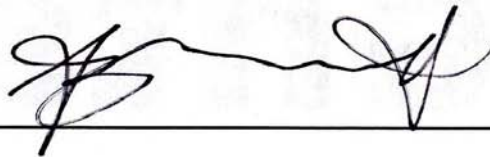
I also agree that NDSU may keep more than one copy of this submission for purposes of security, back-up and preservation.

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

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

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

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



5-10-10

Signature

Date

table of **contents**

Abstract	vii
Problem Statement	1
Statement of Intent	2
The Proposal	4
Program Document	16
Research Results	18
Research Summary	28
Case Studies	32
Historical Context	56
Project Goals	64
Site Analysis	68
The Program	88
Feasibility Study	94
Design Solution	108
References	132
Personal Identification	138

abstract

This book examines the history of technology specific to the area of agriculture. Technology exists as a product of culture, and can therefore be studied through the field of anthropology, even more specifically archaeology. The study of past cultural objects can enhance what we know as humans and influence the future technology that we evolve.

The results of this research are expressed through another cultural object: a building. The outcome of the research presents itself as a facility for the study of technological farming artifacts, removed from fields where they lay rusting into part of the landscape to expose to the public methods of understanding history and the present. The facility lies in the heart of west central Minnesota just south of Rollag, surrounded by acres of farmland and rolling hills. The facility is just over 50,000 square feet.

key words

Agriculture, Archaeology, Technology, Research Center

problem **statement**

problem statement

How can the history of technology influence the decisions we make in the future?

statement of **intent**

typology

Agri-Archaeological research center and museum.

the claim

Technology is a unique human cultural facet that has evolved since the day the first humans walked the earth.

premises

Technology is a characteristic of every culture worldwide.

Technology in western civilization continues to evolve each day at an increasing rate.

The scale and development of technology in western civilization has reached a level where it is no longer sustainable as we look into the future.

theoretical premise/ unifying idea

In order to meet the needs of future generations we must examine the historical path of what led us to a technological state centered on consumption. In analyzing past mechanisms of technology we can gain insight as to how our current methods can reach a sustainable level.

project justification

Agricultural technology and methods have been evolving over the past 12,000 years. It was only recently, in the latter decades of the 20th century, that we have begun to realize that our current technologies are drastically affecting our environments and contributing to the rapid depletion of the earth's resources. By examining technology historically we can better understand the way our cultural objects and actions affect our environments in the present, and adapt to a more sustainable way of life.

the **proposal**

the narrative

Modern technology can often be viewed as either a blessing or a curse. The automobile, for example, allows billions of people the ability to traverse long distances in short periods of time every minute of every day. The technology behind our beloved cars, however, is the combustion engine. The development of this technology can now be blamed for the depletion of large amounts of the earth's resources (fossil fuels). This technology is also largely to blame for the depletion of the earth's ozone layer, resulting in vast climate change that can be observed daily across the world.

Nowhere is this debate over technology more pronounced than in the fields of architecture and agriculture. Advancements in the building industry now allow buildings to be assembled quickly and efficiently. Unfortunately the evidence of this lies mostly in "cookie-cutter" suburbs and consumer districts plaguing many of today's cities. One can also question the advancements in agriculture as well. Advanced equipment allows farmers to develop more land in less time, which depletes and shrinks millions of ecosystems worldwide. The abundance of cattle is also criticized as a main contributor of methane into the atmosphere, a gas that also exacerbates global warming and climate change.

Technological advancements aren't born out of thin air, they evolve over time. In many fields we embrace this. Historic preservation of buildings allows us to recognize certain buildings from the past that display some sort of cultural significance (either associated with a certain historic person or event, or associated with a certain stylistic or aesthetic quality).

These projects are then examined, researched, recorded, documented, and if they qualify, placed on the National Register of Historic Places.

the narrative

In archaeology, scientists study objects from the past that pertain to a certain culture or cultures to get a better understanding of our own present culture, and where it came from. The objects studied are often removed from the earth, examined, and documented. The project I am proposing lies in adapting archaeological techniques to the field of agriculture to preserve and document the history of this very important cultural field.

Old farm machinery exists overgrown in fields and groves, to be excavated and studied like ancient bones of a dinosaur. These implements involved in food production in the past can be analyzed and studied to preserve their cultural heritage, as well as to expose to the public the methods of study and analysis of these objects. By introducing methods of historical analysis to the public they can begin to analyze their own lives and the objects they use to understand the effects they have on their environments.

user/client description

The Agri-Archaeological Research Center proposed would operate in conjunction with North Dakota State University. In particular the facility would be utilized by students and faculty in areas such as agricultural studies, machinery, biology, archaeology and historic preservation. The facility and its property would also serve researchers, scientists, and professors and students from other communities or universities that meet certain standards and would benefit from or contribute to the research and development taking place at the facility.

Aside from the research done at the facility, the other purpose of the building is public education. This is achieved through exhibits, galleries, and tours throughout the research portions of the building.

major project elements

Although the building in its entirety is open to the public to understand the research processes that go on there, it is still necessary to understand which spaces exist for the public, and which spaces are primarily for the researchers.

Exhibition Space

The sole spaces allowed for public use lie in exhibition spaces. The facility will contain a museum, which may include permanent and temporary exhibitions, and outdoor exhibition space. The museum portion of the building will also include a gift shop, a small cafe, a lobby, lavatories, and toilets.

Shop

A large shop space will be the main work space focused on Agri-Archaeological research. This will be a working place for objects that are collected in the field to be studied, documented and recorded, and then either prepared for exhibition or recycling of their material. A shop will also exist for the creation of gallery exhibitions.

Library

The library will serve the entire facility, and will include research of the history and future of agricultural practice. The library will include the records of all historical material studied and recorded (both physically and digitally). The library will also have research and reference material pertaining to the future of agricultural methods and procedures.

major project elements

Laboratories

Laboratories will exist as the main research areas for the study of historic farming technologies and objects. Laboratories will be large enough to research large types of machinery, as well as accommodate for smaller scale research and analysis.

Garage

Aside from the shop, a large garage will be required to store large equipment such as vehicles and trailers, as well as any other large-scale machinery or equipment used in the retrieval or collection of historical objects.

Parking

On-site parking will be provided for all of the employees. Parking accommodations for the public will also be included on-site, taking into consideration universal parking stalls, as well as bus parking.

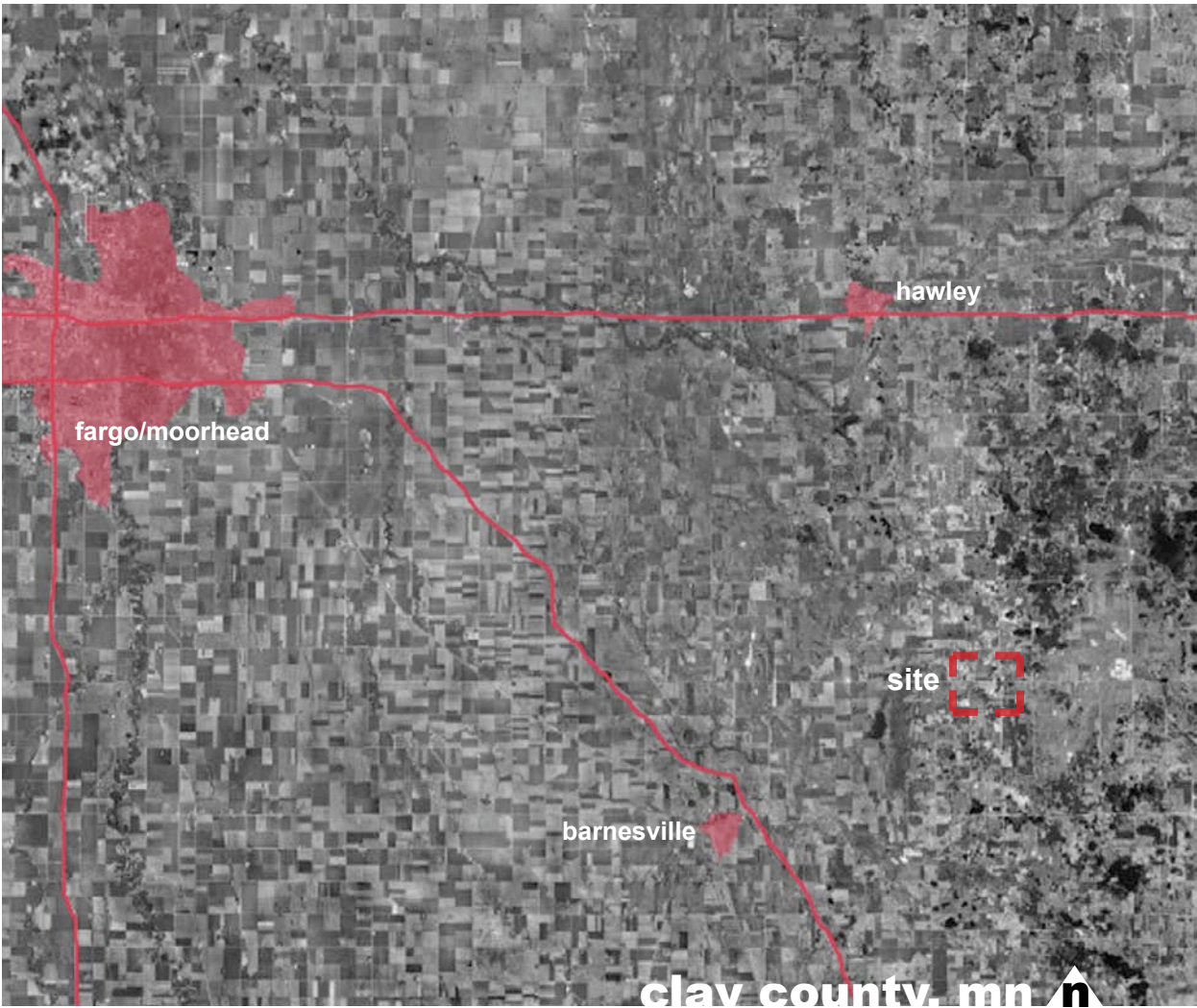
Clay County, Minnesota is located in the heart of the upper midwest, and boasts agricultural land use of nearly 90 percent ("Land Use" 2000). This region is important to the country and is often referred to as the "breadbasket" of North America, as it is known for being a major contributor to the country's food supply. The history of agriculture in this region dates back over 200 years to the Native Americans.

site information



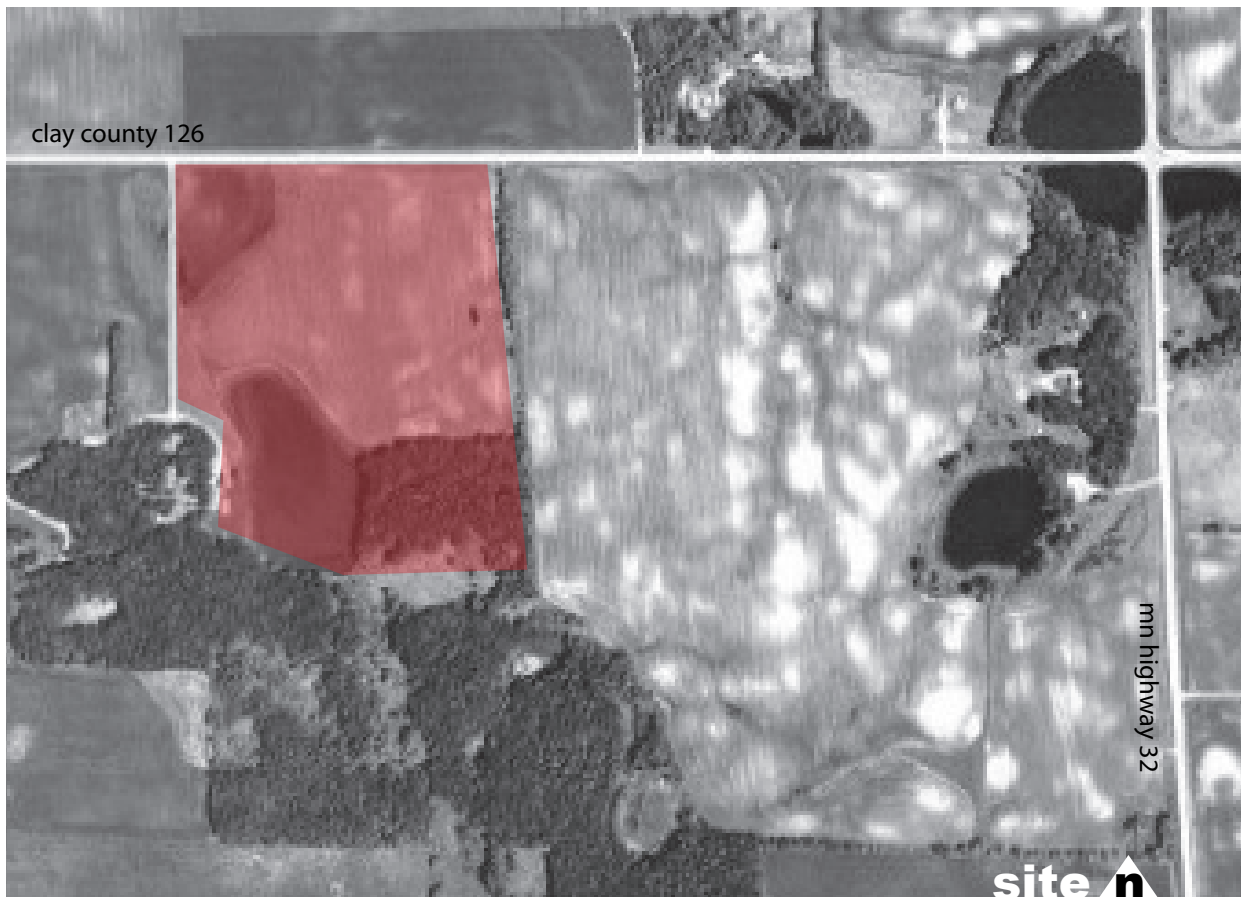
site information

The proposed site is approximately 40 minutes outside of the Fargo/Moorhead community. It lies nine miles east and four miles north of Barnesville. The site's proximity to Fargo/Moorhead would allow for relatively quick access for students and professors from either of the two major universities located in the nearby community. The site's rural setting is in the heart of agricultural land making it an ideal place for the study of agriculture's past and future.



This site lies at approximately 96°15' west longitude and 46°43' north latitude, and can be accessed from Clay County road 126, a half mile off state highway 32 (Google). The site is defined by a row of trees to the east, and a private driveway on the west. This site was chosen for its unique topography: a large, flat hilltop which is found along the treeline to the east. The site's plateau allows for vast, scenic views of rolling cropland spotted by farmsteads, groves of trees, and small bodies of water. Amenities on the site include a small wooded area and a small pond. The adjacent crops include corn and soybeans.

site information



project emphasis

The focus of this project lies in examining historical objects, processes, and systems to better understand the ways of our modern culture and enhance future outcomes. The built environment can be viewed on a continuum from past to present and into the future. Studying past methods and technologies through preservation allows us to better understand what direction the built environment must take to be sustainable into the future.

The same continuum that exists through time in our built environment can be paralleled through agricultural technologies and methods. This project aims to translate this continuum into a building where research of these objects and practices can be examined, displayed, and applied to the methods of tomorrow.

Research for this thesis will be directed through multiple channels. Research will be conducted with a focus on enhancing the understanding of the theoretical premise/unifying idea. Research will also be devoted to understanding the project typology, including further investigation of the site/existing building, historical context, and the programmatic requirements of the project.

research direction

The method I will employ throughout the research and design of this project is a mixed method model. This involves the concurrent gathering and analysis of quantitative as well as qualitative data. The two types of data collected throughout the process will be continually integrated in order to synthesize appropriate outcomes. Direction for the research will be driven by the theoretical premise/unifying idea as well as the project typology and emphases.

design methodology

Special attention will be paid to the continual and regular documentation of the design process. Biweekly submittals will occur to maintain a digital collection of all hand sketches/drawings and process models. To supplement the digital compilation, a physical collection of all design process components will be neatly organized in a binder that will be readily available for review.

documentation of design

the plan

previous studio experience

Second Year

Fall 2006: Stephen Wischer

- Tea House
- Rowing Club
- House for Twins

Spring 2007- Joan Vorderbrugen

- Waldorf School
- Dance Academy

Third Year

Fall 2007- Cindy Urness

- Center for Excellence
- Cranbrook Academy
Renovation and Addition

Spring 2008- Steve Martens

- Science and Technology
Museum
- Center for Prehistoric
Research

Fourth Year

Fall 2008- Darryl Booker

- Vertical Community

Spring 2009- Darryl Booker

- Viable Community-
Santo Domingo
- Public School- Africa
- Santo Domingo Housing

Fifth Year

Fall 2009- Regin Schwaen

- Paddle Boat Competition

program **document**

research **results**

research results

The inherent goal of this thesis lies in applying archaeological techniques to examine the cultural artifacts that have existed in agriculture over the last 130 to 150 years. This timeframe is culturally significant to the region of the Red River Valley, the Lake Agassiz basin, and the upper Midwest of the United States. It was around this time in our region's history that the first sod was being broken to begin the foundations of a "modern" agriculture. I use the term modern in quotations, as opposed to mechanized or industrialized agricultural practices, which came later. I also must make a point to recognize that the settlers who broke the land in this region were not necessarily the first to have an organized method of agricultural techniques, as the Native Americans that were here much earlier had known agricultural methods of food production. However, it is the artifacts of the settlers, the farmers of late that had cultivated this land that concern this thesis. In order to lay a foundation of agricultural archaeology over the last 150 years in the Red River Valley, it is important to introduce the history of the agricultural techniques of humanity, as well as archaeological methods that are currently employed to examine the long history of agricultural production, and civilization.

Many scholars would agree that the origins of civilization began around 10,000 B.C., in a small number of epicenters in the Mediterranean. Many scholars would also agree that to define 'civilization' means to recognize humans as existing sedentary in one decisive location. The well-known 19th century anthropologist Lewis Henry Morgan, however, in his paper "Ethnical Periods", recognized civilization as the final sequential stage of cultural evolution beyond savagery and barbarism.

research results

Morgan defined the civilized level of culture as containing a phonetic alphabet, systems of writing and written records, and monogamous families. As far as agriculture was concerned, Morgan identified a level of Middle Barbarism (below civilization and upper barbarism) which included the domestication of animals and maize, as well as the development of irrigation agriculture (Sidky 2004).

Most archaeologists, anthropologists, and historians would recognize these ancient epicenters of civilization as being in Egypt (the Nile Valley), Mesopotamia, and the Indus Valley. The absolute origin of agriculture, however, remains a debate over many different theories. The earliest theory was that of V. Gordon Childe, who proposed that around 10,000 B.C. large ice sheets retreated northward into Europe, bringing with them local rains. This left the inhabitants of northern Africa and the Near East in areas of dry land with little resources. Childe's theory, known as the Oasis Theory, states that the people migrated to regional 'oases' where the resources remained, thus leading to a food producing revolution of agriculture (Lamberg-Karlovsky 1995). The most recent and widely accepted theory, supported by archaeological evidence, maintains that ancient peoples exploited a select few varieties of plants and animals in specific environments. These environments were only productive during certain seasons. Knowledge of these seasons meant the people knew when certain resources could be harvested. Combine this knowledge with an increase in population and the innovation of agriculture arises (Lamberg-Karlovsky 1995).

research results

Although a number of different theories exist regarding the early developments of agriculture and civilization, they all share theoretical roots in the similar themes of climate, environment, population growth, and the drive for survival. Archaeological evidence dating from 8,000 B.C. to 5,000 B.C. supporting sedentary cultures sustained by agricultural food production includes sickles, axes, hoes, mortars, and pestles. Direct evidence exists in the form of domesticated cereal seeds including varieties of wheat, barley, field peas, and lentils (Lamberg-Karlovsky 1995).

The archaeological approaches used to examine the origins of agriculture and civilizations are unique as they ask 'why', and seek to understand what made certain changes occur within ancient cultures. The methods involved with this archaeological research begin with the recovery of ancient physical artifacts. These artifacts are dated (using multiple techniques), and then analyzed within the time period that they are dated, incorporating other factors (climatological, geographical, etc.) that were known to exist within the same time period.

As archaeological approaches often seek to answer the question 'why', another valuable approach to understanding history and cultural change is to ask 'how'. The British science historian James Burke, in his 1978 publication "Connections", proposed a method of understanding changes within culture, and more specifically, technology.

research results

In examining how change happens, Burke begins in chapter one, 'The Trigger Effect', by proposing the question of what we in modern America would do if our technological 'gifts' all of a sudden failed to operate, asking: Would we be able to survive? Burke suggests it would begin with a blackout, much like that in New York City in November of 1965. The resources within the city would quickly run out, and anyone with knowledge of survival would head to the closest farm and produce for themselves. Burke then flashes back to the ancient civilizations and the origins of food production. Burke's examination of these societies doesn't concern sickles and seeds though, here he is concerned about the innovations brought about from the initial invention in agriculture: the plough (the first technological trigger). Burke's theory argues that technological innovation does not happen in a unilineal fashion (much like Lewis Henry Morgan's sequential stages of cultural evolution), but more so along the lines of a web. An appropriate analogy would be a rock hitting a car's windshield. In this example the rock would be the invention of agriculture. After this rock strikes the windshield it quickly causes veins of cracks, splitting from one into three, and three into nine, and so on and so forth. The first invention of domesticated agriculture led to the plow, which led to food surplus, which led to ceramics for storage, which led to writing, on pots. Large crops required irrigation, which led to stonework for canals, which led to built structures like pyramids. (Burke 1978)

research results

The value that exists within these two methods of historical analysis is based on the fact that both methods approach the topic of analysis with a broad and open point of view. Both methods seek to ask why, or how an historical event or change has occurred. It is therefore clear that when we approach history we see it in a large scale, observing all outside factors in order to analyze and draw conclusions. A contradiction now arises in the modern world of today that although we view history in a broad spectrum, identifying many factors of influence, we perform our actions with blinders on, failing to recognize the outside factors that we are drastically affecting.

The best example of the 'blinder' theory of human actions occurred in the central portion of the southern United States in 1931. In the 1920's the industrial age greatly changed agricultural methods. The advent of the internal combustion engine allowed farming production levels to grow substantially. While a horse drawn plow could break three acres of land per day, the power of a tractor allowed for 15 times the production. The result of this technology: an exploitation of every square inch of land by thousands of farmers through Oklahoma, Texas, Kansas, Colorado, and New Mexico, until every possible piece of land that could grow wheat on it did. The golden sea of wheat flowing over this region of land didn't last long. In 1931 a severe drought began that lasted nearly a decade, turning this once flourishing region into "the dustbowl". The dustbowl was characterized by black skies, intense wind, cyclones of dust, drifts of dust piled like snow along homes, and even dust penetrating people's homes.

research results

Animals and people alike were dying from the inhalation of dust, and the static electricity in the air was killing what little crops of wheat or watermelons would grow. All of this resulted from the intense effect that people had on the land, leading to severe soil erosion, enough to drastically affect the climatic systems of the region.

What brought thousands of people to 'Wheat Country' in the 1920's? The fact that they had blinders on, and in their visions: dollar bills. The story of the dust bowl virtually epitomizes the driving force of change and innovation in the 20th and 21st centuries. Twelve thousand years ago survival and food production brought about technological and agricultural innovation. Today change occurs on the sole basis of self-interest and economic gain. Archaeologists have multiple theories on the origins of civilization addressing multiple factors on ancient cultures. Today economists are the primary theoreticians addressing forces of technology and innovation.

This does not mean that economic factors are bad. I believe James Burke would even argue that modern economics are a result of the invention and application of the plow to agriculture. The plow allowed people to produce a surplus of food. Once people were able to produce a surplus of food, it meant that other people didn't have to produce food and could therefore focus on other tasks. This brought about specialization within societies, trade, divisions of labor, and stratified social classes. Economics exist in any capitalistic structured society and can also be applied to study other fields. Aside from economic gain, historian Jared Diamond outlined other factors that influenced the adoption of new technologies throughout history.

research results

In his Pulitzer Prize winning publication *Guns, Germs, and Steel* (1999), author Jared Diamond identified four main factors that have historically represented a culture's adoption of a new technology. Not surprisingly, the first factor highlighted is economic gain, relative to existing technologies. Quite simply, if a new way of doing something is more beneficial, the odds are that this new technique will be adopted. The second factor outlined by Diamond is social value and prestige, exemplified in modern times by peoples' tendency to purchase clothing of a certain brand name for double the price of an equally durable generic article. The third point outlined by Diamond is a technology's compatibility with vested interests. To explain this Diamond describes the history of the QWERTY keyboard. The original QWERTY layout was designed to slow down typing speeds to keep the original typewriters from jamming, a problem often occurring when adjacent keys were pressed too quickly. Although the QWERTY keyboard layout is extremely inefficient, so many people are entrenched in it (typists, typing teachers, computer salespeople, and manufacturers) that it will likely never change. The final factor introduced by Diamond is the ease with which a new technology's advantages can be observed. If it becomes clearly evident that a certain technology can be advantageous to adopt, the odds are it will happen. For example, once employee A sees the ease of employee B's electronic daily planning device, there is a good chance in the near future he will upgrade to an electronic device himself. (Diamond 1999)

research results

Although *Guns, Germs, and Steel* focuses on technologies employed by societies throughout history, dating back to 12,000 B.C., Diamond's ideas are still applicable to modern western culture. Despite the fact that economic gains are only one of Diamond's factors of technology adoption, all four represent a self-centered approach: prestige may help one attract a better mate, or better job; vested interests often involve one's money or investment; readily observing a better technology often results in an upgrade to make one's day to day activity more efficient. Diamond's ideas support the fact that technological change is often driven by a society with blinders on, whether focused on economic gains or just its members' own self-interests.

Through the examples presented, it is clear that a problem exists in modern technological innovation. The present issue is that self-interests, productivity, efficiency, and economic gain are the driving factors behind many of the technological and innovative changes of today. As illustrated by the example of the dust bowl, when people act with blinders on they neglect to see or foresee the possible effects that they can exert on other systems. Many of our innovations that take place today are more of a linear honing of previous inventions, only to maximize production and efficiency. Focusing on one end result and neglecting the negative effects occurring on other systems once again shows a society with blinders on.

research results

The evidence of this phenomenon can be observed through the innovations in modern agriculture over the last 150 years. Simply by driving down any county road or highway through farmland in the U.S., one will be exposed to relics of farming technology scattered about old farmsteads, or left to rust sitting atop a hill on the horizon line. Farmers across the countryside have long rendered these implements valueless as a more refined and productive implement has hit the market, improving their productivity and cutting down their labor.

The fact that this thesis focuses on agricultural implements is not necessarily important, as these historic agricultural implements represent a vehicle and method for studying the past (however, agriculture was chosen for its cultural importance historically, and to the Red River Valley). The whole point of this thesis is to recognize that when we view history, we do so with an open mind recognizing the entire context of an object or event, but when we act in the present our actions are primarily self-centered, ignoring the effects they have on the surrounding environment. If we can learn to act in the present similar to how we view history (recognizing all the effects of our actions within their present context) we will offer ourselves and future generations a safer and more pleasant environment to sustain life on this planet.

research **summary**

research summary

The research conducted for my theoretical premise and unifying idea was a product of understanding the changes that have occurred throughout history as well as the driving forces behind these changes. The first research exploration involved obtaining an understanding of the events and theories involved in the analysis of agricultural and civilized origins of modern human culture. In this case 'modern' is used in a grand scheme, understanding that archaic forms of humans existed millions of years ago (i.e. australopithecus, homo habilis, homoerectus). The findings of this research indicate that advance agricultural systems existed as early as 8,000 B.C., and have continued to advance, ever rapidly over the last two centuries, into modern industrial agriculture practices as we understand them today.

The next level of research involved broadening the aperture through which we examine historical technological change. Stepping back from just looking at agriculture technology, one can observe the work and theoretical basis of the ideas of historian James Burke. Burke's principles of examining past technological processes involve just that: a widening of the aperture through which we view technological change of objects and an understanding of the system as a whole. Burke introduces the concept of "triggers" throughout the history of technology. According to Burke, the very first trigger that started it all was the introduction of the plough to agriculture. This invention triggered multiple inventions that snowballed, especially when associated and intertwined with other factors such as population growth, specialization and even capitalism.

research summary

Following my research of James Burke's theory of explaining technological change processes, I began to examine the way we operate in the present regarding our technologies. My conclusions are rooted in the theory that our current technological processes occur strictly opposite from the views of Burke. Instead of occurring in a web-like, interrelated fashion, the way we develop our technologies is strictly in a linear fashion. I likened this process to that of a horse with blinders on, because it focuses primarily on self-interests and economic advancement. This economic gain involves increasing productivity and efficiency (an idea examined further in the field of agriculture in the feasibility study, located in the appendix portion of the program document).

To illustrate the idea of operating with blinders on and focusing on economic gain, I used the historic example of the dustbowl. The dustbowl was a decade long climate-based tragedy that plagued the states of Kansas, Colorado, Oklahoma, Texas and New Mexico. It was characterized by severe drought, leading to barren landscapes, dust storms, respiratory problems, even death. The cause of the dustbowl was overexertion of the farming land to get as much production out of it as possible. The once extremely fertile land quickly became barren leading to a severe climate anomaly that lasted almost 10 years.

I then examined the work of historian Jared Diamond, who studied the rise and nature of historic societies and civilizations. In his work *Guns, Germs, and Steel*, Diamond highlighted four factors contributing to a culture's adoption of a new technology, including economic factors.

research summary

The examples I have chosen to research can be analyzed and synthesized to support the theoretical premise of this thesis. The underlying theory as outlined by this research and previously in the proposal operates as such:

Modern human society operates on a daily basis with blinders on, narrowing our point of view onto certain aspects of life. This is illustrated in technological processes by a linear refinement of objects to maximize economical profits. This way of operating is unstable, as presented in the historical example of the dustbowl. Thus, if we as modern society examine our everyday actions in the way we look at history, with a broad holistic view based on larger systems and their interactions, we can understand how to operate in the present on a more stable and sustainable platform. This project seeks to examine this theory by proposing the employment of archaeological methods, that is, the analysis of historical cultural objects, on the artifacts from the field of agriculture over the last 150 to 200 years.

case **studies**

Scientific Barn **34**

SAC **38**

North Dakota Heritage Museum **42**

New Acropolis Museum **46**

Dennis Oppenheim: Factories **50**

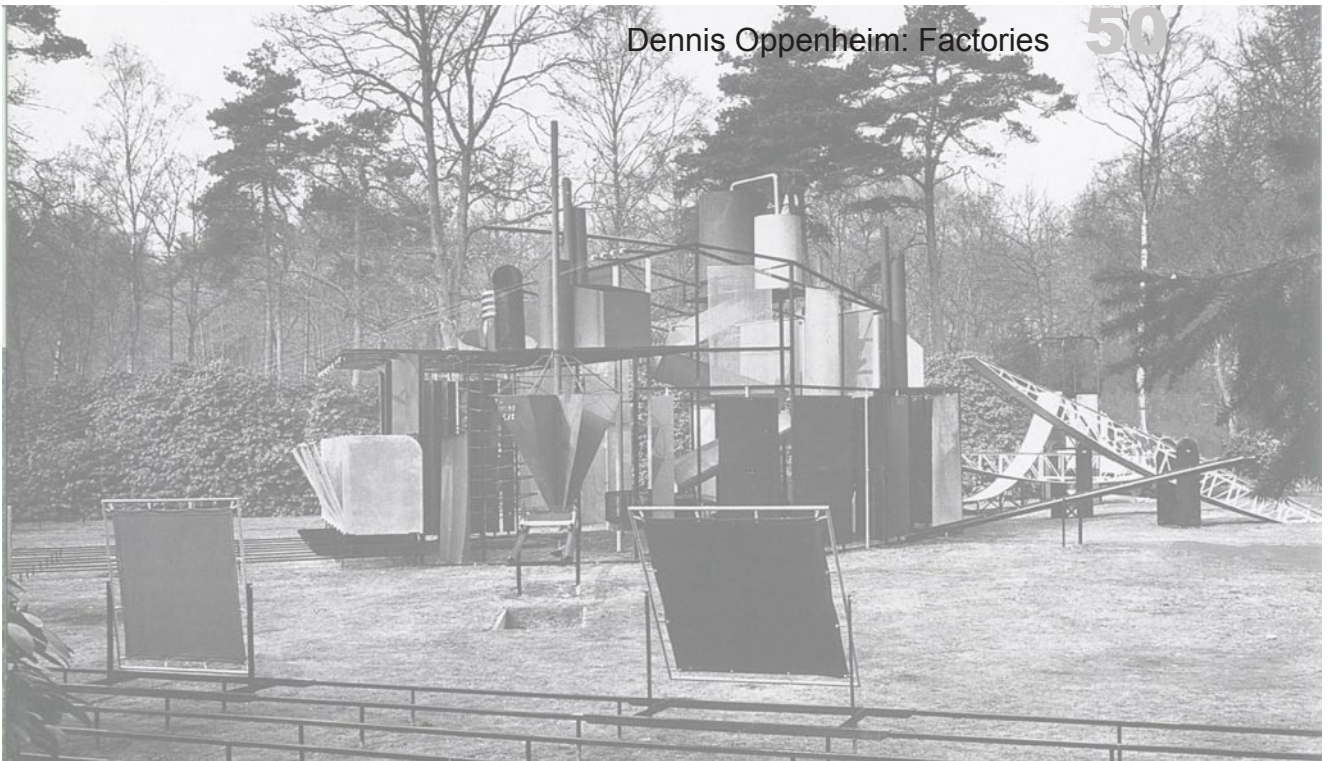


fig. 1.1

"Formula Compound, a combustion Chamber, an Exorcism" Dennis Oppenheim

Scientific Barn

IKOY architect

Research Center typology

Brandon, Manitoba location

97,000 ft² size



fig. 1.2



fig. 1.3

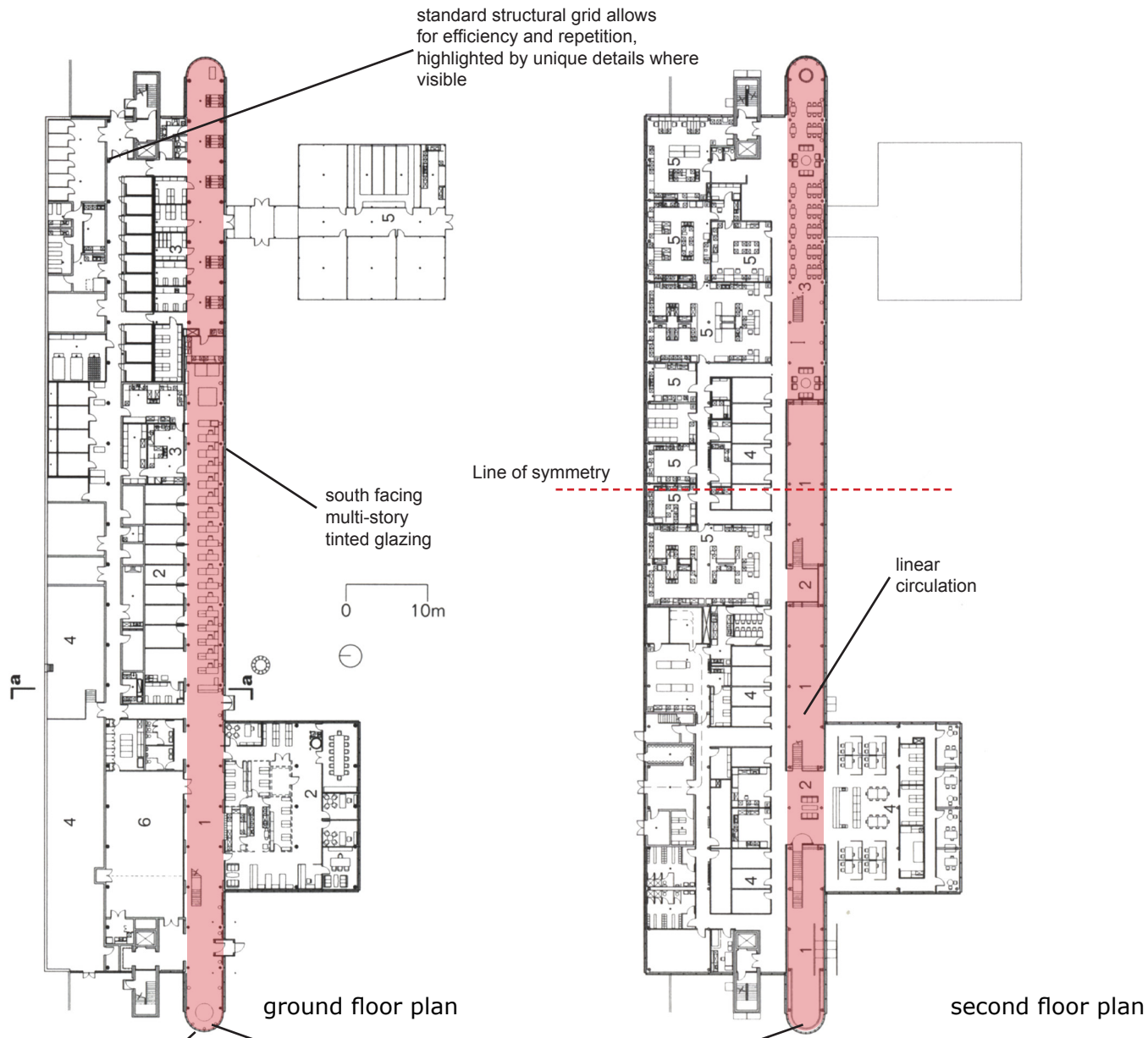


fig. 1.4

IKOY's Scientific Barn, completed in 1995, was designed to reflect the barns of the past coupled with the science and technology of the future. IKOY's barn includes conference and administration spaces with offices for up to 25 scientists, each located near their respective laboratory spaces. The research center, which includes a large header house and computer controlled greenhouse, is highlighted by a library and cafeteria, and perhaps the most important space: the three story galleria. This space is essential to the Scientific Barn as it creates a space where different minds, including researchers, scientists, and farmers, can interact and share their ideas and work with one another.

The Scientific Barn is probably the closest case study to reflect the research portion of the Agri-Archaeological Research Center and Museum. The Scientific Barn is unlike the other case studies as they pertain more to the museum/display aspect of the project. This case does, however, offer some similarities in program. This project, along with the others, contains a library, offices, and work spaces specifically designated for the functions within them.

The site for the Scientific Barn is a 100-year-old farm site, distinguished by a beautiful large red barn. The building was sited to offer views of the farm as well as to take advantage of the environment. A long narrow footprint with south facing tinted glazing allows ample natural light into many spaces, all while mitigating heat gain. The fact that the chosen site was an historic farmstead supports a large cultural impact to the project, with the original barn as a constant reminder as to why the research done here is important.



arc geometry based off silo diameter

central circulation spine (similar geometries in plan and section)

balance by geometry

- inspiration from farming 'silo' form (rectangle with half circle cap)
- unique structural detailing
- south facing tinted glazing
- variance in ceiling heights

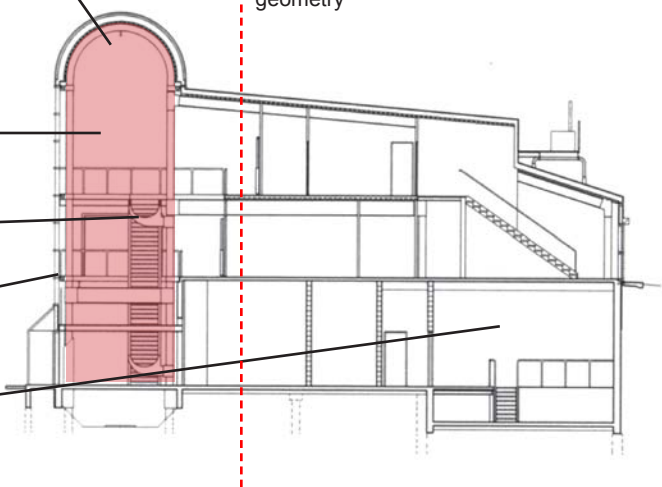


fig. 1.5, 1.6, 1.7



fig. 1.8

The strongest element in IKOY's design of the Scientific Barn is surely its formal qualities. IKOY recognized important landmarks in the countryside to be grain elevators, barns, and steeples. IKOY clearly translated these elements into their design, pairing them with modern materials of steel, concrete, and glass. The beauty of this project, and many of IKOY's, is its wonderful attention to technical detail, apparent throughout the building from structural connections to addressing the mechanical systems. I believe one thing lacking on this project is the entry point, which is simply tacked on to the side of the building. However, the main galleria serves as a clear and successful circulation space for the entire building, offering social and functional value to its users. I am also pleased with IKOY's treatment of the egress stairs, and vertical circulation, capping the ends of the building in grain elevator form-fashion.

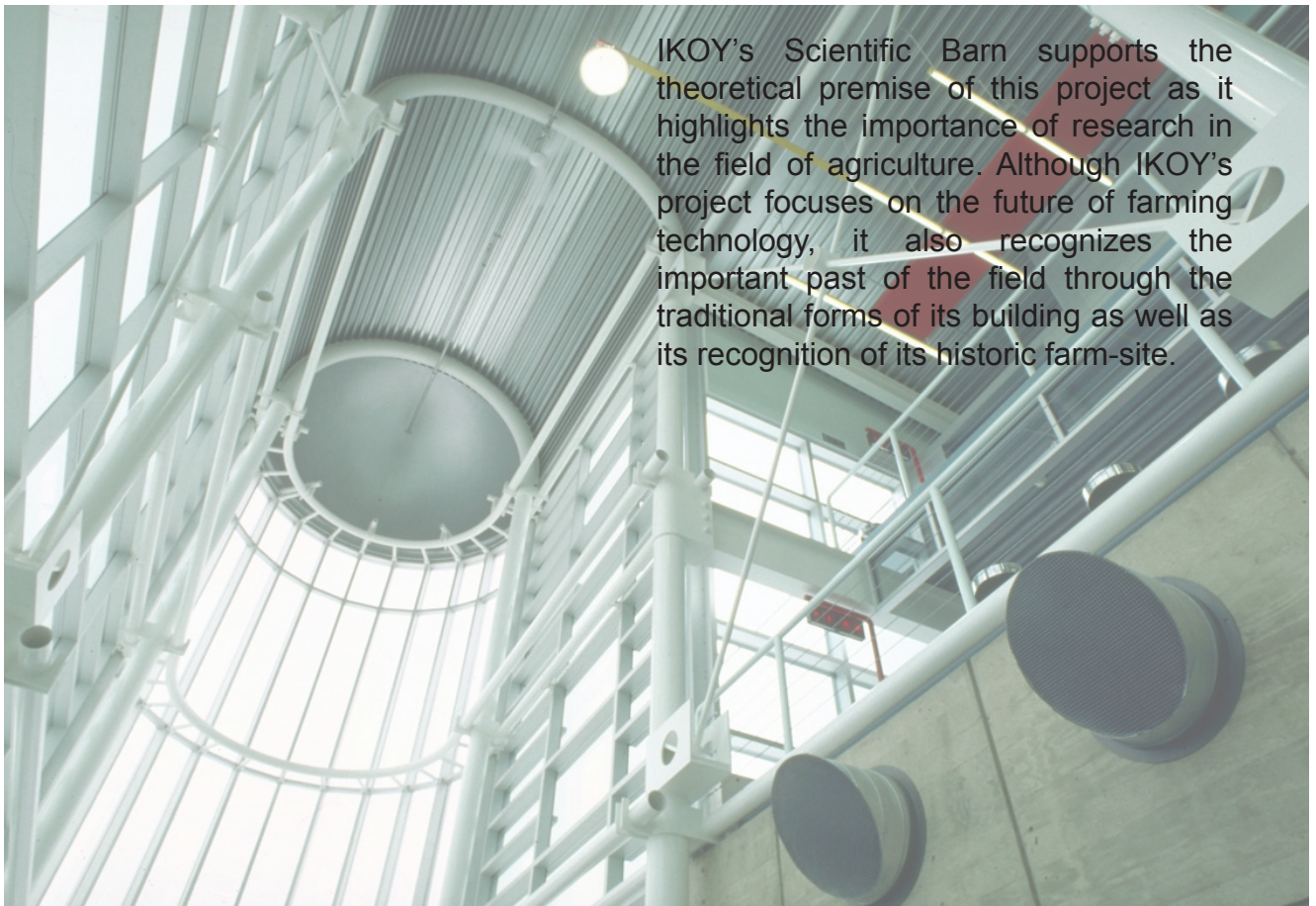


fig. 1.9

IKOY's Scientific Barn supports the theoretical premise of this project as it highlights the importance of research in the field of agriculture. Although IKOY's project focuses on the future of farming technology, it also recognizes the important past of the field through the traditional forms of its building as well as its recognition of its historic farm-site.

Strategic Air Command Museum

Leo A. Daly

Museum

Ashland, Nebraska

290,000 ft²

architect

typology

location

size



fig. 1.10



fig. 1.11

lobby interior

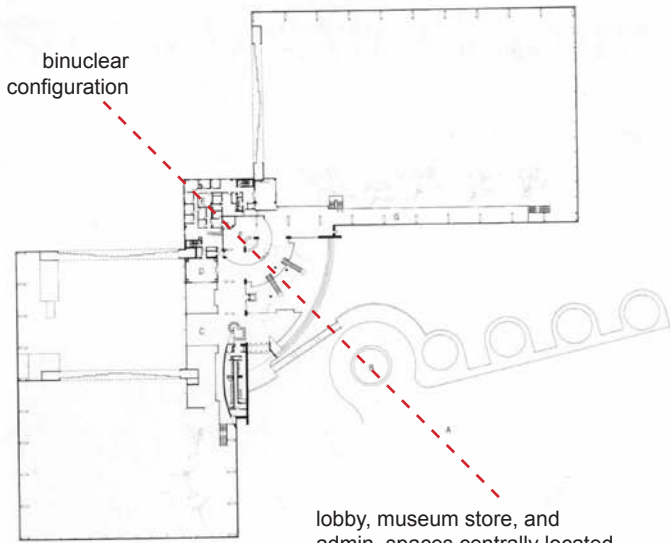
The Strategic Air Command Museum is a unique museum paying homage to aircraft utilized during the cold-war era. The building is highlighted by its conical atrium lobby housing most museum functions aside from exhibition space. The exhibition spaces lie in the two large arced hangars, resting 90 degrees apart with the atrium between. Other museum spaces include a library, cafe, small theater, storage, museum store, and administration.

This museum is unique as its artifacts are not classical paintings or ancient pottery, they are extremely large-scale aircraft. The size of the artifacts is reflected in the overall square-footage of the museum. This building is quite similar to IKOY's Scientific Barn in its overall scheme. Both have a large central atrium space, with spaces adjacent for the functions of the buildings.



fig. 1.12

exhibition space

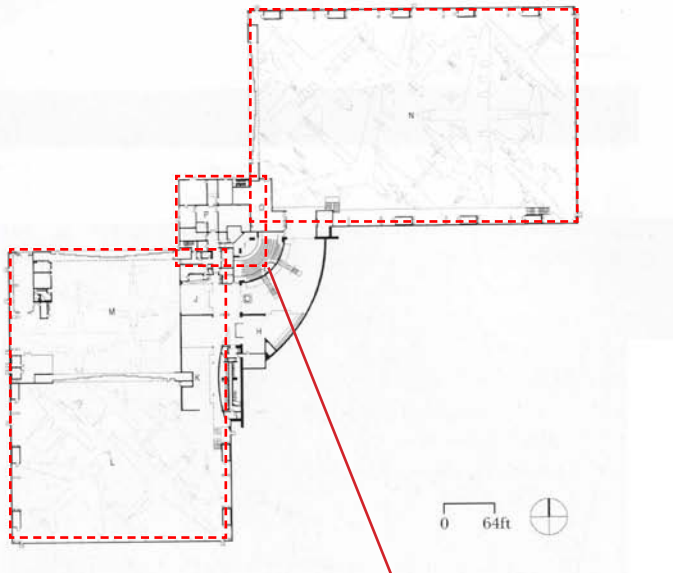


entry level

lobby, museum store, and admin. spaces centrally located with symmetrically balanced exhibition spaces

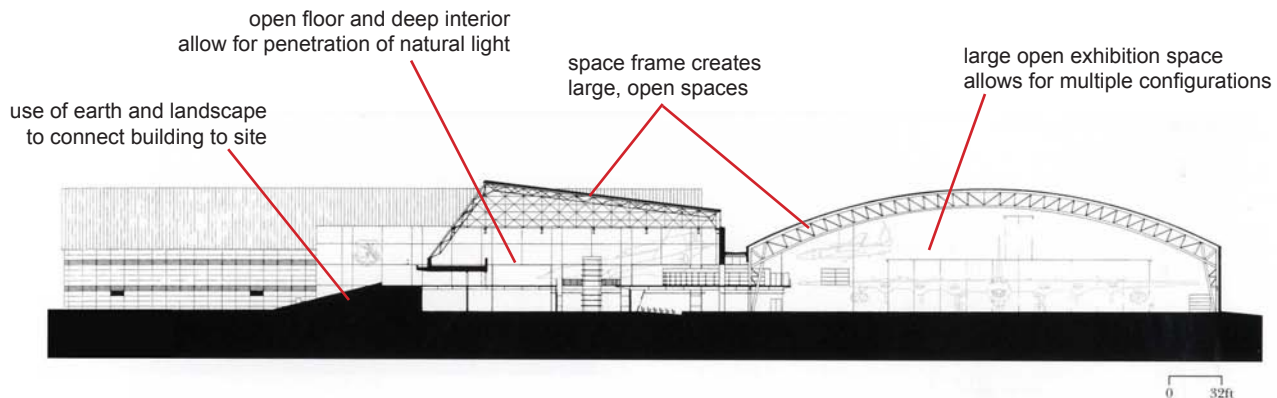
Much like the Scientific Barn, this building does a successful job addressing the features of its site and environment. The large atrium faces southeast to provide natural lighting to many of the interior spaces throughout the day. The two large exhibition hangars and their rounded forms reflect the rolling hillside of the unique Nebraska landscape.

I believe the forms of this building to be a harmony of inspirational and functional. The conical atrium form can be likened to the jet engines seen on the fighter plane in the lobby or even the on site rockets. The exhibition hangars are derived from the functional rationale of hangars past, to meet the needs of the large artifacts they house. Both spaces in this example are highlighted by their beautiful structural design.



lower level

overlapping geometries (rectangle, square, rectangle)



open floor and deep interior allow for penetration of natural light

space frame creates large, open spaces

large open exhibition space allows for multiple configurations

use of earth and landscape to connect building to site

0 32ft

fig. 1.13, 1.14, 1.15

opposite, fig 1.16 lobby space frame fig 1.17, 1.18

I believe this case strongly represents the underlying aspects of the theoretical premise of my thesis project. This case uses great detail in displaying these important artifacts from the cultural aspect of war. This strongly parallels with the cultural importance of the field of agriculture to our country and our region. Although research is not the emphasis of the program of this case, it should be recognized that through the process of restoration and preparation of gallery exhibitions a great deal about the past can be learned. This case also has a strong social aspect as it reaches out to the community to inform and present the importance of these aircraft. The one way in which this case doesn't support the theoretical premise is that little attention is paid to the future and future technologies in the area of flight.



North Dakota Heritage Museum

AWBW

architect

Museum

typology

Bismarck, ND

location

130,000 ft²

size



fig 1.19

perspective drawing



fig. 1.20

lobby stair

Completed in 1981, the North Dakota Heritage Museum lies on the grounds of the North Dakota state capitol, and is run by the North Dakota State Historical Society. The program for the building consists of a large exhibition gallery, lecture rooms, an auditorium, archived collection spaces, lobby, and refreshment mezzanine. The lower service level hosts space for archaeological/historic preservation storage, exhibit design, carpentry, administration, education and interpretation, and shipping and receiving space.

The overall layout and design for this project is quite similar to that of the Strategic Air Command Museum, but this one constructed a decade and a half earlier. Both cases have a centrally located lobby and entry, with other forms on each side. Unlike the SAC, in which both of the adjacent forms were for displays, this project has a gallery on only one side, while the other portion is reserved for research and documentation. Both lobbies in the two cases are quite similar but vary in their level of technology. Both lobbies emphasize vertical space and large amounts of glazing, placing importance on natural daylight within this space.

Although this case varies a great deal from the following case, the New Acropolis Museum, in circulation and layout, they both share similar rectilinear forms. The two cases also share similar concrete column grid structural systems.

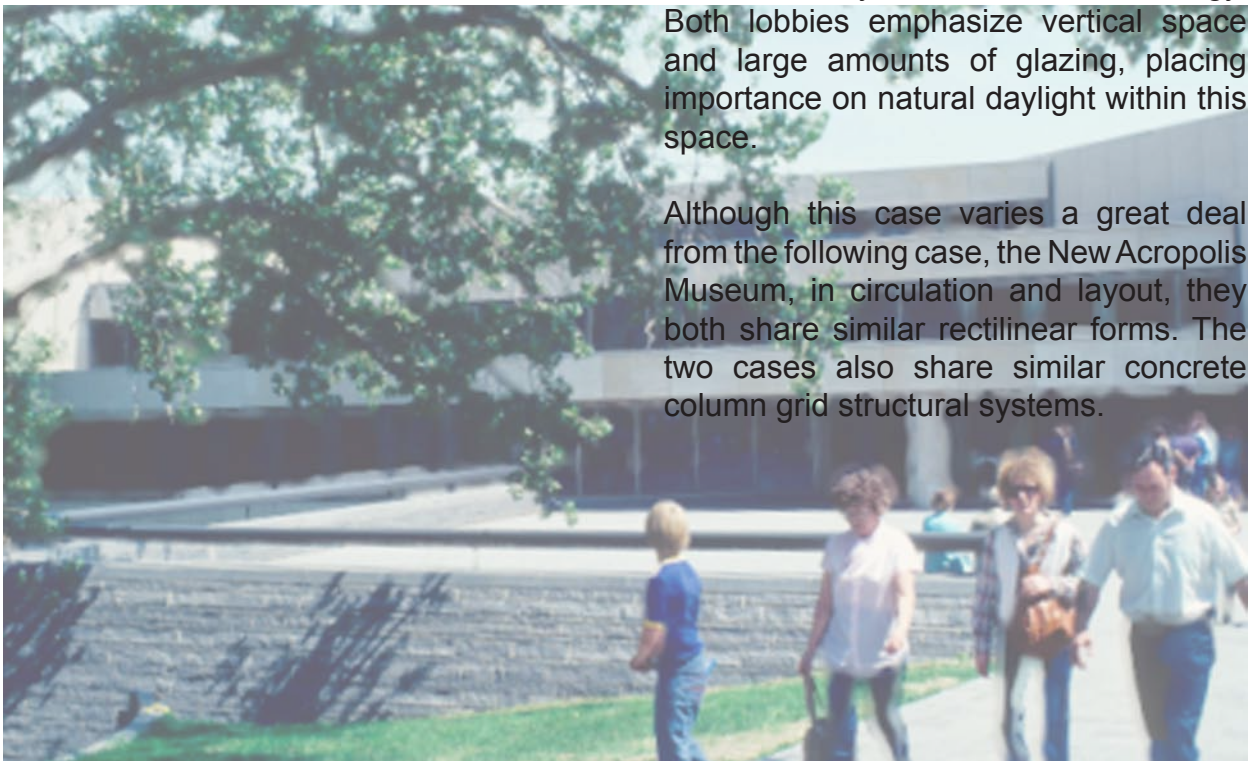


fig. 1.21

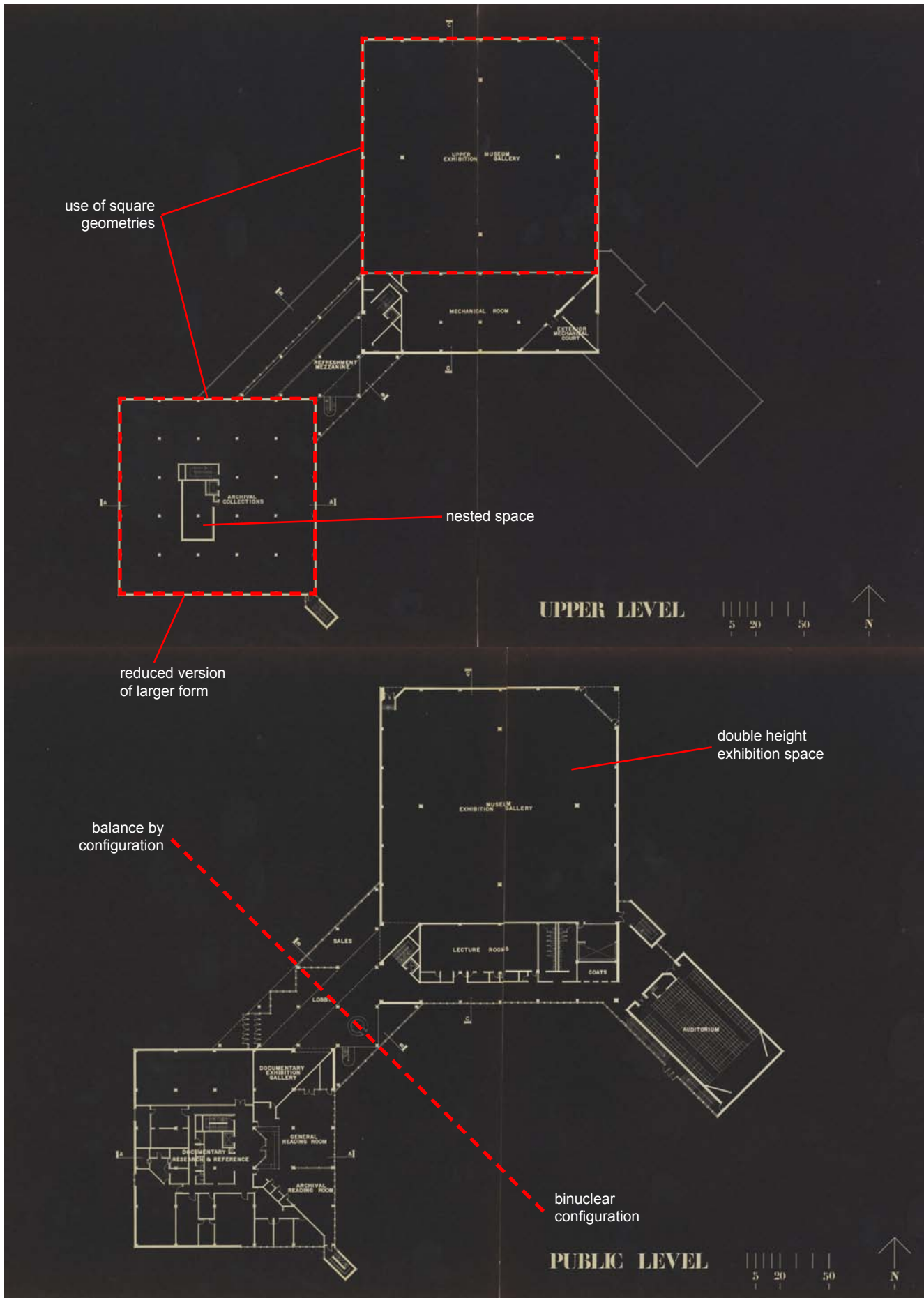
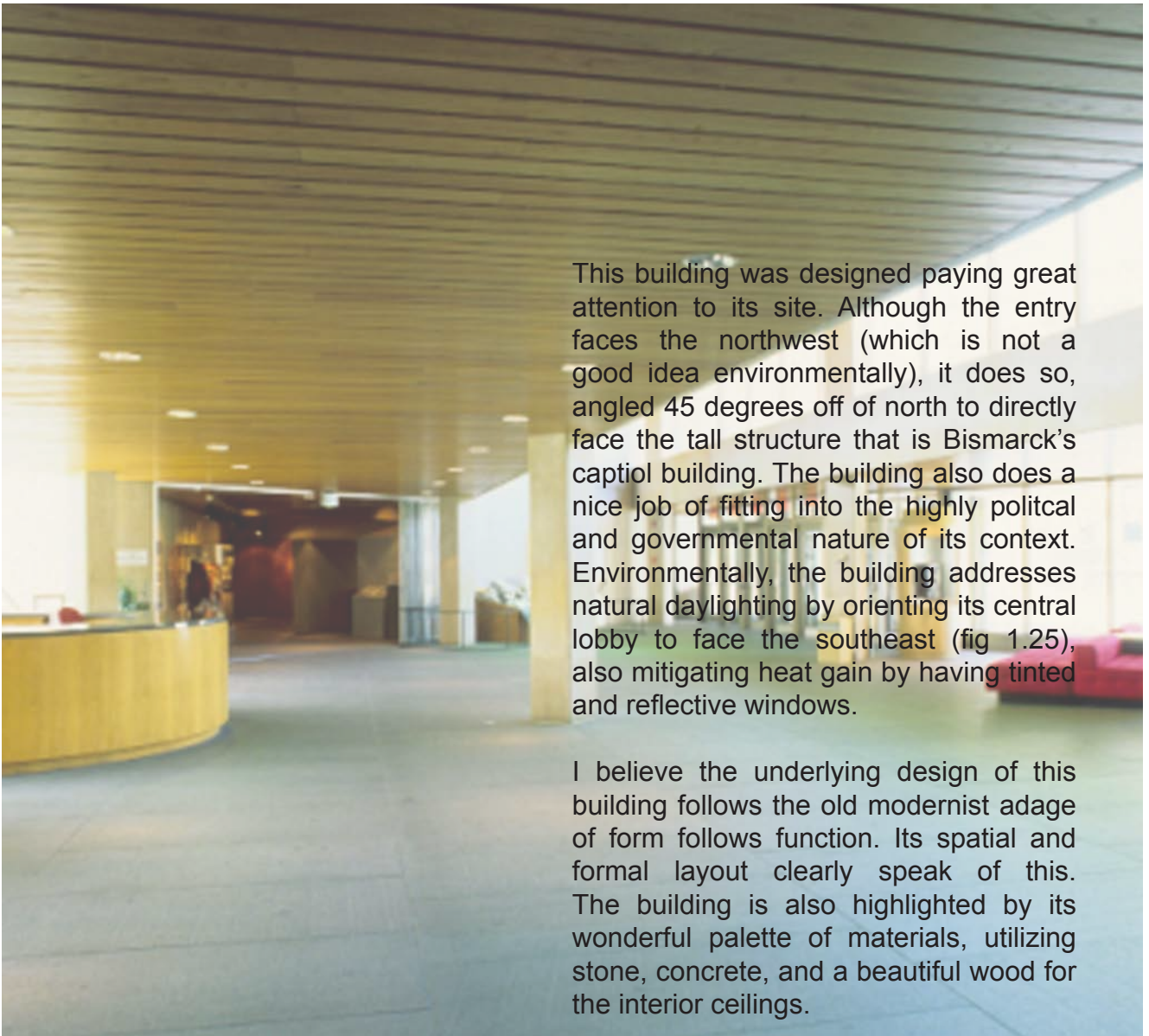


fig. 1.22, 1.23



This building was designed paying great attention to its site. Although the entry faces the northwest (which is not a good idea environmentally), it does so, angled 45 degrees off of north to directly face the tall structure that is Bismarck's captiol building. The building also does a nice job of fitting into the highly political and governmental nature of its context. Environmentally, the building addresses natural daylighting by orienting its central lobby to face the southeast (fig 1.25), also mitigating heat gain by having tinted and reflective windows.

I believe the underlying design of this building follows the old modernist adage of form follows function. Its spatial and formal layout clearly speak of this. The building is also highlighted by its wonderful palette of materials, utilizing stone, concrete, and a beautiful wood for the interior ceilings.

fig. 1.24



In my theoretical premise I have expressed my belief that in order to better serve our future, we can gain much insight from looking at the past. I believe that this project epitomizes that claim, in both its design and its function. As previously stated, this project's roots can be likened to mid-century modernism, understanding the ideals and precedents set forth by the modern masters of architecture. By drawing from modernist design principles, AWBW has developed a building that will truly serve its community successfully well into the future. The building was also designed for the future, as it is undergoing plans for an addition that will mesh nicely with this original building.

fig. 1.25

New Acropolis Museum

Bernard Tschumi Architects

Museum

Athens, Greece

226,000 ft²

architect

typology

location

size



fig. 1.26



fig. 1.27

archaic gallery space

The New Acropolis Museum was built to house the large collection of artifacts exhumed from the Acropolis. This museum contains all of the typical spaces you would expect in a museum but is lacking in administration space and offices. It does include a cafe, restaurant, lounge, temporary exhibition space, permanent galleries, and a museum shop. I thought this was a good building for a case study because its collection is purely archaeological in nature.

This project is similar in size and scope to the Strategic Air Museum, only this building's size is determined by the size of the collection, not the size of the artifacts displayed. Also, similar to IKOY's Barn, this project is extremely site-specific as it is directly adjacent to the Acropolis, for which it is honoring. It does differ quite drastically from the previous two cases in its overall layout and circulation patterns. The New Acropolis Museum houses its vertical circulation primarily in the center of the project, allowing gallery space to surround it.

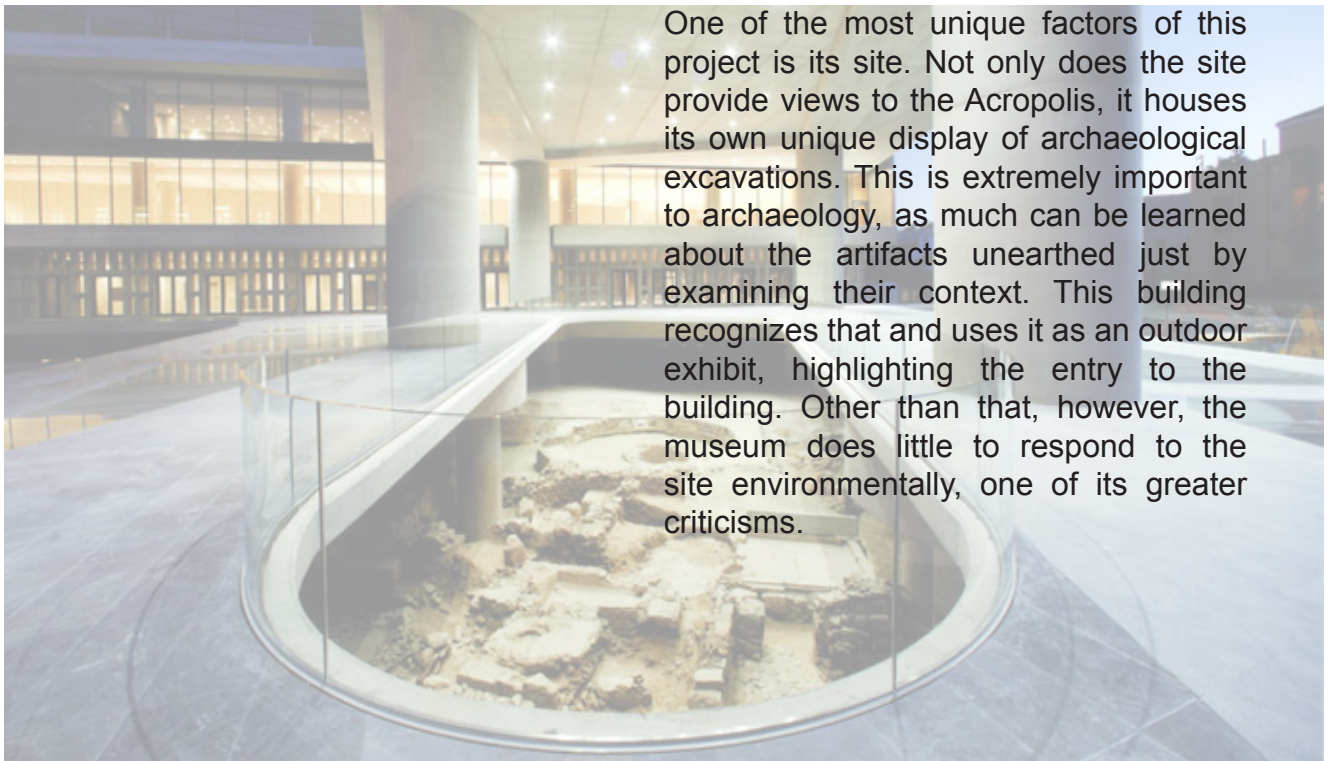


fig. 1.28

One of the most unique factors of this project is its site. Not only does the site provide views to the Acropolis, it houses its own unique display of archaeological excavations. This is extremely important to archaeology, as much can be learned about the artifacts unearthed just by examining their context. This building recognizes that and uses it as an outdoor exhibit, highlighting the entry to the building. Other than that, however, the museum does little to respond to the site environmentally, one of its greater criticisms.

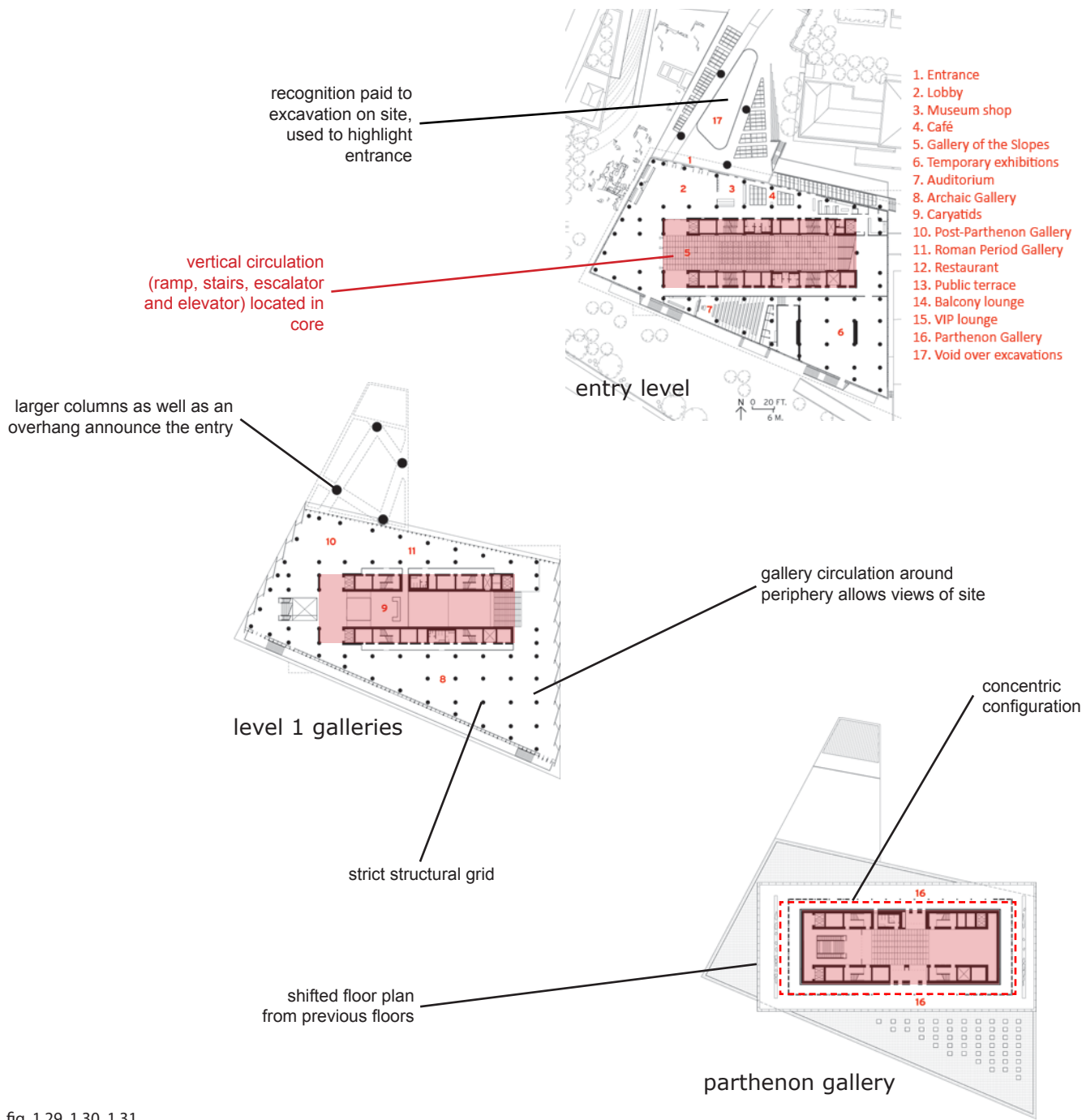


fig. 1.29, 1.30, 1.31



fig. 1.32

opposite, fig. 1.33, 1.34

From my point of view this case is more about the museum collection than the museum itself. The shape and form of the museum seems obscure and random, except for the Parthenon Gallery, which emulates the shape and form of the Parthenon itself. The building's mass seems extremely large and obtrusive for its context, a challenging task for the designer and such a large museum collection. The designer was successful in creating a sense of hierarchy as one moves through the museum, as well as through time, following the path of the chronological layout. The final destination of course, is the Parthenon Gallery, which exhibits ancient friezes, as well as views of the Parthenon itself.

This case highlights the theoretical premise, recognizing the importance of cultural artifacts. Once again, the nature of a museum lacks a perspective on the future, only highlighting important objects of the past. I believe this case does offer a strong perspective on the value of archaeological study, and its methods of understanding the past, therefore supporting the underlying unifying idea of the Agri-Archaeological Research Center and Museum.



Series: Factories & Fireworks

Dennis Oppenheim

Landscape Art

Various

artist

typology

location



fig. 1.11



fig. 1.35

Early on in his career artist Dennis Oppenheim created a series of landscape art pieces. Signalling a shift in his work to the outdoors, he became interested in industrial and mechanized works. Directly to the left is a piece titled “A Station for Detaining and Blinding Radio-active Horse”. This piece, completed in 1981, utilizes materials of metal and rubber, some even found from the site, to create a very rugged and machine-like derelict piece of art. On the previous page, and below left, is the piece “Formula Compound, a Combustion Chamber, an Exorcism”, a piece very similar to the previous example, only this one includes the dynamic of firework explosions. The third piece (below right), from 1984, is titled “Image Intervention”.

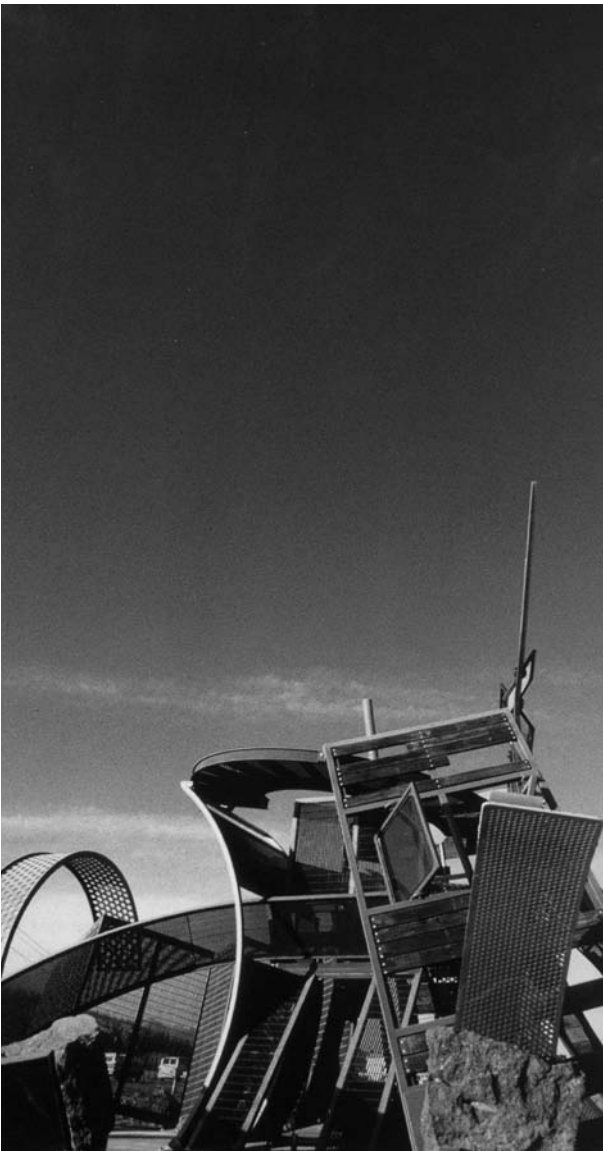


fig. 1.36, 1.37

This series of work seemed a valid case to study for my project. Although the projects offer little in architectural merit, they are cultural objects of art, which play a certain role in society. Oppenheim’s work also draws parallels to the objects of focus to my project, old broken down pieces of machinery. Oppenheim’s work does a wonderful job of reflecting on our mechanized and industrial society, breaking down our very organized technology into constituent parts, and leaving them to remain a part of the landscape, much like old farm equipment of the midwest.



typological summary

This series of case studies was directed at understanding a building typology focused on research, as well as the exhibition, collection, and storage of artifacts. Special attention was also considered in the case of Dennis Oppenheims's land art, and its relationship to industrial agriculture's landscape relics.

The unifying idea for this thesis lies in the proposal that by examining recent historic precedents, we can better improve technologies for the future. I believe that all cases examined supported this theory in one way or another. Beginning with IKOY's Scientific Barn, the case was a futuristic building, functioning for research and development of the agricultural sector. Although the building's function is solely focused on the future, the architects recognized the value of the past by placing this building on a 100-year-old farmstead. The architect even takes it a step further by designing the building with views to the historic barn. The SAC Museum melds history with future and advanced technology by combining traditional hangar forms with the uniquely advanced space frame structure to create exceptionally expansive spaces to display large artifacts of Cold-War aircraft. The North Dakota Heritage Museum expressed modernist design qualities to create a building to function in the present as well as accommodate a future expansion. Lastly, the New Acropolis Museum is significant for its archaeological and historical value, although it does not relate much to the future.

One common thread throughout these cases is the significance of their sites. Aside from the SAC Museum, each of the other cases are extremely site specific. Dennis Oppenheim's "Station for Detaining and Blinding Radio-active Horses" is intensely tied to its site, with much of the material and objects coming directly from the site.



fig. 1.38



fig. 1.39

typological summary

The Scientific Barn was designed to pay homage to agricultural and its associated work. The Heritage Museum recognizes the importance and hierarchy of the capitol building on its site, oriented to reveal this important political building. The New Acropolis Museum obviously couldn't exist on any other site in the world, recognizing its extreme cultural importance to the ancient Greek temples above it. This notion of site importance has already affected my thesis through the process of site selection. This will become evident in later portions of this volume.

Aside from the importance of site, another common thread running through these cases exists in the spatial layout and circulation. IKOY developed a long, linear "public" space to promote interaction between the various users of the building, including the farmers themselves, scientists, and researchers. The Heritage Museum and SAC Museum both emphasized a central lobby and entry space, and allowed for exhibition space on one or both sides. The organization for the Acropolis Museum was substantially different, but in a purposeful way. The layout of that case involved a specific path and hierarchy for moving through the museum. This path was devised to display the long Greek history in a chronological manner, leading to the most important collection at the conclusion: the Parthenon collection.

A few other issues were also realized by observing these selected cases. The first was the challenge of appropriately sizing the spaces specific to the artifacts. The SAC Museum required large, vast open spaces to exhibit its large aircraft, while the Acropolis Museum was able to display smaller artifacts within its more confined spaces.



fig. 1.40

The value of analyzing these cases has been significant. The analysis has brought out certain aspects and issues that will be important in designing my project. The cases also revealed important aspects pertaining to my theoretical premise and unifying idea. Analysis of these cases in plan and section have also revealed some unique architectural characteristics. Just as my thesis argues, the importance of looking at these historical precedents in an analytic manner can and will improve the design of my project.

typological summary



fig. 1.41

historical **context**

historical narrative

Oxford American Dictionary defines museum as “a building in which objects of historical, scientific, artistic, or cultural interest are stored and exhibited”. Clearly this definition serves to literally identify what an actual museum is; however, the definition lacks any sort of context of the role museums play in our society. In aiming to understand the historical context of a ‘museum’, it has become clear that the perpetuations involved in making the museum what it is today (a building in which objects...are stored and exhibited) were taking place long before western civilization even existed.

To understand the modern museum, one can turn back all the way to the fourth century B.C., to the society of the ancient Greeks. Extensive research has been conducted to find that Hellenistic Greeks’ exhibited a strong enthusiasm for collecting, as their interest in art turned from public frescos and symbolic statues to secular paintings (on wood) to be displayed within homes. Greek collections also included imported luxuries from the east, including carpets, wall hangings, and even furniture. Not only were the ancients Greeks interested in collections of cultural objects, the Romans also held an interest in the collection of objects. This began with the Romans’ invasion of the art-rich kingdom of Pergamum in 133 B.C. As the Roman population migrated to this new kingdom they quickly acquired an appetite for Greek art. In just 100 years, at the onset of the Roman Empire (27 B.C.), every Roman that had the chance to collect something did. (Belk 1995)

historical narrative

The next notable stop in understanding the history of museums lies in Medieval Europe. In a time when much of society consisted of peasants who were fortunate if they had a bed, the primary collectors of objects of interest were the churches. The collections of churches were focused on relics, fragments of bones of saints, and other holy artifacts. A thorough collection of relics for a church meant a source of power and prestige among the religious community and other churches, as these objects were viewed to possess the power of a saint. In the Middle Ages, as Europe was transitioning into the Renaissance, a notable collector, Duke Jean de Berry, paved the way for the future collections of the Renaissance period. De Berry's collections were significant, as they marked a time when interest turned from objects thought to possess value (i.e. religious relics) to objects collected for their own sake. The kinds of objects collected by de Berry included art objects like sculptures and paintings, as well as precious stones, precious metals, coins, medals, perfumes, vases, wall hangings, and embroideries. De Berry's interest in collecting objects of interest quickly became the fad of late 14th century noblemen. Another well-known collection of the time was that of the Medici family, among whose demise meant putting their collection on the market bringing forth art dealers, antiquarians, and auction houses. Although popular among the wealthy, evidence also exists that in the mid-15th century, other lower members of society were also collecting cultural objects. The last piece to fuel the fire of 16th and 17th century widespread collecting of objects was the unearthing of ancient Rome from 1450 to 1550. The result of these excavations resulted in people taking objects for investment purposes, only to be turned over for a profit.

historical narrative

With the rise of the Renaissance, came a rise in population (following the plague), discoveries of foreign lands, new inventions, the rise of capitalism, economic growth, and the collections of objects known as cabinets of curiosity. These cabinets of curiosity, or *Wunderkammern* (Cabinets of Wonder) existed across Europe in the thousands. The great popularity of the *Wunderkammern* was made possible by the excitement in finding new worldly objects in the age of discovery. The knowledge of new lands also meant travel, highlighted by the collection of objects from around the world.

The profound occurrence of the Cabinet of Curiosity soon gave way to the classification of objects, initially as either natural or artificial, but soon developed into classifications of greater specialization. These included ethnographic, art, natural history, and geological. With these classifications also came the pronounced division of the arts and sciences, later intensified with the rise of Cartesian science. This rise of science brought a decline to the age of discovery, through a process defined by social scientist Max Weber as “the disenchantment of the world”, of which he also associated the rise of capitalism and modernity.

Although the Cabinets of Curiosity and the *Wunderkammern* may have only lasted a few centuries, they have since evolved and present themselves today in modern museums. The modern museum exists today to educate and inform society through the presentation of exhibits, either stand-alone or interactive

historical narrative

George MacDonald and Stephen Alford in their 1991 article titled *The Museum as Information Utility* argue that modern museums are too object-oriented, stating “this is reflected in the list of key functions of museums: to collect, preserve, study, exhibit, interpret; all are activities performed *on* museums’ artifacts or specimens” (MacDonald 1991). They continue to argue that this introverted focus leads to the belief that artifacts are the reason for the museum, whereas a museum should be a tool through which we learn and teach people about heritage.

MacDonald and Alford also claim that museums need to react to the changes and challenges plaguing society, culturally, technologically, and environmentally. Museums need to be responsive to the changing information needs of society, and not portray heritage as history, but as an integral part of our present. The museums of today, and tomorrow, need to present knowledge to their audience in an organized and functional manner, careful not to inundate the viewer with information but to create in the viewer an understanding of the information presented.

Just as the Oxford Dictionary defined the museum functions as “storage and exhibition” MacDonald and Alford present us with a series of functions for the museums of the future: Generation, Perpetuation, Organization, and Dissemination. Their definitions of these roles are as follows:

historical narrative

1. *Generation* of information results from the research activities of experts, as a product of the study of museum collections or the historical, cultural, and natural contexts of items in the collections. It may, however, also result- intentionally, or serendipitously- from such things as conservation activities, the creation of replicas, or the re-enactment of historical activities.

2. *Perpetuation* of information most obviously results from conservation of collections; but dissemination of knowledge is also a perpetuation strategy. Preservation of heritage objects is not an end in itself, but serves to maximize the access to information encoded in them.

3. *Organization* involves establishing the relationships between discrete elements of information, bearing in mind that this involves the unavoidable intervention of subjectivity and that information elements can interrelate in many ways but nonetheless valid patterns. This function may express itself, for example, through classification systems used in collections management; or through interpretive activities, including the recontextualization of artifacts in a period setting exhibit. In practice, generation and organization of knowledge often occur simultaneously, as researchers integrate new information into existing worldviews.

4. *Dissemination* is achieved by creating access to information, which entails both making information readily available and ensuring that its users have the ability to comprehend it. That access may be either museum-directed, such as through promotion, publications, exhibitions, and educational and interpretive programs; or it may be client-directed, such as through research in the library, or remote searching of a museum database. It is important for museum to create an environment in which the audience is receptive to the information offered- this is an integral requirement for effective dissemination, and depends on a good understanding of audiences' wide-ranging needs, interests, tastes, and learning styles.

(Macdonald & Alsford, 1991)

historical narrative

Macdonald and Alsford maintain that the primary resource or commodity should be recognized as information and not as artifacts. I believe that this perspective is essential in understanding the future of museums and their role in society. In order for museums to be successful in the future they must adapt to society. For example, the move from an industrial age to the information age means that one must think about how information is presented to people who are actively reliant on television or the Internet. This concept may also be translated into the design of the actual museum itself. Thus the question for this design problem becomes: how does one design a museum that will succeed in the information age, and be able to adapt to the future of society? This question can be examined by the exact theoretical premise of this thesis. By looking at the history of 'museum' it was observed that the Cabinets of Curiosity that were popularized by the ideals of the Renaissance only lasted a few centuries, falling prey to the ideals of Cartesian science and empiricism. It is therefore understood that in order for a museum to maintain success over time, it must adapt to the changes that occur within society. This solution must be recognized as important, as well as the adherence to the modern museum functions as outlined by MacDonald and Alsford above, as I undergo the design process of the Agricultural Archaeology Research Center and Museum in the second phase of this thesis project.

project goals

academic goals

The academic-based goal of this thesis project is to provide a valuable contribution to anthropology, as this thesis deals primarily with the way human society operates. This is carried out by the proposal of a new way of looking at and understanding the way our current society operates, primarily defined by our cultural technologies and their processes of change.

This project also aims at contributing new ideas to the area of archaeology, and more specifically historical archaeology, that sub-field concerned with the more recent history of human culture.

The academic goals of this thesis are to be achieved by executing a quality publication that clearly introduces and reflects my ideas so that they may be used for further advances in the areas and fields of study regarded in this thesis.

professional goals

The professional goals associated with this thesis project are ultimately concerned with the process of execution established throughout the project and its development. The final result should consist of a well-developed thesis project, documented, displayed, presented, and published in a manner that is consistent with the professional sector of architecture.

The professional aspect can be defined or characterized in the end by a final product of this project that would be suitable to present to outside professionals in the field of architecture. To do so, one must have a project that one is proud to stand by, not only now but when one should look back on it in the future. This leads to the third and final type of goal: personal.

personal goals

The personal goals associated with this project stem from the two goal types previously recognized. In order to achieve a project that is valuable to the academic sector, and executed with a professional quality, I must challenge myself to carry out all divisions of the project with the utmost sincerity and dedication, in order to achieve the previous goals stated.

Other personal goals I have come to recognize with my thesis include the utilization of my previous education experience, a degree in Anthropology with an emphasis in Archaeology. Another goal was to develop a project that is of utmost interest to me, and that can also be applied and executed in an architectural manner. Finally, I have the goal to build on the design education that I have been continuously building over the last four years as a part of this institution. I consider this project as a capstone project encompassing my entire collegiate career, synthesizing years of studies from various fields to produce a coherent project that is of relevance to all fields associated with it.

And finally the last goal resides in producing a project that develops and acts as the final stepping stone, a solid foundation to jump off of as I transition my career from one of collegiate studies to an incorporation into the professional design field of Architecture.

site **analysis**

the narrative



fig. 2.1

As a young child I remember travelling through the local county-sides of Minnesota and the Dakotas, noticing the old and abandoned agricultural icons that farmers would often leave displayed on hilltops within their fields (e.g. fig. 2.1). When thinking about the selection for my thesis site I knew I needed something with some moderate topography, in order to re-capture the spirit of those aging hilltop derelicts. Closely scanning my Minnesota atlas I narrowed in on the faint gray contour lines marking the old shores of Lake Agassiz. I headed off in my pickup to venture the back county roads of Clay County just 40 minutes east of Moorhead. After a morning of navigating through gravel pits, herds of bison, and down minimum maintenance roads, I turned down a dusty gravel road. I drove a short while down this hilly road until the land became flat again. I turned around. A short while later, as I was nearing County Road 32, I saw it: a hilltop reminiscent of those I had seen as a child. It was perfect.

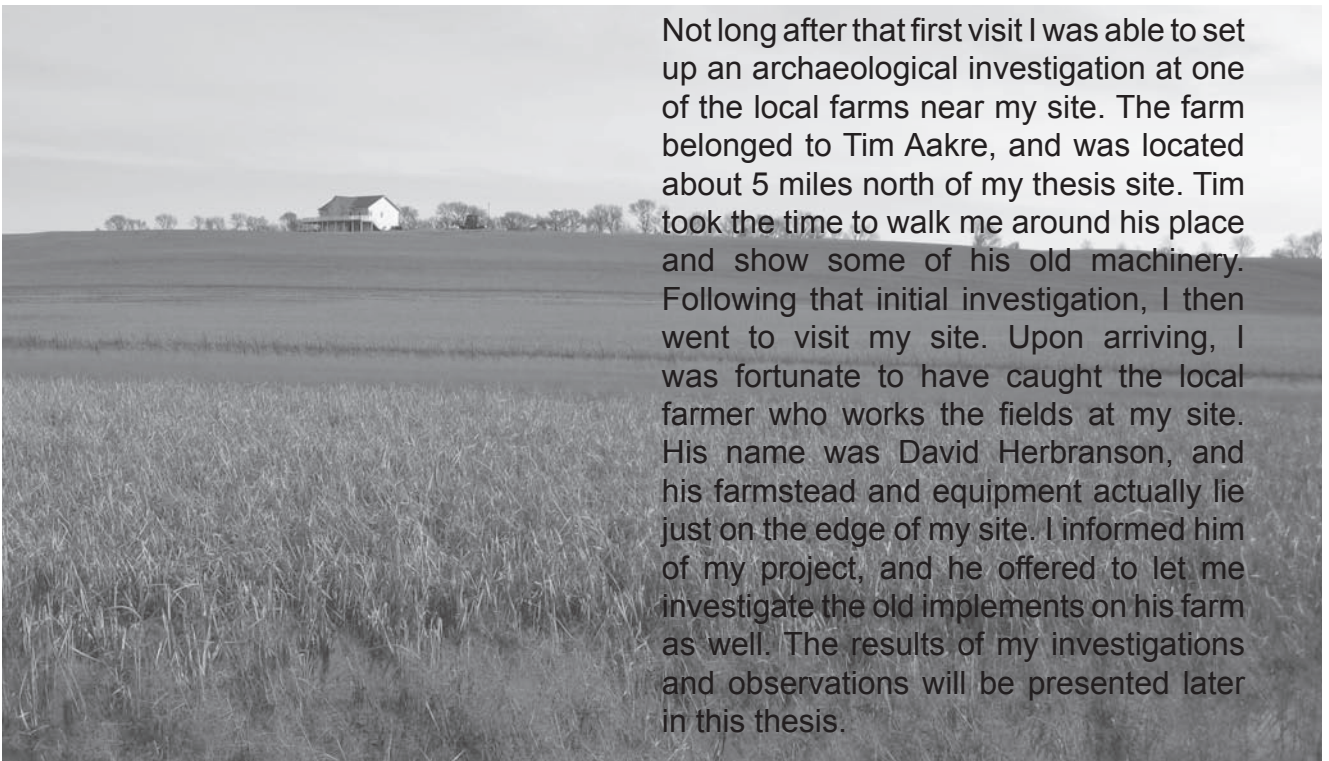


fig. 2.2

Not long after that first visit I was able to set up an archaeological investigation at one of the local farms near my site. The farm belonged to Tim Aakre, and was located about 5 miles north of my thesis site. Tim took the time to walk me around his place and show some of his old machinery. Following that initial investigation, I then went to visit my site. Upon arriving, I was fortunate to have caught the local farmer who works the fields at my site. His name was David Herbranson, and his farmstead and equipment actually lie just on the edge of my site. I informed him of my project, and he offered to let me investigate the old implements on his farm as well. The results of my investigations and observations will be presented later in this thesis.

Upon my first site visit, the moment I saw that hilltop I knew it was right for my thesis. Once I was on it I learned of the even greater potential. As I peered out over the vast horizon I could see miles of farmland. Nothing but corn and soybeans to the north and west as I peered down into the valley. A short way off into the distance one can spot the steeple of the Rollag Lutheran Church, located in the small town that hosts the annual Steamthreshers Reunion, a time each summer when the local community overflows with old machinery enthusiasts,

On my first visit I was taken aback by the wonderful serenity of this place; the wonderful views, the fresh air, and the quiet stillness in the air, occasionally interrupted by the faint drone of a tractor off in the distance. On the second visit I was a little less concerned with the serene quality of the place and more concerned with the treasure trove of rundown farming fossils contained around the two archaeological sites I investigated. I found the physical quality of these farming ephemera to be fascinating, the rusted metal, peeling paint, all being usurped by the flowing nature that has encompassed them. If ever there was a place determined to harvest the potential that lies within these industrial relics, the thesis site I chose would be it.



fig. 2.3

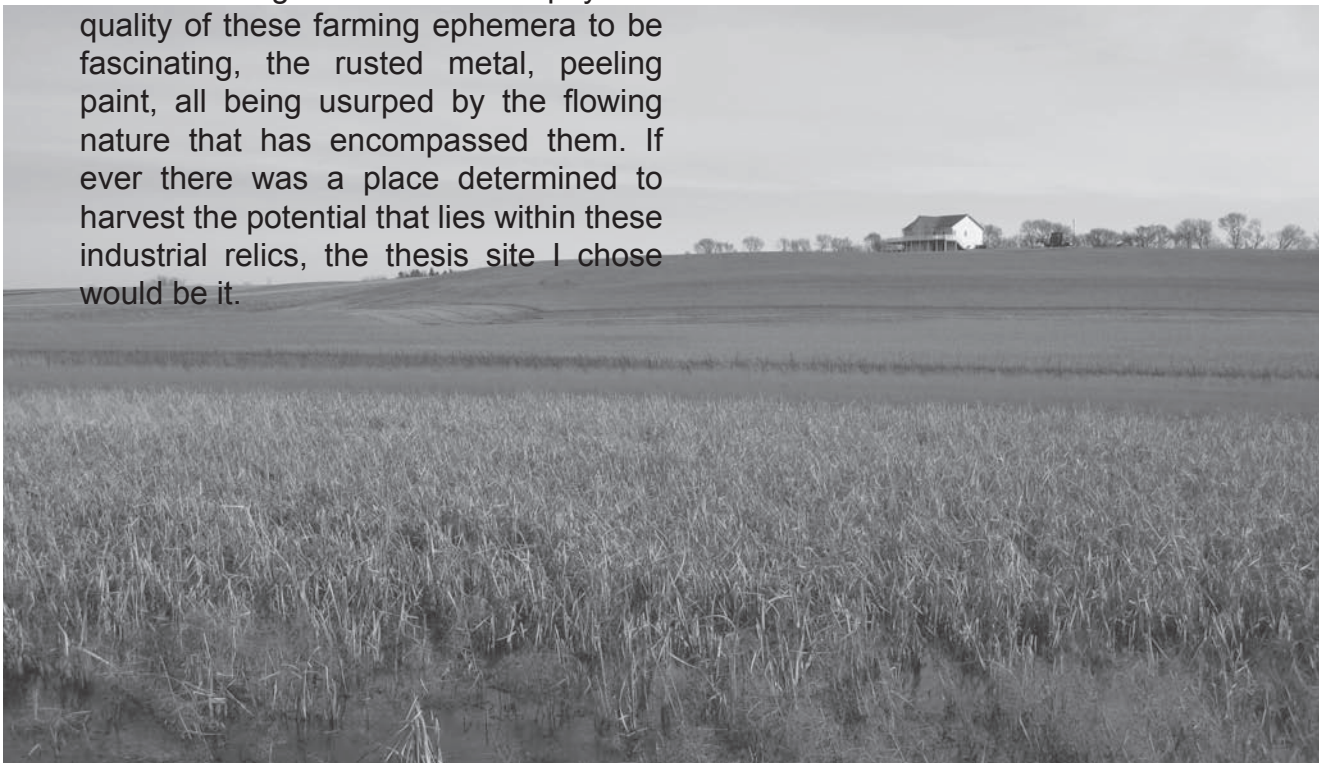
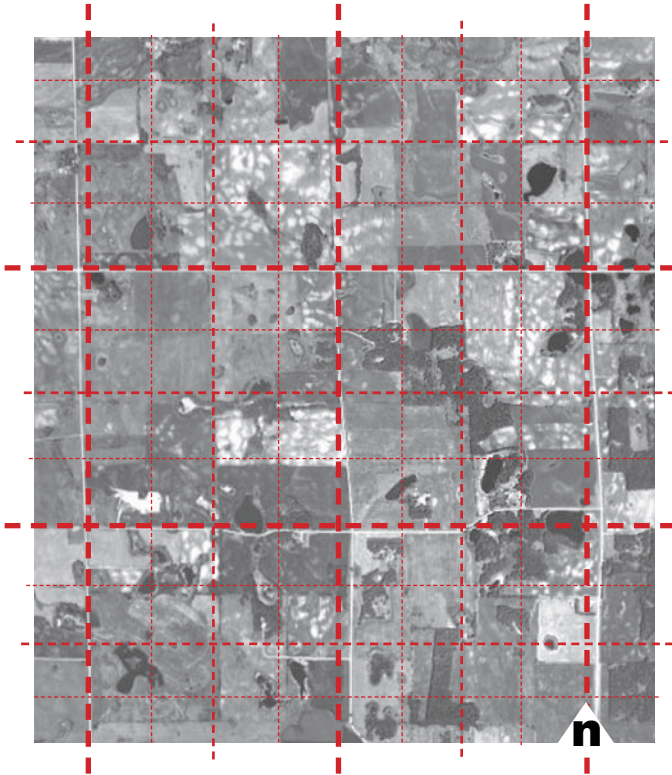


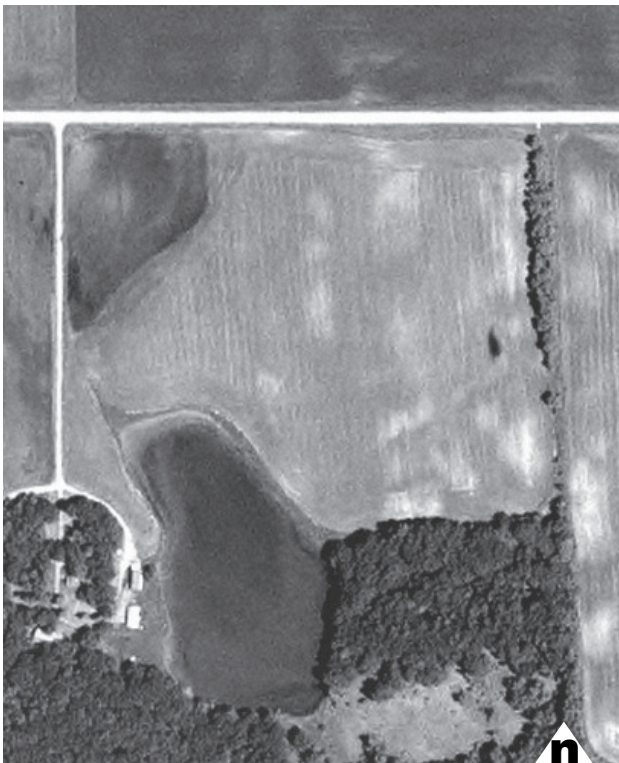
fig. 2.4

site characteristics



Grids

While similar to the grids observed in an urban setting, the grids that exist on my site occur at a much larger scale than those of the city. The grid layout present on the landscapes throughout the U.S. are the result of president Thomas Jefferson, as declared in 1785. Jefferson's system divided the land on a grid platform with six mile by six mile sections, forming townships. Within these townships, land is divided by square mile (or 640 acres), quarter mile, and often times even smaller.



Textures

The textures that occur on and around the site are quite unique as they vary by year and by season. This year the site's texture was indicated by fields of soybeans. Late in the season the texture will be that of tilled earth, fresh after the harvest. It is very likely that the texture next year will be defined by uniform rows of corn. Other textures contributing to the sense of place include the smoothness of the small pond nearby, the rocky and wash-boarded texture of the gravel road, and the textures of the nearby wooded areas.

site characteristics

Geometries

Geometries that occur around the site are those familiar sights of local country-side farmsteads. These include grain bins, silos, and barns. Each of these forms maintains their own unique textures as well.



fig. 2.5

Site Section

Figure 2.6 represents a section cut diagonally through the site and pond, facing the southeast. This section was developed to understand the topographic relationships existing on the site.

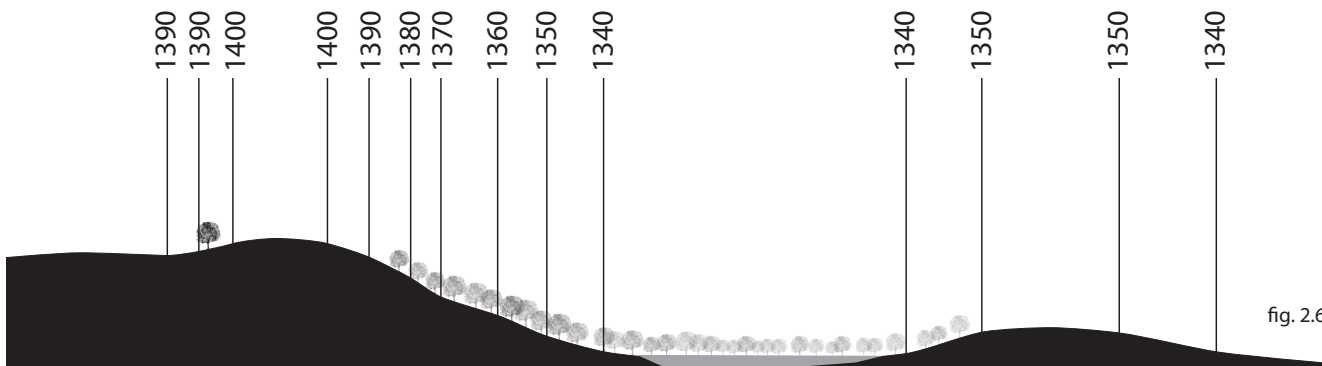


fig. 2.6

site characteristics

Built Features

The back country of Clay County is not very densely populated. The land around my site averages four farmsteads per square mile. Each farmstead has 3-6 buildings with types such as barns, garages, sheds, houses, and grain storage.

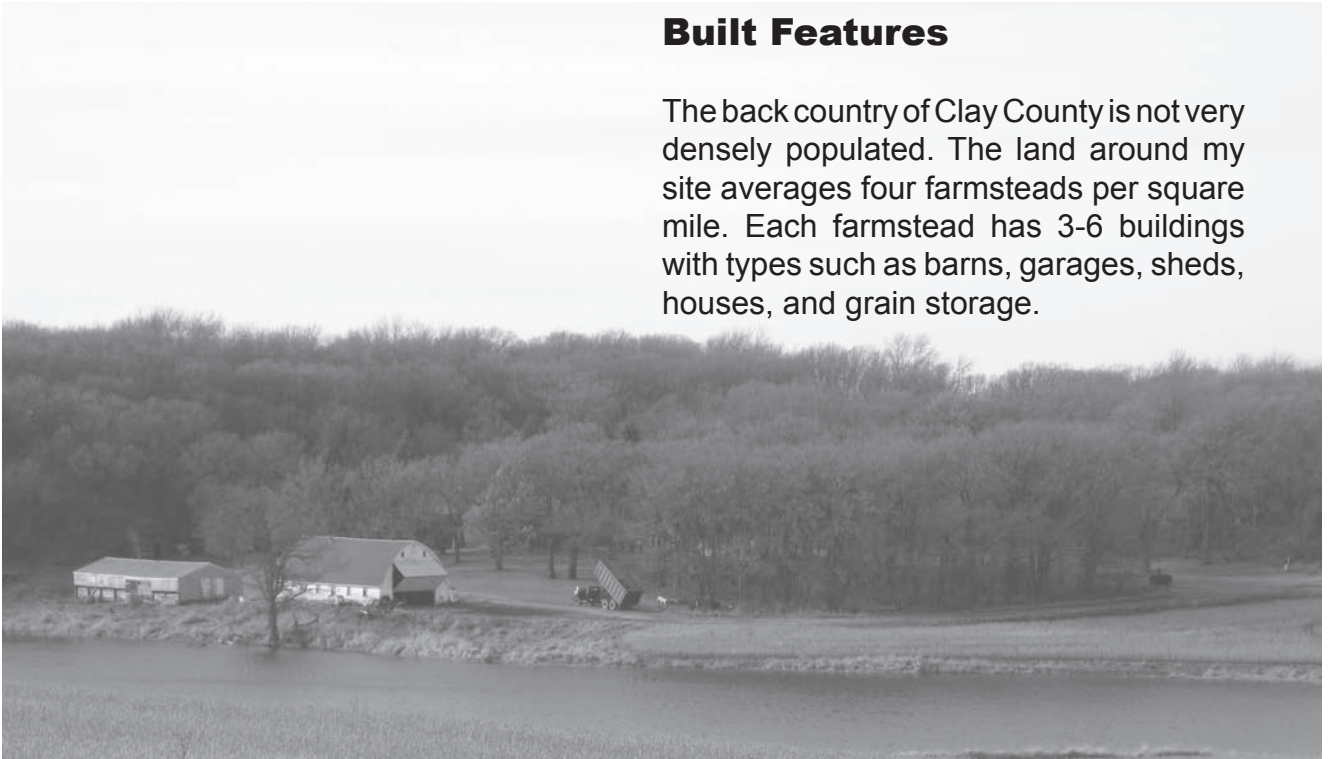


fig. 2.7

Herbranson farm

Light Quality

Light quality is another characteristic that can vary depending on the time of year. The first time I visited my site the air was clear and the light was strong. A few weeks later on my second visit, the local farmers were either trying to get their harvest in, or already tilling. The light quality on my second visit was that of a hazy sunshine, a result of the local farming activity, and the disrupted particles that were in the air. Although the air was a bit hazy, the sunlight was still very strong.



fig. 2.8

site characteristics

Water

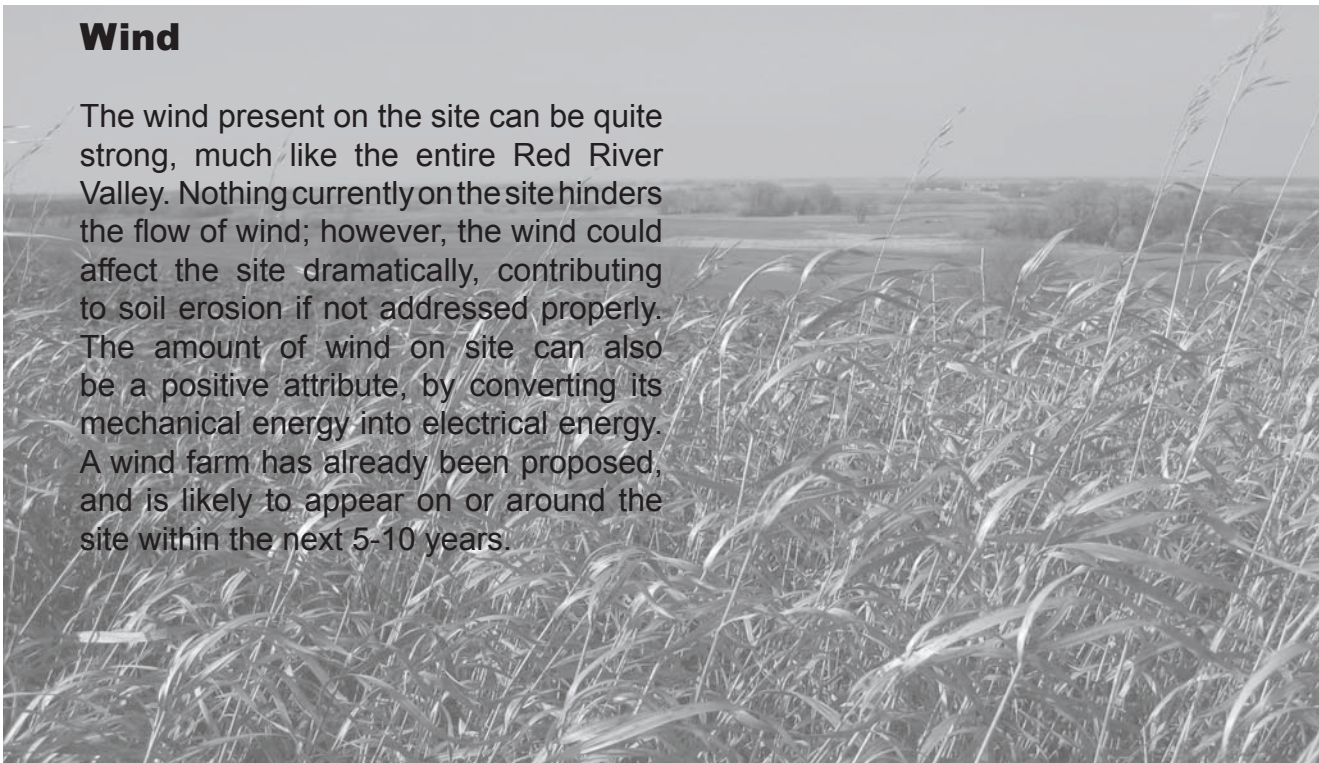
Throughout the site there are two small bodies of water. The larger of the two lies near the bottom of the hill, next to the Hebranson farm. The second lies near the top of the hill, just south of the highest point. Both bodies of water have a similar quality. The clarity is very poor, and the overall color is a brownish green, similar to most rivers in the state. These water sources could suffer from any fertilizer pollution that would exist in the runoff from the crop fields. Although the water quality is low, I believe that the small bodies of water are a unique complementary feature to the site.



fig. 2.9

Wind

The wind present on the site can be quite strong, much like the entire Red River Valley. Nothing currently on the site hinders the flow of wind; however, the wind could affect the site dramatically, contributing to soil erosion if not addressed properly. The amount of wind on site can also be a positive attribute, by converting its mechanical energy into electrical energy. A wind farm has already been proposed, and is likely to appear on or around the site within the next 5-10 years.



photograph taken from field adjacent to site

fig. 2.10

site characteristics

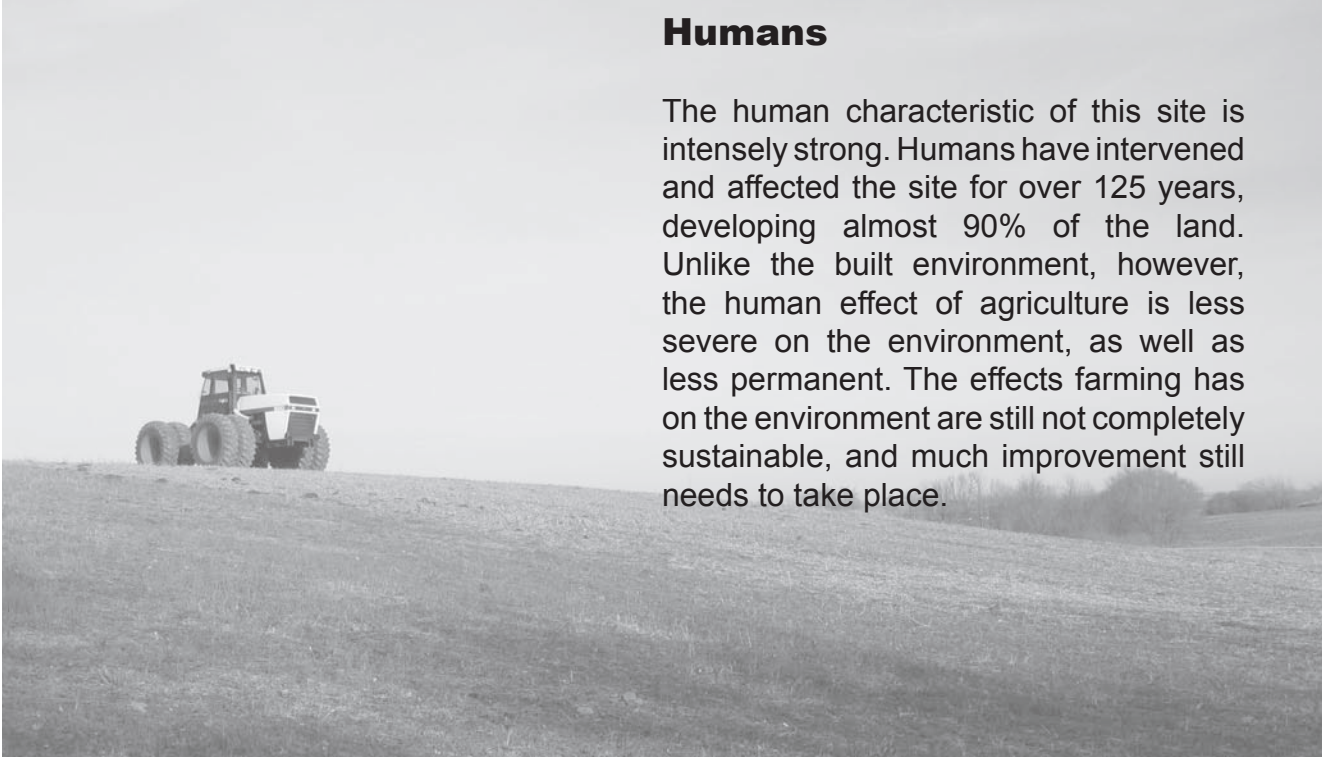


fig. 2.11

Humans

The human characteristic of this site is intensely strong. Humans have intervened and affected the site for over 125 years, developing almost 90% of the land. Unlike the built environment, however, the human effect of agriculture is less severe on the environment, as well as less permanent. The effects farming has on the environment are still not completely sustainable, and much improvement still needs to take place.



fig. 2.12

Distress

One may argue that the nature of current industrial agricultural practices is evidence of distress to land and the environment. I believe distress occurring at this site exists more on a micro level than on the visible macro level. Polluted water on site can be evidence of distress. Reduced soil quality can also be evidence of distress on the site.

site statistics

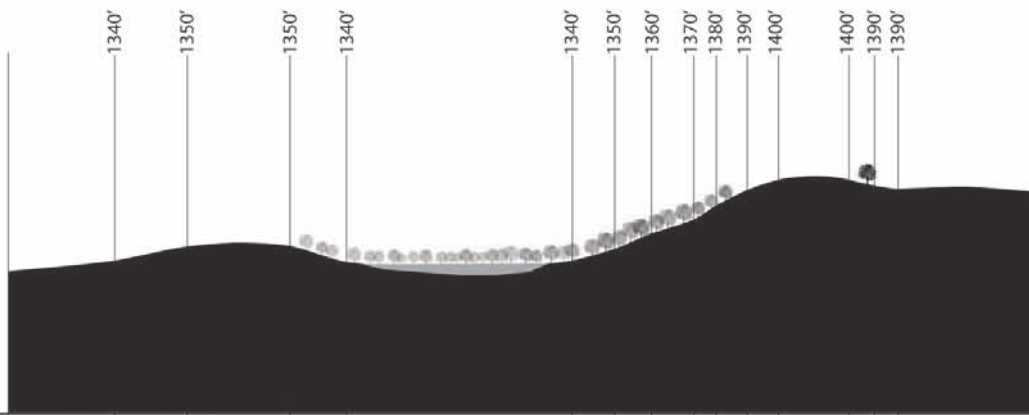
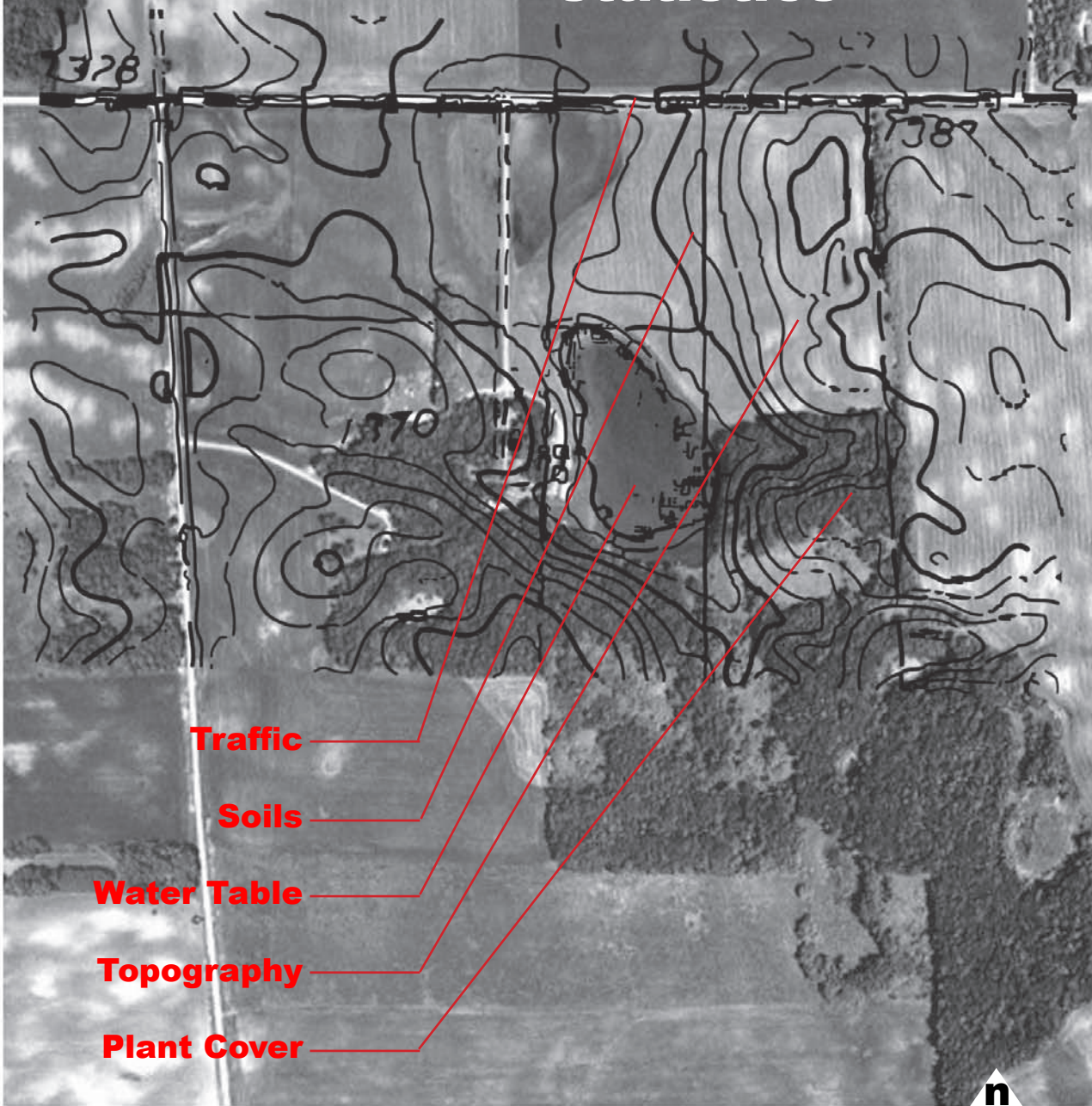
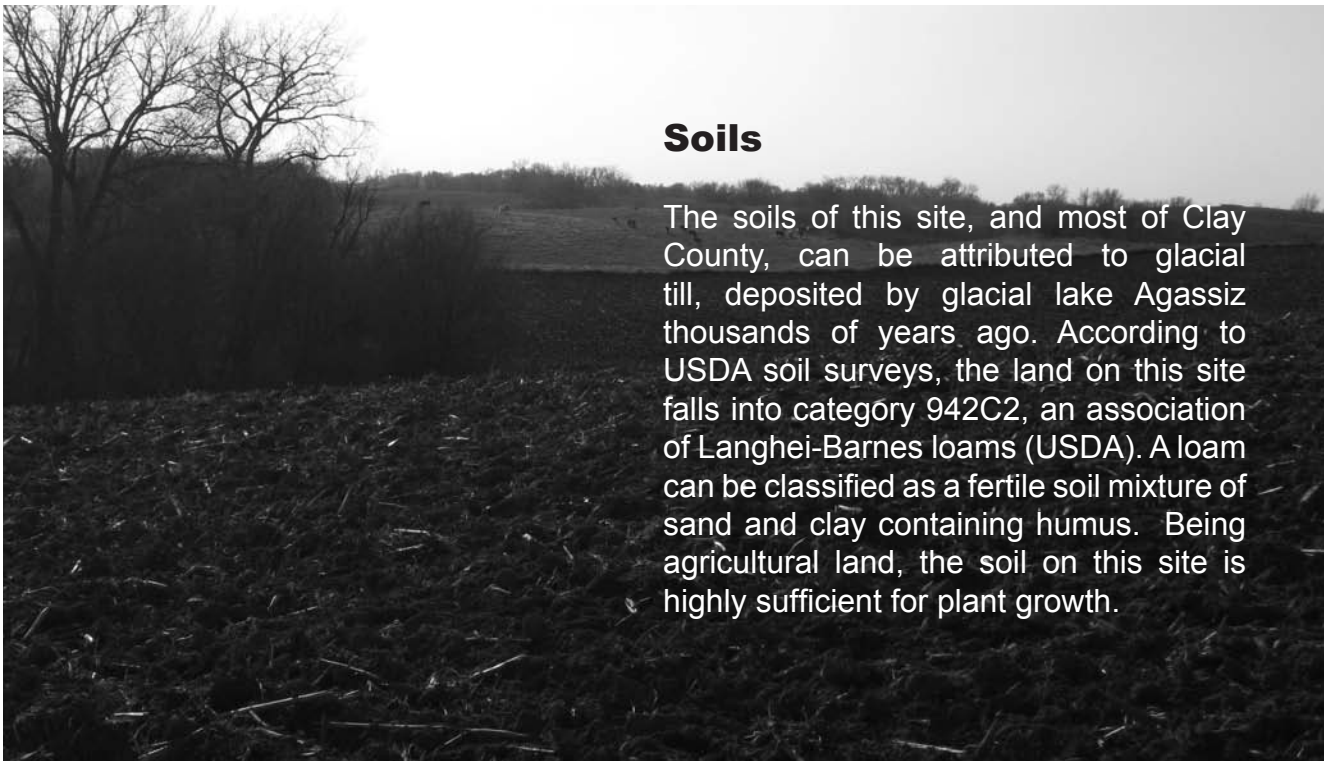


fig. 2.13

site statistics

Traffic

Traffic on the site is quite minimal. The main road accessing the site is a gravel road with primary traffic being residents of the area, as well as farm workers or machinery. Traffic on Highway 32 (approximately .5 mile east) is substantially greater. Pedestrian traffic on the site is negligible; one is more likely to see a deer or pheasant on the site than a pedestrian, other than people farming the land.



Soils

The soils of this site, and most of Clay County, can be attributed to glacial till, deposited by glacial lake Agassiz thousands of years ago. According to USDA soil surveys, the land on this site falls into category 942C2, an association of Langhei-Barnes loams (USDA). A loam can be classified as a fertile soil mixture of sand and clay containing humus. Being agricultural land, the soil on this site is highly sufficient for plant growth.

fig. 2.14

site statistics

Topography

Initially this site was of interest because of its unique topography (unique in the sense of different from the rest of the Red River Valley). According to the USDA, there are two slope types existing on my site location. The higher elevation portion is classified as having slopes ranging in 6% to 12%, considered walkable and suitable for informal activity. On other portions of the site, slopes are recognized as 2 to 6%, considered relatively flat and able to support a variety of activity.

Water Table

According to the USDA, the quality of the soil performs well in regards to drainage. The water table is deeper than 80 inches, and the frequency of flooding and ponding is classified as none.



fig. 2.15

site statistics



fig. 2.16

Plant Cover

Plant cover on the site primarily consists of whatever crop is being grown by the local farmer, generally corn or soybeans. Trees prevalent on or adjacent to the site include general deciduous varieties. Examples of this include the tree line defining the eastern edge of the site, as well as the small wooded area capping the site to the south.

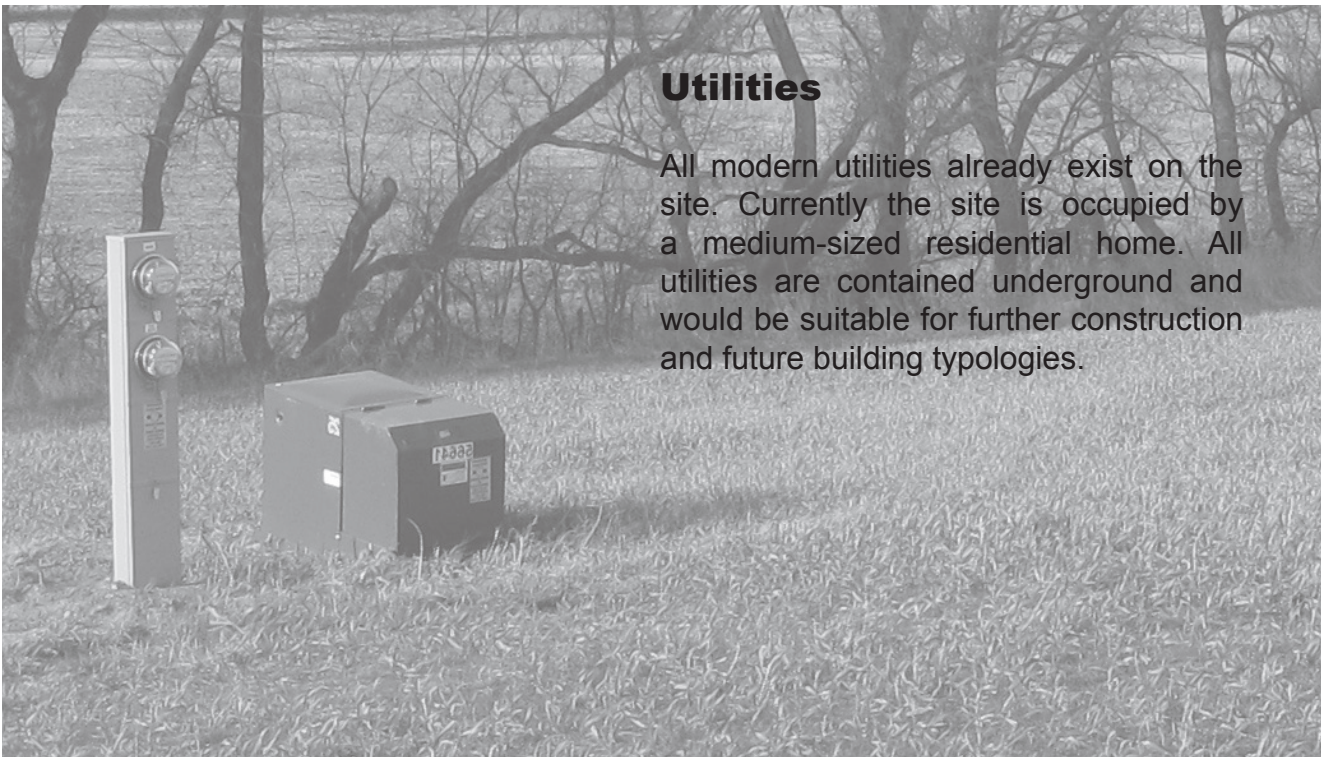
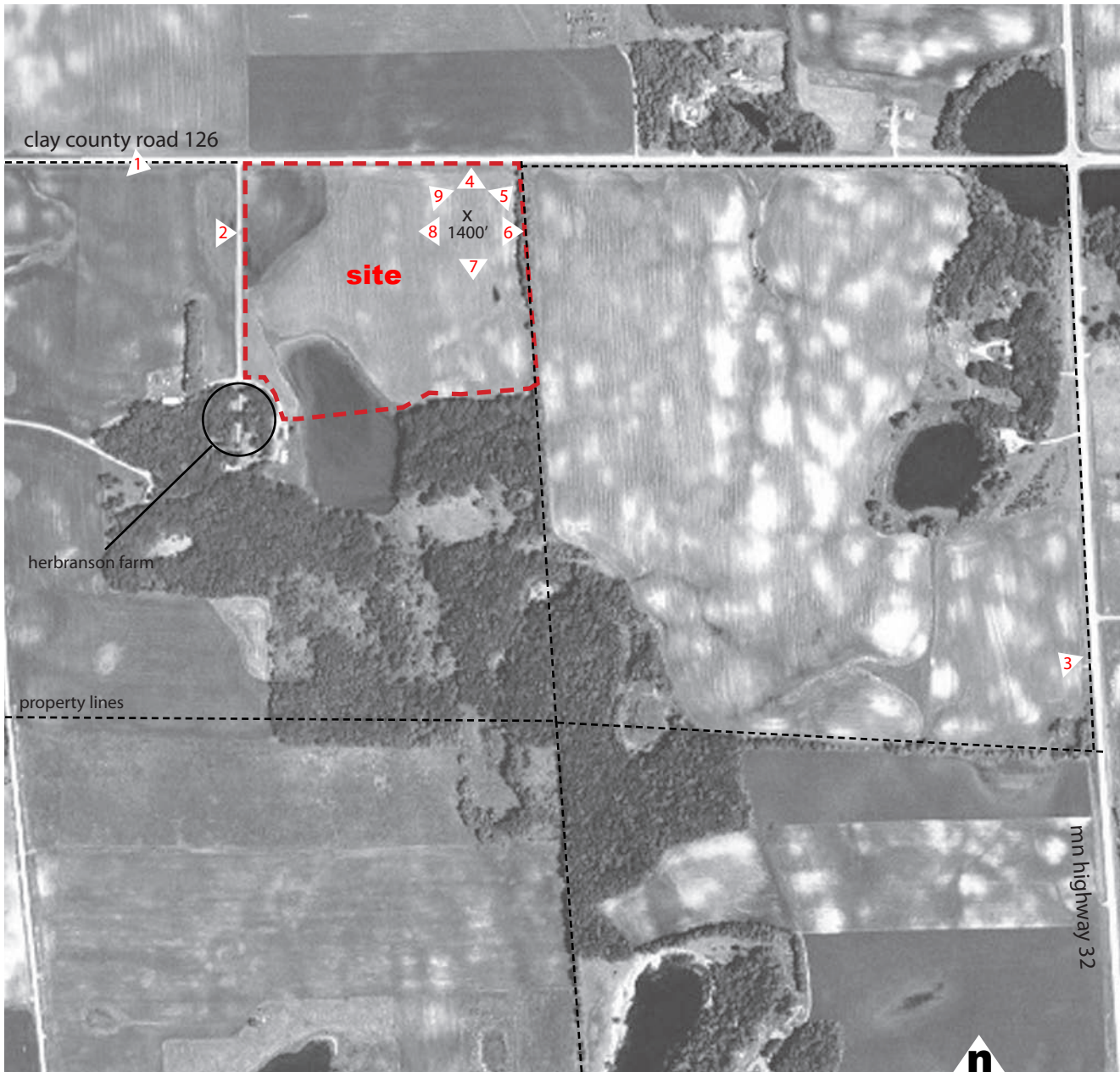


fig. 2.17

Utilities

All modern utilities already exist on the site. Currently the site is occupied by a medium-sized residential home. All utilities are contained underground and would be suitable for further construction and future building typologies.

base map



Base Map

This base map was generated to give the reader a better understanding of the site and its features. The base map is also tied into the photo-grid on the following pages, where noted views in the site map correspond with certain photographs.

photo grid



fig. 2.18



fig. 2.19



fig. 2.20

photo grid



4 view to north

fig. 2.21



5 view to northeast

fig. 2.22



6 looking east from site

fig. 2.23

photo grid



fig. 2.24



fig. 2.25



fig. 2.26

site statistics

Temperature

The graph below depicts the annual average temperatures for Clay County. Average highs are the upper dashed line, average lows the lower.

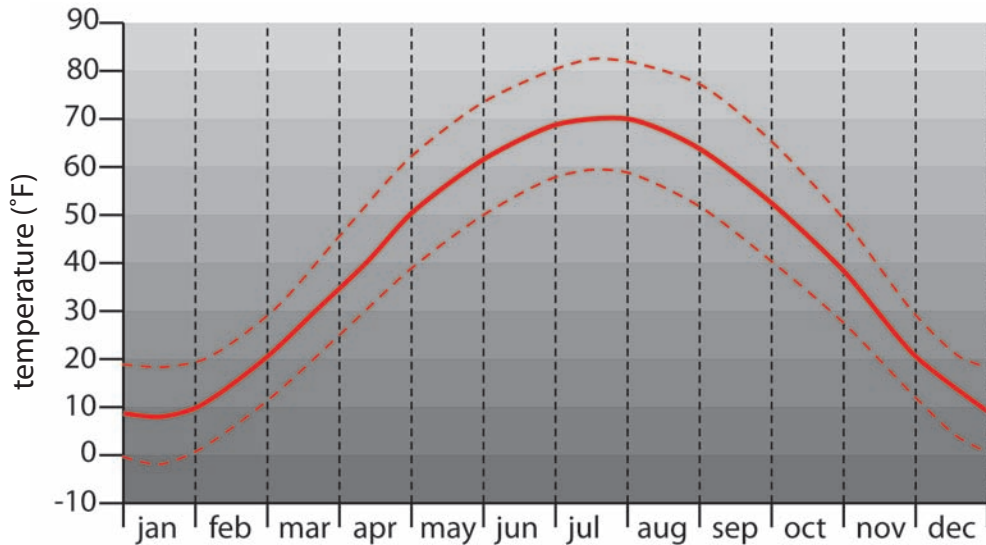


fig. 2.27

Humidity

The graph below shows the annual average humidity levels for **morning** and **afternoon** in Clay County.

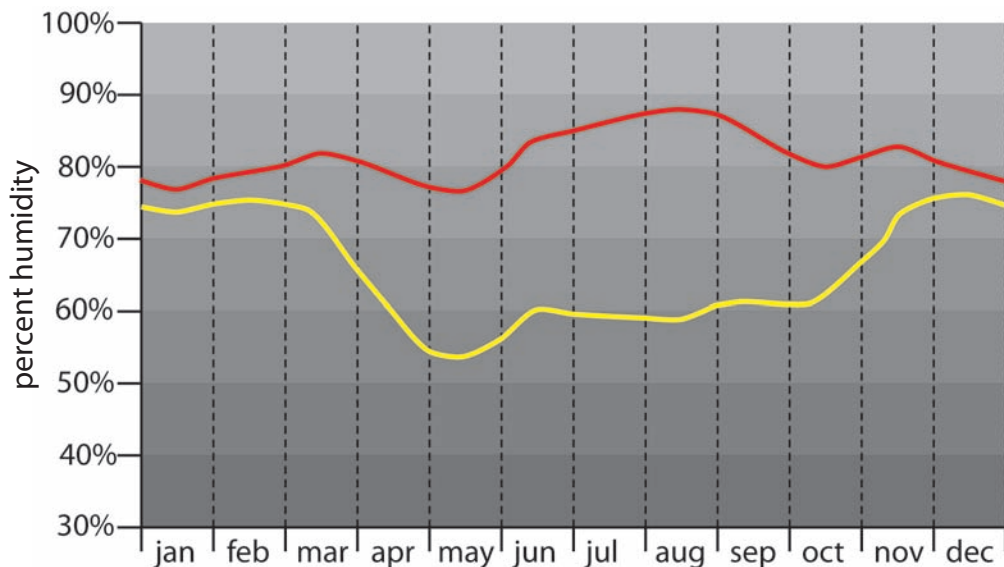


fig. 2.28

site statistics

Precipitation

The graph below displays the average levels of precipitation for Clay County.

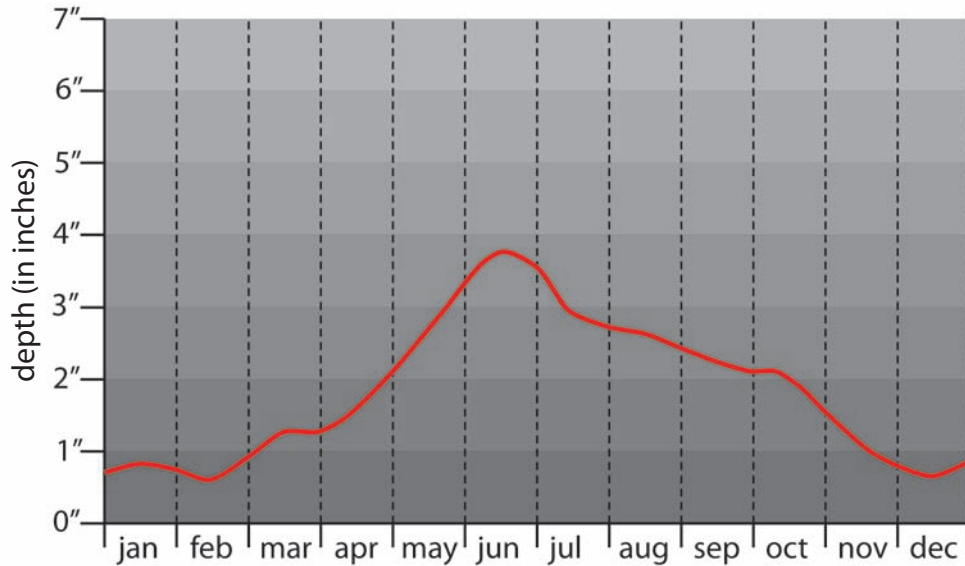


fig. 2.29

Cloudiness

The graph below depicts the number of cloudy days per month. Red represents cloudy days, the middle tone is partly cloudy days, and the lightest tone represents sunny days.

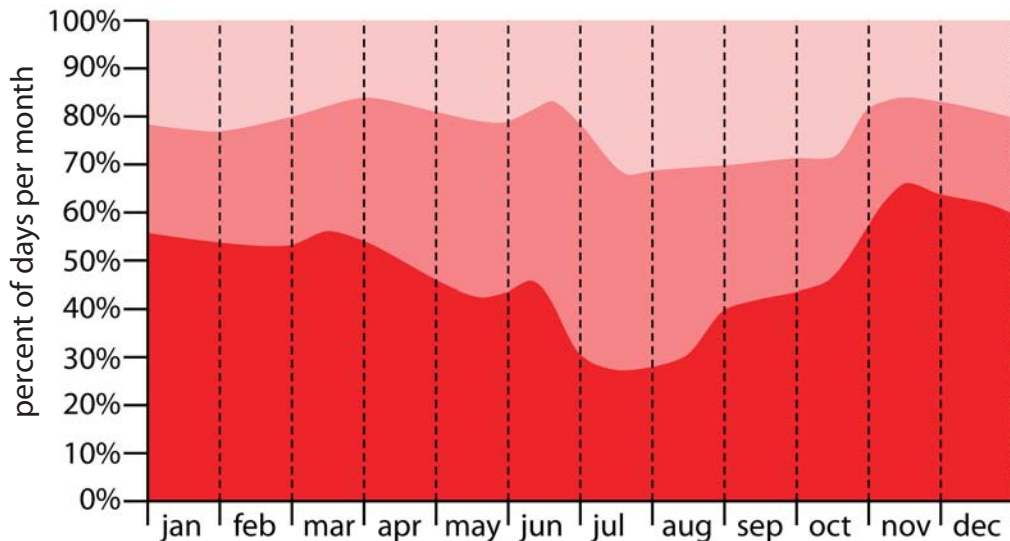


fig. 2.30

site statistics

Wind

Figure 2.31 represents the speed of wind, as well as the percentage of the time the wind comes from a certain direction. The most common winds for this area come from the south-southeast, north, and north-northwest. Figure 2.32 depicts the average wind speed per month.

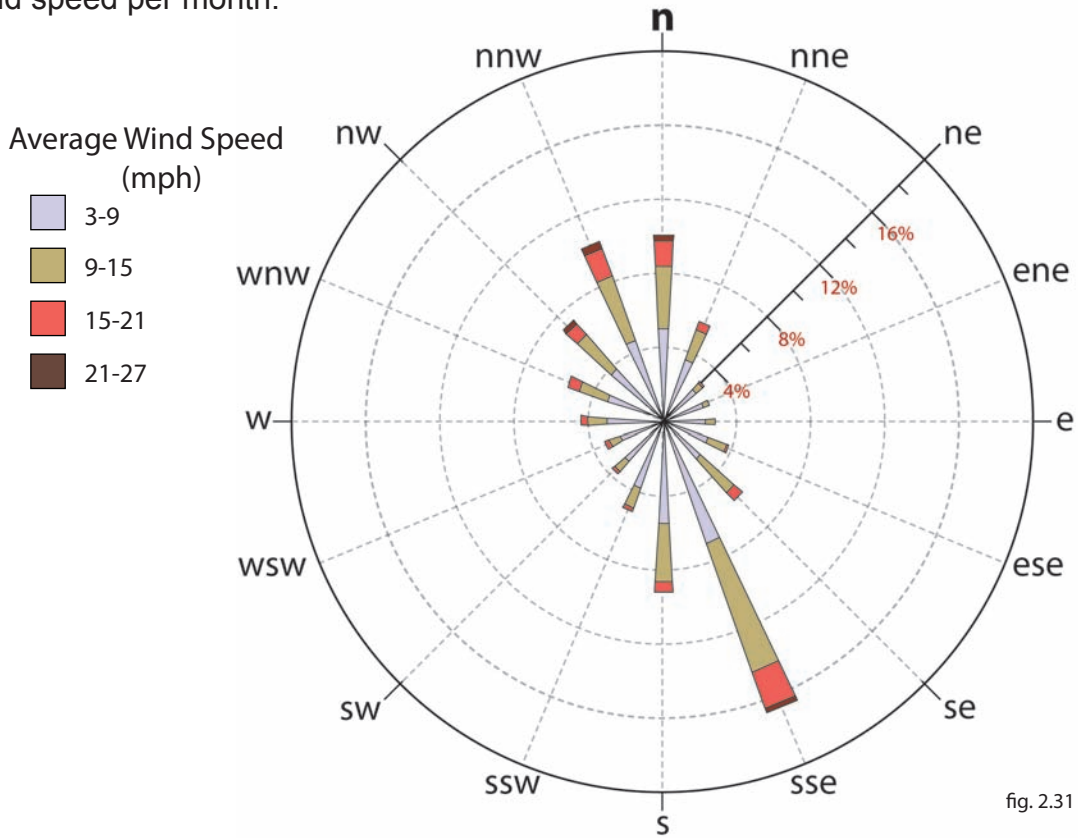


fig. 2.31

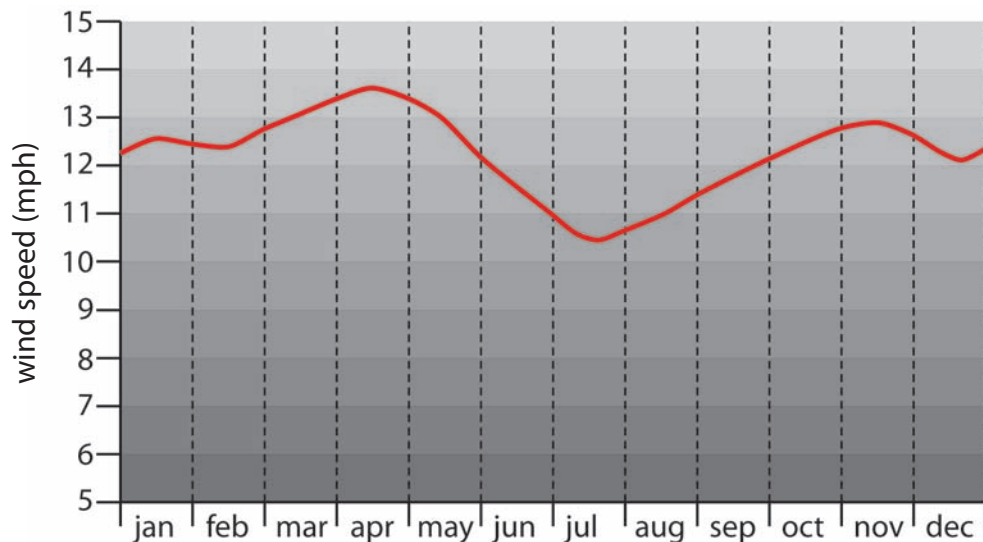


fig. 2.32

site statistics

Sun Path Diagram

Figure 2.33 represents the sun's relationship to the earth at varying points of the year. The upper dashed line is the sun's path, including times of sunrise and sunset, on the summer solstice (June 21). The solid line is the sun's path around the earth on both the vernal and autumnal equinoxes. The lower dashed line corresponds to the sun's path on December 21.

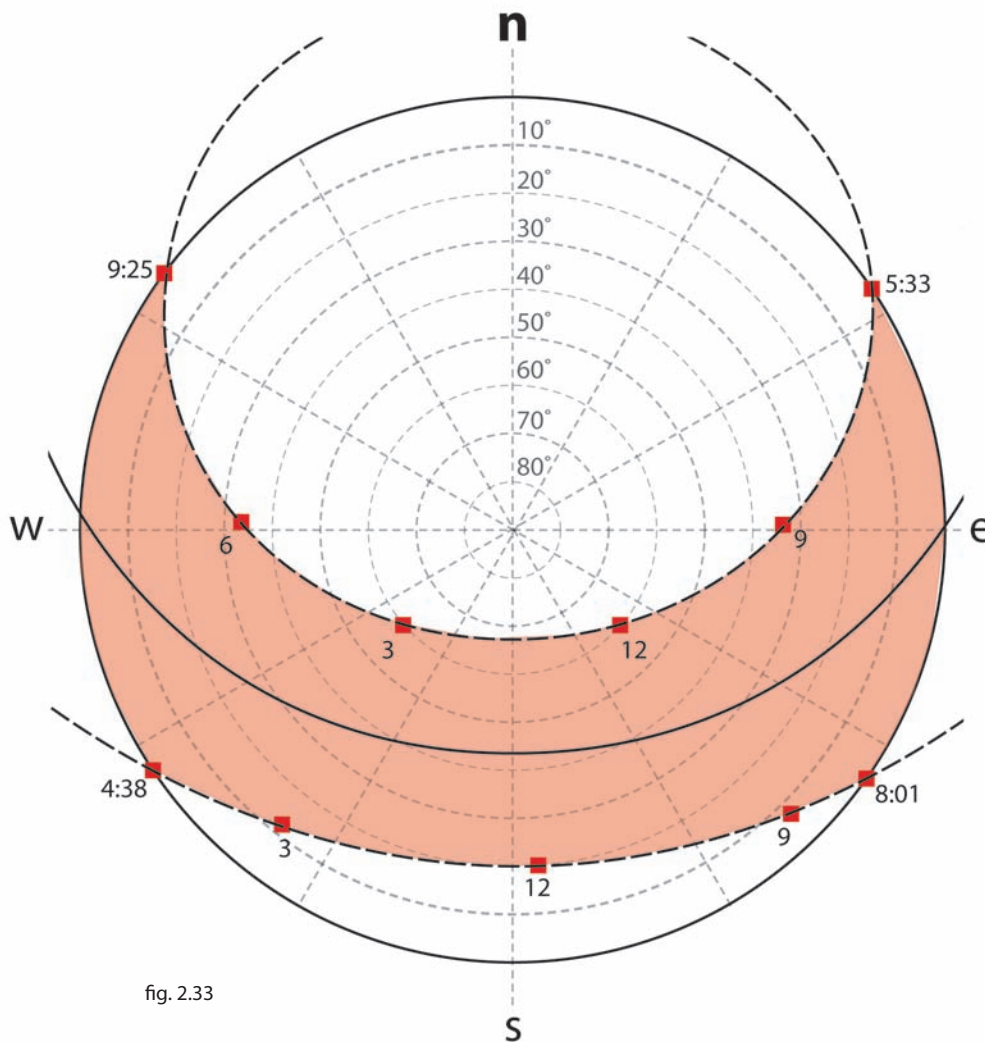


fig. 2.33

the **program**

space allocation **Museum**

Exhibition Space

15,000 s.f.

Space will be required for the museum's permanent exhibits, as well as temporary exhibits. The temporary exhibit space will be approximately 15% of the permanent exhibition space. Outdoor exhibit space will be included.

Administration

1,500 s.f.

Office space will be sufficient for the small number of full-time museum staff.

Public Space

3,000 s.f.

Public space includes lobby, restrooms, small restaurant/cafe, and museum store.

Auditorium

1,500 s.f.

The auditorium serves as a gathering space for large lectures or presentations.

Classrooms

1,800 s.f.

Classroom space serves to lecture or present to smaller groups.

Exhibit Design/Shop

2,800 s.f.

Exhibit design space is used for the design and construction of museum exhibits.

Research

space allocation

Large Artifact Analysis

8,000 s.f.

Large artifact analysis space is used for the cleaning, deconstructing, and recording of large artifacts and their constituent parts.

Small Artifact Analysis

3,000 s.f.

Small artifact analysis space will be reserved for dealing with smaller scale artifacts, likely older artifacts of smaller scale and more fragile material.

Researcher Offices

2,000 s.f.

These offices will serve the daily, full-time employees of the research sector of the building.

Conference Rooms

1,200 s.f.

Conference rooms serve as a meeting place for small gatherings of people. These rooms will also be configured for video conferencing and state of the art data communications.

Classrooms

1,800 s.f.

Classroom space is shared with that of the museum portion of the building.

space allocation **Research**

Library

3,000 s.f.

Library space includes an extensive collection of books, journals, periodicals, and reference books on the topics pertaining to the research undergone at the facility. The library also provides reading space, computers, a scanner, photocopier, and fax machine.

Storage/Collections

3,500 s.f.

The storage space is another shared space with the museum. It can be used to store collections of artifacts, artifact records, or exhibit storage

Lounge

600 s.f.

The lounge provides a relaxing space for the researchers, museum staff, and possibly guests.

Garage/Machine Shop

4,000 s.f.

The research center has a small vehicle fleet used for employee travel, as well as equipment for recovering and hauling artifacts. Space should be located with direct access to analysis labs.

Auxiliary

As required s.f.

Includes restrooms, mechanical, and any other spaces required for the everyday functions of the facility.

appendix

feasibility **study**

study research

In the process of creating an idea for this thesis, I investigated multiple ideas over the last year and a half. Recognizing the value of my past education experience, a degree in Anthropology with an emphasis in Archaeology, I began to consider ways to use this background. The initial concept resulted from a metaphor, an idea of excavating and examining industrial agricultural relics as if they were ancient fossilized dinosaurs. Although this metaphor likens to the field of paleontology, I quickly realized the connection of industrial agricultural artifacts as having strong cultural ties to the region, prompting the idea of an archaeological investigation.

Cultural Importance

To support the claim of cultural importance of agriculture to the region, I examined land use for Minnesota, and Clay County. Figure 3.1 depicts the percentage of land use in Minnesota, with the portion in red representing the amount of land used for agricultural cropland and grazing land. This amount represents 51% of land in the state. Figure 3.2 represents land use in Clay County, with agricultural land use encompassing nearly 90% of the county's surface area. These statistics support the importance of agriculture to our culture, thus supporting the proposal of employing an archaeological (a cultural object based study) investigation on the objects associated with modern food production in our region

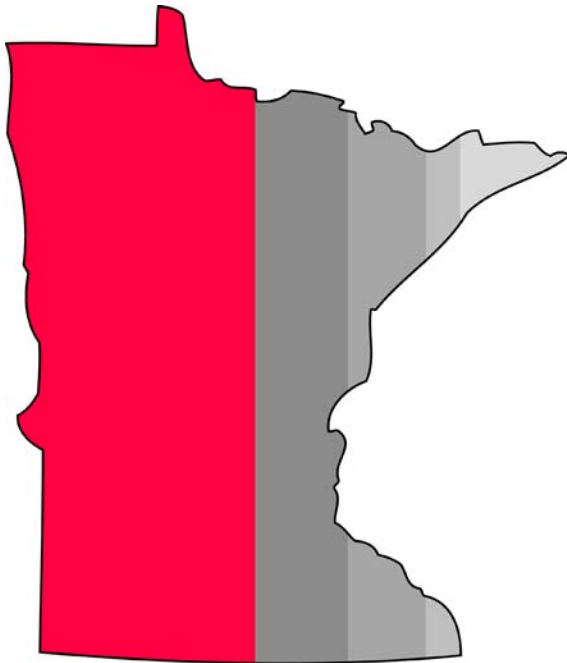


fig. 3.1

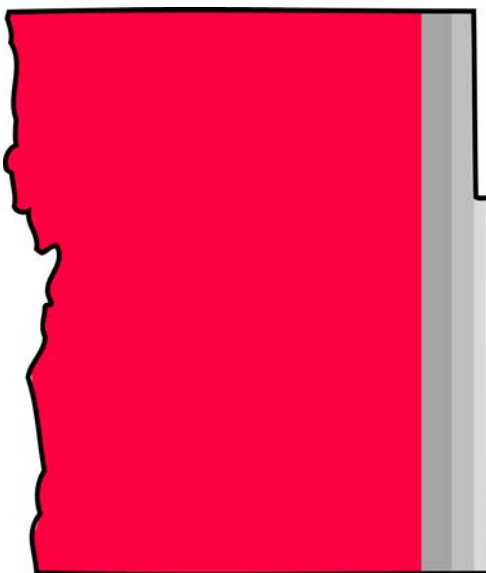


fig. 3.2

Agricultural Technology

study research

The history of agricultural technology was also researched to gain a better understanding of how technological advancements have affected the agricultural sector. Figure 3.3 below examines levels of productivity over time from 1850 to the present. Around 1875, the first American Agricultural revolution was defined by the shift from human power to horse power. The second American agricultural revolution occurred from 1945-1970, and was characterized by a shift from horses to tractors, as well as the adoption of a group of other technological practices.

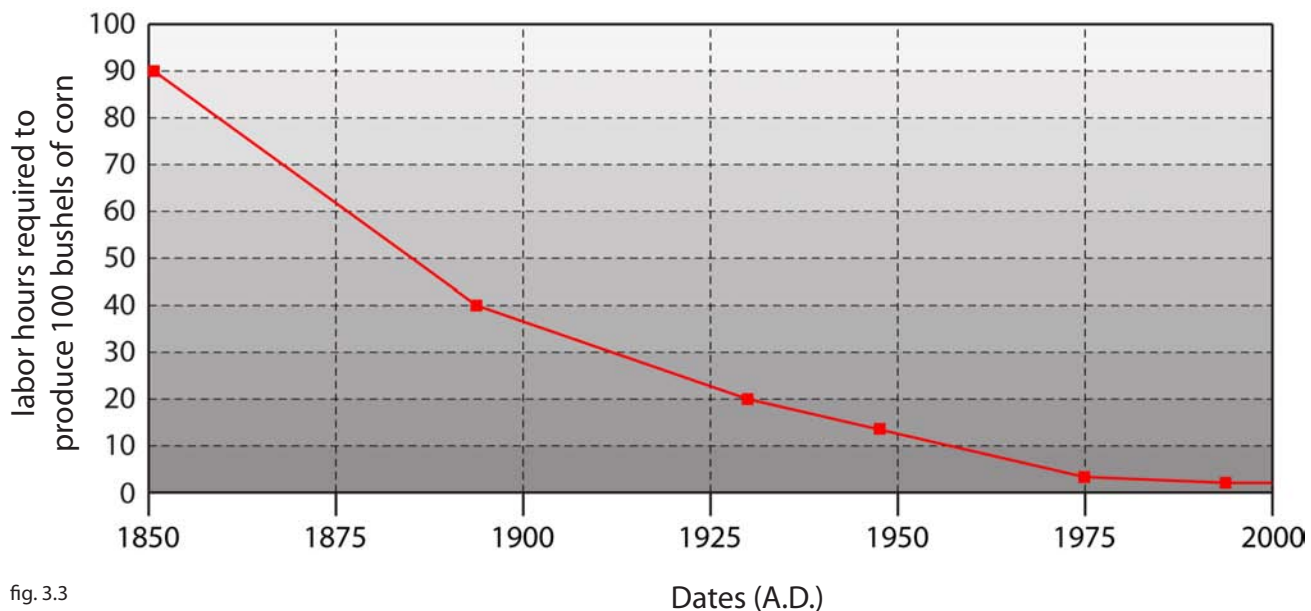
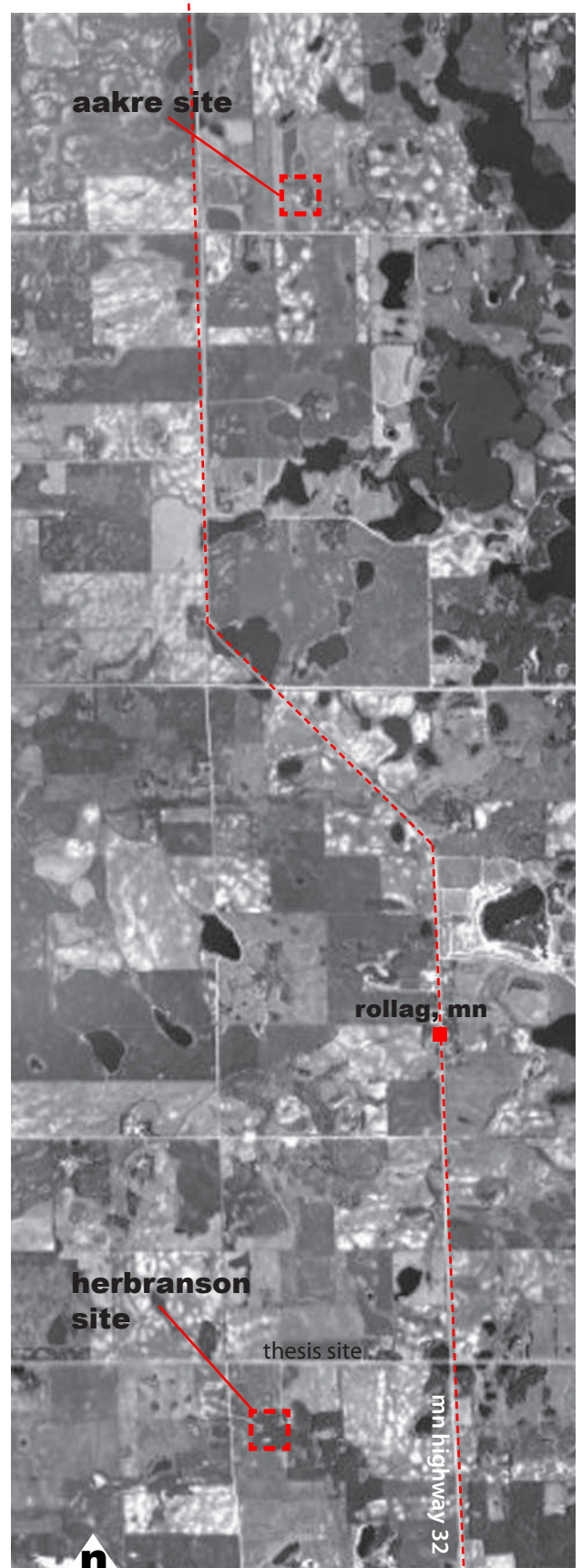


fig. 3.3

agricultural archaeology

Artifact Investigation

One of the biggest questions upon undertaking this thesis project was whether or not enough agricultural relics still existed on farm sites within the region. To investigate this question it was of utmost importance to set up actual archaeological 'digs' on local farmsteads near my site. What I found on the two sites I investigated was a multitude of historic agricultural artifacts, varying in degrees of wear and weathering, all displaying unique physical qualities. The results of my findings are expressed through photographic media on the following pages, along with a sketch investigation containing actual measurements, and plan and elevation drawings of one specific implement.



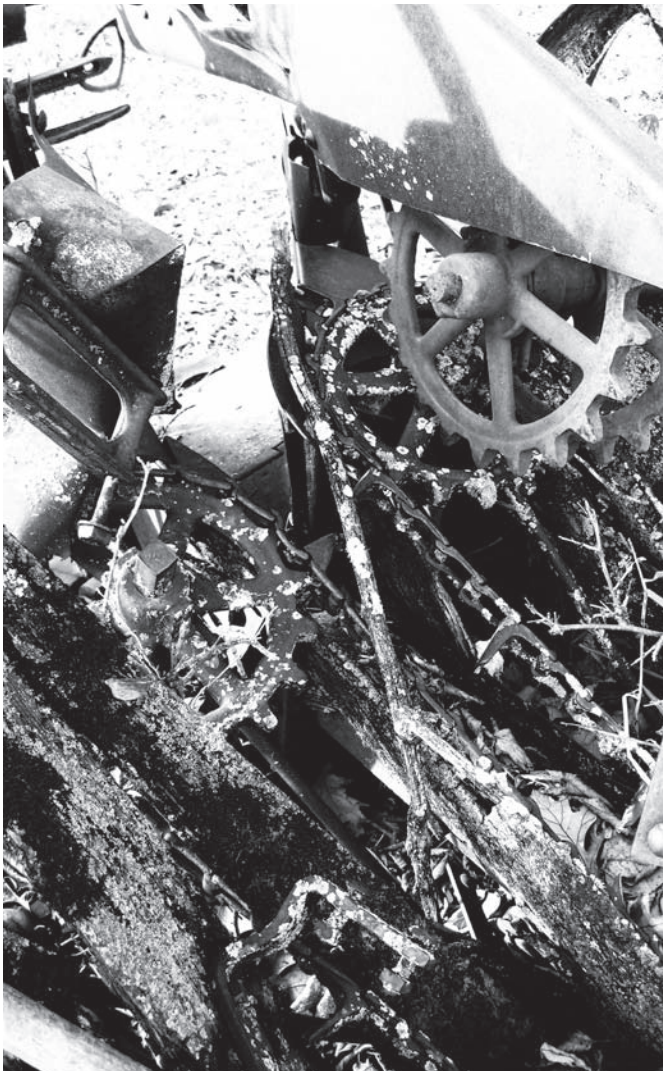


fig. 3.4

aakre site

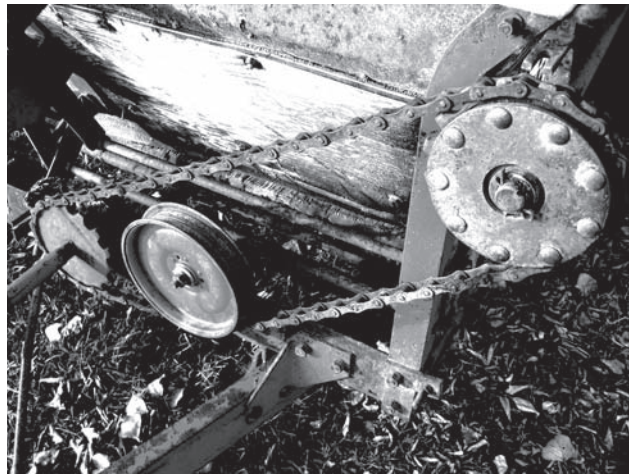


fig. 3.5



fig. 3.6



fig. 3.7



fig. 3.8

Aakre Site

The Aakre site was the first farm that I visited to observe its historical agricultural machinery. Tim Aakre, the owner of the farmstead, took the time to show me around and discuss some of his equipment with me. The Aakre site had over two dozen tractors, some dating back to the 1930's, (those being collectibles), while other tractors were either going to be restored by Tim's son, or would be used for parts. Some of the most interesting artifacts included the unique tractor cabs, sitting by themselves like empty skulls of ancient creatures. I also found the mechanics of the equipment very intriguing, the belts, chains, gears, and levers. The Aakre site had quite a variety of really old artifacts, overgrown by small shrubs and grass, which were characterized by a combination of wooden material as well as iron or steel, as seen on the opposite page. I found the piece pictured above to be of interest with its metal seat and wheels, definitely an older specimen.

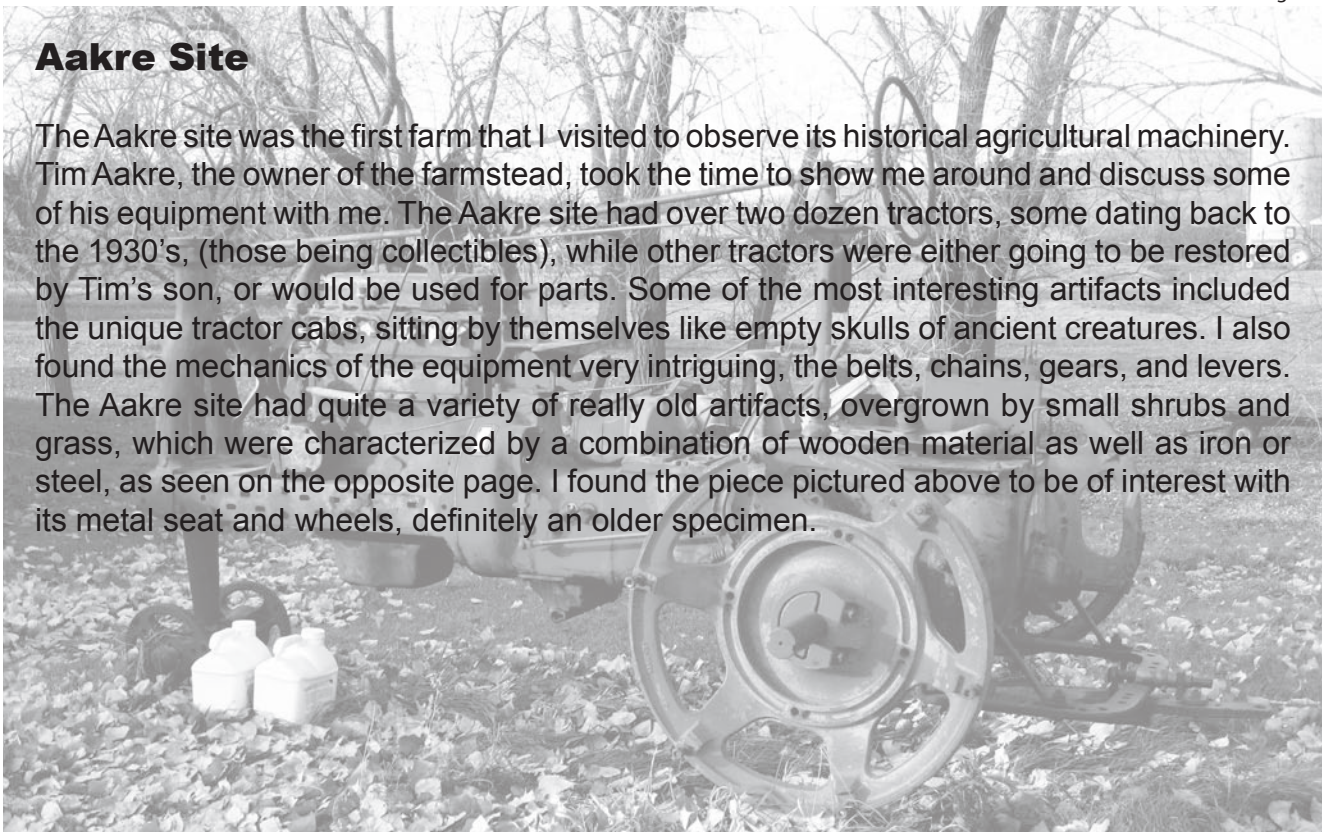


fig. 3.9



fig. 3.10



fig. 3.12



fig. 3.11



fig. 3.13

herbranson site



fig. 3.14



fig. 3.15

Herbranson Site

The Herbranson site is located directly adjacent to my thesis site. The artifacts on this farm site were unique as they rested in a fairly dense grove of trees, and were overgrown with grasses. Some of these artifacts would actually have to be excavated to be analyzed further. Many of the artifacts appeared to be from the industrial age, although some were older, as they were smaller and more overgrown. Similar to some of the artifacts at the Aakre site, the mechanisms incorporated on the machinery were of interest, for instance springs and gears on the green artifact seen in figure 3.19.



fig. 3.16



fig. 3.17



fig. 3.18



fig. 3.19

plow study

One of the most interesting artifacts at the Hebranson site was the original plow that David's great-grandfather had used to break the land of their farmstead over 130 years ago. The physical quality of the plow was fantastic, the wood and iron covered with lichens, the handles smooth from wear, the wear pattern on the plow blade, and the unique wheel, with a large chunk out of it, proclaiming its wear. I documented my observations photographically, as well as made some quick sketches of the plow, being sure to note measurements that I had taken.

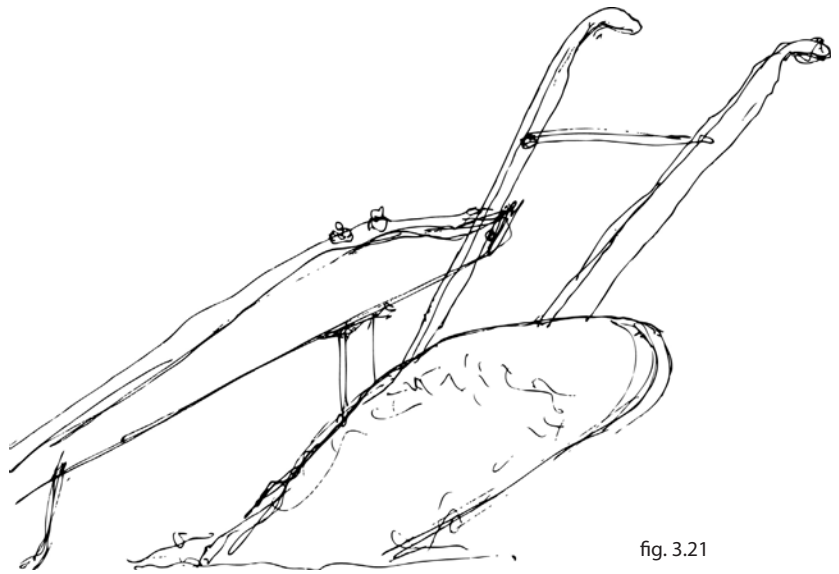


fig. 3.21



fig. 3.20

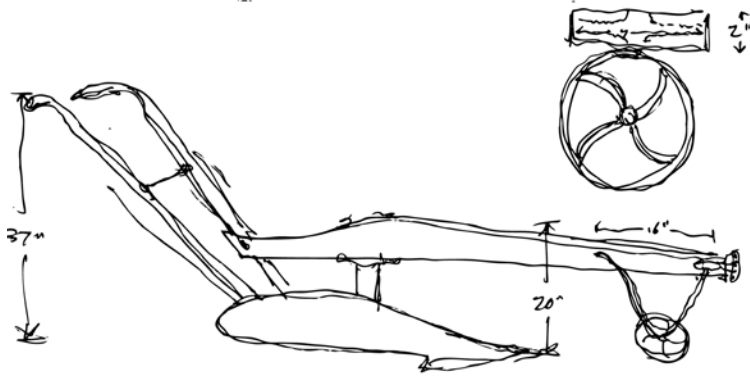


fig. 3.22



fig. 3.25

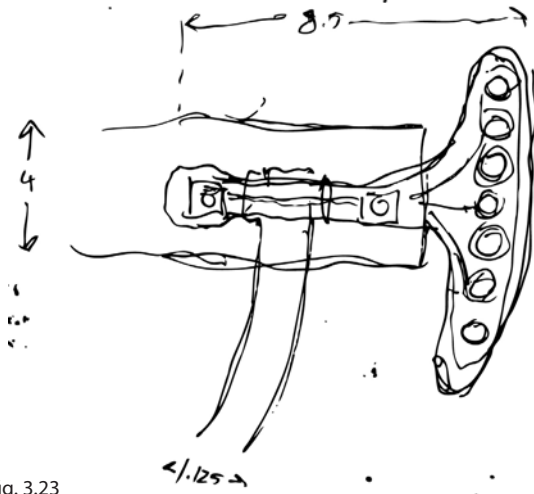


fig. 3.23



fig. 3.26

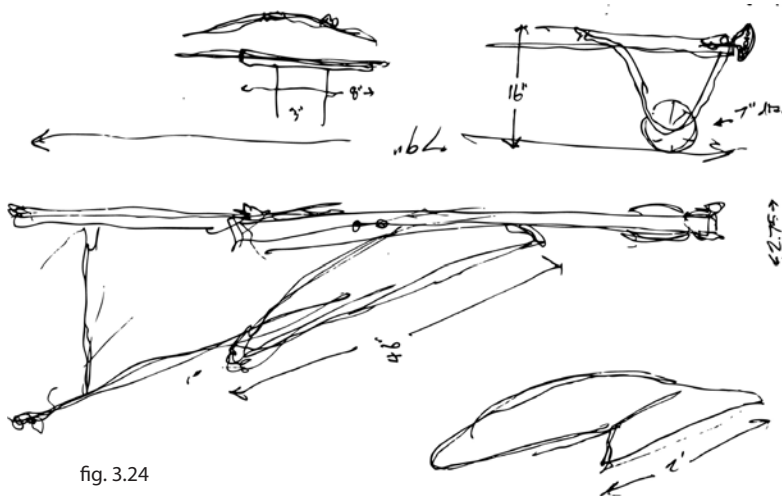


fig. 3.24

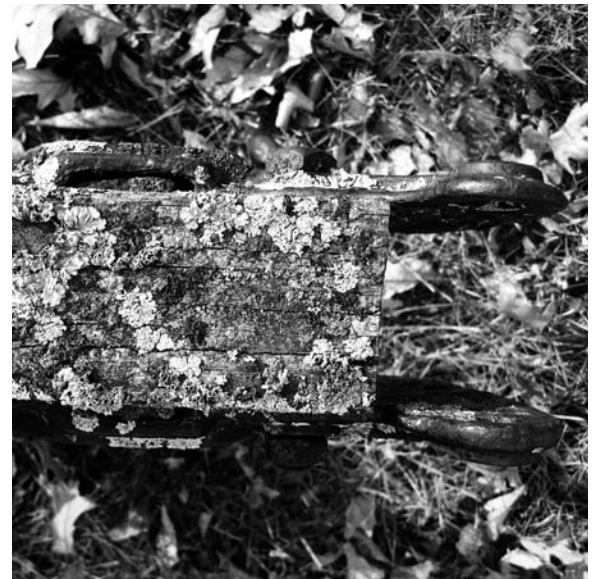


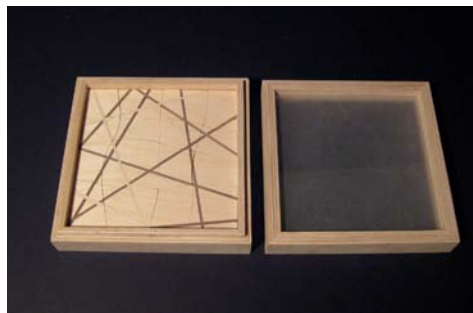
fig. 3.27

design **solution**



Inspiration + Parti

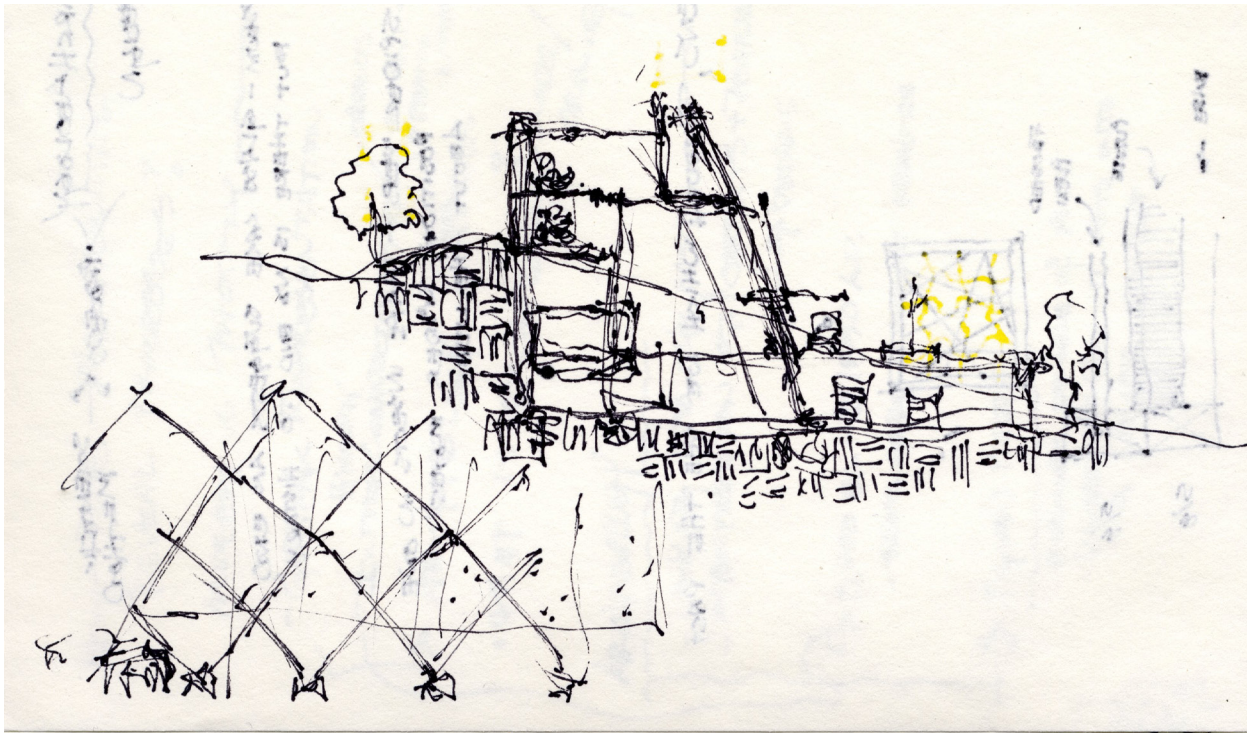
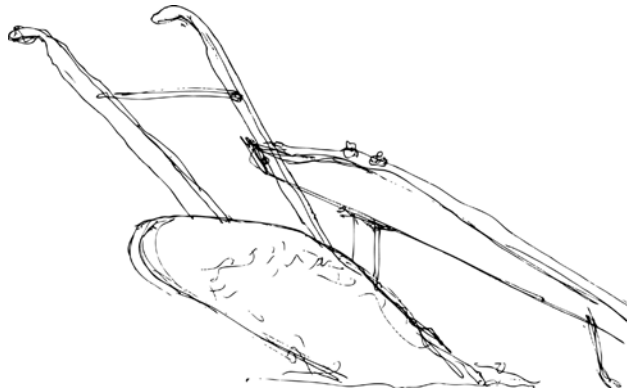
Inspiration for the project was found in looking at old farm equipment. In particular the building was to become reminiscent of the old hilltop icons seen across rural landscapes of the upper midwest (as seen in the photo at left). A parti was created to capture the nature of archaeological study, as well the history of technological innovation as prescribed by James Burke. The parti is a puzzle, encased in a frosted glass lid that speaks of archaeology being a lens that looks into the past, but the view is however not really clear. The puzzle pieces reflect ancient artifacts found by the archaeologist from which he must deduce past cultures ways of living. The wood design on the pieces was drawn from Burke's view of technological innovations being related much like a web, rather than linear progression.

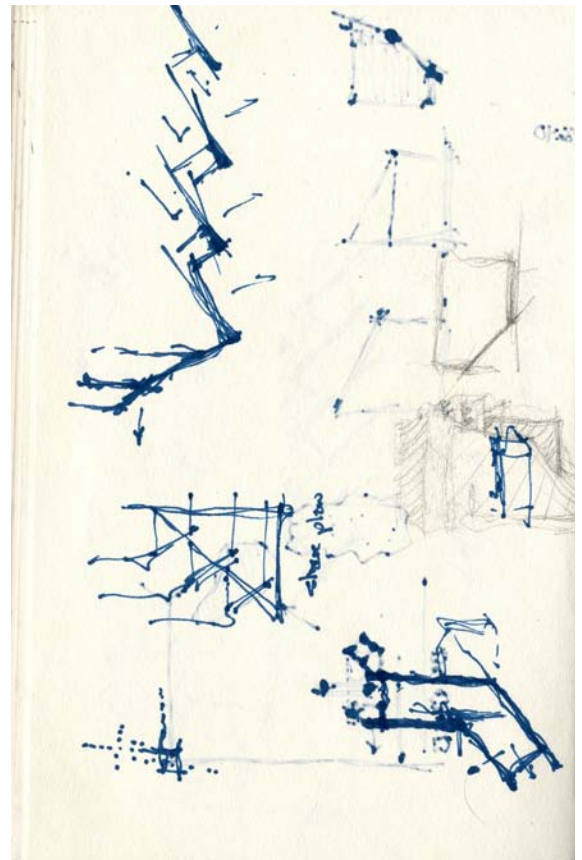
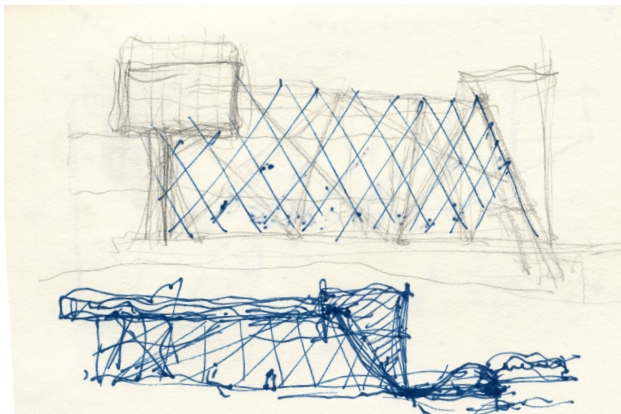
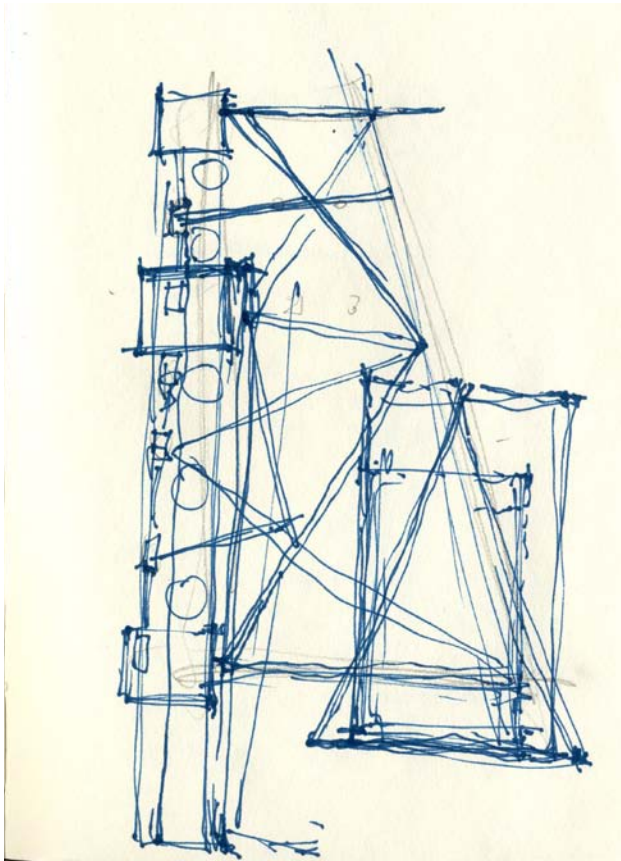


parti

Initial Concept

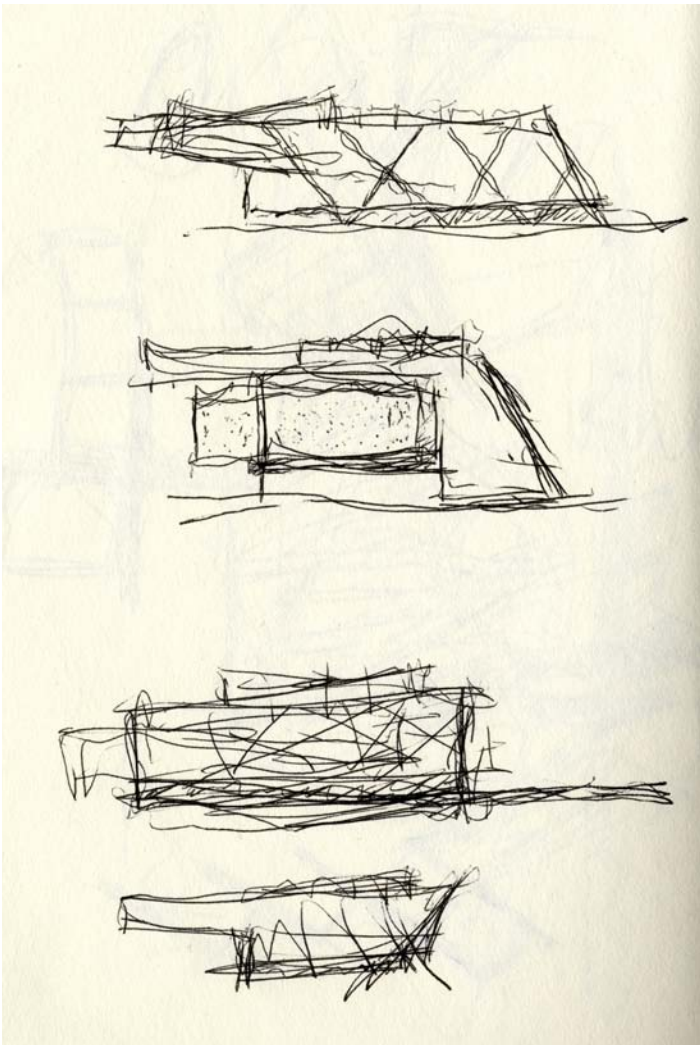
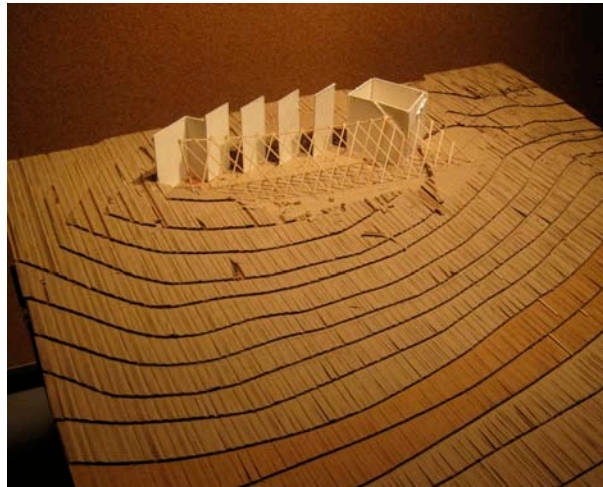
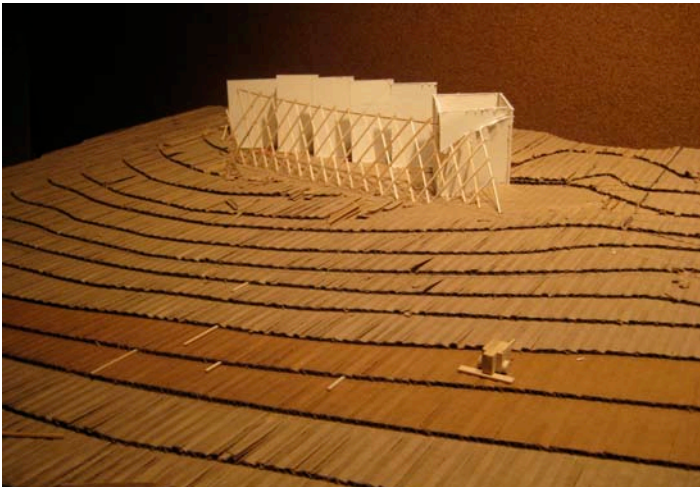
The initial design concept was drawn from the old plow that was found on the Herbranson site. Drawing from this old tool I experimented with a blade-like form that cut into the hilltop. Also, recognizing the advantages of a hilltop site, I studied and recognized the importance of the building section in understanding how different levels of the building could be below or above grade. It was also recognized early in the design that the best views that needed to be designed for existed to the west, looking down into the Red River Valley across low rolling hills.





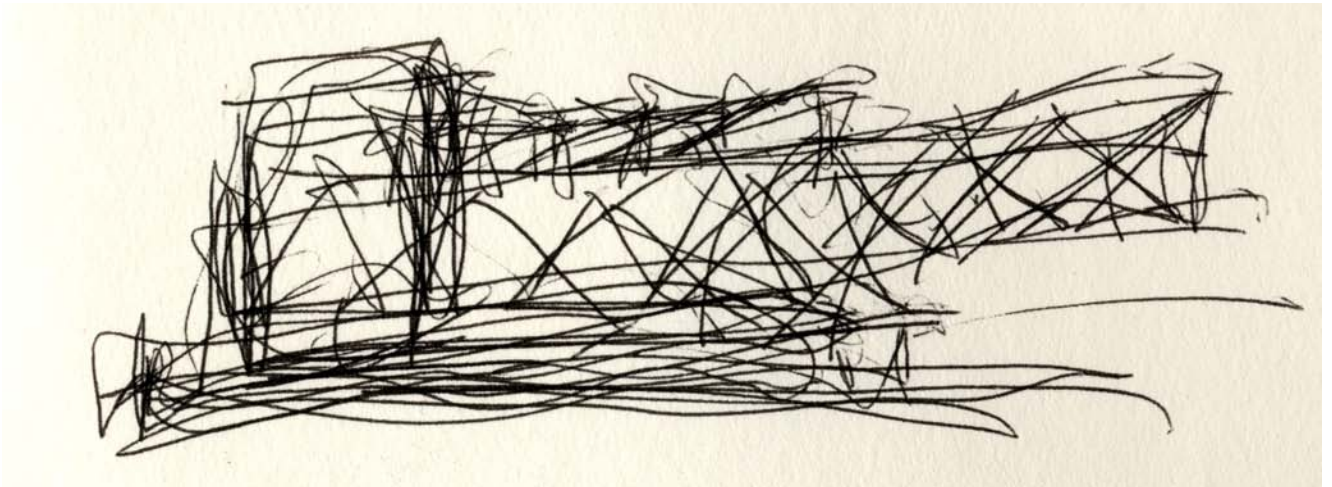
Process

In trying to develop the building form and the blade shape, I also looked at another type of plow, one with multiple disks. I utilized their angular arrangement into the east side of the design, by creating angled planes that would allow natural light to come into the exhibition spaces highlighting the artifact displays.

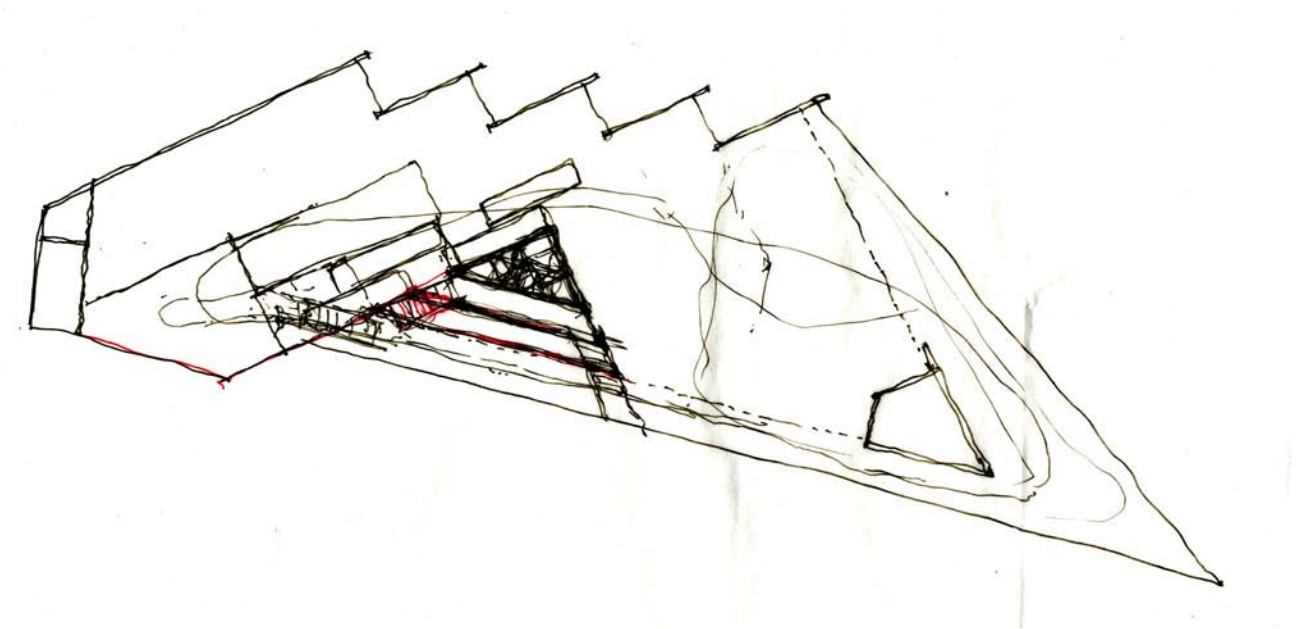


Process

In constructing a simple process model, I was not satisfied with the combination of the blade form on the west and the angled planes on the eastern portion of the building. My decisions led me to keep the angled planes for their value of bringing light into the gallery spaces. Through sketching I studied ways of developing the western facade to get it to work better with the planes on the eastern side.

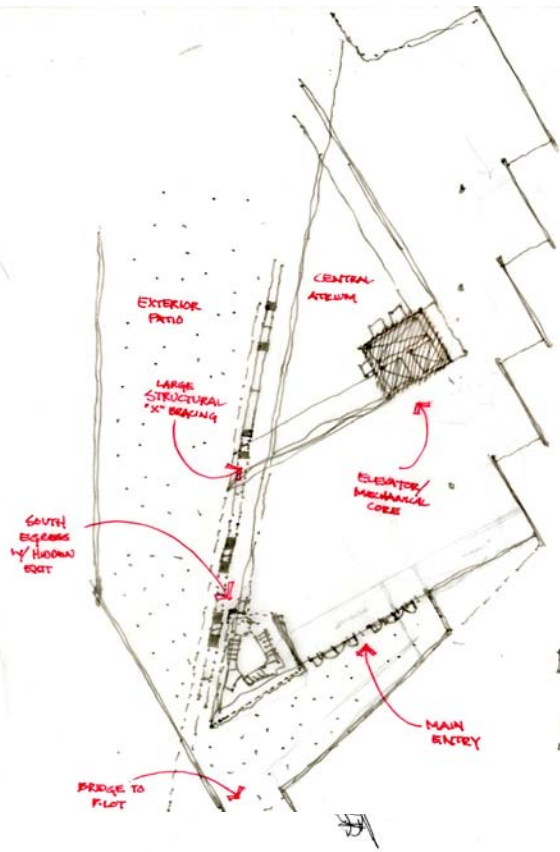


final concept sketch

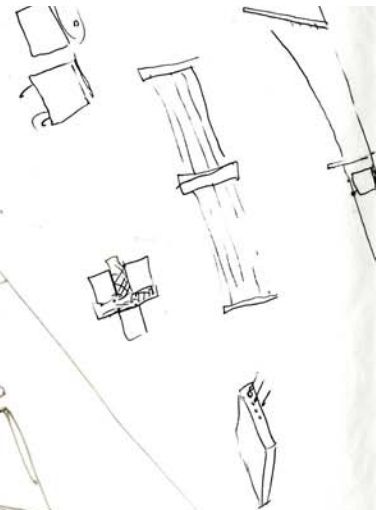
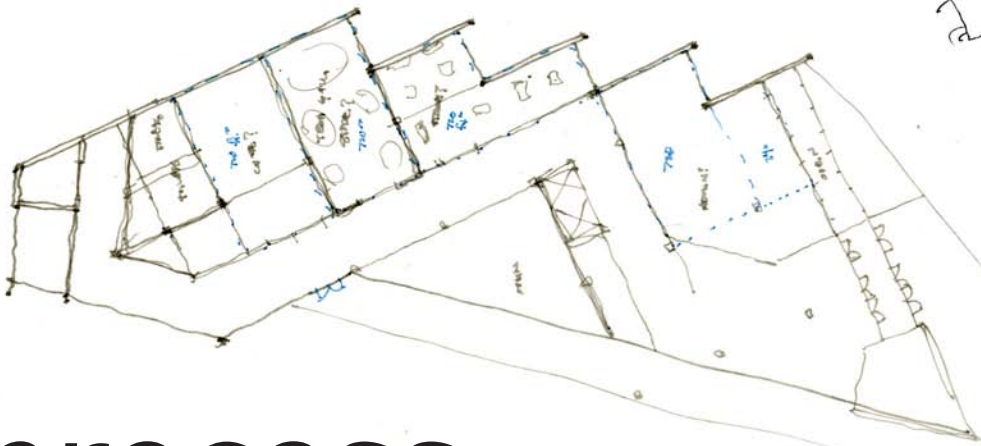


Process

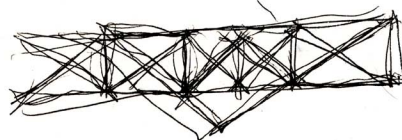
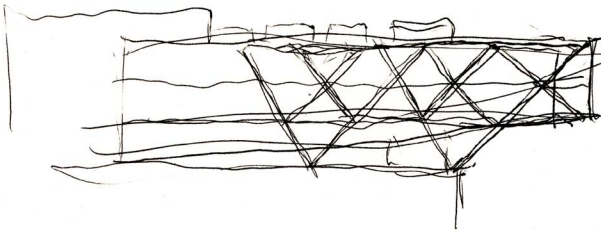
The final conceptual sketch took on the abstract form of a combine, thus creating a metaphor for the building as being like that piece of machinery sitting atop a hill. Elements drawn from the sketch include a “cab”, “chassis”, and the cantilevered “chute”. Work then began on developing floor plans, looking at structure, mechanical systems, and circulation paths.

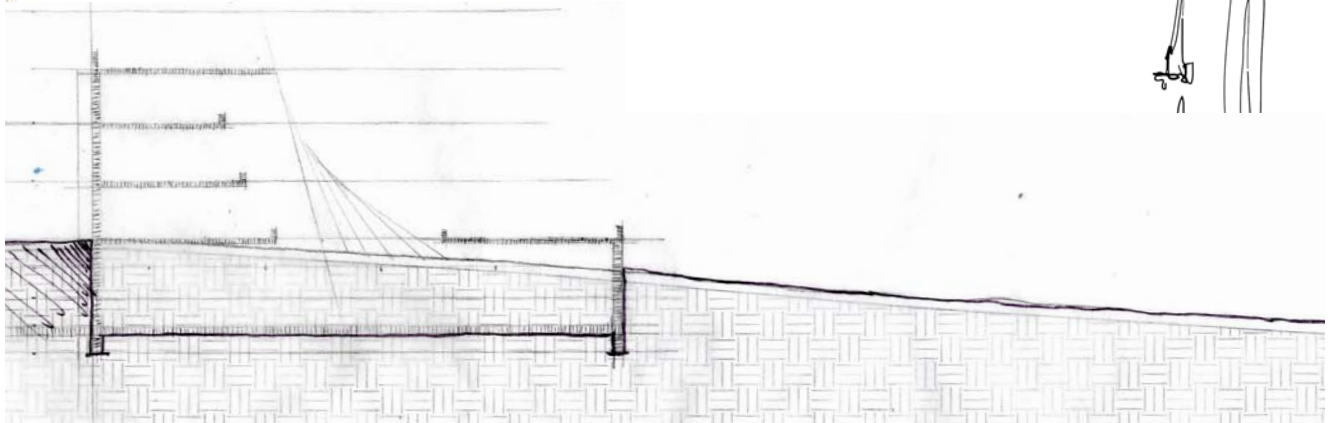
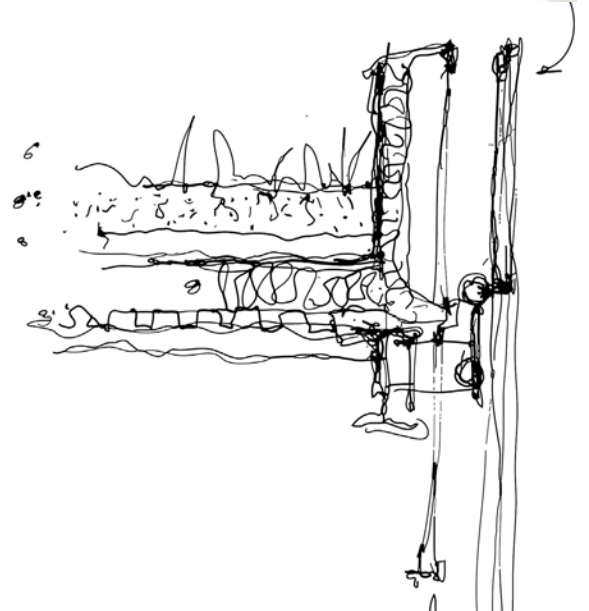
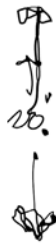
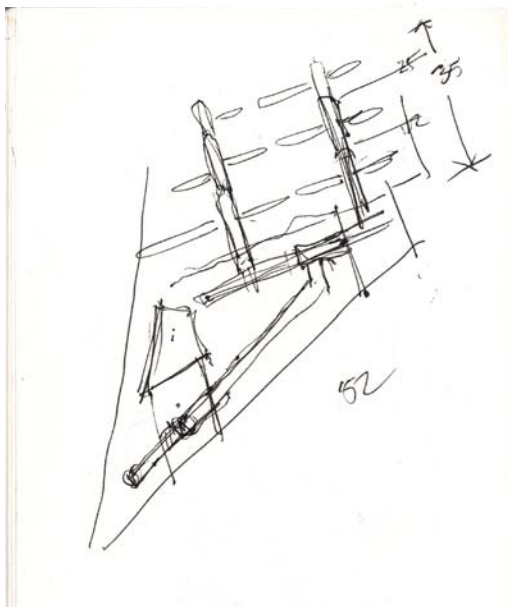
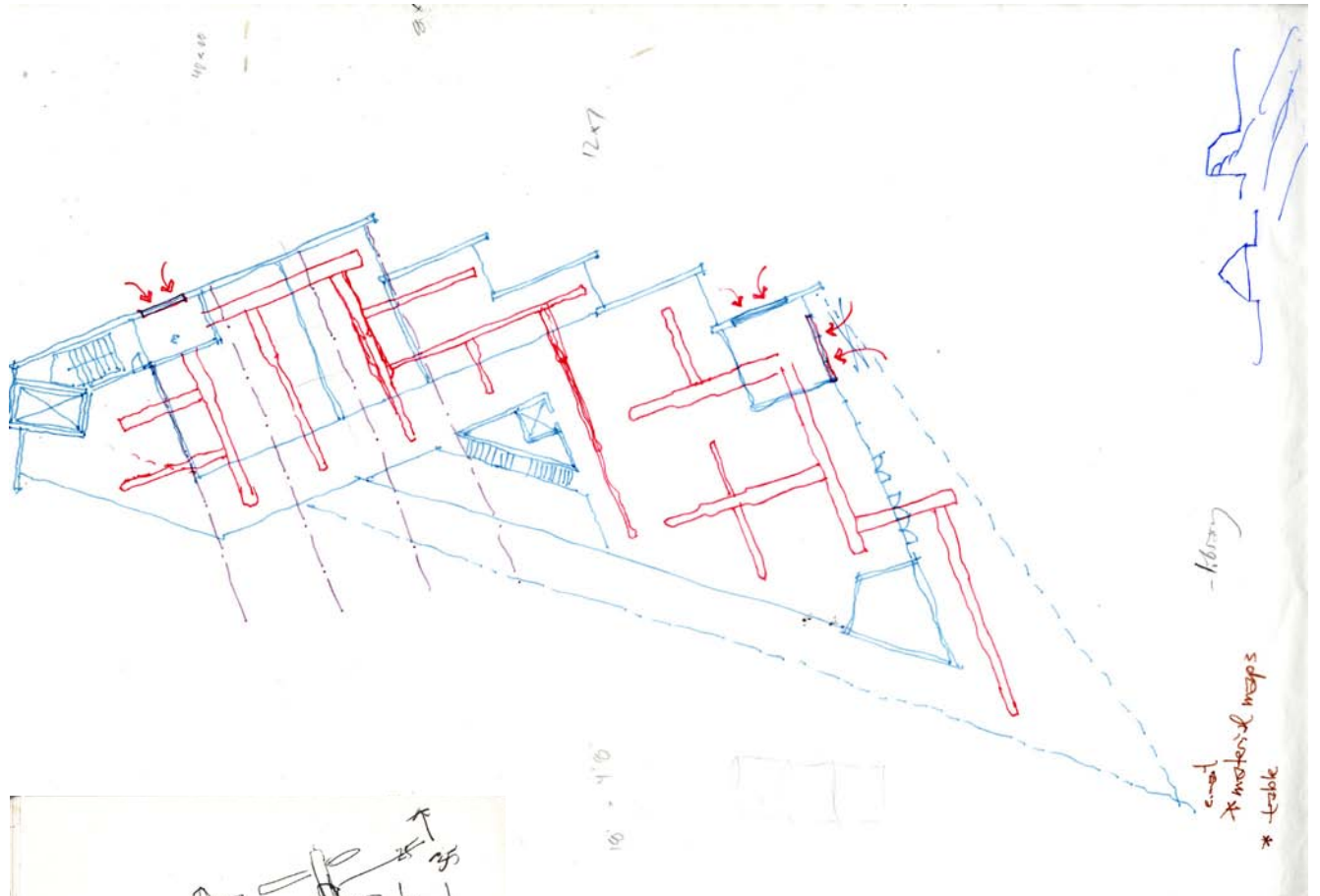


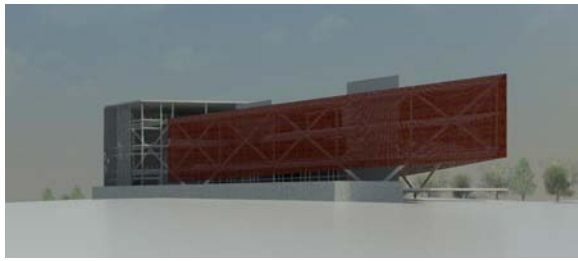
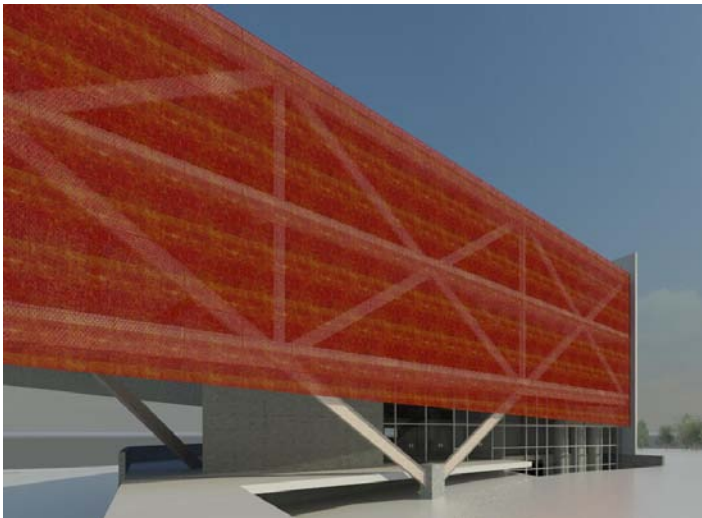
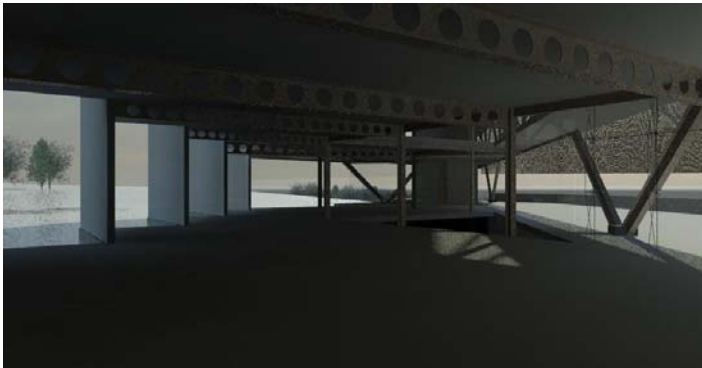
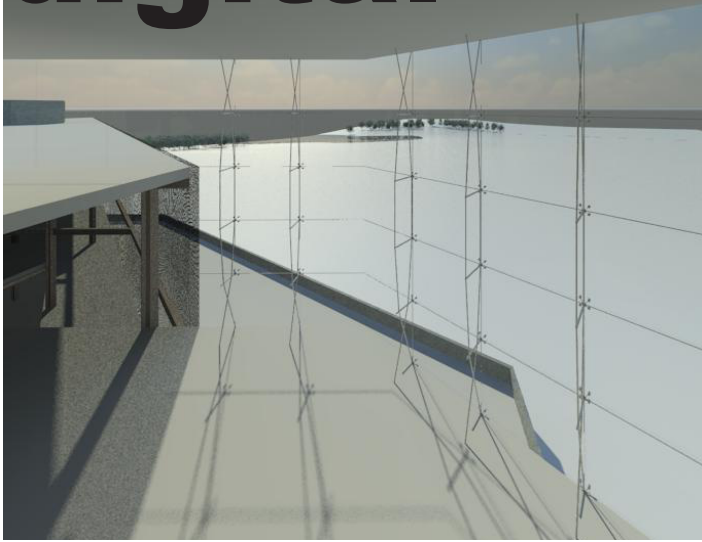
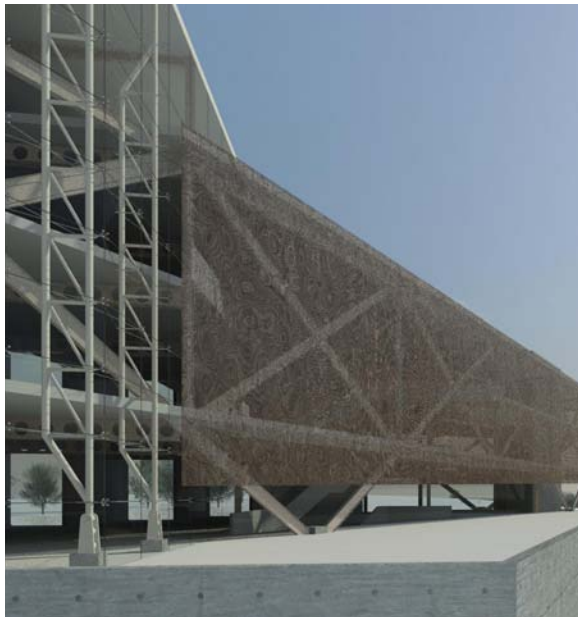
ENTRY LEVEL
1" = 16'

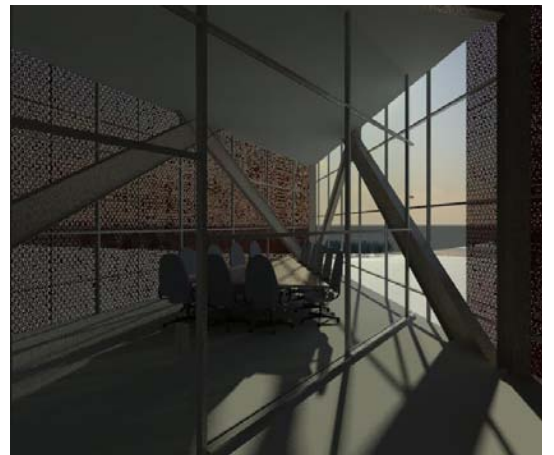
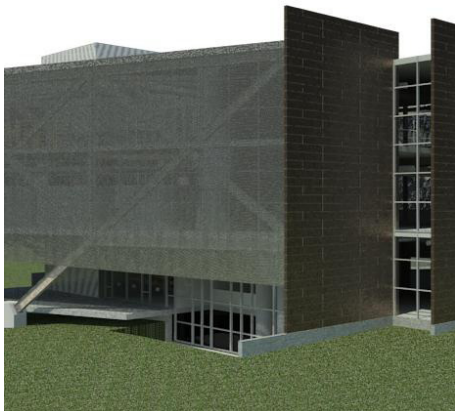
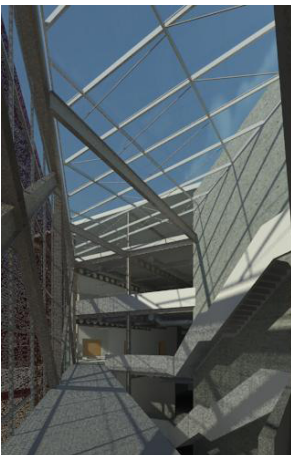
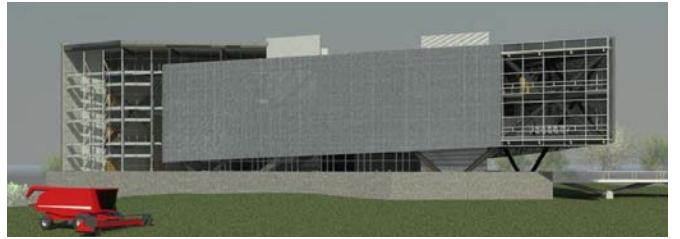


process drawings











final design

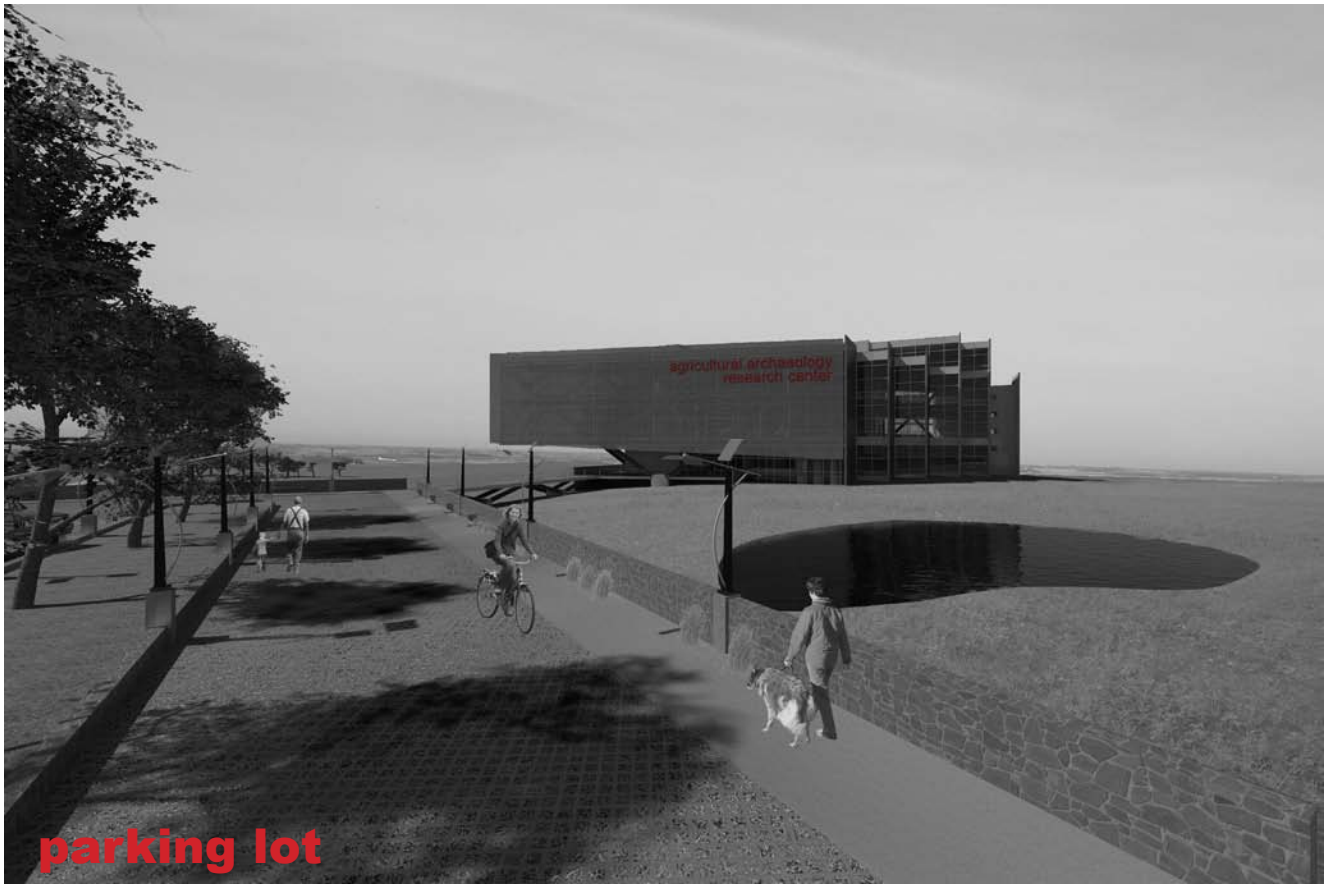




cab view



cafe



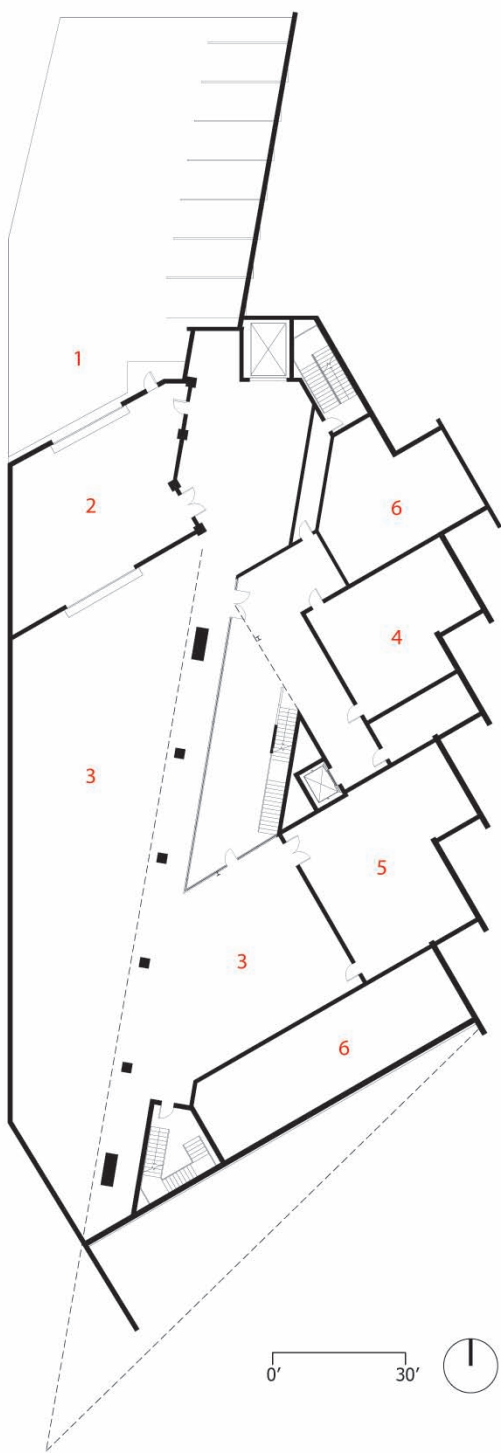
parking lot



gallery



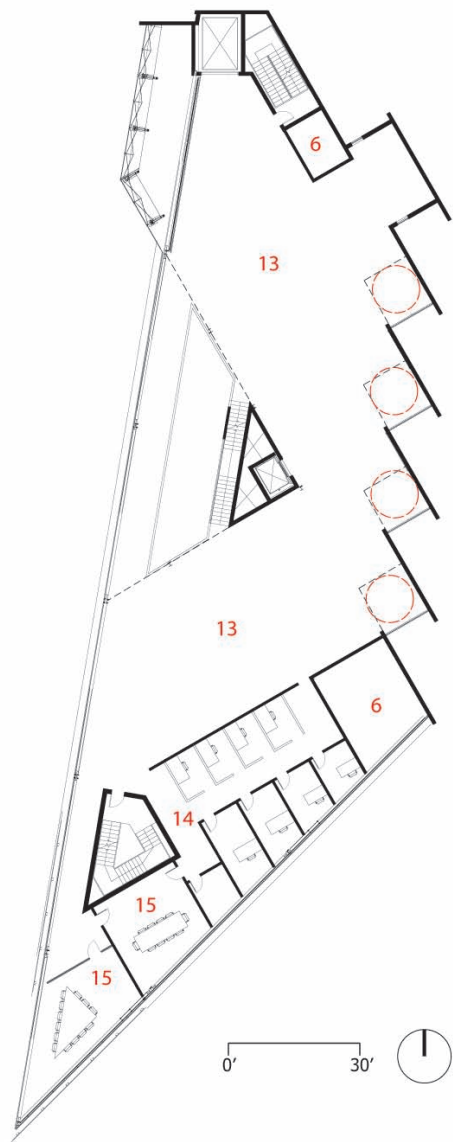




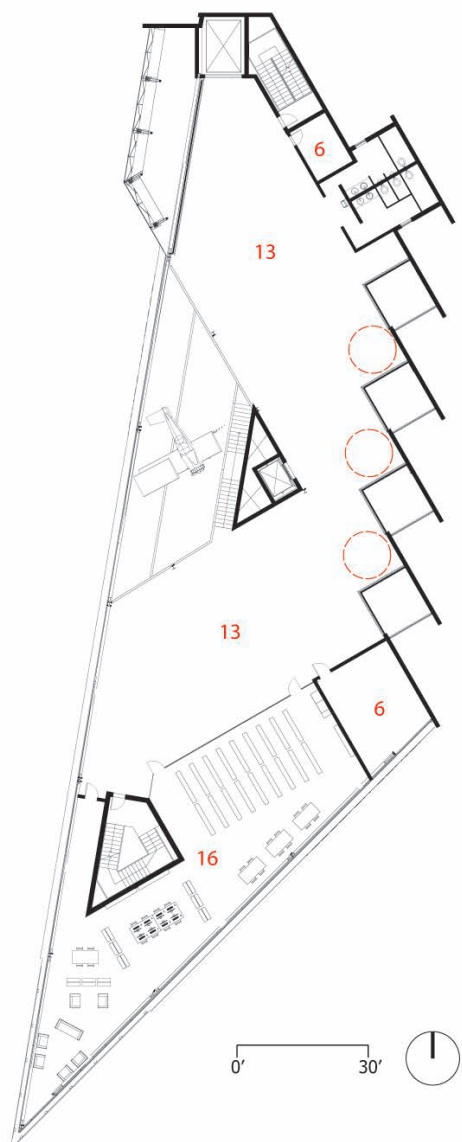
lower level



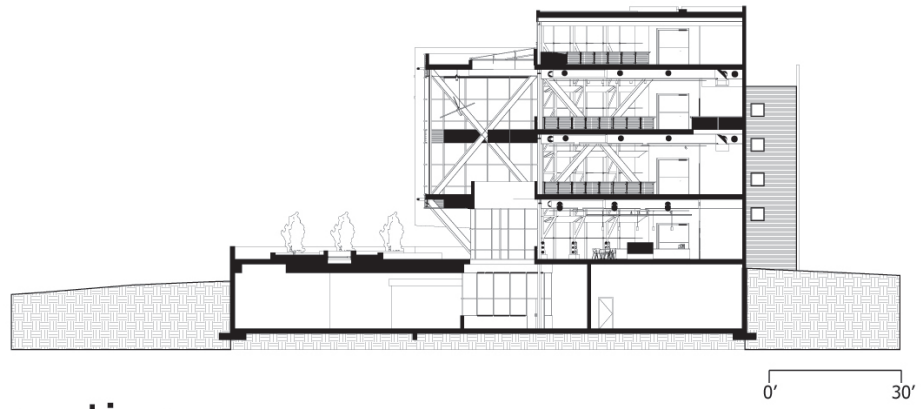
entry level



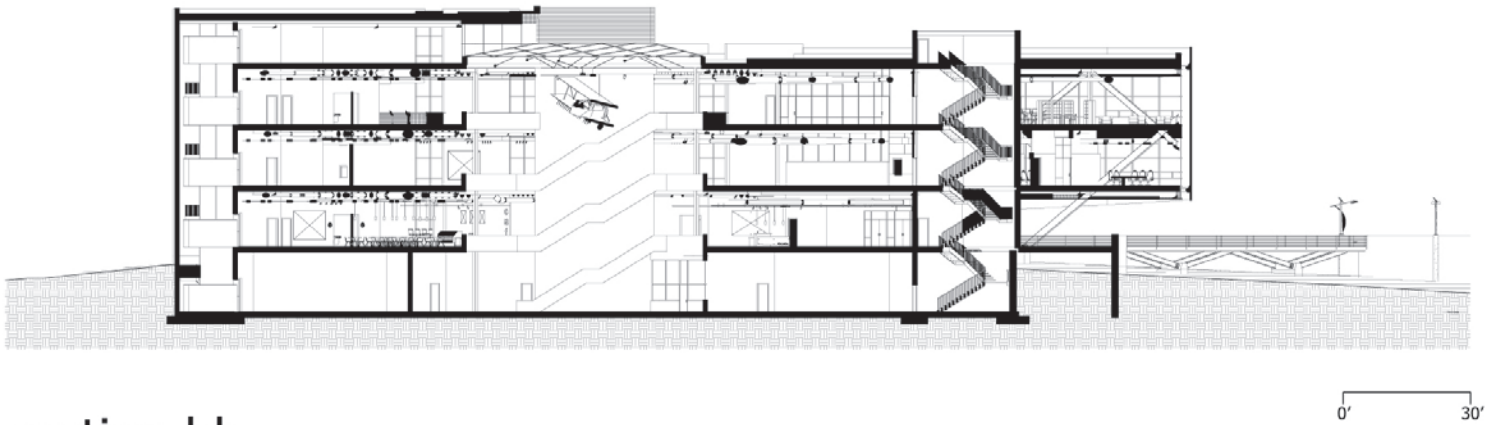
second level



third level



section aa



section bb



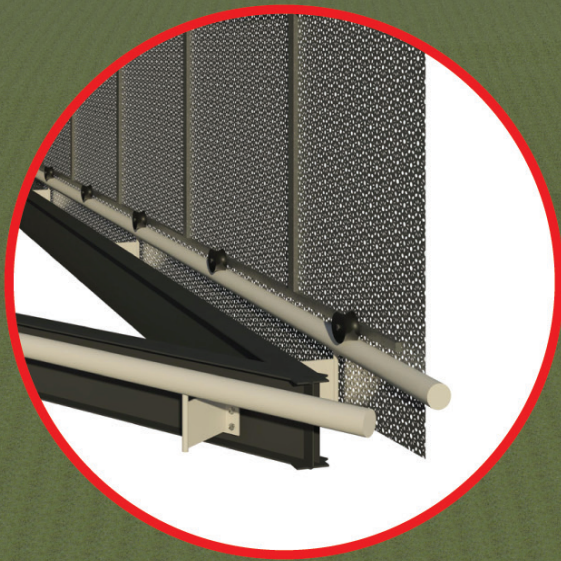
section **perspective**

environmental integration



operable windows- allows natural ventilation and climate control in smaller spaces such as offices and conference rooms

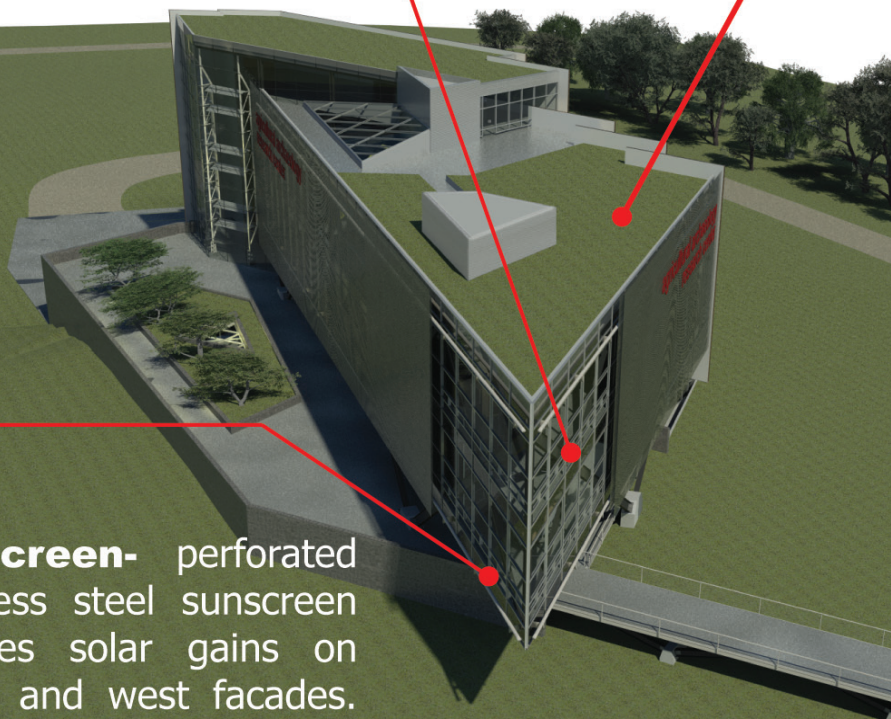
extensive covering near roofing area, reduces heating loads as well as runoff



sunscreen- perforated stainless steel sunscreen reduces solar gains on south and west facades. screen is operable on certain portions to allow more natural light

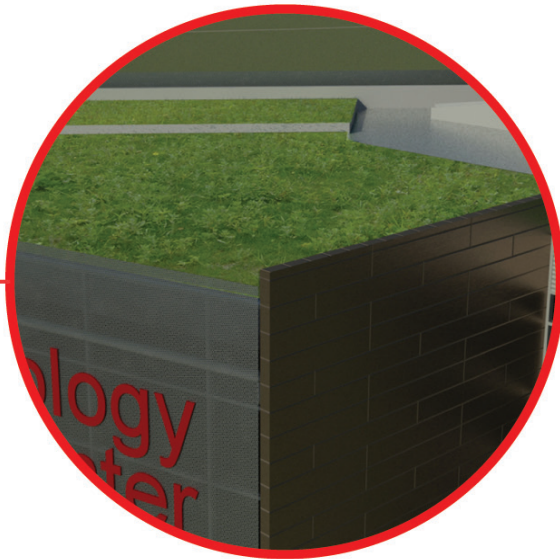


parking- permeable grasscrete minimizes water runoff, while solar powered street lights utilize passive energy

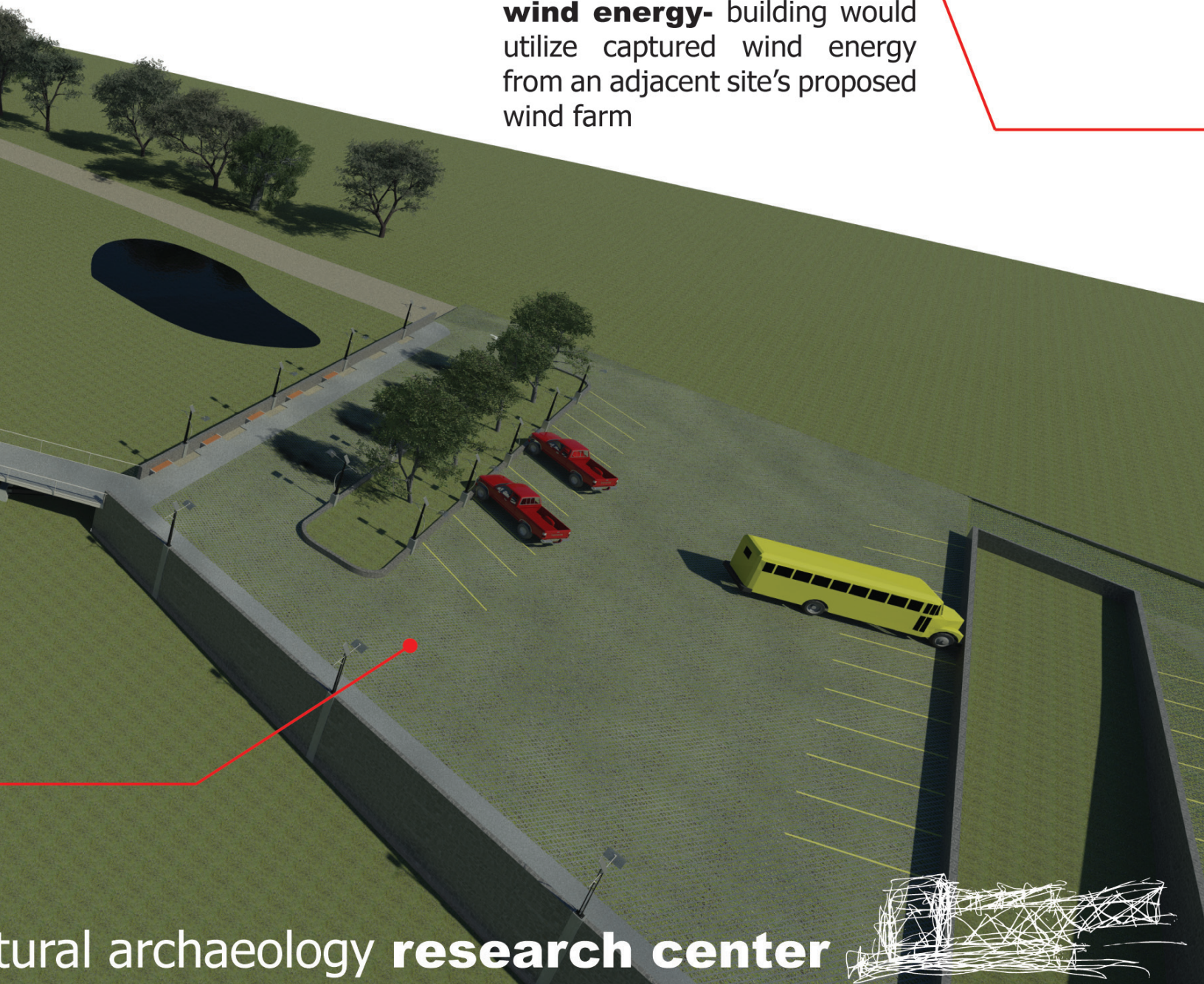


on strategies

green roof-
ly 80% of total
the green roof
ng and cooling
l as rainwater



wind energy- building would
utilize captured wind energy
from an adjacent site's proposed
wind farm



cultural archaeology **research center**

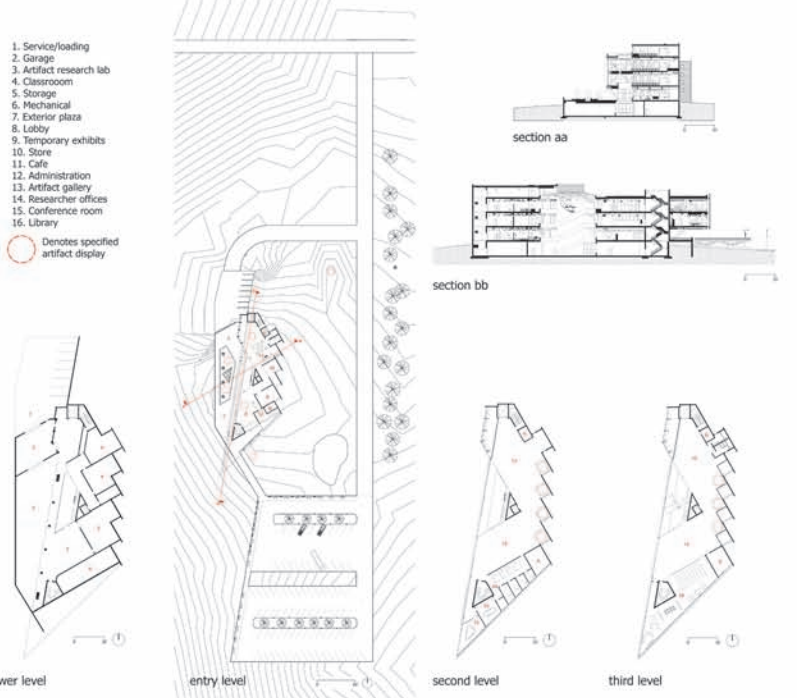


agricultural archaeology research center



Situated among a sea of rolling cornfields in west central Minnesota, the Agricultural Archaeology Research Center is designed to create a place for researchers, professors, and students of regional universities to study agricultural artifacts from the past 150 years. These artifacts are often seen upon hilltops as iconic rural landmarks or found on local farmsites laying in the tree groves being overtaken by their environment. The old machines become part of the landscape, much like fossils or artifacts of ancient history. The recovery and research of these artifacts is intended to create a better understanding of how these machines were used. The research also aims to preserve the strong cultural value of agriculture that has been associated with this region. The emphasis of this project includes education of the public by creating exhibition galleries and other public spaces. Unlike traditional museums, this design aims to inform the public by encouraging them to interact with, and understand the exhibited artifacts, not solely view them through a glass case. Influences for the design were drawn from agricultural artifacts, archaeology, and technological evolution.

- 1. Service/loading
 - 2. Garage
 - 3. Artifact research lab
 - 4. Classroom
 - 5. Storage
 - 6. Mechanical
 - 7. Exterior plaza
 - 8. Lobby
 - 9. Temporary exhibits
 - 10. Store
 - 11. Cafe
 - 12. Administration
 - 13. Artifact gallery
 - 14. Researcher offices
 - 15. Conference room
 - 16. Library
- Denotes specified artifact display



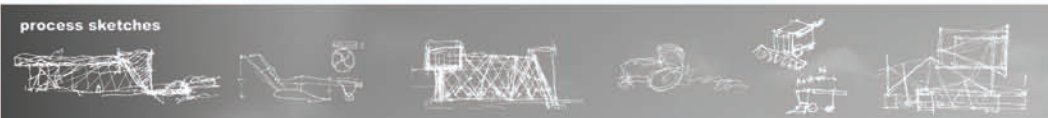
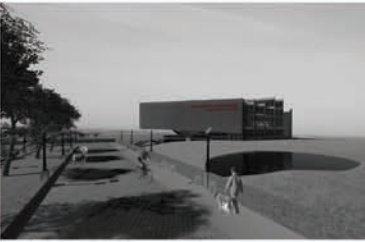
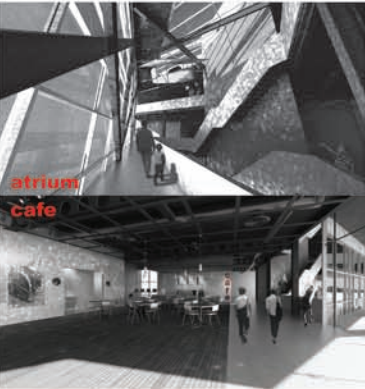
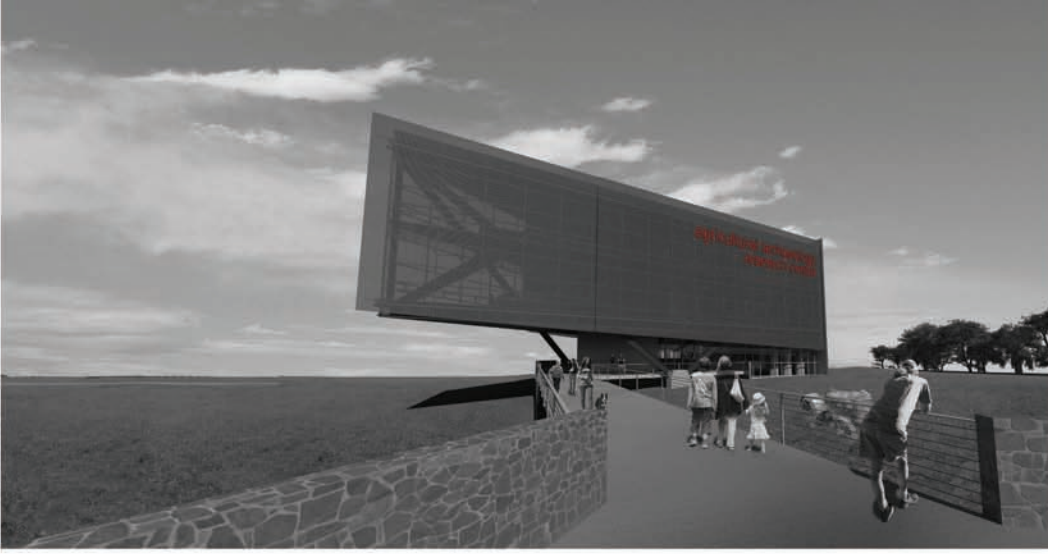
artifact studies



final concept sketch



final boards



references: **text**

- Land Use and Growth: Clay County Community-based Comprehensive Plan (2000). Retrieved on November 11, 2009, from <http://www.co.clay.mn.us/Depts/PlanEnvi/CompPlan/CP275t85.pdf>
- Burke, J. (1978). *Connections* (1st ed.) Boston: Little Brown and Company
- Diamond, J. (1999). *Guns, Germs, and Steel*. New York: W. W. Norton & Company, Inc.
- Lamberg-Karlovsky, C.C., & Sabloff, Jeremy A. (1995). *Ancient Civilizations: The Near East and Mesoamerica* (2nd ed.). Illinois: Waveland Press, Inc.
- Sidky, H. (2004). *Perspectives on Culture: A Critical Introduction to Theory in Cultural Anthropology*. New Jersey: Pearson Prentice Hall.
- Gazit, C. (Producer/Writer). (2009). *American Experience: Surviving the Dustbowl* (Motion Picture). United States: Prairie Public Broadcasting.
- Belk, R. W. (1995). *Collecting in a Consumer Society*. London: Routledge.
- MacDonald, G. F. & Alsford, S. (1991). *The Museum of Information Utility*. From *Museum Management and Curatorship*. V 10, 305-311.

references: **images**

Figures 1.11

Kurmann, Luigi. Dennis Oppenheim: Public Projects

Figures 1.2-1.4, 1.8-1.9

IKOY Project Index. Retrieved December 5, 2009 from IKOY website:
<http://www.ikoy.com>

Figure 1.5-1.7,

Research Buildings 1: Scientific Barn. *Canadian Architect*. June 1996, 20-21.

Figure 1.39

Kopelow, Gary. Research Buildings 1: Scientific Barn. *Canadian Architect*.
June 1996, 20-21.

Figures 1.10-1.18

Retrieved on December 5, 2009 from flickr website: <http://www.flickr.com>

Figures 1.19-1.25

Images courtesy of Joel Davy AIA, JLG Architects

Figures 1.26-1.28, 1.32-1.34, 1.38

Daniilidis, Nikos. Yatzer Report: New Acropolis Museum. Retrieved November
22, 2009 from Yatzer website:
http://www.yatzer.com/1762_the_new_acropolis_museum

Figure 1.29-131

New Acropolis Museum. *Architectural Record* (2009). Retrieved on November 22,
2009 from [http://archrecord.construction.com/projects/portfolio/
archives/0910acropolis-1.asp](http://archrecord.construction.com/projects/portfolio/archives/0910acropolis-1.asp)

Figure 1.35,1.36

Uncredited. Dennis Oppenheim: Public Projects

Figure 1.37

Amendola, A. Dennis Oppenheim: Public Projects

Figure 2.1-2.26

Barnett, A. D. Photos. 2009 November

Figures 2.27-2.30, 2.32

Barnett, A. D. Data obtained from City-Data.com:
<http://www.city-data.com/city/Moorhead-Minnesota.html>

Figure 2.31

Barnett, A. D. Data obtained from North Dakota State Climate Office website:
<http://www.ndsu.edu/ndsco/windrose/farg/index.html>

Figure 2.33

Barnett, A. D. Data obtained from GAISMA website:
<http://www.gaisma.com/en/location/fargo-north-dakota.html>

Figure 3.1

Barnett, A. D. Data obtained from Land Management Information Center:
<http://www.mapserver.lmic.state.mn.us/landuse/>

Figure 3.2


Barnett, A. D. Data obtained from Clay County Assesor, Dahlgren, Shardlow & Uban, Inc.

Figure 3.3

Barnett, A. D. Data obtained from USDA

Figure 3.4-3.27

Barnett, A. D. Photos and sketches. 2009 November



Adam D. Barnett
1609 5th Street South
Moorhead, MN 56560

+218.790.0624
a.d.barnett@hotmail.com

Motley, Minnesota

“Less is more”
-Mie Van der Rohe

**personal
identification**