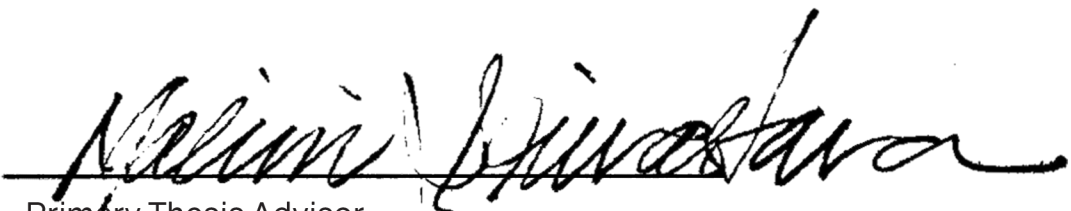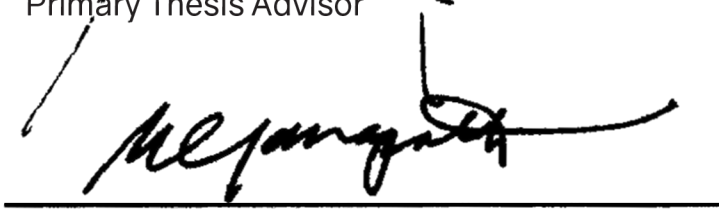# Crafting Community Through Architecture

CRAFTING COMMUNITY THROUGH ARCHITECTURE

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
Master of Architecture

_____
Primary Thesis Advisor

_____
Thesis Committee Chair

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This project intends to allow the public to have easy access to various resources and spaces within which to practice art, material hobbies, music, or simply gathering in a creative environment. This intent will be fulfilled with the design of a creative community center on a site in downtown St. Paul. The building will of course address needs such as accessibility and sustainability, as well as simply being an enjoyable public space. However, the main objective of this thesis is to identify and apply the elements of architecture that can connect an urban community through the design of a makerspace.

My design thesis will focus on creating a space where people can create things and interact with one another. I witnessed a space like this first-hand in Europe, when we visited the city of Kortrijk. The city supported a sort of community center where people had access to various resources, such as art studios, music rehearsal areas, and to our delight, a wood shop and technology area complete with laser cutters and 3D printers. This typology is an important resource in the modern age and it is and vital to encourage people to work with their hobbies and be productive. I believe that this type of environment could be a very successful display of architecture.

I propose to design this structure in downtown St. Paul. Ideally this space could function on its own, but perhaps it would be wise to join forces with a similar organization in the Twin Cities. My general outline for research topics is: 1) What sort of resources would benefit the city of St. Paul the most? 2) How can architecture help to encourage people to be designers themselves? 3) How can this space be designed in a way that will be easily adapted or added on to for future needs?

These question are important for architecture as a whole because the building could help to educate and enable the public in the methods and abilities of design fields, while also being a display of quality design. Ideally, this typology could be replicated in other cities as well, however my design will rely heavily on the context of the site, as should future editions of this building. So the focus of this project will be a single instance of this typology. The goal of this project is to research and create a dedicated makerspace to provide an interactive environment that all can enjoy.

The project typology is called a makerspace. It is a relatively recent concept that has gained widespread popularity in cities across the world. The makerspace provides the general public with access to high quality machinery and tools for 'making'. These buildings often include woodworking machinery, laser cutters, 3D printers, sewing machines, art studios, and gallery space, and are often very open spaces that allow for a versatile working environment. The result of this project will be a makerspace design that fosters community in downtown St. Paul.

Figure 1

Figure 2

BUDA::Lab is a project in Kortrijk, Belgium and has many attributes that make it a good makerspace. It has a good location amidst a residential riverfront, is has a lot of open space for versatility in its uses, and the forms are inviting for new patrons. Pictured above is the entry condition, which is in contrast to the surrounding buildings with an intense angular form. This form is repeated in the central staircase and is one of the elements that makes this design a success: it gives emphasis to the circulation spaces and reinforces the idea of community by stretching through all three levels of the interior. The entry mirrors this shape with a void outside the main doors. The building is rather unassuming at a glance, but the color of the brick and the shape of the 'courtyard' help it to stand out.

Figure 3
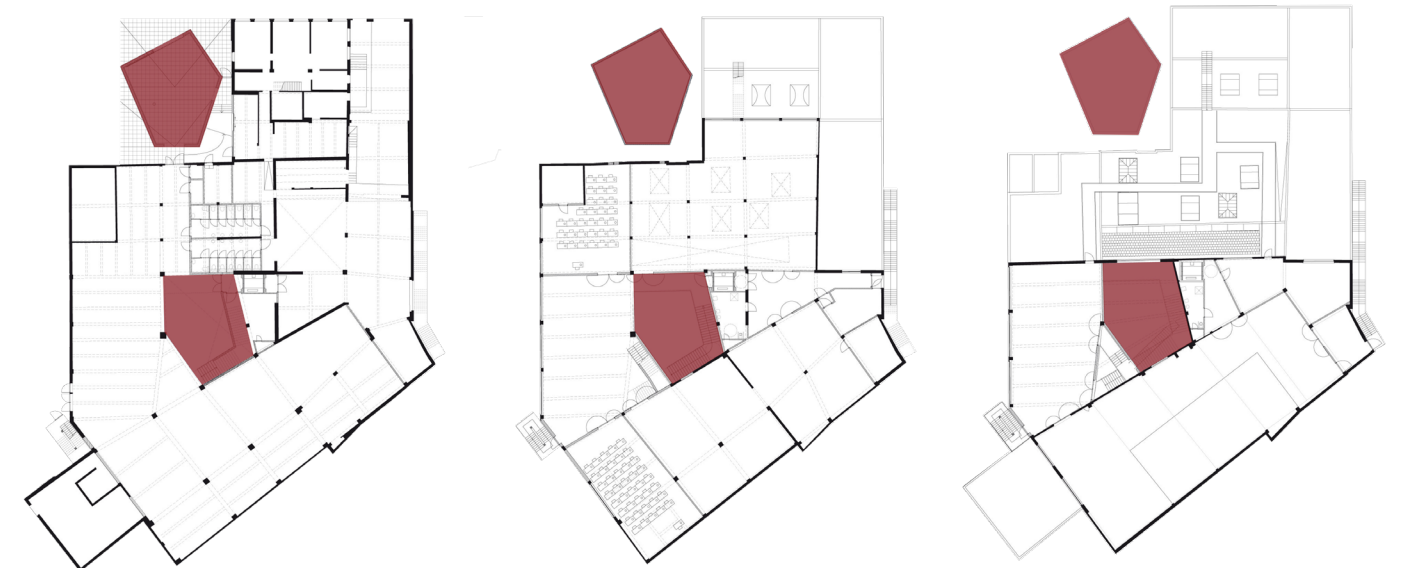
Figure 4

The central circulation staircase, highlighted in red, is an odd five-sided structure that connects all important spaces together. The stairs hug the interior walls, leaving a large atrium in the center of the building. These plans also illustrate the spatial layout: open gallery space occupies the ground floor, while the second and thrid floors are reserved for more smaller and more specialized rooms.

Figure 5

Kortrijk has a relatively low profile for a cityscape, and so the three story height of BUDA::Lab fits in with its surroundings. Here we can also see that the entry courtyard is open to the elements. This sort of enclosure is a good segway between the outside world and the interior of the building.

TAKEAWAY:

One important thing I learned from this research is that a building does not have to be expensively built or over-designed to be a good project. The architects of this building have a chieved a lot with very little and that is a good thing to keep in mind. Another takeaway is the idea of an identifying central space. The entry and circulation areas of this project were successful in my opinion and I would like to emulate these ideas to create a similar sense of community in my project.

Figure 6

The 'Open Works" makerspace in Baltimore, Maryland is an example of a reuse of an older space, as many buildings in this typology are. However, the finished renovation looks brand new, and as my project will be new construction, I think this is a suitable reference. One of the things I believe is most effective here is the flexible use of the plaza area that stretches out to the street corner. The designers made good use of an awkward lot shape and added additional functionality to the makerspace. To me, this is a good alternative example to the five-sided shape of the BUDA::Lab. The site creates a sense of community with the vegetation, active plaza, and various entrances scattered around the perimeter of the building. It is interesting to note that this building also resembles its neighbors in terms of height and relative size. Still, the bold diagonal stripes on the exterior portray a modern facility, and in this area the building may serve as a sort of landmark for the neighborhood. Another point of interest is that the interior furnishings are only composed of necessary equipment. This suggests that the form and design of this typology is heavily dependent on the function.

Figure 7

Baltimore

Maryland

Figure 8

Figure 9

Despite having only one floor, the architects still decided that open space was important to the design. The central spaces are mainly utilities, allowing the spaces around the perimeter to gain natural sunlight and open floorspace. It should also be noted that the building is accessible from three separate entrances, which encourages public access.

Figure 10

The building sits at the edge of a neighborhood, separated from downtown Baltimore by a rail road track. However, it is adjacent to one of the largest parks in the city. This may surround it with an attitude of leisure and enable more exposure to the public.

TAKEAWAY:

This project shows how a good exterior site can enhance the design and the potential use of a space. It also tells me that makerspaces are minimal in the interior. This means that the design should emphasize what goes on inside the space, rather than try to create a brand new experience. One thing that I think this project could improve on however is accessibility. All entrances have an incline to reach them, and while there are ramps for some of them, I think it would be better if the building came down to meet the street level.

Figure 11

Figure 12
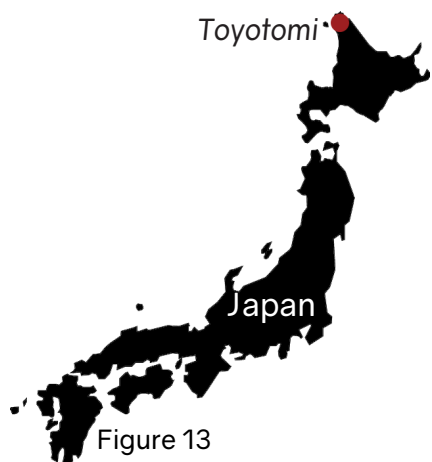
Toyotomi
Japan
Figure 13

The Toyotomi Community Center is a versatiel environment for learning and health. The design has a very fluid circulation through and between the space, and this is something I wish to achieve with my own design. One of the factors contributing to this successful design is the use of diffused natural light in the ceiling and from the exterior walls. This soft light is best for activities that require a lot of visual concentration, and so it will be important for me to incorporate it into my own design. I also appreciate the simple use of materials on the interior. Spaces are separated not by walls, but by a change in the floor or ceiling pattern.

Figure 14

The floor plan reveals that the main entry (blue) is a central node to the rest of the spaces. One side (green and yellow) is dedicated to learning activities such as reading and contains many study rooms. the other side (purple and red) is more focused on the health and wellness aspect of the community. This separation based on function seems simple, but it is a very effective design especially for a public facility such as this one.
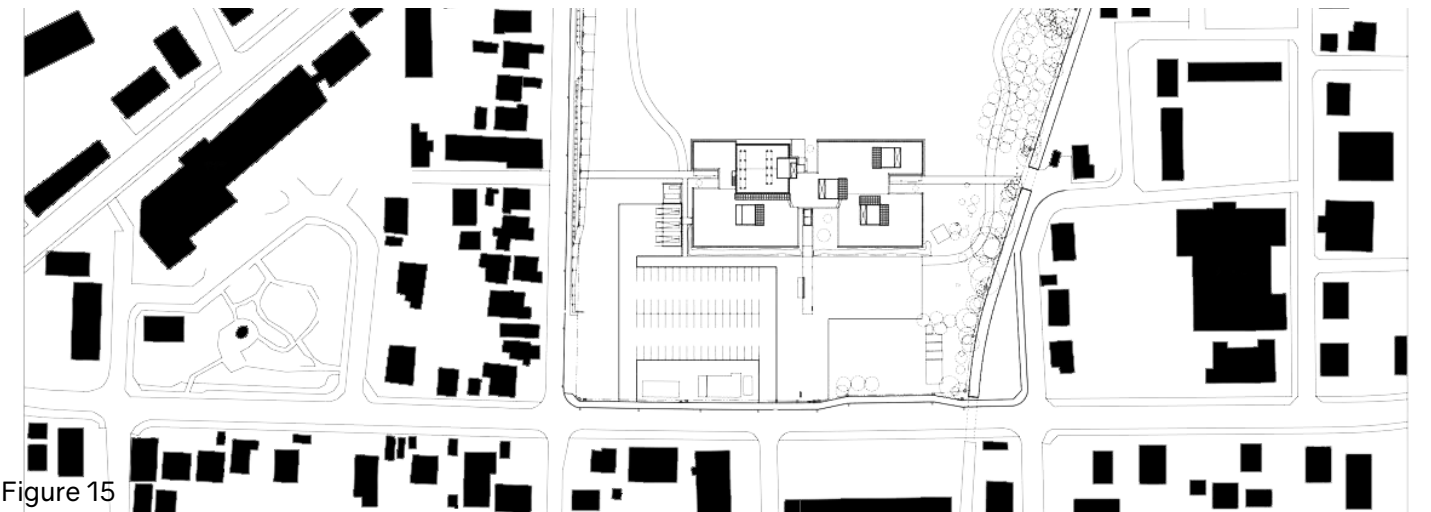
Figure 15

The community center is in a small suburb of Toyotomi, and also features a large open park. Here you can see that the designer gave the nearby homes a respectful distance and set back the building on all sides. This is a good example of how the building adapts to its context.

TAKEAWAY:

My main takeaway from this case study is the material usage and the restraint that is exhibited with its simple and functional layout. This building is one that was built to serve its community. It makes no effort to take over the space, but instead it fills it in a similar way to its surroundings. This attitude is one that I wish to use for my design. Form should follow function in a community space.

EXTERIOR AREAS
this includes entries, parking, landscaping, and other exterior elements that are open to the public at all hours.

PUBLIC SPACE
These spaces transition between outside and inside, and are for public use. They require plenty of natural light and privacy is of no concern. Spaces in this category include circulation areas, gallery space, and seating areas.

SPECIALIZED AREAS
These spaces will each have specific functions, for example, a woodshop, classroom, or a ceramics studio. They will require special equipment and mechanical functions. However, they are still public areas and should have natural lighting and easy access to other spaces.

PRIVATE AREAS
These spaces could be studios or private breakout areas that may require scheduling ahead of time. They may have some direct access to public areas but privacy is a priority in terms of visibility, acoustics, and circulation.

UTILITIES
The utilities are mechanical spaces, toilets, storage, and maintenance areas that will not require frequent access. These will be prioritised to not occupy valuable areas of the site that have good access to sunlight and they will not need to be easily accessible to the public.

EXTERIOR AREAS　　PUBLIC SPACE　　SPECIALIZED AREAS　　PRIVATE AREAS　　UTILITIES
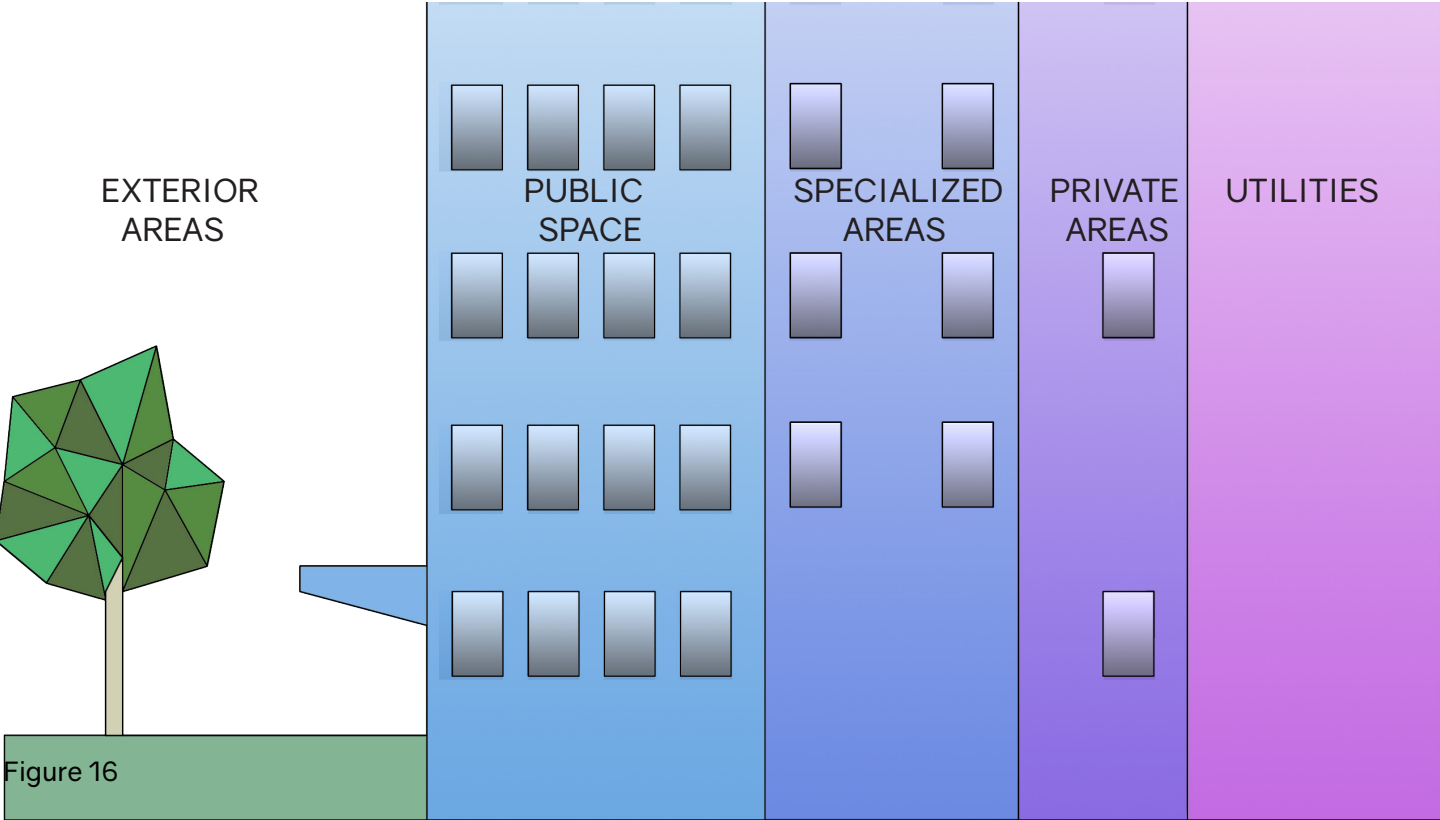
Figure 16

The users of this project would be anyone who has the impulse to create. The idea is that even people who have no experience would be able to take the time and learn a new skill or hobby. Painters, sculptors, engineers, musicians, woodworkers, and more would have a convinient public place where they can work and form a community. An outdoor space could also creat a space for small-time vendors, street artists, performance artists, or just people looking to relax.

This project should be done in conjunction with an existing institution for makers. The one that I have chosen is called Nordeast Makers. They are a small group of people that started a makerspace in Minneapolis in 2013. They had to make do with a repurposed old building for their own makerspace, but I think a new design can better accomodate their needs. The funding for their project comes from its members, who pay a monthly fee to gain access to ll the tools and machines of the makerspace. Members also have access to free training in these skills. this exchange of knowledge is very important to the idea of a makerspace and a sense of community.

With this client in mind I think this location would provide a good foundation for a new Makerspace in downtown St. Paul.

Figure 17

Minnesota

St. Paul
Figure 18

The site is located in Downtown St. Paul near the new Saints Baseball Field. The area is zoned as mixed-use, but it is surrounded by residential zones and has several parks nearby. It is also located near the interstate and is a walkable distance from many apartment buildings, so it is very accessible. One issue that will certainly affect the design is its proximity to the freeway. Noise from this roadway may negatively impact the users of the makerspace, so an acoustic buffer of some kind will be required. Another challenge will be how to best capture the sun, since the southern exposure is limited during the winter. However, there are also some good opportunities. Both streetside corners of the site have a lot of potential for pedestrian usage, particularly the southwestern corner. Many of the buildings in the immediate area are older, but this presents an opportunity to aid in the renewal of the neighborhood.
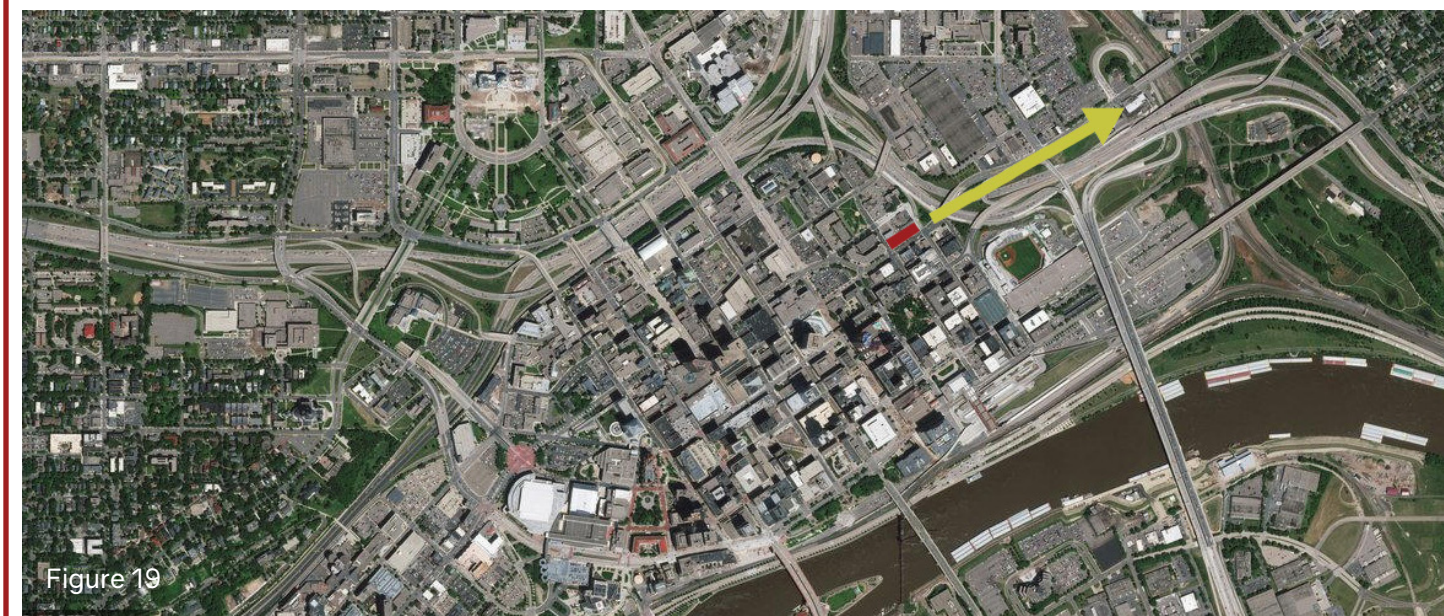
Figure 19

This large-scale map shows downtown St. Paul. The city quickly changes into residential or industrial zones. Being on the edge of the city, my site has an opportunity to provide a transition between neighborhoods and pull people into the city. Although the freeway lies to the east, the view in that direction is still good due the the rising hills and treescape.
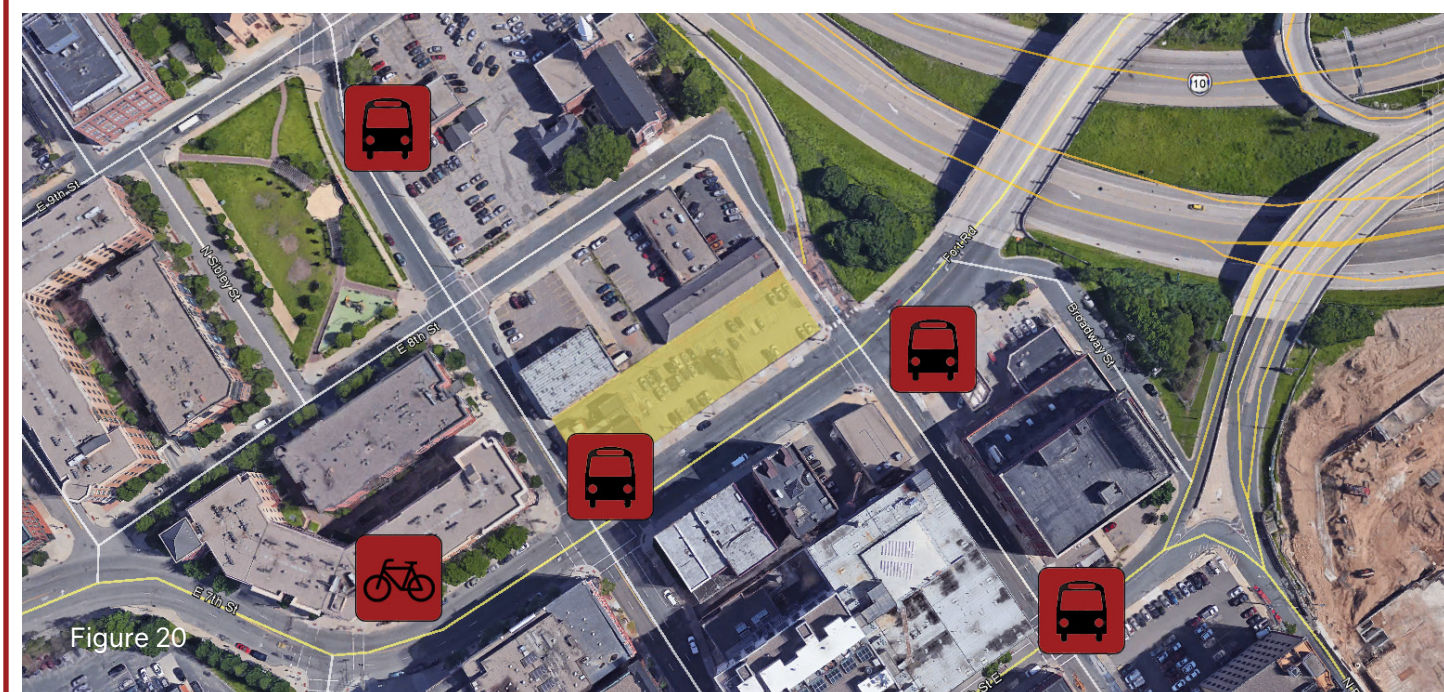
Figure 20

This map shows the location of nearby bus stops as well as a bike-share station. These stops provide excellent service to the downtown area, and particularly my site. This gives me an opportunity to connect to even more of the city and perhaps design a bus stop.

My main priority with this project is to create a community-centered design on a small scale. I would like to put focus on the public and circulation space and examine how they interact with the site context. Using models, computer models, and research, I would like to determine how public space can both react to and reinforce a sense of community in an urban environment, with downtown St. Paul as the specific study.

This study will hopefully express my design abilities and increase my knowledge on model building and problem solving within an urban context. Public space is one of the most interesting aspects of design in my opinion because it frequently defines the built environmet and expresses a culture. With this project, I will seek to both express and serve the public culture of downtown St. Paul.

Academically, the goal of this project is to further my knowledge of building environments and creating spaces that are useful in the real world. I intend to ahieve this through several iterations of deisng with physical models, digital models, and sketch drawings. I want to work with these methods together and try to find a way to effectively move from one medium to another without backtracking or losing important elements. This is something that I struggle with as a designer, so I hope that this project can increase my knowledge in that regard.

Professionally, I want to craft a thoroughly designed project that responds to its environment both socially and physically. I believe that this can be done using the methods stated above, and I believe that at the end of the year, these methods will prove themselves in a presentation format.

My personal goal is to design a project that I can be proud of and use as a stepping point for future work. I want it to be a testament of my abilities as much as a display of my interests.

The next stage of my thesis development is responding to the Site Analysis. This will enable me to think about the design of the building and how it can respond to its environment. Graphic and digital analysis will be used primarily during the design phase of the project. It is also my intention to use many model-making resources for the design process, such as laser cutting and 3D printing. I believe that this sort of development is important for this project in particualr because my work can serve as an example of what the building can bring to the cummunity, and I believe that physical models are more engaging as form studies than regular digital modeling.

For now, most of my research will be using the mixed-method approach, using both qualitative and quantitative focused research to determine an appropriate response. Documentation of my research and design development will be achieved digitally, with an organized compilation of photos, charts, texts, observations, and any other media that may present itself. The models I make will also be documented digitally for safekeeping and for a more comprehensive presentation.

In this review, I will discuss that attitude of several professionals over the concept and practical development of a makerspace. The main result of this research has told me that the makerspace typology is flourishing and has seen rapid growth in recent years. Both professional and amateur designers of all fields seem to agree that makerspaces have a very positive impact on their community and even the economy. There are several issues to be worked out however, especially when considering energy usage and the policy of each makerspace.

The first article is an edited transcript of an interview with several architects and professors working for MIT. They have a background in architectural education and have been doing research into the concept and use of makerspaces. They have been able to see the great positive impacts of them easily with students and the 'maker' culture that is readily found at MIT. First I will cover how this typology can create an environment for discussion. I will then describe one of the main functional issues in designing a makerspace. Lastly I will present a review of the opinions of the interviewees regarding the demographics that this typology tends to serve.

Creating a Forum: Toni Loiacano, another interviewee, describes the makerspace typology very well. He says that "We found that there's a village quality that captures people and keeps them in place. One of those qualities has to do with complementary spaces. . . there's a need for some kind of a forum, a place clean enough that you could bring a venture capitalist in, talk about theories, and a glass wall to show people working on or demonstrating prototypes. There tends to be a great need for meeting spaces, and they're often team spaces. These two types of spaces have become really critical". This quote really encapsulates the idea behind my thesis, where a makerspace can be more than just a laboratory for 'doing'. It is a forum for discussion and education in an environment that encourages making things. May good community buildings provide a similar sense of 'forum' as well, but I think it is very relevant and useful for a makerspace as well, because it can relate directly to the crafting going on. This quote is also helpful to me when considering the elements of my program. For example, I may need to add more square footage in a gallery/gathering space.

Potential Issues: One of the interviewees mentioned that the issue with the makerspace typology is that it consumes a lot of energy. There is no real way around this, since the tools and machines

in the space just need energy. But it could be resolved by several technological advances, as well as a more energy-efficient building design. Jeffrey Schantz says that, as designers, "what we need to do is find ways to deal with the industrial hygiene without adding to the energy equation" This may be something that I can work on in my thesis project. But I think my main goal is still to create a community environment.

Target Audience: Another thing that was discussed in the article was the idea that makerspaces should cater to the younger generations and they talked about what the kids want these days. In the article, Susan S. Szenasy says, in reference to students, that "They hear and feel that the world is falling apart. At the same time they want to fix our broken world. So how do you, in academia, not play up to apocalyptic predictions, but rather recognize the new generation's energy and figure out what kinds of spaces and what kinds of programs can tap into that energy?" The kids fear the apocalypse but they want to learn how to improve it. This is something that is certainly important for the longevity of the building, and I must take into consideration how this attitude might change in the future. Still, I would prefer to keep my design for the largest number of people and not target age demographics. I think this would bring some benefits as well because then older, more experienced 'makers' can share their skills if the environment is well suited for that. If the space is just for kids then what the heck. Won't work. But I understand the perspective of Szenasy in the article. It makes sense. But that view makes more sense for a school environment like MIT instead of a public setting like my site in St. Paul.

A
With this in mind, I think the research and review of this article has provided me with some good insight into the design of my thesis project. The information found in this article can have very real effects on the practicality and efficiency of my design, and for that reason I found it valuable. Another article tells us about the up-and-coming makerspace ideas that are manifesting in Singapore. The focus of this piece is on the future of the makerspace and how it will be used to connect people based on their interests. First I will review a statement about how it connects designers with other development groups. Then I will talk about a potential issue with the way the makerspace is implemented in Singapore. I will conclude by reviewing how the culture of Singapore is helping to encourage this kind of collaboration.

Cross-Collaboration: The article mentions how a state-sponsored 'design marathon' really exhibited the power of open collaboration. The article states that "The winning design . . . showcases what the design and tech communities can achieve when they work together. It was to encourage more such cross-collaborations that the government's information technology and telecommunications agency opened the makerspace at the National Design Centre. IDA Labs . . . is one of three in the city that offer spaces to make ideas into prototypes and to connect designers and technologists with mentors and investors." The marathon featured "170 designers, students, tech developers, and health-care specialists," which showcases the diversity of people

that can could make use of such a space. I find it interesting that the 'maker culture' can be found throughout the world. I also find it very promising that these sort of facilities can have a tangible, positive impact on the societies they are in. With my own project I will seek to design a space that can be utilized by as many groups as possible, as in the example of this article. However, due to limited time and resources, my own project may not be able to include all aspects seen here, and certain priorities must be in order. Still, I think this is a good background to have for my thesis project.

Potential Issue: While nothing is certain, one of the contributors to the article did have some reservations about the makerspace and how it is being implemented in Singapore. Their labs are all government sponsored, and this gives entrepreneurs a greater sense of freedom when going about their craft. "If there is one weakness in Singapore's comprehensive support for design, it is that it might result in future generations becoming over reliant on the state." Again, this is something that is not certain and the attitudes towards makerspaces are bound to change as they become more popular and more effective at contributing to their cities, but this issue is a very real threat to the long-term success of the makerspace. However, this issue has a lot more to do with policy and government than it does on the actual design of a space. And though it is important for my thesis to develop this policy, I don't think this issue will need to be addressed directly through architecture.

Entrepreneurship: David Toh, a manager of one of Singapore's investment firms, says that "A rising number of young Singaporeans are seeking to create instead of finding employment." This is an opportunity that the government is ready to utilize. He says that "We are always working towards developing the infrastructural support and community to groom and nurture these entrepreneurs." The makerspace is a perfect example of this 'infrastructure' that is needed to encourage the entrepreneurial spirit. All this goes to show that the idea or a makerspace is derived from the culture of the place it serves, and that the very concept of makerspace is a pragmatic concern. The typology is built to serve a function in society, and this is something that appeals to me. I have great interest in architecture that arises from a concrete need, and I think that the need for makerspaces in today's world is a good example of that. I think that with the current rise in 'maker culture,' the makerspace could even become a part of the modern vernacular style.

This article has revealed some key points on how the typology serves the culture and the great value that the makerspace gives to its community. This article shows us that these buildings have great potential to be a core part of small business development and craftsmanship education, things which are undeniably important today and in the future. What remains to be seen is how people will adapt and use these spaces well into the future.

After studying examples and researching the typology, I created these diagrams to illustrate and guide the design process affecting the program. I have identified several key components of a makerspace and approximated their square footage and relation to each other. This is simply a starting point and the values/relationships are subject to shange as I progress through the design phase. The adjacency chart to the right shows which spaces should be next to or near each other, to develop a hierarchy of form. Below, the space allocation table lists values for varying sizes of makerspace and shows the proportion of each space relative to the rest of the building.
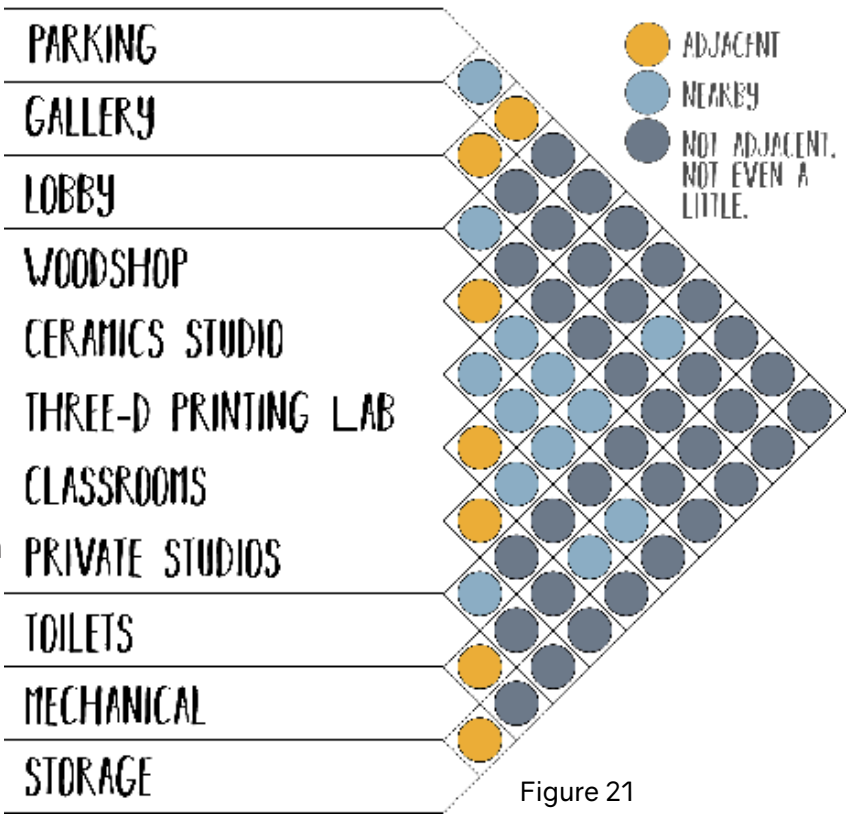

Figure 21

Figure 22

	Small		Average		Large	
Gallery	800	6.3%	900	5.8%	1000	5.4%
Lobby	1100	8.7%	1300	8.3%	1500	8.0%
Woodshop	1600	12.7%	2000	12.8%	2400	12.8%
Ceramics Studio	1400	11.1%	1700	10.9%	2000	10.7%
3D Printing Lab	800	6.3%	900	5.8%	1000	5.4%
Metal Working Studio	1300	10.3%	1500	9.6%	1800	9.6%
Classrooms	1600	12.7%	2000	12.8%	2400	12.8%
Private Studios	1400	11.1%	1700	10.9%	2000	10.7%
Toilets	600	4.9%	900	5.8%	1200	6.4%
Mechanical	1600	12.7%	2000	12.8%	2400	12.8%
Storage	400	3.2%	700	4.5%	1000	5.4%
	12,600		15,600		18,700	

This project is important to me because it reflects my personal interests. I thoroughly enjoy models and craftsmanship, and I love seeing the result of time, effort, and passion put into any field. The fact that the result is a physical object with some conceivable use is even better. For this reason, designing a space where people can do this is something that I have a great interest in. This project comes at a time in my academic development where I have learned the basics of the many skills I need as a designer. With this project I can focus more on the typology of my choosing. This project is also valuable to me as a student to be a good summary of my learning at NDSU. Professionally, this is important for me as a student about to enter the field, because I don't know exactly what I want in an architecture career. I haven't had enough real world experience to determine what I like and don't like, so, this project is a good way to show what I like and then use it as a resource for comparing other typologies/areas of focus.
This project will add to my skills by forcing me to think not only about how I can make the project work, but why this project is important in the first place. It will also have me thinking more as a developer, choosing a site, typology, and context, and using my current architecture skills to create the project. Economically, this project is relevant because the space will contribute to the learning and practice of important manual skills. It is privately funded and will not be a profitable building for an organization, but it contributes to the development of the workforce which is just as important to the economy. The technology used in this project is necessary for the typology and is justified by the use of its occupants. Although I do not know the design or materials of the building yet, the typology favors more pragmatic design and so I am confident that a resourceful and environmentally friendly solution can be reached. This project for me is only an option, and not an imperative. I am not one to rush into a problem intending to solve it with design skills. However, this project would indeed have a positive impact on the surrounding area and economy in general. Socially, it would be a welcome addition to the residential/small business surroundings because most of the people there could be potential users and/or benefit from people using the building. This project could be solved by someone else I'm sure, but for me one of the focuses of architecture is making a building that is context sensitive, and this is a problem that must be solved with every project. In my project, I am simply solving this problem as one particular iteration on one particular site. I should be the one to work on this iteration because it is relevant to my interest, I know the area, and I am familiar enough with the design techniques needed to solve it.

Historically, the specific typology of this thesis is fairly young. However, the program borrows many of the same elements found in any workshop or manufacturing facility, which have a larger historical presence. The main difference in this modern approach is the smaller scale and incorporation of the public in the facility's use. From a social perspective, this thesis is riding the trend of the makerspace idea, where there is a shift towards more physically impactful projects in a computer-dominated society. A large component of this thesis is working to create a community environment with architecture, and although this will be a difficult goal verify, it is as much a part if the program as any other piece. The cultural aspect of this thesis is set in a very familiar Midwestern environment. A large feature of this culture reveals itself in the cold winter months, when people are forced to migrate indoors. It will then be very important to address this with the architecture of the makerspace.

Figure 23

Figure 24

BUILDING DENSITY

Above is a satellite image from 2015. To the left is a figure-ground diagram I created to study the density of buildings in the area surrounding my site (in yellow on both images). To the north of my site, the building density is very low, however the freeway cuts across there and brings its own irritation such aas noise and foul smell. To the souh, the buildings are more densely packed and they ar emuch taller there as well. Most buildings there are mixed-use and they have lots of residential space. My site lies on the outskirts of Downtown St. Paul, but it is still well placed within the area with several amenities nearby.
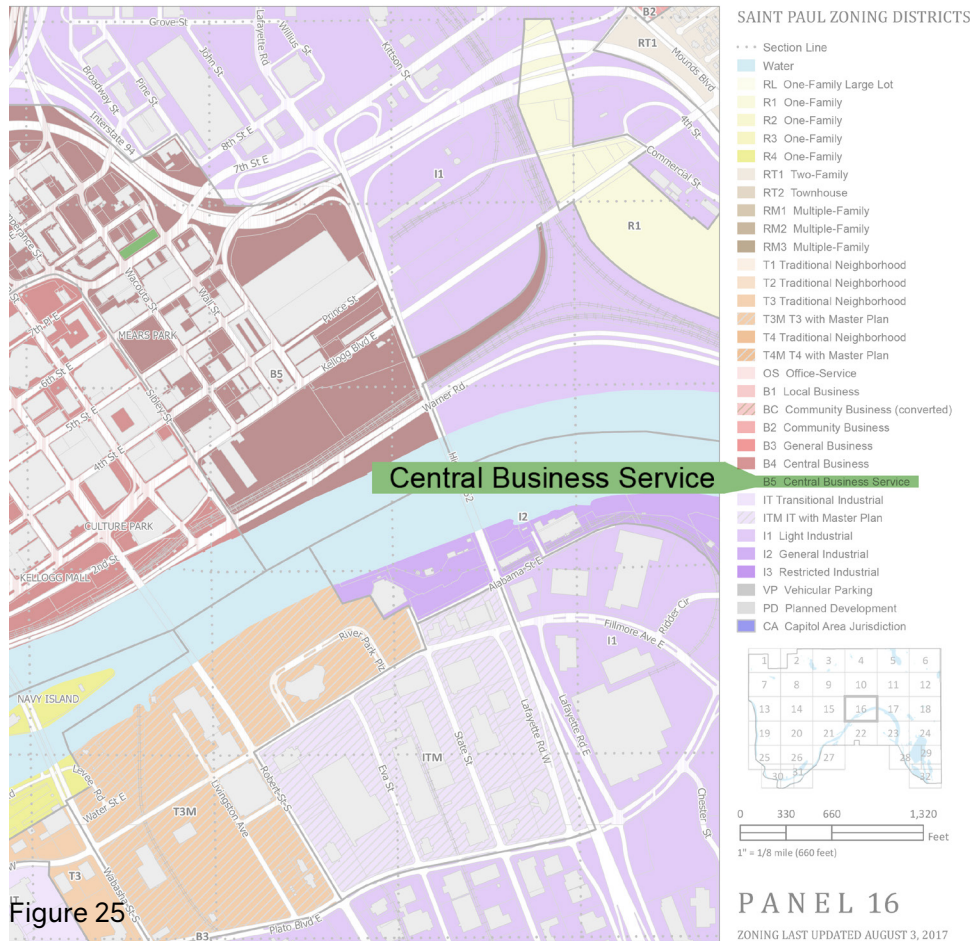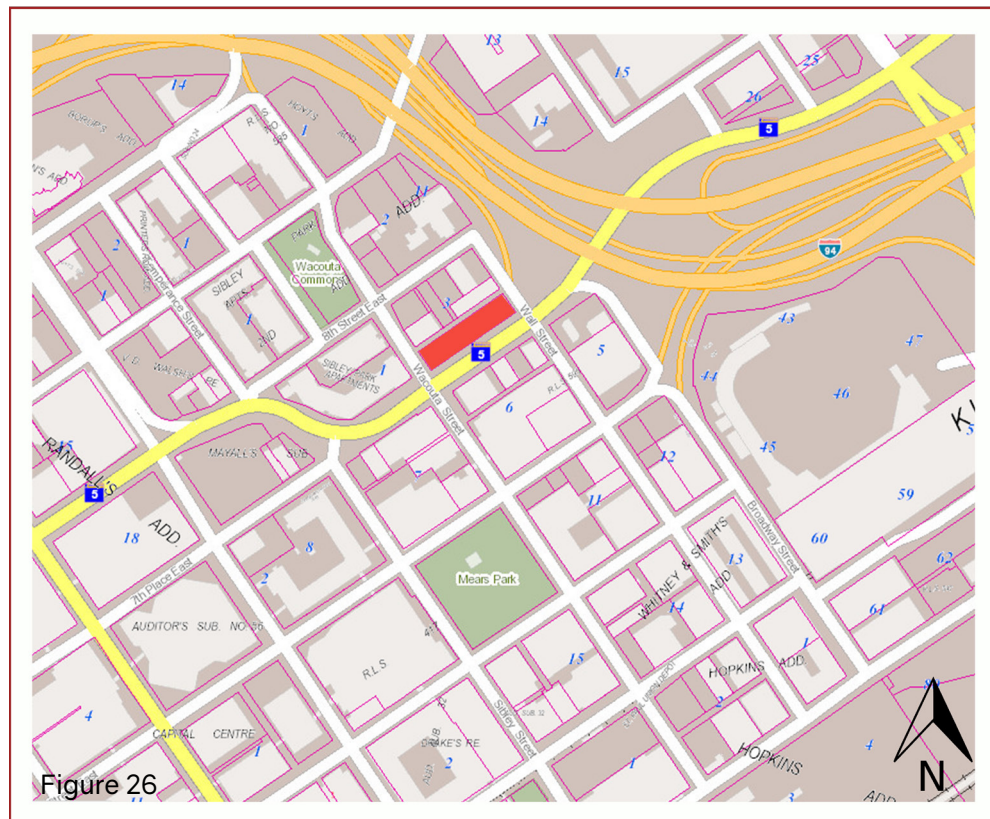
Figure 25

ZONING AND UTILITIES

This zoning map shows that my site is zoned for a business. This will work well with my typology because it is essentially a business and will have similar operating hours as the nearby small businesses. Because this site is locates downtown on an existing plot of land, it already has access to utilities such as electricity and plumbing. The makerspace will require several specialized mechanical functions but these will be handled internally with special HVAC appliances.

LEGAL BOUNDARIES

This maps shows the building lots and legal lines as stated by the city government. This illustration also clearly shows the proximity to the highway and the major lanes of traffic that afford easy accessibility to visitors. My site occupies several tiny plots, but these boundaries ar ecurrently being ignored by the use of the site at present.

Figure 26

Figure 27

VEHICLE/PEDESTRIAN TRAFFIC

In the diagram above, the freeway is highlighted in orange, and the roads are overlaid in white. The site is easily accessed because it is on one of the main avenues through Downtown St. Paul. Below, I have illustrated my observations of pedestrian traffic. Red and orange areas show higher density traffic, while the yellow areas represent lower density traffic. The traffic through my site is minimal, but it is very close to high-traffic areas.

Figure 28

Figure 29

GREEN SPACES

With this diagram I have overlaid the green spaces near my site. This map is a little decieving because the northern green spaces are within the boundaries of the freeway. However, Mears park lies just to the south (the large square) and there are several other small parks, in addition to the baseball stadium. The proximity of these green spaces means there is not a dire need for more green space, however incorporating it into my design could help to link the existing spaces together.

VEGETATION

This map shows the major vegetation (dark green dots). From the plan view we can see that much of the vegetation is used to block noise and/or sightlines to and from the freeway. I have also identified a small streetscape element in front of the apartment building to the west of my site. This may be an opportunnity for me to sontinue the street scape through my design and help to unify my building with its surroundings.

Figure 30

Figure 31
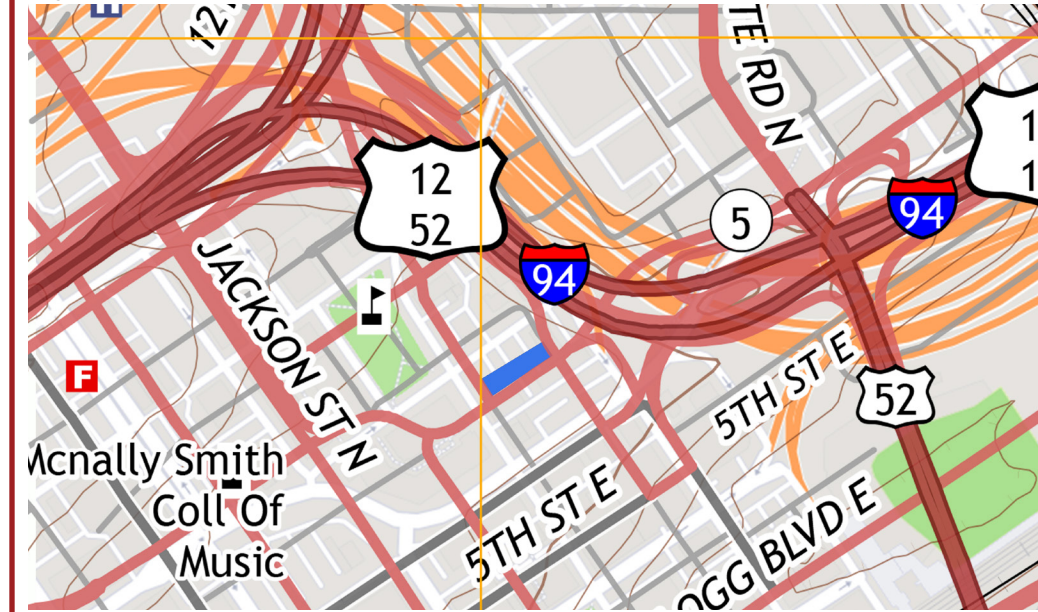
TOPOGRAPHY

The topography of my particular site (shown in blue) is very level, with a very *very* gradual slope to the south and the Mississippi River. This means that I will had to design a drainage solution to deal with excess water and snow. A green space of some kind could help with this problem.

HISTORICAL PHOTOS

Immediately to the left is a photo from 1957 of my site. The freeway is not here yet and allthe surrounding buildings are farily small and short. The gridded avenues continue to the northeast and overall the entire neighborhood is much more structred and homogenous than the modern-day version. The image below (Figure 35) shows what my site looked like in 1974. As you can see, the highway has made quite an impact on the site and how it is perceived. This image was taken before the vegetation was planted, meaning that the noise from the freeway would have penetrated my site.
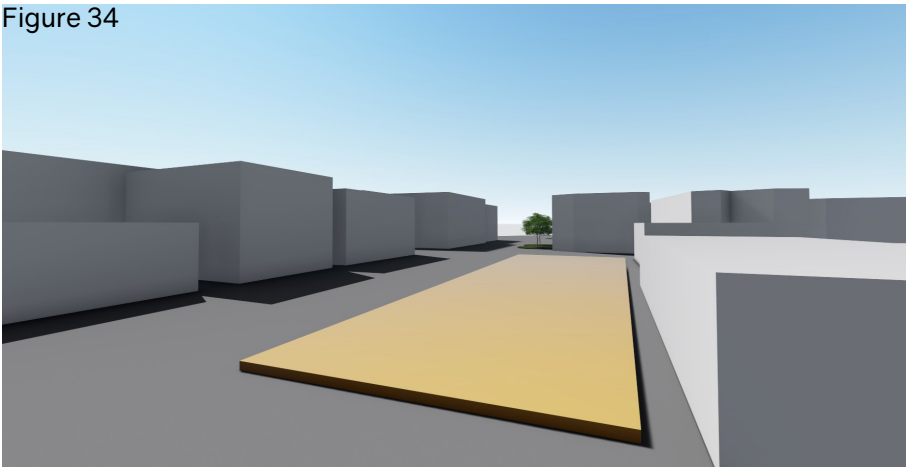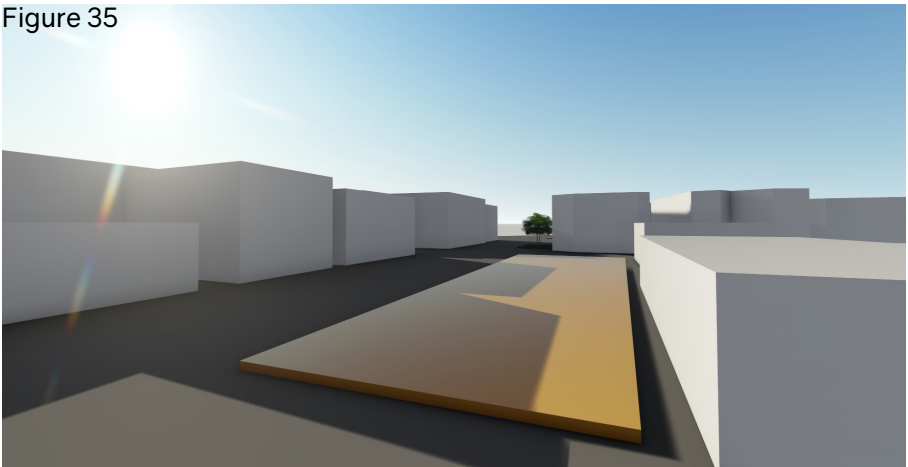

Figure 32

Figure 33

Figure 34

LIGHTING QUALITY

The site receives planty of natural light during the summer, because non of the nearby buildings are tall enough to cast a shadow across the street during the season. In this illustration, the sun is at its higest point and it is sirectly south of the site. The yellow portion represents my site.


Figure 35

In the winter, the site receives much less light. The buildings across the street manage to block almost half of the available sunlight, as shown here. In this picture, the sun is again at its highest point directly south if the site. However, since northern light creates the best working conditions, this may not be such a big problem.

Figure 36
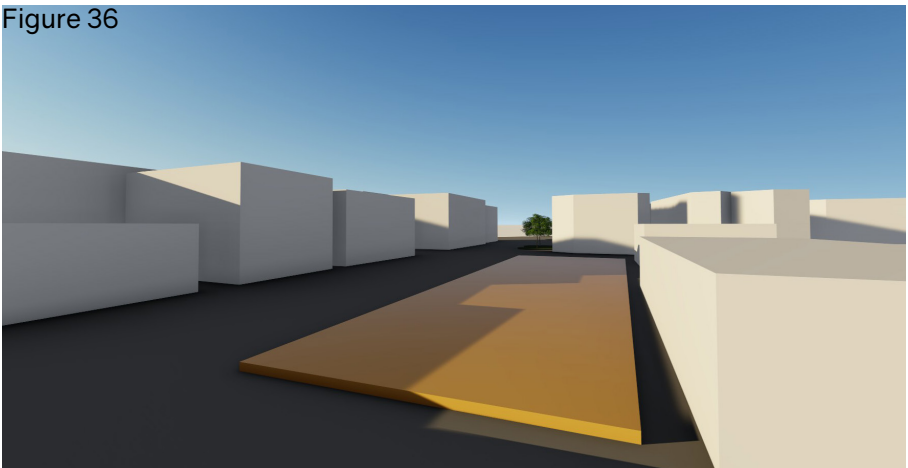
This drawing shows how the sunlight reaches my site during sunrise. In the early morning hours, almost half of the site is blocked by the shade of surrounding buildings. It is clear that my building will not always have direct access to the sun. However, this site is still not terribly constricting when it comes to natural lighting, because most of the buildings are fairly short.

Figure 37
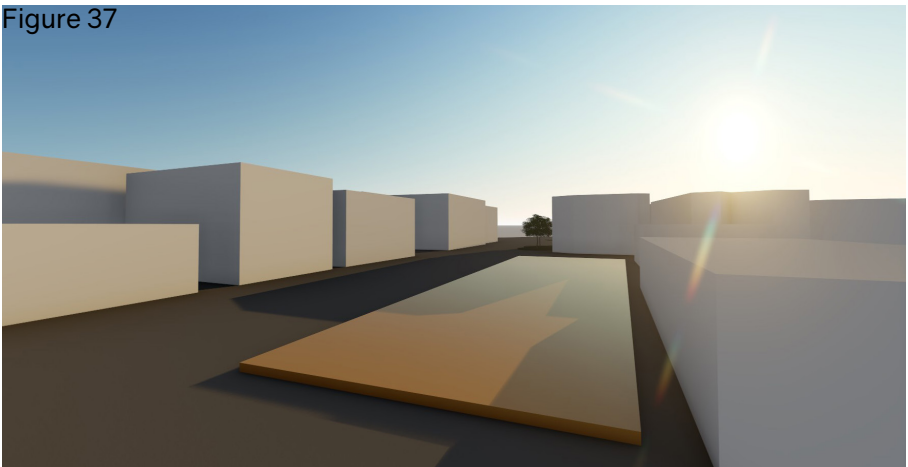
This final diagram shows the condition during sunset. Again, much of the site is cast in shadow.

CLIMATE INFORMATION

Since the winter climate in Minnesota can be somewhat severe, caution must be taken to avoid the cold. However, the site is guarded on the north side by another building, which will provide good cover against the winter winds. Unfortunately most of the cooling summer breezes are also blocked by buildings to the south. Most of the heating and cooling needs will have to be addressed by using thermally resistant materials and HVAC systems. Capturing sunlight may be more of a challenge than usual, due to the buildings surrounding the site on three sides. Fortunately, the buildings are not incredibly tall, and even a one-story structure could recieve a fair amount of sunlighton my site, especially during the summer.
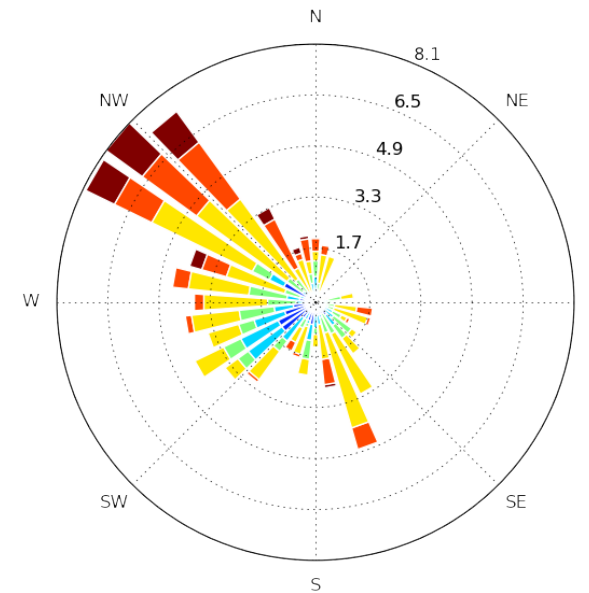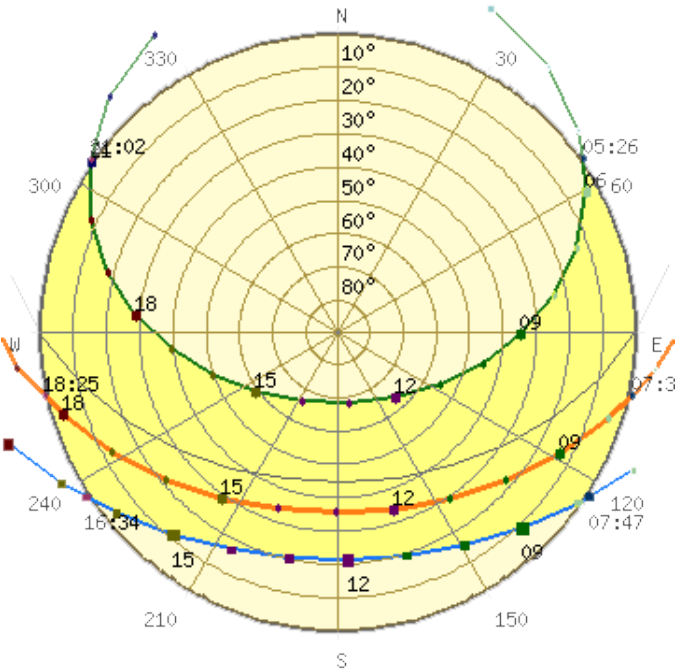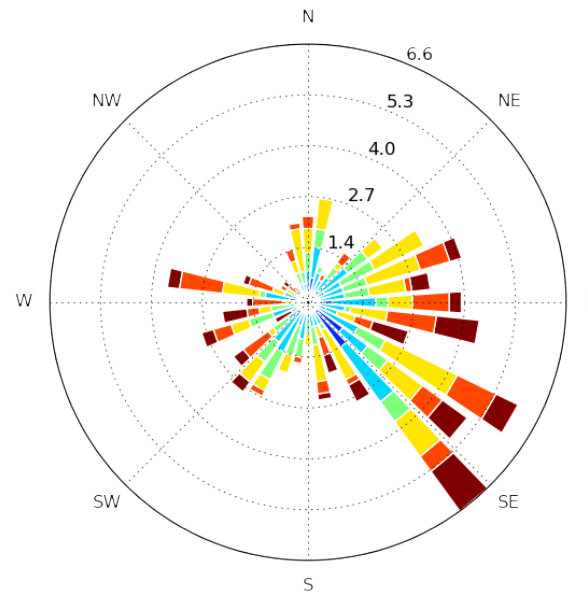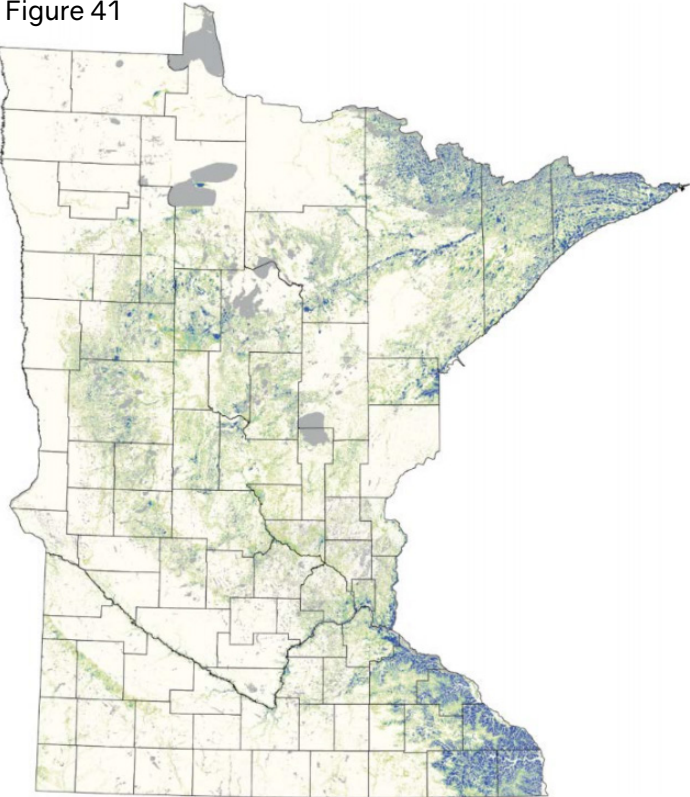
Figure 38

Figure 39 (winter winds)

Figure 40 (summer winds)

Figure 41

WATER

To the left is a map showing the relative water table height in all of Minnesota. The blue areas represent a deeper water table. In St. Paul, the water table is relativley shallow at around twelve feet. The image in the bottom left shows the parts of the city that are at risk of flooding, according to FEMA. Fortunately, my site is far enough inland and on high enough ground that flooding from the river will not be an issue in the forseeable future. Finally, below is a chart that shows the average rainfall in St. Paul. Based on the chart, the water will accumulate much more in the summer and there is some risk of flash-flooding. This, coupled with the almost non-existent slope of my site, means that a proper drainage solution will need to be found to keep the building dry and safe from water damage.
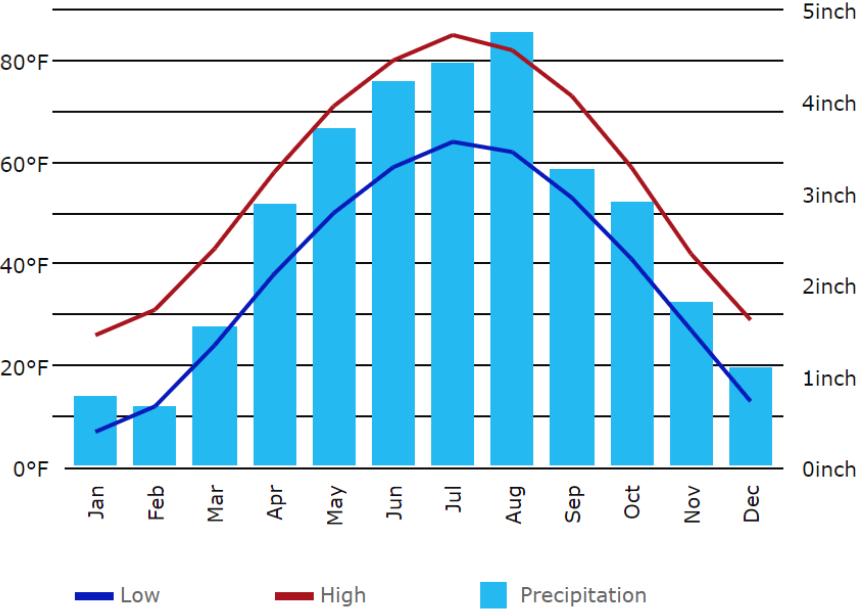

Figure 42

Figure 43

38

SOIL SURVEY

Figure 44

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
1039	Urban land	0.6	100.0%
Totals for Area of Interest		0.6	100.0%

Figure 45

Map Unit Setting
  National map unit symbol: 1t9c9
  Mean annual precipitation: 27 to 33 inches
  Mean annual air temperature: 39 to 46 degrees F
  Frost-free period: 135 to 180 days
  Farmland classification: Not prime farmland

Map Unit Composition
  Urban land: 100 percent
  Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Urban Land

  Setting
    Landform: Moraines
    Down-slope shape: Linear
    Across-slope shape: Linear

  Interpretive groups
    Land capability classification (irrigated): None specified
    Other vegetative classification: Not Suited (G090XN024MN)
    Hydric soil rating: No

39

Space Allocation: area, volume, and list of adjacent spaces will be used to for measurements
•The plans and 3D models of my project can be used to calculate values for area and volume of my project. These can be compared to analyses of other similar projects within my typology. These analyses can be formed mainly by finding and measuring floor plans of other buildings.
•This will be done mainly by using digital drawings to compare to other plans. Adding square footage, taking note of where spaces are located, and calculating volumes will be the primary aspects of analysis.
•After analyzing the data from the other buildings, I should be able to determine a general summary of how much space each area needs. Then it is simply comparing the numbers (area, volume) to determine how close I got. As for the location of spaces, there should be some identifiable patterns in the other projects, so it will be a fairly subjective matter to determine how closely my plans resemble that of other buildings. However all of this should be taken with a grain of salt because each building is unique to its particular use and context, and I think that 'space allocation', while a helpful study, is merely a tool to obtain success in other categories such as behavioral performance, cost, or code compliance.

Energy Consumption: kilowatt-hours will be the primary measure for energy consumption
•I will obtain the information I need from a digital model and the World Wide Web.
•Using the World Wide Web, I will be able to pretty accurately estimate the power consumption of my building based on information from a digital model. Then I will find buildings of similar size and typology and try to discover or estimate their power consumption. I am not sure that all this information is obtainable however, and if that does not work then I will have to rely on region averages for energy consumption.
•To judge the performance of my building, I will first compare the energy consumption of my building to that of the other buildings (or averages) that I have found. I will also have several iterations of my own design that I can use to calculate the consumption, so I will be able to show what design methods enabled me to do so.

Environmental Performance: measured using lumens, degrees Fahrenheit, and decibels
•The data for these can be found in analysis of digital models
•Using Revit plugins, 3D rendering software, and online estimators, I can estimate the quality of lighting, create heat maps, and the acoustical environment. Lighting information can be obtained with scale models as well.
•The judgement of performance in this category will be done by comparing the lighting information to charts detailing what kind of lighting conditions are best for each activity. The thermal data can be compared to other projects in the geographical area, and the acoustics can also be judged with charts obtained online or from texts.

Behavioral Performance: measured subjectively and without any actual data from my project, since it will never be constructed
•I can obtain some usage patterns from similar projects that have data available, or by first-hand visits of similar typologies. This data will not directly apply to my project however.
•I could make little model people and use scale models and play doll-house with the people and make them all have little cars and little jobs and then they come to use my building, but this may produce inaccurate data since all the people are controlled by me.
•It will be very difficult to assess my success in this category, so the best I can do is use other data such as space allocation and case studies to infer the usage patterns of my own building. But there will be no concrete data available, so any analysis will be entirely subjective.

Environmental Impact: measured using LEED checklist and criteria from other programs
•The measure of my project will be obtained mainly from digital model analysis. The specifications of the programs can be found on the World Wide Web.
•I will perform several analyses based on the LEED checklist. These will be done digitally within Revit and using other software, such as FlowDesign. The analyses will focus on materials, heat loss/gain, lighting, public access and contextual analysis, and water and energy usage.
•The data from my analyses can be directly compared to the LEED checklist to determine whether or not I fulfill the requirement. Should be pretty cut-and-dried.

Code Compliance: measured using written words and my own plans/digital models
•I can find most of the building codes pertaining to my project on the World Wide Web. I will make the plans for my design myself.
•I can directly compare the various components of my design to the code descriptions. For example, the length of a ramp or the height of a stair riser can both be easily determined, compared, and 'analyzed' to be either within the code or against it.
•I will judge the code compliance simply by determining if I am within it or against it. Ideally, I will be operating within the written code at all times. If for some reason I must make an exception I will detail it in my design.
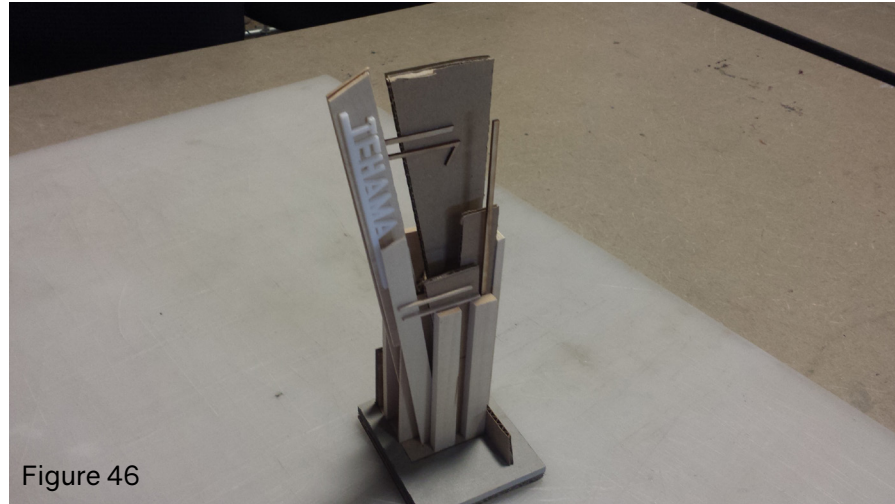
Figure 46

I began the process by making physical models out of random scraps that I had. These itereations allowed me to get into the design mindset and begin to think about making and doing as a means of process.
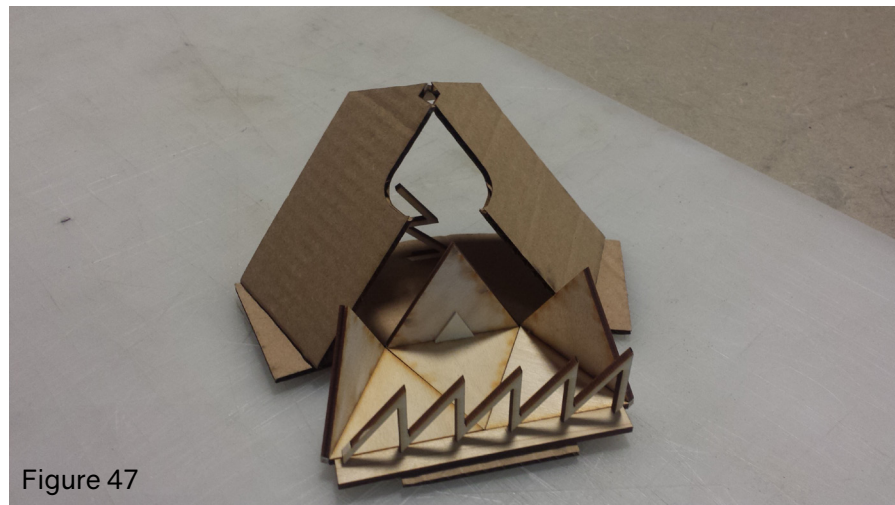

Figure 47

This is another iteration of a 'rip-and-tear' model. With this iteration I attempted more to create an actual space within the model and create a sense of interior/exterior.
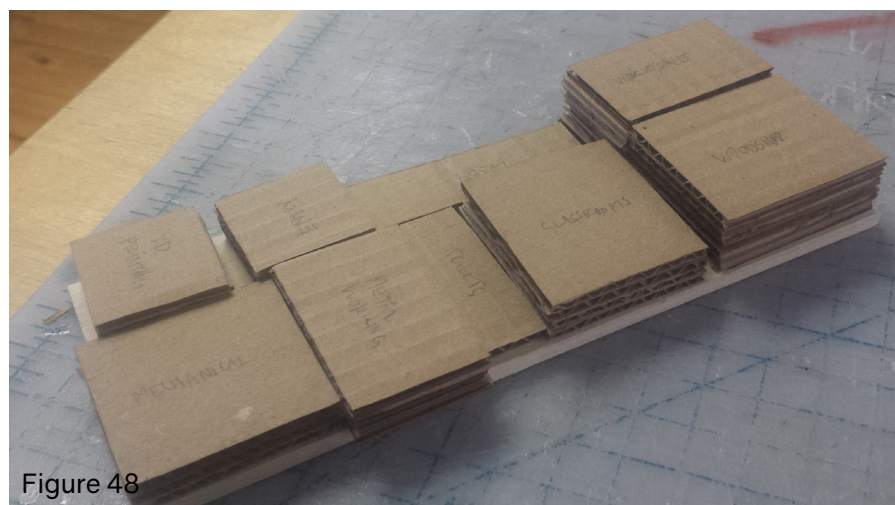

Figure 48

The is my first leap into the programming aspect of design. These cradboard blocks allowed me to physically rearrange the spaces to create new relationships, while still maintaing the correct square footage (according to my prior research). The different heights represent a hiererchy of spaces; taller blocks have more priority in the overall layout of the program.
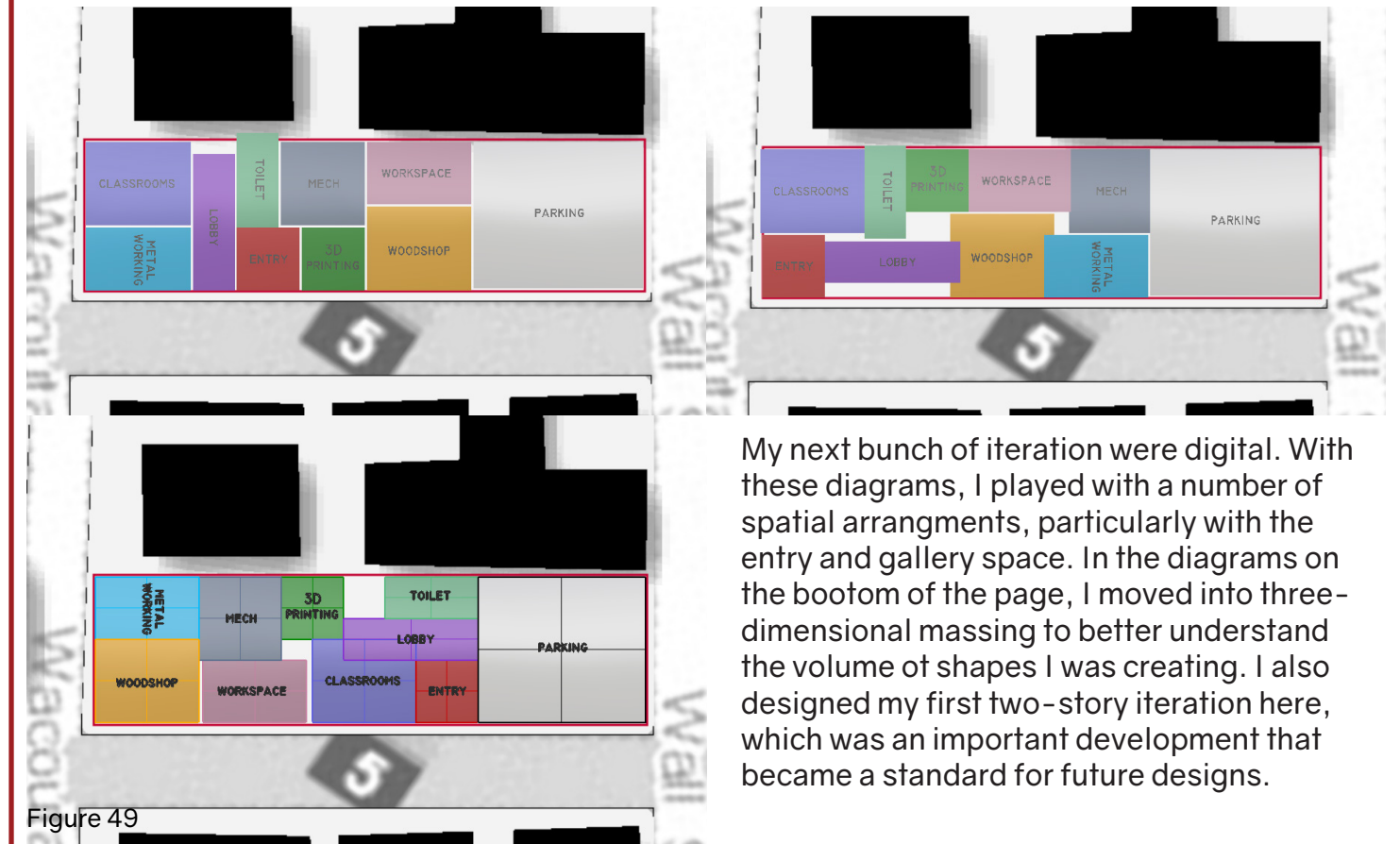
PROGRAM DEVELOPMENT

Figure 49

My next bunch of iteration were digital. With these diagrams, I played with a number of spatial arrangments, particularly with the entry and gallery space. In the diagrams on the bootom of the page, I moved into three-dimensional massing to better understand the volume ot shapes I was creating. I also designed my first two-story iteration here, which was an important development that became a standard for future designs.
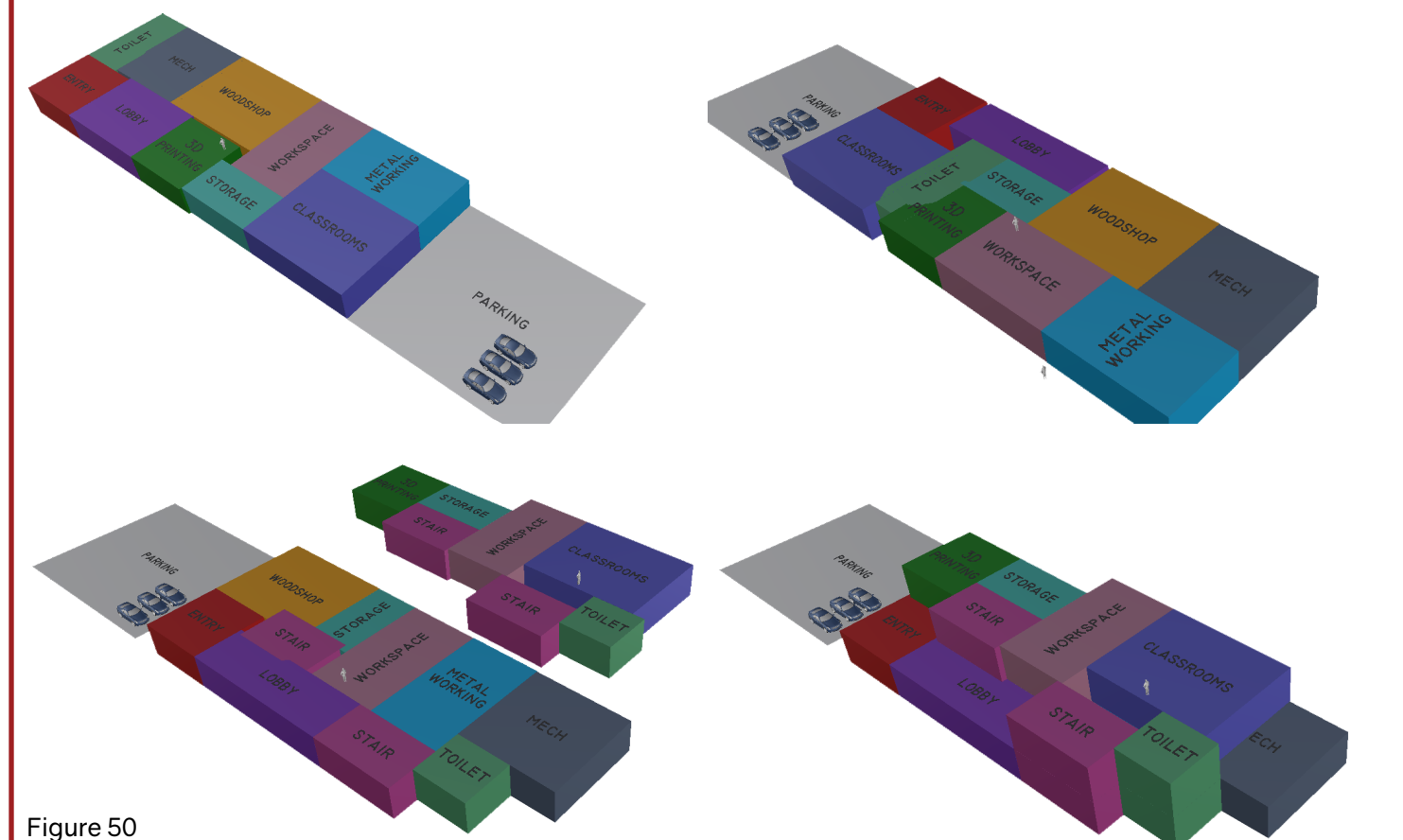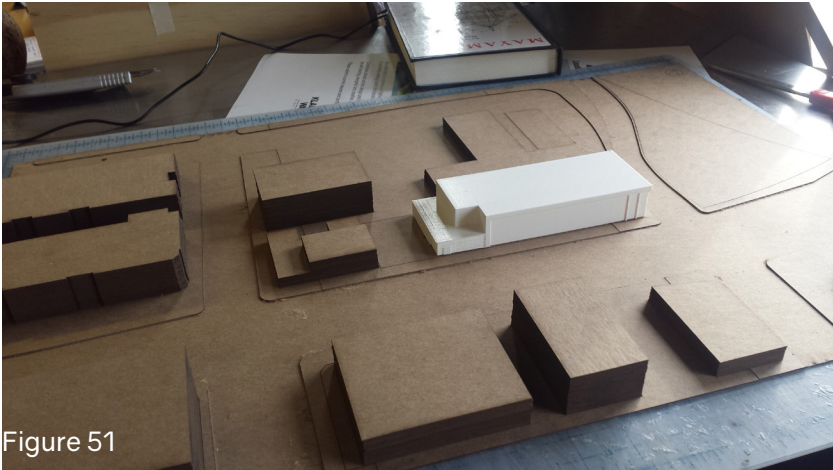

Figure 50

MASS MODELING

Figure 51

I 3D printed several mass models throughout the semester, to gain a better understanding of how the masses I was creating would impact the site at large. This iteration is more visually interesting than subsequent versions, due to the exposed stair core and lowered entry condition.
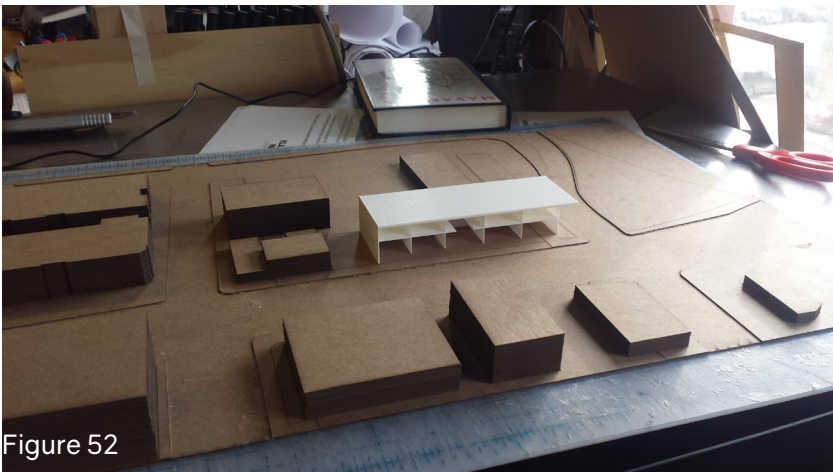

Figure 52

This is another 3D print of a later iteration that features much more basic organizational patterns. With this print, I opted to leave the front facade open to witness how light could enter the spaces behind. At this time, my only facade development was that it would be transparent.

VOID AND FORM

This 3D view of a Rhino model illustrates the location of spaces and how they relate to the street. I found that this iteration was too rigid in organization, and the accessibility of the various spaces was not equal or good enough to continue with this design.
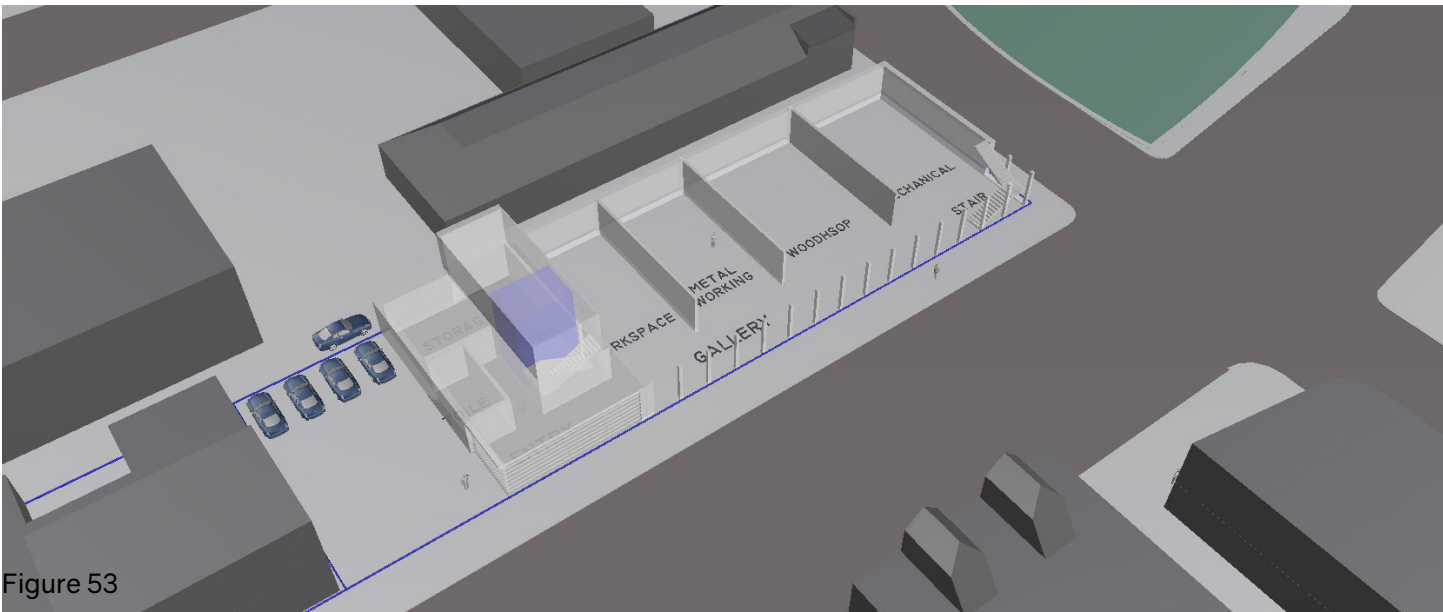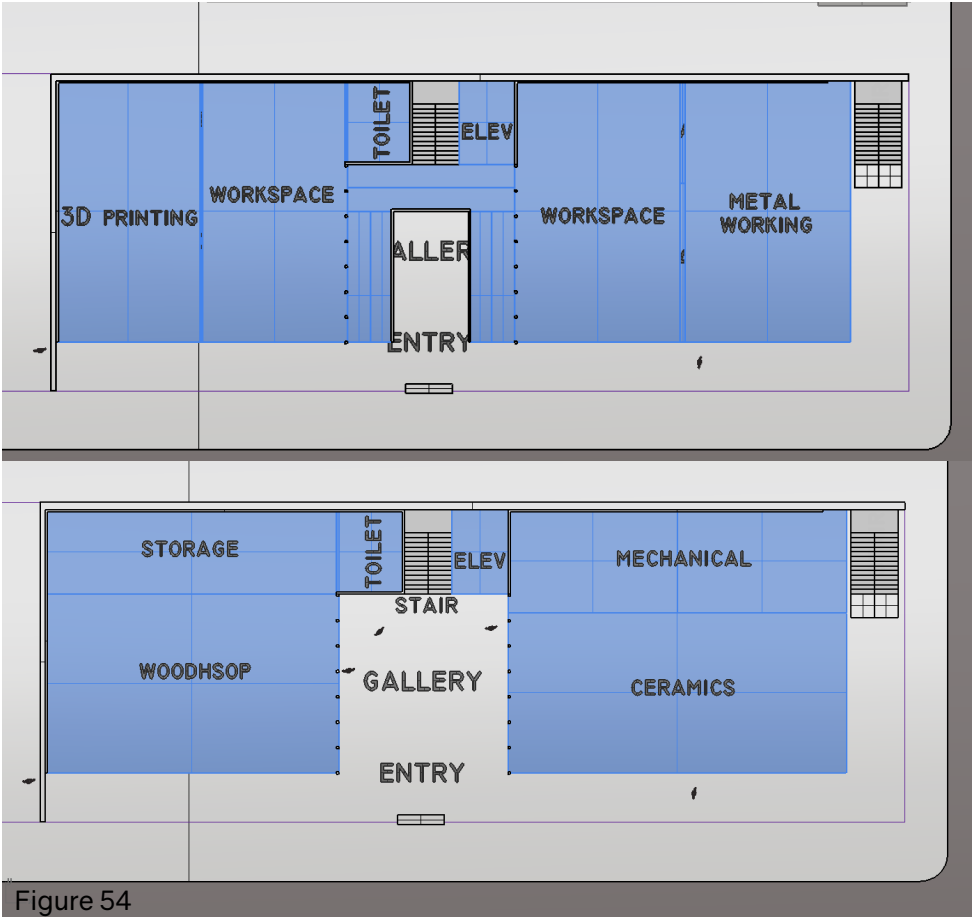

Figure 53

Figure 54

This floor plan represents my first attempt at creating a central area. In doing this study, I discovered the strength in having a central node and how it can be used to tie the program together. It can serve several functions as a gathering space, a circulatory space, and a collaborative environment. this iteration also shows the second floor balcony that wraps around the workspaces. This created an element of shared verticality that I enjoyed and attempted to incorporate into future iterations.
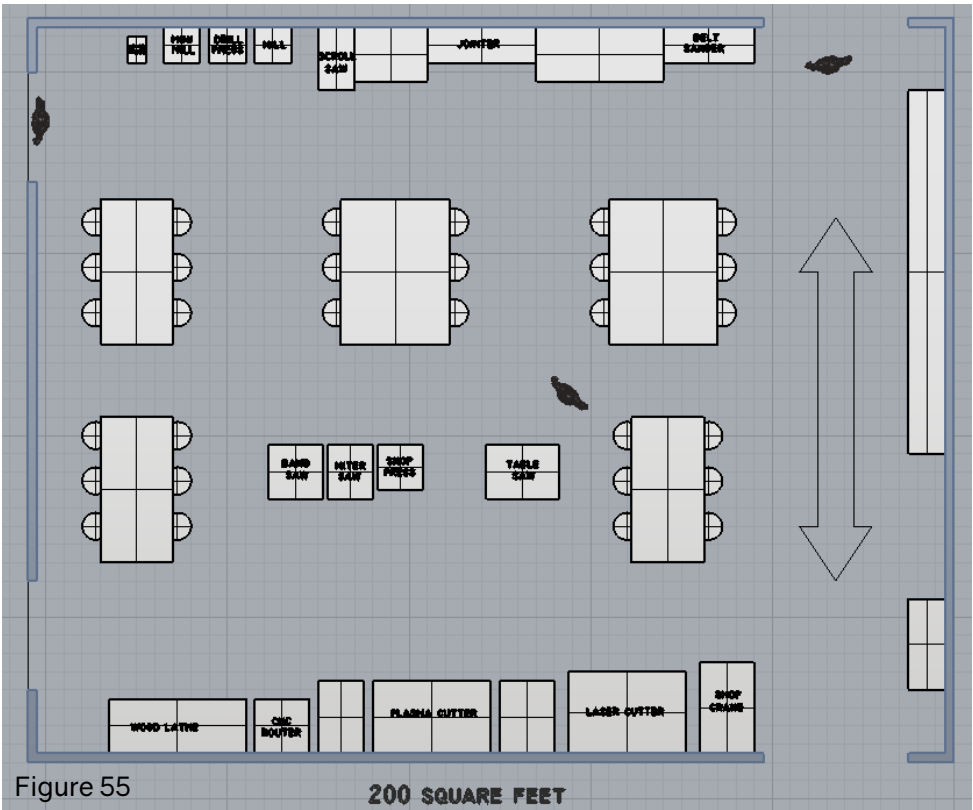

Figure 55

This study is one of the first iteration of room layout that drove my design process from this point onward. It was important that I understood the scale of the machines that were inherent to the program. This image shows one example of how the tools could be laid out in such a way that allows for circulation of people and projects to, from, and throughout the space.
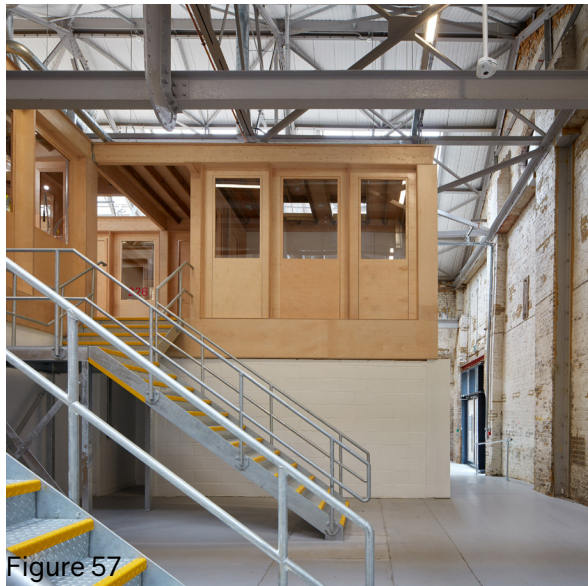
Figure 56

Figure 57

ADDITIONAL TYPOLOGICAL RESEARCH

I found myself doing additional research into the typology throughout the semester. One important study was in London, called 'The Forge'. Some key aspects I took away from this study was the material usage and the scale style of the private studio spaces. This study also reinforced my ideas of incorporating verticality and maintaining a strong central element.

EVALUATING PROGRESS

Based on my studies and research so far, I decided to lay a framework for future iterations. This list of attributes describes the main elements that I consider to be crucial for the design of a good community environment, especially a makerspace. I have marked which aspects have been achieved by the various iterations as a way of assessing my progress.

QUALITIES OF COMMUNITY DESIGN	ITERATIONS 1	2	3	4	5
POINT OF FOCUS	POSSIBLE	POSSIBLE	POSSIBLE		
DEFINED PRIVATE AREAS			INCLUDED		
VIEWS BETWEEN AREAS	INCLUDED	INCLUDED	INCLUDED		
VERTICAL ACCESS	INCLUDED	INCLUDED	INCLUDED		
STORAGE EXPRESSED		POSSIBLE	INCLUDED		
FOCUS GENERATED FROM INSIDE		POSSIBLE	INCLUDED		
MIX OF PRIVATE AND PUBLIC			INCLUDED		

INCLUDED (green)
POSSIBLE (yellow)
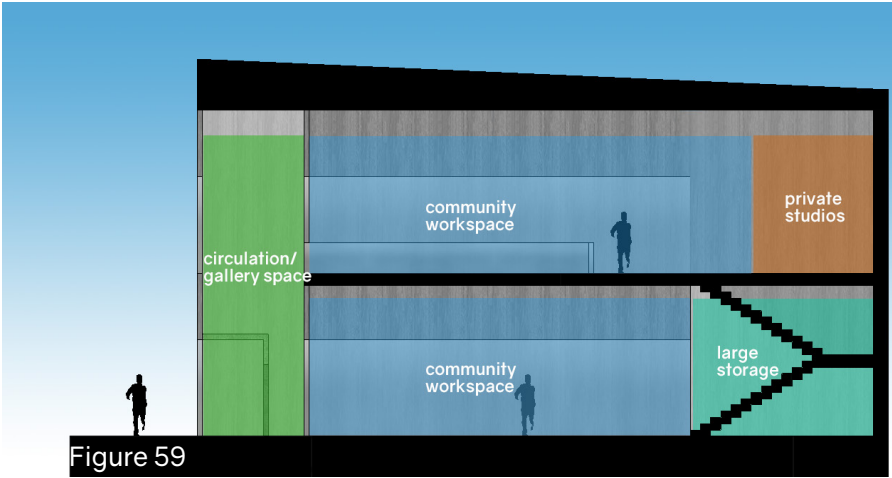
Figure 58

GRAPHICAL ANALYSIS

Figure 59

I began to work graphically in section to develop my concept of the main attributes of a good community space. Here, I have noted the main programmatic areas as they relate to public/private space. This diagram is derivitive of an earlier diagram, shown on the bottom of the page.
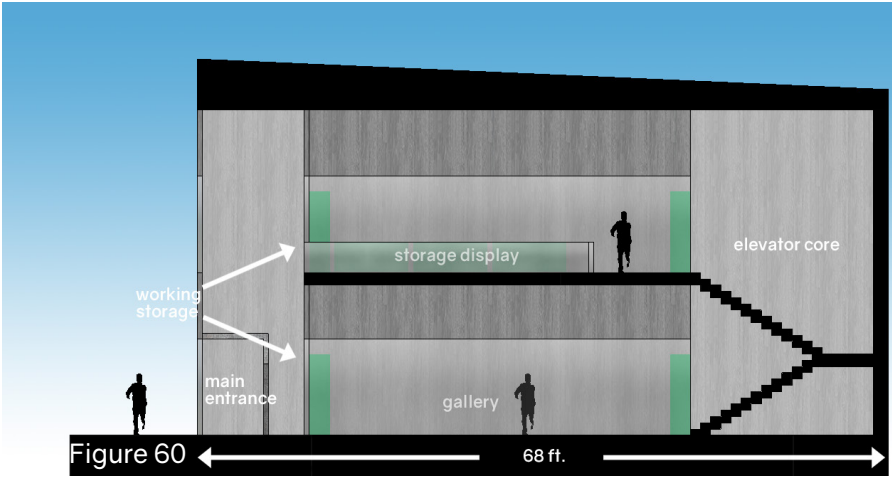

Figure 60   68 ft.

This is another section drawing to help me note how I planned to address the element of storage, which I found to be important in the design of a makerspace. In this iteration, the storage is centrally located and borders the gallery space.
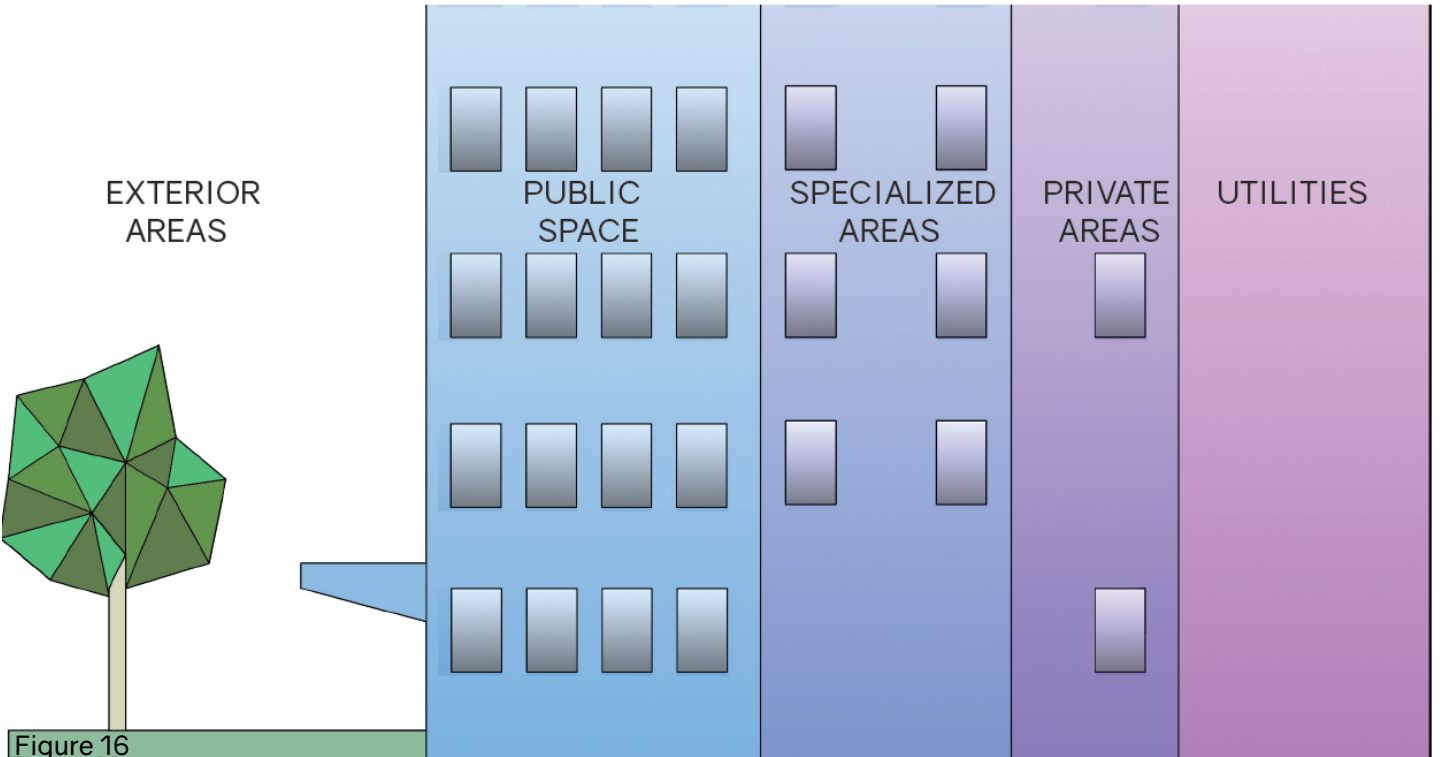

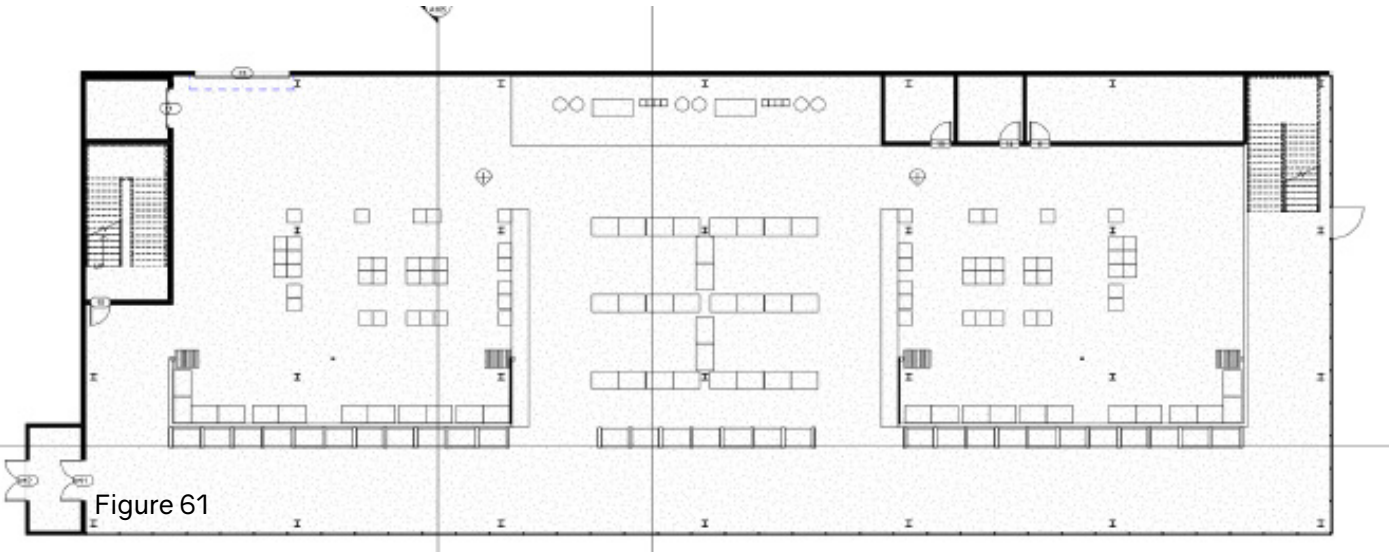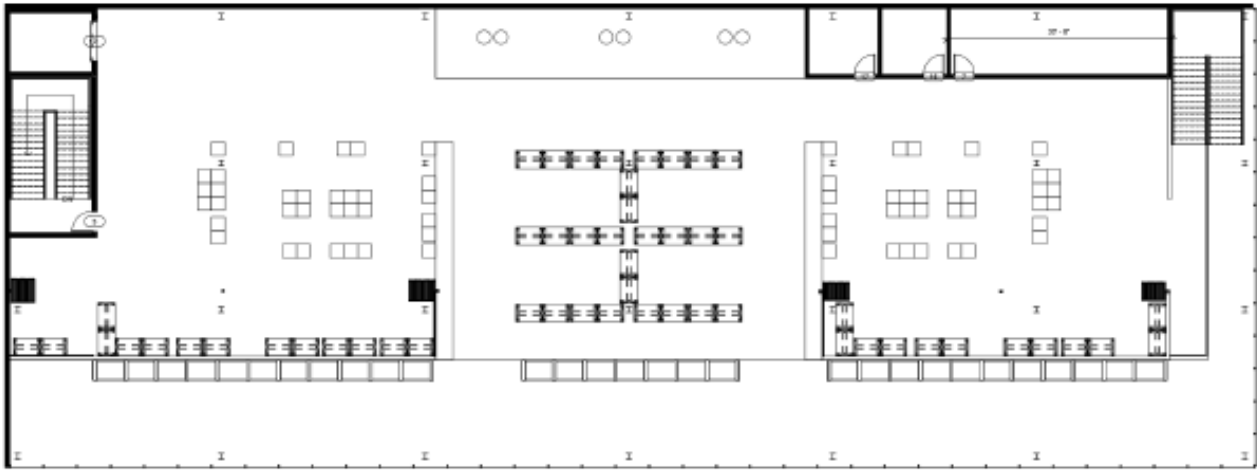EXTERIOR AREAS | PUBLIC SPACE | SPECIALIZED AREAS | PRIVATE AREAS | UTILITIES

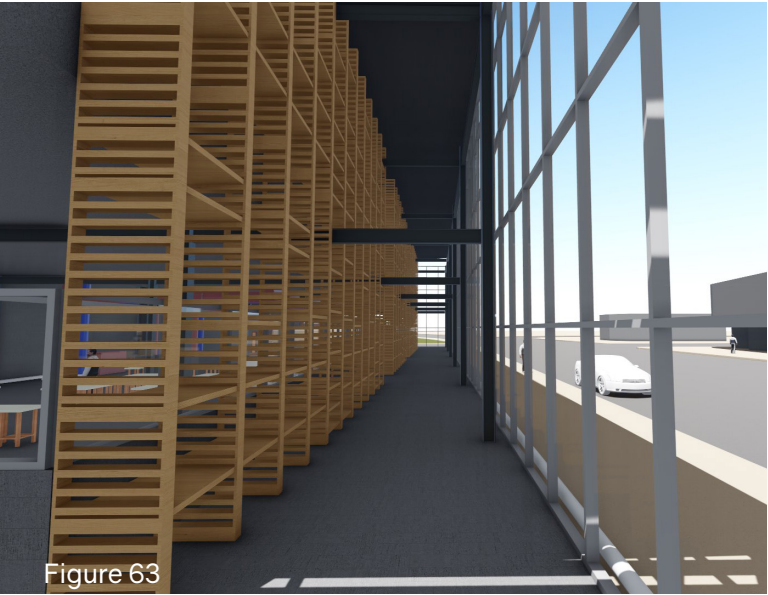Figure 16

NEW ITERATION

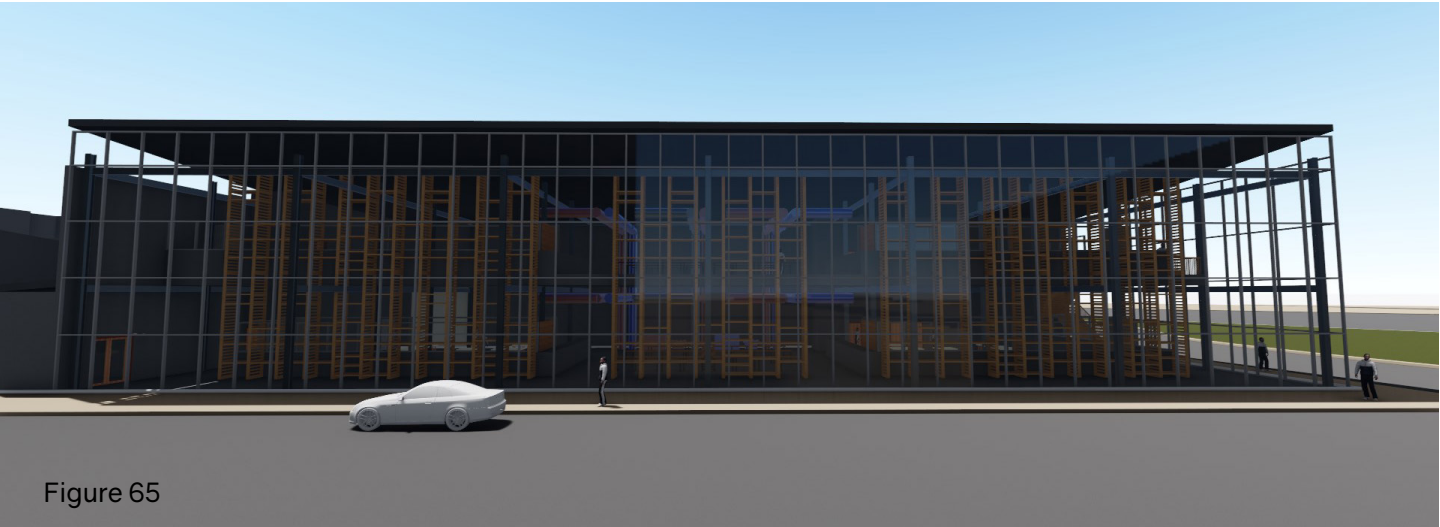Figure 61

Figure 62

MATERIAL AND TEXTURE

Figure 63

I started to use rendering to gain an understanding of materiality and light. I knew that the large spans of glass I currently was using would be too much for the climate, for privacy's sake, and for my own tastes. This rendering drove that point home and forced me to start thinking about the facade and the streetscape in new ways. In this iteration, the storage elements could be seen from the street, which is an idea that I took to my final design.

Figure 64

This rendering was an attempt at understanding the floor-ceiling heights, table heights, and how the shevling system might impact the views to and from the street.

Figure 65

Figure 66

Figure 67

Figure 68

The top image shows how the building can be opened up in favorable weather to allow for more public interaction and to incorporate events such as art crawls.On the bottom left is an image of the collaborative space and staircase that are central to the floor plan and program. On the bottom right is an image looking east thtough the main gallery space. Here, we can see the expanse of the shelving system and how it can relate to the streetscape on the right side of the image.

2nd Floor

Woodworking Studio   Flex/Educational Space   Mechanical
3D Print Lab
Private Studios
Open to Below

Kiln   Mechanical
Ceramics Studio   Flex/Educational Space   Metal Working Studio
Gallery

1st Floor
0   10   30   80
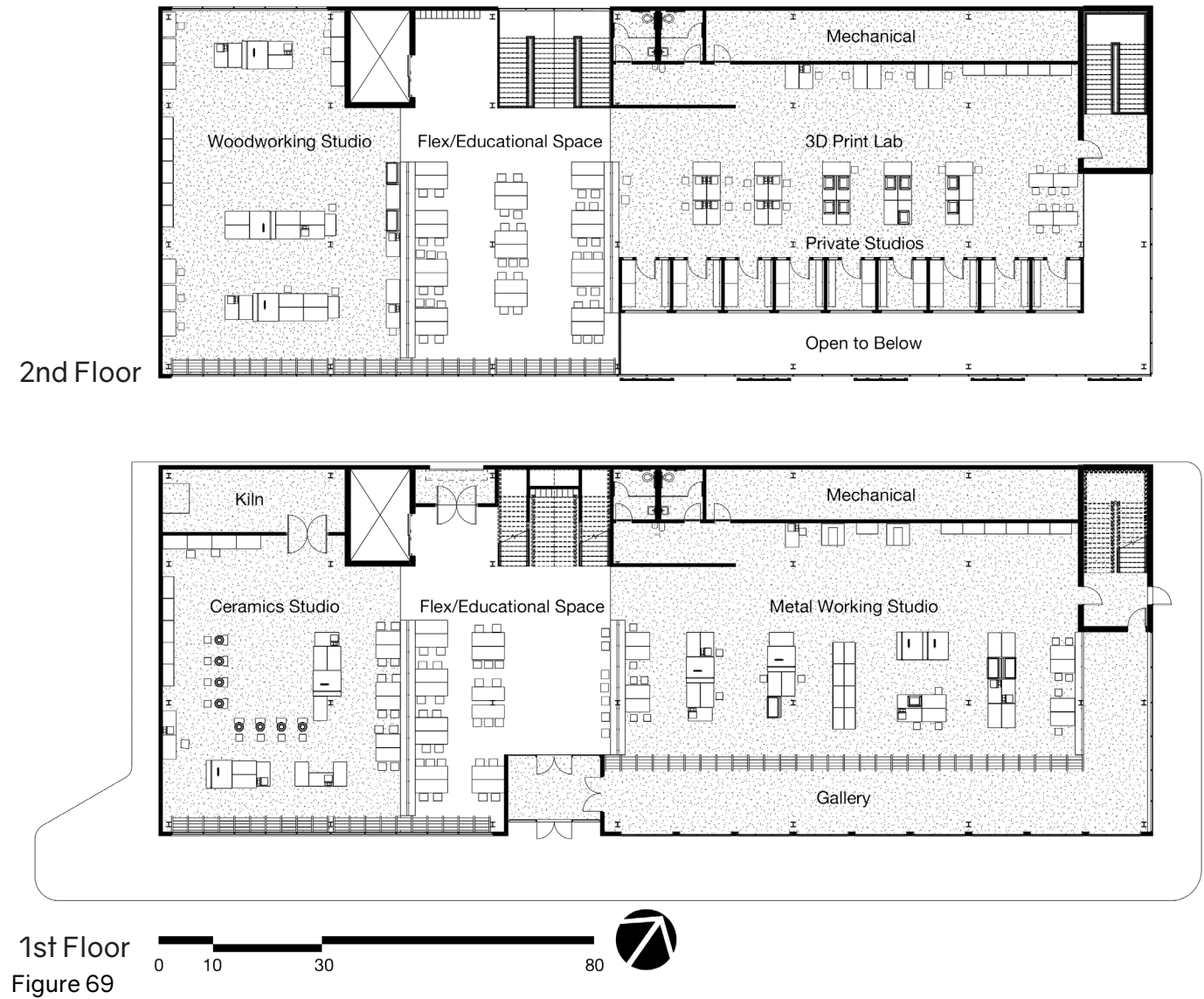Figure 69

Figure 70

Figure 71
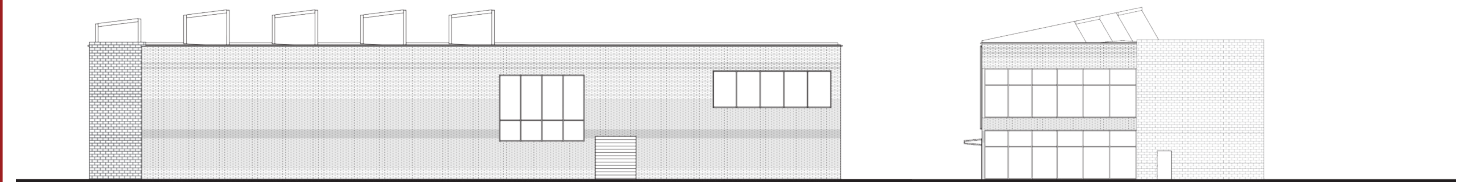

Figure 72

Figure 73

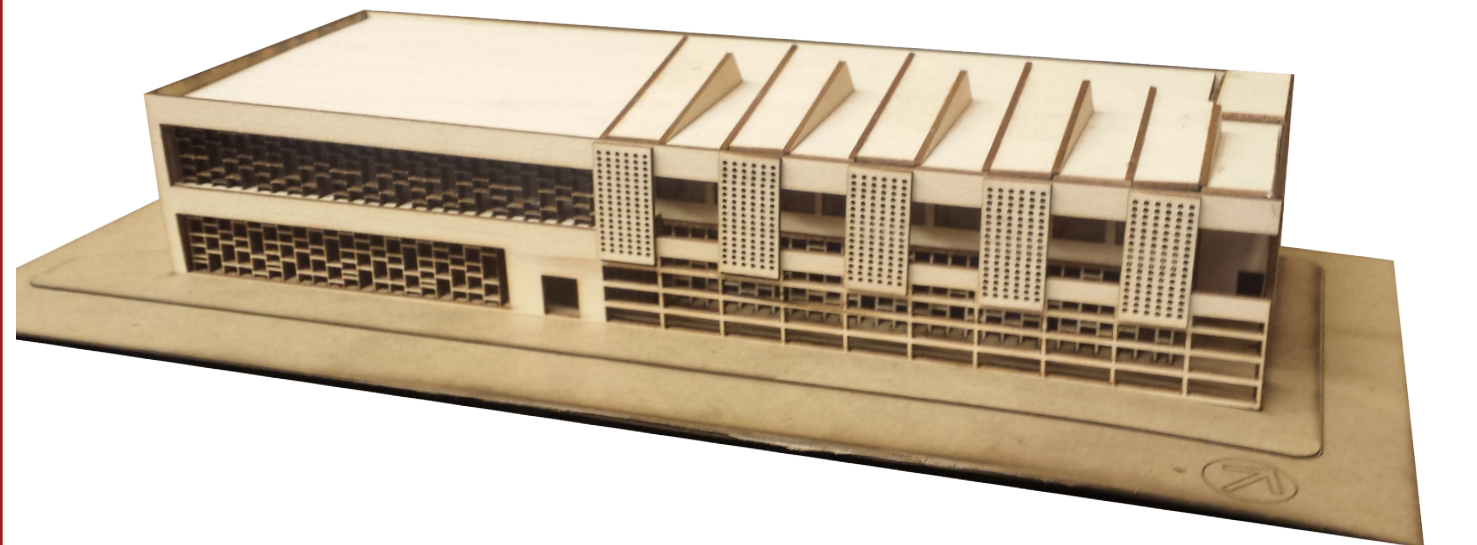

Figure 74

Figure 71

Figure 75

Figure 76

One of the factors that drove the design was the relationship of pedestrian traffic and vehicle traffic around the site. The southern streetscape was something that I felt was a necessity to incorporate into my design, which influnced the transparency and materiality of the facade, as well as teh placement of the shelving system.

Figure 28

Figure 77

One aspect of the natural enviornment that I tried to utilize is the good quality of indirect sunlight. I placed severl north-facing windows, as well as the sawtooth skylights seen in the image above, as a way to draw in natural light without introduucing glare.

Existing on the site is an alley that runs east-to-west behind the building. To address this opportunity, I incorporated a large garage entrance for ease of access to people or machines that require a large amount of clearance space.

Figure 78

Figure 7

This image shows the relationship between one of my case studies and a section cut of my final project. Note the ceiling heights, exposed structure, and material usage, as well as the large spaces between machines to allow for efficient circulation. A contrast occurs in the method of storage, which can be seen in the southern section cut (below).
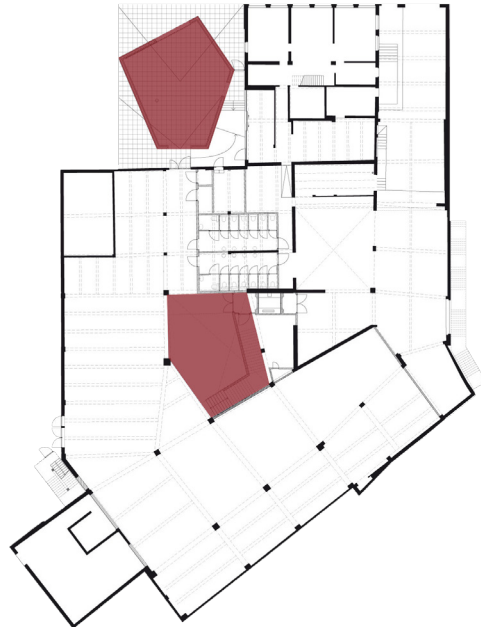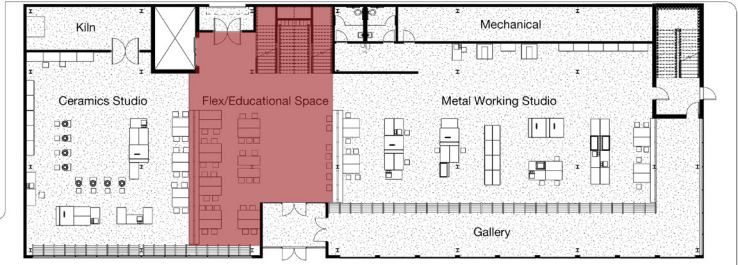

Figure 79

Figure 70

Figure 4

Figure 68

The Buda::Lab in Belgium has a strong presence of a central space, both in the entry condition and in the main staircase. These concepts were incorporated into my final project, with the vertiacal circulation becoming a core element of the central space. Here, the similar areas are colored in red.

PROGRAM COMPARISONS

I have added the square footage values of my final building onto the spaceallocation chart that I originally derived from my typological research. Overwhelmingly, my values tend to lean on the larger side of the averages. There are also some interesting deviations which were ultimately dictated by how the building would be used by patrons.

	Small		Average		Large		My Project	
Gallery	800	6.3%	900	5.8%	1000	5.4%	1200	6.3%
Lobby	1100	8.7%	1300	8.3%	1500	8.0%	300	1.5%
Woodshop	1600	12.7%	2000	12.8%	2400	12.8%	2700	14.2%
Ceramics Studio	1400	11.1%	1700	10.9%	2000	10.7%	2300	12.1%
3D Printing Lab	800	6.3%	900	5.8%	1000	5.4%	1800	9.5%
Metal Working Studio	1300	10.3%	1500	9.6%	1800	9.6%	3300	17.3%
Classrooms	1600	12.7%	2000	12.8%	2400	12.8%	2400	12.6%
Private Studios	1400	11.1%	1700	10.9%	2000	10.7%	900	4.7%
Toilets	600	4.9%	900	5.8%	1200	6.4%	400	2.1%
Mechanical	1600	12.7%	2000	12.8%	2400	12.8%	2600	13.7%
Storage	400	3.2%	700	4.5%	1000	5.4%	1100	5.8%
	12,600		**15,600**		**18,700**		**19,000**	

Figure 80

Figure 66

Here I have returned to the list of qualities of community design in an effort to evaluate the success of my project. I have concluded that my final iteration is more or less successful in each category on this list. Of course, this is in large part because this chart heavily influenced my design decisions throughout the semester.

QUALITIES OF COMMUNITY DESIGN	ITERATIONS					
	1	2	3	4	5	
POINT OF FOCUS	🟡	🟡	🟡	🟢	🟢	🟢 INCLUDED
DEFINED PRIVATE AREAS			🟢	🟢	🟢	🟡 POSSIBLE
VIEWS BETWEEN AREAS	🟢	🟢	🟢	🟢	🟢	
VERTICAL ACCESS	🟢	🟢	🟢		🟢	
STORAGE EXPRESSED		🟡	🟢	🟢	🟢	
FOCUS GENERATED FROM INSIDE		🟡	🟢	🟢	🟢	
MIX OF PRIVATE AND PUBLIC			🟢	🟢	🟢	

Figure 81

PROJECT EMPHASIS

My main priority with this project is to create a community-centered design on a small scale. I would like to put focus on the public and circulation space and examine how they interact with the site context. Using models, computer models, and research, I would like to determine how public space can both react to and reinforce a sense of community in an urban environment, with downtown St. Paul as the specific study.

This study will hopefully express my design abilities and increase my knowledge on model building and problem solving within an urban context. Public space is one of the most interesting aspects of design in my opinion because it frequently defines the built environmet and expresses a culture. With this project, I will seek to both express and serve the public culture of downtown St. Paul.
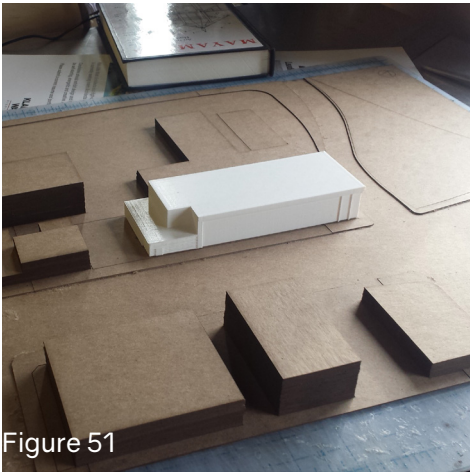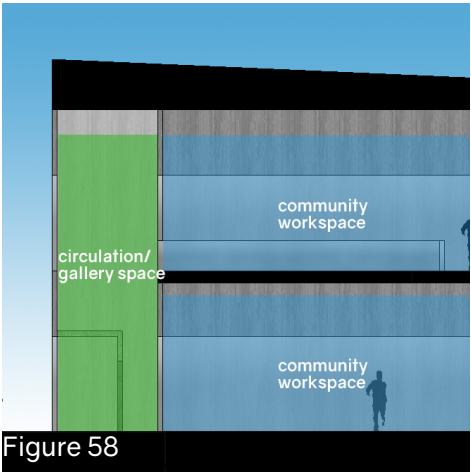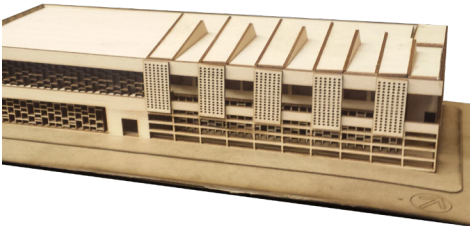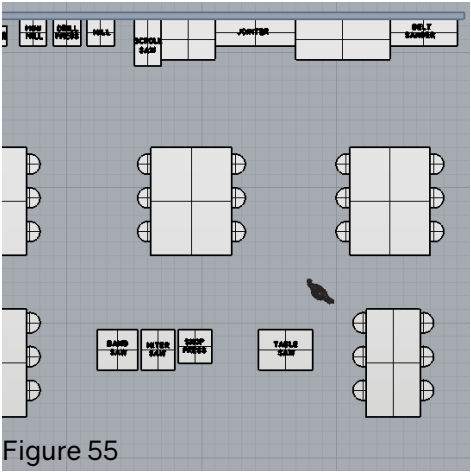

Figure 51

Figure 58

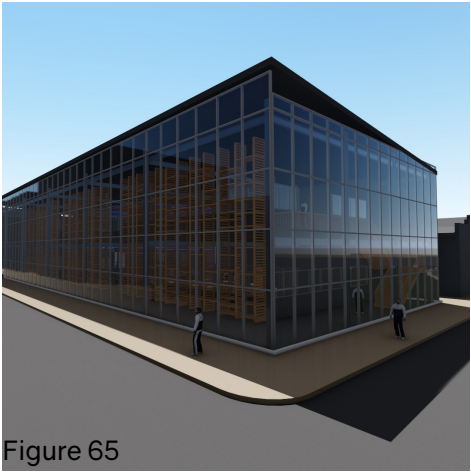Figure 75

Figure 57

Figure 55

Figure 65

I was able to complete most of my emphasized goals throughout the semester. I was able to incorporate the methods I set out to practice, and although I altered my priorities as I gained more knowledge of the site context , typology, and building, I was able to develop a project that addressed the main concerns that I previously stated in this document.

Additional materials that I used as part of my digital presentation

Figure 82

Figure 83

Figure 84

Figure 85

Figure 86

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PREVIOUS STUDIO EXPERIENCE

Fall 2014:
Tea House and Boat House projects
(with Joan Vorderbruggen)
These projects introduced me to the concept of site design and how metaphors can instigate the design process. This is also where I learned to enjoy crafting 3D models to represent my ideas.

Spring 2015:
Montessori School and Dwelling
(with Darryl Booker)
This studio reinforced the notion of iterations on a design, and taught me to never be finished with my work. I was also introduced to several new technologies such as CAD and laser cutting.

Fall 2015:
Concert Hall and Mosque
(with Ronald Ramsay)
In Ramsay's studio I furthered my knowledge in CAD, particularly Rhino 5, and chose to pursue more unconventional forms to test the limits of my abilites.

Spring 2016:
Manufacturing Facility and Surgery Center
(with Mark Barnhouse)
This semester was full of detailing and slow but steady improvement on a carefully chosen concept. Pragmatism guided the designs in this studio, and it taught me to design at a human scale from the very start.

Fall 2016:
High Rise
(with David Crutchfield)
During the integrated design project, I learned a lot about how building systems come together. However, I felt that my biggest takeaway with this project was how to respond to the site context in a very urban environment.

Spring 2017:
Urban Redevelopment in Brussels
(with Paul Gleye)
This studio taught me how to budget time and work out details with a LA partner. I learned how to collaborate and how to illustrate 3D ideas in a 2D environment.

Fall 2017:
Wetlands Research Laboratory
(with Mark Barnhouse)
The current semester is helping me to improve on presentation techniques, particularly with Lumion. It is showing me the importance of a complete 3D model and reinforcing the idea of slow and steady progress.