2024

Design Build: Construction Package for Bardy Farm Interior Fit-out

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Recommended Citation

Grypinich, Alexandra, "Design Build: Construction Package for Bardy Farm Interior Fit-out" (2024). *Renée Crown University Honors Thesis Projects - All*. 1353.
https://surface.syr.edu/honors_capstone/1353

Design Build: Construction Package for Brady Farm Interior Fit-out

A Thesis Submitted in Partial Fulfillment of the
Requirements of the Renée Crown University Honors Program at
Syracuse University

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and Renée Crown University Honors
May 2024

Abstract

Through an established community partnership, our Syracuse University School of Architecture Directed Research group was brought in to design and build interior millwork and operable furniture for local non-profit client Brady Farm. During the course of one semester, this group of 17 students researched, designed, revised, documented, and ultimately built an adaptable casework solution for the farm's new market shed which could meet the varying programmatic and spatial needs of the client. As a complex project with an abbreviated construction schedule, this fit-out necessitated the implementation of construction management techniques in accordance with its delivery method and scope. Through these organizational methods, this team of amateur cabinetmakers was able to effectively communicate and collaborate to deliver the project on time and with a high degree of quality and design consideration.

Executive Summary

Brady Farm, a subsidiary of the Brady Faith Center, is an urban farm striving to feed the bodies, minds, and souls of the Southside Syracuse community. Founded in 2016, the project has steadily grown into an important part of the community now occupying 5.8 acres of land between Onondaga Creek and a tributary of the creek. The entire farm is embedded in a residential neighborhood and is across the street from a local elementary school. To fulfill their mission of creating an economically sustainable and resilient source of affordable, locally-grown food for the community, the team at Brady Farm partnered with academics at Syracuse University to assist in the farm's expansion in building critical infrastructure such as storage sheds, washing stations, and market spaces.

Hannibal Newsom RA, an assistant professor of architecture at SU and Principal of Mago Architecture, partnered with Jessi Lyons, director of Brady Farm, in 2022 to design and build a structure to address many of the needs of the growing farm. Professor Newsom led a team of graduate students in the School of Architecture in a two-week seminar to explore pre-engineered design concepts for the farm based on the client's needs. This exploration set about Professor Newsom and his collaborator David Shanks' process of designing the structure and creating a set of construction documents. These documents were then handed off to the farm, which acted as a general contractor and was to be assisted by the project architect. This unique delivery method, in which the client is their own general contractor, was necessary because a significant portion of the labor and some materials were being donated to the farm. The project began construction in the fall of 2023 and is set to be completed in late spring 2024.

The final design is a 1,555 square feet structure divided into two rooms featuring a wash and pack room with a cold storage walk-in and an open room for market and display of produce, see Appendix A. The building also provides the farm with its first fully functioning bathroom attached to city plumbing. The project is both functional and aesthetically interesting as it incorporates many design features, such as a double-gabled, sliding roof configuration. While the building itself provides a critical space for the farm, the 2022 capital gains grant Brady Farm used to fund the project did not include important interior

furnishings and equipment needed to make it fully functional. This presented the opportunity for a new design project: creating a custom fit-out for the building in order to provide the necessary functions of storage, food display, and office. Our thesis will document the construction of this fit-out as designed by a group of architecture students participating in a design-build research project.

Our enhanced expertise in construction will be used to create a construction package that will document and organize the “build” portion of our design-build project. We have followed typical architectural workflow for this project including schematic design, design development, construction documentation, and construction administration. We will briefly touch on the schematic design and design development phases while going into more specific detail for construction documentation and especially construction administration.

Looking towards the early phases of our work, our design process began by meeting with Jessi Lyons to get a better understanding of the Brady Farm organization, its needs, and how it plans to utilize the new building. Like a typical architectural client meeting, we asked questions back and forth, and began to understand her work at the farm. Following the meeting, our group traveled to Brady Farm for a site visit. During this visit, we were given a tour of the farm facilities and documented its needs. This also included a tour of the small, rickety shed structure that currently houses a lot of the programs that the farm hopes to move into the new building being constructed just a few feet away. At the time of our first visit, only the foundation and concrete slab had been laid. We could, however, still appreciate the size of the new addition, the relationship between programs, and its orientation in relation to the entire farm.

The key goal of the interior fit-out is to provide Jessi and other workers at the farm with a flexible and functional space that can meet their storage needs while maintaining the aesthetic qualities of the new design. Because the wash and pack portion of the new building is heavily constrained by commercial food safety codes requiring stringent specifications, our work is concentrated in the 650-square-foot market space. As designers volunteering our services, we are in a unique position to create something custom for the space and the client. Alexandra Grypinich, along with her peer Greta Ulatowski, applied for and were awarded a $5,000 SOURCE grant from SU which, along with a $2,700 faculty works grant awarded to Professor Newsom, will fund the project. Thus, using our skills and funding, instead of purchasing cabinetry or creating simple closets in the space, we used the knowledge gained in our conversation with Jessi to create a system specifically for the farm's use that has a more built-in feel.

With our design goals in mind, we dove into the early stages of precedent study and test fitting. We found numerous precedents of flexible/adaptable wooden furniture that could pose as potential solutions to the farm's needs. We then tested multiple ways of organizing our design in the room keeping in mind important considerations such as square footage, paths of travel, accessibility, and more. After a two-week-long iterative process, we culminated our ideas into one scheme that we believed best fit the space. Images of the project at this stage are included in Appendix B. We presented this design to both our client and at our midterm review and gained valuable feedback on both the functionality and the design aesthetics of the proposal.

After spending another week refining these changes, we began the work of translating our images and ideas from something conceptual to something buildable. This is where the bulk of the work demonstrated in this construction package begins. As in any construction process, meticulous organization and planning were critical to completing this project. This included creating a set of construction documents, specifically millwork shop drawings,[1] to the proper dimensions of the materials selected. Understanding our limitations as architectural students and not professional carpenters, we created a full-scale mock-up of one element of our design as a test of fabrication and proof of concept. Using this mock-up as a test we practiced utilizing the tools necessary for the work, and tried to catch any mistakes in our design and correct our shop drawings. We then used these completed drawings to perform a quantity take off, or a detailed measurement of the materials and labor needed to complete the project. We used this quantity take-off to perform a detailed estimate and order all materials needed to complete

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[1] Shop drawings, usually produced be a contractor or manufacturer, are detailed plans critical for translating design intent into buildable work.

the project. We also created a Gantt chart, or detailed construction schedule, for the planning, construction, and installation of the project. In addition to creating these critical documents, the construction package will document the work done through construction photos and lessons learned at each step of the process.

Our thesis organizes and documents the work created by the Engaged Practices Directed Research studio through industry-standard construction practices to complete the design-build process. This work is critical in completing a project of this magnitude. The resulting fit-out for Brady Farm will have a lasting impact on the Farm's capability to function highly and continue its exemplary work to bring fresh foods to the deserving local community, see Appendix B.

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Preface

The School of Architecture at Syracuse University initiated a new thesis model in Spring 2024 entitled Directed Research. Instead of students individually proposing design projects and finding faculty members to guide them in their work, this new model empowers professors with established research interests to lead a group of like-minded students in the exploration of a shared topic, either as a group, individually, or in pairs. Because of his role as a registered architect working with the local community, Professor Hannibal Newsom established a directed research design-build studio entitled Engaged Practices. As architecture students, we have the opportunity to design every semester. However, our design studios are mostly conceptual and do not incorporate key factors of the architectural process such as working with a client, budgetary constraints, construction documentation, and fabrication or building. The Engaged Practices Directed Research studio aims to allow students to not only design a project but also see it through to construction.

Understanding the interdisciplinary nature of architectural practice and the value of construction knowledge in the design process, we have chosen to supplement our architectural education with construction minors (construction management and sustainable construction). We joined Professor Newsom's proposed design-build studio to utilize our skills and combine our architectural and construction education.

Acknowledgements

While we, Erik Dighton and Alexandra Grypinich, are the authors of this honors thesis focusing on construction, the design and implementation of this project is a collaborative effort led by our advisor Hannibal Newsom and includes 15 other architecture students in the Engaged Practices Directed Research course. These students are Averie Cohen, Julia Dinatale, Christopher Hauserman, Sanskruti Kakadiya, Ruijia Ma, Ronan McCabe, Jediel Ponnudurai, Lucas Rossington, Eleanor Sedor, Danlin Sun, Greta Ulatowski, Joaquin Vargas, Muge Zhang, Jingge Zhao, and Kevin Zhu. The contributions of everyone involved in this project allowed it to be possible. We would also like to acknowledge the professors at SUNY ESF that have taught us many of the valuable skills we used to complete this project, most notably our secondary readers, Dr. Paul Crovella and Dr. Endong Wang.

Chapter 1: Programming and Analysis

Introduction

According to Feeding America, a non-profit organization aimed at reducing food insecurity nationwide, 44 million people, including 13 million children in the United States are food insecure.[2] A food insecure household is one where the food intake of one or more household members is reduced and their eating patterns are disrupted during the year because the household lacks money and/or other resources for food. On the other hand, a food-secure household is one that always has access to enough food to maintain an active, healthy lifestyle for all household members. Because of its significant effects on physical health, social health, and mental well-being, food insecurity can be a core element in continuing the cycle of poverty. Physical effects, such as malnutrition and chronic conditions such as heart disease and diabetes, result from a lack of proper nutrients. Mental stress, anxiety, and depression can all be caused by not being able to meet basic food needs. Challenges in social well-being occur due to food insecurity can cause an inability to attend or concentrate at work/school.[3]

Neighborhoods with low access to food options where residents face limited access to affordable and nutritious food options are considered food deserts. Suburban and urban development over time has led to a decline in the number of local farms which exacerbates the prevalence of food deserts.[4] In the heart of Central New York, Syracuse is a prime example of a city built around and for car-based infrastructure. This, along with its history of racially based systemic discrimination has left many parts of the city as food deserts. The Southside of Syracuse is a particularly large food desert. High food insecurity and poverty in this region has influenced many nonprofit organizations to dedicate initiatives

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[2] "Hunger in America." *Feeding America*, www.feedingamerica.org/hunger-in-america. Accessed 23 Apr. 2024.

[3] Gundersen, Craig, and James P. Ziliak. *Food Insecurity and Health Outcomes | Health Affairs Journal*, Nov. 2015, www.healthaffairs.org/doi/full/10.1377/hlthaff.2015.0645.

[4] Su, Shiliang, et al. "A geo-big data approach to intra-urban food deserts: Transit-varying accessibility, social inequalities, and implications for Urban Planning." *Habitat International*, vol. 64, June 2017, pp. 22–40, https://doi.org/10.1016/j.habitatint.2017.04.007.

toward bringing healthy food into this neighborhood. One such organization is the Brady Faith Center and its subsidiary Brady Farm.

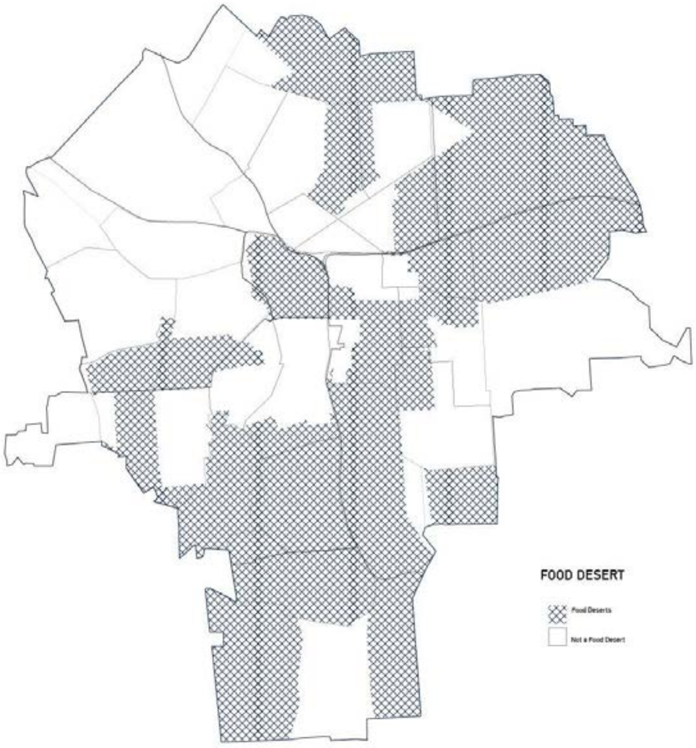

Figure 1.1 - Food deserts in Syracuse, New York. Data from American Community Survey (ACS) - Census DATA

Brady Farm

Located in the heart of south side Syracuse between US Highway 80 and 11, lies Brady Farm, a 5.8-acre farm which, since its founding in 2016, has steadily grown into an important part of the community in where it resides. The farm sits within a residential neighborhood across the street from a local elementary school. As an urban farm, the organization aims to feed the bodies, minds, and souls of the South Side while fulfilling its mission to create an economically sustainable and resilient source of affordable, locally-grown food for the community. Director and founder of the farm Jessi Lyons grew up in rural Oregon where she "took food security for granted." After moving to Syracuse to attend graduate school at SUNY College of Environmental Science and Forestry for landscape architecture, she learned more about the ongoing issue of food insecurity in Syracuse and began Syracuse Grows. As a non-profit organization, Syracuse Grows acts as a grassroots network that supports local community farms.[5] Through her work with this organization and the wider community, Jessi accumulated strong relationships based on being present and listening which helped her eventually create Brady Farm as a subsidiary of the Brady Faith Center. She believes the farm is about the interaction of people's personal values and attempting to create a strong relationship between people and the food they eat.

The farm not only grows food for the community, but it has also been used for medical checkups, therapy sessions, homeschool groups, art classes, yoga sessions, and simply as a loved meeting point for local community members. Over the past eight years, the farm has partnered with many organizations and institutions to facilitate its expansion and allow it to take on this extra programming. The Syracuse University School of Architecture and Associate Professor, registered architect, and Principal of Mago Architecture, Hannibal Newsom have an established relationship with the farm and have assisted them in creating critical infrastructure. In 2022, Professor Newsom and Jessi Lyons partnered to design a new building to address many of the farm's growing needs. In the early stages of their conversations, Professor Newsom led a team of graduate students at the School of Architecture in a two-week seminar to explore pre-engineered design concepts that could potentially meet the farm's needs. Using this as a starting point, Professor Newsom and his collaborator David Shanks designed a 1,555-square-foot structure. Images from the design and construction process of this structure can be found in Appendix A. The small building is divided into two rooms featuring a wash and pack room with a cold storage walk-in freezer and an open room for market and display for produce. The building also provides the farm with its first fully functioning bathroom attached to city plumbing. The project is both functional and aesthetically interesting as it incorporates many design features, such as its double-gabled, sliding roof configuration. After completing the design and creating construction documents approved by the municipality of

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[5] "Mission, Vision, and Values." *Syracuse Grows*, syracusegrows.org/about/. Accessed 23 Apr. 2024.

Syracuse, construction began in the fall of 2023 and is set to be completed in late spring of 2024. Because a significant portion of the labor and some material needed to construct the building was donated to the farm, the farm itself is acting as the general contractor for the project with the assistance of Hannibal Newsom and the project architect and construction administrator. Additional funds needed to complete the project were obtained by Brady Farm through a 2022 capital gains grant. This funding, however, did not cover important interior furnishings and equipment needed to make the farm fully functional. This need presented an opportunity for a new design project to create a costume fit-out in the spaces to provide the necessary functions such as storage, food display, and an office. Our thesis will document the construction of this installation or fit-out as designed by a group of architecture students participating in a design-build research project. Before recounting the construction management process in detail, a quick explanation of the early design process will provide the needed context and properly depict the entire project from start to finish.

Client Meetings

To begin the design process, our Directed Research team, or studio as it is more commonly referred to, met with Jessi Lyons, who is the client to speak with her about her needs and desires for the interior fit out of the farm. She began by providing a brief history of her work and how she started the farm in addition to the day-to-day functions of the farm. During the initial conversation, the studio asked a series of questions to help better understand the farm in its entirety and took diligent notes to keep throughout the design process. Some examples of the types of questions posed and their answers were as follows:

1. Who works on the farm day-to-day? *Jessi Lyons runs the farm with the help of apprentices. The apprenticeship/internship program employs about 4-5 people from April to November which involves intense training in the science and process of food production and the business of selling*

and distributing food. Apprentices come from all backgrounds and are usually people who have limitations that keep them from having stable employment. Examples include young moms (16-20 years old without diverse licenses or diplomas), people suffering from domestic abuse, and others who require flexible schedules. This is another way the farm works to reinvest in the community: by investing in people.

2. Where does the food go once it is grown? *Food is distributed in a number of ways. The farm owns one cargo van that helps transport food to various nonprofit organizations. The farm sells food directly on-site through markets on the weekends during the summer months.*
3. Do you ever work with kids or invite schools to the farm? *Brady Farm has a good relationship with the Southside Academy Charter School but is not able to host them often as they do not currently have interior space suitable for a class full of children. However, on nice days the school has organized trips to the farm for the children to be exposed to urban farming and learn about the importance of healthy eating.*
4. What types of things would you like to do at the farm in the future? *The farm would love to host cooking workshops such as a kimchi-making workshop. This is in an effort to help connect immigrant cultures and local foods and continue the goal of connecting people of all backgrounds through food.*

A significant portion of our conversation was dedicated to understanding what needs the farm has that the Directed Research studio could fulfill. Important constraints such as budget restrictions, limited fabrication equipment, and small building space were all important constraints that needed to be kept in mind during client conversations to temper expectations. Jessi’s top priorities were creating multiuse and flexible spaces as space is a valuable resource for the farm. She expressed an interest in Murphy tables as an example of such flexible space. Other important features on her wish list included fridge space for cold storage display, storage for standard-sized produce crates, a sales counter, and visual appeal. Aside from her strong emphasis on storage and flexibility, Jessi was open minded to the studio's suggestions for how to best utilize the space on the farm.

Site Visit

After our initial meeting with Jessi, she invited our studio to the farm to show us both the existing infrastructure and growing space they were working with, along with the initial phases of the construction of the new building on the site. Upon arrival to the site on a cold, snowy winter day, the studio gathered "inside" the new building which at this stage was simply a slab on grade. The concrete slab and foundation were in place along with main plumbing features and connections to city water.

Figure 1.02 - Construction progress on Brady Farm new building as of Feb 13, 2024

While the studio was familiar with the building through the construction drawings and renderings, walking through the construction site allowed for a better understanding of the scale of the building. The team took note of the division of the building into distinct spaces and how each space would serve various functions. Another key characteristic of the building were the thresholds and subsequent paths of travel.

The building is meant to be open and allow people to move through the space easily, especially throughout the summer months when the large barn doors on the east wall can be opened. The main entry is only one of 4 doors to the exterior along with large windows throughout the building and large skylights on the roof. Important to this initial investigation was the envisioning of a built work inside of the space that would not impede on any already programmed spaces, such as the accessible bathroom.

In addition to visiting the active construction site, the studio team moved through the entire farm to take note of the current infrastructure and functionality of the existing spaces. Jessi began by leading the group into the working shed where most of the farm's indoor programs exist. This building was made quickly and cheaply and was filled to the brim with storage for the farm. Racks along the wall kept files, boxes, crates, paper towel, equipment, and even growing seedlings that would eventually be transferred outside. One corner of the space was a makeshift refrigerator which was essentially a large, insulated box with a metal door and attached AC system consistently pumping in cold air. The space above the box was also used for even more storage. Dried flowers, onions, and garlic hung from the exposed rafters. A second point of entry for the building was boarded as evidence of a break-in at the farm where the culprits removed the entire door from the building in order to gain access and steal valuable equipment inside the shed. Jessi explained that while this space serves extremely important functions for the farm, it is not suitable for visitors and the public. With the construction of the new building, Jessi required more storage, higher quality equipment, and an outward-facing space that would be safe and inviting to the public.

Figure 1.03 - Existing building on farm site taken on Feb 13, 2024

The next point of interest on the farm tour was the high tunnels, or growing spaces made of steel covered in polyethylene which absorbs solar radiation and traps subsequent heat allowing for longer growing seasons and more controlled growing environments. Some of these high tunnels were used for storage of various necessities of the farm such as soil, tractors, bins, etc. A tunnel with active growing space was complete with freshly planted seedlings of lettuce and other greens. Jessi explained in detail how these types of crops are grown on the farm and when they can be harvested and changed out. While the studio's design would not pertain directly to the growing spaces of the farm, it was valuable to learn more about the farm as a whole to fully comprehend the scope of their work and how our design may fit into this.

Figure 1.04 - Jessi Lyons describing the process of growing kale in the winter in a high tunnel

Chapter 2: Schematic Design

Precedent Study

To begin exploring design potentials for Brady Farm, the studio team collected precedents of existing projects that serve similar functions to our client's needs. Precedent study is an important part of the architectural process as it gives the designer a sense of what solutions to a problem already exist and how they could be potentially adapted to fit the needs of their own client. The specific point of interest was adaptable or flexible furniture. Taking the idea of a Murphy table as a starting point, investigations included builds that could morph, stack, slide, flip, bend, etc. A benefit to the studio team being so large is the ability to individually look for reference images and showcase them one by one which culminated in a large collection. Conceptboard, an online collaborative visual pin up board was used to display these findings.

With this visual display, an open conversation about which ideas could potentially be combined into a cohesive design became possible. These design discussions centered around feasibility of many of these ideas. While important, aesthetic qualities were not at the forefront of thought. Functionality and building constraints outside of the studio's control became top priority. From there, design choices could be made within the necessary constraints. Limited fabrication equipment led to a focus on wood materials, as metal fabrication would require welding experience and other tools..

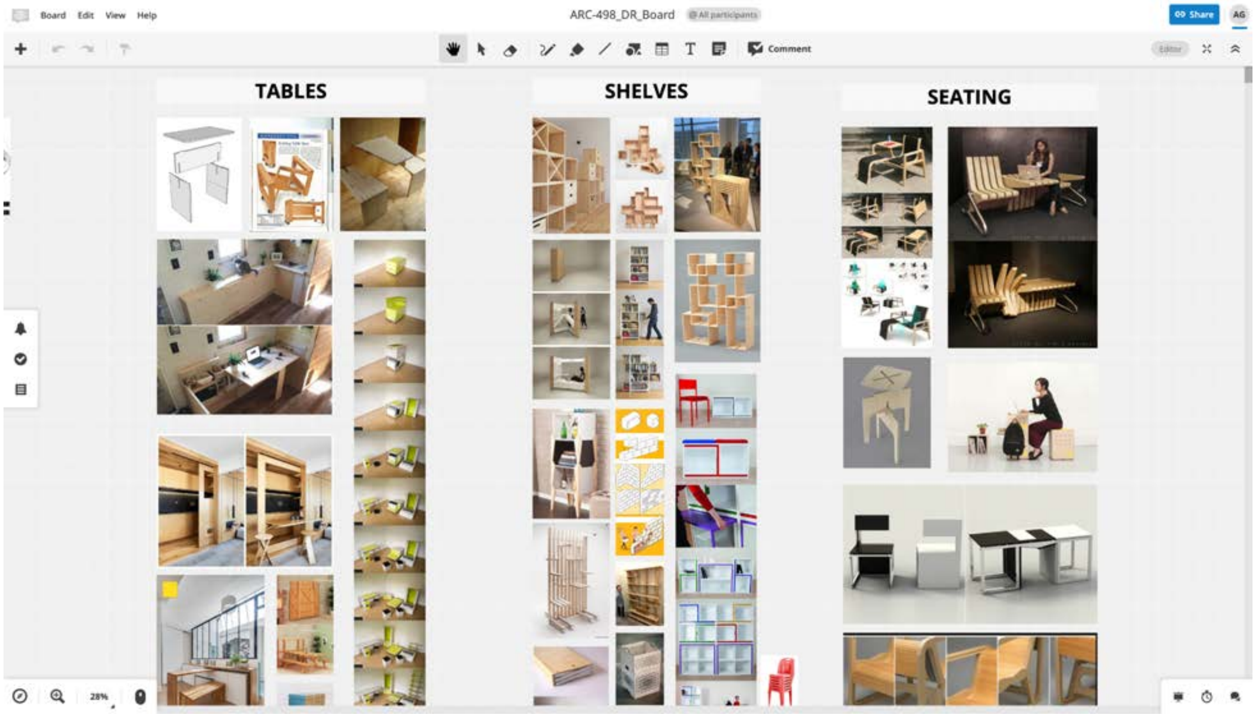

Figure 2.01 - Screen capture of initial precedent study image collection on Conceptboard

Through our early design discussions, the studio highlighted precedent images and styles of storage solutions believed to be viable options to build for the farm. These included roll-out tables under fixed counter spaces, swing rotating tables for flexibility, piano key shelves, stackable wooden stools, amongst others. The next step in this process was to decide where each element could sit within the spaces available in the new farm building. Laying ideas spatially on the plan of the building became a jumping-off point from which more sophisticated design iterations could be made for the space.

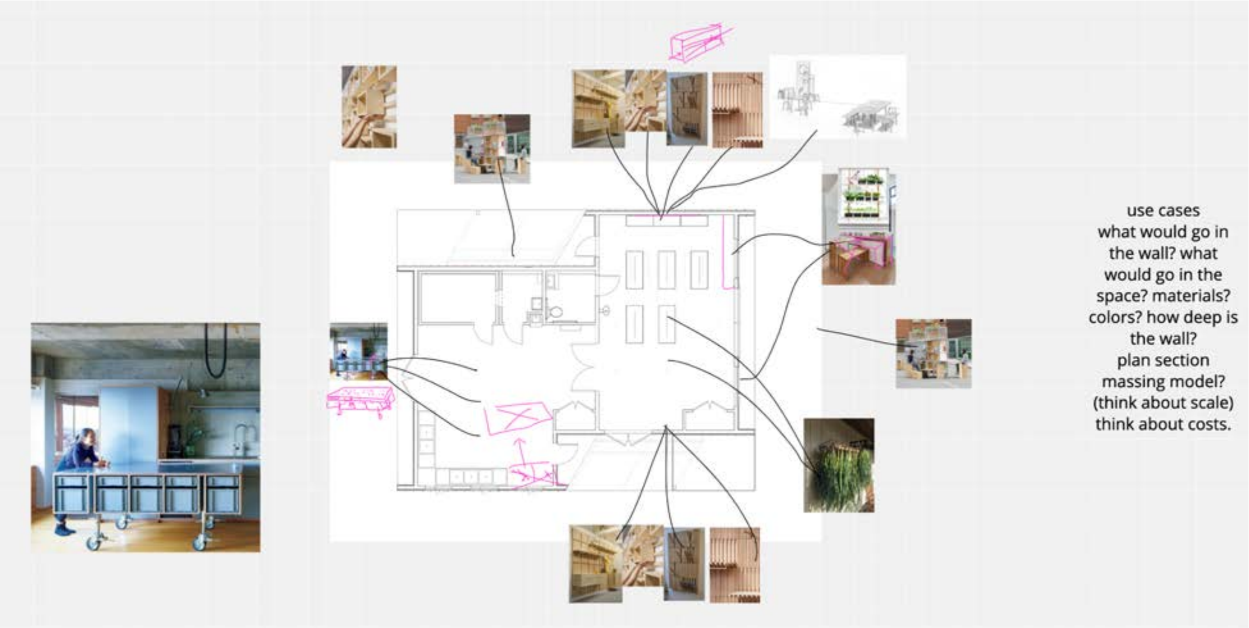

Figure 2.02 - Brainstorming locations for precedents within the farm

Iterative Development

In an effort to consolidate the studio's findings, three groups were tasked with designing unique schemes, or design possibilities, for the farm space. This involved collecting ideas from the precedents and fitting them into the space of the farm. Construction plans were used as the base from which new drawings demonstrating the designs embedded within the space were created. Each group came up with several detailed drawings, perspective images, and orthographic plans to demonstrate their design concept. Presenting the work allowed for other studio team members to offer critique and suggestions. Critique is an important part of the architectural process where one can receive valuable feedback to improve their work. The next important step in our process was iterative development, which involves taking the feedback received to create new versions of the work, or new iterations. Each new version revisited important questions about our product, such as how functional it is for the farm, whether it can be easily stowed away, and if it is too heavy for a single person to move or lift. These questions were essential in advancing the designs and making them effective solutions.

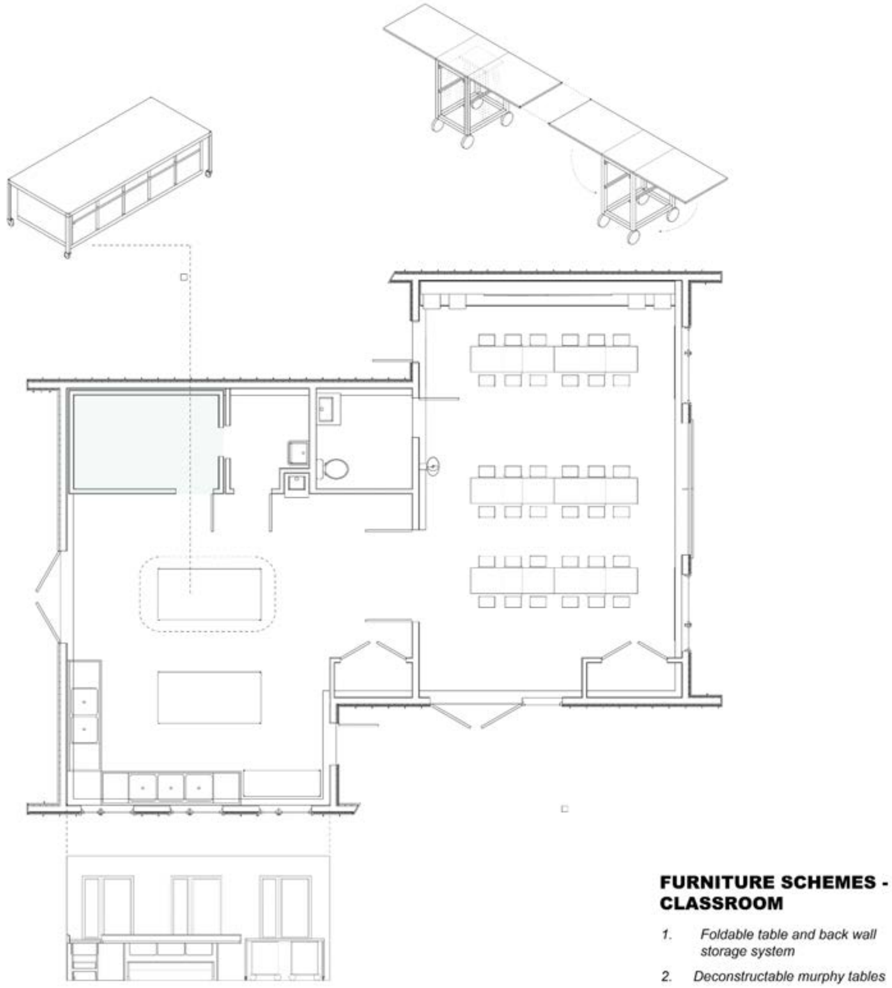

Figure 2.03 - Group 1 proposed design overview, drawn by Erik Dighton

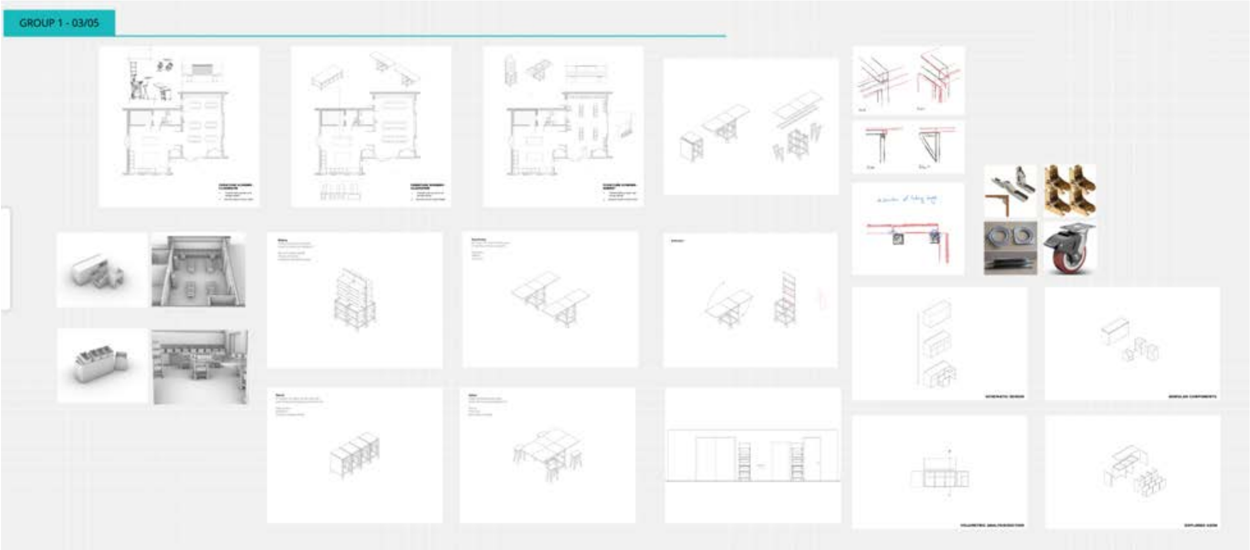

Figure 2.04 - Group 1 full design proposal including hardware, sketches, and perspective images

For example, Group 1 proposed a series of fold-out tables on wheels that could be adjusted into numerous configurations as standard tables, work benches, and market spaces. These tables would then be easily folded down and placed into slots along a storage wall along the north side of the market space. The group also proposed large, specialized work tables for the wash and pack space with a stainless steel countertop above a set of racks for standard food storage bins. Another group focused on the north wall as a storage solution for more standard tables and chairs. They introduced a tripartite concept of large sliding doors to stow away these tables and allow for a clean surface once all doors are closed.

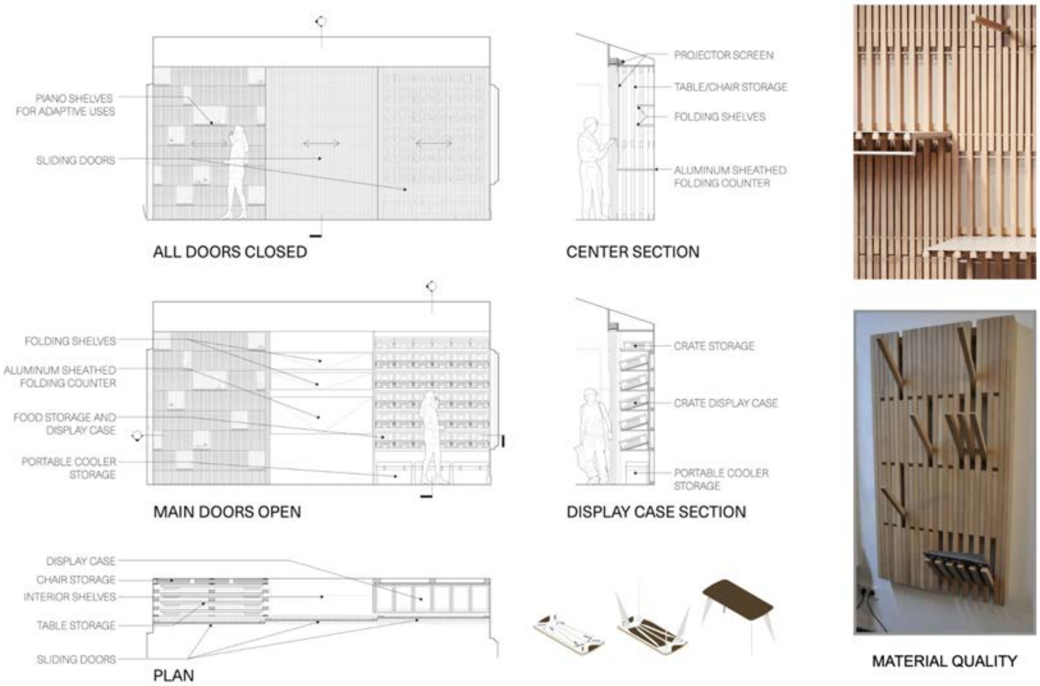

Figure 2.05 - Group 3 proposal for north wall storage, drawn by Christopher Hauserman

After presenting varying design concepts, the studio consolidated ideas and leaned into the scheme believed to function best for the space. A key concept of the agreed-upon design included using the north wall as a flexible storage solution with multiple layers that could be slid over on a track to reveal more hidden or exposed storage. A Murphy table and TV in the center of the room was added to be used by the farm to give presentations, show movies, or host meetings. The leftmost side of the wall would be used to store tables and chairs for when the space should be free of obstructions. The rightmost third would be designated for displaying food during market hours. The studio came to the collective agreement that this was the strongest scheme and instead of continuing on separate paths, the team would come together to continue to investigate this idea further. Potential issues in the design included questions of reachability. The uppermost and bottommost parts of the wall were not ideal places for presenting goods, so the team decided to incorporate drawers along the entire base of the wall. Above, the studio opted for more permanent hidden storage along the top of the wall for items that do not require as much daily use. With each new development, the team created new drawings, images, and renderings.

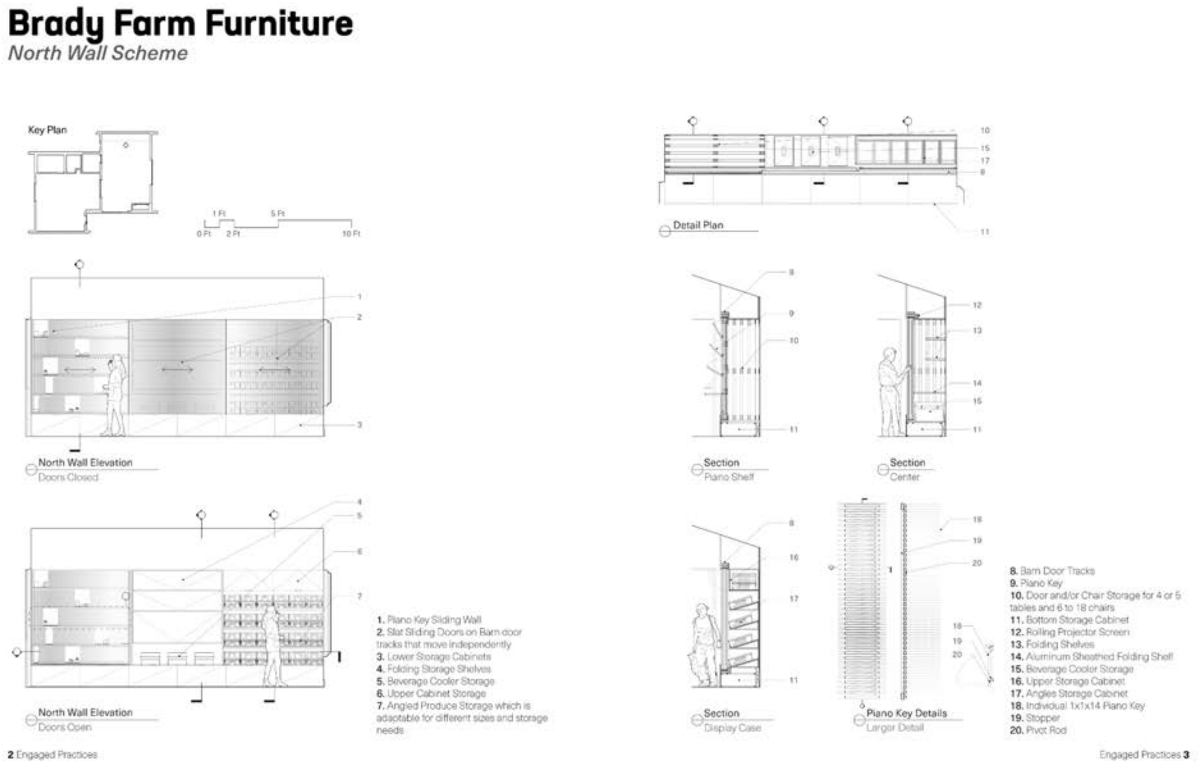

Figure 2.06 - Updated iteration of the north wall based on studio collaboration, drawn by Christopher Hauserman

After agreeing upon the proposed design, the team looked at expanding this idea to other spaces within the market room to continue our aesthetic language and provide the farm with more storage ideas. Along the south wall, a similar solution by the main entrance to the market shed connected the design into an aesthetically cohesive spatial language. Here, the scheme would provide similar functionality as the north wall in terms of storage, but would feature a slide-out desk that could act as an office space and point-of-sale space for the market. Both of these programs were requested by the client during our initial meeting. A new idea for the wash and pack room was advanced as well. These three elements comprised the entirety of the proposed design. After a long process of iteration, the studio settled on the design and began creating drawings and physical models to present the work and receive outside feedback.

Outside Feedback

In order to advance the project, it was crucial to invite outside perspectives to look at the design and help identify areas of improvement. The first outside voice invited to our studio was the Fabrication Manager at the School of Architecture, Mike Giannattasio. With his expertise in fabrication, and specifically with the tools available in the School of Architecture, Mike was able to expand upon more important considerations for our project. Many of these insights related to the materials needed to make this project happen and the longevity of material choices. Firstly, Mike advised us to not build any wooden chairs for the farm. He indicated that chairs are especially difficult to fabricate, and more importantly, experience significant wear and tear from daily use. Another important consideration was the safety and potential misuse of chairs by kids at the farm. He advised focusing on cabinetry and storage solutions while simply buying foldable chairs or stackable stools to increase their longevity. This would also be beneficial because if one of our designed chairs broke, it would be much harder to replace or fix a custom built product. Agreeing with Mike's assessment of the potential risk associated with wooden chairs and tables, we opted for more standardized metal chairs that could be stowed away into our cabinetry wall. Mike also looked at our proposed design and gave us insight into which tools we would need to utilize in the shop. This included many large tools such as the table saw and track saw to sanders, drills, and biscuit joiners.

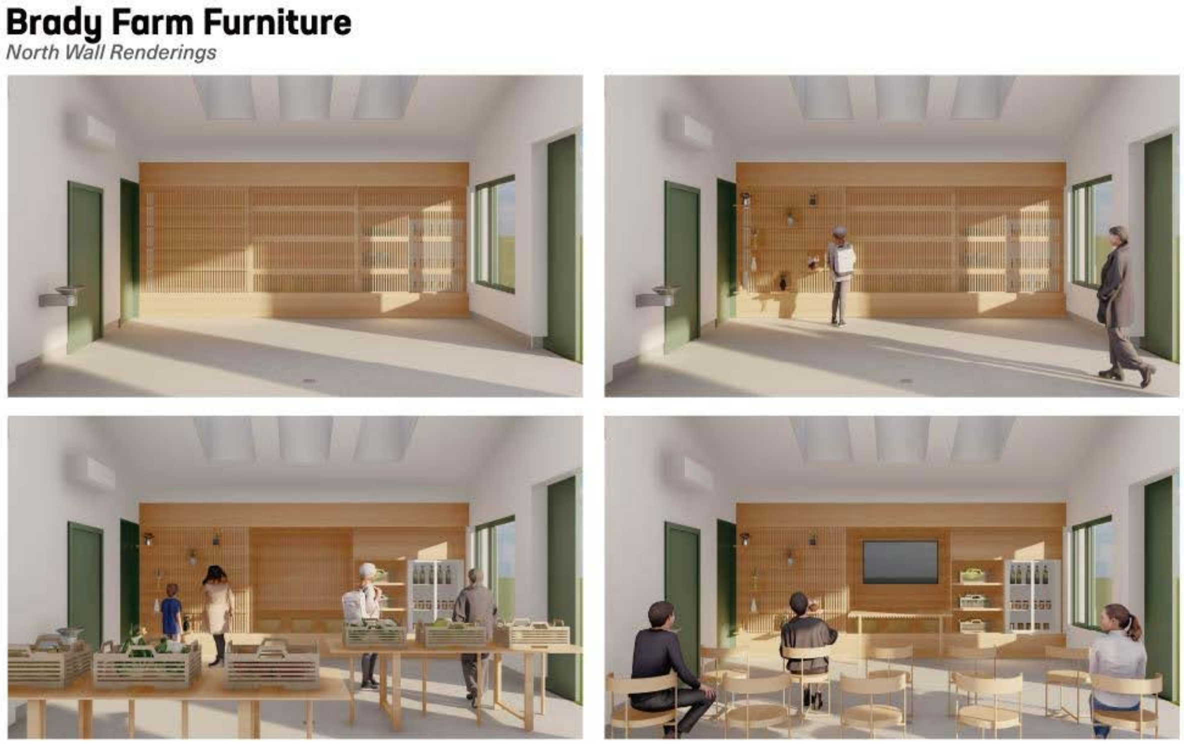

Figure 2.07 - Midterm presentation north wall renderings, created by Kevin Zhu

Next, Jessi Lyons returned for another client meeting where the studio presented to her the proposed scheme for the farm build. This was our most crucial conversation. Our goal at this point in the process was for our design to fit all of the needs of the farm and not impede any of its functions. As her space, it was also important to make sure Jessi appreciated the aesthetic characteristics of the design. At this stage in our design process, many questions still existed about what exactly the space would be used for and how the design could best serve those functions. Having Jessi present to discuss these matters was invaluable and led to some major changes in the design. Some of these changes included making room on the north wall for a large beverage cooler, hiding more storage, and creating space above the cabinetry for more storage instead of blocking it off. Jessi's overall impression of the design was positive, yet she indicated that the repetitive nature of the slatted wooden doors did not look quite as modern as she would like. She also requested that the character of the farm be reflected in the design.

Figure 2.08 - Midterm presentation of south wall rendering schemes, created by Muge Zhang

Finally, after the client meeting with Jessi, the directed research team presented the design to a panel of professors from the School of Architecture including Ayesha Ghosh, Magdalena Valdevenito, and Lawrence Davis. The purpose of this conversation was to get specific feedback about the design of the project. Each of the panelists asked a series of questions regarding the nature of the project to better understand how it could be pushed further. A key piece of feedback the studio received was that our design put strong emphasis on functionality, while not exploring more a range of aesthetic choices. This criticism resonated strongly with the team as it related directly to what Jessi mentioned during the most recent client conversation. The faculty panel encouraged the team to continue exploring how to keep many of the functional elements of the project while exploring new and interesting qualities such as color, texture, asymmetry, and more. Another area of potential improvement pointed out was the potential to divide the large room into smaller areas which could be used for more private programs such as office space or medical check ups.

This prompted the studio team to take a step back from the design and continue to explore more possibilities, returning to the iterative development stage for one final round of designing. This exercise proved fruitful in pushing the design to new levels. A discussion of new elements and aesthetic changes through precedent study led to the creation of a new design that met both Jessi's needs and desires as the client and the faculty panel's criteria of high quality design. The new design featured an asymmetrical wall of three distinct programs along the north side. Chalkboard doors were added to provide extra functionality and creative freedom to the farm, and the sliding doors covering the middle of the north wall were adorned with the Brady Farm logo, grounding the installation in its context as a project built for the farm. Finally, a superstructure of wooden framing was added above the south wall from which the farm could hang a curtain for privacy or plants and flowers to dry. With this established design completed and approval from the client, the project could move into the design development phase, where it was translated from an idea into a buildable project.

Figure 2.09 - Post midterm rendering of north wall, created by Kevin Zhu

Figure 2.10 - Post midterm rendering of south wall, created by Danlin Sun

Chapter 3: Design Development

Material Selection and Structure

After receiving client and professional feedback on our Directed Research team's iterative designs, we focused on transforming our updated design direction from 2D renders and plans to a comprehensive millwork package and 3D prototype model. This step required a jump in project definition from general form and function to specific material selection, joinery design, component division, and intended use-case for each area of the installation. We worked with and around these real-world constraints to produce a casework design that accommodated our planned methods of construction and short timeframe.

The consensus direction for building material amongst our studio during schematic design proved to be wood, and this was solidified when selecting specific materials and thicknesses. Planar wooden materials such as plywood and medium density fiberboard (MDF) were chosen as readily available commodities with a high degree of uniformity. We found that their similar finishes and sizes to one another, and the history of their use as casework components, were beneficial to our building and planning process. They also fulfilled all the needs of our design intent at an economical cost.

The majority of the build-out was to be done in plywood. Plywood, when compared to equal thickness MDF, is stronger, more flexible, and has a higher capacity to hold screws without stripping. 3/4" is the thickest dimension commonly-available in plywood, making it the strongest and most fit to withstand use in a farm setting and hold up heavy bins of produce display. The 3/4" profile also provides the most area for joinery and fasteners, allowing for ease of assembly, and ensuring each component is most likely to sustain through time and remain square and solid. The 3/4" plywood, importantly, would be used as the load-bearing walls of each component of the cabinets, as well as the top and bottom, shelves, blocking, and door stops. These components were anticipated to be under the most frequent use and heavy loads. On the contrary, we decided to use exclusively 1/2" plywood for the back panels of the casework. These pieces did not have to support significant load and were not going to be frequently interacted with.

The decision to use 1/2” plywood in these locations meant the casework would be less heavy, less expensive, and easier to install into the wall blocking at Brady Farm.

We chose to use 3/4” MDF as the material for the front-facing pieces of the casework. This was due in large part to MDF’s low propensity to warping over time, a problem which would most affect the aesthetics of the build-out if occurring on the front panels. It is also generally less expensive than plywood because it is made of recycled wood fibers. MDF is heavier than plywood, which is a drawback, but we were able to factor this into our design development with the project materials established.

Size Constraints and Tolerances

Upon entering the design development phase of the project, it was necessary for us to consider the dimensions of our selected materials as constraints for our component sizes, and to consider the divisions which would make assembly most simple. This is when we began to understand our project as a modular assembly of three vertical types of components broken up into horizontal sections of varying width, with common construction methods across the north and south wall casework.

Up to this point, our studio had been drawing and thinking of the casework build-out as full-height system of sliding doors and shelving. We had not yet united the vertical datums across the north and south walls, or considered the length of available materials as a constraint on the height of our system. After selecting plywood and MDF as our materials, we were able to work within the maximum dimensions of a sheet, 48 1/2” x 96 1/2”. This informed our decision to divide the height of the casework on each wall into 3 components; the base, main, and header, each 14 1/2”, 76” and 7” tall respectively. The base was designed to be an appropriate height to house a drawer inside, and to position the base of the main component high enough off the floor for easy use and convenient display. The main body was made tall enough to accommodate storage for jackets, tables, and chairs, or plenty of shelving for display. It also had to be designed tall enough for tolerance with the still-unspecified beverage cooler to be installed in the casework. The header was designed to balance the visual weight of the base above the main, and to support heavy display and storage above the casework with internal structure. Each component was designed to be the same depth as those above or below it, though the vertical divisions we chose allowed for easy adjustment in the case of sliding doors. We designed the sliding doors to run on a track that would be housed in the header and base components, in which case the main component would be recessed to allow enough tolerance for the thickness of the doors.

During the design development phase, our horizontal bays increased from 3 to 6 on the north wall, and from 2 to 3 on the south wall. This was due in part to the restrictions of the size of a sheet of plywood. In the case of the main components, the back face made of 1/2” plywood would already be taller, at 76”, than the short 48 1/2” edge of a sheet. This meant the back faces would need to be cut out of the sheets in the portrait orientation, meaning the 48 1/2” dimension would be the maximum horizontal width of each component. By increasing the number of horizontal components on the north and south walls, we were working with an average component width of 36” - 40.” We also incorporated tolerance for the yet-field-verified interior dimension of each wall, which was important to allow for imperfections or changes in both the building and the casework.

We based our decisions about hierarchy of pieces and joinery on conventional casework and ease-of-fabrication. In typical cabinetry, the left and right walls “cover” the top and bottom horizontal members, with the front and back walls “covering” the left and right walls. We made the decision to inset the front pieces between the left and right walls at first though, due to the resulting common dimension of width between the front piece and the top and bottom pieces, aiming to simplify the cutting process. This also resulted in a verticality that our studio indicated they were interested in, design-wise. By establishing a hierarchy of pieces, we simplified our design and our build process to be more consistent and easy for a large team to communicate and understand. Furthermore, we made the decision to use butt-joinery and countersunk screws between all pieces, again to simplify the cutting and assembly process.

Other considerations included the yet-undetermined height of the sliding door hardware and the tolerances for moving pieces in each component. In order to maintain visual consistency and hide the hardware, we incorporated a datum line of fixed front pieces that would hide the seam between the base and main or main and header components, and extend vertically with enough tolerance to cover a range of hardware heights. 1/8” tolerance between moving and fixed pieces was selected to allow for construction imperfections, but maintain only a small gap.

3D Prototype Model

After working with our Directed Research group to implement these changes in the millwork package, we next prepared a 3D model of one bay of cabinetry with a base, main, and header, each modeled with distinct pieces, material thickness, proper hierarchy and tolerances, and made to fit into each other as they would in the final build. We chose Bay 6 from the north wall to prototype, as it had the most simple and typical construction when compared to others. The overall dimensions of the 3D model were 31 1/2” x 36” x 97 1/2”, and our intent was to use it as the blueprint for a 1:1 scale model, allowing our DR to evaluate our design decisions, our selected dimensions, and the buildability of the fit-out.

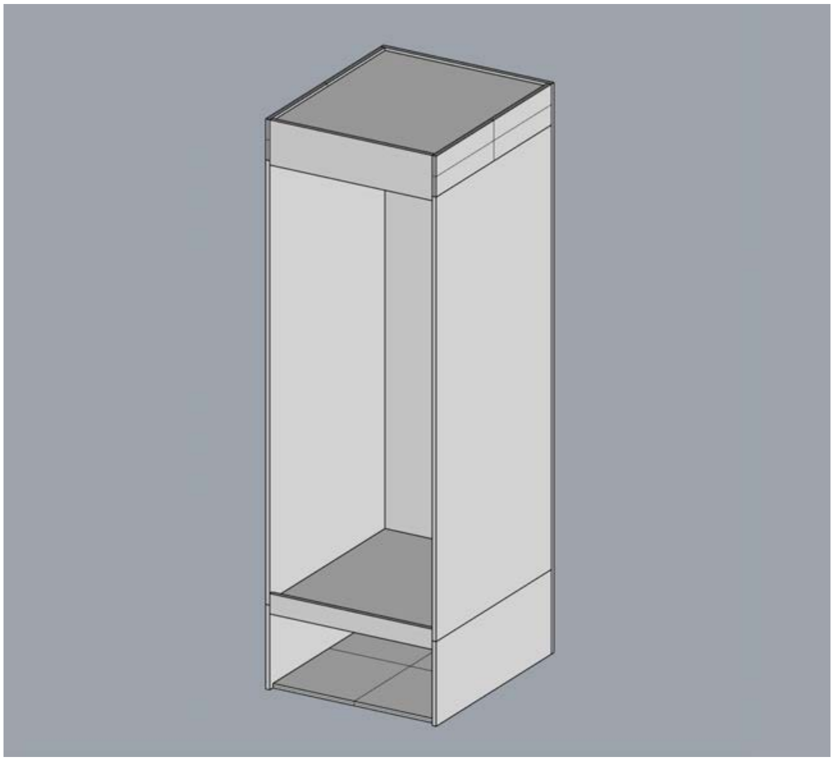

Figure 3.01 - 3D model of prototype box

In order to prepare the 3D model for prototyping, we had to generate cut sheets with each necessary piece included. Cut sheets are planned layouts of how desirable size pieces can be fit and cut out of standard size materials, in our case, 48 1/2” x 96 1/2” plywood. Using cut sheets is an effective way of managing material resources, as planning cuts can allow one to most effectively make use of purchased material with the least waste possible. In order to prepare these, each individual piece of the base, main, and header components were broken out and laid next to one another coplanar. This allowed us to begin sorting the pieces by size, with the largest pieces first being put down on a sheet and smaller pieces filling in the remaining area. This process allowed us to find the minimum number possible of plywood sheets necessary for our 17 prototype pieces, which was 4.

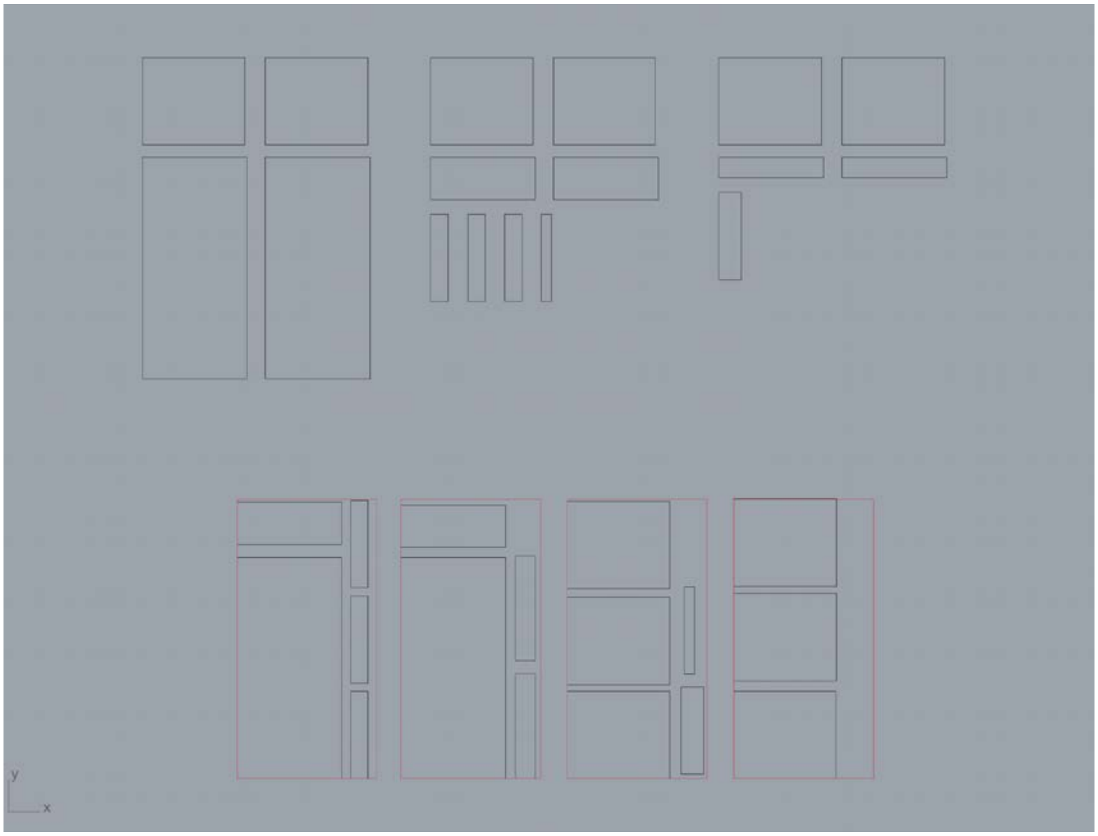

Figure 3.02 - Planned cut sheets for prototype

Using these prepared cut sheets, our Directed Research team was able to purchase the appropriate amount of materials and work efficiently in the School of Architecture woodshops, executing planned cuts on the table saw, chop saw, and track saw. This process took only one day, despite some students being inexperienced in the Fabrication Labs. In our first foray into space and time management, we made the decision to bring the cut pieces into our studio space in Smith Hall for assembly, due to restrictions on the Fabrication Labs open hours. Assembly was relatively straightforward, though we kept notes of potential problems and improvements to be made throughout, based on our own observations and feedback from our DR team. The division of vertical components proved to be helpful to the assembly process, as it allowed more team members to work on assembling more different components at once, a quality that would be valuable come our final build-out on a constrained schedule. Our studio also used the prototype as an opportunity to test hardware installation, including side-mounted drawer sliders and surface-mounted cabinet door hinges, which were installed on each component before bay assembly. Upon the completion of each component, the three were stacked on top of one another and mounted together to finalize the prototype. The result was a very large, tall cabinet system which provided us with insight into future design changes, construction considerations, and finishing processes needed. However, it was also a proud moment where we felt that our goal of designing and building 400 cu ft of casework came into view and one which propelled us forward.

Figure 3.03 - Prototype box assembled

Chapter 4: Construction Documentation

Design Adjustments

Following our studio's prototype build, we were aware that we had one month remaining until the date of our final review, a fact which would influence our design and construction management strategies for the remainder of the project. Our goal was to produce an updated set of construction documents and models that would reflect a more simple and consistent millwork design and scope – quickly – so our team members and ourselves could begin construction as soon as possible.

Using observations and feedback from our prototype building process, we implemented a variety of adjustments to the casework design to improve design, increase quality, and mitigate issues. This began by changing the front panels, made of MDF, to be the most hierarchically important in the build. This would reduce the verticality introduced by the side walls' prominence and make the more appealing veneer face of the front pieces most visible. Additionally, this change would ease in assembly, as the unequal depths of the side walls and horizontal members (caused by the horizontal members' additional 3/4" of depth to match the plane of the front face) meant that it was difficult to ensure the pieces were square and properly aligned when coming together. It would also resolve an irregular cut needed on the side walls of the main components, now meaning that every piece needed for every component would be a simple rectangle.

The next adjustments we made were to the heights of various components, as a variety of new details were becoming clear. Firstly, we realized that our casework overall height could be no greater than 96", to allow a single sheet of material to conceal the gaps and seams between the build-out and the wall. Between bays 1, 6, and 7 and the respective walls, there would be a gap left on purpose to allow for tolerance with the cabinetry, covered by a thin tall strip of MDF that is cut-to-size. Furthermore, on the right side of bay 9, the sides of each component would be covered by a single MDF sheet, hiding the seams and screws. We would fix this by reducing the height of the main components to 73 3/4" and the header components to 5". These changes would also allow 2 3/4" between the floor and the base for leveling legs, which would be supporting each base on its corners. These changes impacted the height of the drawer face and sliding door pieces. The drawer face became 14 1/4” tall, allowing a 1 3/8” tolerance between its bottom face and the floor. The sliding doors were designed using the new main component height and 3 1/4” of total hardware height, resulting in a height of 72 1/2”.

Adjustments to bays 5 and 6 were made to reflect the beverage cooler specification from the client. Bay 6 was adjusted from 31 1/2” wide to 22 1/2” wide in order to accommodate the cooler width in bay 5. Front panels from bay 5 had heights adjusted to reflect the proper tolerances for the beverage cooler door specification.

With our dimensions in place and reflected in updated millwork drawings, we could communicate and delegate the remaining design work amongst our team. This included locating the necessary wall blocking at Brady Farm for the cabinetry to fasten to, designing the sliding doors, and designing the murphy tables. In the case of the sliding doors, we determined the size, 40” x 72 1/2”, and maximum thickness allowable, about 1 1/2”, which would allow members of our DR team to break off and design the piano key door, relief-logo doors, and closet doors without worrying about potential conflicts. In the case of the murphy tables, we designed those ourselves at a later date for both the north and south walls. On the north wall, the murphy table was intended to be used as a meeting space or display around a large TV. The table was made 48” wide, the largest possible width from one sheet of plywood, attached to a series of open shelves surrounding a wall-mounted TV by a piano hinge. On the south wall, the murphy table was meant to be used as an office space and point-of-sale. It too has a built-in kickstand leg and attaches to open shelving with a piano hinge, though this location includes a trap door built into the shelving which covers a hidden storage compartment for point-of-sale hardware. These additions were best represented by our 3D millwork file, the comprehensive model of the most updated millwork we created following these changes being finalized.

3D Millwork Model

The 3D millwork file served as our database for the most current model of each component variation, and as the basis for our quantity takeoff, which was created in conjunction with this file. As each variation was being modeled, each piece's size and thickness were input into our quantity takeoff and multiplied by the instances of the variation. This came to include a model and takeoff for the piano key door and murphy tables as their designs were completed.

As each component was modeled, it was organized according to part and type. There was not a separate type of component for each bay, as many shared widths and depths. Base A was used in 4 bays and base D in 2, while drawer type A was used 6 times in conjunction with these bases. Main type C and type F were each used 2 times, and header type A was also used twice. By reducing the types of components needed to outfit all 9 bays, we were able to simplify the modeling, takeoff, and construction processes.

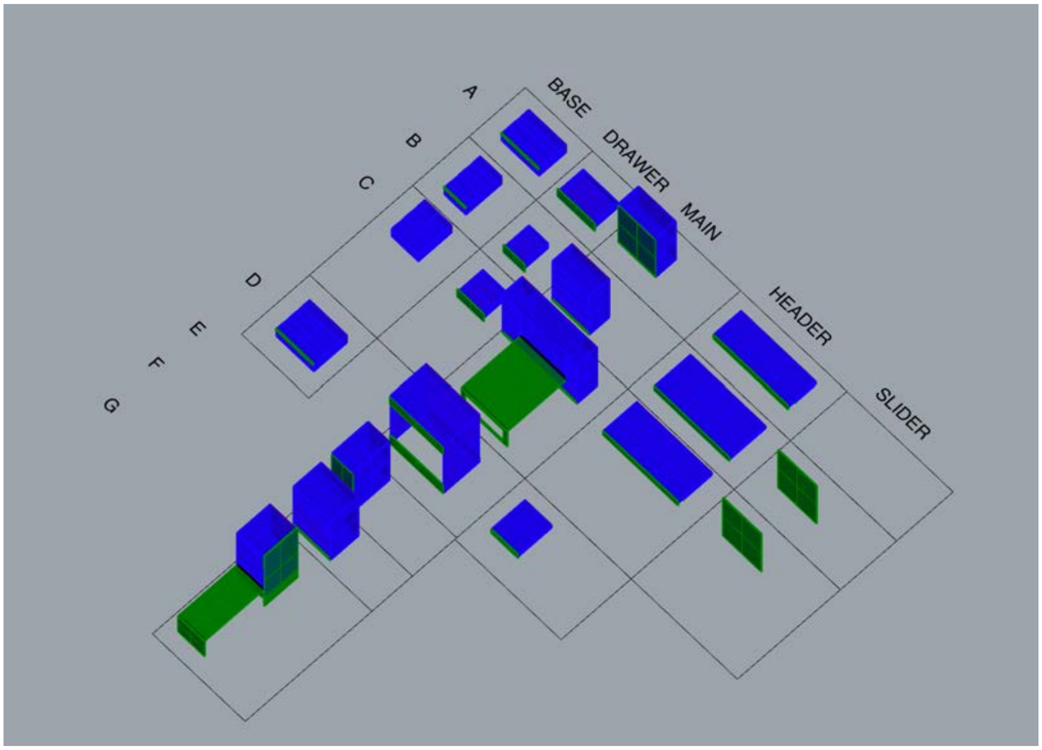

Figure 4.01 - Kit of parts

In addition to the component-by-type organization, the 3D millwork file also included an "assembled" model, with copies of each component stacked together in a mock layout. The assembled model allowed us to check our work and ensure everything fit as intended, communicate the proper assembly to our team, and provided a visual aide to members of our studio creating mockup renderings or doing remaining design work. Both the component-by-type and assembled models were kept up-to-date with design changes and added components as they were completed, which mitigated some of the challenges of keeping consistent design work across a large team of people. This also reinforced the file's use as a resource for team members to reference.

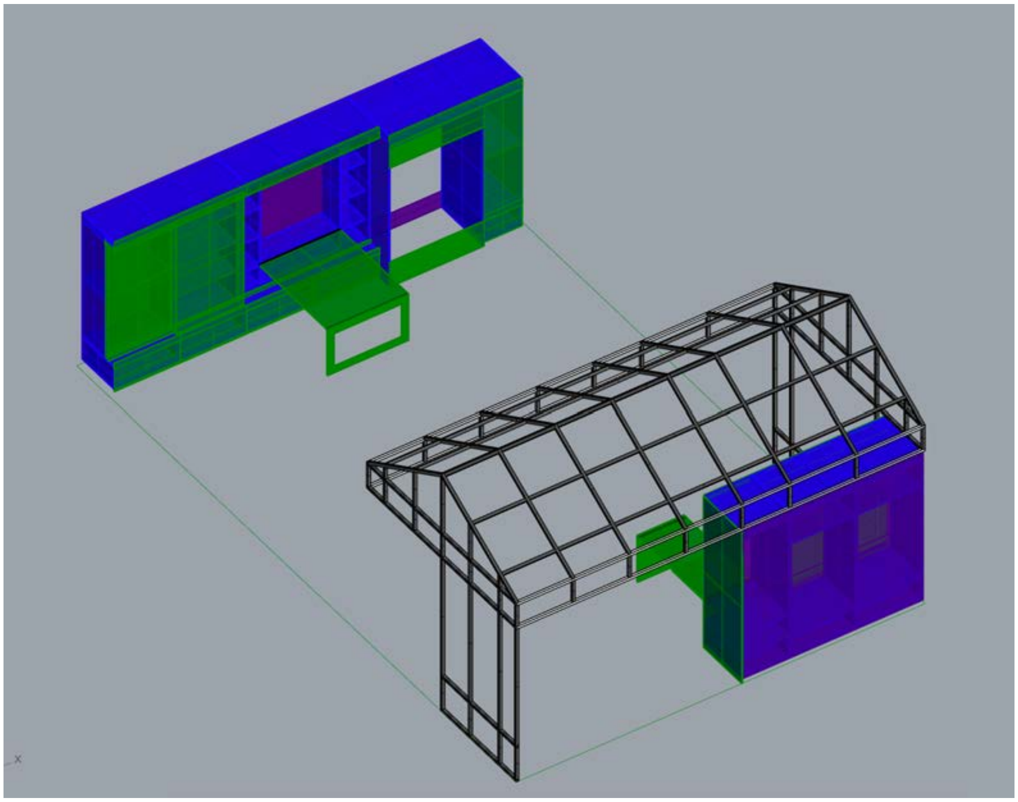

Figure 4.02 - Final model for all elements

Value Engineering

Functioning as both designers and construction managers, we had been “value engineering” our project proposal since the beginning of schematic design. This included a variety of aforementioned design updates, which had adjusted dimensions and joinery details with one goal being to reduce cost and complexity. It also included reductions in scope, either due to constraints on fabrication or time.

Early fit-out proposals included multiple rooms and operable furniture which could not be feasibly built within our timeframe. The wash and pack room adjacent to the event space, where our fit-out was eventually contained to, had proposed tables and shelving in many schemes. These ideas were eventually discarded as we found typical restaurant kitchen counters and shelving would be easiest to buy and replace, and have the longest lifespan of any proposed options. Furthermore, custom-proposed deployable and operable tables and chairs were nixed in favor of commodified plastic and metal folding tables and chairs. These changes in scope were not only most economical but necessary to ensure our fit-out could be built by our final review.

While the trellis system was not value-engineered out, it was delayed beyond our time working on the project. This portion of the scope was fully designed and engineered to support live loads despite its slender structure. However, unlike our casework, its design was not conducive to prefabrication, and because the Brady Farm structure was not yet drywalled during the spring of 2024, we were unable to make significant headway into its construction process. A preliminary quantity takeoff was performed and found that it would take about 67 8’ 2x2 pieces of lumber to build, though this was the extent to which the trellis was pursued. The completed design and takeoff remain documented and are to be followed up on after the casework installation.

These reductions in scope and simplifications over time were necessary in taking our project from schematic proposal to construction document and model package. The casework design our studio came to reflects the needs of the farm, our design intent, and the budget and time constraints we were working under. Our ability to implement and anticipate these changes in scope was enabled by the design-build delivery method we were working in, in which we were closely knowledgeable of all aspects of the project. We were able to rapidly implement construction management techniques as designs were being created, which saved time, ensured consistency, and allowed us the flexibility to make changes on a short schedule.

Chapter 5: Preconstruction

Design-Build Delivery Method

Simultaneous to the construction documentation phase, we worked on implementing a variety of commonly-used construction management strategies in order to organize and understand the materials, labor, and price of our final design. We created a work breakdown structure which was used as the basis for our quantity takeoff, estimate, and material sourcing, all of which was needed to begin construction of our final build.

Our project's delivery method allowed us to work quickly to perform preconstruction activities. Delivery method refers to the way the structure of contracts and responsibilities are set up for a construction project. The most typical delivery method is design-bid-build, which involves an agreement between the owner and the architect, and a separate agreement between the owner and the builder.[6] This method is the most clear in terms of division of labor, but requires the architect and builder to work together in an administrative relationship. The design-build delivery method uses a single contract between the owner and design-builder, who performs the administrative work in-house. This method is less popular because of the range of expertise needed to carry it out, though it can reduce project duration and costs by being more streamlined. This method was selected as part of the Directed Research proposal prepared by Professor Newsom and a large part of the reason why our Directed Research team came together as it did. Our group was formed of people expressly interested in design-build, as many students desired hands-on experience or were planning to pursue careers or academic ventures in construction-related fields. This breadth of knowledge base is part of what made using the design-build method possible, as a project like this is typically not possible to carry out with a group of architects interested only in architecture, or builders interested only in building.

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[6] American Institute of Constructors. *Associate Constructor Exam Official Study Guide*. Alexandria, VA, 2018.

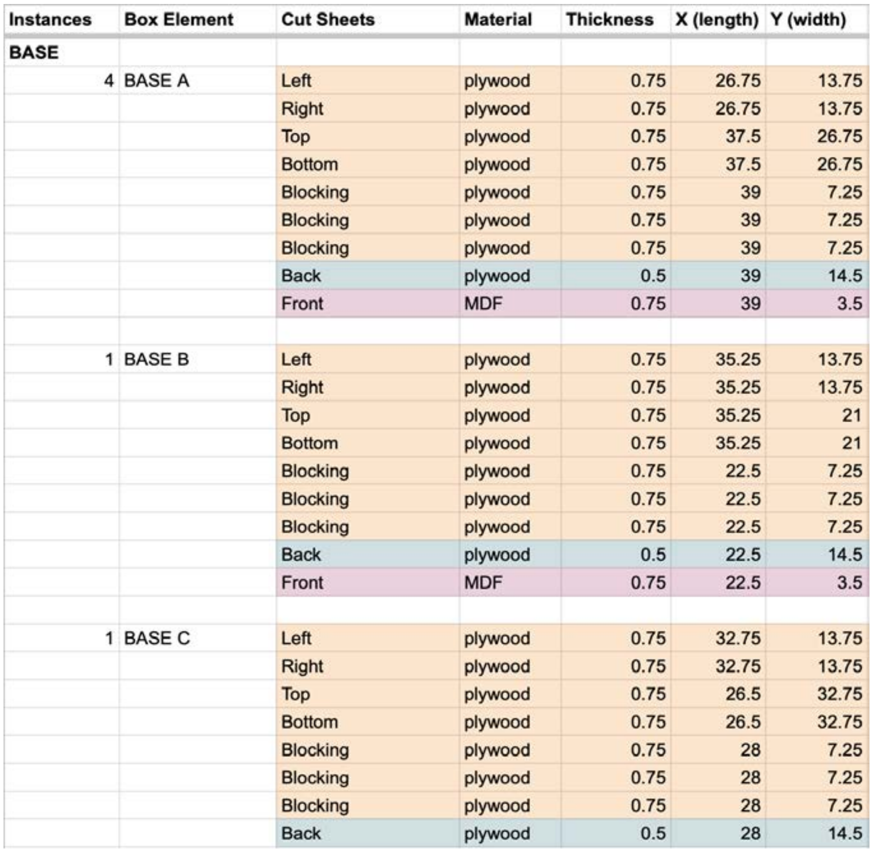
Working as both part of the design team and as construction managers, we were able to use intimate knowledge of our design intent and close relationships with fellow team members to quickly move from documentation to construction phases.

Work Breakdown Structure and Quantity Takeoff

As we made final revisions to our millwork drawing package, we began our preconstruction process with a work breakdown structure (WBS). This is a document with a comprehensive list of all construction activities necessary to complete a project, organized into levels of hierarchy and grouped by task and subtask. Our WBS was organized by location (north or south wall), then component (base, drawer, main, header), then type (A, B, C, etc.), with required quantities of each type attached. Using 3 tiers of hierarchy is typical of a WBS document, though many more can be used in more complex construction projects. Using our prepared work breakdown structure, we were able to move into quantity takeoff for each component.

Quantity takeoff is the process of identifying the quantity, length, area, or other applicable unit amount needed of a certain material to complete construction. This can be done in a number of different ways, each with its own purpose and appropriate use case. Rough takeoffs, using square foot area and past project quantities as a basis, can be a quick tool used to provide a ballpark estimate to a client early in the construction process. A full quantity takeoff, though, will determine the dimensions of each constituent piece of a project in order to best understand the materials necessary. This type of estimate is most common during the construction process, once a client has a more detailed program and preconstruction activities are underway. With our design finalized, we performed a comprehensive quantity takeoff during the creation of our 3D millwork model.

We worked together to undertake the quantity takeoff and 3D millwork modeling simultaneously, as the two required many of the same details and thought processes. In both cases, we were finding the exact dimensions of each piece of each component, and either placing it in 3D space or listing it on our takeoff, respectively. Doing both tasks at the same time also ensured consistency between the two files, as we were able to understand the significance each piece on the takeoff had on constructing the final assembly, such as which pieces were butted to which. As each piece was modeled in 3D, using the dimensions necessitated by the 2D millwork package, those dimensions were read aloud and input in the takeoff exactly as they were modeled. After doing this for each piece in a component, the total number of pieces was verified to be identical between the takeoff and model, mitigating modeling errors and ensuring nothing on the takeoff was skipped. We then repeated this process for each type, as components of the same nature (e.g. bases) had mostly identical construction with adjusted dimensions. We worked through all the component types we identified in our work breakdown structure, and the result was a complete quantity takeoff for each, sorted by material type and thickness, and identified with their number of instances in the build out.



Instances	Box Element	Cut Sheets	Material	Thickness	X (length)	Y (width)
BASE						
4	BASE A	Left	plywood	0.75	26.75	13.75
		Right	plywood	0.75	26.75	13.75
		Top	plywood	0.75	37.5	26.75
		Bottom	plywood	0.75	37.5	26.75
		Blocking	plywood	0.75	39	7.25
		Blocking	plywood	0.75	39	7.25
		Blocking	plywood	0.75	39	7.25
		Back	plywood	0.5	39	14.5
		Front	MDF	0.75	39	3.5
1	BASE B	Left	plywood	0.75	35.25	13.75
		Right	plywood	0.75	35.25	13.75
		Top	plywood	0.75	35.25	21
		Bottom	plywood	0.75	35.25	21
		Blocking	plywood	0.75	22.5	7.25
		Blocking	plywood	0.75	22.5	7.25
		Blocking	plywood	0.75	22.5	7.25
		Back	plywood	0.5	22.5	14.5
		Front	MDF	0.75	22.5	3.5
1	BASE C	Left	plywood	0.75	32.75	13.75
		Right	plywood	0.75	32.75	13.75
		Top	plywood	0.75	26.5	32.75
		Bottom	plywood	0.75	26.5	32.75
		Blocking	plywood	0.75	28	7.25
		Blocking	plywood	0.75	28	7.25
		Blocking	plywood	0.75	28	7.25
		Back	plywood	0.5	28	14.5

Figure 5.01 - Example of work breakdown structure and quantity take off

Separately, we conducted a quantity takeoff of hardware and accessories required to assemble the cabinetry. These items included door and drawer pulls, sliding door hardware, and hinges, each counted in a quantity. Quantities were also taken of leveling cabinet feet, piano key door hardware, and rubber table feet, ensuring no wood would rest on bare concrete and be exposed to water. We conducted linear foot takeoffs for cabinet door trim where necessary, 35” wide vinyl chalkboard rolls, and steel rods for the piano key door. With this, our quantity takeoff was complete, and it reflected the specifications of our 3D millwork model.

Estimating and Material Sourcing

On our condensed timeframe, it was critical to order our materials as soon as possible to allow for lead times, unexpected delays, and the assembly process. We performed a square foot estimate for the plywood and MDF to quickly understand what we needed to order, despite not yet identifying the exact number of cut sheets necessary, which came later in our construction process. We then identified lumber and hardware suppliers, and placed our orders as soon as possible.

Our square foot estimate involved calculations using the quantity takeoff we performed and the size of material we’d be ordering. Since we formatted each piece’s dimensions in inches and in its own cell, we could find its area as a product of each dimension, and when multiplied by the instances of its component type, we had an area which could be added to the rest of the same material to find a total. This number, the total area required of each type of material (3/4” MDF, 3/4” plywood, 1/2” plywood), could be divided by the area of a sheet of these materials, 4608 sq in, to find the estimated number of sheets needed to equal the area of the quantity takeoff. This estimate was most helpful because it allowed us to instantly have a figure for ordering materials the moment we finished our quantity takeoff, using only a few formulas on the data we already had. However, we understood this would be an underestimation of the actual number of sheets of each material we would need. We would need to account for material waste, which is typically 10-20%. This informed our decision when we placed our orders with higher quantities than our square foot estimate came to.

	sq in	sheets @ 48x96
3/4 Ply	129631.30	28.13
1/2 Ply	31276.75	6.79
3/4 MDF	37112.58	8.05

Figure 5.02 - Simplified material estimate

We ordered plywood from local building materials store Liverpool Lumber, which was able to be delivered to our campus within a few days. We ordered MDF from Atlantic Plywood, which we identified online as a supplier of MDF in the correct thickness and birch veneer. Hardware and accessories were also identified online, either to be ordered or picked up nearby, which allowed us to have our team to help pick out hardware as they designed around it. We consolidated an Amazon order and multiple Home Depot pickups to supply us with materials quickly. Sliding door hardware, drawer sliders, handles, and hinges were selected from reputable manufacturers and to our required specifications, and likewise ordered as soon as possible to only allow more time for assembly.

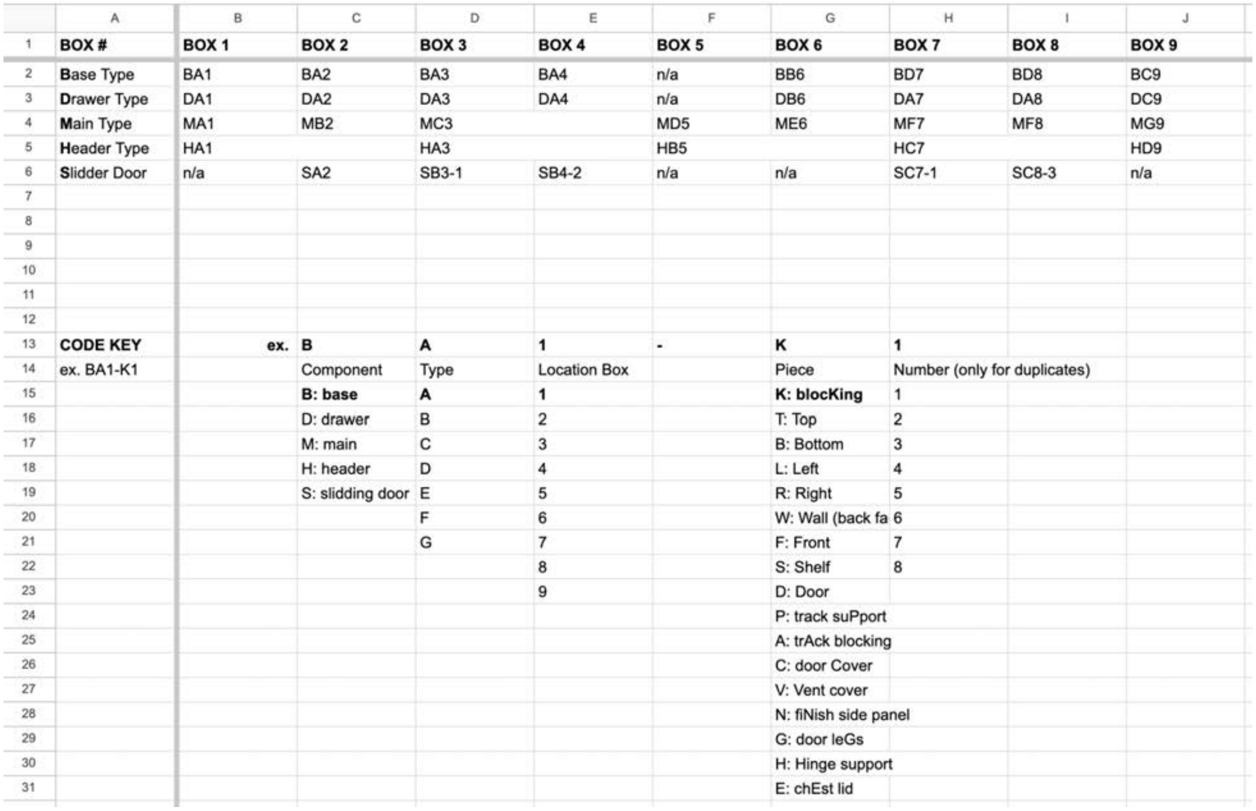
Chapter 6: Construction Management

Naming Convention

Once we felt confident that our work breakdown structure included all of the necessary material and cuts we would need to complete the installation, it became critical to disseminate this information to the wider studio team, which involved a lot of coordination and organization. One major factor in this process was creating a naming convention that would be used to identify every single piece of wood used to build the project. While some ways of referring to separate sections of the work evolved throughout the earlier design phases (such as north wall vs south wall), more specific annotations would allow anyone on the directed research team to correctly identify, cut, finish, and assemble any part of the project. This was made especially evident once the quantity takeoff revealed that there would be over 300 individual pieces to create this project. This “code” or naming convention also needed to be short and easily written on tape, which would be used to affix each piece with its label.

The prototype we made provided a strong framework for how to build the installation, however at its small scale, it was made very quickly by only a small group of the studio team and required very minimal cuts. Therefore, organizing and labeling each element was not entirely necessary. With over nine times the amount of cuts, the full casework installation warranted a much more extensive organizational system.

To create the work breakdown structure and quantity take-off, we had already begun naming different parts of the project by how they would be built (base, main, header). We also labeled many of the cuts top, bottom, left, right, back, etc. However, in working to distill this information into a singular code, we contemplated the best way to accurately name each element of the box without having any redundancies which may cause confusion in the construction phases. The result was a 4-5 digit alphanumeric code which was broken down into the following parts: component, type, location, piece, and sometimes number (for duplicates only). We made sure to never use the same letter to denote different things. For example, instead of using the word body with the label “B” we chose the word main with the label “M” as to not confuse the base components already labeled “B”. Figure 6.1 explains the entire code system with the example BA1-K1. Another example could be HC7-L which would indicate the left piece of the header type C located on box 7. While the system took some time to become accustomed to, it eventually became second nature and proved invaluable in the later stages of the construction process.



	A	B	C	D	E	F	G	H	I	J
1	**BOX #**	**BOX 1**	**BOX 2**	**BOX 3**	**BOX 4**	**BOX 5**	**BOX 6**	**BOX 7**	**BOX 8**	**BOX 9**
2	**B**ase Type	BA1	BA2	BA3	BA4	n/a	BB6	BD7	BD8	BC9
3	**D**rawer Type	DA1	DA2	DA3	DA4	n/a	DB6	DA7	DA8	DC9
4	**M**ain Type	MA1	MB2	MC3		MD5	ME6	MF7	MF8	MG9
5	**H**eader Type	HA1		HA3		HB5		HC7		HD9
6	**S**lidder Door	n/a	SA2	SB3-1	SB4-2	n/a	n/a	SC7-1	SC8-3	n/a
7										
8										
9										
10										
11										
12										
13	**CODE KEY**	**ex.**	**B**	**A**	**1**	**-**	**K**	**1**		
14	ex. BA1-K1		Component	Type	Location Box		Piece	Number (only for duplicates)		
15			**B: base**	**A**	**1**		**K: blocKing**	1		
16			D: drawer	B	2		T: Top	2		
17			M: main	C	3		B: Bottom	3		
18			H: header	D	4		L: Left	4		
19			S: slidding door	E	5		R: Right	5		
20				F	6		W: Wall (back fa	6		
21				G	7		F: Front	7		
22					8		S: Shelf	8		
23					9		D: Door			
24							P: track suPport			
25							A: trAck blocking			
26							C: door Cover			
27							V: Vent cover			
28							N: fiNish side panel			
29							G: door leGs			
30							H: Hinge support			
31							E: chEst lid			

Figure 6.01 - Box element breakdown and naming code key

Cut Sheets

With an understanding of all of the pieces needed to build the installation, the next step involved organizing these pieces onto “cut sheets.” A cut sheet is a tool that organizes pieces that need to be cut out of a material into an efficient layout based on the available material size. The standard size for plywood and MDF sheets is 48 ½ in by 96 ½ in. In order to minimize our material use we attempted to fit as many pieces onto as little sheets as possible. This required some shifting around of pieces and proper labeling of each, another reason why our code was such a crucial part of the organizational process.

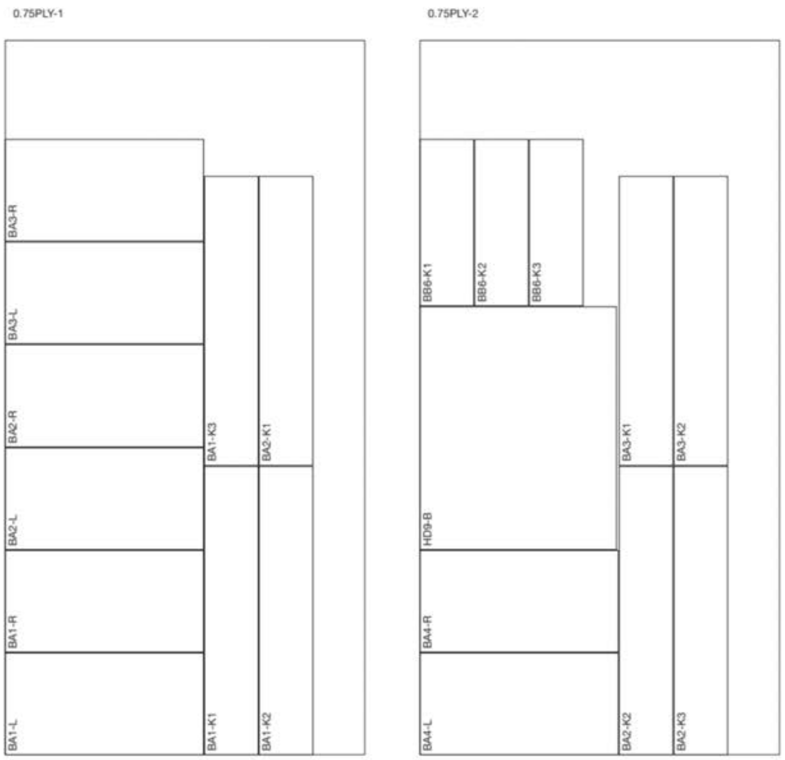


Figure 6.02 - Example cut sheets for ¾ in plywood

The figure above shows two examples of cut sheets that were created in the construction management phase of our work. The exterior bounding box represents the size of one single sheet of plywood. Each rectangle is labeled with its identification code, and pieces are spaced at a distance of ⅛ in apart to account for blade thickness. While fitting as many pieces as possible was important to this process, a major consideration was the tools used to cut the pieces. For example, each of the sheets above require three table saw cuts running vertically along the material. In doing this cut, any pieces not along these lines would get cut in half. We wanted to make sure that all of our cuts were simple and straight across to minimize any errors. This was especially important as many of our peers in the directed research studio had never worked with power tools before and would be learning as they went. Once each sheet of material was filled with as many pieces as possible, leaving enough space for trimming of the edge to create a flush cut, we labeled the cut sheet and listed each of the elements represented on that sheet in a new part of the work breakdown structure called the sheet reference.

The sheet reference was separated into three parts by material: 3/4 in plywood, 1/2 in plywood, and 3/4 in MDF. Having the full sheet reference was also particularly helpful to understanding which pieces had or had not yet been cut. In order to make the cutting process as seamless and efficient as possible, we printed out the sheet reference spreadsheet and the corresponding cut sheet layouts to be used during the cutting phase of construction. With both references, one could know which pieces were being cut and at which dimensions. Additionally, groups cutting could check off pieces and sheets as they went through and cut and labeled each piece. This ensured that no pieces were cut twice or misplaced during the cutting process.

	A	B	C	D	E	F	G
1	**MATERIAL**	**SHEET #**	**PART #**	**Location**	**X (length)**	**Y (width)**	
2	0.75MDF						
3		0.75MDF-1	MA1-F	Front	39	2	0.75MDF-1
4			MB2-F	Front	39	2	0.75MDF-1
5			SB3-D	logo door	40	72.5	0.75MDF-1
6			MF7-F	Front	39	2	0.75MDF-1
7			MF8-F	Front	39	2	0.75MDF-1
8			DA1-F	Front	38.75	14.25	0.75MDF-1
9			BA1-F	Front	39	3.5	0.75MDF-1
10			BA2-F	Front	39	3.5	0.75MDF-1
11			BA3-F	Front	39	3.5	0.75MDF-1
12			BA4-F	Front	39	3.5	0.75MDF-1
13							
14		0.75MDF-2	SB4-D	logo door	40	72.5	0.75MDF-2
15			DA2-F	Front	38.75	14.25	0.75MDF-2
16			BD7-F	Front	39	3.5	0.75MDF-2
17			BD8-F	Front	39	3.5	0.75MDF-2
18			HA1-C	Door cover	78	4	0.75MDF-2
19			MC3-F	Front	78	2	0.75MDF-2
20							
21		0.75MDF-3	SC7-D	south wall door	40	72.5	0.75MDF-3
22			DA3-F	Front	38.75	14.25	0.75MDF-3
23			HC7-F	Front	78	7	0.75MDF-3
24			HD9-F	Front	28	7	0.75MDF-3
25							
26		0.75MDF-4	SC8-D	south wall door	40	72.5	0.75MDF-4
27			DA4-F	Front	38.75	14.25	0.75MDF-4
28			HA3-F	Front	78	7	0.75MDF-4
29			BB6-F	Front	22.5	3.5	0.75MDF-4

Figure 6.02 - Sheet reference with element code, sheet number, and dimensions

In total, after organizing and reorganizing our cut sheets to maximize density, we needed 10 sheets of ¾ in MDF, 8 sheets of ½ in plywood, and 37 inches of ¾ in plywood. The initial estimate based on square area of material did not cover these quantities, even though they were rounded up to account for estimated scrap material. A new order was then placed to supplement the original shipment with the remaining sheets needed to complete the project. An extra sheet of any material was always included to account for potential miscuts or damaged material.

Delegation

Once the organizational elements of the construction project were completed, we transitioned into labor organization and delegation of roles. Because of our expertise in construction management and our work to organize the construction process, we took leadership in explaining and delegating the construction process we laid out for the studio. We needed to make sure that each of our peers understood how to read the work breakdown structure and where to find vital information they would need during the construction process. We began by giving a thorough explanation of our preconstruction process and our code. We made sure to disseminate the printed cut sheets and sheet references along with the key to the naming convention. To add to this, we also created a box reference guide that organized all of the component parts for each box within one sheet to be easily referenced. This meant instead of organizing by cut sheet, the pieces were grouped with those with which they would be assembled to create the different elements such as the base, main, or header. These box reference guides were created for use during the assembly process but also helped assess when box pieces would be all completed as their sheet reference was also included. For example, in the screen capture below, all of the elements needed to construct base A1 are laid out on sheets 1 and 3 of ¾ in plywood, sheet 1 of ½ in plywood, and sheet 1 of ¾ in MDF. Therefore, when each of these sheets are cut and labeled, all respective elements for base A1 are ready for the next step in the process.

	A	B	C	D	E	F
1	**BOX 1**	**BOX 2**	3/4 Ply			
2	BA1	BA2	1/2 Ply			
3	DA1	DA2	3/4 MDF			
4	MA1	MB2				
5	HA1					
6	n/a	SA2				
7						
8		**CODE**	**PIECE**	**X (length)**	**Y (width)**	**SHEET**
9	BASE A	BA1-L	Left	26.75	13.75	0.75PLY-1
10		BA1-R	Right	26.75	13.75	0.75PLY-1
11		BA1-T	Top	37.5	26.75	0.75PLY-3
12		BA1-B	Bottom	37.5	26.75	0.75PLY-3
13		BA1-K1	Blocking	39	7.25	0.75PLY-1
14		BA1-K2	Blocking	39	7.25	0.75PLY-1
15		BA1-K3	Blocking	39	7.25	0.75PLY-1
16		BA1-W	Back	39	14.5	0.50PLY-1
17		BA1-F	Front	39	3.5	0.75MDF-1
18						
19	BASE A	BA2-L	Left	26.75	13.75	0.75PLY-1
20		BA2-R	Right	26.75	13.75	0.75PLY-1
21		BA2-T	Top	37.5	26.75	0.75PLY-4
22		BA2-B	Bottom	37.5	26.75	0.75PLY-4
23		BA2-K1	Blocking	39	7.25	0.75PLY-1
24		BA2-K2	Blocking	39	7.25	0.75PLY-2
25		BA2-K3	Blocking	39	7.25	0.75PLY-2
26		BA2-W	Back	39	14.5	0.50PLY-2
27		BA2-F	Front	39	3.5	0.75MDF-1
28						
29	DRAWER A	DA1-L	Left	10	24	0.75PLY-10
30		DA1-R	Right	10	24	0.75PLY-10
31		DA1-B	Bottom	35	23.25	0.75PLY-11
32		DA1-W	Back	35	10	0.75PLY-12
33		DA1-F	Front	38.75	14.25	0.75MDF-1

Figure 6.03 - Box reference guide example including each element required for boxes 1 and 2

We disseminated this information to our studio peers and answered any questions they had along the way. An important part of this discussion was emphasizing the need for accuracy in cutting, labeling, and organizing the pieces. Once the team was briefed on the construction process, we worked together to organize our labor. Firstly, we created a schedule that laid out our team's weekly availability and when both of the woodshops we had at our disposal would be open for our use. This general calendar would be used to distribute the workload amongst the group throughout the week and would allow for better communication between peers when assistance was needed. Organizing people into construction teams based on experience and confidence with power tools and the assembly process was a part of this initial planning meeting. We split the group into a general assembly team and special elements teams. The general assembly team would work on the casework itself while the special elements teams would manage the unique millwork elements of the design such as the piano key door, the chalkboard and logo doors, and the Murphy tables. As noted in the image below, the trellis, or "cage" as we sometimes referred to it, was left out as explained in the value engineering process. While discussing the construction plan was essential to getting the project started, the actual construction process and labor distribution varied immensely once the actual construction began. The team was learning by doing and better understanding how everything needed to come together as we repeated the process many times. A major change that resulted due to the same unforeseen circumstances was to the proposed schedule for the project.

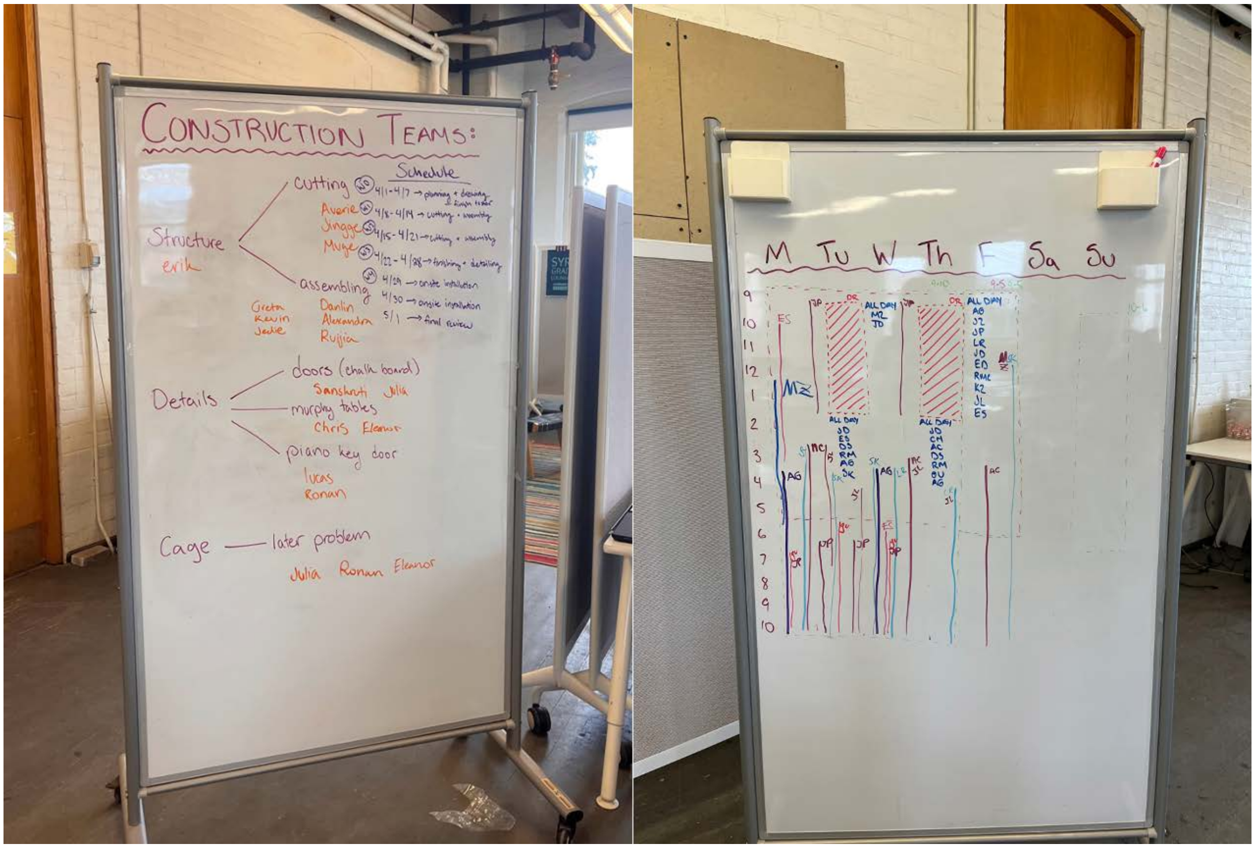


Figure 6.04 - Resource management for labor and tasks before construction

Construction Schedule

We created a number of schedules meant to assist in the organization of labor and tasks throughout each phase of the project. Each schedule examines various scopes including the entirety of the relationship between Brady Farm and the Syracuse School of Architecture, to the duration of the interior fit-out design process, to the month-long construction process. Each schedule goes into more detail and breaks down more specific tasks.

These schedules are represented using Gantt charts. A Gantt chart is a specialized timeline that tracks a project's constituent tasks over time and in relation to one another. Gantt charts are the industry standard for construction scheduling as they are easily read by people inside and outside of the field and can be easily adjusted when changes arise. Each activity on the schedule is assigned a duration and can be related to other activities in a number of ways such as finish-to-start, start-to-start, or finish-to-finish. Finish-to-start relationships are the most common as they describe tasks that must be done in sequence with one another. For example, before any piece of wood can be sanded down, it must be cut. Start-to-start relationships can also be very important and help advance projects as this describes a task that must be started but not necessarily completed for another to begin. An example of this would be how the cutting process could begin for each different type of material at the same time.

As in any construction project, and especially in those without precedent, anticipated schedules can change drastically throughout the process. This fact, coupled with the studio's collective inexperience in carpentry, resulted in very significant changes to the schedules not only in duration, but in logical sequence of tasks. For example, our initial detailed construction schedule used the prototype box the studio built as a basis for the tasks and sequence needed to complete the project. However, when looking towards our final installation, not only was the scale significantly larger than the prototype, but the quality of execution needed to be much higher to provide the farm with a durable and aesthetically pleasing fit-out. Because of this, three new vital steps were added as additional tasks. These included sanding, staining, and edge banding. Sanding would reduce rough edges and prep the wood for staining and edge banding. Staining would polish the wood, seal in the veneer, and protect the casework from tarnishing from wear and tear from people or the elements. Finally, edge banding, or the process of covering the exposed plywood edges with thin veneer would create a seamless, cohesive wood look across the installation. Only once pieces were sanded, stained, and edge banded could they be assembled. After learning about the correct sequencing of tasks we remade our construction schedule based on the hard logic of the order of tasks. Hard logic refers to dependencies that exist because one activity physically depends on another being completed.

However, during the construction process, we also ran into soft logic issues where a resource constraint impeded us from continuing our work. Thus our sequence needed to be adjusted to continue working while we waited for a resource to arrive or labor to be available to finish a task. Such roadblocks demonstrated the challenges of resource management.

Resource Management

Resource management refers to the organization and proper use of four main types of resources. These resources included labor, equipment, materials, and workspace. Managing labor, or the time the directed research team would put towards the project, was challenging for a number of reasons. Firstly, the only scheduled times when the entire studio team would be together in one place was on Tuesdays and Thursdays between 9:30 am and 1:20 pm. With a group of 17 students, it was very challenging to get everyone in one place at one time outside of class hours. As mentioned previously, our conversations about work delegation and availability helped us manage this resource. The front-end work we put into making the documents and organizing the pieces as legible and comprehensive as possible was also an effort towards labor management as it meant that people could work individually and track their work progress in the provided spreadsheets where someone else could then take over where they left off.

Equipment management included the use of both the Slocum Hall and Smith Hall wood shops to maximize our cutting time. Using both shops allowed us to cut our material more quickly and efficiently. Because the Smith Hall shop is only open until 5 pm on weekdays and closed all weekend, we could only utilize the Slocum shop during some periods. Knowing these schedules in advance, we did not encounter too many issues with large equipment management. Equipment not provided to us or specific to our project proved more difficult to manage. For example, edge banding uses irons to melt pre-glued veneer onto the edges of the plywood cuts. We could only obtain one iron from the wood shop and needed to purchase two more irons to speed up our process. We also needed special cutting blades and tools to square our wood pieces. A lot of equipment management issues arose from needing more equipment to do multiple tasks at once. While we were able to allocate funds to purchase more equipment, it often slowed us down and added extra delays to our schedule.

Materials management involves meticulous planning and scheduling of material deliveries taking into consideration availability and lead times. Because of the quick turnaround of this project, we chose to source as much material locally as we could. However, materials management still proved to be one of the most challenging parts of maintaining our construction schedule. Due to long lead times for materials such as MDF, we had to put in orders for material before being able to do full quantity take-offs to determine the exact amount of material needed. While ordering supplemental material to account for potential overage was a possibility, this had the potential to waste valuable funds from the project. Additional constraints to obtaining materials resulted from necessary paths of ordering shipments to the School of Architecture, which needed to be handled through one point of contact instead of distributed amongst the studio team.

Finally, workspace management was invaluable to this process. Workspace is an important resource when attempting to build a project of this size. We decided to convert our studio workspace into a build space by stacking chairs and tables aside to create an open floor plan. We purchased a broom and moving mats to clean and prep our space for material storage and installation. We also needed to utilize different spaces for more potentially hazardous activities such as staining and sanding. The studio was permitted to use the basement of Smith Hall as a work space including the woodshop and large spray painting room. Proper utilization of the space was also critical in keeping cuts organized and allowing the workflow of the project to continue seamlessly.

Chapter 7: Construction

Logical Sequence

Briefly introduced in the previous chapter, the logical sequence of the casework build is as follows: cutting, sanding, edge banding, staining, and assembling. While seemingly straightforward, each of these steps included important considerations and varied depending on the piece being worked on. Additionally, while the casework repeated across the entire installation followed a similar sequence of tasks, other, more unique elements of the design, had their own schedule of events. For example, the piano key door as an element made up of many moving parts and various materials, required significant planning and organization that often coincided with casework tasks, but had a distinct goal and final product. Managing the piano key door's development mostly focused on making sure the door was completed in time for its installation at the completion of the project. Looking closer at each of the five major categories of work during the construction process can give a better understanding of the steps necessary to complete the work.

Cutting

Because of the extensive amount of planning and organizing of the cut sheets and sheet reference documents created in the construction management phase, the cutting process went smoothly and significantly faster than originally anticipated. The studio team broke into groups and utilized both wood shops to cut, label, and organize all of the material in our first plywood shipment in a matter of days. Unfortunately, lead times delayed shipments of more plywood, yet with about two-thirds of the cuts made, the sanding and staining process could begin on those pieces already cut. Long lead times for the MDF also delayed the start time for this material, however when it did arrive, the studio team had built up expertise in the cutting process and was able to cut all nine sheets of MDF in a matter of hours. Learning how to use the woodshop machinery was an important part of this effort. The team utilized three tools to execute the cuts including the table saw, for long straight cuts, the track saw for cross cuts, and the chop saw for small cuts. Another invaluable aspect of creating a proof of concept prototype for the design was the experience gained using this equipment. We learned from woodshop technician Jeremy Tarr during this process and then disseminated this knowledge to each other as we each worked through cutting the over 50 large sheets of material. The studio team also used this time to create construction guides that documented how to use the materials and tips and tricks to help create the most accurate cuts possible. After each cut was made, it was checked off the sheet list as "completed", and all included parts were labeled with blue tape and their corresponding code. Then sanding could begin.

Figure 7.01 - SawStop instruction drawing including on/off switch (1), saw blade (2), and fence (3)

Figure 7.02 - Makita Track saw clamped directly onto wood to create straight cuts

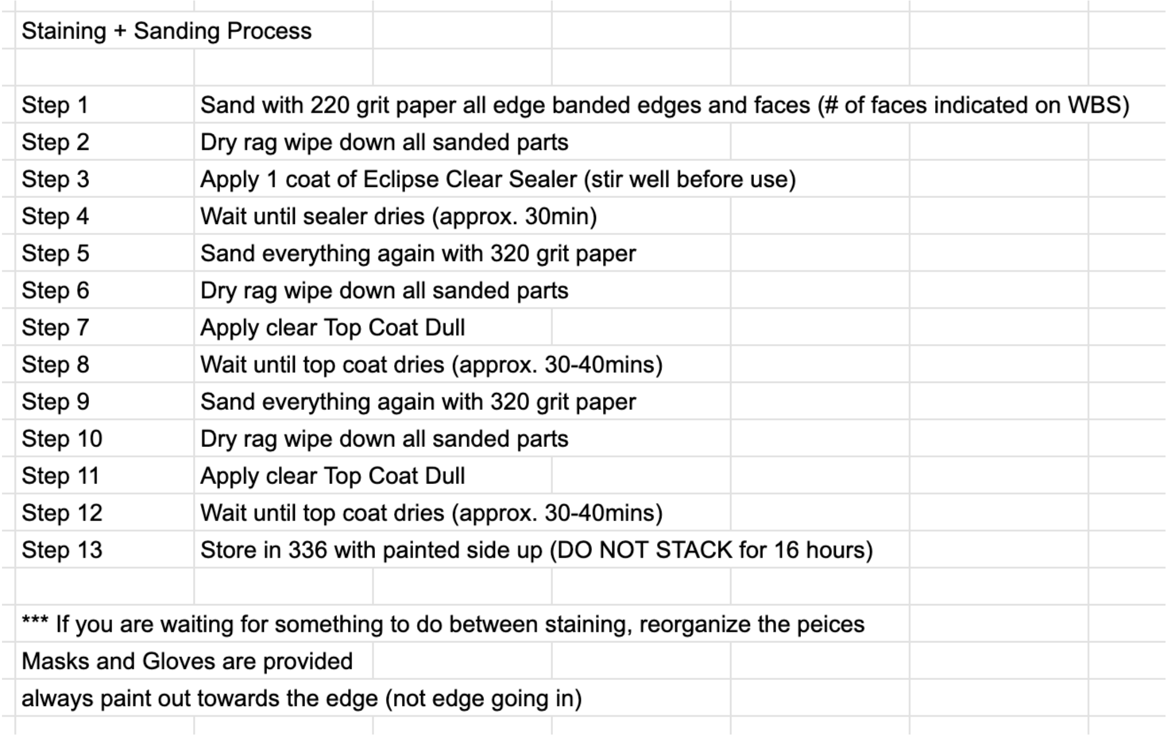
Finishing

The finishing process for the wood elements involved sanding, edge banding, and staining. Sanding down all sides of exposed plywood edges with 150-grit sandpaper was necessary to both ease the handling of the wood and provide a smooth surfacing for edge banding. Another important part of the construction management and organization of the design was determining which pieces needed to be edge banded. Using the completed 3D model as a guide, we incorporated edge banding into our existing work breakdown structure by noting how many and which sides needed to be edge banded. This would take the guesswork out and quicken the workflow process. The same steps were applied to determine how many, if any, sides of the wood would need to be stained. Edge banding and staining were necessary for any part of the design that would be visible once assembly was completed. Some elements, such as blocking, did not require edge banding or staining, and were denoted as “n/a” in the WBS. Once pieces were edge banded and stained, they were labeled green (or yellow if only one side was completed), which allowed us to track our progress in real-time.

	A	B	C	D	E	F	G	H
1	**BOX 3**	**BOX 4**	3/4 Ply					
2	BA3	BA4	1/2 Ply					
3	DA3	DA4	3/4 MDF					
4	MC3							
5	HA3							
6	SB3-1	SB4-2						
7								
8		**CODE**	**PIECE**	**X (length)**	**Y (width)**	**SHEET**	**EDGE BANDING**	**STAIN**
9	BASE A	BA3-L	Left	26.75	13.75	0.75PLY-1	1Y	1
10		BA3-R	Right	26.75	13.75	0.75PLY-1	1Y	1
11		BA3-T	Top	37.5	26.75	0.75PLY-5	1X	1
12		BA3-B	Bottom	37.5	26.75	0.75PLY-5	1X	1
13		BA3-K1	Blocking	39	7.25	0.75PLY-2	n/a	1
14		BA3-K2	Blocking	39	7.25	0.75PLY-2	n/a	n/a
15		BA3-K3	Blocking	39	7.25	0.75PLY-3	n/a	n/a
16		BA3-W	Back	39	14.5	0.50PLY-3	n/a	1
17		BA3-F	Front	39	3.5	0.75MDF-1	2X	2
18								
19	BASE A	BA4-L	Left	26.75	13.75	0.75PLY-2	1Y	1
20		BA4-R	Right	26.75	13.75	0.75PLY-2	1Y	1
21		BA4-T	Top	37.5	26.75	0.75PLY-6	1X	1
22		BA4-B	Bottom	37.5	26.75	0.75PLY-6	1X	1
23		BA4-K1	Blocking	39	7.25	0.75PLY-3	n/a	1
24		BA4-K2	Blocking	39	7.25	0.75PLY-4	n/a	n/a
25		BA4-K3	Blocking	39	7.25	0.75PLY-4	n/a	n/a
26		BA4-W	Back	39	14.5	0.50PLY-4	n/a	1
27		BA4-F	Front	39	3.5	0.75MDF-1	2X	2
28								

Figure 7.03 - Edge banding and staining log in the work breakdown structure

As with any part of the process, learning how to edge band and perfecting the technique took time. Sharing of tips and tricks helped the studio team advance this part of the process. Once pieces were edge banded, they were ready for staining. The staining process included three total layers, including a sealer and two top coats. Sanding the faces down with each layer took time but was vital to creating a quality finish on the wood. In more effort to manage the finishing process, we wrote detailed instructions for how to stain the wood and what materials were needed to do this. These detailed steps allowed any member of the team to participate in the finishing process and easily hand off work to another team member.



Staining + Sanding Process	
Step 1	Sand with 220 grit paper all edge banded edges and faces (# of faces indicated on WBS)
Step 2	Dry rag wipe down all sanded parts
Step 3	Apply 1 coat of Eclipse Clear Sealer (stir well before use)
Step 4	Wait until sealer dries (approx. 30min)
Step 5	Sand everything again with 320 grit paper
Step 6	Dry rag wipe down all sanded parts
Step 7	Apply clear Top Coat Dull
Step 8	Wait until top coat dries (approx. 30-40mins)
Step 9	Sand everything again with 320 grit paper
Step 10	Dry rag wipe down all sanded parts
Step 11	Apply clear Top Coat Dull
Step 12	Wait until top coat dries (approx. 30-40mins)
Step 13	Store in 336 with painted side up (DO NOT STACK for 16 hours)
*** If you are waiting for something to do between staining, reorganize the peices	
Masks and Gloves are provided	
always paint out towards the edge (not edge going in)	

Figure 7.04 - Detailed steps for staining and sanding process

Assembly

Once all pieces of a component such as a header, main body, or base were cut and finished, they were ready to be assembled. To aid in the assembly process, the 3D model we created was shared with the studio to use as a basis for creating assembly guide drawings detailing how each element of the box should come together. These guides were then displayed around the studio build space and used as reference when needed. Each drawing included an exploded axon of the component with red dashed lines representing the connection point to be followed during assembly. They also included a reference location axonometric drawing to indicate where in the build-out the component exists.

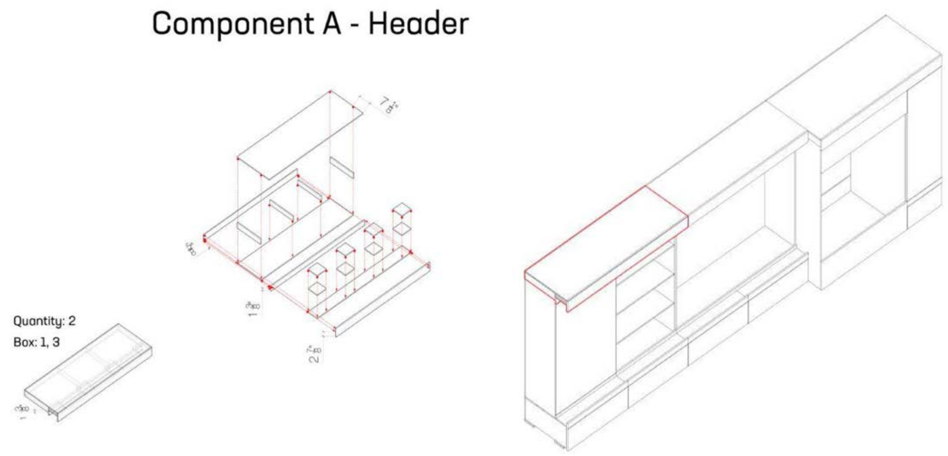


Figure 7.05 - Assembly component exploded axonometric with location reference axonometric

Because the casework elements were designed to be repetitive with similar construction techniques across the entire design, consistency in the assembly process was crucial. We worked with the studio team to create the first of each element (base, main body, header, etc.) slowly and carefully, and then disseminated that information and repeated the process for each of the corresponding elements. This meant that the building process began slowly for each new piece and then speed up as the team gained important knowledge. Another important factor of the assembly process was making sure to cover any imperfections and seams in the design. This included making sure that front-facing elements, made of ¾ in MDF, were screwed in from the back to allow for a smooth surface to be visible from the outside. To do this, we needed to use a Kreg tool and plan out our drilling locations ahead of time. Unfortunately, even with this process, we miscalculated the depth of the screws and realized that the screws would puncture the front-facing veneer of the wood. We purchased smaller screws to resolve this issue and reduced the depth of our Kreg for the remaining pieces. Because of our lack of experience, the team faced many challenges, some expected and some not expected, during the assembly process. However, we were able to problem-solve throughout the process to fix mistakes or find creative solutions to combat them.

Chapter 8: Substantial Completion

Temporary Installation

Because the construction of the new building on the farm was ongoing throughout the studio's own design-build process, the building was not completed in time to allow for the casework to be installed on-site. The drywall and electrical outlet installation needed to be finished before any casework could be brought in. The Directed Research course final reviews necessitated the project to be completed and presented by May 1st. Therefore, the installation was assembled temporarily in the visiting critic studio of Slocum Hall for review days until it could be transported to the site. Temporary installation required additional steps to ensure the safety of both the work and those interacting with it. This includes blocking and weights to make sure the system is securely attached.

Once all of the components were finished, they were transported from Smith Hall to Slocum Hall. This involved clearing multiple doorways, two elevators, and a sloped street, emphasizing the importance of breaking down the project into smaller, more mobile components. The studio team was very cautious in transporting the casework with the assistance of dollies. Drawers were removed from bases and transported separately to avoid movement. Murphy tables were tapped shut for extra protection. Workspace management was again very important during this transporting and installation phase. The space needed to be cleaned and cleared for the installation to begin.

With all component parts in one space, the bases were able to be lined up and leveled. Leveling was an important part of ensuring the project presented well and was safe to build up. This process is critical for all locations as construction cannot ensure a perfectly level floor, especially because of drainage concerns at the farm. The studio also worked together to block the separate elements together with 2x6 boards. Long screws were drilled from the back of the cabinets into the boards to fasten them together. Once the main elements were attached, the tracks for the sliding doors could be installed. Because the sliders cross over multiple components, this needed to be done once all pieces were brought together. Another element that remained to be done during installation included the screwing of the header panels to cover the tracks. We wished to create as many smooth surfaces as possible to hide screw holes, so these holes were marked in place and Kreged prior to the installation. The large empty box which will contain the farm's beverage cooler also required installation in the presentation space. As the studio team went about the process of assembling the project, many issues and complications arose which required communication and problem solving. For example, in order to avoid the plywood panels touching the concrete floor, something which would inevitably cause moisture damage to the wood, we needed to add rubber feet onto the bottom side panels of the fridge. This required trimming the elements and screwing in the feet at the correct locations. Finally, after a lengthy process of installation, culminating in door attachment, the project was completed and ready to be presented and critiqued.

Presentation

In architectural drawings, entourage refers to the surroundings of a work which is often included in plans and sections such as landscape, greenery, people, cars, decorations, etc. Entourage allows a drawing or rendering to be true to life and feel lived in. This is something we wanted to do to showcase our project. As the final build is at its most simple reading a storage solution, we wished to display the use of the project by bringing in items of entourage to liven up the work. This included coats, pencil cases, plants, books, vegetables, and many more potential items the farm could store. We also chose to write on the chalkboard walls to demonstrate the power of personalizing the installation. We used this space to sign our work, including the names and signatures of each member of the studio team responsible for the design and construction of the casework. Finally, we printed out images of a TV and beverage cooler to fill the spaces that were left blank since these items would not be added until the farm installation. Images of the final review and the casework in detail can be found in Appendix B.

The panel of presenters included three faculty members from the Syracuse University School of Architecture, a past collaborator of Professor Newsom who had a hand in designing the new farm building, and our client, Jessi Lyons. To this group, we presented the extensive research that preceded this project, as well as the design process, preconstruction process, and construction process. We also used this time to demonstrate the interactive elements of the project such as the Murphy tables, sliding doors, and piano key folding shelves. Jessi opened the discussion by congratulating our team on the work we put in and appreciating the design in its final form. She expressed that we met and exceeded her expectations and believes this installation will service the farm very well and is visually appealing at the same time. We also used this time to reflect upon the challenges the studio faced during each step of the project and how they could have been addressed differently. Part of this conversation became a general review of the design-build process in an academic setting and how valuable it can be for aspiring designers. Overall, the discussion left us with a profound sense of pride in our completed work.

Final Installation

Our casework design will be installed at Brady Farm once the construction of the market shed allows. This will take place after drywall has been installed and the building is weatherproof, in order to protect the cabinets and ensure their proper installation, and should occur in the early summer of 2024. As most of our studio team will be moving from Syracuse prior to then, this phase of the project will be carried out by Professor Newsom, and assisted by a new team of students and interns interested in design-build and community engaged practices. Using the collection of strategies and techniques we found useful, this team will be able to reassemble our fit-out with relative ease and the assurance that everything fits and anchors in place. With our developed processes, research basis, and Professor Newsom as a throughline, we look to establish a knowledge base of how to best execute these projects, including the installation of our casework on the farm and future Directed Research projects.

Conclusion

Over the course of our five years at Syracuse earning a professional degree in architecture, we have learned a tremendous amount about architecture and its various components such as design, theory, history, representation, structures, building systems, and more. Being a part of this design-build Engaged Practices studio has provided a unique experience that will help prepare us for our future endeavors in the fields of architecture and construction. New or expanded skills such as project management, collaboration, preconstruction, woodworking, client relations, cost management, and more will prove invaluable in helping us become better designers. Experience and the ability to anticipate problems and solve them in earlier phases is critical to efficiency and is something that we will not forget from this work.

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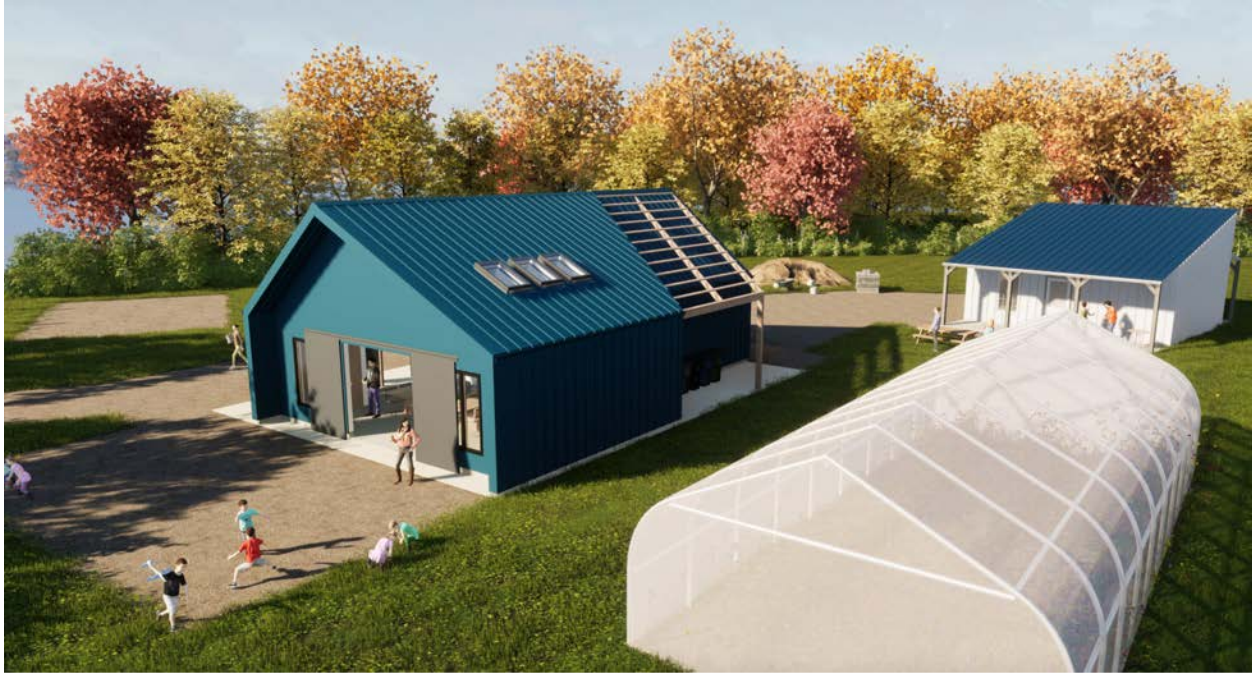
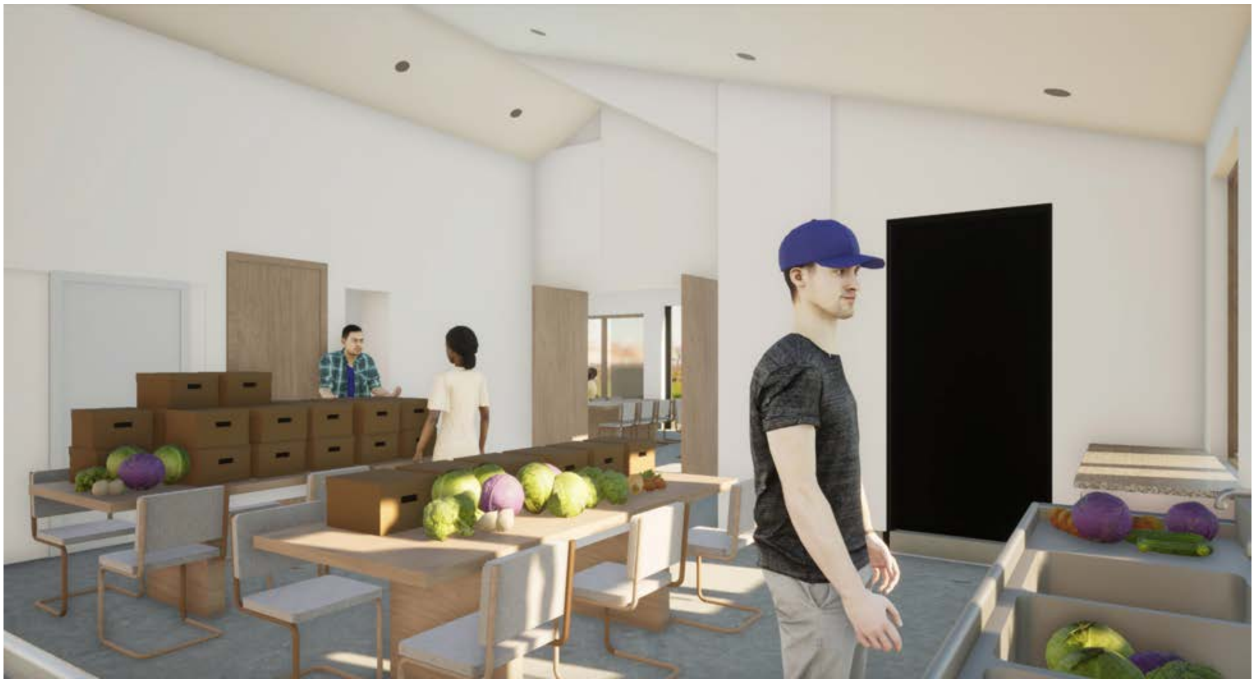
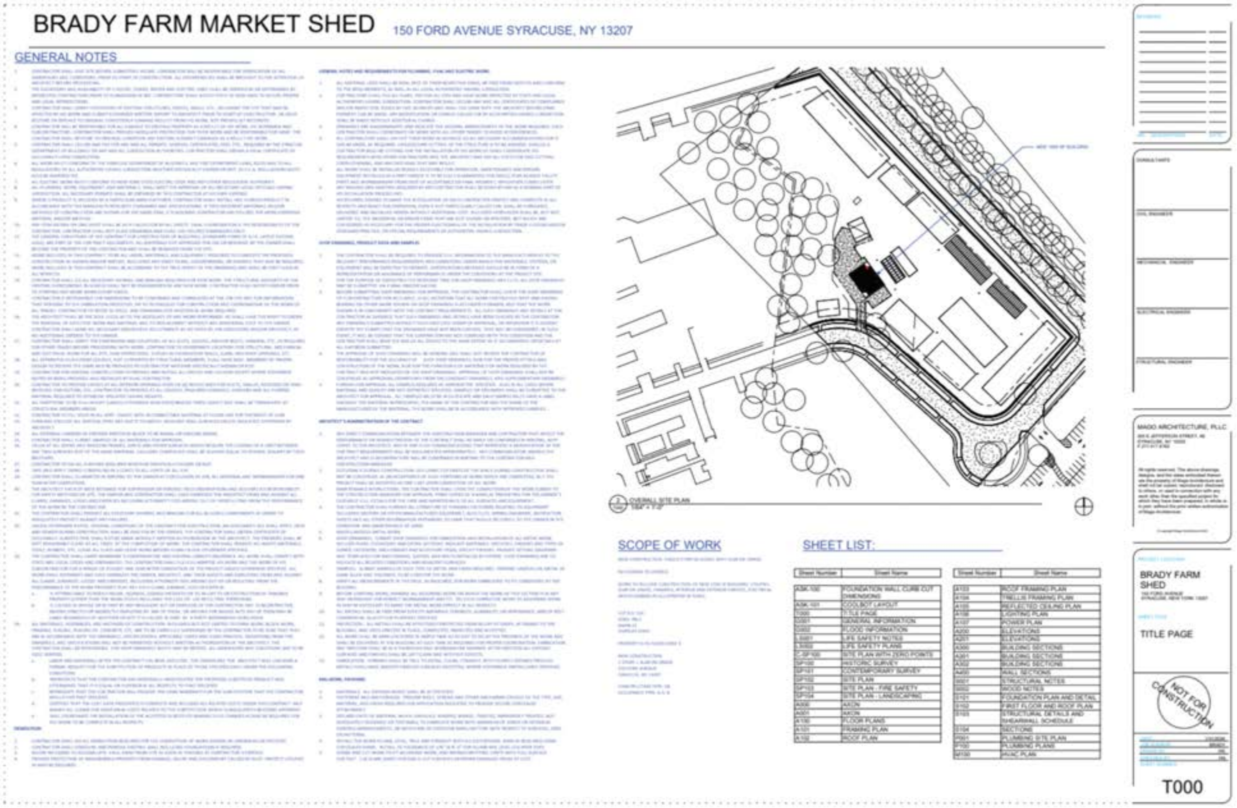
Appendix A







BRADY FARM MARKET SHED

150 FORD AVENUE SYRACUSE, NY 13207

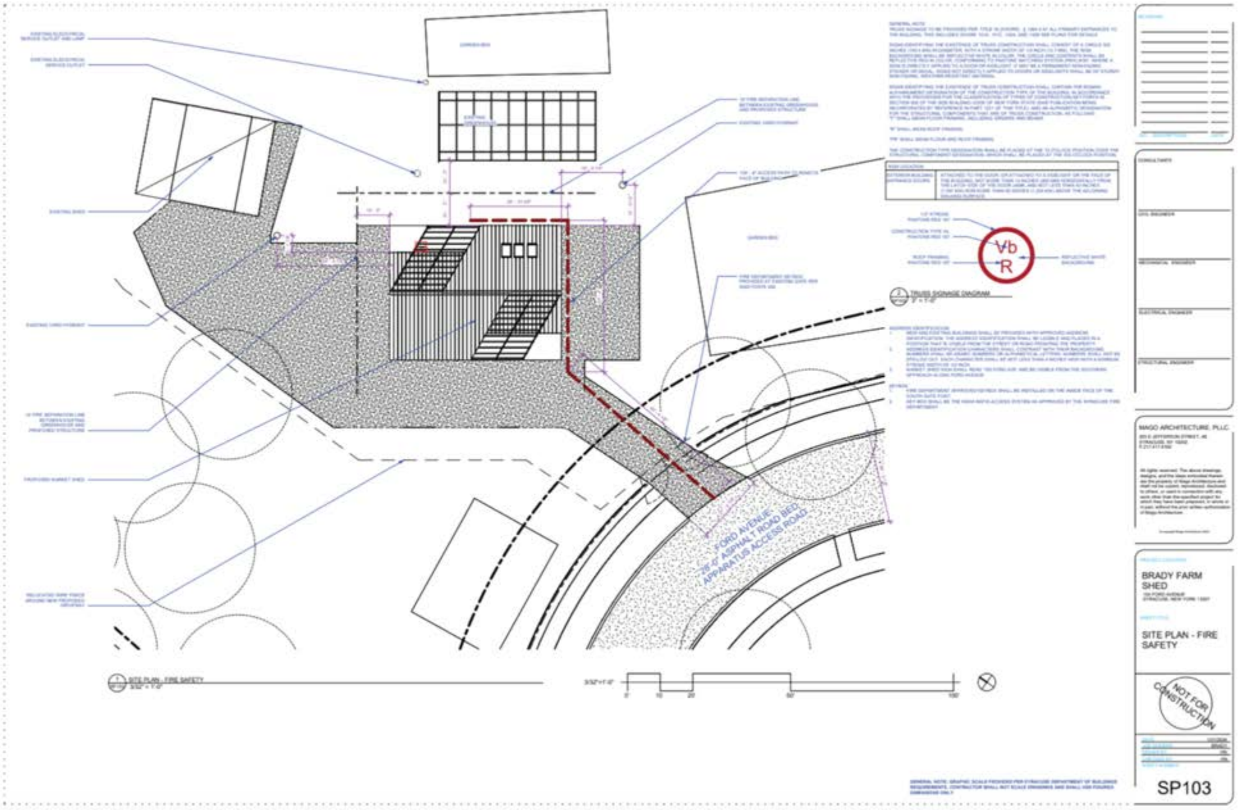
GENERAL NOTES

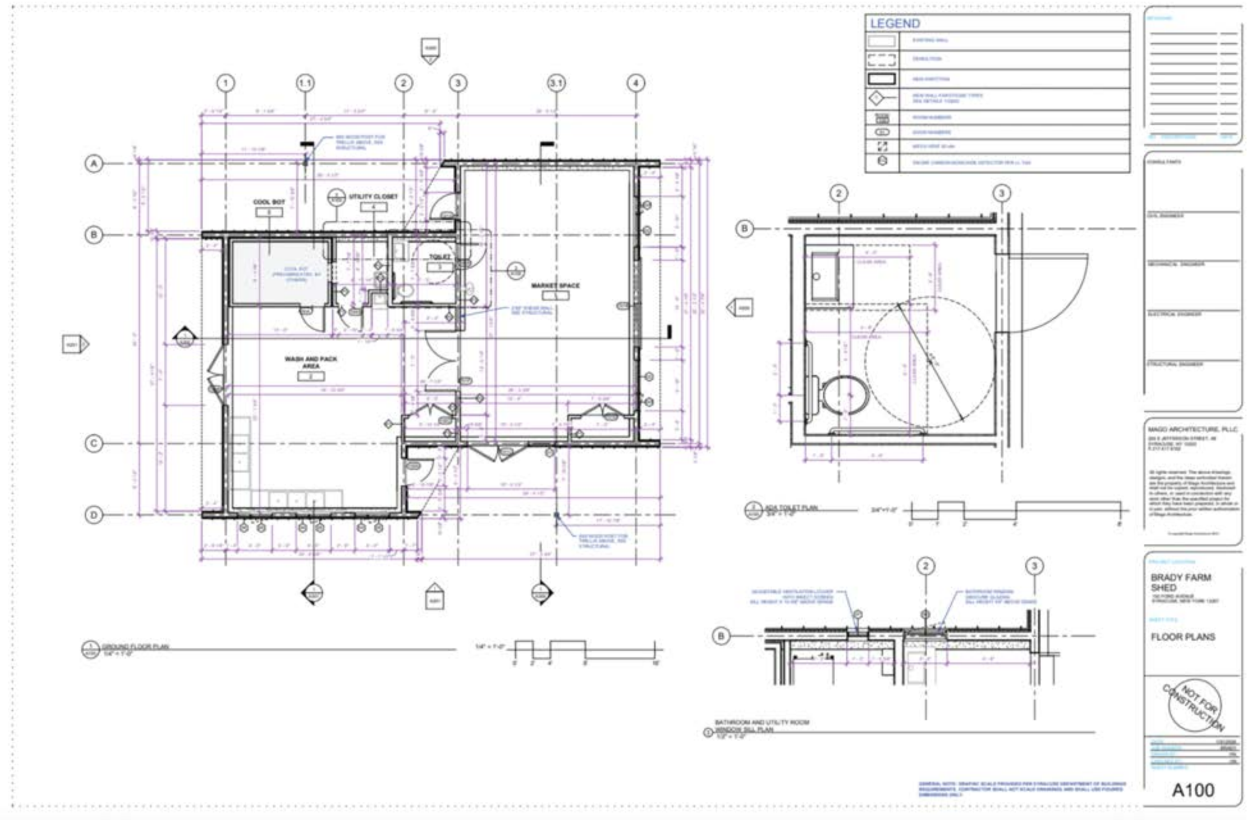
SCOPE OF WORK

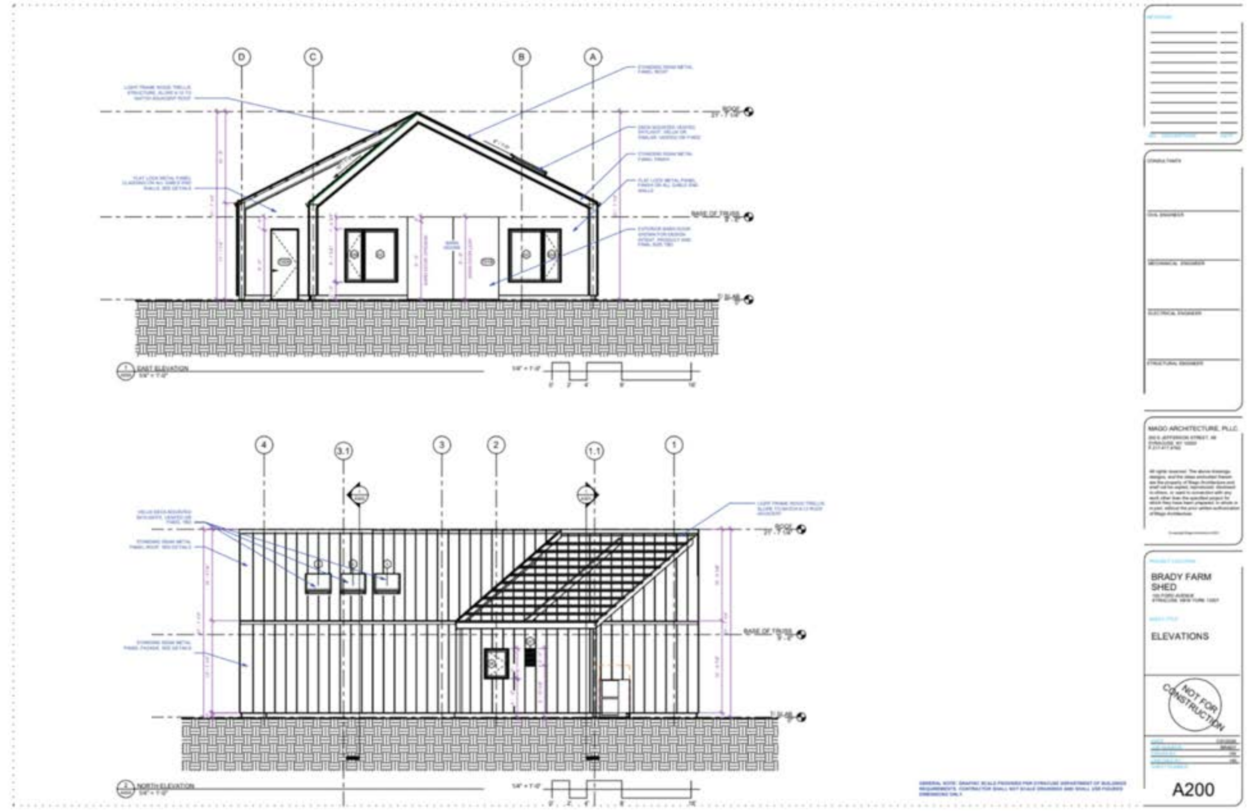
SHEET LIST:

Sheet Number	Sheet Name
ASK-100	FOUNDATION WALL CURB CUT DIMENSIONS
ASK-101	COOLBOT LAYOUT
T000	TITLE PAGE
G001	GENERAL INFORMATION
G002	FLOOD INFORMATION
LS001	LIFE SAFETY NOTES
LS002	LIFE SAFETY PLANS
C-SP100	SITE PLAN WITH ZERO POINTS
SP100	HISTORIC SURVEY
SP101	CONTEMPORARY SURVEY
SP102	SITE PLAN
SP103	SITE PLAN - FIRE SAFETY
SP104	SITE PLAN - LANDSCAPING
A000	AXON
A001	AXON
A100	FLOOR PLANS
A101	FRAMING PLAN
A102	ROOF PLAN

Sheet Number	Sheet Name
A103	ROOF FRAMING PLAN
A104	TRELLIS FRAMING PLAN
A105	REFLECTED CEILING PLAN
A106	LIGHTING PLAN
A107	POWER PLAN
A200	ELEVATIONS
A201	ELEVATIONS
A300	BUILDING SECTIONS
A301	BUILDING SECTIONS
A302	BUILDING SECTIONS
A400	WALL SECTIONS
S001	STRUCTURAL NOTES
S002	WOOD NOTES
S101	FOUNDATION PLAN AND DETAIL
S102	FIRST FLOOR AND ROOF PLAN
S103	STRUCTURAL DETAILS AND SHEARWALL SCHEDULE
S104	SECTIONS
P001	PLUMBING SITE PLAN
P100	PLUMBING PLANS
M100	HVAC PLAN




LEGEND
COOL BOT
UTILITY CLOSET
TOILET
MARKET SPACE
WASH AND PACK AREA
A
B
C
D
1
1.1
2
3
3.1
4
GROUND FLOOR PLAN
ADA TOILET PLAN
BATHROOM AND UTILITY ROOM WINDOW SILL PLAN
MAGO ARCHITECTURE, PLLC
BRADY FARM SHED
FLOOR PLANS
NOT FOR CONSTRUCTION
A100

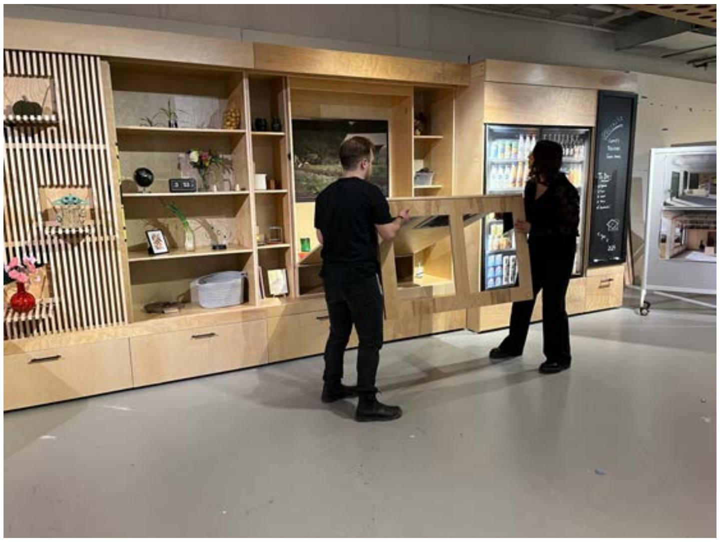

D
C
B
A
4
3.1
3
2
1.1
1
RIDGE
BASE OF TRUSS
T/ SLAB
EAST ELEVATION
NORTH ELEVATION
MAGO ARCHITECTURE, PLLC
BRADY FARM SHED
ELEVATIONS
NOT FOR CONSTRUCTION
A200

Appendix B


engaged practices
NEWSOM'S DR:
BRADY FARM
SPECIALS:
Carrots
Potatoes
Green onions
To Do:
2024


engaged practices
NEWSOM'S DR:
BRADY FARM
COMMUNAL
STRANGERS


engaged practices
NEWSOM'S DR:
Lucas Rossington
Erik Dighton
Averie Cohen
ELEANOR SEDOR
JINGGE ZHAO
BRADY FA




engaged
NEWSO
Lucas
Rossington