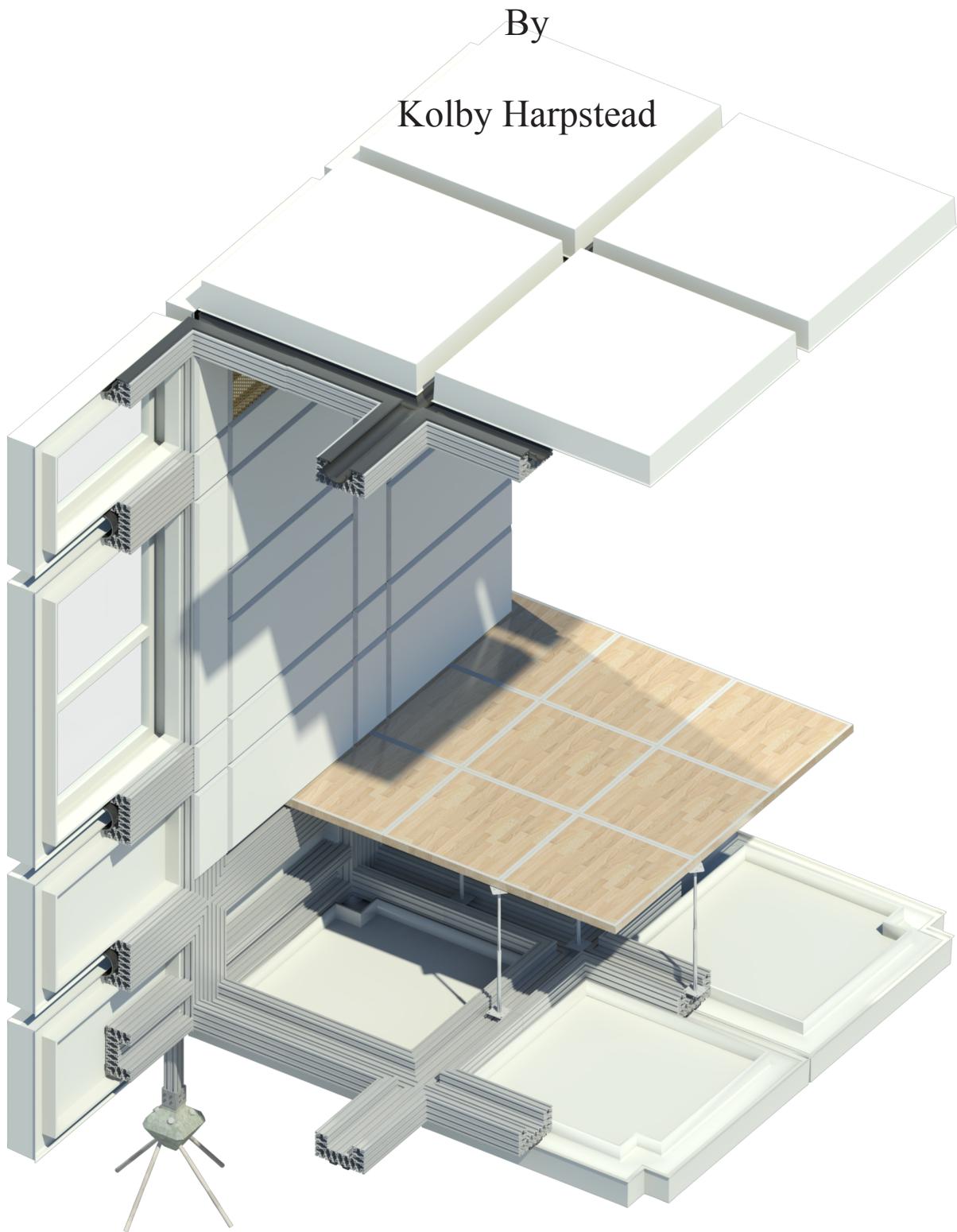


Disassemblable Small Business for Rural Communities



DISASSEMBLABLE ARCHITECTURE
FOR RURAL COMMUNITIES

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

By

Kolby Harpstead

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


Primary Thesis Advisor


Thesis Committee Chair

May 2010
Fargo, North Dakota

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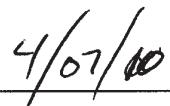


Table of Context

Thesis Abstract

Thesis Problem Statement

Statement of Intent

The Proposal

The Program

Final Design

Reference List

Personal Identification

7

9

11

13

31

87

97

101

Thesis Abstract

Title: Disassemblable architecture for rural communities

Introduction: Our society today has been experiencing a mass migration within its own borders. People are leaving the economically stale rural communities for the hopes and prospects of large cities. These diminishing communities leave the ghosts of their histories in the buildings and structures that are left decaying and useless. Yet new construction continues in these communities. What will become of these new structures? Will their fates be any different than the fates of the old empty structures decaying on the streets now? A new architecture for such communities should adapt, grow and contract, and change functions to facilitate the next occupant, or simply disappear to be used elsewhere. This thesis focuses on creating an architecture that facilitates the growth of rural communities by creating buildings for small businesses that are easily adaptable and disassemblable. These structures would range from 1,000 to 5,000 square feet and be developed from a catalog of parts. While the focus is for application in small communities, the system can be used in any low density commercial area.

Keywords: Flexible, Disassemblable, Rural Community, Small Business, Entrepreneurship

Problem Statement

How does the decline of rural communities affect
the built environment?

Statement of Intent

Typology:

Adaptable small business buildings for rural communities

Theoretical Premise/Unifying Idea:**Claim:**

Looking at the declining population of rural communities and the empty buildings they leave behind, it is apparent new construction needs to be adaptable to the future.

Premises:

Declining rural communities are leaving structures that are blights on our landscape and wastes of precious resources.

Lack of population reduces the scale of structures to occupy.

New construction must respond to this dynamic population .

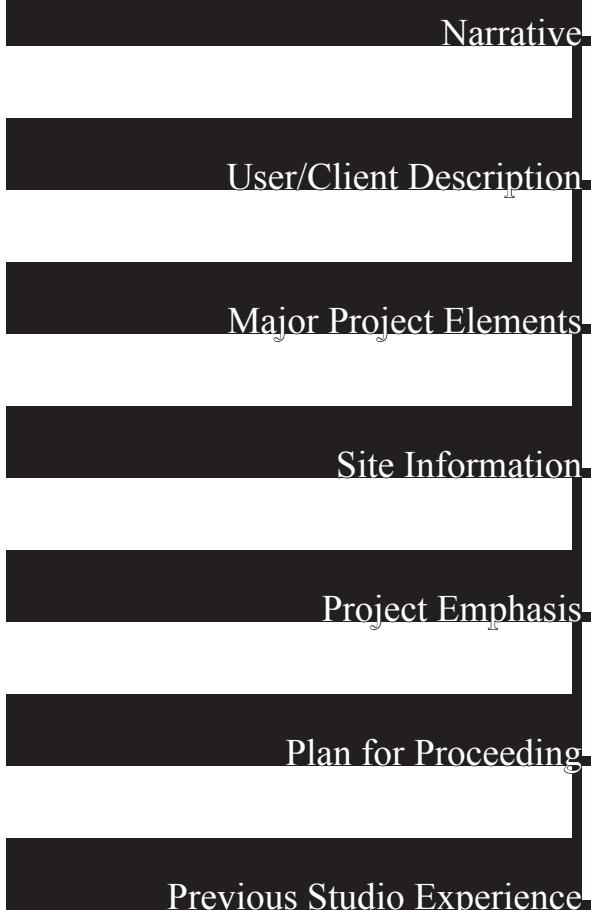
Theoretical Premise/Unifying Idea:

New construction in rural communities should be designed to change or even disappear in recognition of its changing future roles.

Project Justification:

As our rural communities slowly disappear, what happens with leftover structures is of major importance. An architecture that is not rooted to one place but adaptable and dynamic can better meet the needs of such communities in the future.

The Proposal



15

17

19

21

25

27

29

14

Narrative

Rural communities in the United States and around the world are in decline. People leave these areas of economic difficulty for the promises of larger cities. What happens to the rural community as people leave is an important issue to consider when designing new construction. How can we design for this uncertain future?

Rural communities in the United States harken back to the origins of a nation. People still know their neighbors and help strangers. There is a quality of character that is hard to find in larger cities. Smaller communities have aspects that many people value but are suffering because of stale economies. How can we, as designers, provide a means of countering this decline with appropriate design solutions?

Though it would be the best outcome to increase populations in small communities, larger cities may always offer more. What then will happen to the structures left vacant? Who will fill them? What will they do? Will they stand empty until time finally erodes them away?

It is interesting that in these rural communities new construction is still occurring. New homes are built, businesses expand and contract. However, these new structures are the same as the old ones standing vacant blocks away. Should not the new construction learn from the failings of the old buildings to be more flexible to the future demands of the small community?

This thesis will examine adaptable, flexible, and deconstructible design as it would help rural communities.

User/Client Description

Client:

The City of Morris owns the site and would be a major benefactor of this project. The financial strength of the community of Morris and the surrounding area is of utmost important for the city and its future. The entire community's economy would be improved with an increase in diverse businesses. With the city's help, the project can continue to be of use into the future.

User:

The specific users of the individual spaces are hard to define. Present and future occupants must be taken into consideration. The intention to have structures that are adaptable to future occupants and uses dictates the need for flexible solutions. Users will be entrepreneurs from the college and community.

Major Project Elements

The premise of this thesis is to create a space that will adapt to and change with the needs of its future occupants and users while fulfilling the needs of present uses. This dictates the need for flexible spaces, though some spaces can be universally applied.

Entry/Reception

Work>Showroom

Offices

Outdoor space

Site Information

Macro: Minnesota



Region: Stevens County





Site Information



The Morris Area Elementary School property was a major element of Stevens County until it stopped functioning as a school in 2006. Soon after the students left, vandals moved in and started tearing the building apart. Many in the community fought for the building to be saved as a historic treasure, especially the 1914 section. Sadly, the problems in the building were too big, and the decision was made to remove the building and redevelop this site in the middle of Morris.

Project Emphasis

Architecture aware of future needs of occupants and users.

This will be examined in the flexibility of space, modularity of elements, and investigation of future deconstruction.

Architecture and Rural Growth.

An investigation of the effect insightful design invested into the rural community can have on future growth.

Plan for Proceeding

Research will be conducted into many areas of inquiry. The directions followed will be based on the Theoretical Premise/Unifying Idea, the project's typology, historical context, site analysis, and programmatic requirements. A quantitative/qualitative Mixed Methods approach will be implemented following the Concurrent Transformative Strategy. Data, both qualitative and quantitative, will be gathered concurrently and be integrated at several stages of the process dictated by the examinations of the premises. Analysis and interpretations of the data will be documented both in text and through graphics on a bimonthly period. Collected data and analysis will be compiled digitally and made available on a compact disc at the conclusion of this thesis.

Studio Experience

Sophomore Year Studios, 2007



Arch271 Architectural Design I

Professor Joan Vorderbruggen

Projects:

Tea House Fargo, ND

Rowing Club Minneapolis, MN

Dwelling Bears Lake, CO

Arch272 Architectural Design II

Professor Bakr Aly Ahmed

Projects:

Montessori School Moorhead, MN

Prairie Dance Academy Fargo, ND

Junior Year Studios, 2008



Arch371 Architectural Design III

Professor Cindy Urness

Projects:

Center of Excellence Fargo, ND

Cranbrook Art Library Bluffton, MI

Arch372 Architectural Design IV

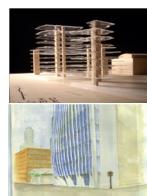
Professor Ronald Ramsey

Projects:

Fargo Housing Fargo, ND

Chicago Restaurant Chicago, IL

Senior Year Studios, 2009



Arch471 Architectural Design V

Professor Darryl Booker

Projects:

High-Rise San Francisco, CA

Arch472 Architectural Design VI

Professor Darryl Booker

Projects:

Master Plan Santo Domingo, DR

Marvin Windows Tanzania

Graduate Year Studio, 2010



Arch771 Architectural Design VII

Professor Mark Barnhouse

Projects:

Water Resource Station Linton, ND

The Program

Research Results and Goals

Site Analysis

Programmatic Requirements

33

71

85

32

Research Results and Goals

Results from the Theoretical Premise/Unifying Idea Research:

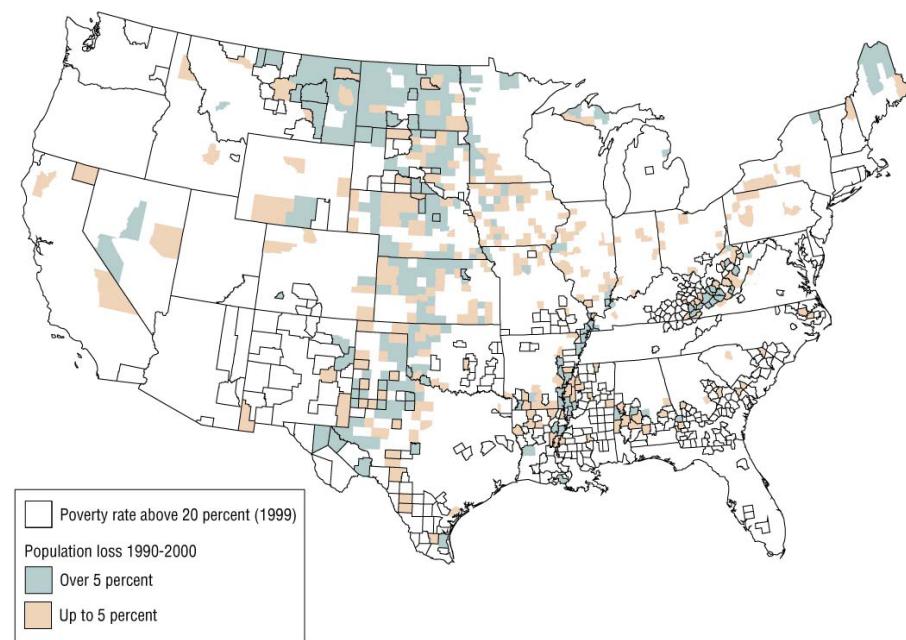
Currently, 20 percent of Americans live in a rural community. These 56,910,800 people are distributed across 3,443,772 square miles, which is 91% of the total United States. Their lack of density and economic influence cause many to be overlooked. The majority of these communities are suffering hard times in regard to economics and demographics. Rural areas are generally viewed as being economically stagnant, dependent on agriculture or mining with little economic diversity, which is true for the majority of these areas. It is difficult to retain and attract younger generations, causing an out-migration from rural areas. At the same time, when asked in a survey where a person would prefer to live, besides their current location, the popular response was a wide open country setting 30 minutes from an urban area. Even with this idealized image of the country, rural populations are still decreasing at -.82%. This reduced population is compounded upon by reduced fertility rate nationwide. While many of our small towns are disappearing and the character and morality of their people are going with them, some are finding ways to counter their decreasing populations and attract new people to their communities. This research investigated why small communities do not attract people or businesses, and what programs are available to counter these factors.

Many studies and investigations have been conducted to understand rural decline and

Research Results and Goals

methods to counter it. The United States Department of Agriculture (USDA) is one organization focused on helping the continued development and understanding of rural communities nationwide. Its publication, *Rural America*, discusses issues related to rural growth and decline. McGranahan(2002) identifies three major characteristics of declining counties: their distance from metropolitan areas, low density, and a relative lack of natural amenities. Rural counties farther from metro areas have less access to markets, materials, and population gain from city commuters. Low-density areas, frontier counties with less than 10 people per square mile, do not have the services to keep or attract more people so they continue to lose population. Areas without lakes, mountains, or comfortable climates were unable to attract new populations for a lack of recreational options. Quite often areas which had more than one of these characteristics were found to have lost population between 1990-2000, some as much as 5% out-migration. Factors such as distance from metros and natural amenities are geographical issues

Figure 1
Poverty and population loss in nonmetro counties
High poverty and population loss are unrelated



Sources: Censuses of Population, 1990 and 2000.

that are virtually unalterable. Beyond the creation of a manmade lake, counties lacking in these two factors have little chance to improve them. Extremely low-density areas will continue to lose population (McGranahan, 2002).

Surprisingly, a correlation between poverty or job opportunities and population loss was not found. Counties with a high level of poverty were not necessarily congruent with a high population decrease. This is explained by low rates of high school completion in poverty-stricken areas and the shift of urban manufacturers looking for a minimum of a high school education. Therefore, people in rural areas without a high school diploma can no longer expect to obtain low-income urban jobs. The USDA also found that small business entrepreneurship alone was not a critical factor in population loss in these low-density counties. Entrepreneurship would not make a difference with the lack of the other factors working against it. This does not mean that small businesses have no effect on rural communities, but distance from metro areas, low-density, and lack of natural amenities have more effect on determining population growth or decline (McGranahan, 2002).

Population loss was found to be more dependent on physical aspects of the county; most influential were the natural amenities available. Information was gathered in six areas to provide a scale of natural amenities in rural counties.

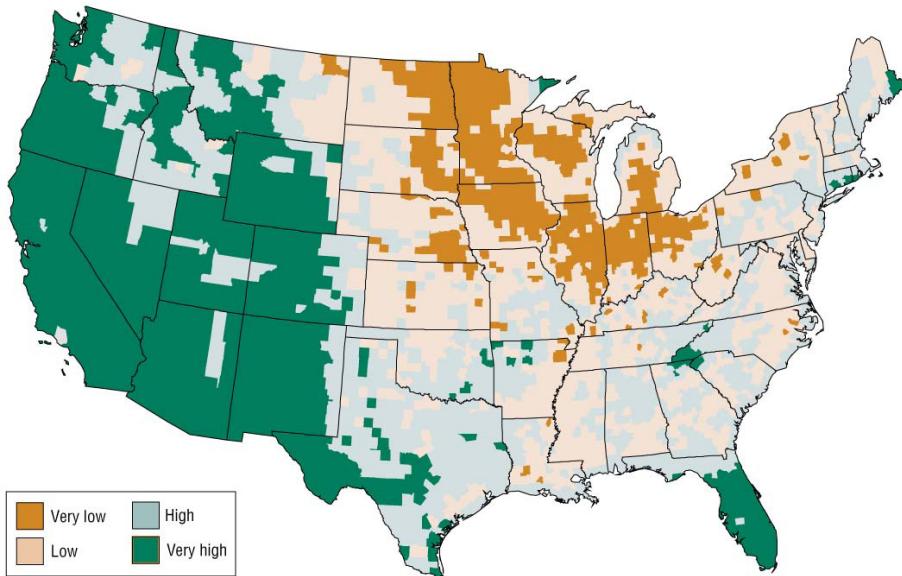
Research Results and Goals

Data on average January temperature, January days of sun, temperate summer, low July humidity, percent of the county that is surface water, and topological variation was collected to rank areas from very low to very high in natural amenities. Counties with a lack of amenities also often had low-density and population loss from

1990-2000. This pattern can be explained by looking at agricultural practices. Areas well-suited for growing crops are large expanses of flat open land with few lakes or deviations. These areas, though good for crops, do not supply opportunities for outdoor recreation that people look for when moving to the country. Natural amenities are a major reason people move to the country (McGranahan, 2002).

These three factors defined by the USDA are difficult, if not impossible to change, making the possibility of a solution quite bleak. Frontier areas have very few choices when it comes to attracting people. They can capitalize on the natural amenities they have or accept their population loss. Certain frontier areas dependent

Figure 5
Natural amenities scale
The North Central scores low in natural amenities, while the mountainous West scores high



Note: Low is within 1 standard deviation below the mean and High is up to 1 standard deviation above the mean.
Other categories are more extreme.

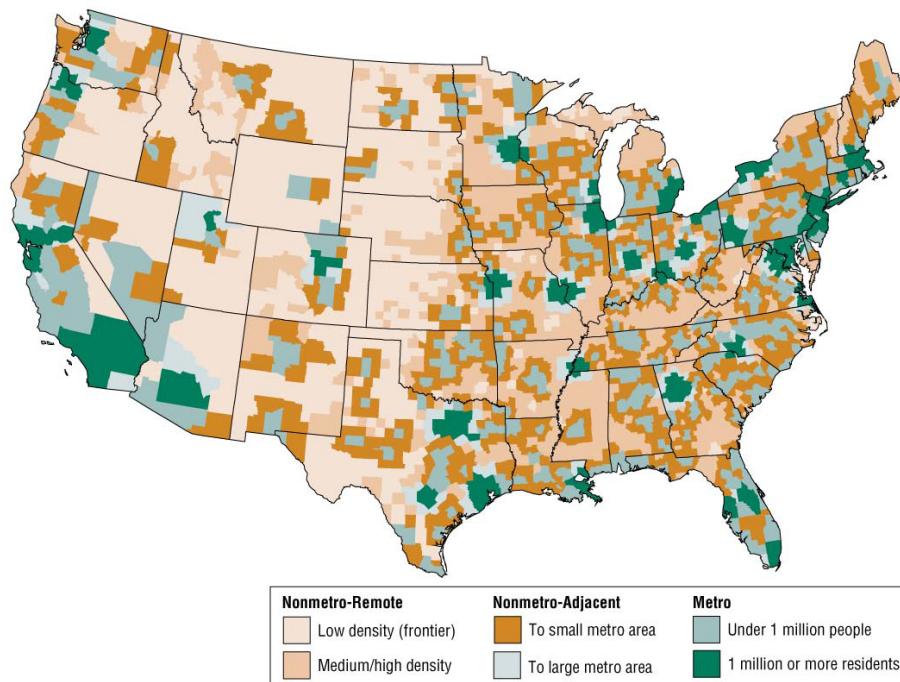
on agriculture will continue to lose population because of changing agriculture trends less dependent on labor and the general lack of recreational activities. Rural areas with a higher density, a few natural amenities, and closer to a metro areas, stand more of a chance of stemming their population loss (McGranahan, 2002).

People like the idea of life in the country and there have been times when rural areas have experienced population growth. In the early 1970s, the migration trend of movement from rural to urban turned around. Rural areas were experiencing population growth for the first time since the 19th century. There were multiple reasons attributed to this growth.

Institutions of higher education were being founded in more rural communities in the 1950s and 60s. These institutions created job opportunities in rural areas for professors and students. Young men and women had closer access to higher education and the possibility of creating skilled jobs in the rural community. The interstate highway system also provided

Figure 2
Settlement patterns, 1993

Frontier counties dominate the western half of the contiguous States



Sources: Censuses of Population, 1990 and 2000.

Research Results and Goals

a means for growth in rural areas. Commuters could live in the country and work in the larger cities along the interstate. Smaller communities along the interstate could use the increased traffic as a market and income source. Some people were fed up with the congestion in the city and looked for the quality of life the country offered (Fuguitt, 1979). All of these attributes are still available in the rural counties, they are just not attracting people as before. By the 1990s the migration trend was back to normal as people once again left the rural communities for better jobs in the cities.

The idealized view of the country is not enough; people are still leaving the financially challenging rural communities by .82% a year. In 2001 alone, one million people left rural counties, mostly in the 1-39 year age. College graduates were in the highest percentile of out-migration (Cromartie, 2002). Poor quality and basic scarcity of jobs forced graduates to go to urban centers for work. Rural areas have higher unemployment and rates of poverty than urban areas. In 1995, per capita income was 28% lower in rural areas than metropolitan areas and poverty rates were 2.5% higher. Good quality jobs are hard to find in rural counties due to poor infrastructure, lack of access to services such as legal, marketing, and accounting, lack of capital to start and maintain a business, lack of trained employees, and the great distance from markets. Attempted solutions, such as government

subsidies, community help for existing small businesses, small loan funds, and business “incubators” have had mixed results creating and sustaining jobs (Okagaki 1998).

There are businesses that help rural communities grow and develop. Remote elements of larger businesses could be started in rural areas. Telemarketing and data processing can be managed away from the mother company in small towns. They can add to the local economy and hire unskilled workers. The basic needs of these elements are labor and the infrastructure to support the increased demand (Leistritz, 1991). Prisons have also been ideas for rural growth, but they are met with mixed feelings. They do increase the population of the area and provide a government project to construct, but they often lack long-term benefits. People who live in the areas are often ineligible for employment because of union restrictions or lack of skills. The prisons have no link to the local economy because the communities near them have no local businesses to support the prison. Though they offer a one-time large influx to a community, prisons have been shown to lack prolonged benefits to local economies (King, 2003). Small business entrepreneurship has achieved success from starts in rural markets. Snowmobile manufacturing was started in a small town in Minnesota. Edward Jones (a 2\$ billion investment company) started by seeing the rural areas and people as an overlooked market

Research Results and Goals

and found success. Even today, Edward Jones is focused on small town communities and values (*A Lesson*, 2000). In starting small businesses it is important to be able to see the market and act. One approach to small businesses is clustering companies with like features or markets together to help one another. This cluster of small businesses must have similarities, such as shared market, same material or technology, or similar products. They can work together to compete with larger companies. This sort of business organization started in Japan more than 30 years ago and has been shown to help small town economies (Okagaki, 1995).

Research Results and Goals

Summary:

The focus of this thesis are the issues and difficulties facing rural communities. Rural communities are in a slow decline due to social and economical factors. It is important to understand these factors beyond the general conception about “economically stale rural areas.” Research into the economic, social, and physical factors of declining rural counties led to a better understanding of possible solutions. For decades, organizations and communities have brainstormed solutions to combat rural decline, finding and implementing strategies with mixed success. This shows the importance of rural communities. The priority of the research on the theoretical premise and unifying idea was understanding rural decline and investigating possible solutions.

Rural decline was tied closely to the physical environment of the area through economic and social interactions. Areas appealing for agriculture, such as large, flat areas of uninterrupted land, lacked natural amenities for recreation. Agricultural communities find it hard to attract people for this reason, which leads to a lack of interest for other business opportunities. General distance from urban areas of larger population made rural areas unable to utilize the larger density. Without density, new businesses are hard pressed to find the customers needed to sustain an entrepreneurship. Rural areas seem to be their own worst enemies in their dependence on a single market, low-density, and distance from other available markets.

Research Results and Goals

It is difficult to change these factors, so rural communities must use innovation to overcome these limitations. Many strategies have been tried to stem rural declines and save rural communities. No single solution was met with universal success. Depending on what the area had to start with, strategies such as government subsidies, small loan funds, and business “incubators” either succeeded or failed. Some areas of promise are telecommunications and a clustering of small businesses. Rural populations can handle data collection for larger companies, creating satellite businesses in rural areas. Clustering businesses creates a group of companies that work together to compete with large enterprises. Both are possibilities to create rural growth.

Rural communities with some physical benefits and density to work with can utilize small business entrepreneurship to stimulate growth. Though this does not guarantee growth or business success, new business diversity and opportunities are needed in these communities. It is likely, and must be considered, that these businesses will fail or not be right for the community they start in. This translates into a built environment that can respond to this dynamic. Also, the structure should be able to expand with success to retain the business in the area. These facts will drive the intent of the thesis project.

Research Results and Goals



Results of the Typological Research:

Cellophane House

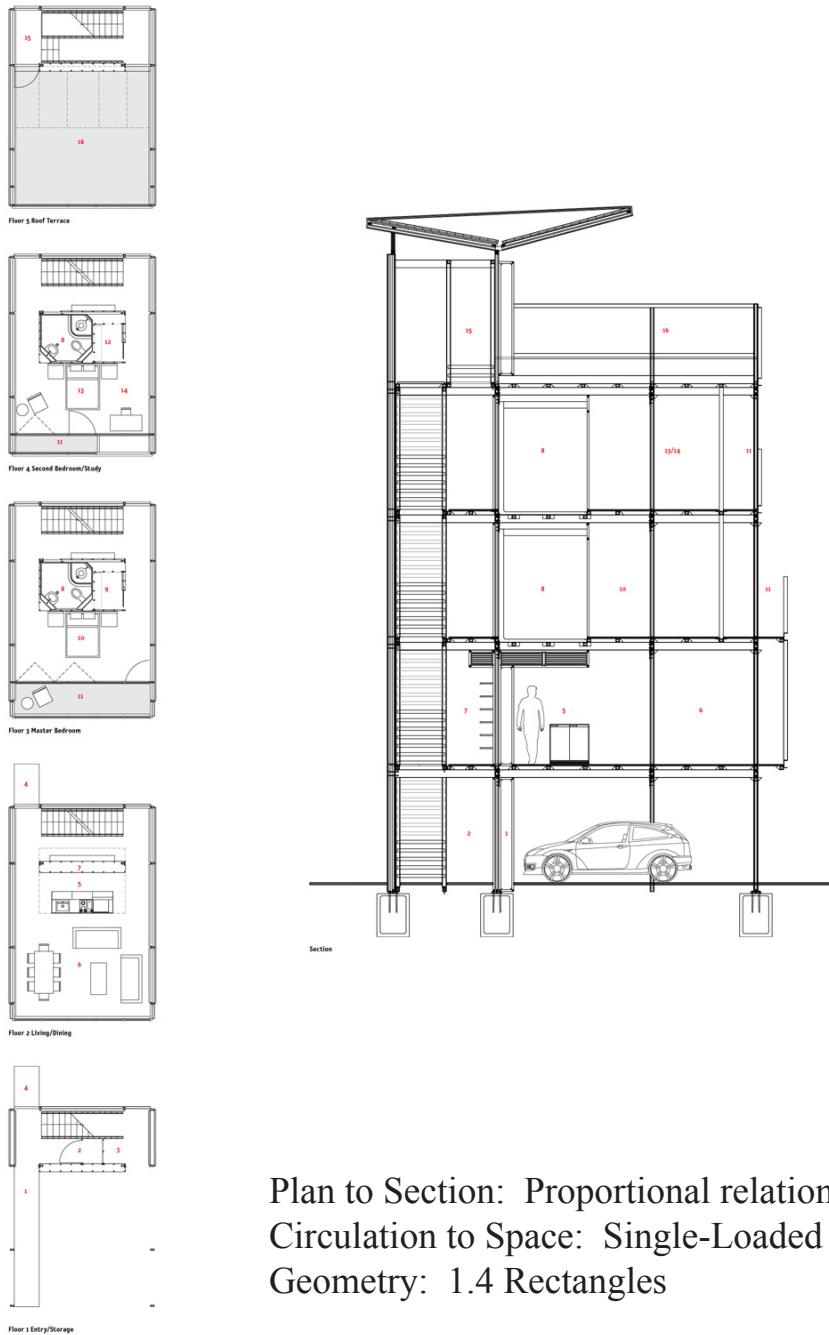
Architect: KieranTimberlake

Museum of Modern Art, New York, NY

The Cellophane House was assembled for the Museum of Modern Art's exhibition *Home Delivery: Fabricating the Modern Dwelling* from a kit of modules designed by KieranTimberlake. The three sections, rear stair, central connection, and front living, of this five-story mock residence were held together rather than fixed for future replacement and disassembly. The exhibition began July 20, 2008 and the house was erected from prefabricated sections in an empty lot next to the museum. On October 20, 2008, at the conclusion of the exhibition, it was disassembled piece by piece and shipped off. During the exhibition, the 1800 square foot residence contained two bedrooms, two bathrooms, living and dining space, a roof terrace, and carport.

KieranTimberlake's concept is that "a building is, at root, nothing more than an assemblage of materials forming an enclosure" (KieranTimberlake, 2009). A designer must recognize that the materials used for construction are there temporarily, and at some point in the future will be taken apart and moved somewhere else, often with a great expenditure of energy. Timberlake's idea takes its lead from the automotive industry and the sale of used parts, only in the built environment. The structure of the Cellophane House is an aluminum scaffolding called Rexroth, manufactured by Bosch, that supports interior and exterior walls allowing for easy change of interior layouts and exterior panels. The exterior material is a heavy-duty Saran Wrap system called Smart Wrap, which can integrate photo voltaic panels and a double skin system to provide a well-insulated exterior. Its complete transparency allows natural light to penetrate throughout the home. This also gives the building a lightweight feel which is more void than mass.

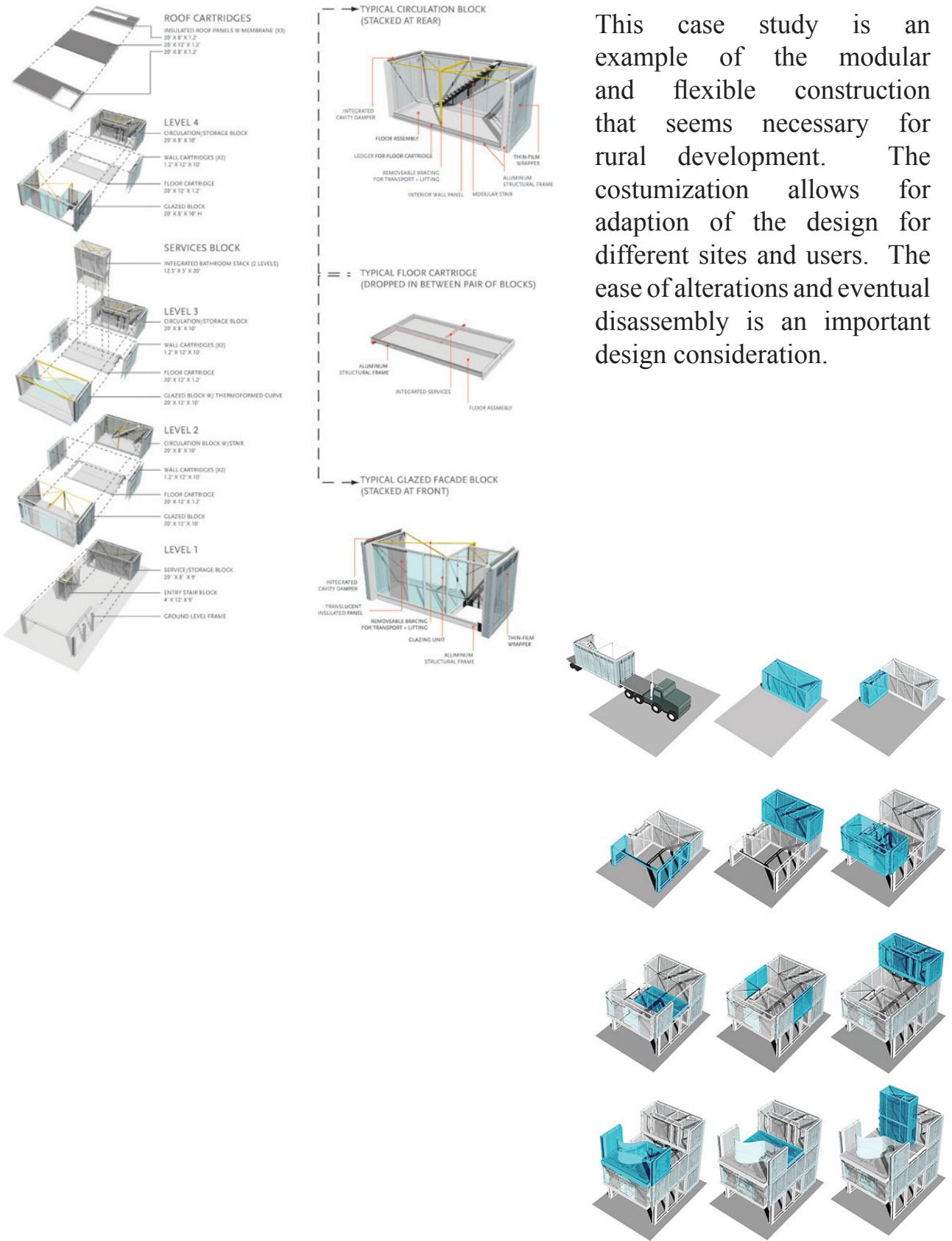
Research Results and Goals



Plan to Section: Proportional relationship
Circulation to Space: Single-Loaded Vertical Corridor
Geometry: 1.4 Rectangles

Conclusions:

This case study is an example of the modular and flexible construction that seems necessary for rural development. The customization allows for adaption of the design for different sites and users. The ease of alterations and eventual disassembly is an important design consideration.



Research Results and Goals



Iron Studio

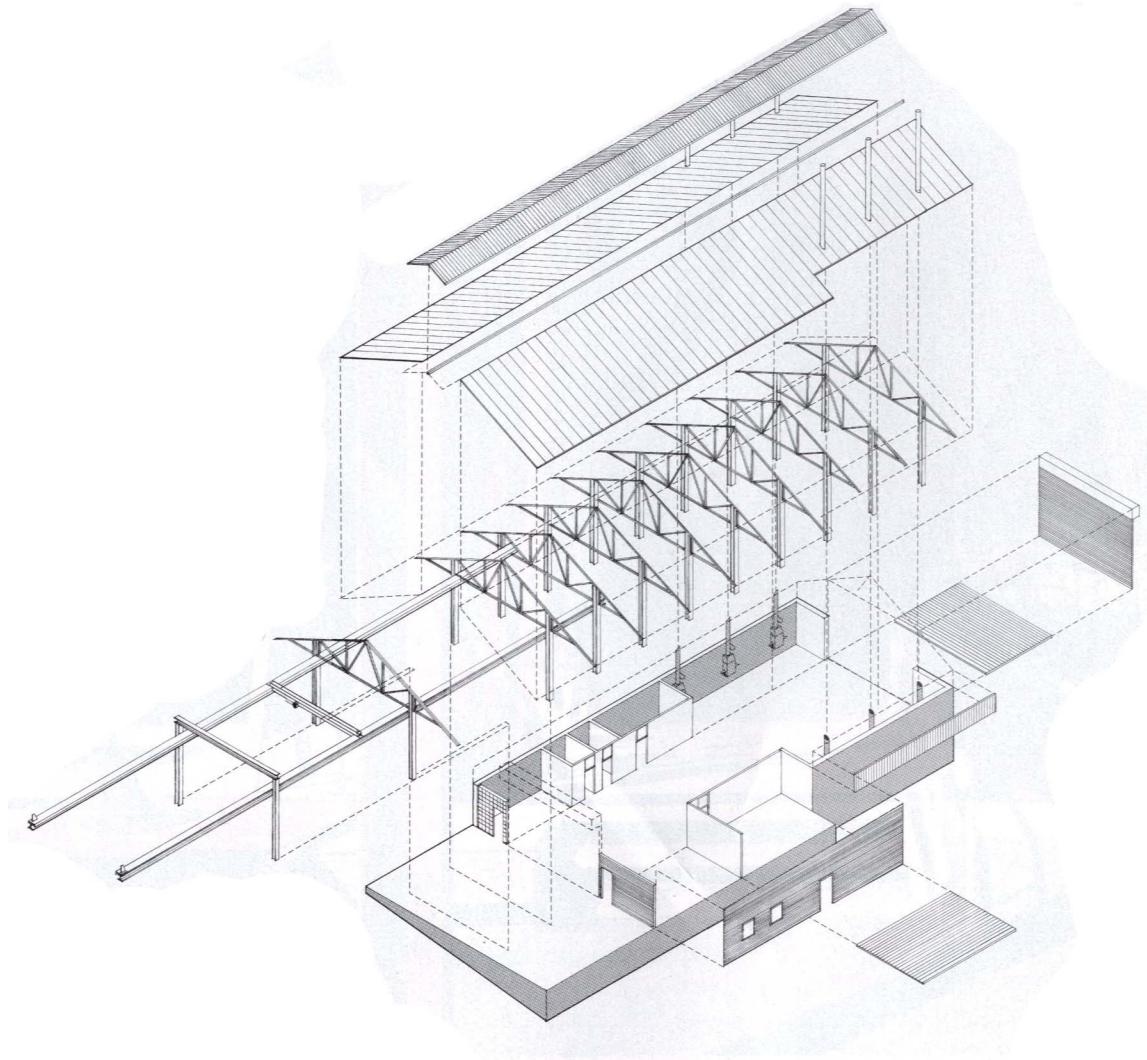
Architect: Frank Harmon

Penland School of Crafts, North Carolina

When the Penland School of Arts and Crafts needed a new building for their expanding blacksmith studio they wanted an Architect known for his hands-on philosophy. Frank Harmon is one such Architect. To understand the process of iron working, Frank and his office took a three-day workshop at the school. Harmon took a light industrial education building and created a naturally lit celebration of steel and metallurgy. This simple shed proudly exhibits its construction process and all the little nicks Architects usually try and hide.

This 6,312 square foot facility was designed with a flexible open floor plan to create metalwork as large as five-tons. Penland School also wanted the studio to take advantage of natural light and ventilation. Harmon opened the walls to natural light by lifting the roof above the concrete block walls and separating the peak with clearstory windows, allowing for ventilation. Positioned in the rugged mountains, the building became long and linear to limit the effect on the topography. The 24-foot door on the south end opens up to solar access and views of the mountains. Inside, the rigid steel framing shows students the process of the building's construction. The building is set into the ground with the massive walls but the roof floats above creating a mix of heavy and light massing. Frank Harmon takes simple materials like corrugated steel and concrete block and creates a light-filled cathedral for the sooty art of metal.

Research Results and Goals



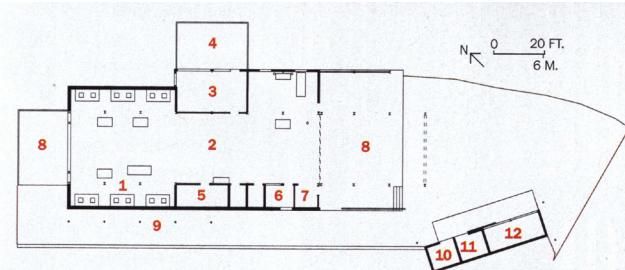
Plan to Section: Proportional relationship

Circulation to Space: The space is the circulation

Geometry: Rectangles

Conclusions:

Frank Harmon shows that small industrial buildings need not lack design. Allowing for natural light and ventilation can bring nature into an industrial process. Simple materials can have a quality and appreciation that luxurious materials lack.



- 1. Forging stations
- 2. Fabrication
- 3. Classroom
- 4. Deck
- 5. Tool storage
- 6. Office

- 7. Vestibule
- 8. Porch
- 9. Scrap storage
- 10. Sandblasting
- 11. Compressor
- 12. Coal storage

Students in the forge
area hammer and weld
red-hot metals into
functional objects and
works of art.

Research Results and Goals



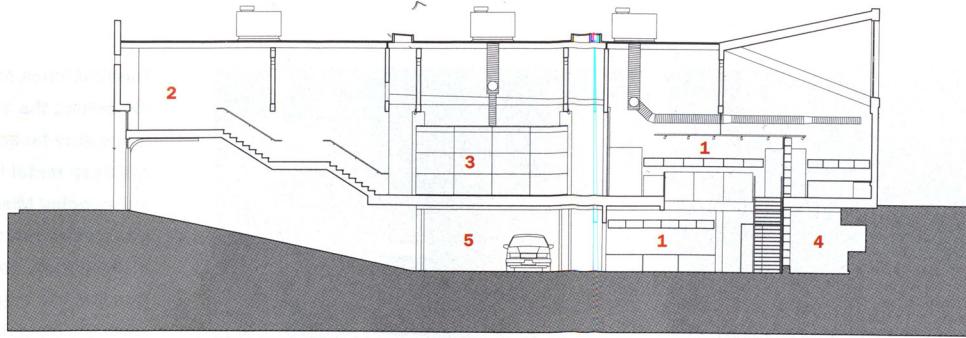
Suyama Peterson Deguchi Office

Architect: Suyama Peterson Deguchi

Seattle, Washington

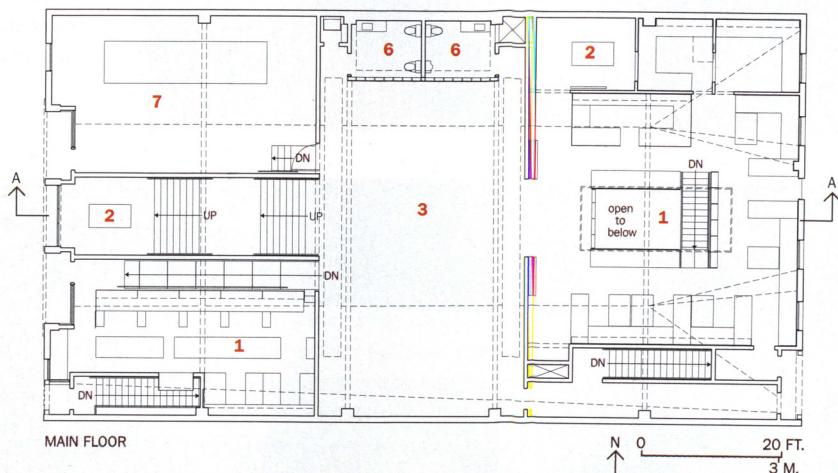
When Suyama Peterson Deguchi Architectural firm was looking for a new space for their office, they wanted a more urban building, but not necessarily a larger one. What they found was a 12,280 square foot 1800s livery-stable-turned automobile service garage for their eight person firm. Needing only 2,000 square feet for their office, Suyama needed to fill the remainder of the building and satisfy the requirement of the city by having retail at the front of the building. The solution incorporated retail and gallery space into the program and provided a rewarding mix of use. Currently, the office has 19 employees in offices surrounding the 20-foot tall gallery space available to local artisans. The renovation of this historic building mixed old and new without being nostalgic of either. The heavy timber structure is exposed throughout the spaces creating a warm, rough contrast to the new, clean-cut elements. The offices are flooded with light from a large window at the back of the building and skylights bring in light to the edges of the gallery. The gallery is a calm center surrounded by the hectic showrooms and offices.

Research Results and Goals



SECTION A-A

- 1. Office
- 2. Conference
- 3. Gallery
- 4. Kitchen
- 5. Garage
- 6. Bathroom
- 7. Retail



Plan to Section: Proportional relationship
Circulation to Space: Central Circulation
Geometry: Rectangles

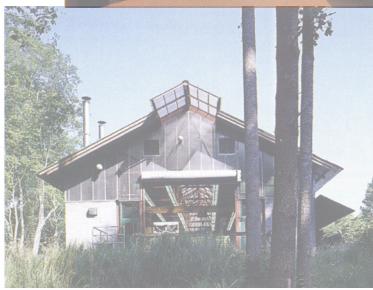
Conclusions:



This case study shows the synergistic effects of mixed use. The office employees become inspired by the art and acquire contacts where they did not before. The play between these different spaces brings interest and intrigue to the typical idea of offices.



Research Results and Goals



In Architecture, as in all efforts, it is important to learn from other's successes. Case studies are necessary to compare your intentions with what has been done before. This case study series looked at three widely different projects, each with elements desired for this thesis program. A flexible commercial building, applicable to a range of businesses, from light industry to offices, is not a specific typology out in the market. Therefore, one project was chosen based on its modular design which is flexible to customization, growth, and disassembly. Another project considered the demands of light industry on a building without creating a windowless, empty shed. The third and final case study showed the less demanding office environment mixed with gallery and retail spaces. Though these projects did not affect the unifying idea, they better defined the intent of the program.

The Cellophane House is an excellent example of a flexible, adaptable structure not only for its modularity but more importantly for the ability to disassemble and use the parts again. This is an extremely sustainable idea for there is no waste in repair or deconstruction. The panels can be built to last indefinitely and whether the building lasts or not the panels can be reused.

The Iron Studio's function as an industrial building is overshadowed by Frank Harmon's use of materials. He uses industrial materials create a cathedral to metallurgy. Natural light streams into a space that one would image as dark and sooty. He creates an improved image of what light industry could be.

Research Results and Goals

The office of Suyama Peterson Deguchi integrates the old with the new. The quality of materials and the organization of spaces facilitated the office and the mixed use spaces. The combination of gallery, retail, and office create an intriguing dialogue of calm and hectic environments. This clash creates energy and interest in a space that could be dull and uniform.

Each of these projects succeed because of their level of design, creating space that is more than the walls surrounding it. These projects could not be more different from each other. The projects cover different uses, in different environments, with different clients, but each reach a high level of refinement. Quality of spaces and honesty of material create valuable space.

The spatial relations of the office, gallery, retail, and industrial space will inform the program requirements for the final project. The spaces created must handle the rough and demanding use as an industrial space, as well as the delicate calm of the office environment. This requires materials that are durable and strong as well as comforting and warm. Customization of spaces must consider this duality and more.

These characteristics must be handled in a modular organization that allows for customization, adaptation, and disassembly. This raises technical issues that will need to be resolved for the project to achieve the goals set forth in this thesis.

Research Results and Goals

Results of the Historical Context:

Originally, the whole country was frontier land, untouched by human development. Wilderness spanned from coast to coast, over prairie and mountains. Even after the Native Americans arrived over the Bering Strait, the country remained a natural place. Native American lifestyles were often nomadic dwellings in movable temporary structures. When agriculture came with the European pilgrims, settlements and trade became the driving market and livelihood of the population. As more people came from across the ocean, more frontier land was claimed and farmed. Civilization slowly crept across the country driven by opportunity and government incentive. The Homestead Act of 1862 spread people across the prairie to develop the abundance of land. The promise of opportunities drove people into the frontier, even with its risks and hardships. People spread thin across the country were vulnerable to the hostile climate and natives of this country. The hardships of frontier life were overcome and population increased into the prairie. Frontier land developed in the cities and rural communities of today.

During the Homestead Acts of 1862, 1909, and 1916 people from the east coast flocked to the Midwest for the opportunity to own land. These opportunities were weighed against the hardships of frontier living. Many

Research Results and Goals

people did not make the trip out to their new frontier homes. A harsh climate and uncertain crops were only some of the dangers of living in this scarce environment. The low populations of the prairie left people isolated and vulnerable to illness and attack. However, people survived and the development of the frontier continued. Towns grew at the hubs of trade where diverse markets intermingled. Small farms needed to sell their produce and receive goods for themselves. Trade created the first towns on the prairie and trade drove the placement of these towns. Trade along rivers, oxcart trails and eventually railroads created centers for population growth. This growth drove entrepreneurs to start businesses focused on satisfying the needs of the growing areas. Different densities developed from the farm to major cities in the progression of moving goods from one to the next. Rural areas, after producing raw materials, always had the economic short stick. Farms and small communities had to depend on other areas for refined products. This set rural areas up for economic difficulties far into the future.

Government action and support has kept rural communities going through the roughest of times. After the extreme droughts of the 1930s, governmental agencies were created to help destitute families and deteriorated farm land. Since that time, the United States

Department of Agriculture has been entrusted with maintaining the rural areas of the United States and continuing their development. In 1935, the government drove the electrification and telecommunications through the rural areas to further the development of some of these neglected yet important parts of the nation. Even with government support, rural areas could not compete with the attraction of urban areas.

As the nation developed, opportunities that were once found in the country were overshadowed by the thriving urban areas. Throughout the 19th century, migration to urban centers from rural communities was a constant drain of population from the countryside. Urban areas promise more employment, a greater variety of entertainment, and a more energetic environment than rural areas. Urban cities attract younger generations for these reasons. Small towns must fight against these opportunities to retain the future generations. The idealized view of the country attracts a portion of the population looking for a slower, more personal community life, but at the cost of economic opportunities and activities. People look to the country for retirement and old age, harkening back to simpler times. This is the situation for small towns throughout the country.

Research Results and Goals

Morris is one such small town struggling to attract new, younger generations to the community. Many elements in the area of Morris could be utilized to attract younger people. The University of Minnesota, Morris, is ranked in the top ten public fine arts schools in the nation. College students from across the nation come to this university to study more than 30 majors and minors, as well as eight pre-professional programs. The University also has an initiative in green solutions, building a wind turbine and biomass plant to supply their electrical needs in the future. Even with these cutting edge advances, graduating students do not stay in the area. Families considering a move to Morris would find good schools, libraries, a fire department, courthouse, and a variety of religious institutions. Lakes and rivers can be found throughout the area, providing opportunities for recreation in the summer and winter months.

All of these elements should help attract people to Morris. However, Morris has experienced a population decrease of 1.4% since 2000. This can be explained by the economic recession we are in and the limited number of job opportunities in Morris. Agriculture is the major market for Stevens County. In addition, there are a number of industrial and service industries in Morris. The diversity and opportunities to expand within

Morris are limited causing a negative effect on the community's economy. Small business development and increased job opportunities for skilled and unskilled labor are the elements lacking in the community of Morris. With some businesses in the process of leaving Morris, new jobs and businesses need to be created to fill in the deficiencies. This thesis project intends to address this inadequacy.

Research Results and Goals

Goals of the Thesis Project:

Academic Goals:

A clear, concise, and meaningful thesis proposal and program

A well documented process of design and development

A final project of a quality concurrent with the completion of five years of study in Architecture

Clear and thought provoking oral presentation

Add to a knowledge base

Create a standard for future students

Professional Goals:

Produce work at a professional level of competence

Further insight into the subject and typology

Personal Goals:

Investigate thoroughly the unifying idea

Document sufficiently the process of design and production

Create a project to my satisfaction

Produce a project and display up to my standard of excellence

Present to the best of my ability the finished project

Site Analysis



Qualitative Aspects:

The site chosen for this thesis project is located in Morris, MN, at the location of the unused elementary school. The prominent element of this site is the historic school building, located on the southwest third of the site. Placed at the top of the only hill in Morris, the school dominates the site with its presence. After the new school was constructed off site, the site became distressed by human involvement and natural forces. Graffiti and vandalism have begun the slow decay of the abandoned school building, making a once important building a blight on the city. Now the building is the site of unsavory people and behavior. Ground asphalt from the parking lot, pea rock from the play equipment, and track surface still cover a majority of the site. A few pieces of equipment still dot the area, creating whispers back to the time it was used daily by hundreds of young children.

Beyond a few other small buildings, the site is an open grassy area with small elevation change. The topography quickly falls away from the school to match the elevation of the rest of Morris. Rows of trees create windrows along the northwest and southeast sides of the site. Another row of trees proceeds down the center of the site along a change of a few feet in elevation, separating the track and playground. Between the playground and the old soccer fields on the north corner of the site, the topography becomes even with the street level. Lack of trees and buildings allow solar access to the entire site, with very intense sun in the summer.

The site is surrounded by residential, commercial, and university areas. Houses and low-rise apartments border the southeast and west edges of the site. Light industry businesses border the northwest edge and a cemetery separates the site and university to the east. Views from the site change drastically between these areas.

Site Analysis

Quantitative Aspects:



17.5 acre site

Soil: Udorthents, Loamy (cut and fill land)
Little to no erosion
Abandoned School building
10% Trees dead or dying

East 7th Street to NW
East 5th Street to SE
South Columbia to SW
College Ave. to E

Site Analysis

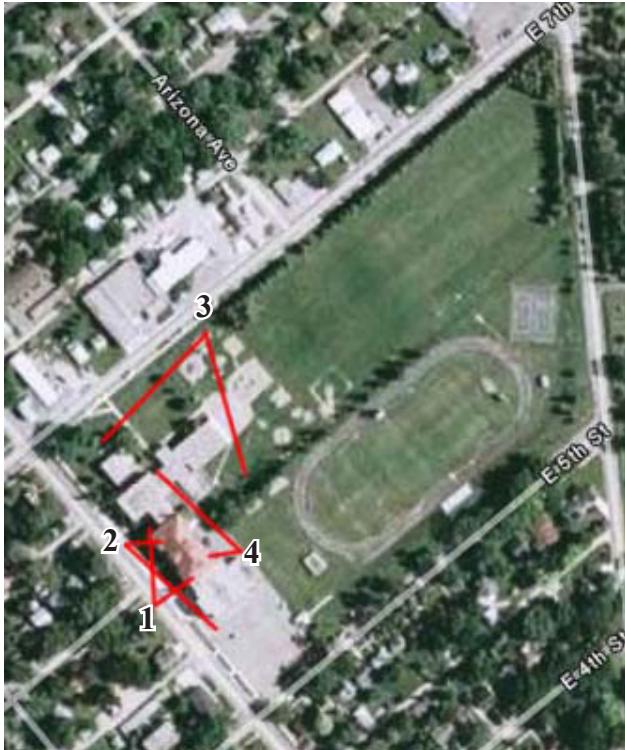
Vehicular and Pedestrian Traffic:



Electrical , Buried Utilities, and Topography:



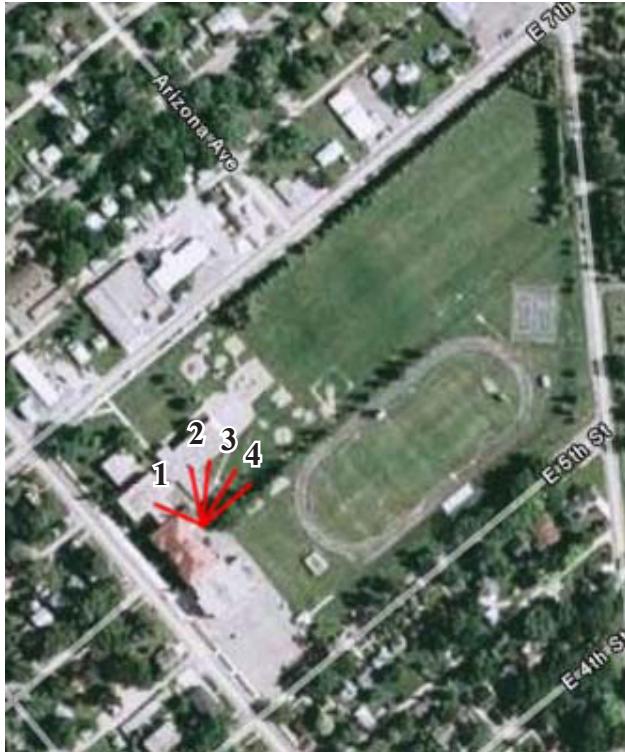
Site Analysis



Site Reconnaissance:



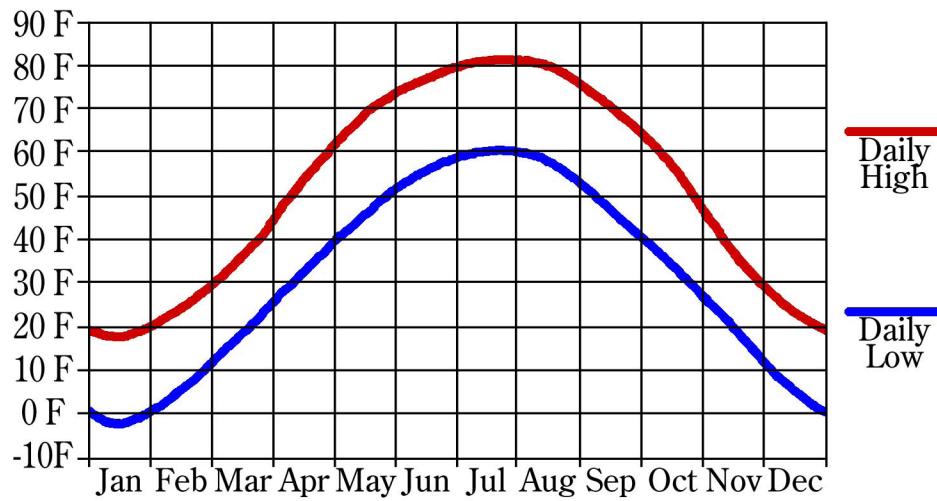
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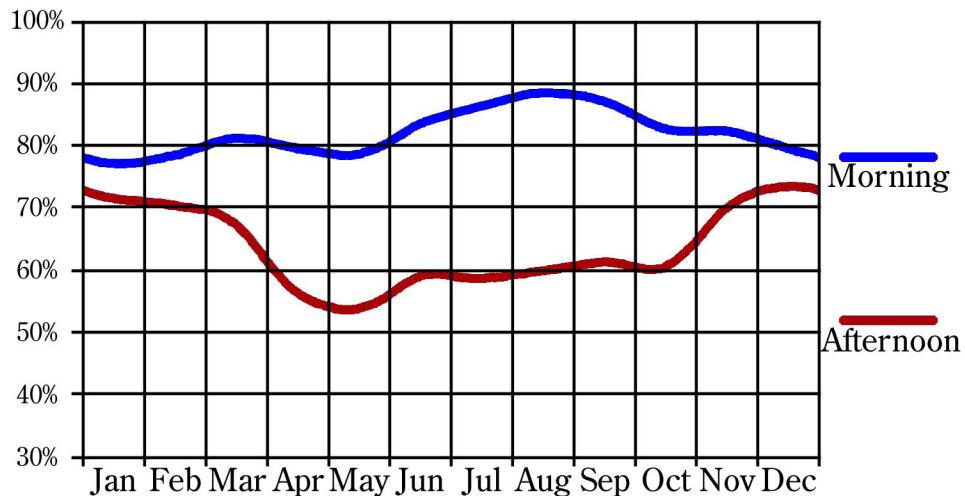


Site Analysis

Temperatures

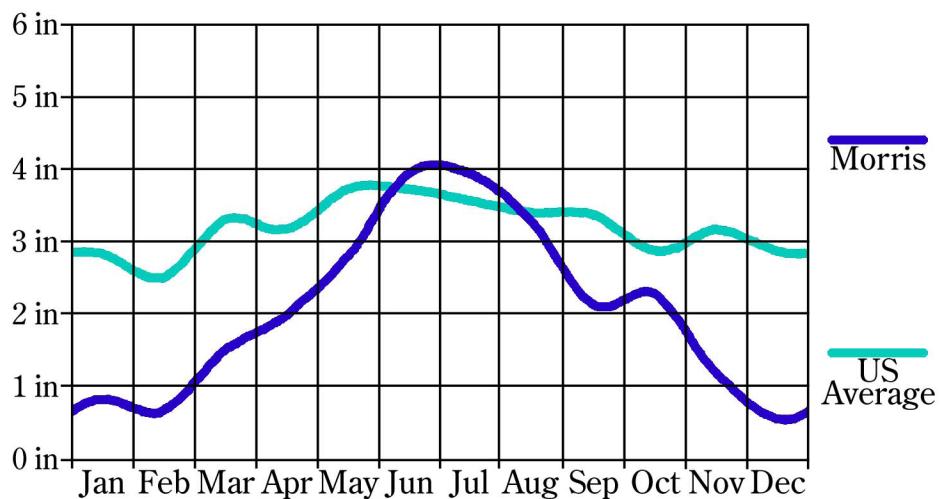


Humidity

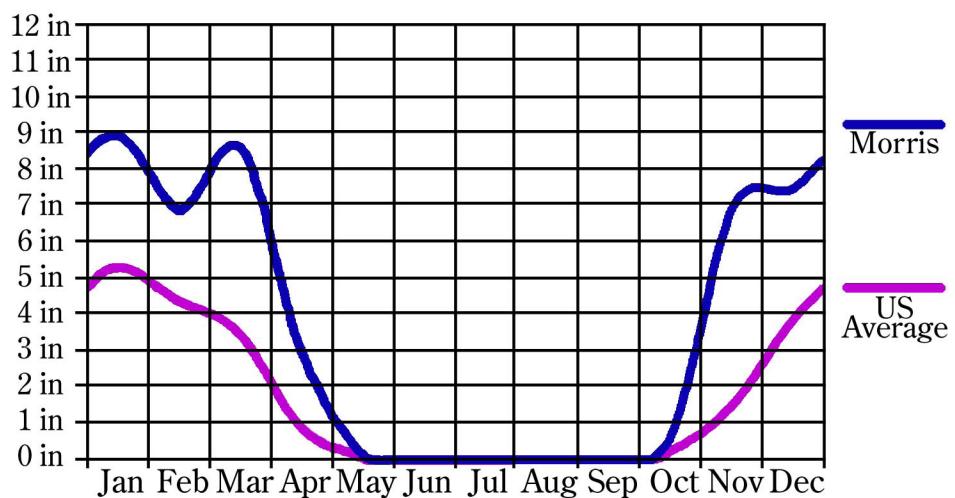


Climate Data:

Precipitation

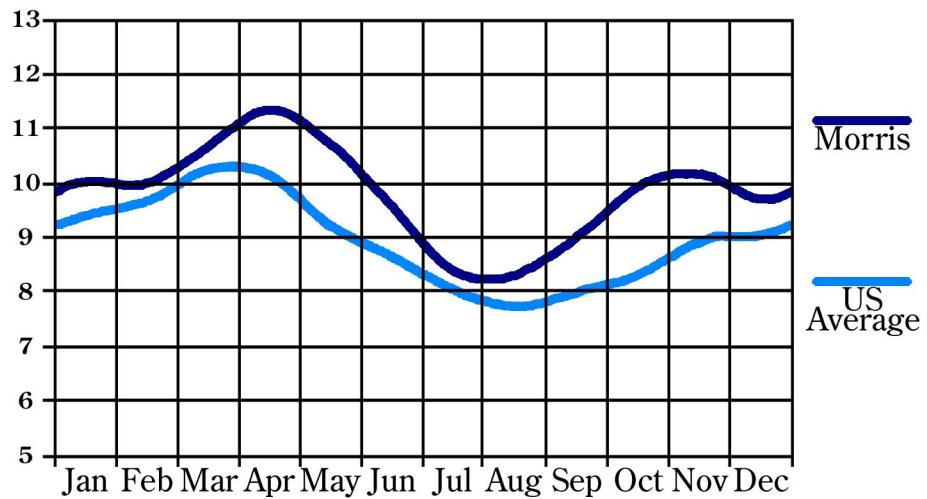


Snowfall

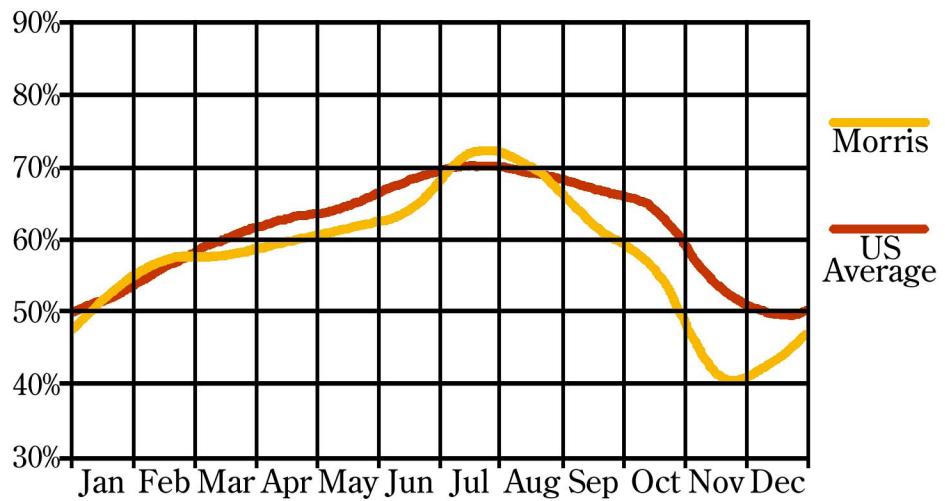


Site Analysis

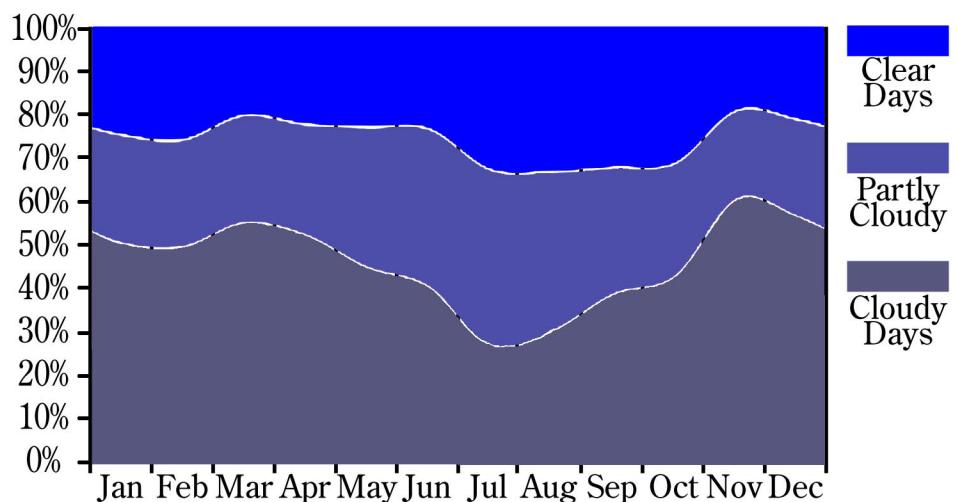
Wind Speed (mph)



Sunshine



Cloudy Days



Programmatic Requirements

The intended results of this thesis is a kit of modular parts, interchangeable, adaptable, easily assembled and disassembled. Assembled, this structure will be occupied for uncertain uses and must be considered in terms of the possible extremes of use. It must be durable and strong for use in light industrial application but could just as easily be an office structure. It must take advantage of natural lighting and ventilation by considering orientation and organization. Common spaces for multiple uses will be:

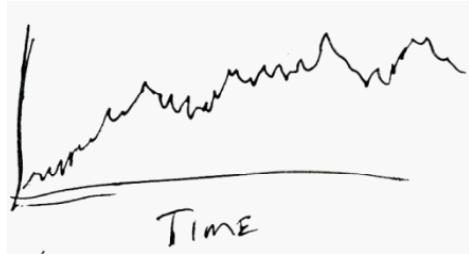
Vestibule

Flexible space, 1,000-5,000 square feet

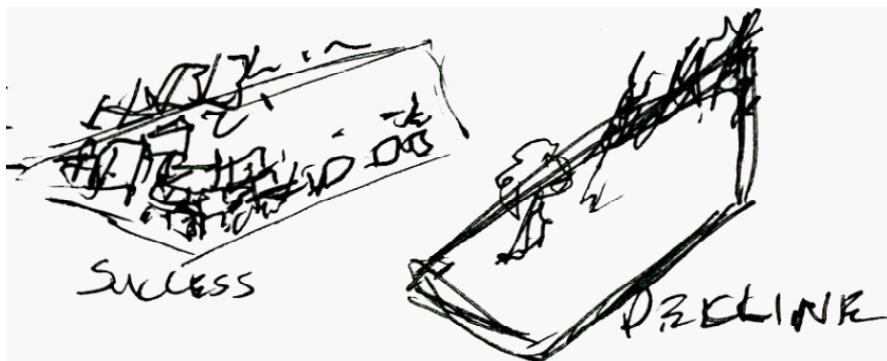
Mechanical

Outdoor public space

Final Design



Duality
Dynamic



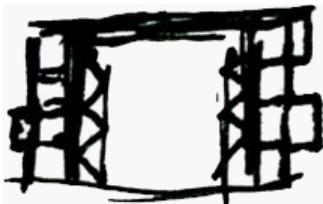
Intentions

Interchangeable
Easily Reconfigured
Completely Disassemble
Versatile
Durable/Renewable

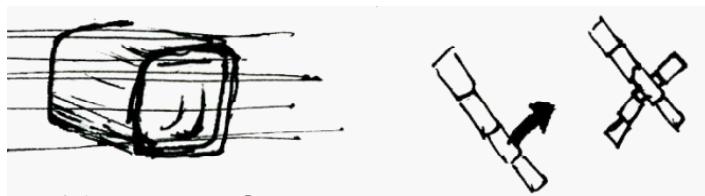
Panels Between Structure



Panels Attached to Structure



Solid Units

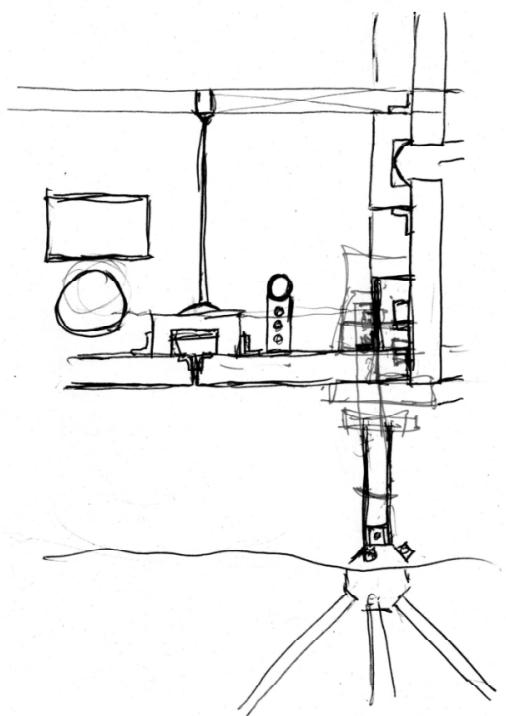
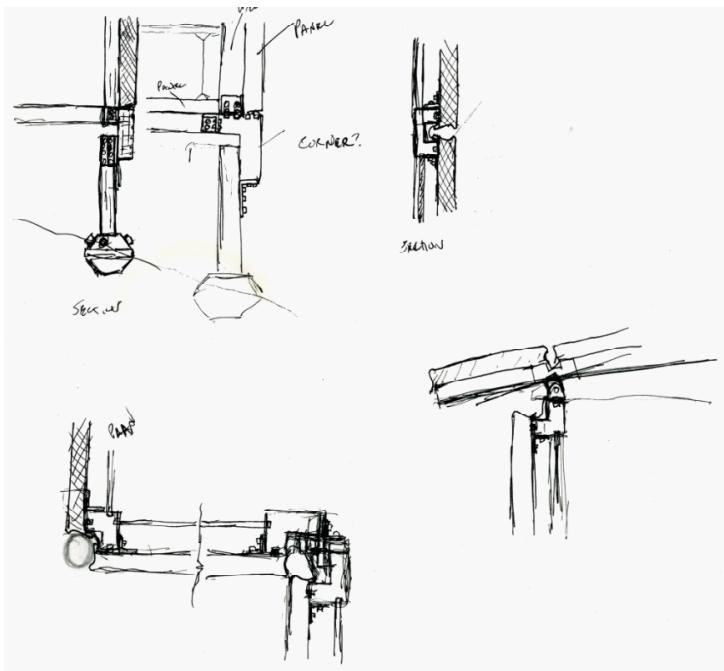
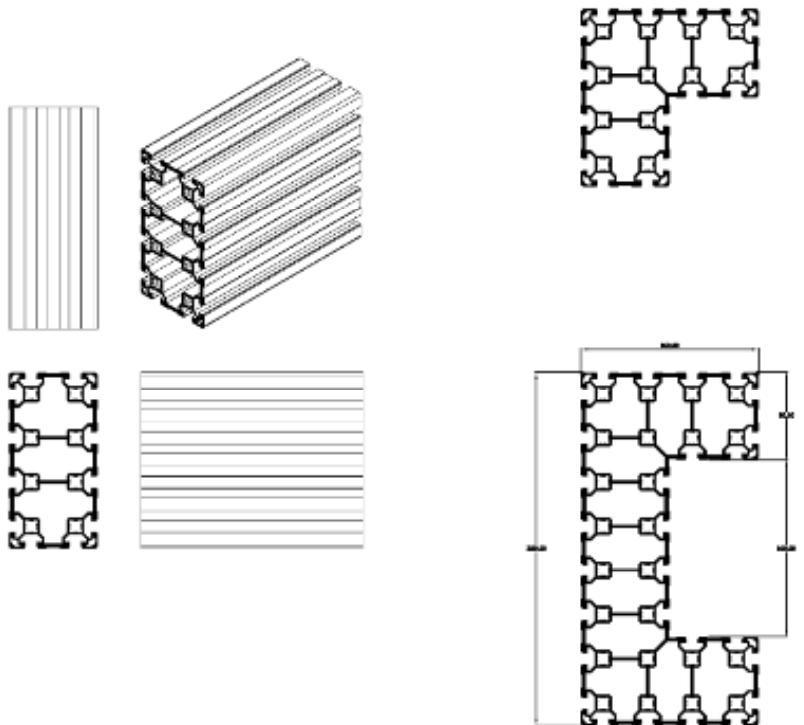


Exterior Structure



Process:

Rexroth Aluminum Framing



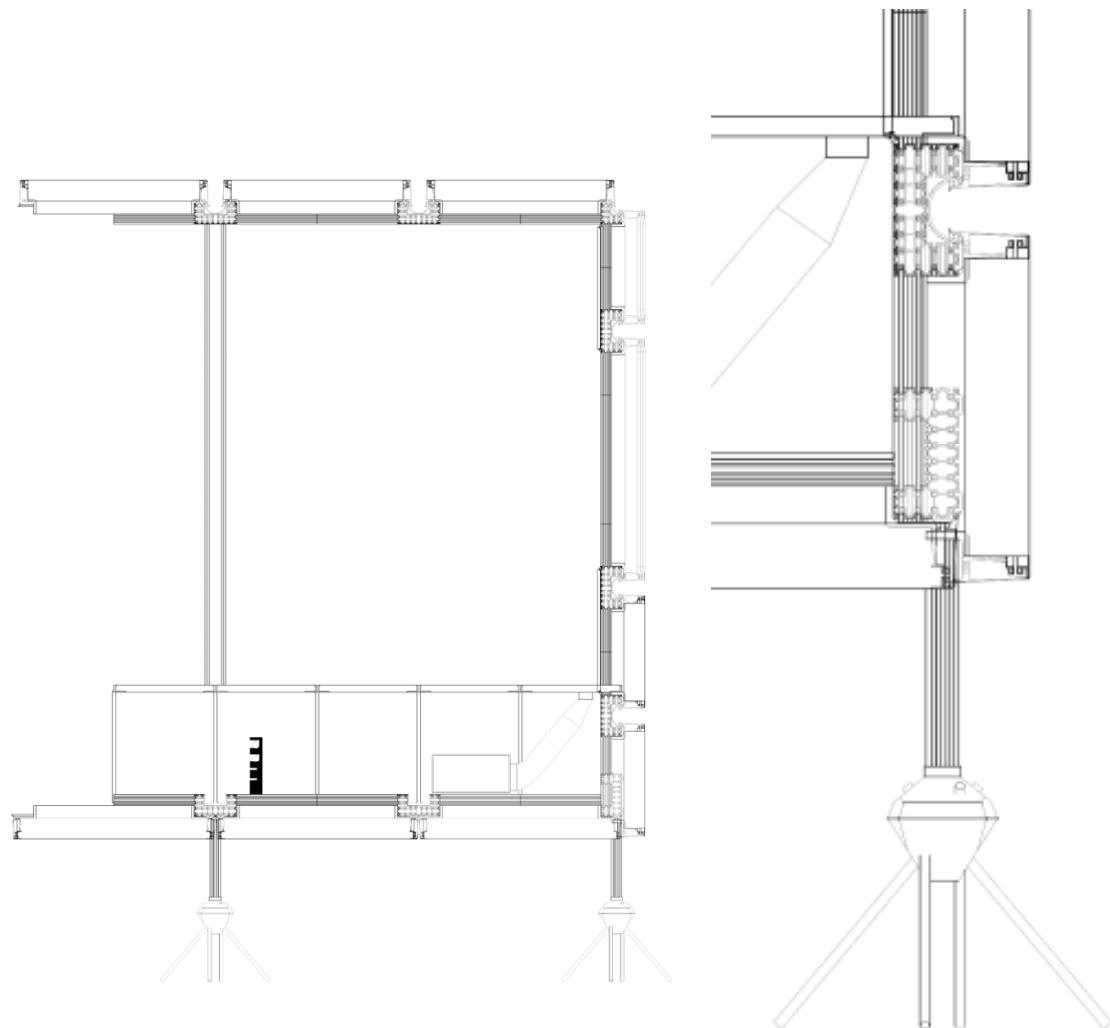
Final Design

Catalog of Parts:



Final:

Details:



Final Design

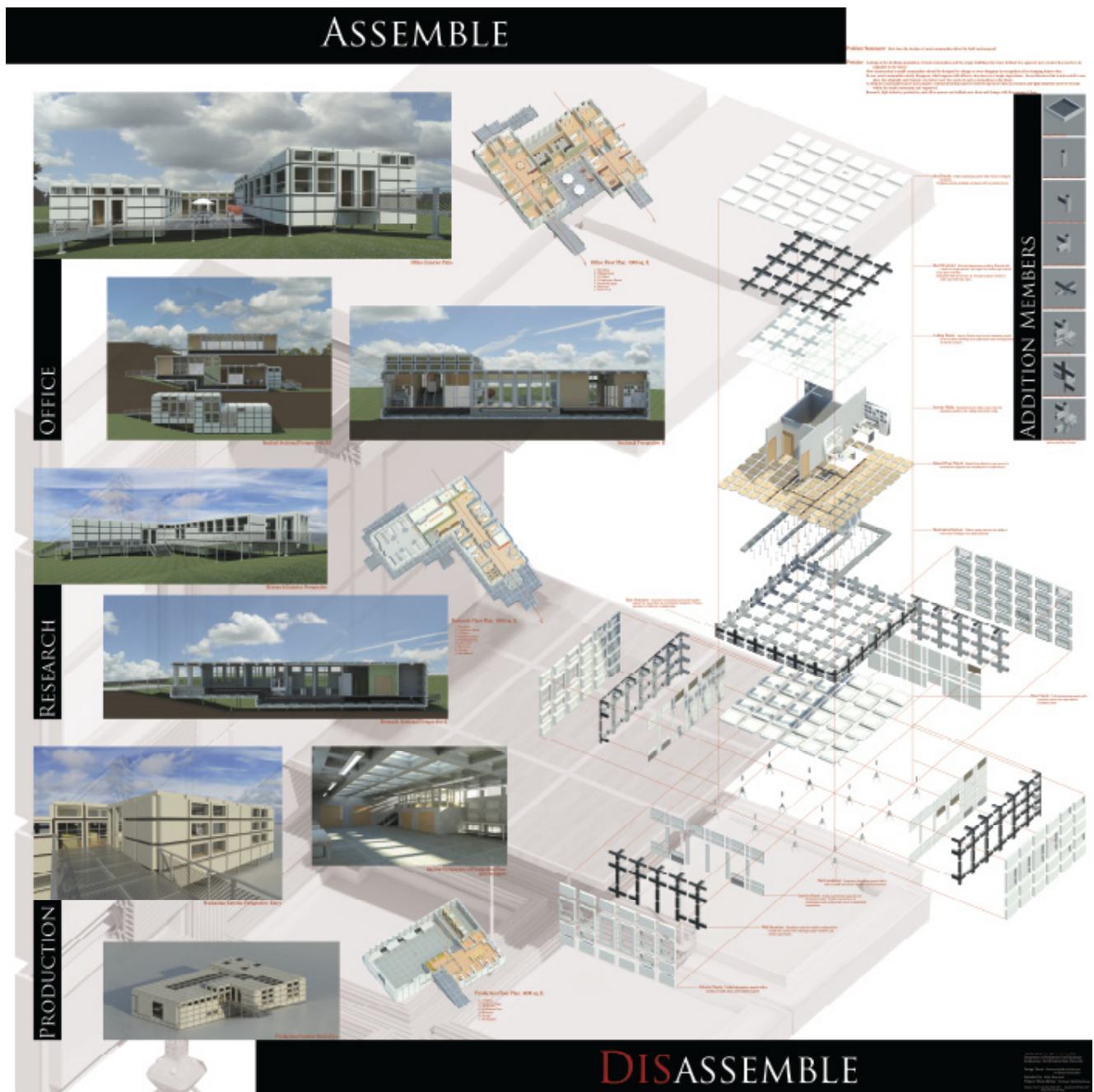
Master Plan:



Model:



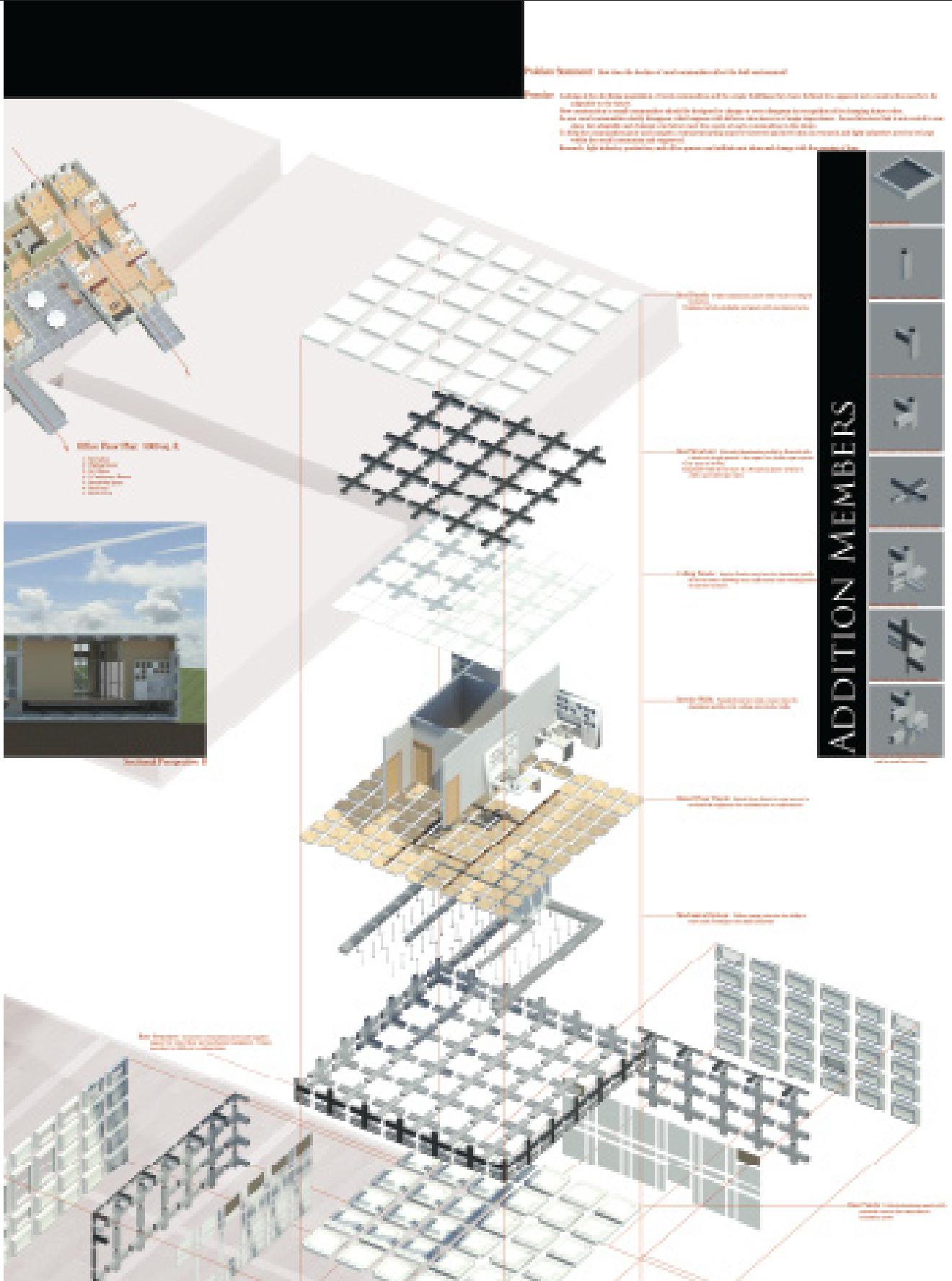
Final Boards:



Final Design

ASSEMBLE



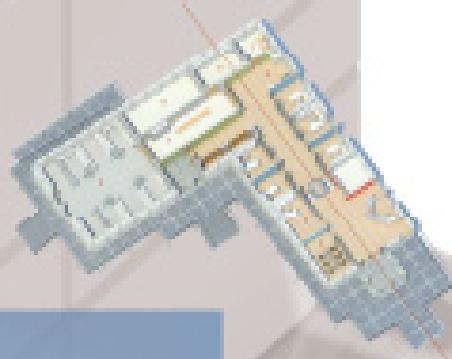


Final Design

OFFICE



RESEARCH



Research Floor Plan 400' x 80'

PRODUCTION



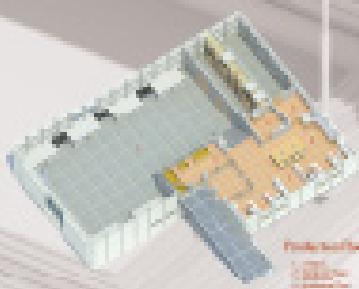
Production Facility Facade



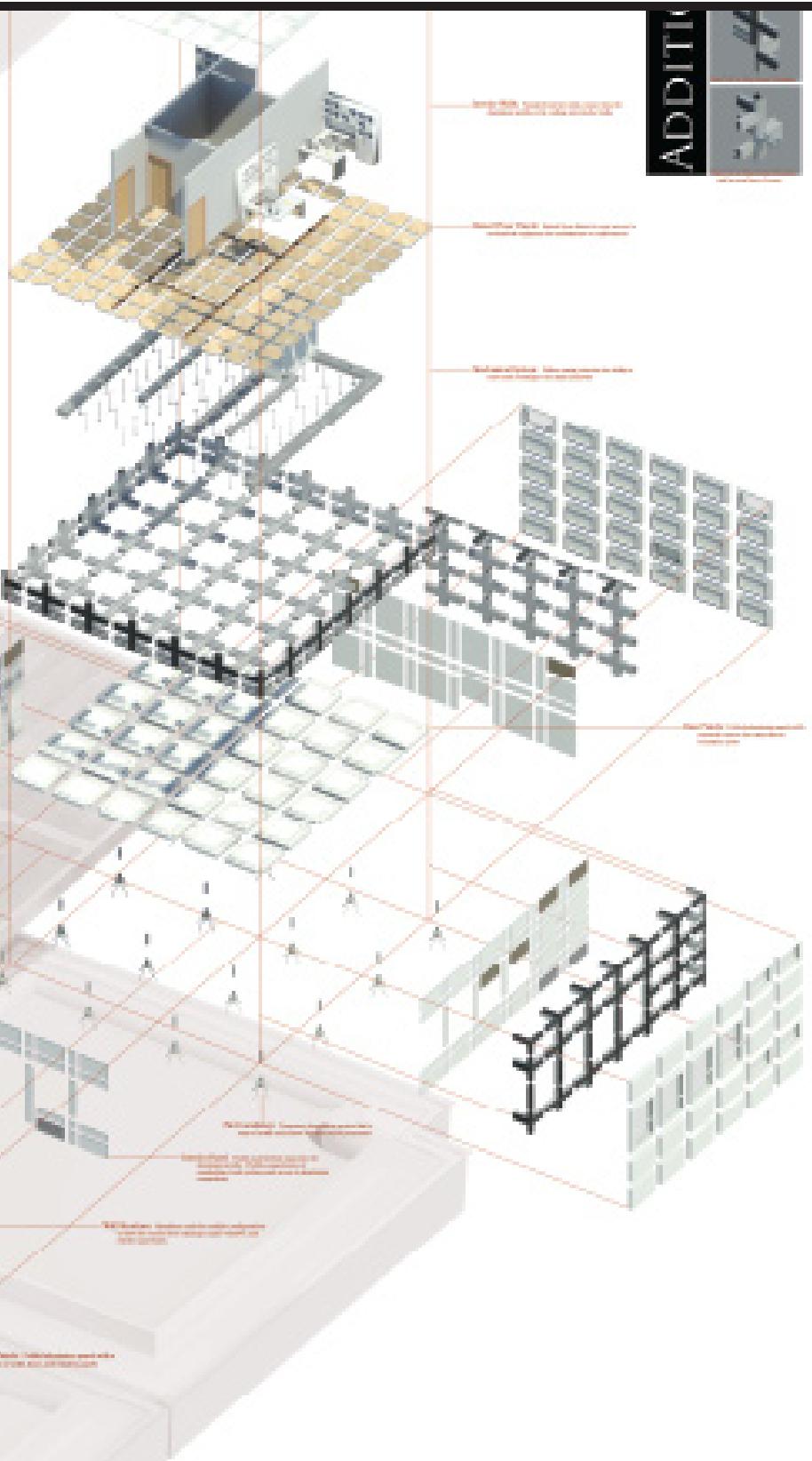
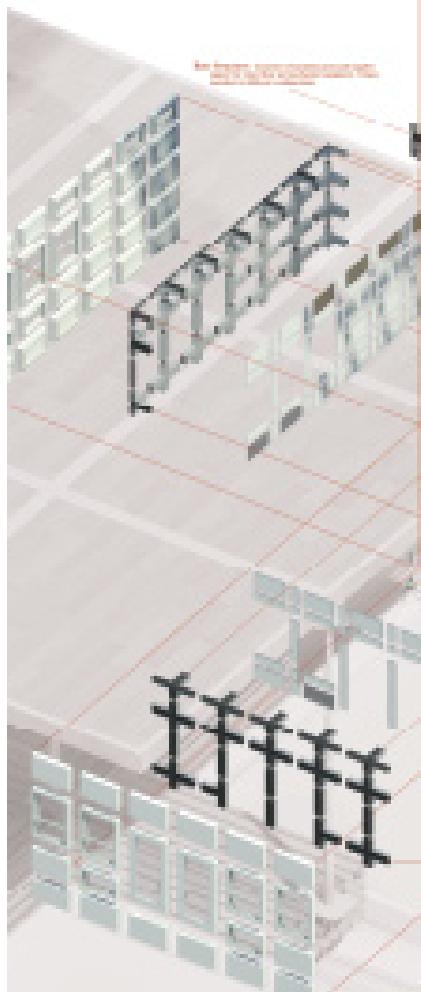
Production Facility Production Hall



Production Facility Side View



Production Floor Plan 300' x 80'



DISASSEMBLE

DISASSEMBLE
Design: David Mertens, Alexander
Kolodkin, Ilya Kuznetsov
Project: David Mertens, Alexander
Kolodkin, Ilya Kuznetsov
Foto: David Mertens, Alexander
Kolodkin, Ilya Kuznetsov

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“NDSU gave me a great beginning to what I hope to be a constantly rewarding career.”

