PODS & MODS

Modularity as a Response to the Skills Gap

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Modularity as a Response to the Skills Gap

A design thesis submitted to the Department of Architecture and Landscape Architecture of North Dakota State University.

by

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In partial fulfillment of the requirements for the Degree of Masters of Architecture.

PRIMARY THESIS ADVISOR DATE

THESIS COMMITTEE CHAIR DATE

MAY 2018
FARGO, NORTH DAKOTA

Table of Contents

THESIS PROPOSAL

Thesis Abstact

PODs & MODs focuses on vocational trades schools, design build programs, entrepreuneurial maker space startups, modular shipping container builders and the manufacturing industry to investigate the issues companies are facing to meet current employment demands and the ways in which design build and modular, skills-based learning envrionments can become a solution to equip tomorrow's youth and decrease the American skills gap.

The Narrative

Image by: Bureau of Labor Statistics

[1]According to the U.S. Department of Labor Statistics, America's skilled labor force; carpenters, welders, stone masons, timber framers, plumbers, electricians, skilled manufacturers and more have declined by nearly six million jobs since the year 2000. Economic pressure and the low cost of making goods overseas resulted in an outpouring of our large manufacturing industries to other countries with our nation reaching its lowest recorded employment during the 2008 recession. The good news is that almost a decade later we have

1 (Torpey, 2014)

"The popular conception about China is that companies come to China to do business because of low labor costs. However the truth is China stopped being the nation with the lowest labor costs many years ago. That is not the reason to come to China from a supply point of view. **The reason to come to China is because of the skills and the quantity of skills in one location.**"

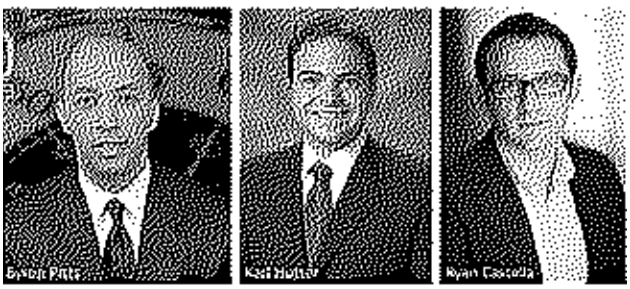
Tim Cook, Apple

seen the number of manufacturing jobs gradually increase.
(see Figure 1)
But America's primary issue is no longer just 'growth', however, the issue has shifted to what many in the manufacturing and trade related industries refer to as "The Skills Gap". As manufacturing and trade companies have grown, so have their problems finding reliable, qualified individuals who can fill one, out of thousands and possibly millions, of the open positions currently available today (see Figure 2).

For example, [2]in 2012 Byron Pitts of CBS News interviewed both Karl Hutter, the Chief Operating Office of Click Bond Inc. and Ryan Castella (Head of Strategic Initiatives) to discuss the issues their company is facing with the growing skills gap and their ability to fill open positions. Karl expressed a large frustration that many of today's manufacturing and vocational trade companies are dealing with, "We can't find enough students who are interested in pursuing these trades.

Maybe because to them it seems hard or there is a requirement to do math, but I don't know why we can't find people to fill these positions." On another note, Ryan expressed a deep concern he had for the quality of applicants he sees that have proven themselves unable to perform simple tasks like; properly structuring sentences on a resume without major grammatical errors. In Ryan's opinion, he is unwilling to hire people to operate multi-million-dollar equipment, which is critical for manufacturing parts to military jets, if applicants can't excel at basic math and writing skills. However, [3]in response to the growing skills gap, companies like Click Bond are acknowledging that they must invest

2 (News, 2012)



3 (Giffi et al., 2015)

more resources into training programs and apprenticeships that can train and educate either unemployed or underqualified workers to do the jobs these companies will need to keep up with future market demands.

American culture has increasingly devalued and degraded blue-collar work and therefore continues to persuade individuals to pursue college degrees and incur massive amounts of student loan debt at the expense

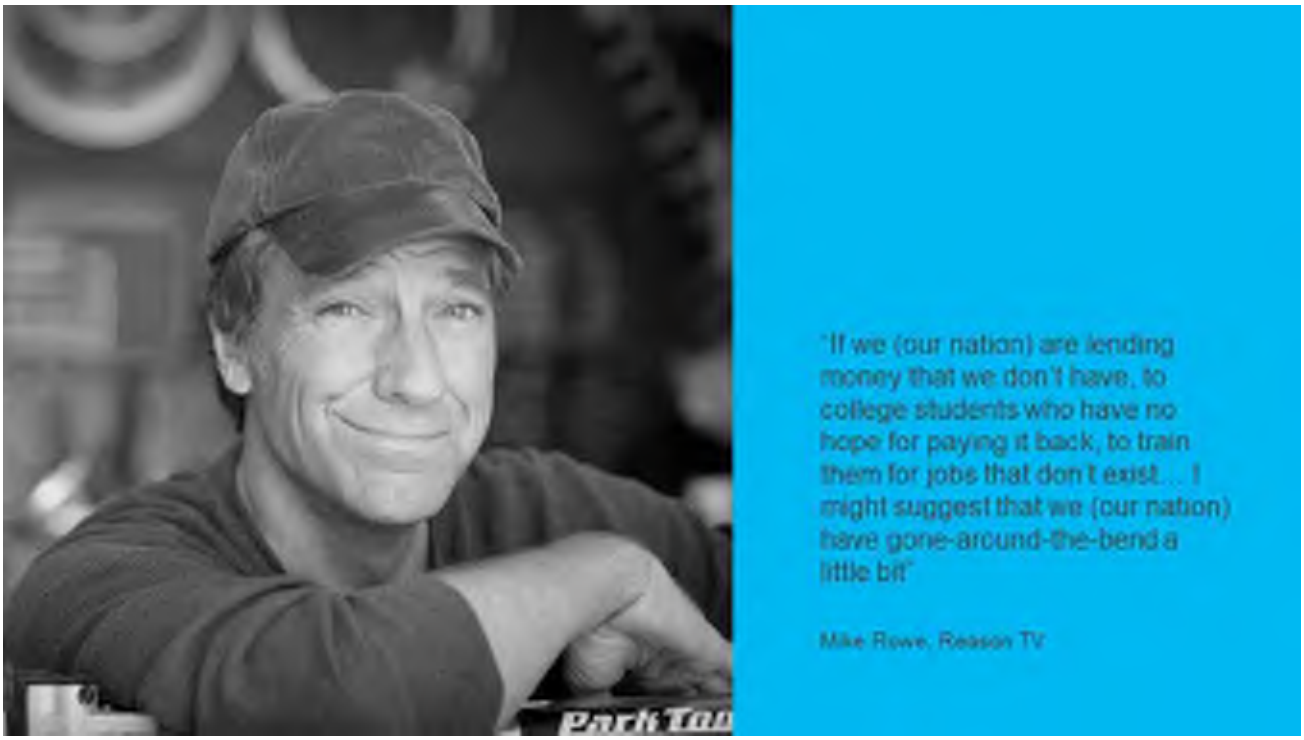
Another rising voice in the vocational trades, whom has become very acquainted with blue-collar America via his show "Dirty Jobs" on Discovery Channel, is Mike Rowe. Rowe has begun touring the nation to raise awareness about the skills gap and to explain how he believes our culture's [4]'war on work' has contributed to an entire generation overlooking well paid, high quality vocational or manufacturing careers for a seemingly over glorified four-year diploma. [5]In an interview hosted by ReasonTV, Nick Gillespie poses this question, "We are doing everything we can to push every kid toward a four-year college, what is wrong with that?" Rowe believes of skilled, physical jobs the country depends on to produce many of its products. Many of these jobs Rowe adds do not require a degree at all yet are healthy well-paid careers. Rowe stated, "If we are lending trillions of dollars, to students who have no hope for paying it back, to train them for jobs that clearly do not exist, I might suggest we have gone-around-the-bend." Nevertheless, it is a fault of our American view of blue-collar jobs that continues to influence kids that happiness and opportunity are only attainable via higher education.

[6]To further explain Rowe's position, he draws on a personal experience in which a former high school counselor

4 (T. T.-M. Rowe, 2009)

5 (M. Rowe, 2013)

6 (M. Rowe, 2013)



had advised him to adhere to the motto "Work Smart NOT Hard". This advice implied that it was below Rowe's potential to consider a 'subordinate' career path instead of going to college. Fast forward several decades Rowe has decided this motto ought to have said "Work Smart AND Hard" implying that there is nothing wrong with a college degree, nor is there anything wrong with pursuing a career in blue-collar work that might take you to a technical/vocational school, welding certification program, apprenticeship, or even straight into the workforce. Ultimately, Rowe would seem to assert that manufacturing and trade industries would begin to rise in popularity as American's began to have open and honest discussion with kids about the opportunities and benefits a trade job can offer as an alternative to the current four-year institution.

So statistically we know that there has been a major decrease in manufacturing jobs over the past half century due to the economy, though in recent years it is on the gradual climb (see Figure 1). We also know that there is a problem called the [7]'Skills Gap' which primarily is a result of the following things; 1) [8]a talent shortage 2) [9]a cultural perception of trade jobs that tends to devalue vocational work. But according to new research

7 (Giffi et al., 2015)
8 (Giffi et al., 2015)
9 (Giffi, Rodriquez, & Mondal, 2017; M. Rowe, 2013)

found in [10]"The Skills Gap in U.S. Manufacturing", a survey reported in 2015 by the Manufacturing Institute and Deloitte, the manufacturing industry is faced with what it might consider to be its biggest problem contributing to the skills gap…[11]retiring baby boomers leaving the workforce. Companies are expecting to suffer from major shortages not only related to the number of employees available, but more specifically to the number of 'highly skilled' and experienced craftsmen that will operate in place of those master tradesmen expected to leave for retirement. As a result, there is an increasing urgency for companies and skilled trades organizations to pass down generational knowledge and expose younger workers to the experiences they will need to simply maintain existing production demands. [12]As Ryan Castella describes it during his CBS interview, "You have a massive wave of Baby Boomers who are leaving the workforce very soon, and we must replace those folks, and that isn't even talking about growth!" To further complicate things, reports indicate the lack of STEM (science, technology, engineering and mathematics) skills among workers, and, a decline of technical education programs in public high schools are also key contributors to the growing skills gap.

Now in my view these are complicated issues and there seems to be mixed opinions on who is responsible for picking up the slack and training the next generation. [13]For example, there are many companies who recognize their need to invest into the future workforce to ensure their own survival. These companies have begun partnering with local universities and community programs to fund training courses and apprenticeships that will assist in the development for them. [14]Other companies maintain the view that the burden lies solely on high schools and higher education to provide the skilled labor needed.

10 (Giffi et al., 2015)
11 (Giffi et al., 2015)
12 (News, 2012)
13 (News, 2012)
14 (News, 2012)

Project Typology

My project evolved a lot through the research and design process. Initially the typology was a skills-based educational design build campus that was going to provide temporary housing, building pads, recreational facilities, and other facilities needed for building and fabricating. However, halfway through the thesis process many factors led me to believe that a transportable, modular shipping & stacking system might be a better option. Therefore, the typology of the building / solution is much closer to a **transportable modular kit-of-parts used for constructing skills based learning environments.**

Typological Research

The following are precedent studies I had looked into prior to shifting the design toward a modular solution. Below are projects that helped me understand larger campus layouts and programmatic needs for design build, as well as, skilled trades education.

1) Rural Studio
2) 804 Studio
3) Red River College - HTTC Building

The final set of typological studies are much more representative and relateable to my end design. These projects, especially N.I.M.B.Y. Ponyride & Urban Boat Builders, gave me some urban examples of successful maker space and modern skilled trade enviornments being used to educate or employ future makers. N.I.M.B.Y. Hoonigan Racing & Royal Wolf do the best at showcasing how versatile a shipping container can be in making a variety different size working spaces & interesting overhangs or connections between spaces.

1) N.I.M.B.Y
2) Ponyride
3) Urban Boat Builders
4) Hoonigan Racing HQ
5) Royal Wolf HQ

Photo by: University of Auburn Rural Studio

Fabrication Pavilion

ARCHITECT: Auburn Rural Studio
LOCATION: Newbern, Alabama
AREA: 7,210 sq.ft.
STRUCTURE: Wood & SIP Panels
PROJECT STATUS: Completed 2015

Intro

Designed by Auburn University's 2015 Rural Studio participants, the Fabrication Pavilion succeeds at proving design build architecture can be a holistic learning process that not only produces fine architecture but also can develop students with real world experience to the building and fabrication of their designs. Under the guidance and empowerment of professional mentors, this project was chosen based on its scale, it's purpose, and method of construction. I am confident this project could influence my building type based on its; programatic and functional similarities, similar proportions in scale and most importantly the constructability of such a structure by inexperienced labor.

Research Findings

The Fabrication Pavilion is a combination of an enclosed woodshop with an open air pavilion that acts similar to a manufacturing warehouse in its use. Though the finshed images don't depict this yet, the intended use of this pavilion is to host full scale mockups, or finalized build-outs of projects the Rural Studio expects to design in the future.

There was every intention to build a space that was large enough to accomodate multiple building projects under a single roof, while also allowing clearances under the designed roof trusses for small scale and large scale equipment to be maneuvered without creating cramped spaces.

Not to be ovelooked, much thought was given to the placement and design of the loading dock as well, specifically in relation to its location near the adjacent street. The loading dock is a place of high traffic that has been carefully designed to streamline the operation of receiving and sending items on and off the build site.

Though simple looking in section, the asymetrical design of the roof bents was intended to serve several functions. First, the lower side of the bent regulates heat gain and light glare from the hot southern sun. Second the tall side of the bent serves as both a functional requirement to shed water while conceptually providing a relational dialogue between the front face of the pavilion and future building projects located on the interior of the campus.

The conceptual underpinnings of this project seem relatively simple, and potentially even obvious in terms of how to construct a pavilion with a woodshop. However I think there is more complexity and value to this project when one acknowledges the implications, challenges, and experiences that the students and professionals would undergoe executing a project like this.

In my experience, it is unique for professionals across many disciplines to sit cooperatively in a room and discuss the detailing and design concepts of a project with the collaborative goal to achieve a high quality design that does not ignore both the educational opportunity provided to expose students to real world design limitations, and at the same time not compromising creative enginuiety at the guise of engineering complexity.

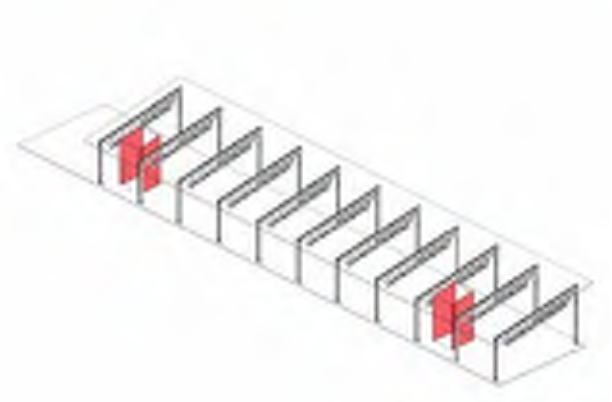


Image by: Auburn Rural Studio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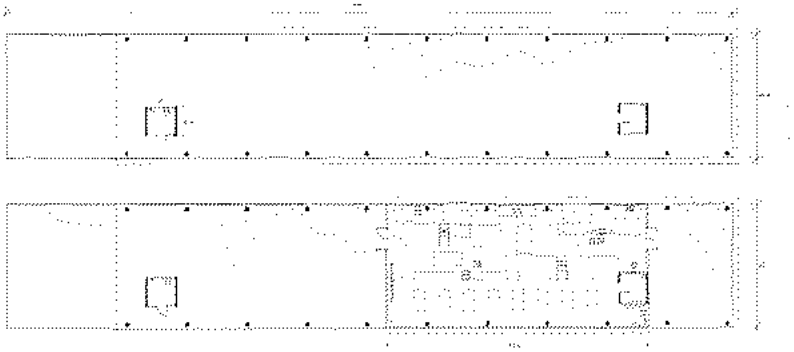
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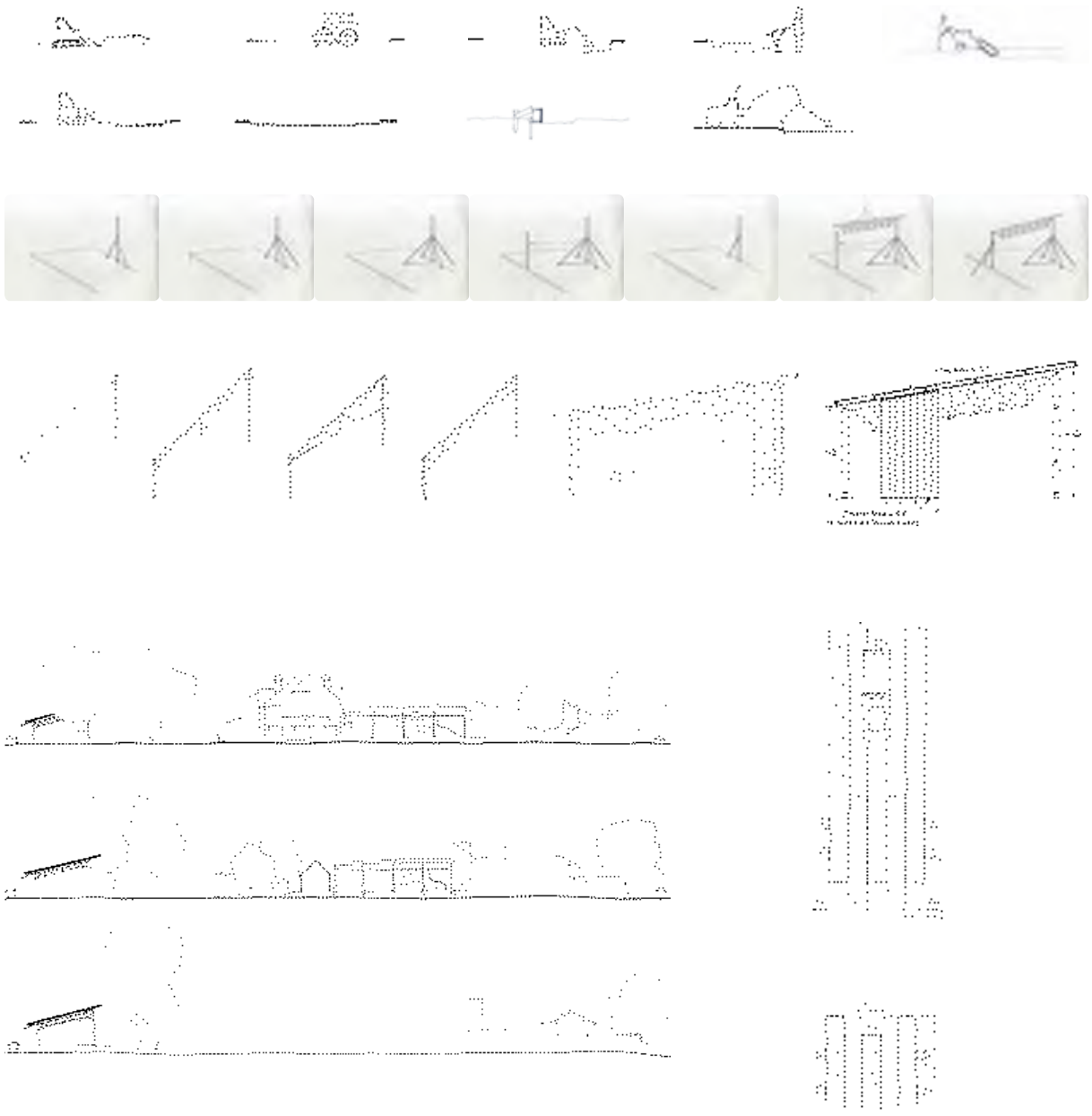


All Images by: Auburn Rural Studio

Conclusion

The Fabrication Pavilion is a great example of a design build process that expands a group of student's understanding in construction, via a skilled based learning experience, complete with intergenerational, cross disciplinary mentorship. The project successfully employs repetitive, yet inventive building concepts that take advantage of cheaper building materials and methods of constructing those materials. This in turn allows mentors and students to focus their efforts in the education and development of basic carpentry, concrete pouring, roofing and finish construction skills to be exercised during the build process.


Image by: Dan Rockhill & 804 Studio

1301 New York

ARCHITECT: Dan Rockhill & Studio 804
LOCATION: Lawrence, Kansas
AREA: 2,000 sq.ft.
STRUCTURE: Wood
PROJECT STATUS: Completed 2015

Intro

Designed by Kansas University's 2015 804 Graduate Studio participants, the 1301 New York Residence is an example of a high quality design build project that was capable of achieving LEED & Passive House certification standards while also exposing students to real world construction methods via hands-on apprenticeship styles of learning. This project could directly influence my proposed typology as I acquire insight into the building's form, energy consumption, and design build process.

Research Findings

The 1301 New York residence is an exceptional project built by students that showcases premium design details and material selections, within a clean and straightlined form, resulting in a beautifully modern engergy efficient home.

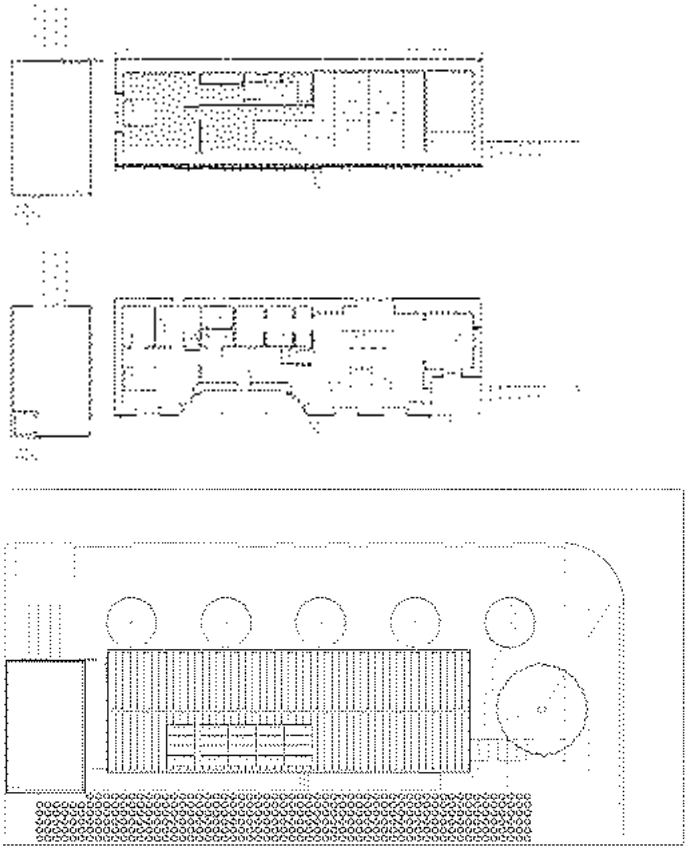
It is my expectation that this home could serve as a model to design permanent housing on my proposed site for both a full scale home that owners might live in, and, smaller scale temporary cabin like quarters that might host the more temporary trade professionals that visit the site.

Speaking of the site, Dan Rockhill and the students of 804 studio really picked a unique site for their build. This location used to be home to a corner gas station and had even left the old gas tanks burried underground. This was a unique hurdle to overcome, but the removal and repurposing of the old gas station site, in combination with its proximity to downtown, proved to be two major components contributing to the homes LEED Certification Status.

The home was oriented on the narrow site based on standard solar and winter heating factors. Though the lot overlooked the street to the North and the East, it was critical for heating purposes to reduce northern wall penetrations from windows and therefore built the entrance and porch to the southern side.
Continuing design strategies that employed green building concepts the team sought to achieve high r-value wall systems that would manage heat gain and heat loss throughout the seasons. Dan Rockhill advised students to triple the amount of required insulation and place most of the wall penetrations on the southern wall.

Finally the project employed the use of solar panels to provide working electricity for the home. The end result is a highly crafted home producing zero carbon footprint on the environment.

Programmatically the home boasts 2,000 sq.ft and has plenty of room for two bedrooms, two and a half bathrooms, a main living and kitchen space, a study that doubles as a third bedroom, a loft and assorted closets and mechanical spaces. The form, iconic of Dan Rockhill, resembles the sophisticated simplicity of a traditional gabled roof structure, similar to the style of Hugh Newel Jacobsen.



Images by: Dan Rockhill & 804 Studio

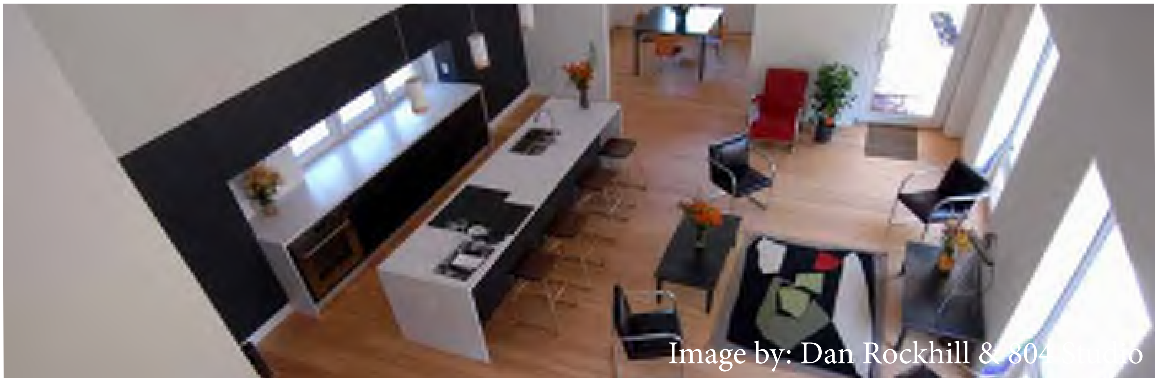


Image by: Dan Rockhill & 804 Studio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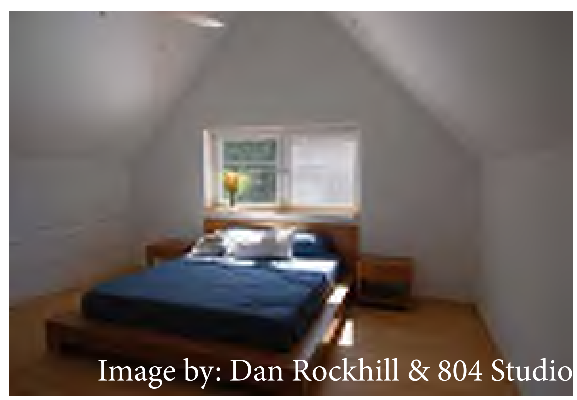
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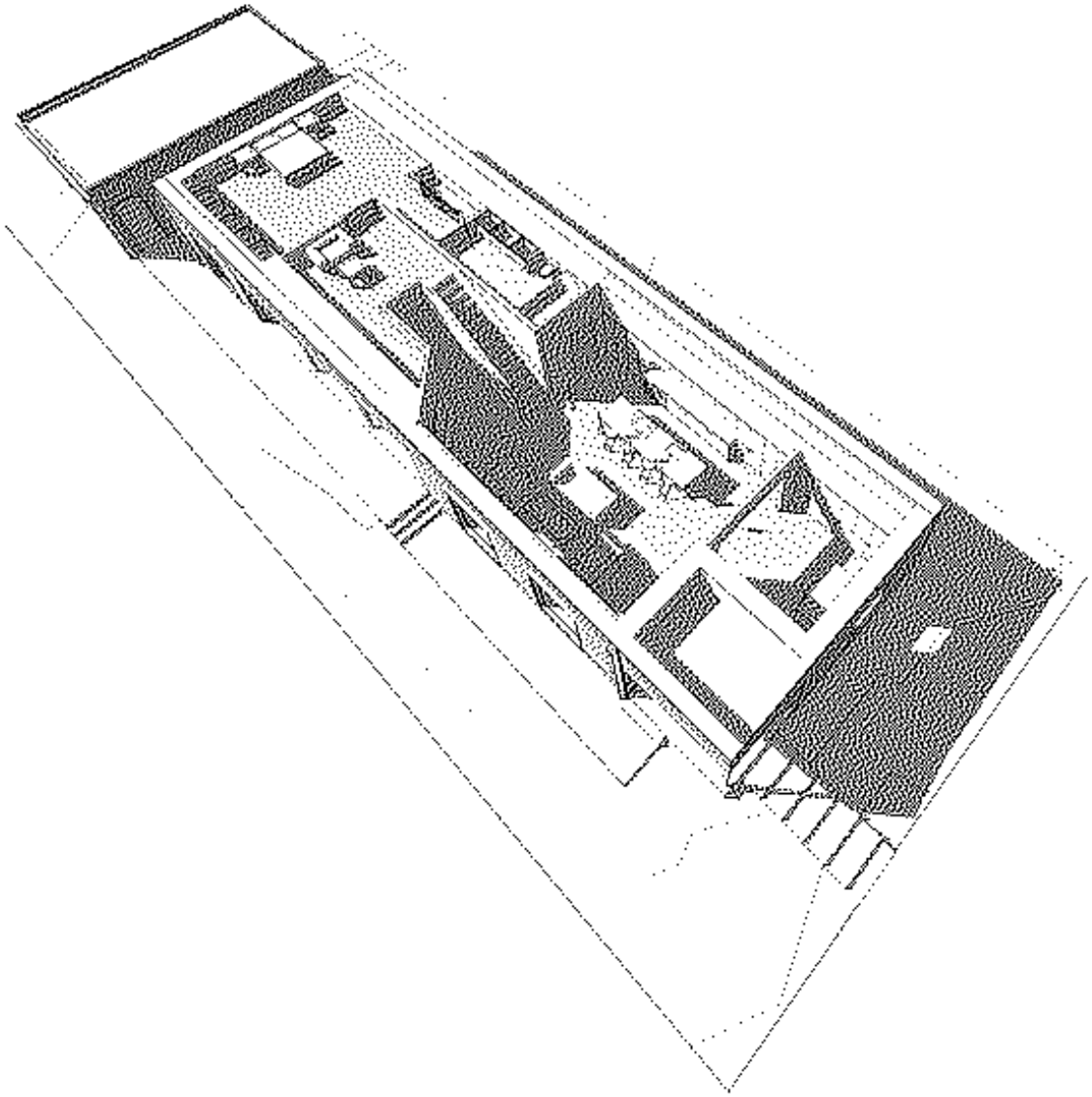

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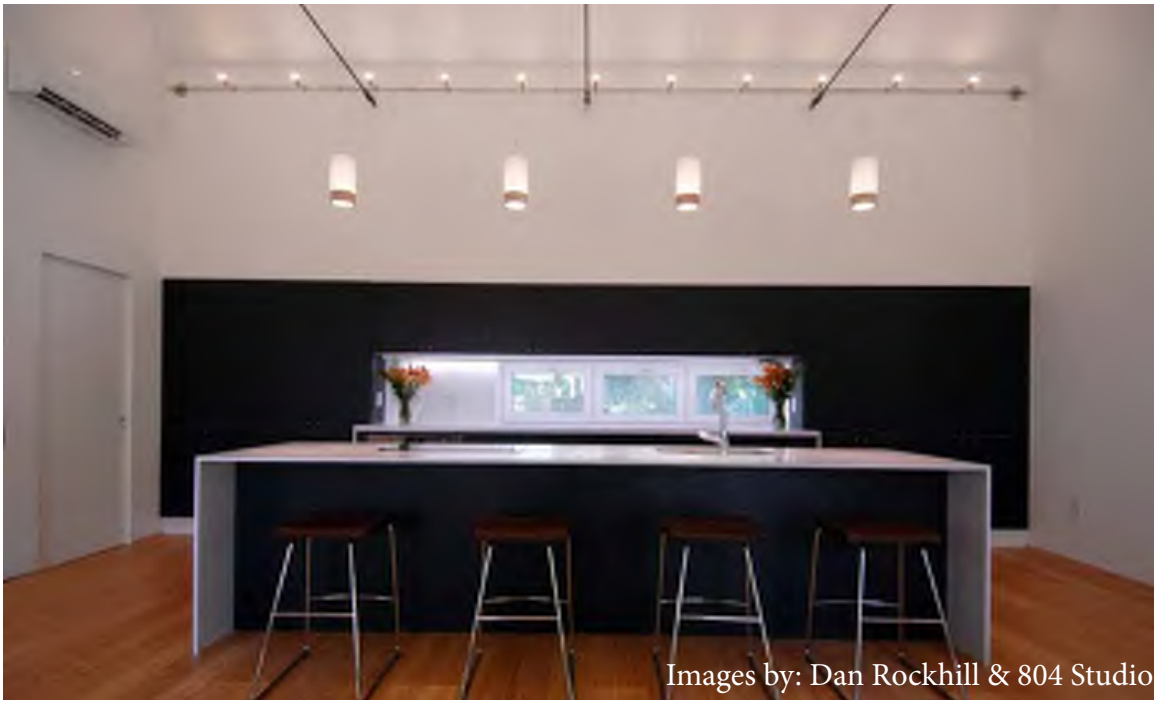

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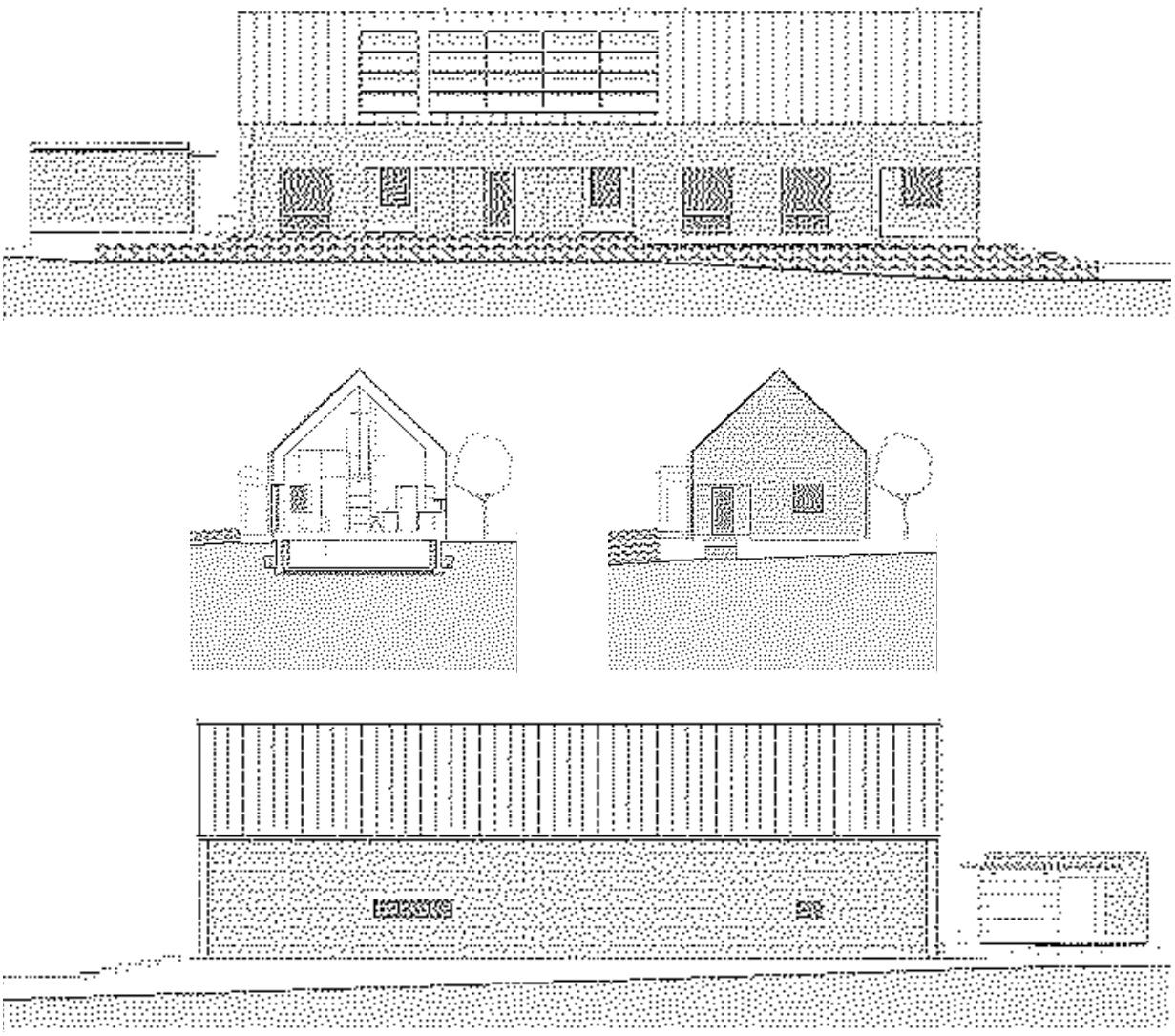

Images by: Dan Rockhill & 804 Studio

Conclusion

The Residence at 1301 New York is a great example of a student executed design build project, well advanced in its resources and design standards, that likewise expands a group of student's understanding in construction, via a skilled based learning experience. The project successfully employs simple, yet sophisticated building details to maintain a relatively simple structure to build that resonates intentionality and beauty, while remaining highly functionl in nature. Being able to educate students on industry leading building technologies are critical if we hope to maintain momentum in energy conservation and pioneer a future where students invent even better ways to improve our planet.

Images by: Red River College & Number TEN Architectural Group

Red River College STTC

ARCHITECT: Number TEN Architectural Group & Ager Little Architects
LOCATION: Winnipeg, MB, Canada
AREA: 102,000 sq.ft.
STRUCTURE: Wood
PROJECT STATUS: In Construction

Intro

The Skilled Trades & Technology Center (STTC), currently under construction and scheduled for completion in 2018, will be a brand new addition to the Red River College - Notre Dame Campus. This facility will accommodate up to 800 students each year in high-demand trades such as carpentry, sheet metal, electrical, refrigeration, machining, manufacturing and HVAC. I have chosen to study this project to learn how colleges are tackling the skilled labor gap, and the resources required to do so, through their future designs and campus masterplans. I would expect this project to influence my overall masterplanning strategy as I investigate the types, scales, and relationships of spaces required to foster environments for higher levels of learning.

Research Findings

Number TEN architects clearly defined the major themes of their masterplanning process; 1) Establish the 'heart of campus' 2) Integrate and design in response to the natural environment 3) Establish a modernized building aesthetic with forms and spaces that appeal to, and encourages future enrollment of aboriginal students.

The overarching masterplan of this three phase addition was intended to link existing classrooms together with a unifying center to the campus, add new housing, but most importantly build a total of 200,000+ square feet of skilled trades and technology based resources.

The architects organized modules consisting of; (4) high-bay workshop and (6) low-bay workshops that would then be replicated eastward across the campus away fromt he new central core. The goal was to abut the newly designed warehouse floors to the major passing roads, allowing the university to show off student work displayed throughout the eastern window fronts.

Five main modules, and other varied versions, would be seperated by wide circulation spaces on three sides to allow ample room for students and services to circulate in and around the warehouse/classroom floors.

Other major concepts discussed in the master plan involved primarily in developing lots of intersectional space for students and faculty to engage one another outside of the classroom. There was a specific desire of the college to encourage relationship building across disciplines to hopefully further advance exploration of the building trades based on a variety of perspectives and expertise.

Images by: Red River College & Number TEN Architectural Group

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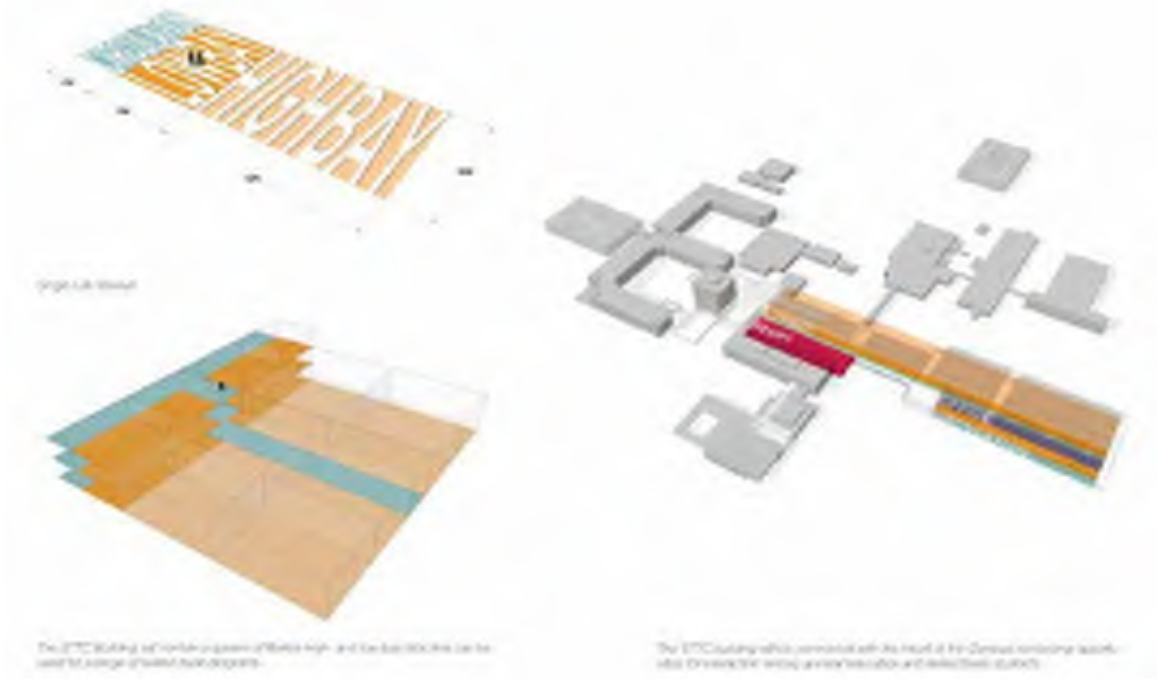

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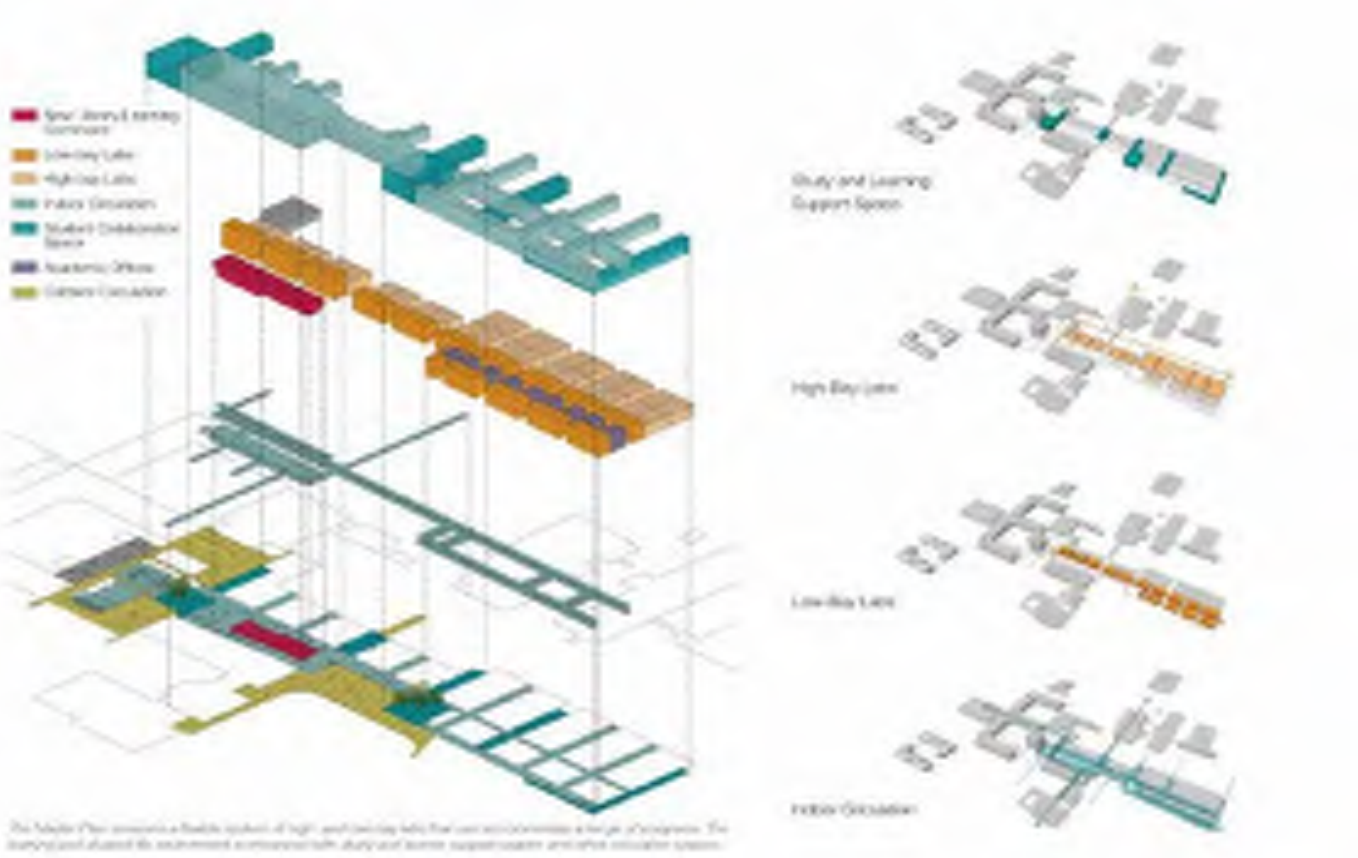


Images by: Red River College & Number TEN Architectural Group

Conclusion

The Red River (STTC) is a great example of modern resources, spaces, and techniques future minded colleges are implementing to attract and engage the young professionals of tomorrow. Number TEN has established some core principles I think will assist in the masterplanning process of a skills trade oriented camp. First, identify the culture of people you are looking to attract and establish an design methodology that would appeal and engages those people. Second, establish the heart of campus. Third, if looking to design multiple spaces, define the square footage requirements and establish a module that can achieve the program needs. Fourth, integrate circulation and servicing lanes for equipment and delieveries that do not interfere with the flow of campus. And finally, integrate multiple breakout spaces, casual lounging spaces, collaborative spaces that promote intergenerational and cross disciplinary conversation.

Precedent Analysis (Initial Concept)

Although these three case studies are not an exhaustive list of cases that apply to my project, I did select these cases for a specific reason. Though different in terms of their scale, programming and function, they all are examples of environments tailored for skills based learning and the handing down of vocational knowledge through the excersise of constructing.

Rural Studio's Fabrication Pavilion showcases student designers taking advantage of general market materials in a unique way by working with engineers to customize special details used to create their bents. They then applied a repetitive design language over the span of a massive working slab to house both a woodshop and mockup space. This is a useful case for exploring the ideal building type, scale, and layout of a smaller design build organization.

804 Studio's residence in Lawrence, Kansas displays simplistic forms with sophisticated energy design. Harnessing the power of solar panels and heat management from specialty windows, this design build raises the standard that student led projects could be expected to produce, especially as professionals implement industry leading technologies into their design build curriculms.

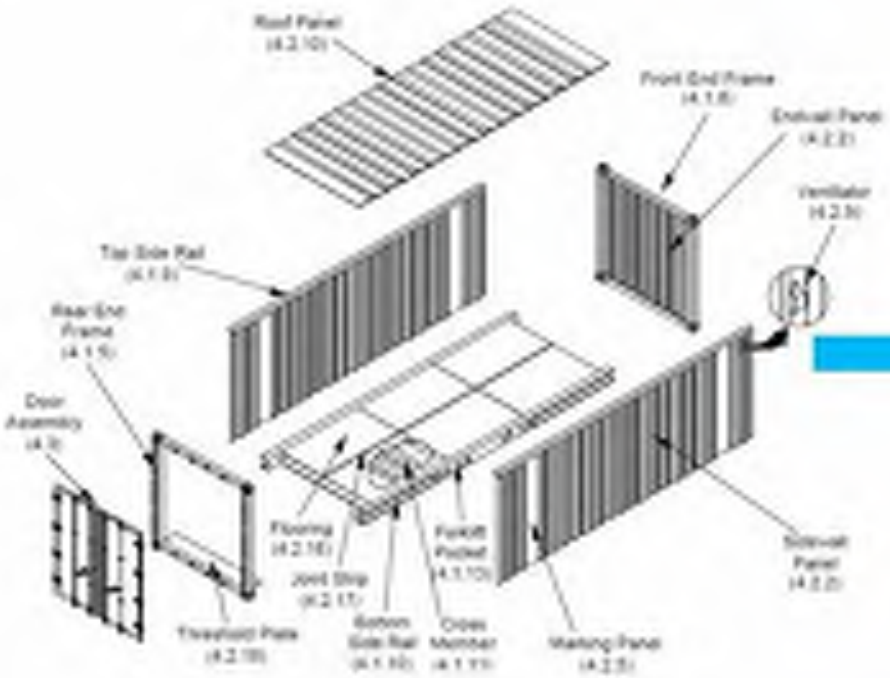
Red River College Skills Training and Technology Center (STTC) is a perfect investigation of how modern colleges are reshaping their campuses to integrate skills based learning envionrments and resources while at the same time maintaining a quality of life, through design and the built environment, that is appealing to the next generation of students.

These projects have provided some useful design strategies, both on a large scale and a small scale, that will be extremely important in the development of a future project.

Masterplan

Building

Details



Building

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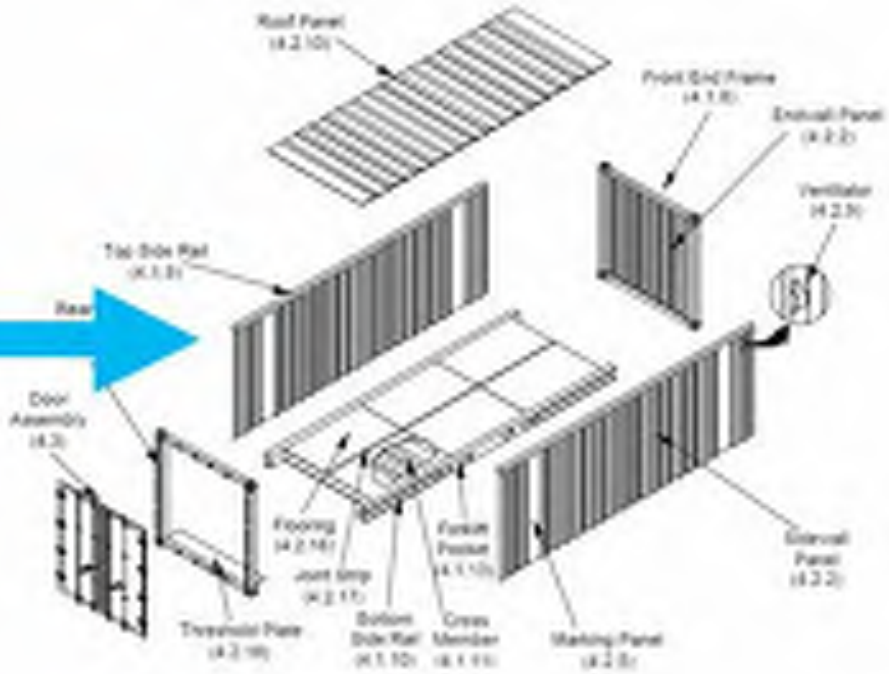


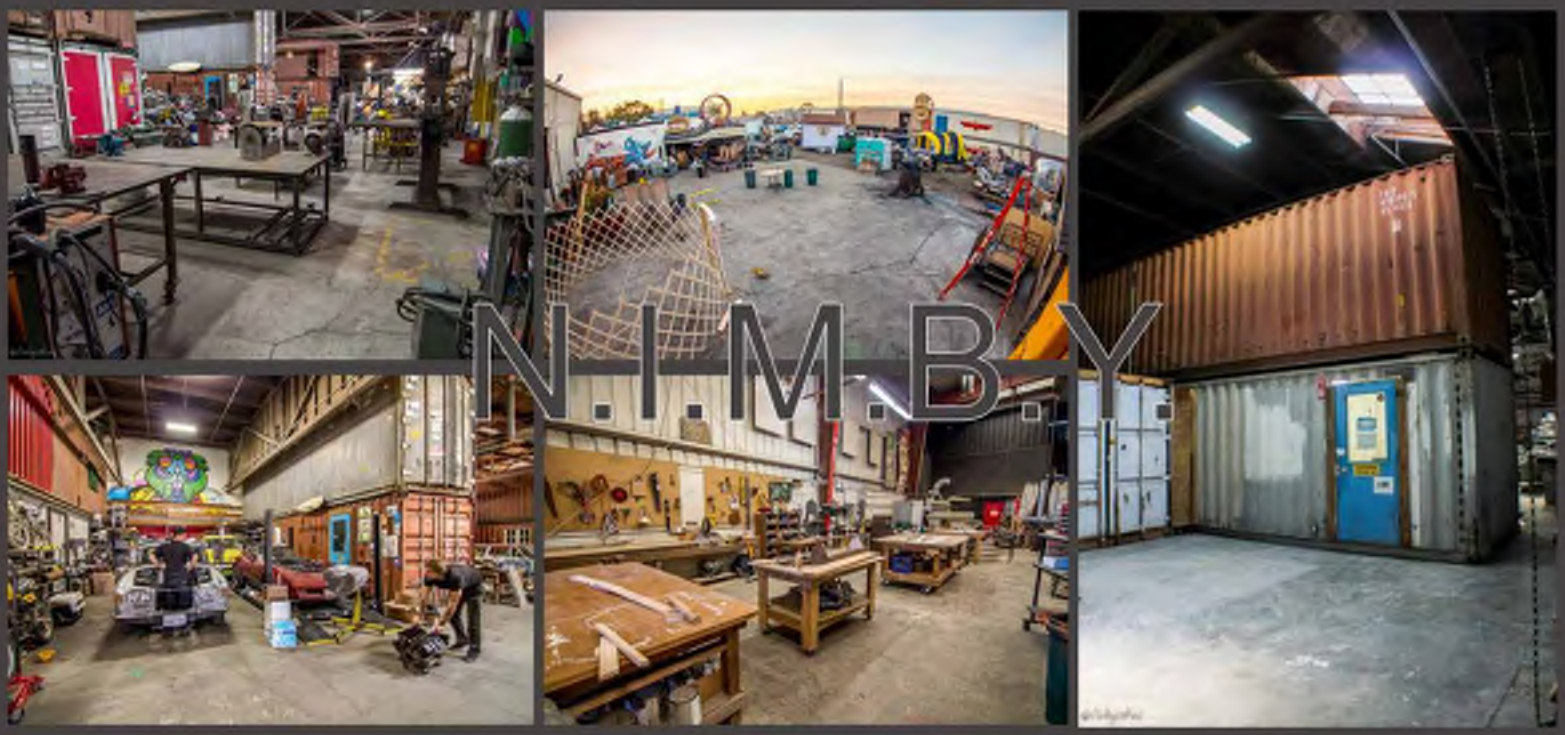
Masterplan

N.I.M.B.Y.

This space is a 28,000 SF warehouse located in Detroit, MI. The owner of this space rents out to hundreds of tenants. The space is quite unique and perfectly suited for a large variety of tenants and uses. The overall intent is to provide working spaces for makers and the way it is achieved in this building is by partitioning spaces using shipping containers and walls.

This becamse very interesting to me because I found that many of the tenants were highly attracted to this space because of its great ability to connect all different types of makers, to other makers, with open and collaborative spaces.

I used this as a model for form and space making and did a lot of spatial studies to determine the scales at which public, private, and collaborative spaces needed to be.



Ponyride

This space is an old 33,000 SF abondoned warehouse that was renovated into an open concept collaborative space which tenants rent at super cheap prices. The intent of the building was to provide large spaces and basic resources to young startups and entrepreneurs located in Detroit, MI who were looking to start or maintain a business at low costs. The space prides itself on being highly collaborative with multiple different tenants sharing the same spaces, highly adaptable to the tenant needs, and very cheap in comparison to other options.

I used this project to determine the scales, dimensions, and uses for certain spaces and how those helped makers be able to do their daily functions.

Urban Boat Builders

Urban Boat Builders is an program located in the twin cities that educates and trains troubled youth in the art of boat building. Apprentices are taught all the skills needed to design and build their very own boat or canoe.

This project was a great example of an urban program that aimed to equip youth with practical skill sets needed in todays working world while at the same time addressing a large issue in providing mentorship to unreached and disadvantaged youth.

This building helped me to determine the size of a typical large woodshop facility and the equipment needed to go in it.

Hoonigan Racing HQ

Hoonigan Racing HQ is a unique space! Here I was particularly interested in the spatial forming aspects of the project as well as the aesthetics.

Built under the covering of a large metal building, the shipping containers are stacked and shifted to create large communal areas, mid-sized conference areas, smaller break-out spaces, and even private offices. The project excells at blending spaces into one another in a compelling way that does not appear stagnate and hyper restricted to the confines of a shipping container.

In other words, the project does a great job at using overhangs, overlaps, shifts, and stacking to create a variety of defined large, medium, and small spaces that truly make for a dynamic and uniquely immersive experience.

Royal Wolf HQ

Royal Wolf is a company out of Australia that specializes in modular shipping container designs. Shown belw is an image of their office headquarters built out of modular shipping containers.

Royal Wolf served as an aesthetic, as well as, a structural guide for my project by helping me to see what were some possible solutions currenlty in existence.

Royal Wolf also has a line of single shipping container units modified to be shippable workshops. These helped me to justify, design, and identify the elements I would need to develop my own shipping container modules / PODs.

Precedent Analysis (Revised Concept)

After studying the previous case studies I found that there are some legitimate opportunities and strengths showcased in these urban maker spaces / craftsman spaces.

N.I.M.B.Y, Hoonigan HQ and Royal Wolf really helped me see the potential that shipping containers could have to create dynamic spaces of various proportions. And the only reason that this is of particular interest to me is because I am needing to identify a method in which I can (1) create space of all different types, uses, and scales using a small module (or shipping container) that has structural properties, and, (2) identify the form or space making techniques that is making these spaces so attractive to younger generations.

These projects help to identify the collaborative open office space concept that is becoming very popular to younger generations while at the same time revealing many of the technical aspects required to modify a shipping container into a useable space. For example, Royal Wolf showcases how they were able to modify containers so that mechanical systems, electrical systems, and even plumbing systems are all operable within the framework of a shipping container(s).

The following is a list of design principles I took away fromt these projects and intend on implementing into my final design:

1) Create highly collaborative spaces and community building spaces.

2) Need to also create semi-private and private spaces for smaller groups of people.

3) Take advantage of the shipping containers ability to shift, rotate and stack to create dynamic spaces.

Major Project Elements

The Kit-of-Parts
1) Modular Shipping Containers
2) Connector Pieces
3) Base Grid
4) Structural Frame
5) Ground Condition Frame
6) Decking System
7) Vertical Elements

Programmatic Elements
1) Advanced Robotics Lab & Training Equipment
2) 3D Printing Lab & Equipment
3) Advanced 3D Scanning Lab & Equipment
4) Manufacturing Micro Training Equipment
5) Advanced Data Analytics & Computer Lab
6) Heavy Machinery Simulators
7) CNC, Laser Cutter & Plasma Cutter Equipment
8) Basic Woodshop Facility
9) Basic Metalshop Facility

Other Elements
1) Manufacturing Bay
2) Loading Docks/Areas
3) Dormitory / Temp Housing

Client Description

Rural & Urban Schools
The basic concept is to supply as many schools as possible with the newest, most relevant technologies in leading manufacturing sectors that students can become trained and certified on. This would help students begin careers in manufacturing and provide them with job ready skills coming out of high school.

16-30 Year Olds
Thought he primary targeted client is schools. This system is capable of working on its own and on any site. In fact one proposed site in my thesis is a rural camping site that currently operates as a church retreat camp. The larger idea is that anyone anywhere could order and construct numerous amounts of these containers on their site to create as large a structure they needed to support their various needs. With that in mind many different types and ages of people should and will have access to this solution.

Other Organizations
Other manufacturing, specialty trade & construction related organization looking to expand its manufacturing knowledge could also rent or purchase one of these PODs to their site.

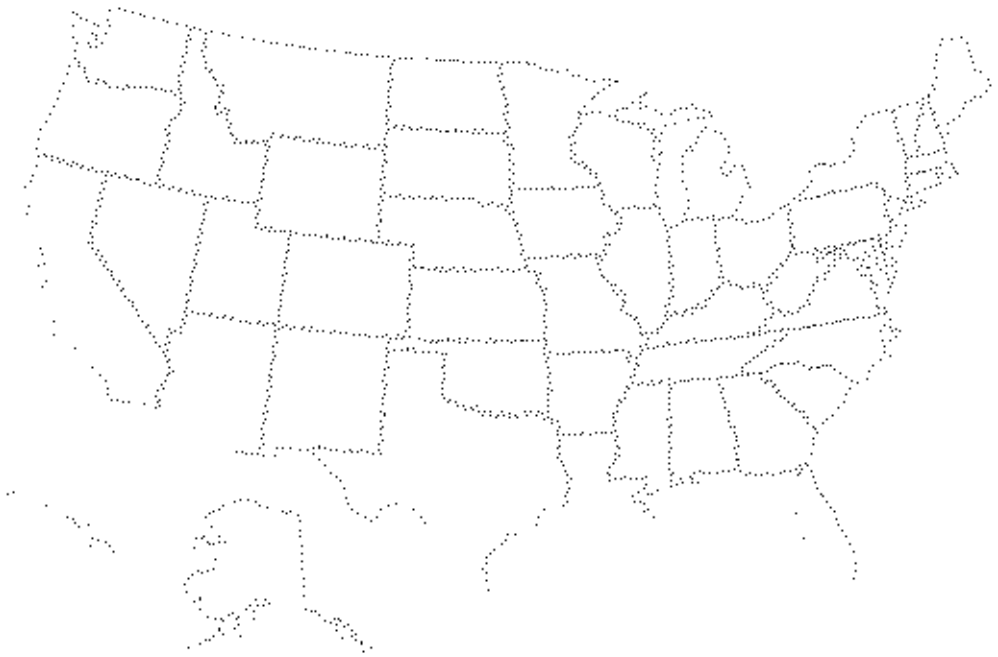
The Sites (Macro Vision)

The graphics on the following few pages represent the larger vision and concept for the project as a whole. Keeping in line with this thinking that the design solution would be modular and transportable so as to service a much broader scope of people across the country, I have developed a series of diagrams to represent the overall vision of how my design solution could operate in various scales.

For example you will see diagrams describing a "large manufacturing base". Here you might see a large quantity of modular PODS (aka shipping containers) assembled into an array of programmatic elements for the purpose of (1) reproducing a high volume of PODs needed for servicing other areas in the country (2) hosting larger volumes and ranges of urban youth for the purpose of skills training and certification programs.

You also will see diagrams describing a "smaller rural manufacturing base". Here you might see exactly the same functions and programs as the larger manufacturing bases located in urban centers, however, these smaller manufacturing bases will serve smaller capacities of people and produce smaller quantitites of PODs. These smaller manufacturing bases will also differ in their setting. These bases will function more like a retreat style camp in a rural area that doubles as a skills based and manufacturing campus. The goal here is to provide a lot of the same resources to rural areas of america while also creating a unique atmosphere surrounded by nature.

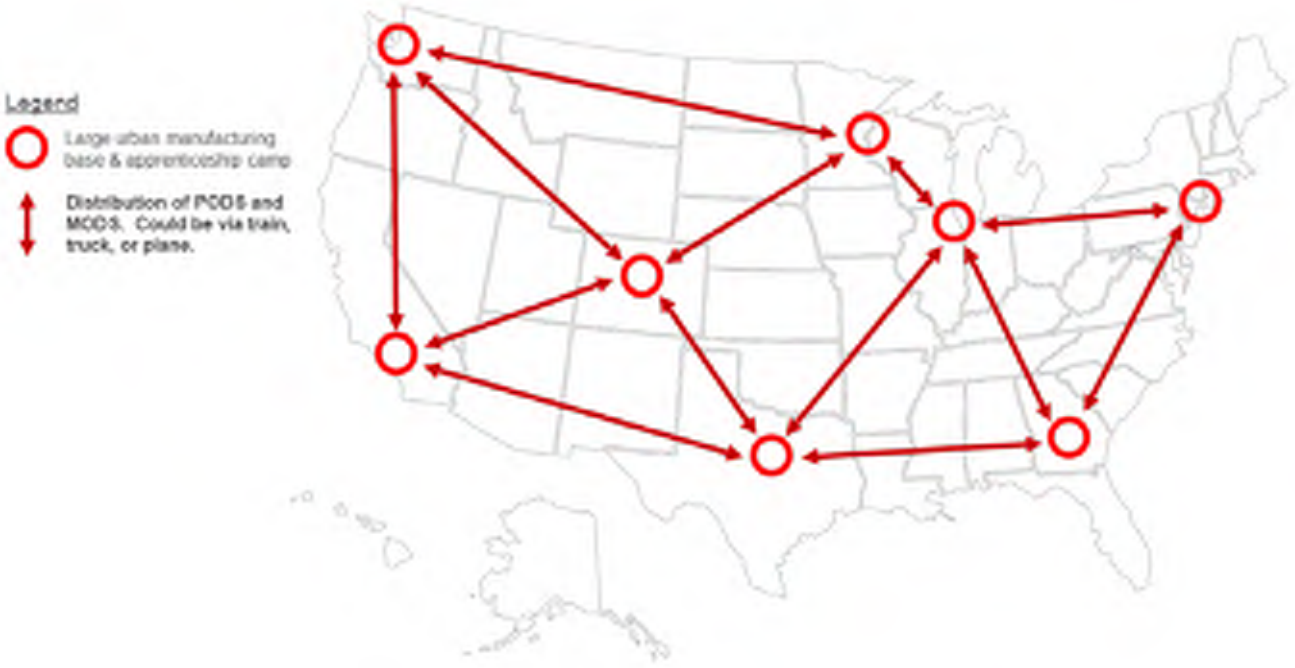
Next you will see graphics representing the possibility of clients all over the country that might could use the PODs on a much smaller scale. And finally you will see the distribution intent between all the differing sites.




Legend
Large urban manufacturing base & apprenticeship camp


Legend
Smaller rural manufacturing base & apprenticeship camp

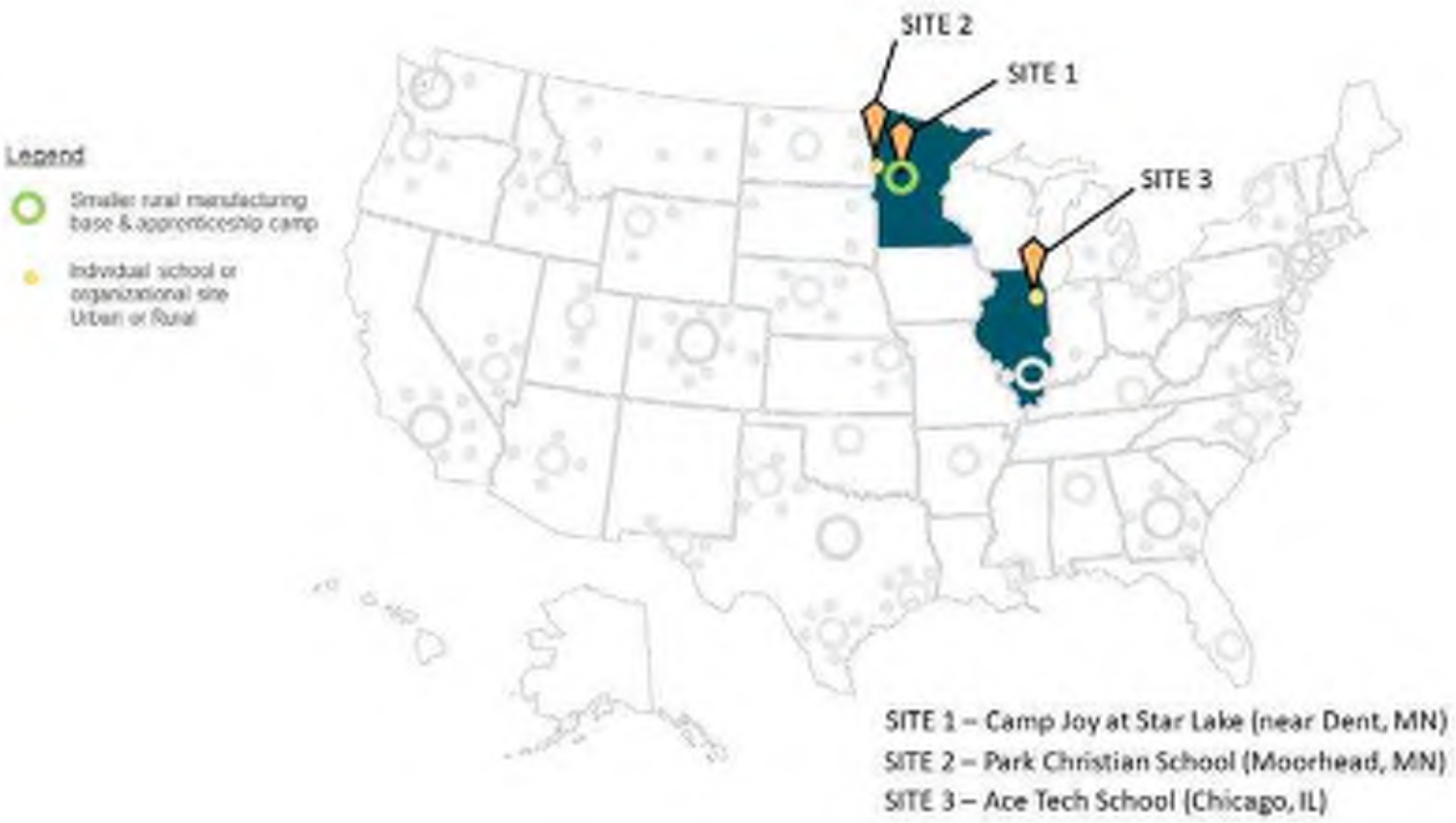

Legend
Individual school or organizational site Urban or Rural


Legend
Large urban manufacturing base & apprenticeship camp
Distribution of PODS and MODS. Could be via train, truck, or plane.


Legend
Large urban manufacturing base & apprenticeship camp
Smaller rural manufacturing base & apprenticeship camp
Distribution of PODS and MODS out to rural bases. Likely transported via trucks.


Legend
Smaller rural manufacturing base & apprenticeship camp
Individual school or organizational site Urban or Rural
Distribution out to these sites would happen primarily via truck and trailer

The Sites



The graphic above represents the three selected sites for my project. I have chosen to work with (1) rural school (1) urban school and (1) rural manufacturing base. The reason for this was to depict the varying scales and applications my design was capable of addressing, and, showcase the ability for my design to adapt both in scale and functionality based on differing site conditions or limitations found between rural and urban contexts. Where the rural schools tend to have more land and are typically capable of expanding or building horizontally across swaths of land, rural and urban schools typically lack this luxury. Therefore choosing a site where I was forced to identify another possible solution, in this case building vertically within a defined boundary (a parking spot), further strengthens my design and solution as a modular system capable of addressing both rural and urban conditions.

Site 1 - Camp Joy Dent, MN


Dent
108
41
Camp Joy

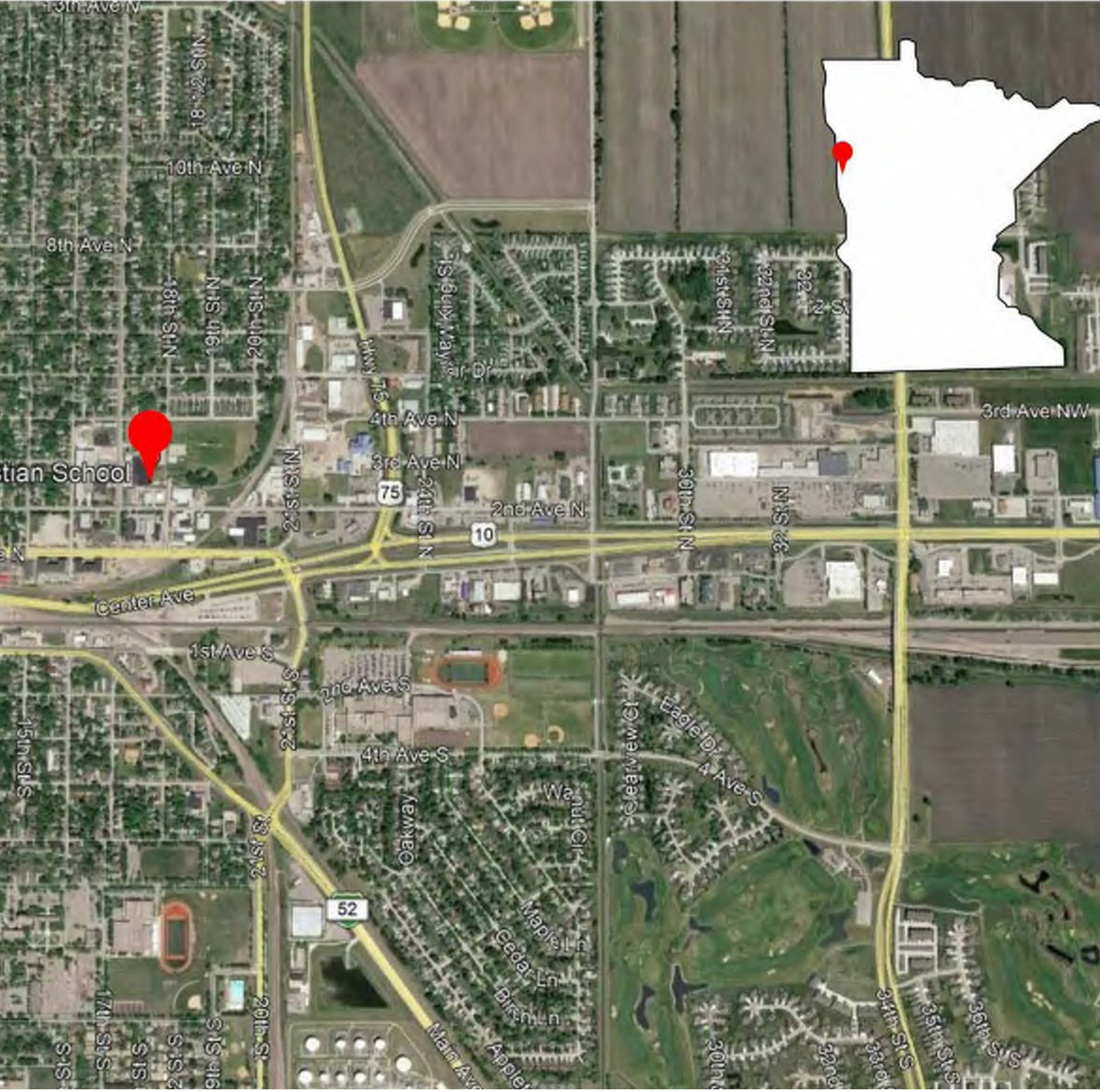
CAMP JOY BIBLE CAMP (near Star Lake)
32521 380th ST. DENT, MN 56528

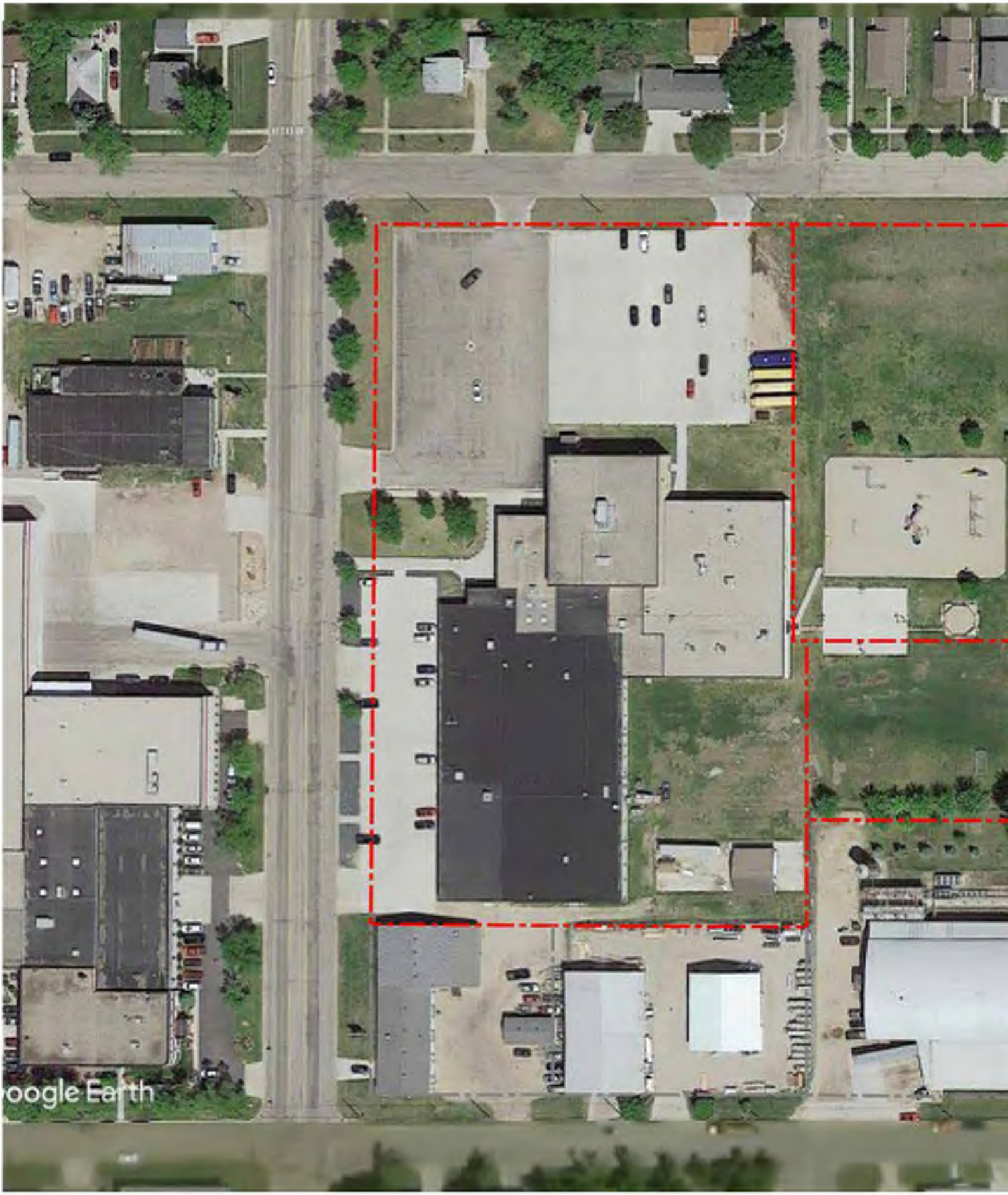
Rura

l Site

0' 50' 100' 200' 300'

Site 2 - PCS School Moorhead, MN


10th Ave N
8th Ave N
4th Ave N
3rd Ave N
2nd Ave N
Center Ave
1st Ave S
2nd Ave S
4th Ave S
3rd Ave NW
Eagle Dr
Oakway
Maple Ln
Cedar Ln
Main Ave
Hwy 75
75
10
52

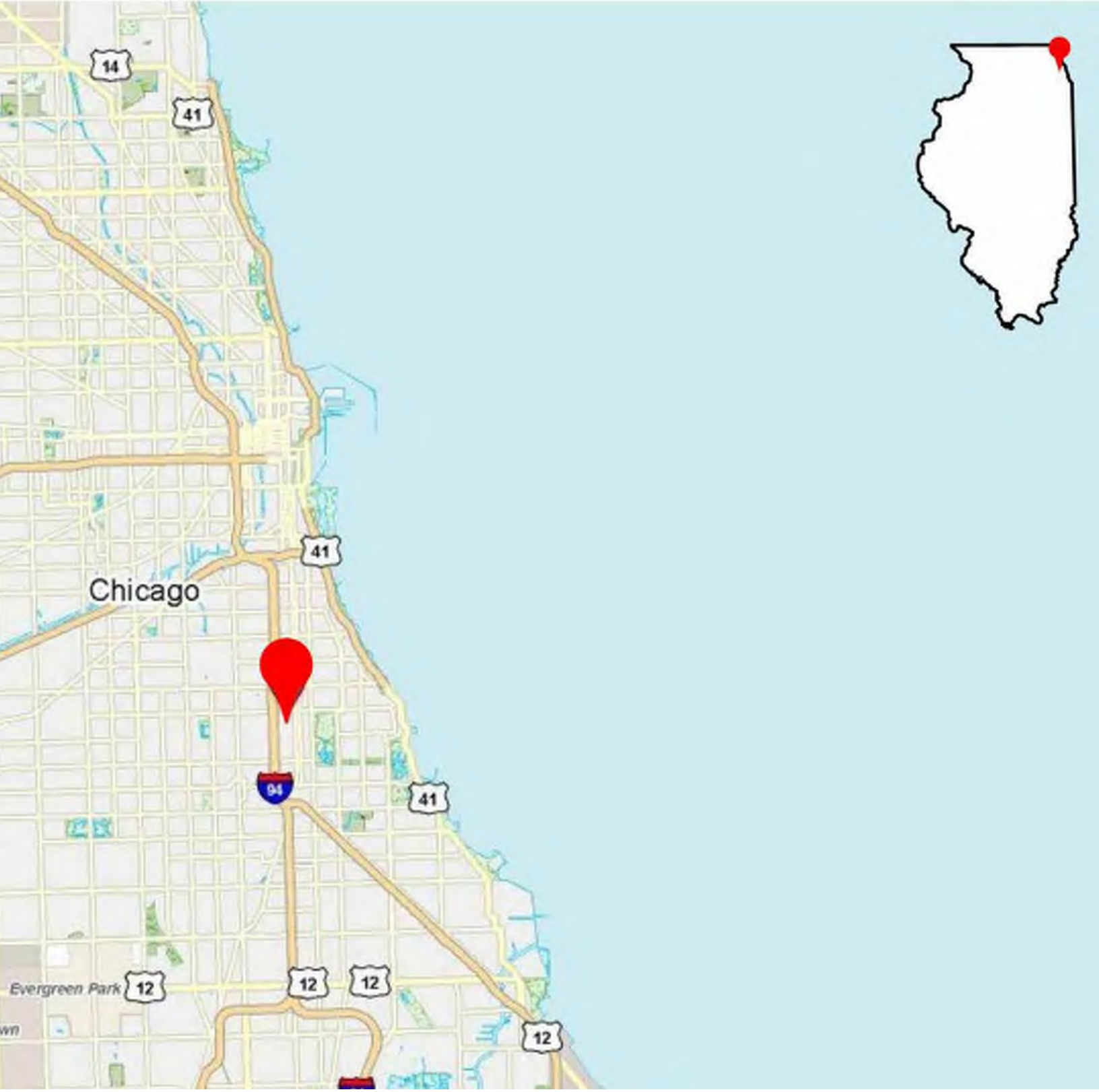


Park Christian School
300 17th St. N, Moorhead, MN 56560

Rural Sch

ool Site 1

Site 3 - Ace Tech Chicago, IL


14
41
41
Chicago
94
41
Evergreen Park
12
12
12
12

ACE TECH CHARTER HIGH SCHOOL
5410 S STATE ST, CHICAGO, IL 60609

Urban Sch

hool Site 1

Project Emphasis

Emphasis will be placed on design solutions that are flexible in nature and allow for a wide mix of private, semi-private, semi-communal, and highly communal spaces. “Maker spaces” and “Maker Labs” are trending in the millenial workforce and quickly becoming a popularized alternative to individual woodshops or studios. These spaces offer self-starters, entreprenuers, builders and makers of any kind the opportunity to collaborate with like minded individuals in a bigger, cheaper space that is specifically tailored for fabrication and making.

Further emphasis will focus on developing a system of parts capable of modifying a standard shipping container into a highly modular and versatile POD, equipped with a variety of modifications or MODS. This Kit-Of-Parts will serve as the foundational elements needed to create habitable space of varying scales using shipping containers.

The last bit of emphasis will be placed on determining the limitations and elements needed for the system to be transportable, hyper modular, and useable in both rural and urban settings.

Questions to be answered:

1) How can we equip our youth with the advancing skillsets needed to work in the manufacturing and skilled trades industries?

2) How can modularity be a solution to help decrease the American skils gap?

3) How can shipping containers be modified in order to create a system capable of supporting current and future technologies that will evolve as technology advances.

Goals of Thesis Project

Academic Goals

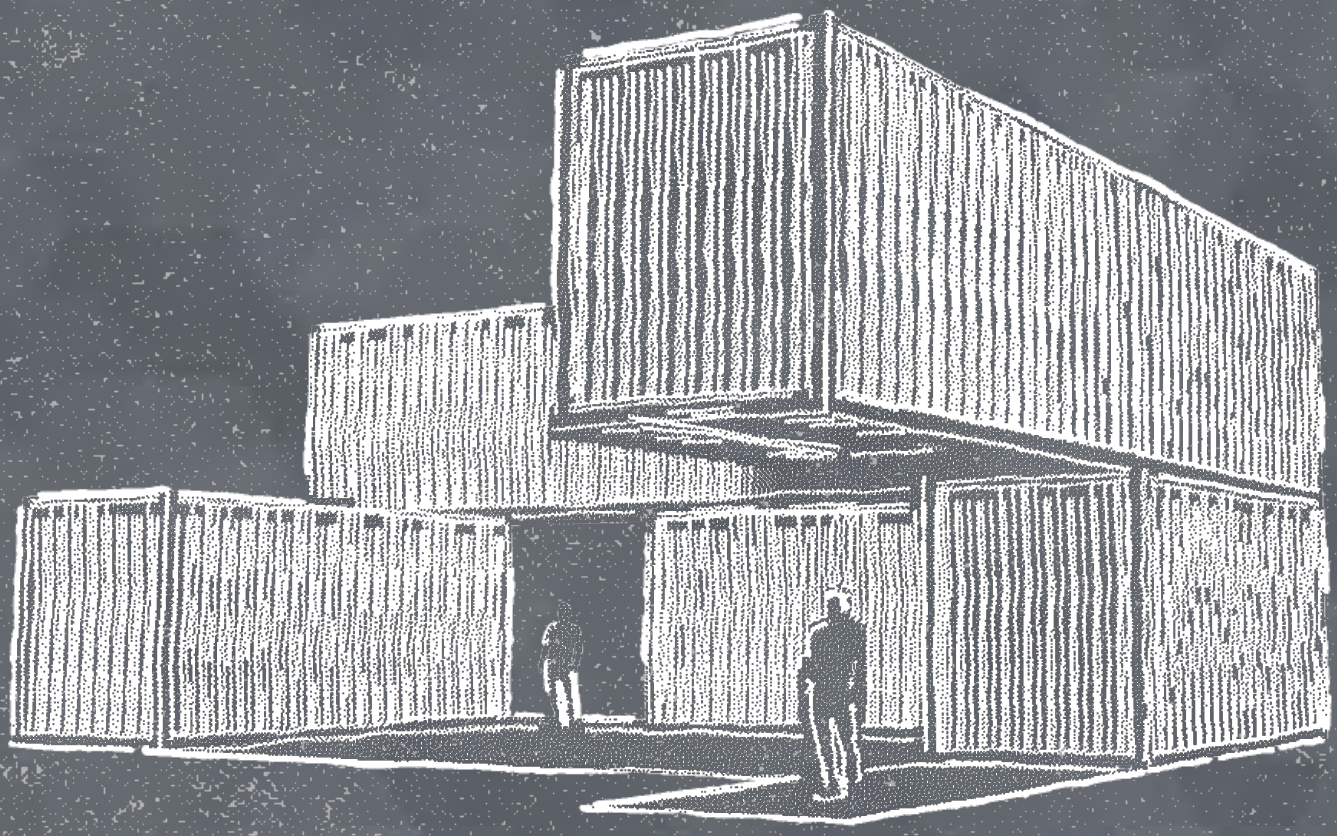
To be a successful thesis, in my view the project should do two things well; 1) Clearly articulate my passion for design build architecture and the value apprenticeship styles of learning can bring to our profession and 2) articulate a beautiful design aesthetic, both in the building concepts and design presentation which showcases my ability to achieve high quality presentations.

This project is an opportunity for me to combine my life experince in design build with many years of architectural education to create a project that truly represents my commitment to excellence and architectural ability.

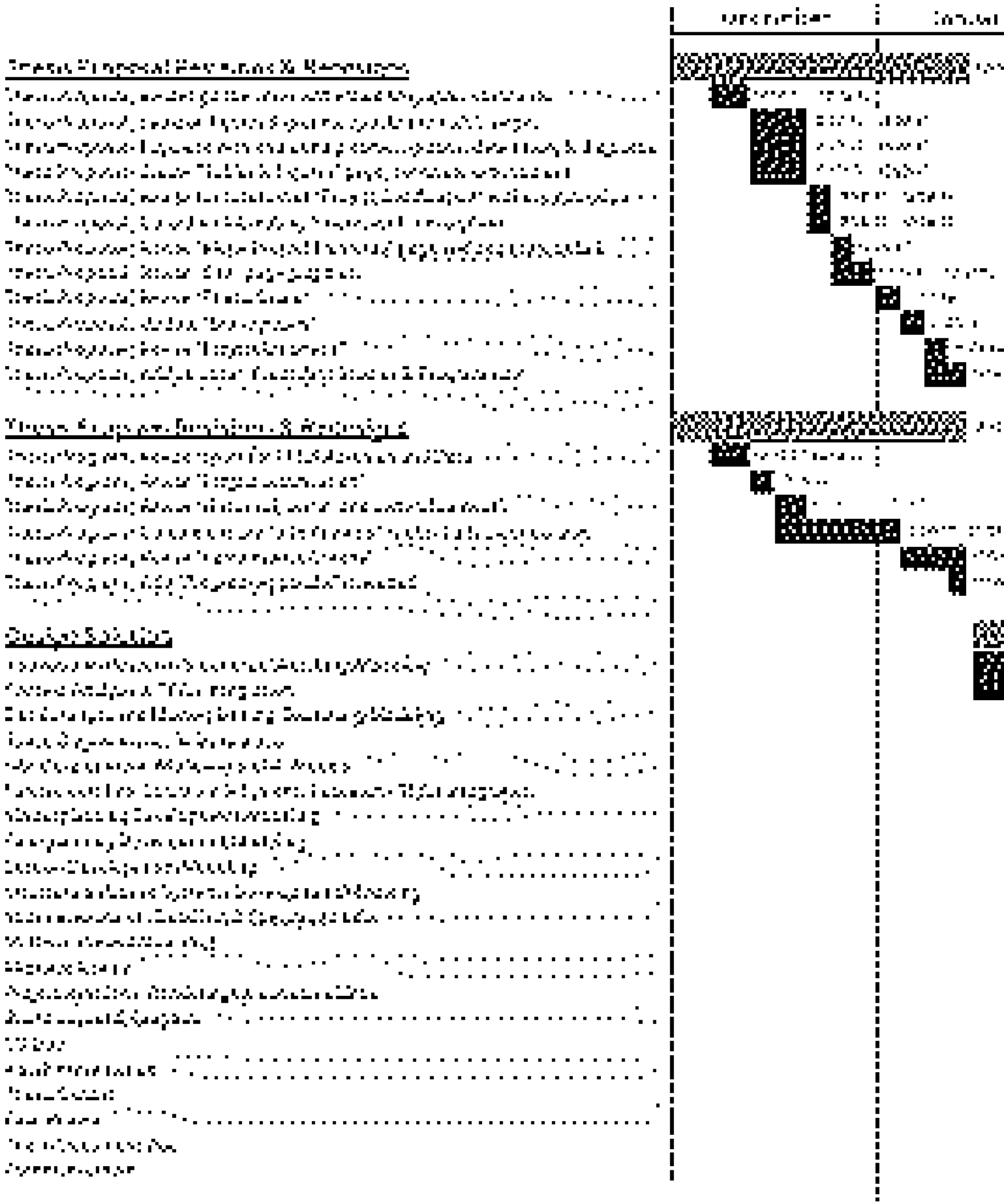
Professional Goals

Being that this is my last academic project, a wonderland of endless possibilities, it is critical for me to realize my ideas through a highly sophisticated and graphically stimulating project. I want to have a project that people are eager to learn about and visually satisfied when looking at it. It is my hope that this project can become a tool to articulate to future employers of my unique design language and broad understanding of architecture and construction alike.

Plan for Proceeding



Plan For Proceeding




February
March
April
May

Design Methodology

My design and research process has changed on nearly every single project since I started architecture school. As I became more educated & exposed to processes, software programs, and design styles I naturally would develop new methods and means by which to produce the end result required for that year's studio project, call it adaptable or flexible. While I have an appreciation for the experiences and opportunities to explore different ways of designing, I haven't been able to shake my dissatisfaction for having gone through four years of undergraduate school and never becoming a master with at least one tried and true string of processes that resulted in high quality architectural work. I no doubt have good experience working in many different programs and design styles, however I am routinely annoyed by the old adage that says, "A jack of all trades is a master of none." This has been a real struggle for my architectural career because I am so intrigued by many different styles of architecture and the methods designers employ to do their work. As a result, this therefore makes it difficult for me to define an exact design methodology, since I have routinely developed a skill for adapting my design method based on the end deliverables and the programs or processes I believe will get me to the end result.

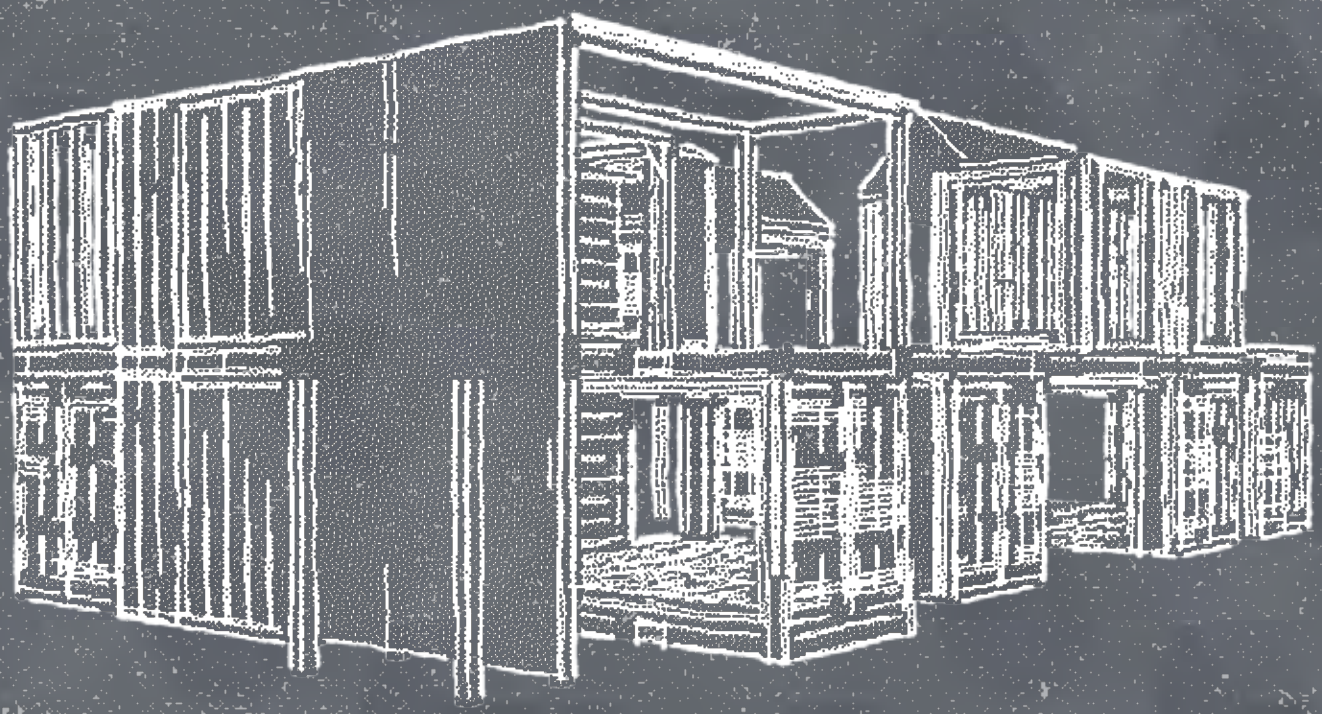
Since my junior year of undergraduate architecture I have been highly attracted to building and fabrication. It has always been a goal of mine to prove architects are more than capable of producing quality architectural designs that are not oblivious and ignorant of common construction techniques and building methods. I believe architects would be more equipped to develop, and defend, their designs if they learned and mastered most, if not all, the common /basic techniques that design and construction depend on to build our communities. This belief coupled with my love for working with my hands led to my participation in many different design build opportunities which have shaped my love for architecture. I built; a pavilion in Wyoming, furniture for Texas A&M University dormitories, a tiny house structure for a studio, a large mountain residence in Colorado, and even a timberframe structure in Michigan. These experiences have reinforced my belief that as an architect I can be more equipped and informed on how to design buildings the more I become aware of the entire building and construction process.

Therefore, it should be expected that my design methodology would include some form of fabrication and building to supplement my understanding of the structure I intend to design.

Other research methods I intend on using might include; Qualitative Research, Quantitative Research, Correlational Research, Historical Research and various forms of logic.

THESIS RESEARCH

Research Results



Reasons for the SKILLS GAP include:

1. A **negative perception of the manufacturing industry** that is disconnected from the reality of the working environment and the importance of the industry as a whole.

2. **Baby Boomers are retiring** whom currently make up a large portion of workers within manufacturing related industries and are in the majority for highly-skilled highly seasoned job positions.

3. **Loss of Manpower & Embedded Knowledge**

4. **Lack of a talent pipeline** that is engaging & equipping students, prospective employees, and even current employees will the relevant skillsets needed to succeed in tomorrows manufacturing warehouses.

Solutions for the SKILLS GAP include:

1. Educating the public about modern manufacturing and the benefits of these jobs.

2. External training and certification programs.

3. Apprenticeship programs and involvement with local schools.

MANUFACTURING Institute

Deloitte.

NATIONAL ASSOCIATION OF Manufacturers

In regards to site:

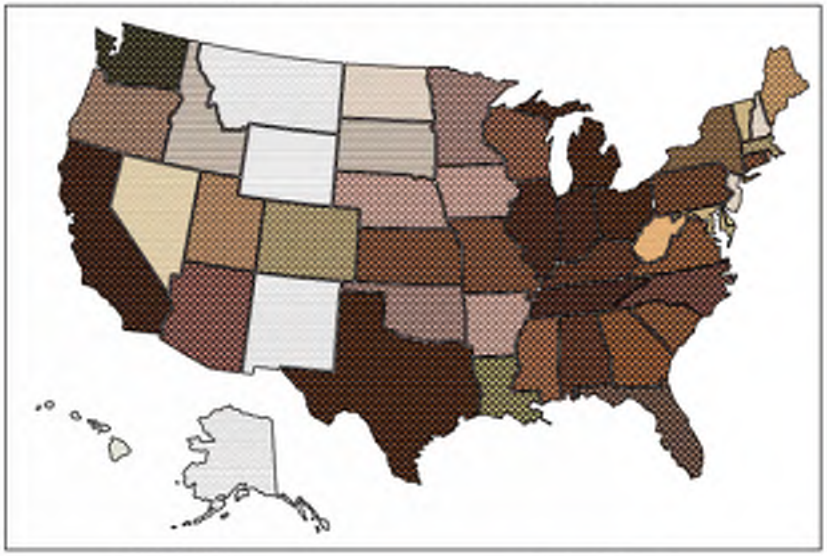
- **Not Site Specific**
- Solution has to work in both Urban & Rural environments
- Seeking to primarily function near schools and serve youth

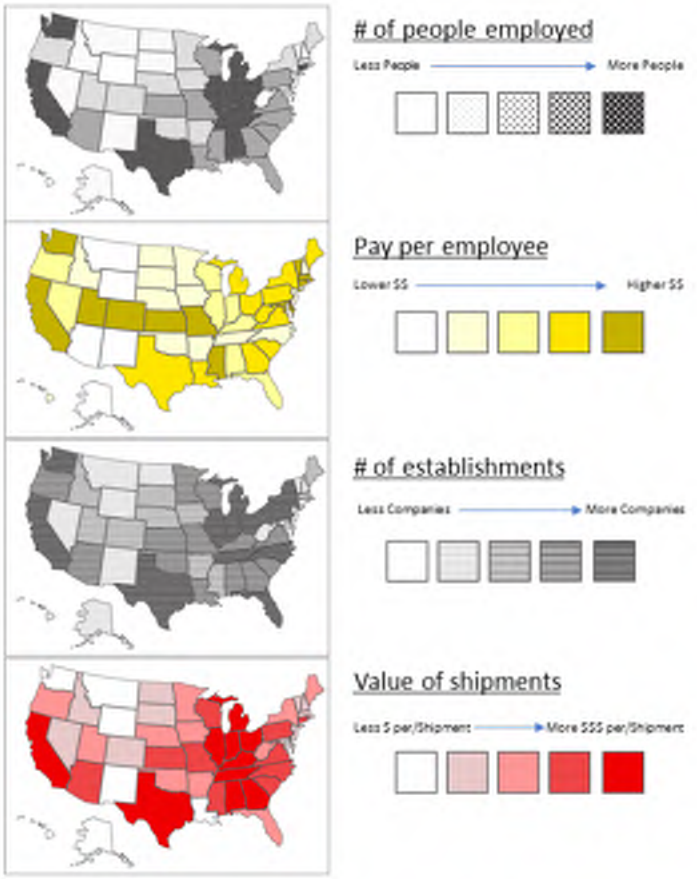
In regards to typology:

- Transportable
- Adaptable
- "Maker Space / Skills Based Educational Structure" that is sc based on need, function & technology.

Transportation & Equipment Manufacturing

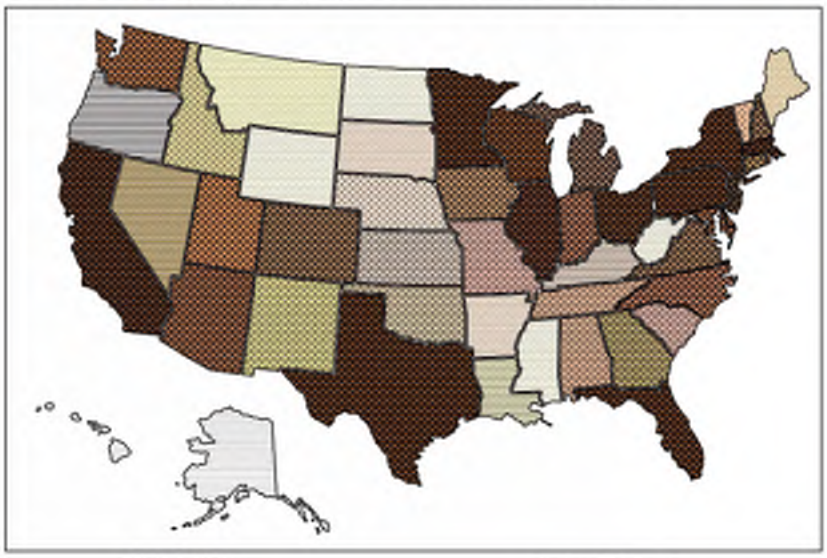
#1 – Number of people employed & #1 – Value of Shipments

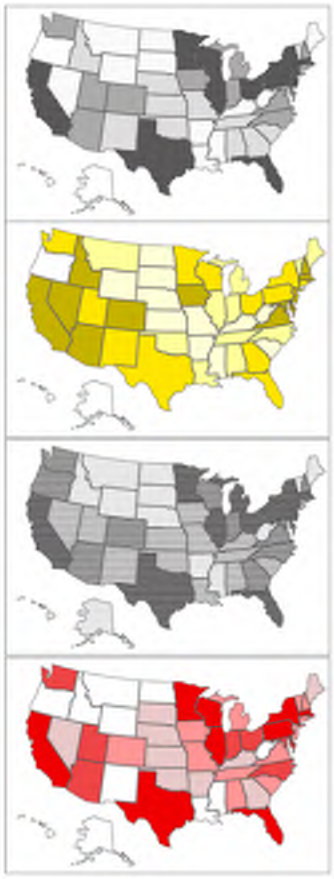




Computer & Electronic Product Manufacturing

#5 – Number of people employed & #7 – Value of Shipments





# of people employed

Less People → More People

Pay per employee

Lower $$ → Higher $$

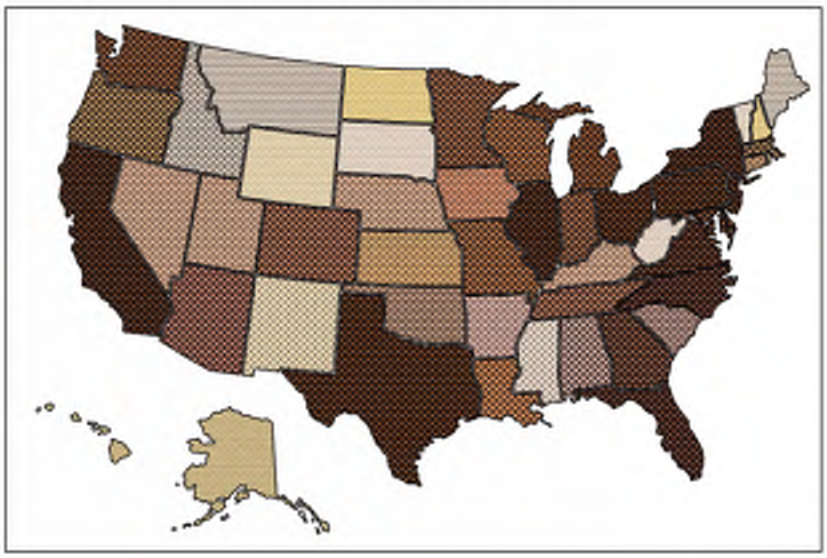
# of establishments

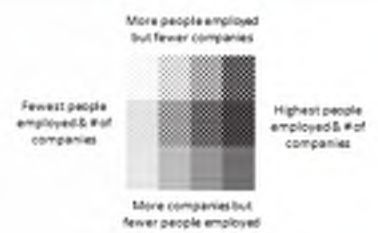
Less Companies → More Companies

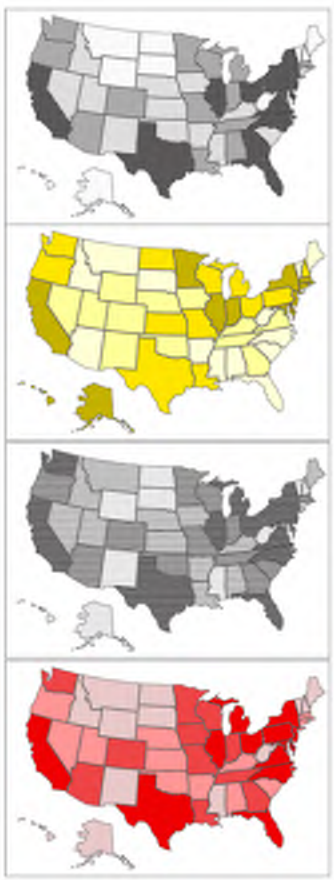
Value of shipments

Less $ per Shipment → More $$$ per Shipment

SPECIALTY TRADES CONTRACTING







# of people employed

Less People → More People

Pay per employee

Lower $$ → Higher $$

# of establishments

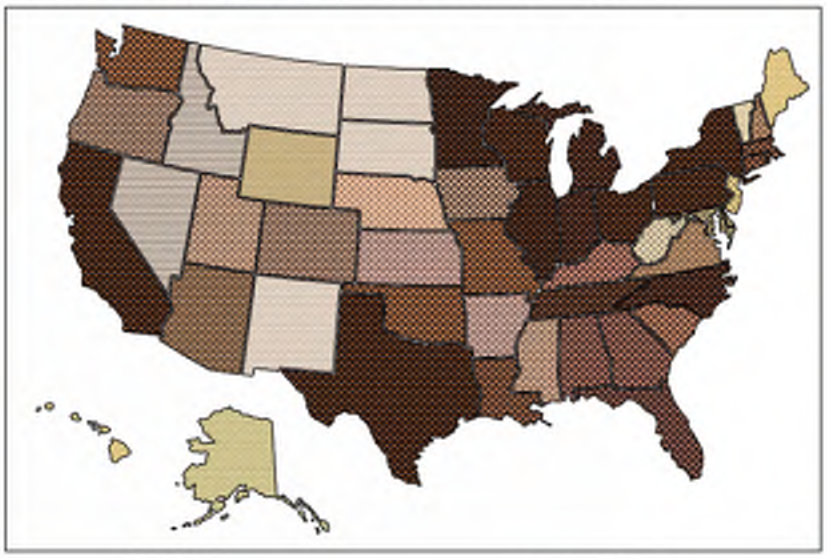
Less Companies → More Companies

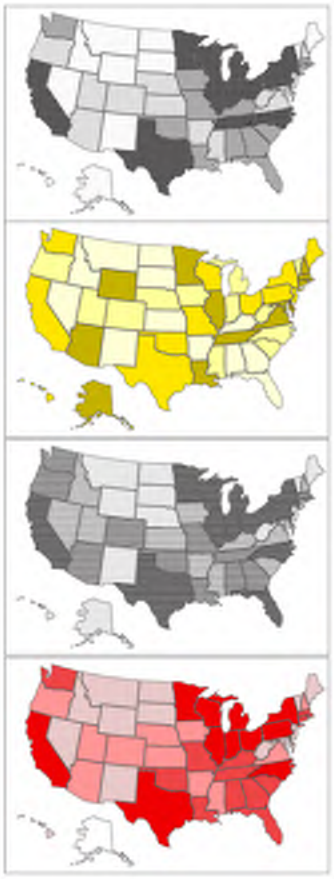
Company Earnings

Less $ → More $$$

Fabricated Metal Manufacturing

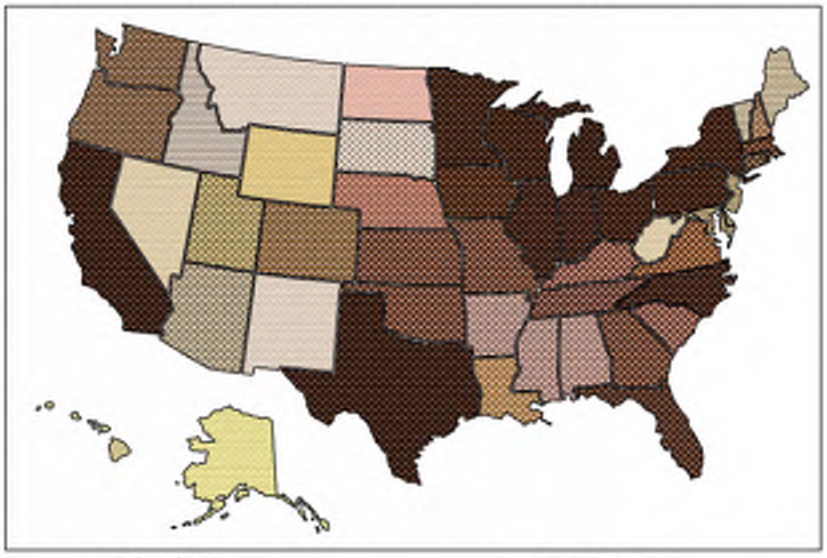
#3 – Number of people employed & #6 – Value of Shipments

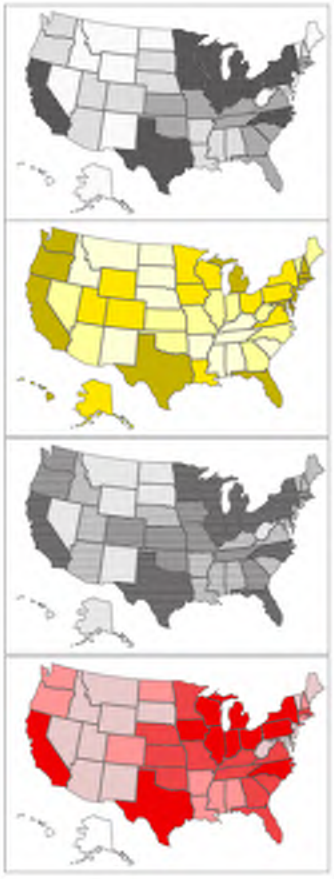


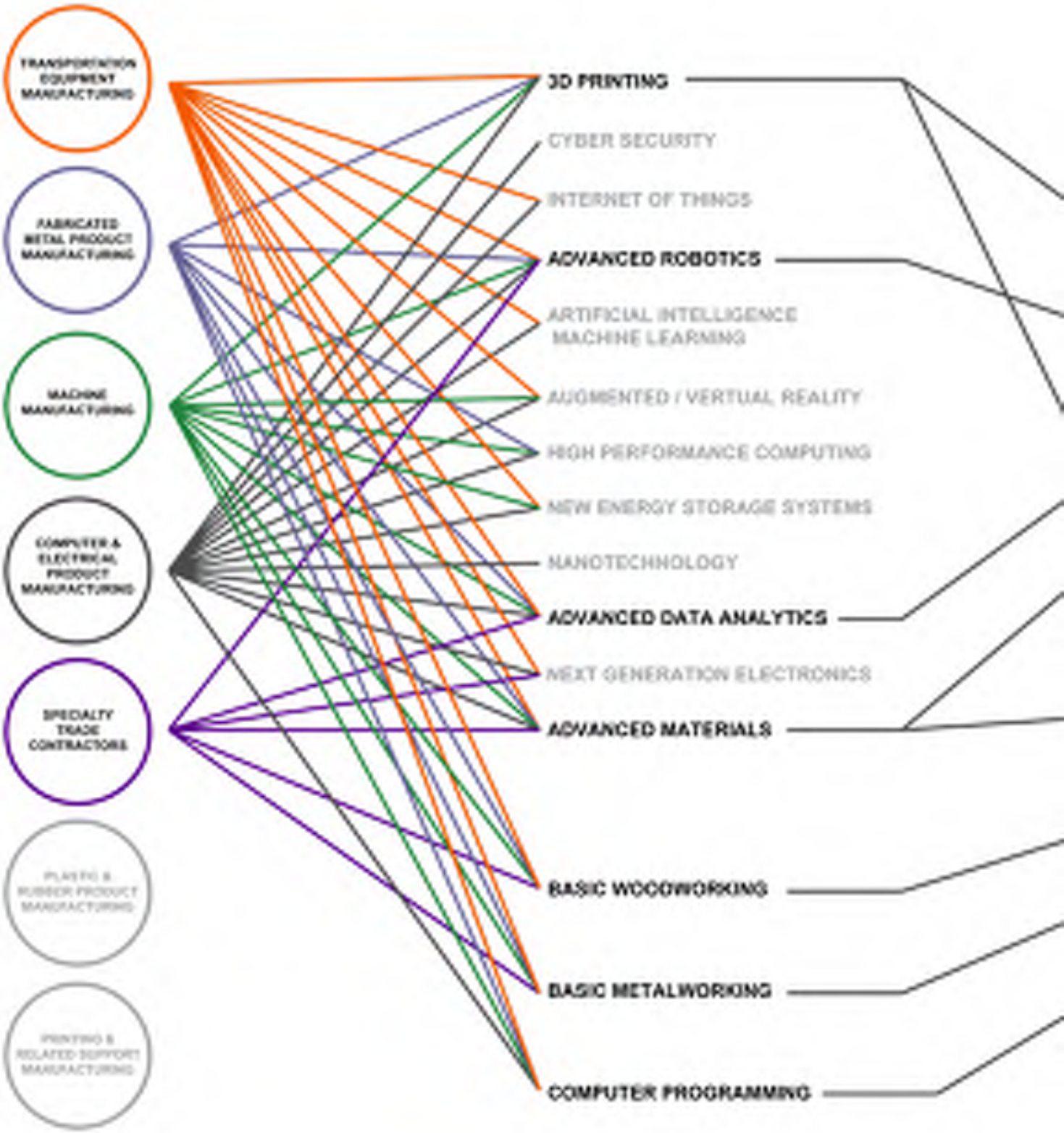


Machinery Manufacturing

#4 – Number of people employed & #5 – Value of Shipments






TRANSPORTATION EQUIPMENT MANUFACTURING
FABRICATED METAL PRODUCT MANUFACTURING
MACHINE MANUFACTURING
COMPUTER & ELECTRICAL PRODUCT MANUFACTURING
SPECIALTY TRADE CONTRACTORS
PLASTIC & RUBBER PRODUCT MANUFACTURING
PRINTING & RELATED SUPPORT MANUFACTURING
3D PRINTING
CYBER SECURITY
INTERNET OF THINGS
ADVANCED ROBOTICS
ARTIFICIAL INTELLIGENCE MACHINE LEARNING
AUGMENTED / VERTUAL REALITY
HIGH PERFORMANCE COMPUTING
NEW ENERGY STORAGE SYSTEMS
NANOTECHNOLOGY
ADVANCED DATA ANALYTICS
NEXT GENERATION ELECTRONICS
ADVANCED MATERIALS
BASIC WOODWORKING
BASIC METALWORKING
COMPUTER PROGRAMMING


APPRENTICESHIP PROGRAMS & CERTIFICATION PROGRAMS CURRENTLY BEING IMPLEMENTED
DESIGN BUILD PROGRAMS & MAKER SPACES
FANUC
SANDVIK Coromant
AMATROL
SIMLOG
TIMBER FRAMERS GUILD
RAMTEC
NIMBY
DesignBuildBLUFF
URBAN
Ponyride
studio 804
TESTED
TIMBER FRAMERS GUILD
RURAL STUDIO
100 FOLD STUDIO
HATCH
Artemis Institute

MFG DAY

TOYOTA USA FOUNDATION
Investing in a smarter tomorrow

dream it. DO IT.

The are organizations changing the perception through:

1. Manufacturing day events which expose students to the industry & career facts.
2. Facility Tours
3. Establishing curriculums for educators to teach their students about modern manufacturing

Robotics Trainers

Hydraulic Trainers

CNC Trainers

Machine Simulators

Module 1 Advanced Robotics

Module 2 3D Printing

Module 3 3D Scanning

Module 4 Manufacturing Trainers

Module 5 Computers & Data Analytics

Module 6 Simulators

Module 7 CNCs

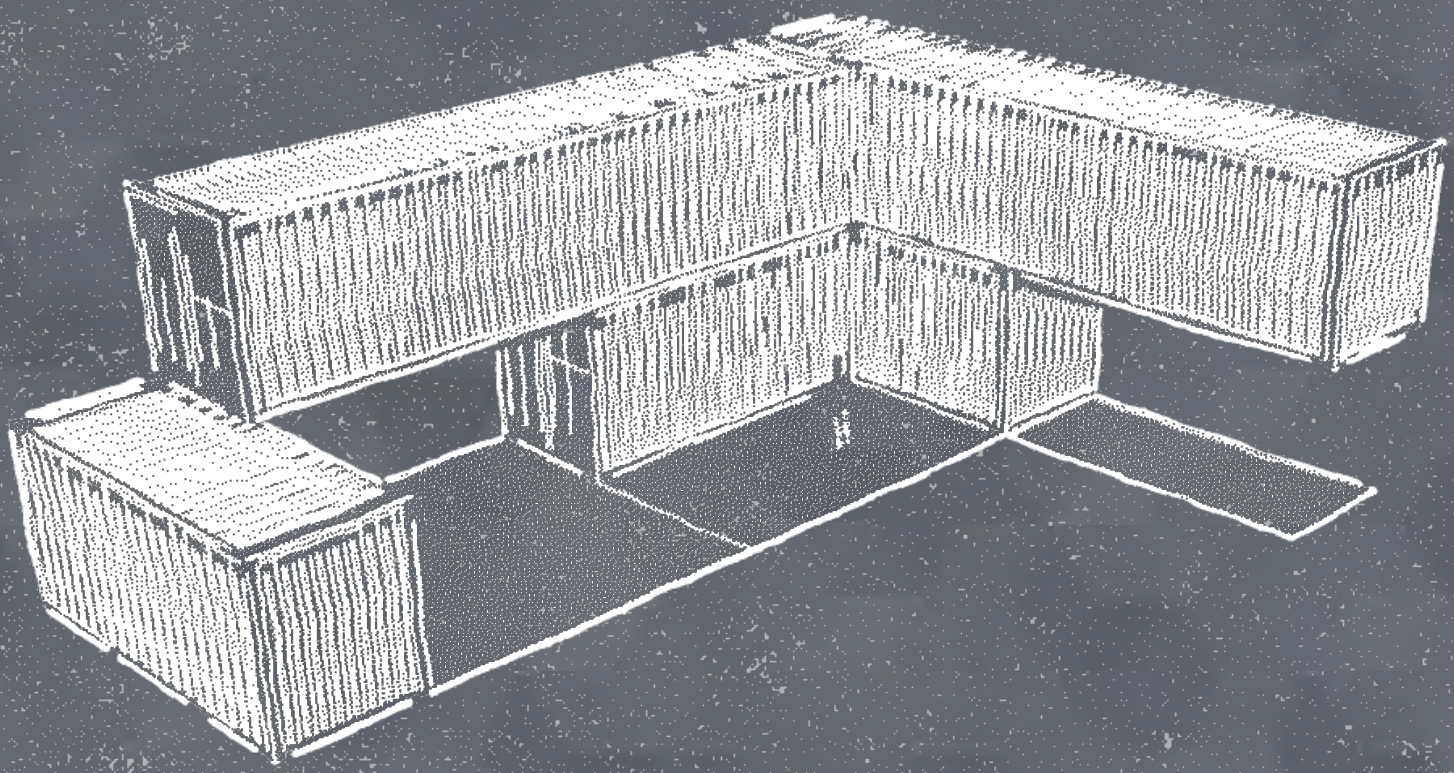
Module 8 Wood Shop

Module 9 Metal Shop

	Image	Can lift heavy containers	Can handle all different container types	Works in tight spaces	Drivable between different sizes	Fast turn around time for loading & unloading	Can stack containers
Reach Stacker		■	■			■	■
Straddle Carrier						■	■
Top Loader						■	■
Side Loader					■	■	
Forklift (8 Ton)					■	■	
Boom Truck					■		
Tilt Bed Truck				■	■		
Container Lifting Jacks		■	■	■	■		
Gradall					■	■	■
Hydraulic Crane		■	■	■	■		■

Can move the container during a lift	Operates from the driver's seat	Max Capacity	Vehicle can be rented locally & operated by user	Vehicle requires certs to operate	Cost to rent this vehicle's services	Cost to own this vehicle	Stacking Capacity Diagram
■	■	32 tons		■	$$$$$$	$xxxK+	
■	■	32 tons		■	N/A	$xxxK+	
■	■	32 tons		■	$$$$$	$xxxK+	
		32 tons		■	$$	$xxxK+	
■	■	8 tons	■		$	$xxK+	
		8 tons		■	$$	$xxxK+	
		8 tons		■	$$	$xxK+	
		32 tons	■		$$	$xxK+	
■	■	8 tons	■		$		
■	■	32 tons		■	$$$		

Project Justification



I am very passionate about this issue of skilled labor in America and the disconnect I perceive between older generations failing to hand down their knowledge of skilled crafts to the millennial workforce of tomorrow. I have been fortunate to benefit from several design build experiences throughout my educational years as I found it necessary to acquire a more holistic view of architecture through the perspective one gains participating in the building process. However after multiple educational and productive experiences, I would still have to admit that my knowledge of modern building techniques feels disappointedly narrow. I would assume this is likely true for many young professionals in architecture and unfortunately even for young tradesmen and tradeswomen entering the workforce.

This only compounds the issue at hand because those people are not only required to know the modern building, manufacturing, and construction techniques but also to master the required skills sets needed to execute those techniques.

When building manufacturers, or carpenters, or brick masons, or concrete specialists, or electricians, or steel makers lack the experience and know-how needed to meet the demands of a growing economy, the building industries, and specifically architecture and its clients suffer.

For example, architects around the globe are generally restricted to the design options they can explore based on their understanding of local/regional contractors and the ability they have to execute constructing certain structures and achieving specific results. Or in another example, architects are routinely forced to “value engineer” their designs, due to astronomical costs and lead times it takes to get high quality products built and shipped to the U.S from foreign companies. This is an issue manufacturing brings to the table as I am sure companies are limited by many factors; highly skilled labor, resources and machinery to name a few.

But flip to the other side of the coin and you can find just as many issues. When architects are unaware or unfamiliar with trending manufacturing methods, building details and construction techniques, it is likely you will see buildings designed with outdated construction practices. In those cases, it is simply an architect’s lack of exposure and understanding to modern manufacturing capabilities or modern construction detailing that limits the building industry’s ability to advance towards more modernized systems, leaving the client paying premium costs for a dated building.

Though there are many examples that I could continue to identify, the overarching point is this; Our country would solve many issues if younger men and women would commit to learning and mastering a useful skillset, and, older generations comprised of highly skilled laborers invested more time and resources to build a stronger industrialized workforce. This is why I believe a project as I am proposing in this document is one solution that pioneer healthy change within tomorrow’s building industries. If we are able to encourage future workers to pursue these careers and equip them with the tools they need to succeed, we might see dramatic change the-likes-of-which America hasn’t seen since the industrial revolution.

1. Why is the project that you have defined important to you as a person?

I am very passionate about this issue of skilled labor in America and the disconnect I perceive between older generations failing to hand down their knowledge of skilled crafts to the millennial workforce of tomorrow. I have been fortunate to benefit from several design build experiences throughout my educational years as I found it necessary to acquire a more holistic view of architecture through the perspective one gains participating in the building process. However, after multiple educational and productive experiences, I would still have to admit that my knowledge of modern building techniques feels disappointedly narrow. I would assume this is likely true for many young professionals in architecture and unfortunately even for young tradesmen and tradeswomen entering the workforce.

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For example, architects around the globe are generally restricted to the design options they can explore based on their understanding of local/regional contractors and the ability they have to execute constructing certain structures and achieving specific results. Or in another example, architects are routinely forced to “value engineer” their designs, due to astronomical costs and lead times it takes to get high quality products built and shipped to the U.S from foreign companies. This is an issue manufacturing brings to the table as I am sure companies are limited by many factors; highly skilled labor, resources and machinery to name a few.

But flip to the other side of the coin and you can find just as many issues. When architects are unaware or unfamiliar with trending manufacturing methods, building details and construction techniques, it is likely you will see buildings designed with outdated construction practices. In those cases, it is simply an architect’s lack of exposure and understanding to modern manufacturing capabilities or modern construction detailing that limits the building industry’s ability to advance towards more modernized systems, leaving the client paying premium costs for a dated building.

Though there are many examples that I could continue to identify, the overarching point is this; Our country would solve many issues if younger men and women would commit to learning and mastering a useful skillset, and, older generations comprised of highly skilled laborers invested more time and resources to build a stronger industrialized workforce. Therefore, I believe a project as I am proposing in this document is one solution that pioneers healthy change within tomorrow’s building industries. If we can encourage future workers to pursue these careers and equip them with the tools they need to succeed, we might see dramatic change the-likes-of-which America hasn’t seen since the industrial revolution.

2. Why is it important for you to do a thesis at this stage of your academic development?

First, it is required by NCARB, a national architectural licensing and standardizing agency for young designers to achieve a certain level of education and training to attain a license as a professional architect. The thesis project is one step toward that end goal where students exemplify all that they have learned throughout their educational careers into one singular project.

Second, the thesis project really allows future employers to see where your strengths and weaknesses lie in terms of design and graphics. Therefore, the thesis project

becomes a major portfolio piece to display to future employers the type of work you are capable of doing.

3. Why is it important to do the thesis project at this stage of your professional development?

I reiterate what I mentioned above, the thesis project currently is one step towards attaining a Master's Degree in Architecture. The Master's Degree is required by NCARB and all state licensing boards for young designers to take there ARE examinations and attain Architectural Licensure.

4. How is the project going to add to your knowledge base?

This project will expand my understanding of;

1) the existing issues revolving around manufacturing & trade.

2) How manufacturing and trade organizations have an adverse effect on both the economy at large and more specifically architecture.
3) What architectural solutions there are that can help mitigate or reverse issues that are hindering the manufacturing/trade industries.

5. How is this project going to add to your set of skills?

Theoretically the thesis project is supposed to be a display of skills you already have. However, I would expect this thesis project to expand my time management skills and challenge my depth of thinking, and, challenge my ability to support my assertions with data and facts.

6. Why is doing the project important for the profession at this time?

Jobs and the “creation of jobs” is the platform by which Donald Trump won the 2016-2017 Presidential election, I would hence assume that understanding the job market as it relates to manufacturing and trades would prove informational at a minimum. The profession of architecture is impacted by manufacturing and trades because the profession of architecture is intrinsically intertwined with both categories. Architecture relies on manufacturing to produce products for buildings, equipment to build those buildings, and even office equipment that companies use to run their business.

Architecture is further impacted by the trades because it is the trades who implement the designs architects create.

7. Why is the project important as an academic exercise at this time?

It is a learning experience where students are able to showcase their skills and then learn from that experience where their strengths and weaknesses are. In addition to that, my project will be able to add to the universities knowledge of American manufacturing, trade schools/organizations, and the architectural solutions that could help change our youth’s perceptions on blue-collar jobs.

8. How can you justify the project economically?

My project would likely be a smaller privately owned project that would seek public donations, investments, construction bonds, or possibly even tax revenues that would assist in its construction.

9. How can you justify expending the funds to implement the project?

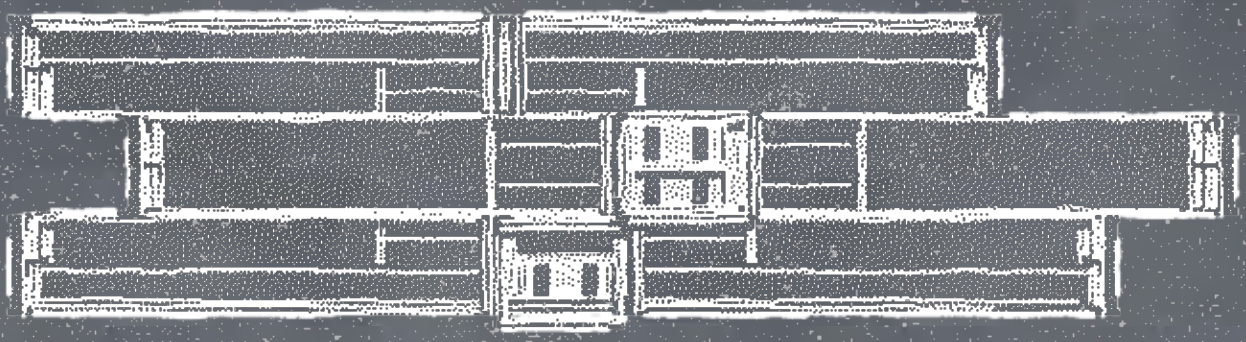
The fund for the project would be raised through local fundraising. Since the project is a camp consisting of multiple cabins and facilities, the project would be best funded by local investors, contributors, and donations that aim to see the project add to their local economy. The price of the project is irrelevant.

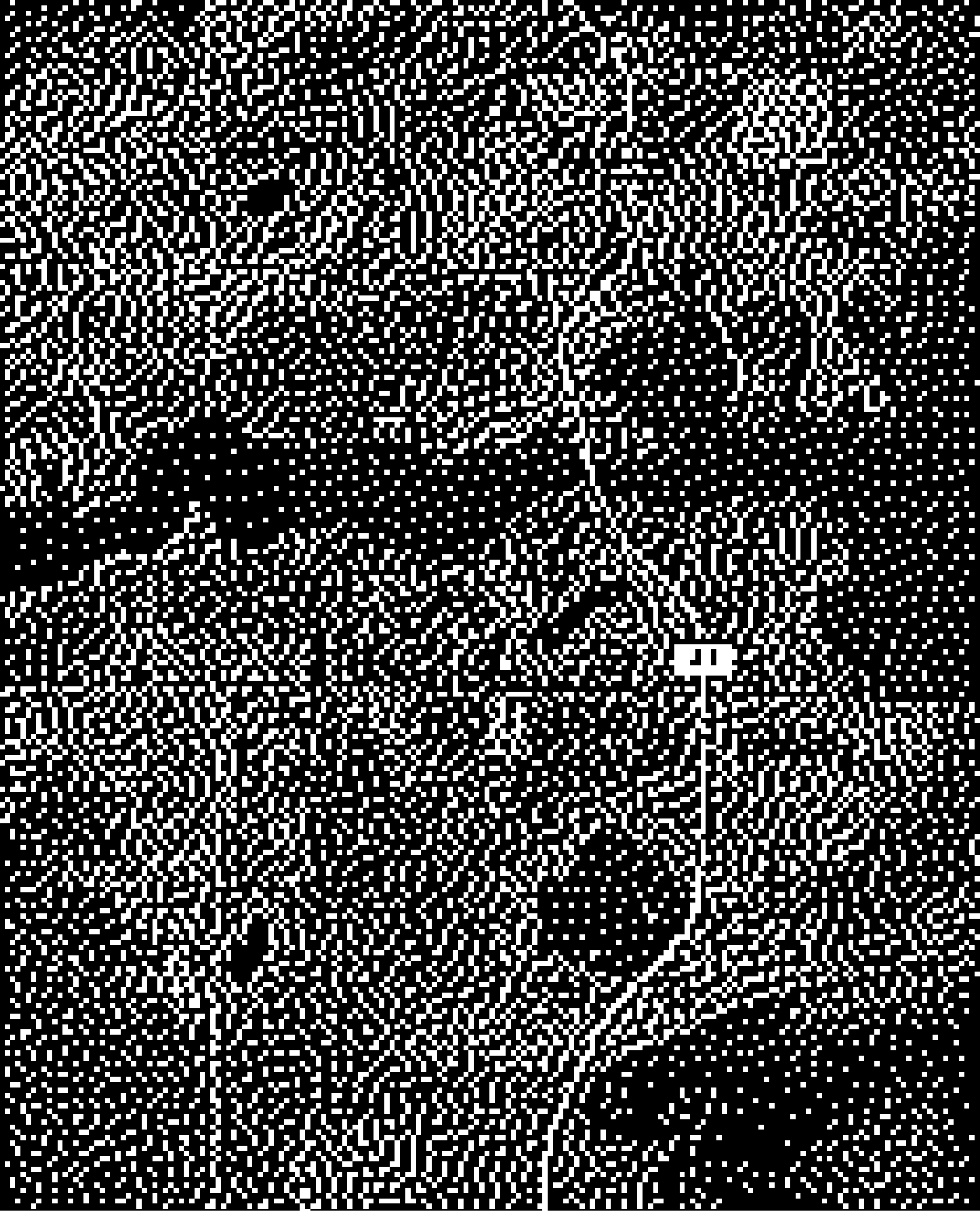
10. Where might the funds come from for the project and are the sources justified?

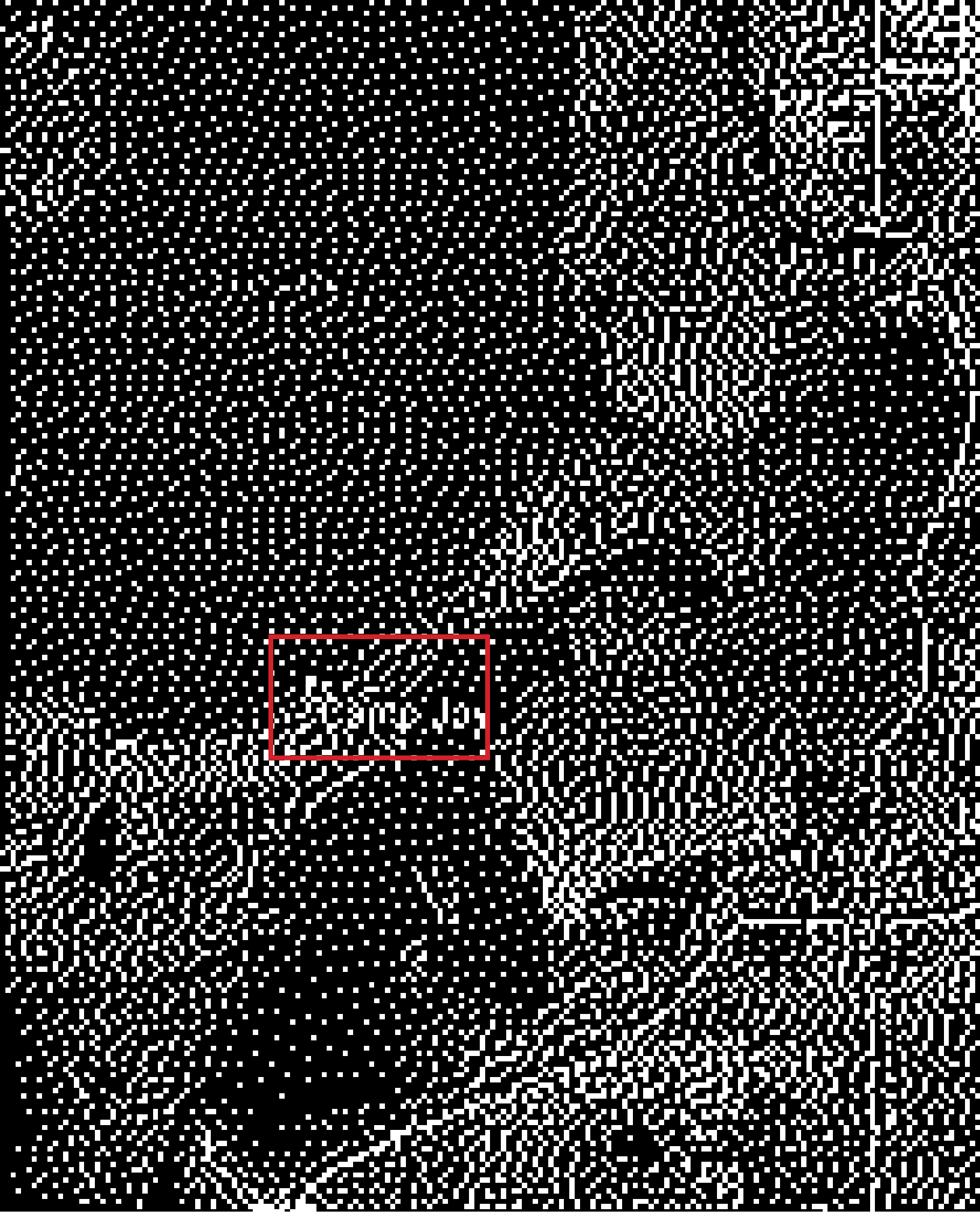
Local churches who already have investment in the land the project will be built on.

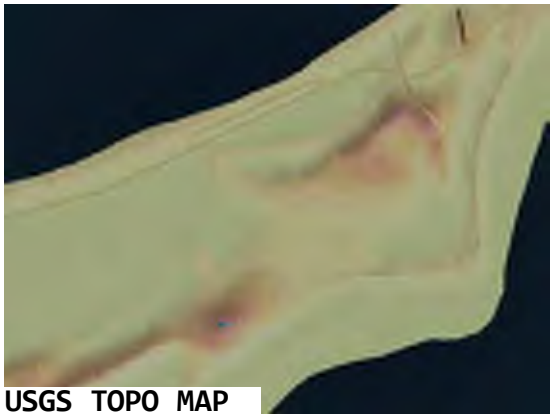
b. Investors
c. Local and State Tax Revenues
d. Construction Bonds
e. Donations

Site Analysis

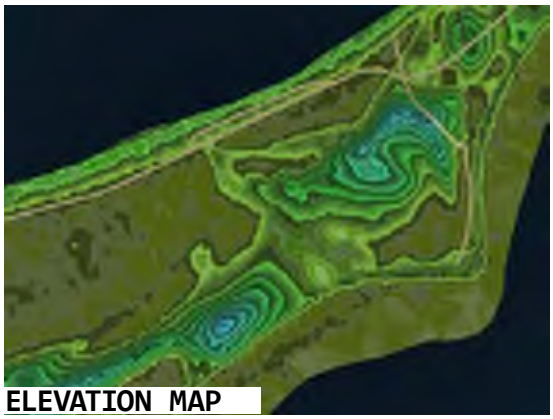




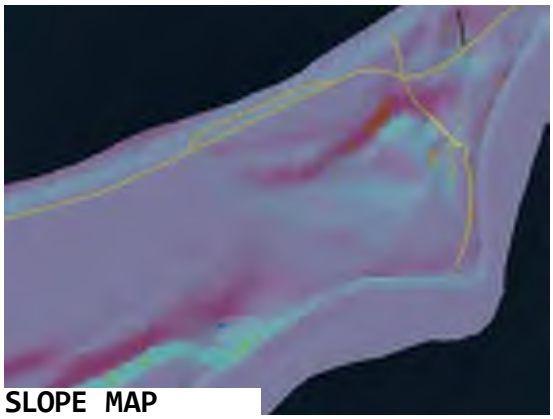




USGS TOPO MAP



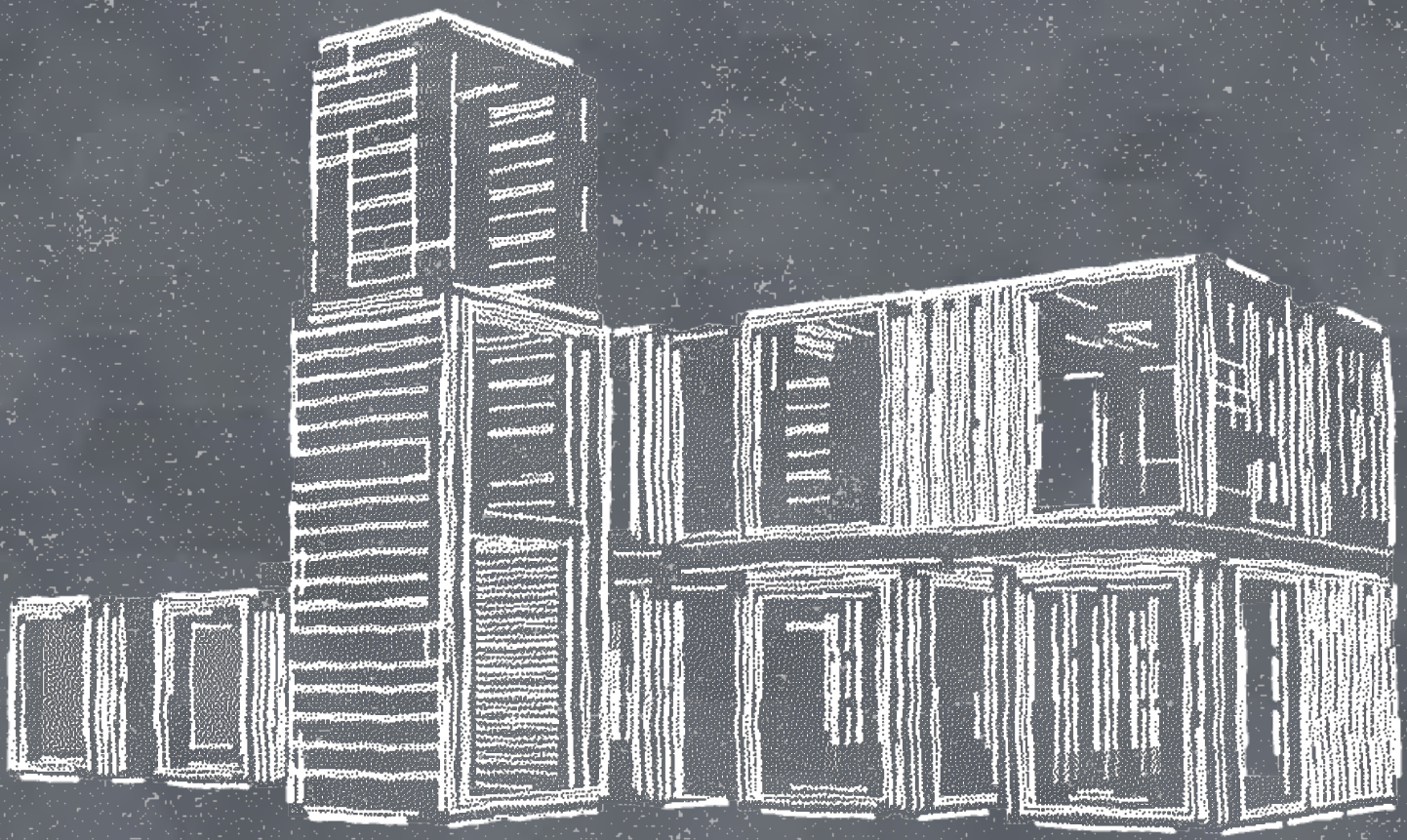
ELEVATION MAP



SLOPE MAP

WATERSHED MAP

Performance Criteria



Space Allocation

Q: What aspect of the performance of your design is measured?

A: The size of the cabin spaces, work spaces, and community spaces. The proximity of spaces to one another will also be measured and how those proximities help to either foster community group learning, one on one mentorships, or environments of solitude and retreat.

Q: What kinds of units of data involved in the measurement?

A: Graphs & diagrams showing square footages, dimensions, and clearances needed to establish certain relationships and environments. Statistical information will also be used to identify the types of spaces that tend to foster certain environments, i.e. community, mentorship, retreat.

Q: How and where will you obtain the performance measure?

A: The statistics on spatial relationships and environments I will retrieve from online research. The measurements and dimensions needed to house particular programs I will also derive from research.

Q: What kind of analysis is done, if any, to generate the performance measure?

A: I will analyze layouts, dimensions, and location of equipment based on existing floorplans from existing buildings or case studies, and, I will analyze measurements and photos from a building that I will personally visit.

A: To analyze the atmospheres that are created through the proximity of certain spaces, I will analyze diagrams & floorplans of existing project that sought to establish varying spatial atmospheres ranging from private – highly communal.

Q: What tools or instruments will be used (drawings, scale models, computer simulations, etc.)

A: Floorplans, photos, models, diagrams, etc.

Q: How will you judge that you have met the performance criteria? Explain the reasoning behind your judgement.

A: In regards to the sizes of cabins, sizes of workshop space, and the size of community spaces, I will judge whether I met the criteria based on whether I provided adequate clearances and space for the equipment or program needs that each item requires, that shows a correlation to the spaces provided in case studies or existing projects.

A: In regards to how I will judge the atmosphere of spaces, I will provide a Lumion Rendered video that showcases the spaces in 3d and how they will be used. I will then overlay diagrams and floorplans over the video to further explain the design and how it relates to research in creating specific spaces.

Energy Consumption

Q: What aspect of the performance of your design is measured?

A: The cabins that residents & campers will stay in will be measured for Passive House certification.

Q: What kinds of units of data involved in the measurement?

A: R-values, energy consumption values, solar heat gain values, wind energy values, solar energy values, air circulation values

Q: How and where will you obtain the performance measure?

A: I will obtain the standard criteria for passive

house certification from case study projects. Studio 804 and NDSU Design Build studio both have passive certified projects that can assist in the energy values needed to achieve such a standard.

Q: What kind of analysis is done, if any, to generate the performance measure?

A: I will first find research that shows the average energy consumption of buildings and spaces. I will use that information to determine the amount of energy that will need to be created through alternative means, such as; solar panels, wind turbines, Tesla roof shingles, or solar water heating. I will determine the climates zones, site location, location of buildings on the site and their relationship to the sun and compare those to the passive house case studies to determine the amount of insulation needed.

Q: What tools or instruments will be used (drawings, scale models, computer simulations, etc.)

A: Revit has several modeling plugins that help in determining this data. Graphic research, diagrams, numerical spreadsheets, data spreadsheets

Q: How will you judge that you have met the performance criteria? Explain the reasoning behind your judgement.

A: I will judge whether I have met the criteria based on whether my cabins & places of residence perform according to Passive House Certification standards.

Environmental Performance

Q: What aspect of the performance of your design is measured?

A: The workshop/building platform will be measured for acoustics. Specifically, the loudness and noise the building platform produces. Hopefully I can provide some acoustic solutions that help to mitigate the amount of noise pollution the camp will have due to construction.

A: All buildings on the site will be measured for their luminosity and thermal characteristics based on the Passive House Certification standards mentioned above in the Energy Performance Criteria.

Q: What kinds of units of data involved in the measurement?

A: Decibels for the acoustics. Renderings, sun diagrams, and light lumen diagrams for the luminosity and thermal characteristics.

Q: How and where will you obtain the performance measure?

A: Online research will provide acoustical standards for specific spaces as well as typical solutions to help mitigate exterior noise.

A: Online research with specific lighting companies will provide ideal lighting solutions and lumen ratios desired for specific spaces. Revit also has a plugin that can help determine Ideal foot-candles and lumens to be designed in a specific space.

Q: What kind of analysis is done, if any, to generate the performance measure?

A: Data and figures derived from online research, industry standards, etc will determine the performance measure. I expect to find specific lighting standards that lighting manufacturers have already caluculated and determined to be acceptable. I then expect to try and replicate those results in my own project based on professional trends.

Research Appendix

OTHER CASE STUDIES THAT HAVE INFORMED MY RESEARCH:

1) AUBURN UNIVERSITY'S 'RURAL STUDIO' DESIGN BUILD PROGRAM
LOCATION: Hale County, Alabama
WEBSITE: www.ruralstudio.org

2) KANSAS UNIVERSITY'S 'STUDIO 804' DESIGN BUILD PROGRAM
LOCATION: Lawrence, Kansas
WEBSITE: studio804.com

3) PONYRIDE
LOCATION: Detroit, Michigan
WEBSITE: www.ponyride.org

4) THE TIMBER FRAMER'S GUILD
LOCATION: Bellingham, Washington
WEBSITE: www.tfguild.org

5) INCITE FOCUS
LOCATION: Detroit, Michigan
WEBSITE: www.incite-focus.org

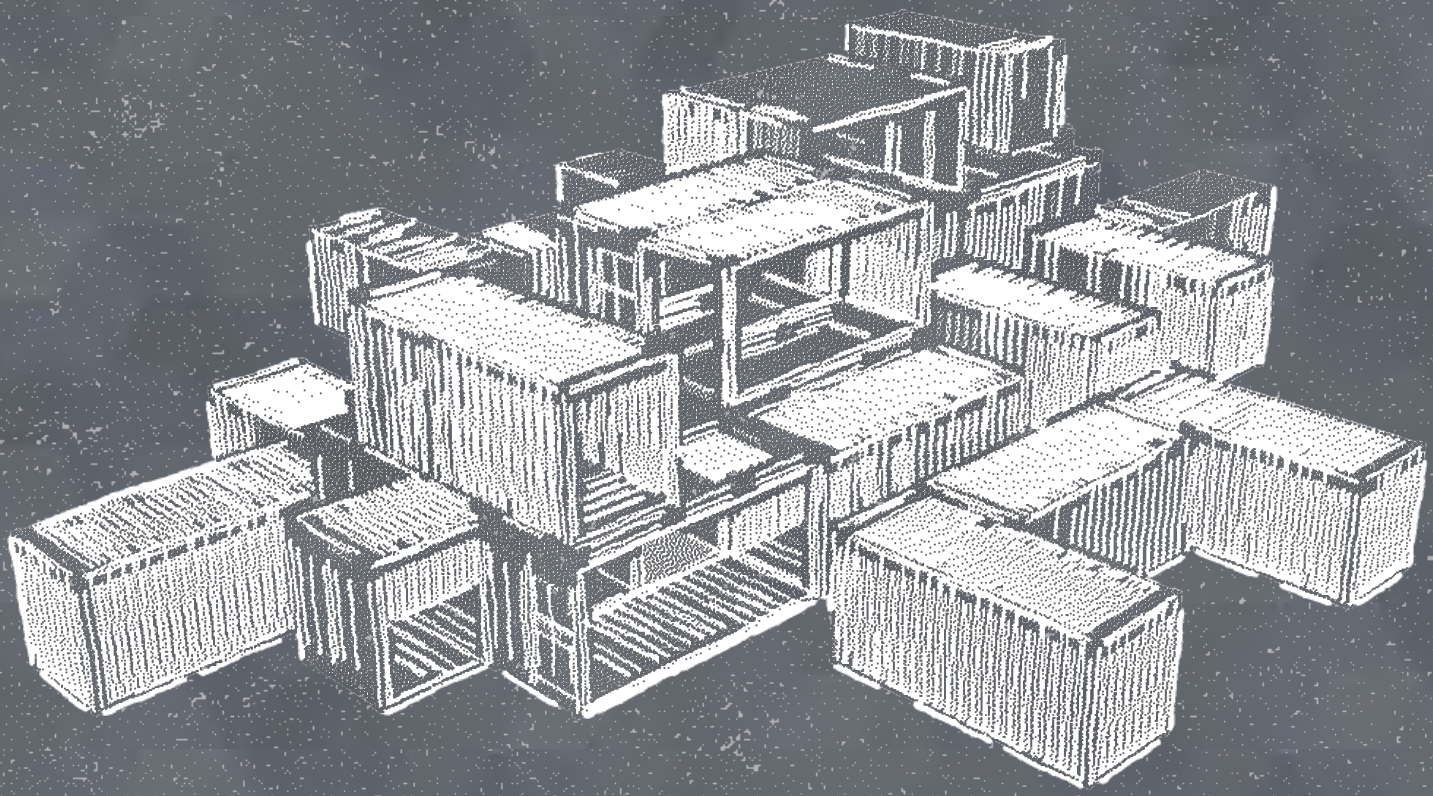
7) URBAN BOAT BUILDERS
LOCATION: St. Paul, Minnesota
WEBSITE: urbanboatbuilders.org

8) NIMBY
LOCATION: Oakland, California
WEBSITE: nimbyspace.org

9) ADAM SAVAGE'S YOUTUBE CHANNEL "MAKER-SPACE TOURS"
LOCATION: Youtube
WEBSITE: https://www.youtube.com/playlist?list=PLJtitKU0CAehkEO_2bwU6kU59_HvQMb30

DESIGN SOLUTION

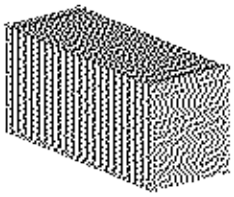
Process



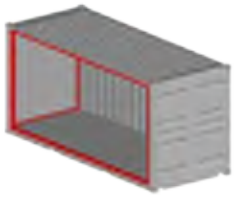
Shipping Container Iterations & Process

The diagrams below illustrate the general process I took to develop the structure of the shipping container itself into a modular, standardized POD that can be used to stack, rotate, and shift for the purpose of creating interior space.

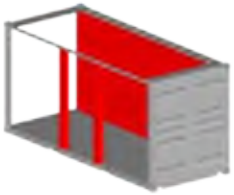
1 - Regular 20’ High Cube Shipping Container



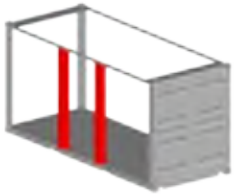
2 - Removing walls & adding glass



5 - Adding column supports & interior wall

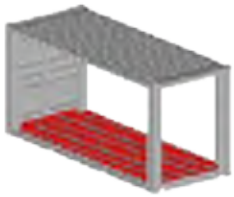


6 - Using column supports to standardize square openings

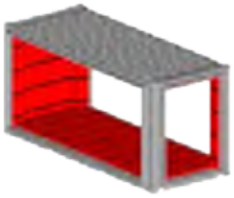


9 - Adding interior metal furring to finalize opening standard widths

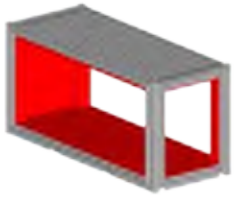
10 - Adding treated floor studs to raise subfloor and allow water drainage



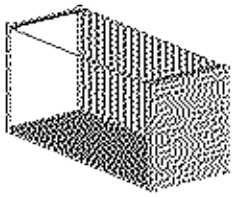
13 - Adding InSoFast continuous insulation panels



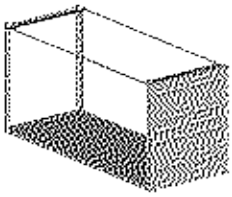
14 - Interior finishes



3 - Removing some walls for space creation

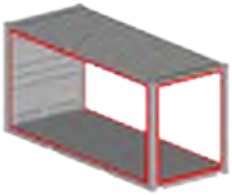


4 - Removing most walls for space creation

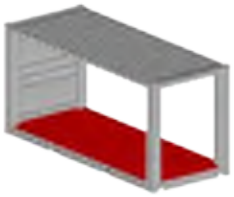


7 - Adding more columns to allow openings on all sides of container

8 - Cutting holes in corrugated siding to receive metal frames



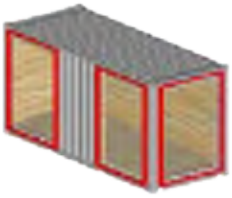
11 - Adding decking



12 - Installing metal frame which standardizes the connection between containers

15 - Possible POD Iteration

16 - Another POD Iteration



Shipping Container Floorplan Iterations & Process

The diagrams below are the floorplans versions of the illustrations seen on the previous pages. These diagrams illustrate the general process I took to develop the structure of the shipping container itself into a modular, standardized POD that can be used to stack, rotate, and shift for the purpose of creating interior space.

1 - Regular 20' High Cube Shipping Container

2 - Removing walls & adding glass

5 - Adding column supports & interior wall

6 - Using column supports to standardize square openings

9 - Adding interior metal furring to finalize opening standard widths

10 - Adding treated floor studs to raise subfloor and allow water drainage

13 - Adding InSoFast continuous insulation panels

14 - Interior finishes

3 - Removing some walls for space creation

4 - Removing most walls for space creation

7 - Adding more columns to allow openings on all sides of container

8 - Cutting holes in corrugated siding to receive metal frames

11 - Adding decking

12 - Installing metal frame which standardizes the connection between containers

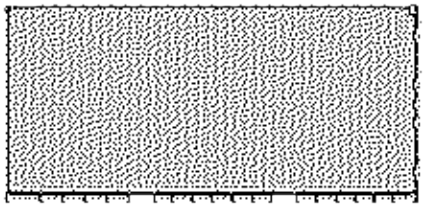
15 - Possible POD Iteration

16 - Another POD Iteration

Shipping Container Section Iterations & Process

The diagrams below are the section versions of the illustrations seen on the previous pages. These diagrams illustrate the general process I took to develop the structure of the shipping container itself into a modular, standardized POD that can be used to stack, rotate, and shift for the purpose of creating interior space.

1 - Regular 20' High Cube Shipping Container



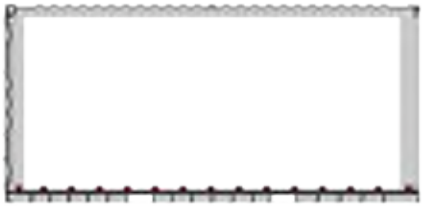
2 - Removing walls & adding glass

5 - Adding column supports & interior wall

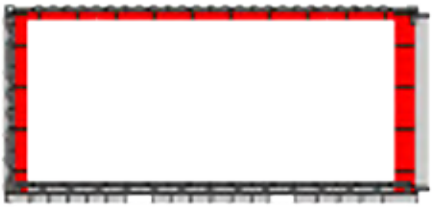
6 - Using column supports to standardize square openings

9 - Adding interior metal furring to finalize opening standard widths

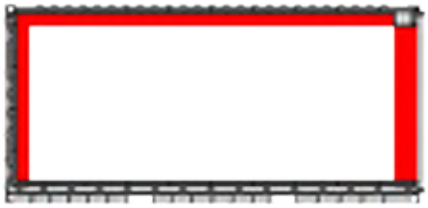
10 - Adding treated floor studs to raise subfloor and allow water drainage



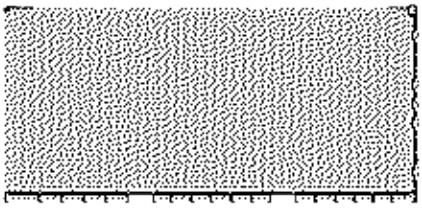
13 - Adding InSoFast continuous insulation panels



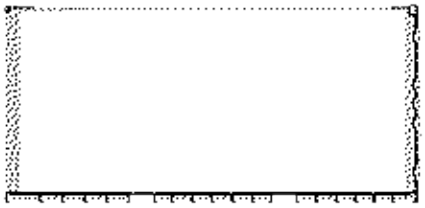
14 - Interior finishes



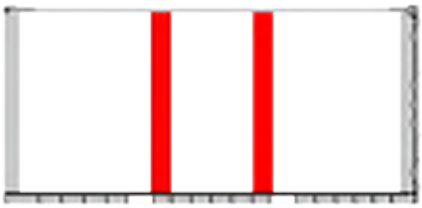
3 - Removing some walls for space creation



4 - Removing most walls for space creation

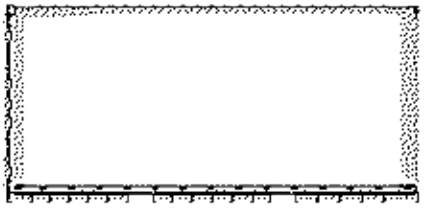


7 - Adding more columns to allow openings on all sides of container



8 - Cutting holes in corrugated siding to receive metal frames

11 - Adding decking



12 - Installing metal frame which standardizes the connection between containers

15 - Possible POD Iteration

16 - Another POD Iteration

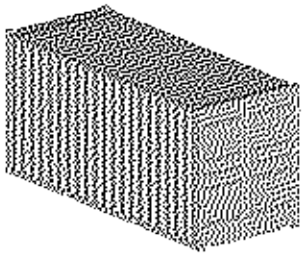
Modification Iterations

The diagrams below illustrate the modifications, pieces and/or parts that were considered. These iterations ultimately led to the development of a “final kit of parts” intended to be used to address issues like; standardizing a grid for connections and placement, how the containers would touch the ground, and finally, how the containers would connect to one another and create a water tight seal.

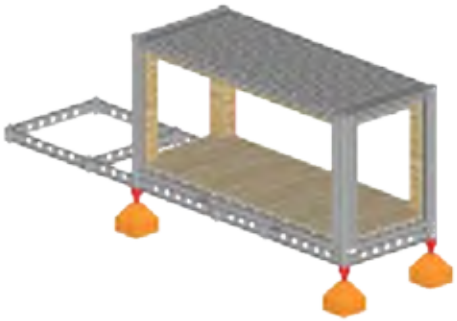
1 - Regular 20’ High Cube Shipping Container

2 - Removing walls & adding glass

5 - Adding column supports & interior wall



6 - Using column supports to standardize square openings



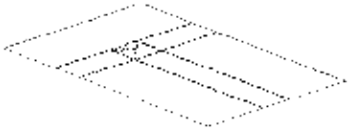
9 - Adding interior metal furring to finalize opening standard widths

10 - Adding treated floor studs to raise subfloor and allow water drainage

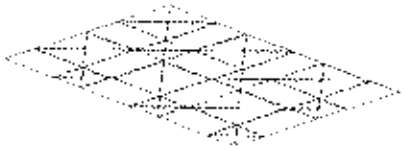
13 - Adding InSoFast continuous insulation panels

14 - Interior finishes

3 - Removing some walls for space creation



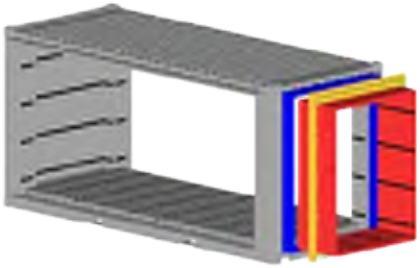
4 - Removing most walls for space creation



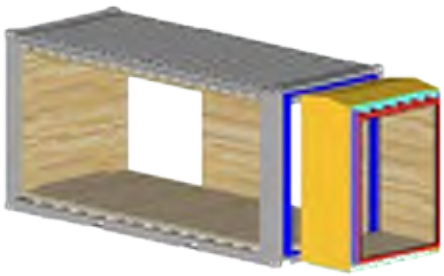
7 - Adding more columns to allow openings on all sides of container

8 - Cutting holes in corrugated siding to receive metal frames

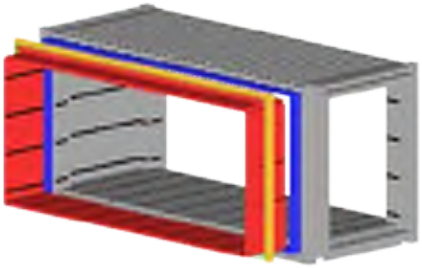
11 - Adding decking



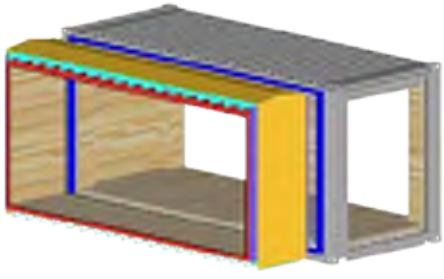
12 - Installing metal frame which standardizes the connection between containers



15 - Possible POD Iteration



16 - Another POD Iteration



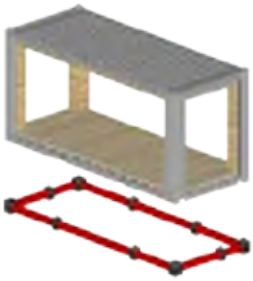
Modification Iterations

The diagrams below illustrate the modifications, pieces and/or parts that were considered. These iterations ultimately led to the development of a “final kit of parts” intended to be used to address issues like; standardizing a grid for connections and placement, how the containers would touch the ground, and finally, how the containers would connect to one another and create a water tight seal.

1 - Regular steel frame with eight connections

2 - Regular steel frame with metal flashing wrap to divert water

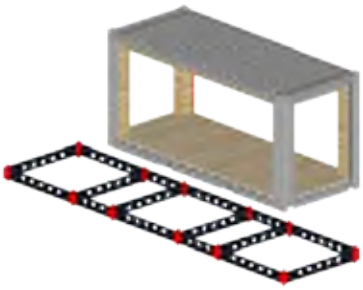
3 - Regular steel frame with four stationary connections and six slidable connections to allow varied configurations



4 - Steel frame w/ landings & over-hangs. Extra steel will also bridge the gap created from final grid.

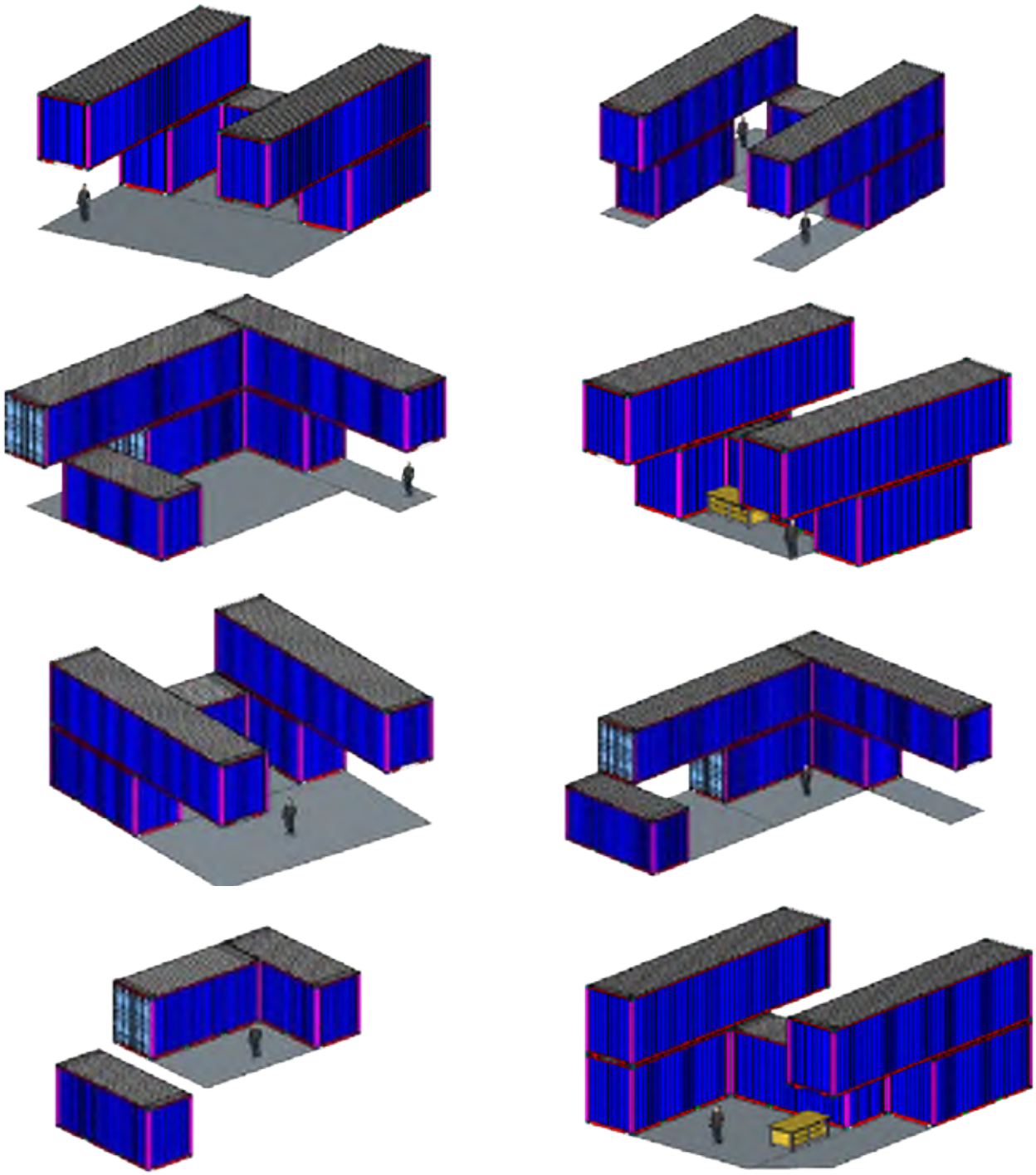
5 - Modified, modular steel frame w/ eight stationary connections & built to align to final grid

6 - Modified, modular steel frame w/ twelve stationary connections & built to align to final grid

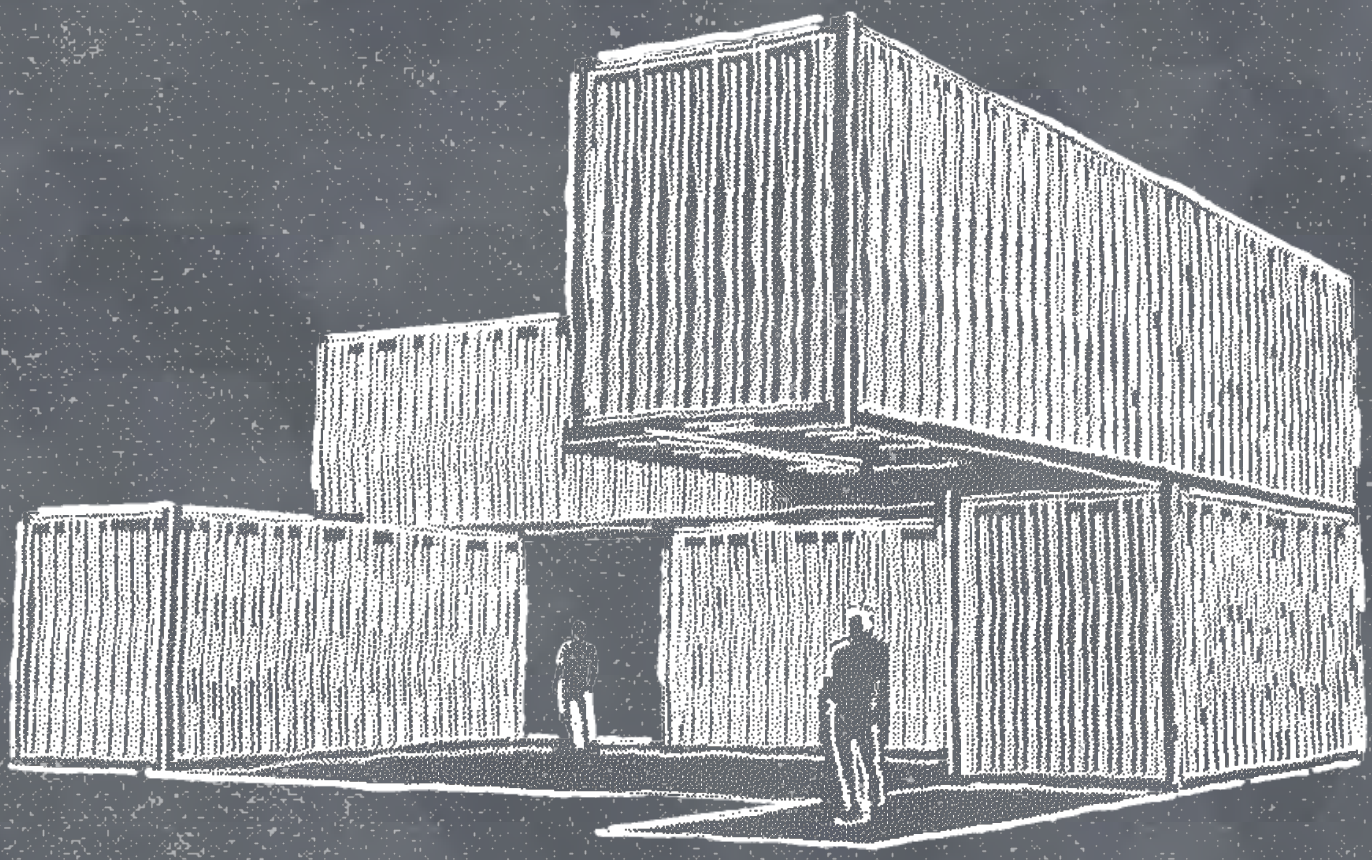


Implied Space Making Iterations

The diagrams below illustrate different iterations stacking shipping containers in order to create (1) corners that could host work benches (2) imply boundaries of space that might be used for a particular working station or building station (3) act as an entrance into or out of a space (4) provide a smaller breakout space defined by overhead edges. The overall intent was to explore what types of spaces could be created through physical boundaries as well as implied boundaries we visualize or attribute to a space based on the relationships of adjacent edges, perpendicular edges and the proximity of objects.



Project Solution



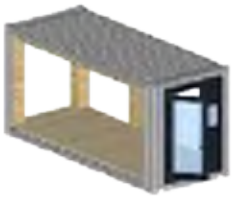
Final Kit of Parts

The illustrations below are examples of the “Final Kit Of Parts”. The Final Kit Of Parts is a set of parts that would be needed, or could be used, to assemble the PODS and MODS together in order to create countless different spatial configurations. This kit of parts contains elements that will allow the PODS to (1) attach, temporarily or permanently, to the ground (2) create a base frame work via the level builder to connect to piers or hydraulic jacks (3) create various spatial configurations by having varied PODS with different combinations of standardized openings (4) provide infill elements for openings not intended to be used for interior space, such as; windows, doors and mechanical elements (5) provide exterior decking & railing solutions for all space outside of the containers and used for building platforms.

1 - The Concerete Pier - These are permanent & used to attach PODs to piers with cast in interlocking connectors

2 - The Hydraulic Jacks - These are temporary & used to set PODs on the ground & address varied topography

5 - Door Infill MOD 1 - This is an example of a door MOD that fits into the standardized opening.



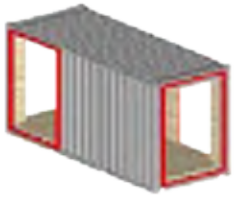
6 - Door Infill MOD 2 - This is an example of a door MOD that fits into the standardized opening.

9 - Mech. Infill MOD 1 - This is an example of a mechanical unit MOD that fits into the standardized opening.

10 - Window Infill MOD 3 - This is an example of a long face window MOD that fits into a standardized opening.

13 - Final POD 3 - Example of POD with 4 small openings & 1 long opening

14 - Final POD 2 - Example of POD with 4 small openings

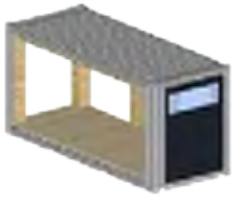


3 - The Level Builder - This is used to create the framework for stacking & connecting PODS & MODS.

4 - Modular Decking & Railing - This is a decking and railing system meant to plug into the existing Level Builder.

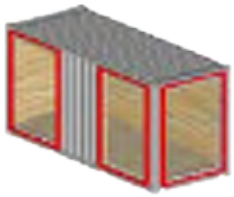
7 - Window Infill MOD 1 - This is an example of a window MOD that fits into the standardized opening.

8 - Window Infill MOD 2 - This is an example of a window MOD that fits into the standardized opening.



11 - Final POD 1 - Example of POD with 2 long openings and 1 small opening

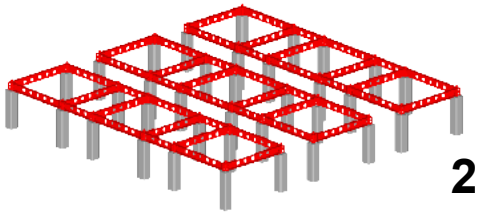
12 - Final POD 2 - Example of POD with 3 small openings



15 - Final POD 2 - Example of POD with 1 long & 1 small opening

16 - Final Stair POD - This POD allows for vertical stacking and stairs to connect different levels

1



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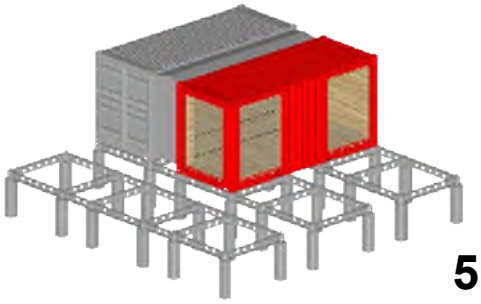

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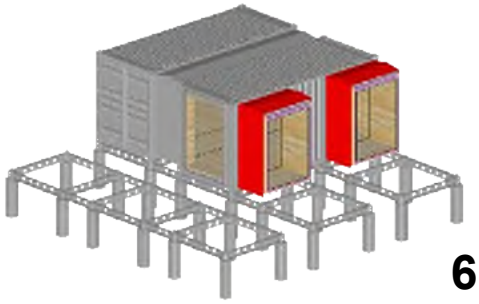

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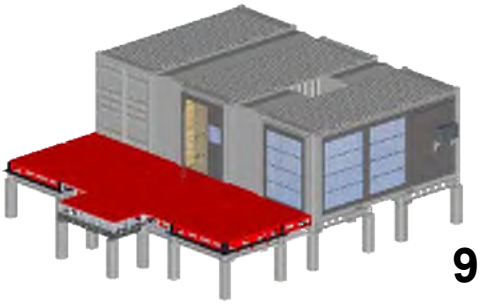

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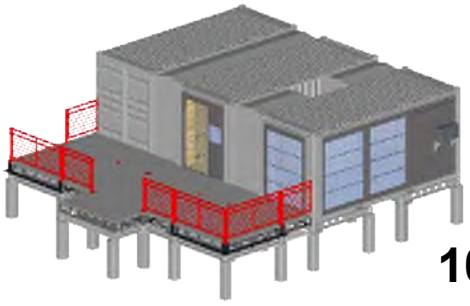

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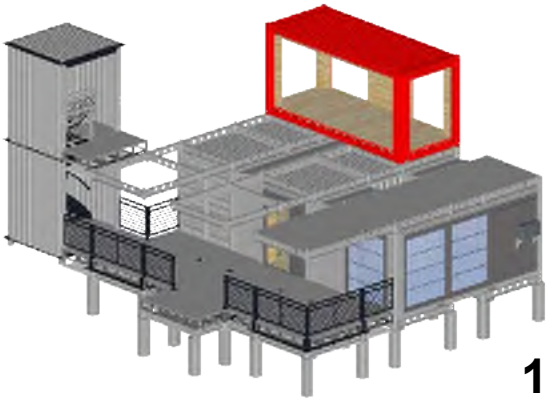

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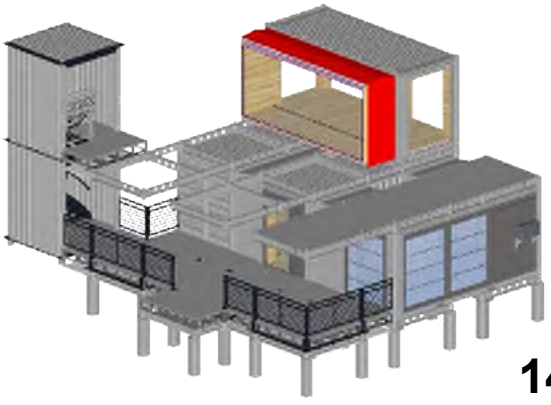

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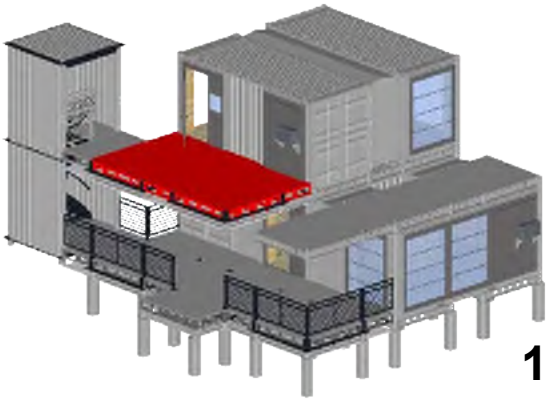

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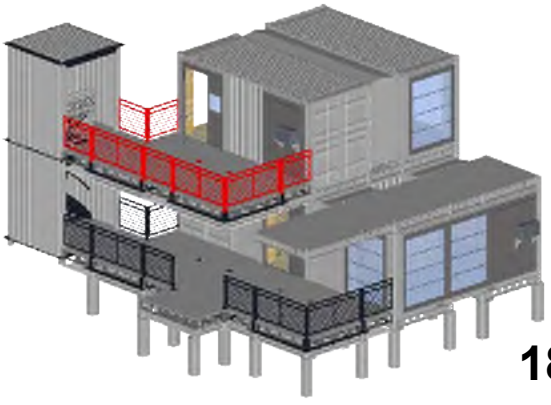

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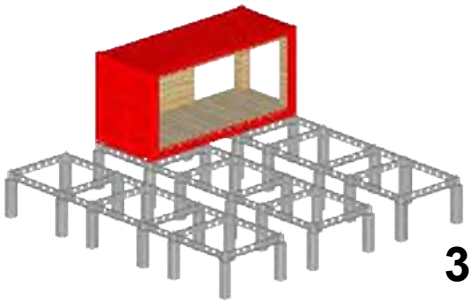

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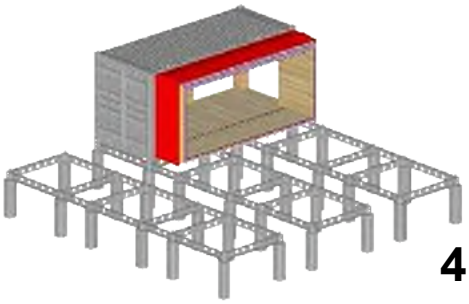

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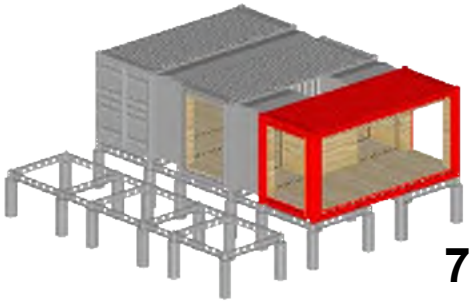

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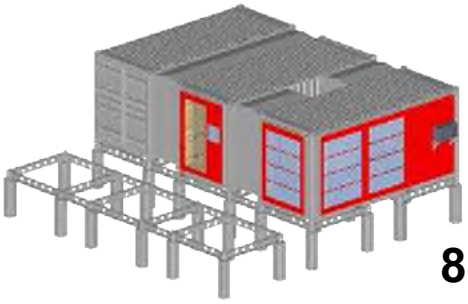

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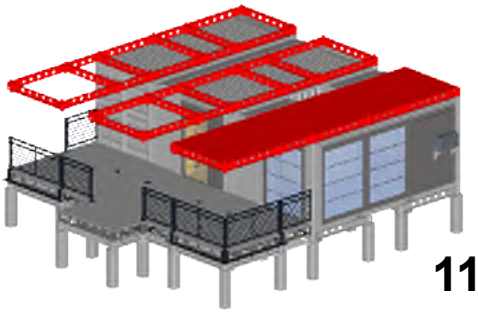

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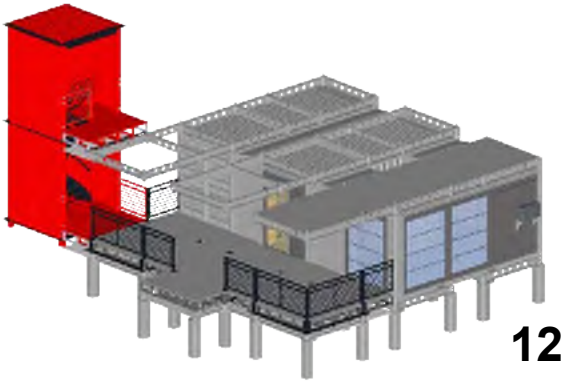

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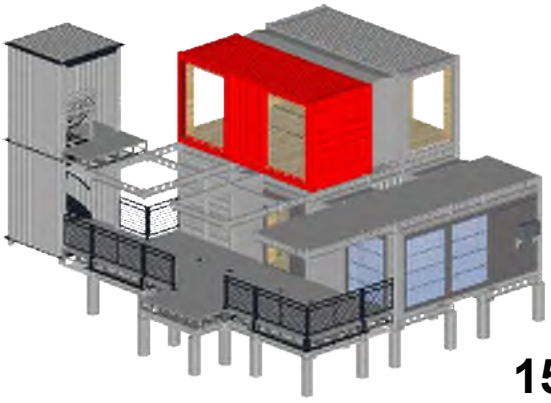

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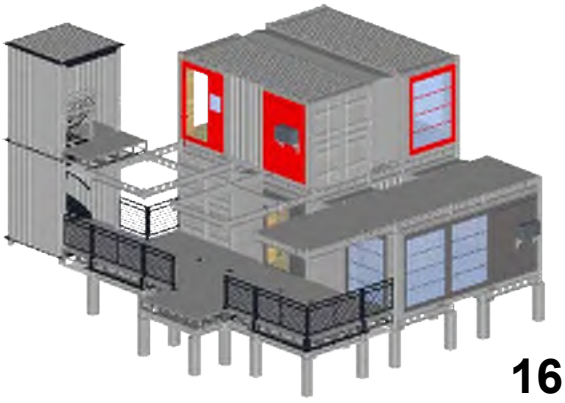

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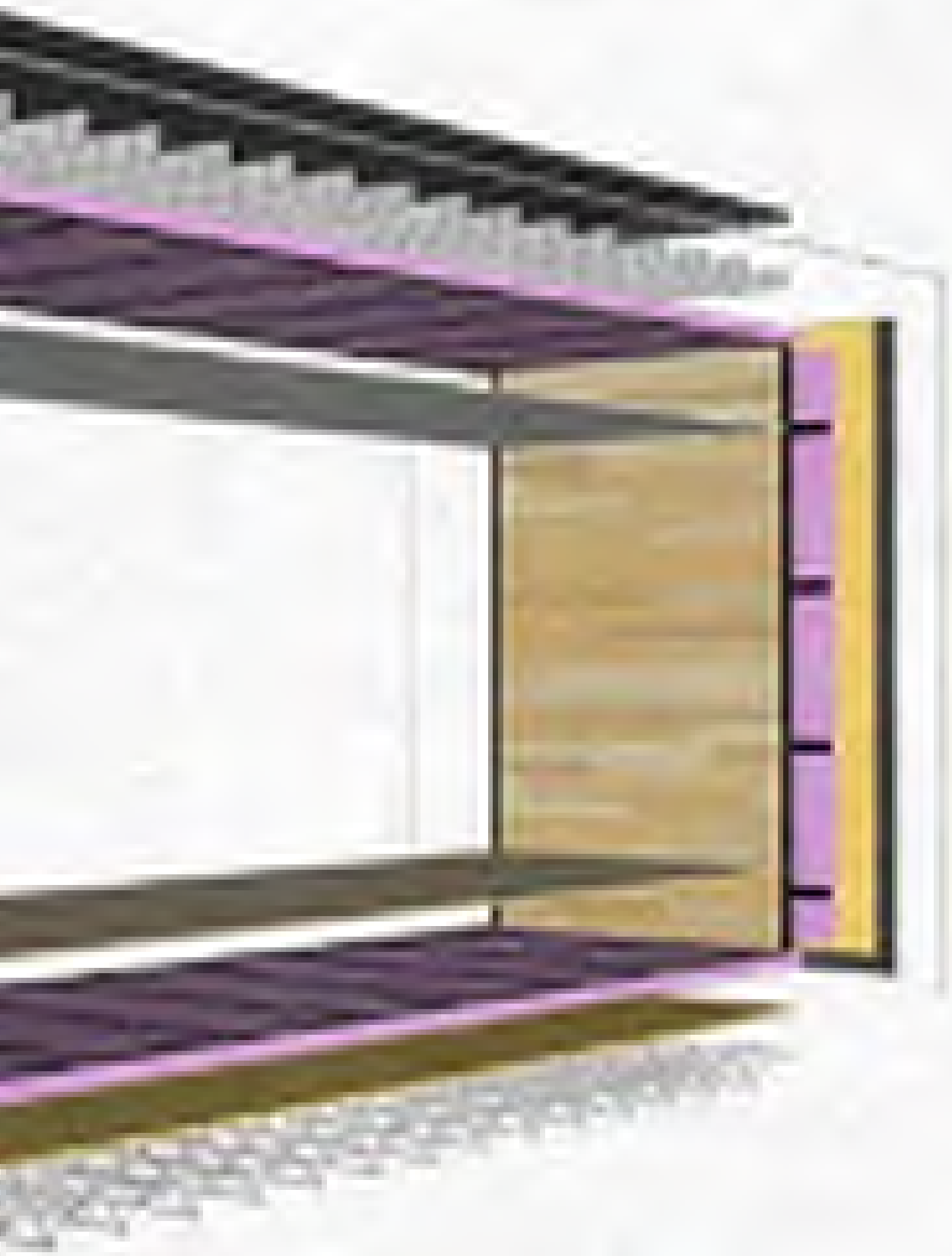
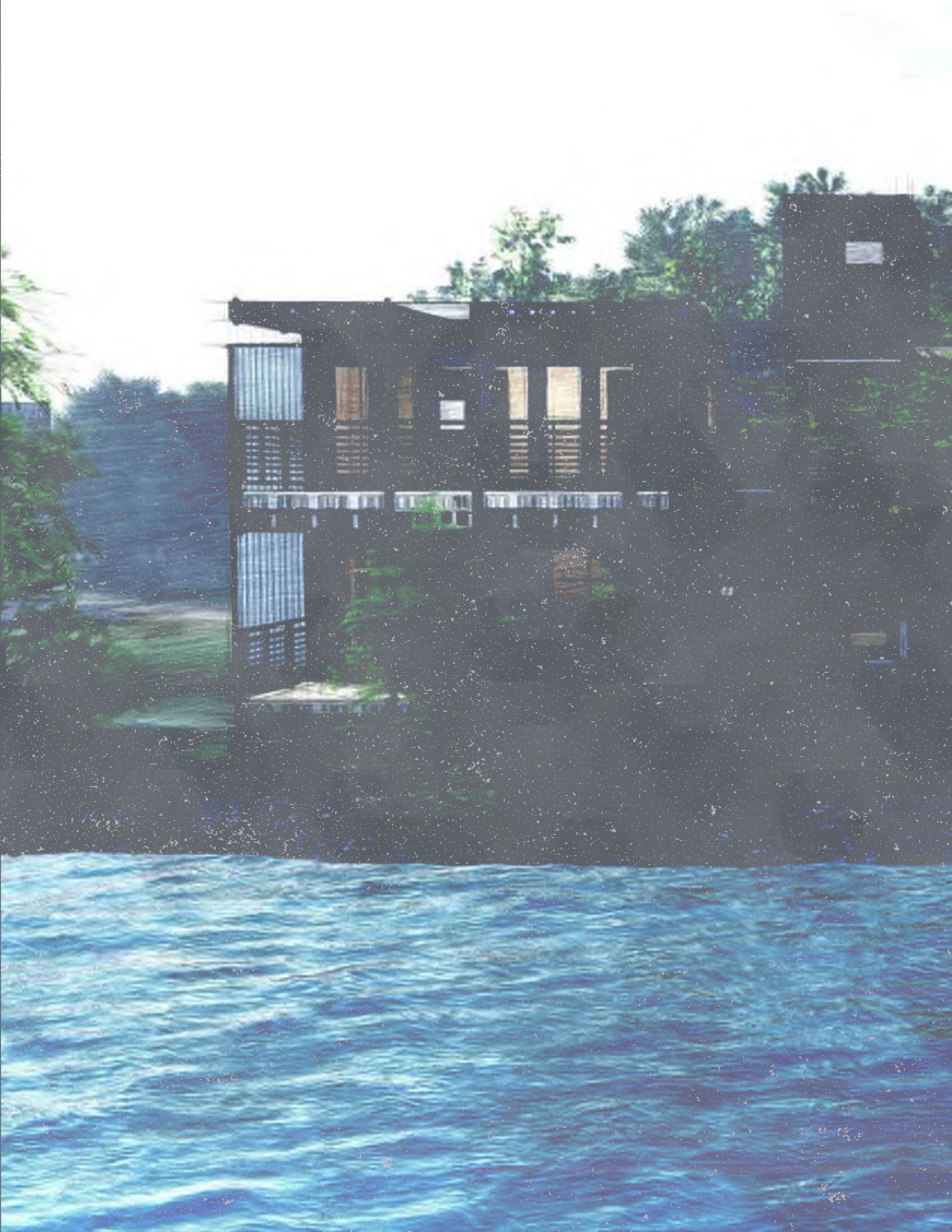
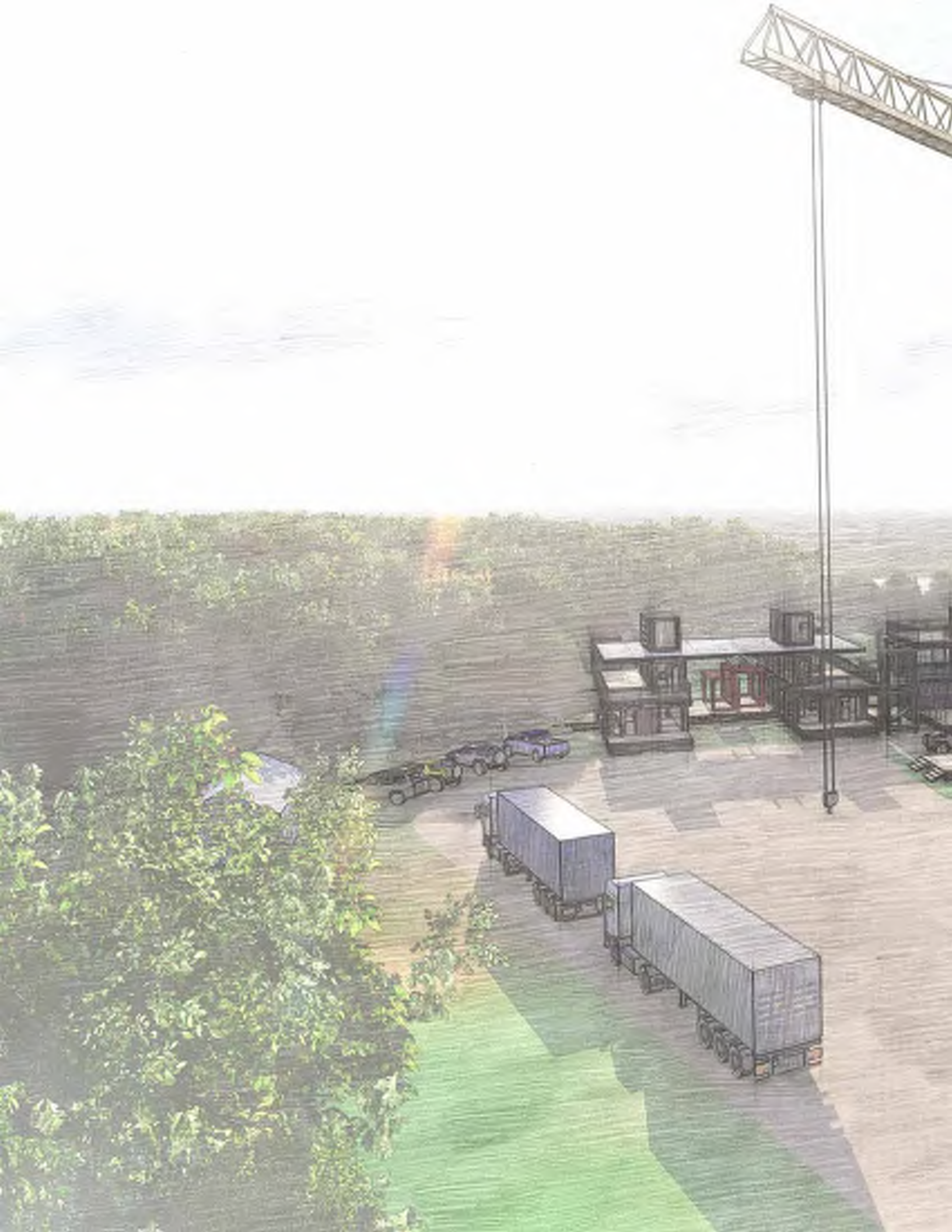
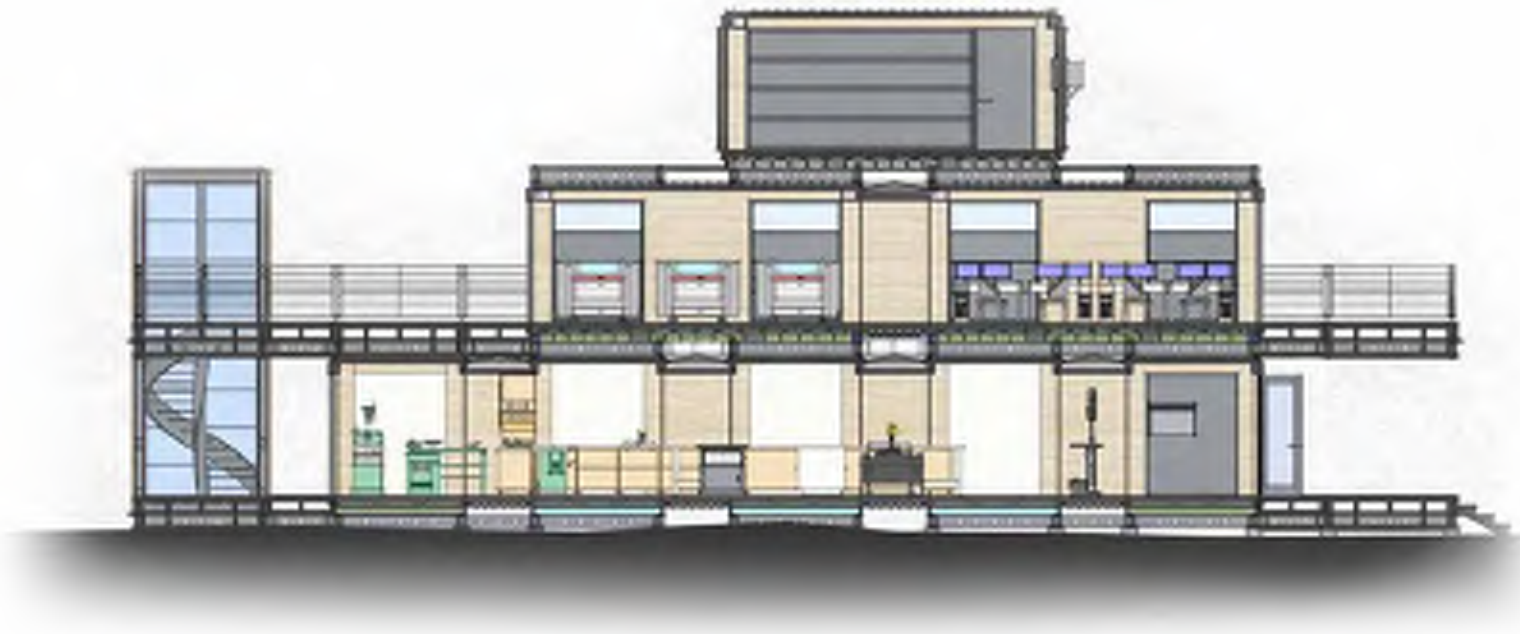
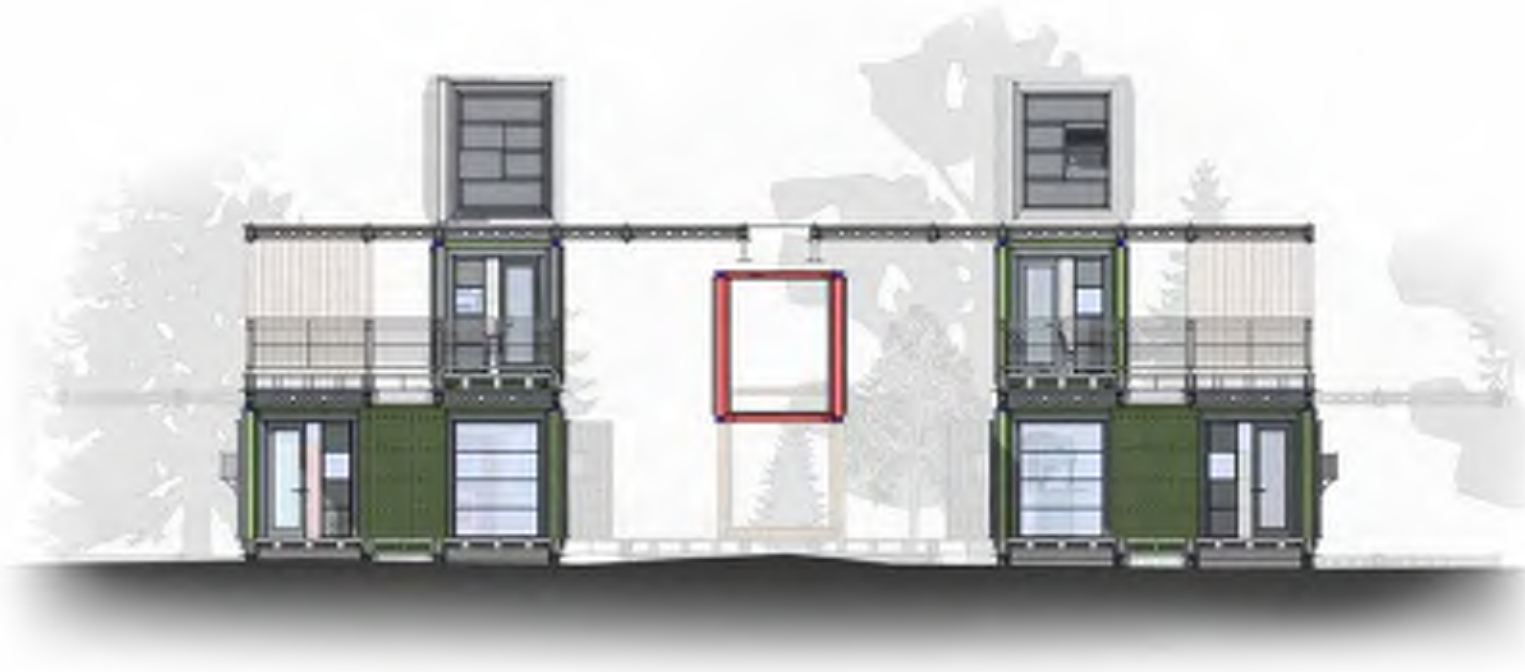


Site 1 - Camp Joy Dent, MN

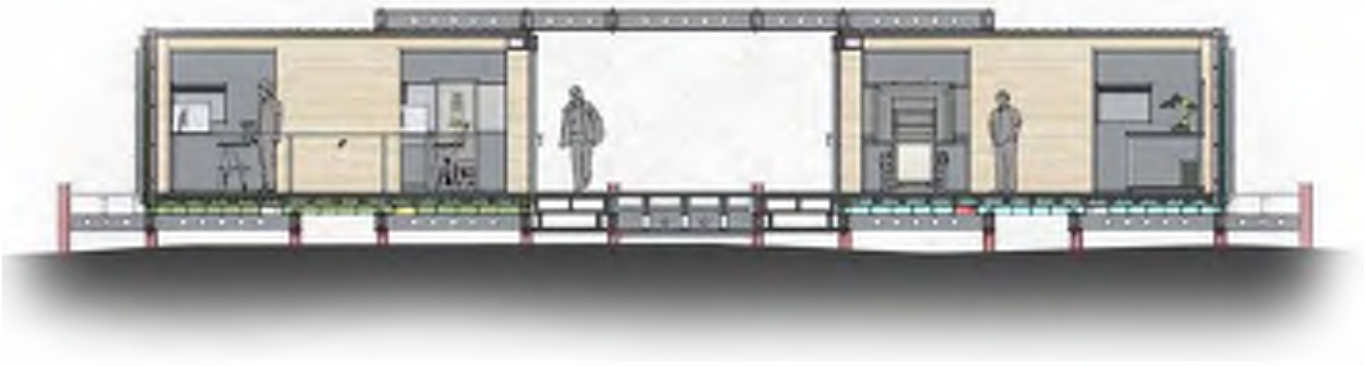


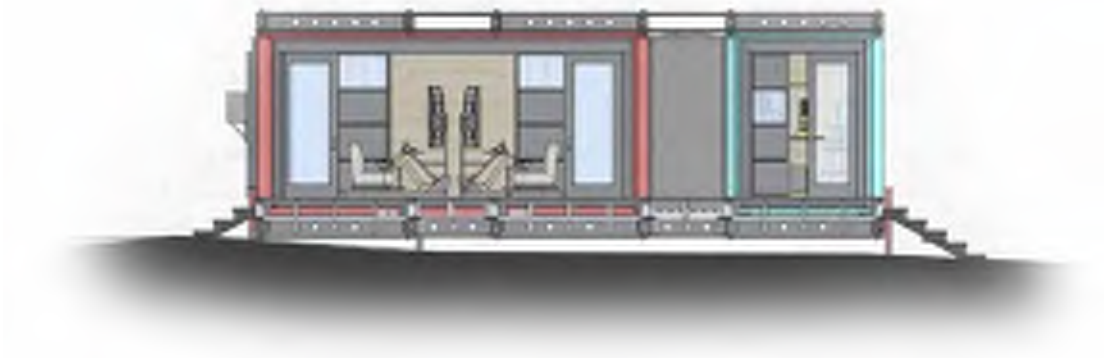


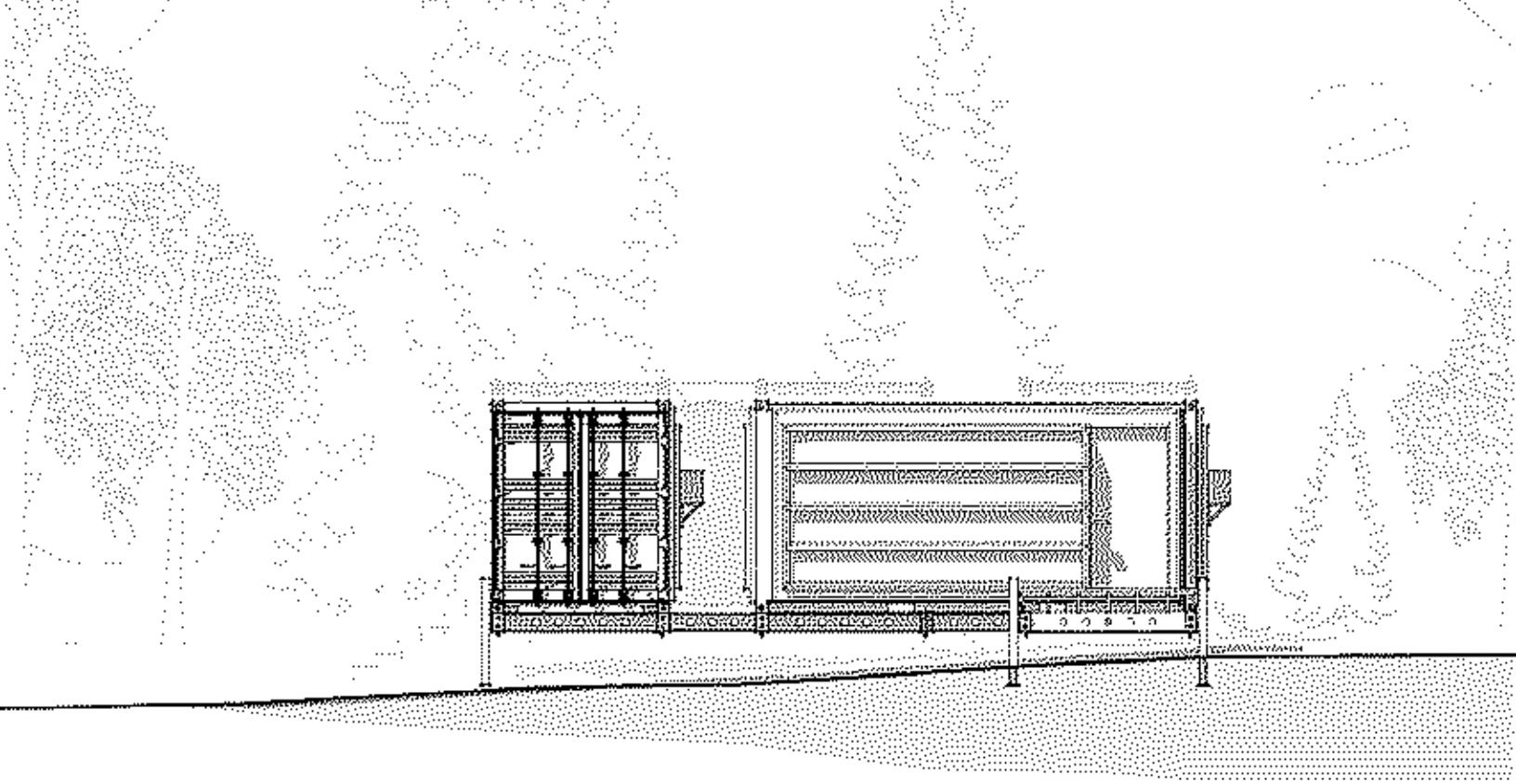


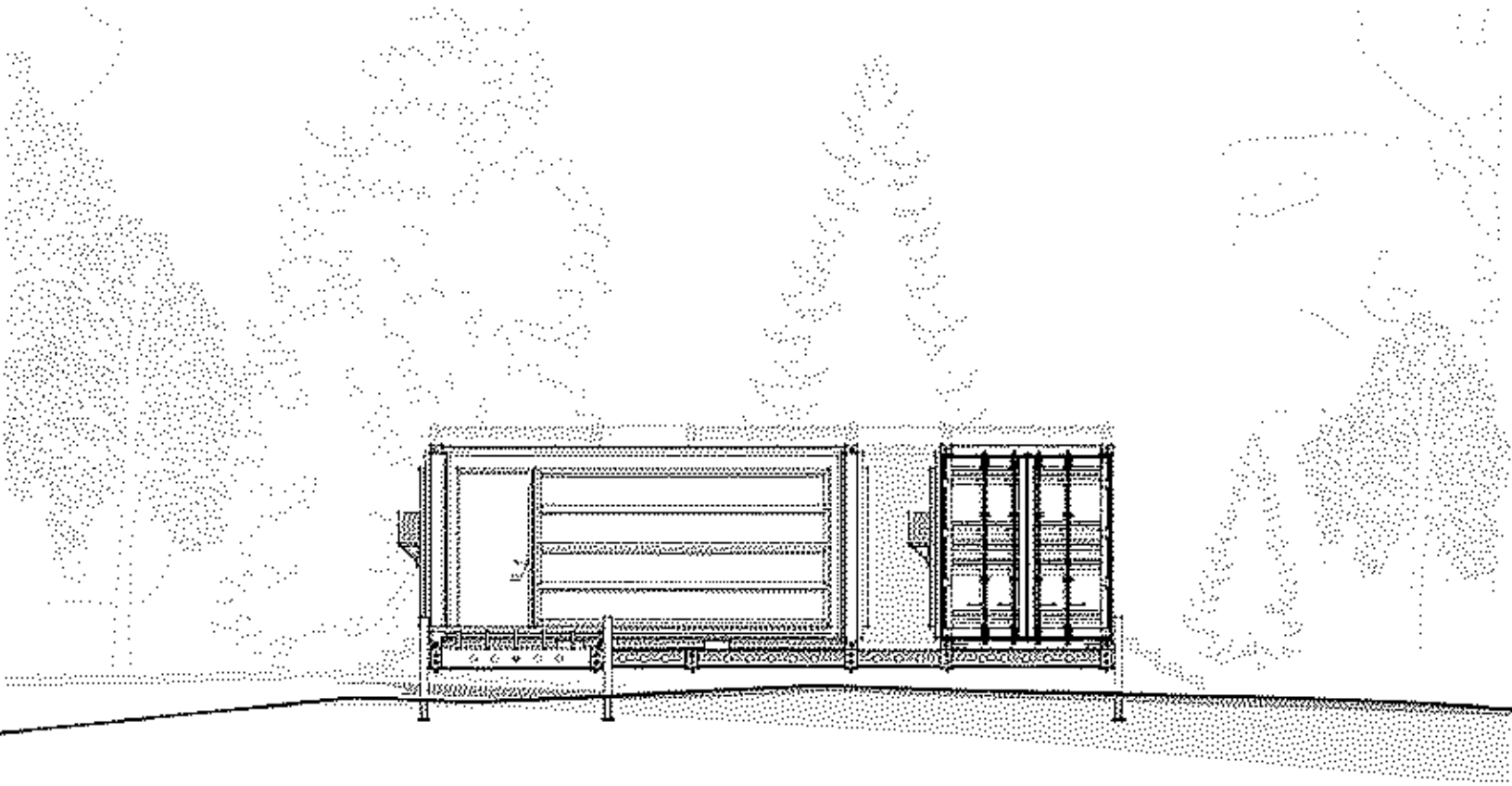


Site 2 - PCS School Moorhead MN










MEASU
TECHNIQUES
EXPLORATORY
PREDICTIVE
SAMPLE
MODELING
YSIS


RESEARCH
STRUCTURAL
TECHNIQUES
PREDICT
SEVERAL

Site 3 - Ace Tech Chicago, IL

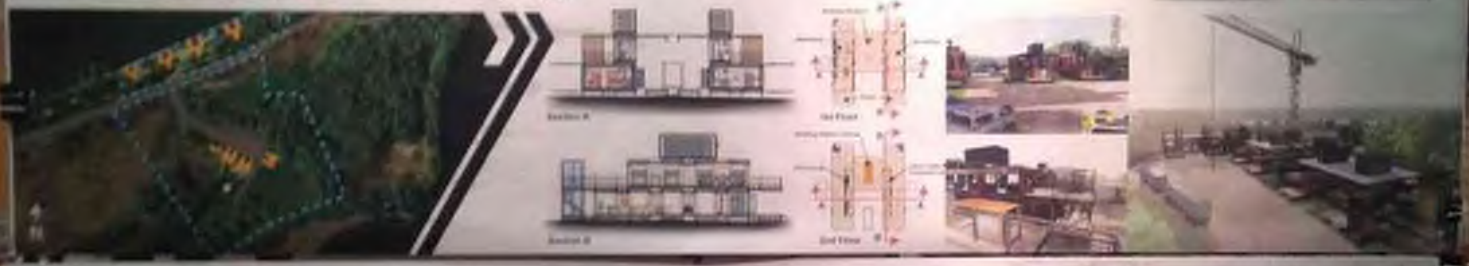
Photograph

(Project installation)

PODS AND MODS : MODULARITY AS A RESPONSE TO THE SKILLS GAP IN MANUFACTURING

PROCESS

SITE 1 › CAMP JOY DENT, MN



SITE 2 › PCS SCHOOL MOORHEAD, MN

SITE 3 › ACE TECH SCHOOL CHICAGO, IL

HOUSING UNIT AT SITE 1 (above)

THESIS APPENDIX

Bibliography

About Us | MFG DAY. (2017). Retrieved from http://www.mfgday.com/about-us

Archiprix.org. (2017). Ahmedabad 2017. Retrieved from http://www.archiprix.org/2017/

Architects, N. T. A. G. A. L. (Producer). (2017). Red River College STTC. Retrieved from https://www.numberten.com/projects/red-river-college-sttc

Bella Vista Landwirtschaftsschule | Ein deutsch bolivianisches Architekturprojekt - Landwirtschaftsschule. (2017). Retrieved from http://www.bellavista-code.de/entwurf/landwirtschaftsschule/

Benson, T. (2016). Motivating Millennials Takes More than Flexible Work Policies.

Bersin, J., Haims, J., Pelster, B., & Vyver, B. (2014). Corporate Learning Redefined: Prepare for a Revolution. Retrieved from https://dupress.deloitte.com/dup-us-en/focus/human-capital-trends/2014/hc-trends-2014-corporate-learning-redefined.html

Bhaduri, A. (2013). Four Reasons Why We Need A Mentor. Retrieved from http://www.wipro.com/blogs/four-reasons-why-we-need-a-mentor/

Bureau, U. C. (2017a, 2017-09-27T09:46:29.768-04:00). Census.gov. Retrieved from https://www.census.gov/

Bureau, U. C. (2017b). Manufacturing in the United States 2017.

Canada, S. O. (2017). Sponsor Feature: Sheridan College - Skills Ontario. Retrieved from https://www.skillsontario.com/news/sheridancollege/

Chaluvadi, A. (2017). Top Challenge for Builders is Labor Cost/Availability.

College, F. (2017). Kawartha Trades and Technology Centre : Fleming College. Retrieved from https://flemingcollege.ca/about-fleming/kawartha-trades-and-technology-centre

Deloitte.org. (2017). Manufacturing | Deloitte US | Manufacturing. Retrieved from https://www2.deloitte.com/us/en/industries/manufacturing.html

Design, B. S. o. A., & Bohn, K. (Producer). (2013). Reciprocating Structure | designbuild X change. Retrieved from http://www.dbxchange.eu/node/1429

Design, D. (2017). DownCity Design | Summer. Retrieved from http://www.downcitydesign.org/summer-1

DesignBuild, T. (Producer). (2012). Skills Center Nairobi | designbuild X change. Retrieved from http://www.dbxchange.eu/node/1215

Dietz, R. (2017). Construction Job Openings in September.

Don't Overlook Automotive Technology as a High-Tech Career Path - ASE. (2018). Retrieved from http://www.ase.com/News-Events/Publications/Car-Care-Articles/Don-t-Overlook-Automotive-Technology-as-a-High-Tec.aspx

Emerman, J., & Avenue, N. (2016). Can Mentoring Change Aging In America? Retrieved from https://www.forbes.com/sites/nextavenue/2016/11/30/can-mentoring-change-aging-in-america/

Energies, V. (2017). Industry 4.0: The factory of tomorrow will be autonomous. Retrieved from http://www.vinci-energies.com/en/its-already-tomorrow/towards-smart-industry/industry-4-0-the-factory-of-tomorrow-will-be-autonomous/

Friedman, M. (1979) Milton Friedman - Greed/Interviewer: Donahue. Donahue, Youtube.

Gates, T. T.-B. (2016). The Value of a Business Mentor - YouTube. Youtube: TED Talks.

Gen2Gen. (2017). Generation to Generation. Retrieved from https://www.generationtogeneration.org/

Giffi, C., McNelly, J., Dollar, B., Carrick, G., Drew, M., & Gangula, B. (2015). Skills Gap in Manufacturing - The Manufacturing Institute. Retrieved from http://www.themanufacturinginstitute.org/Research/Skills-Gap-in-Manufacturing/Skills-Gap-in-Manufacturing.aspx

Giffi, C., Rodriquez, M., & Mondal, S. (2017). A Look Ahead: How modern manufacturers can create positive perceptions with the US public. Retrieved from

Girlsbuildpdx.org. (2017). Girls. Power. Tools. Retrieved from http://www.girlsbuildpdx.org/

Glur, B., & Christenson, M. (2015). The Maker Factory. Retrieved from https://library.ndsu.edu/ir/handle/10365/24929

Grasz, J. (2017). Companies Losing Money to the Skills Gap: Leading Companies Make Commitments to Help Reskill Workers. Retrieved from http://www.careerbuilder.com/share/aboutus/pressreleasesdetail.aspx?id=pr807&sd=3/6/2014&ed=03/06/2014&cbRecursionCnt=1

Guild, T. F. (2017a). Apprentice Training Program.

Guild, T. F. (2017b). Dedicated to the art and science of timber framing. Retrieved from http://www.tfguild.org/

Hagel, J., Wong, J., Benko, C., & Erickson, R. (2014). Beyond Retention: Build passion and purpose. Retrieved from Deloitte Insights website: https://dupress.deloitte.com/dup-us-en/focus/human-capital-trends/2014/hc-trends-2014-beyond-retention.html

HASSELL (Producer). (2010, 2010-10-28). Advanced Manufacturing Centre / HASSELL. Retrieved from http://www.archdaily.com/85033/advanced-manufacturing-centre-hassell/

Hipple, S. F., & Sok, E. (2017). Tenure of American Workers : Spotlight on Statistics: U.S. Bureau of Labor Statistics.

Holt, W., & Mahalingam, G. (2016). Illinois . An Exposure to Sensory Interaction. Retrieved from https://library.ndsu.edu/ir/handle/10365/25592

. How Did American Industry Help Win World War 2 | US Army Documentary | 1942 - YouTube. (2017). In.

INC, C. I. (2017). A new blueprint for America's construction trades [Press release]. Retrieved from https://www.cbsnews.com/news/labor-shortage-a-new-blueprint-for-americas-construction-trades/

Instiute, T. M. (2017). The Manufacturing Institute. Retrieved from http://www.themanufacturinginstitute.org/

Klinger, E., & Booker, D. (2017). Borrowed Past: Reexamining High-Density Housing in South Korea. Retrieved from https://library.ndsu.edu/ir/handle/10365/25983

Labor, U. S. D. o. (2014). OPA News Release: $100M in grants to transform apprenticeship for the 21st century by expanding training into new high-skilled, high-growth industries [12/11/2014] [Press release]. Retrieved from https://www.dol.gov/newsroom/releases/opa/opa20142233

Labor, U. S. D. o. (2017a). ETA News Release: Obama administration announces $474.5 million in grants to expand demand-driven skills training and strengthen employer partnerships [09/18/2013] [Press release]. Retrieved from https://www.dol.gov/newsroom/releases/eta/eta20131932

Labor, U. S. D. o. (2017b). United States Department of Labor. Retrieved from https://www.dol.gov/

Library, C. (2017). American Generation Fast Facts.

Liechtenstein, U. o. (Producer). (2015). Summer School 2015 | designbuild X change. Retrieved from http://www.dbxchange.eu/node/1271

List of automobile manufacturers of the United States - Wikipedia. (2018). Retrieved from https://en.wikipedia.org/wiki/List_of_automobile_manufacturers_of_the_United_States

LLC, D. D., & Institute, T. M. (2015). Manufacturing Matters: Top 10 US public opinions about the manufacturing industry. Retrieved from http://www.themanufacturinginstitute.org/~/media/FEB38932B996491BA0ABCBA34F102FED/us_manufacturing_public_perception_study_top10_infographic.pdf

Manufacturers, N. A. o. (2017). Top 20 Facts About Manufacturing | NAM. Retrieved from http://www.nam.org/Statistics-And-Data/Facts-About-Manufacturing/Landing.aspx

Mayer, H. (Writer). (1964). The Inheritance - The History of Labor Unions. In H. M. Production (Producer).

Mehlman, T. K. George Costanza - What's in it for the mentor?

MENTOR. (2017). The Mentoring Effect - MENTOR. Retrieved from http://www.mentoring.org/program-resources/mentor-resources-and-publications/the-mentoring-effect/

NAHB. (2017). Labor Shortage.

NAHB. (TitleType). Type. Retrieved from http://www.nahbclassic.org/reference_list.aspx?sectionID=734&channelID=311

News, C. (Writer). (2012). Three million open jobs in U.S., but who's qualified? In C. N.-. Minutes (Producer). YouTube.

News, C., & Ponciano, C. (2017). Skilled trades summer camp: girls try welding, woodworking and more. Retrieved from http://www.cbc.ca/news/canada/kitchener-waterloo/girls-camp-trades-conestoga-college-skills-canada-1.4218376

Ontario, S. (2017). Summer Camp Program - Skills Ontario. Retrieved from http://www.skillsontario.com/camp

Oraclehcm. (2013). The Importance of Mentoring in the Workplace. Retrieved from https://www.youtube.com/watch?v=iwy3KKz_WfA

Overfelt, M. (2017). What millennials want more than anything else when they start a new job.

Overview of Qualitative Research Methods - YouTube. (2017). Retrieved from https://www.youtube.com/watch?v=IsAUNs-IoSQ

Pasel, R., CODE, & Berlin, T. (Producer). (2016). Landwirtschaftsschule Bella Vista | designbuild X change. Retrieved from http://www.dbxchange.eu/node/1120

Preston, J. (2016). It's a two-way street: Four ways mentoring benefits the mentor - The Chronicle of Evidence-Based Mentoring.

Preston, J. (2017). New research shows that volunteering can help keep older adults' minds sharp - The Chronicle of Evidence-Based Mentoring.

Rhodes, J. (2015a). Should mentors be compensated? Two experts weigh in - The Chronicle of Evidence-Based Mentoring.

Rhodes, J. (2015b). Study Highlights the Benefits of Serving as a Mentor - The Chronicle of Evidence-Based Mentoring.

Rhodes, J. (2015c). The many benefits of charitable giving: Prosocial Spending and Happiness - The Chronicle of Evidence-Based Mentoring.

Rhodes, J. (2017a). Mentoring by the Numbers: Some Surprising Trends in Volunteer Efforts.

Rhodes, J. (2017b). What's in it for the mentor? Seinfeld (and others) explain. - The Chronicle of Evidence-Based Mentoring.

Rhodes, J. (2017c). Why "intentional" mentoring is so important - The Chronicle of Evidence-Based Mentoring.

Rowe, M. (2013a) Dirty Jobs' Mike Rowe on the High Cost of College (Full Interview) - YouTube/ Interviewer: N. Gillespie. ReasonTV, Youtube.

Rowe, M. (2013b) Jobs in America - SKILLS GAP/Interviewer: B. Maher. Real Time with Bill Maher, Youtube.

Rowe, T. T.-M. (2009). Learning from dirty jobs | Mike Rowe. Youtube: TED PARTNER SERIES.

Rural Studio Fabrication Pavilion. (2017). Retrieved from http://www.ruralstudio.org/projects/rural-studio-woodshop

Rural Studio Woodshop. (2017). Retrieved from http://woodworkshop.ruralstudioblogs.org/?og=1

Sinek, S. (2016) The Millennial Question/Interviewer: T. Bilyeu. Inside Quest, Simon Sinek, Youtube.

Statistics, U. S. B. o. L. (2017). U.S. Bureau of Labor Statistics. Retrieved from https://www.bls.gov/

STEMconnector - World Class Collaboration to Enable the STEM Economy. (2017). Retrieved from https://www.stemconnector.com/

Swanson, A. (2016). Study finds young men are playing video games instead of getting jobs. Retrieved from http://www.chicagotribune.com/business/ct-video-games-jobs-emploment-20160923-story.html

Tech, L. (2017, 2012-12-04). Lincoln Group of Schools - Student Consumer Information. Retrieved from https://www.lincolntech.edu/consumerinfo

The Arm Behind the Army 1942 US Army; Industrial Production for World War II - YouTube. (2017). Retrieved from https://www.youtube.com/watch?v=nfdIKOZyzBQ

The Way We Won: America's Economic Breakthrough During World War II. (2017).

Tim Cook Discusses Apple's Future in China I Fortune - YouTube. (2018).

Torpey, E. (2014). Got skills? Think manufacturing : Career Outlook: U.S. Bureau of Labor Statistics. Retrieved from https://www.bls.gov/careeroutlook/2014/article/manufacturing.htm

Torpey, E. (2017). Got skills? Think manufacturing : Career Outlook: U.S. Bureau of Labor Statistics. In.

Unknown (Writer). (2016). The Rise of Labor Unions. In. YouTube: 16mm Educational Films.

URBANFRAME. (2017). Hands-on Lab. Retrieved from http://www.urbanframe.org/about

Urbano, I., & Pacheco, P. (Producer). (2014). Training center for special education (USAER XXXIV) | designbuild X change. Retrieved from http://www.dbxchange.eu/node/1054

Weber, L. (Producer). (2017). Apprenticeships Help Close the Skills Gap. So Why Are They in Decline? Retrieved from https://www.wsj.com/articles/apprenticeships-help-create-jobs-so-why-are-they-in-decline-1398178808

Who is Killing American Manufacturing? (2016).

Wial, H. (-001, -001-11-30). Interactive: Locating American Manufacturing. Retrieved from https://www.brookings.edu/interactives/interactive-locating-american-manufacturing/

Wisconsin, D. o. W. D.-. (2017). Youth Apprenticeship Students.

Workshop, C. B. (Producer). (2015). Colorado Outward Bound School Micro-Cabins | designbuild X change. Retrieved from http://www.dbxchange.eu/node/998

World War II: Timeline. (2017).

Wyman, N. (2017). Building The Case For Skill-Based Education.

Yestermorrow. (2017). Yestermorrow Design/Build School. Retrieved from https://yestermorrow.org/

Zelon, H. (2016). "Generation War?" New Survey Shows Few Takers. Retrieved from https://encore.org/blogs/generation-war-new-survey-shows-takers/

Previous Experience

FALL 2010

University
Texas A&M University
College Station, TX

Professor
Weiling Hu

Project
Cave Residence & Scuba Shop

Project Description
This project experimented with designing a residential structure into a cavernous landform using Maya and NURBS modeling.

SPRING 2011

University
Texas A&M University
College Station, TX

Professor
Craig Babe

Project
The Habitbal Bridge

Project Description
This project focused on developing breakout and congregating spaces on an enclosed bridge that would link three architecture buildings. Revit was the primary modeling software.

FALL 2011

University
Montana State University (Artemis Institute)
Bozeman, MT

Professor
Lori Ryker

Project
Owen Bircher Pavilion

Project Description
Located near Jackson Hole, WY I participated with six other students to design, present, and build a metal and wood pavilion for the local community. The project connects a local wetland to the townships lone park where seasonal events are held.

SPRING 2012

University
Texas A&M University
College Station, TX

Professor
Craig Babe

Project
The Museum

Project Description
This project focused on developing floorplans and controlling pedestrian flow through a building by developing a circulation path. The project resulted in developing a museum that showcased a particular artists work.

SUMMER 2012

University
Texas A&M University
College Station, TX

Professor
Self Directed

Project
Texas A&M Dorm Furniture (Design Build)

Project Description
I and two other colleagues designed and built a furniture, using reclaimed white oak wood from the university campus, to be placed in the new dormitories.

FALL 2012

University
Texas A&M University
College Station, TX

Professor
Michael O'brien

Project
The Cybernarium

Project Description
This was the capstone project for seniors where systems, structures, and architectural designs were integrated throughout the entire process. My project qualified as "Best in Studio" and showcased a futuristic view of technologically infused public libraries, otherwise referred to as a cybernarium.

SPRING 2013

University
Texas A&M University
College Station, TX

Professor
Mark Odom

Project
Tiny House (Design Build)

Project Description
This studio focused on the design and fabrication of a small tiny house structure for traveling speakers and guests to reside in when visiting the university.

SUMMER 2013

Location
Buena Vista, CO

Professor
Self Directed

Project
Mountain Residence (Design Build)

Project Description
I and four other colleagues designed and built a mountain residence high in the Colorado rockies.

SUMMER 2013

Location
Kalimazoo, MI

Director
The Timber Framers Guild

Project
Farmers Market (Design Build)

Project Description
I voluntered with the TFG to cut and construct 33,000 linear feet of timbers to build a farmers market.

SUMMER 2014

Location
Flathead Lake, MT

Director
John Hudson

Project
Tribal Waves Masterplan & Design Build

Project Description
I participated in a summer internship where I and twelve other students learned about architecture and faith in Jesus. We then designed a masterplan concept for the tribal waves ministries campus on the Polson Indian Reservation in Polson, MT. We eventually then built two small structures to jumpstart the initial vision for this masterplan.

FALL 2016

University
North Dakota State University
Fargo, ND

Professor
Mike Christiansen

Project
Algorithmic Design

Project Description
This was a class that explored algorithmic design via Rhinocerus and Grasshopper.

FALL 2017

University
North Dakota State University
Fargo, ND

Professor
Mark Barnhouse

Project
Wetland Research Lab & Greenhouse

Project Description
This was an advanced studio project showcasing a wetland research facility through the medium of Lumion's video rendering.

Personal Identification

JOSH CRISTY

www.joshcristy.com
joshkcristy@gmail.com

“I am an aspiring architect with a passion for Design Build. I currently work as a Project Designer developing renderings and construction documents while collaborating with various clients durig the design development stage.

I graduated from Texas A&M University in 2013 with a Bachelors in Environmental Design and now I am pursuing my Master’s of Architecture degree at North Dakota State University, with planned graduation of May 2018.

Skilled labor is becoming a thing of the past. I am out to defy this trend by engaging in modern trades and skilled labor techniques while also refining my skills in architecture as a project designer.

It is my hope to partner with professionals of many different trades and architectural backgrounds to continue refining my craft while providing quality design for all, and, to one day equip younger men with those skills which will empower them to design, build and explore a better future.”