ABSTRACT

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	Kathryn Donahue, Master of Architecture, 2014
Directed By:	Peter Noonan, Professor of the Practice, School of Architecture, Planning, and Preservation

Connecting design thinking to making throughout the design process creates an awareness of materials, the assembly process, and of one's self. The discoveries made through an iterative, cyclical process can be invaluable to a variety of professions, especially when involving collaboration. The University of Maryland College Park (UMCP) has multiple disciplines related to the built environment and art and design. Several of these buildings are located on the perceived "back side" of campus with little interaction among the programs. How can architecture foster *making* in an educational environment and promote collaboration and a sense of place among a variety of interests and disciplines? With the recent maker movement cultivating around the world and the fact that many disciplines associated with art and design have always supported thinking through making, UMCP could benefit from a facility that promotes learning-by-doing as well as collaboration among a variety of disciplines.

AWAKENING CREATIVE THINKING THROUGH MAKING

By

Kathryn Donahue

Thesis submitted to the Faculty of the Graduate School of the
University of Maryland, College Park, in partial fulfillment
of the requirements for the degree of
Master of Architecture
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Advisory Committee:
Professor Peter Noonan, Chair
Professor Ronit Eisenbach
Professor Garth Rockcastle

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Dedication

To my parents.

I am who I am because of them.

Acknowledgements

I would like to thank the members of my thesis committee for their support, encouragement, and guidance throughout this process.

I would also like to thank my fellow Path Bs. You all made the past few years more enjoyable and entertaining.

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Introduction

Connecting design thinking to making throughout the design process creates an awareness of the nature of materials, the importance of assembly processes, and an mindfulness of one's self. The discoveries made through an iterative, cyclical process can be invaluable to a variety of professions, especially when involving collaboration. The University of Maryland College Park (UMCP) has multiple disciplines related to the built environment – architecture, engineering, landscape architecture – as well as art and design – studio art, performance art. Several of these buildings are located on the perceived "back side" of campus with little interaction among the programs. How can architecture foster *making* in an educational environment and promote collaboration and a sense of place among a variety of interests and disciplines?

While digital fabrication has its benefits, it has its limitations too, as does traditional methods of making by hand. Both approaches can enhance design methodology in different ways, especially when used together. With the recent maker movement cultivating around the world and the fact that many disciplines associated with art and design – some of which are part of the UMCP community – have always supported thinking through making, UMCP could benefit from a facility that promotes learning-by-doing as well as collaboration among a variety of disciplines. Through the design of a new "Center for Making" at UMCP, the questions of this thesis will be tested and reinforced.

Theory

History of the Architect and the Division of Labor

The role of the architect, and consequently the definition of the architect, has undergone many changes throughout history. Much of this change is related to the social status that the profession of architecture gained over the course of history. Vitruvius believed an architect's knowledge should stem from both practice and theory. In Ancient Greece, the term *architeckton,* meant *master-carpenter;*[1] yet by the Medieval period, when the term *architectus* was used, it was done so to describe masons, while *master-builder* was used to describe an architect in the Vitruvian sense of the word.[2] During the Renaissance, sculptors, painters, and goldsmiths – who were not building craftsmen and did not belong to the construction guilds but received commissions for buildings – were known as architects rather than master-builders.[3] In his treatise on architecture, *De re aedificatoria*, written in the mid-fifteenth century, Leone Battista Alberti aligned himself with the views of Vitruvius:

> An architect is not a carpenter or joiner…the manual worker being no more than an instrument to the architect, who by sure and wonderful skill and method is able to complete his work…. To be able to do this, he must have a thorough insight into the noblest and most curious sciences.[4]

These statements highlight the historical split that was beginning to occur between those who designed and those who completed the labor. Architects were slowly developing a higher social status while laborers were starting to be viewed to be lower on that scale.

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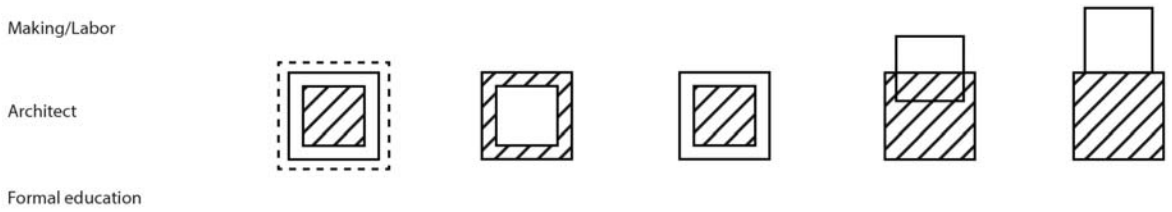
[1] Spiro Kostof, *The Architect* (New York: Oxford University Press, 1977), 11-12.
[2] Kostof, *Architect,* 60.
[3] Mary N. Woods, *From Craft to Profession* (Berkeley: University of California Press, 1999), 5.
[4] Kostof, *Architect,* 98.

During the 16th through 18th centuries, the term architect became more of a pliable term, but implied a person with authority and responsibility.[5] Several key event happened during this time period, including the establishment of the Royal Academy of Art in 1671, which set the stage for the architectural education model: principles of design taught first, practical experience learned later. Also, during the Beaux-Arts Movement in the late 1800s, architects wanted to be seen as those with specialized knowledge gained through extensive study with a theoretical base.

The field of architecture became more like a business as we moved into the 19th and 20th centuries, with labor valued in different class. In 1897, the first registration for American architects was required by law in the state of Illinois.[6] This was the start of the architecture practice as a business, requiring a division of labor between decision-making and architectural tasks. In addition, the office of Skidmore, Owens, and Merrill was established in 1939, becoming the archetype of 20th century American practice.

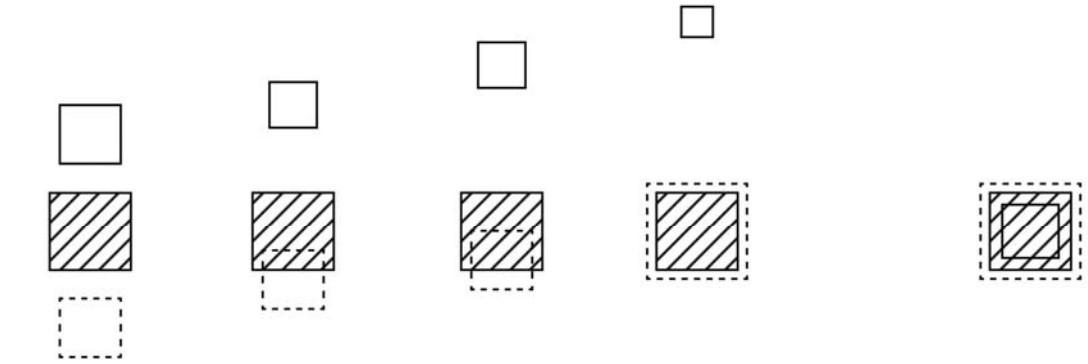
The division of labor seen throughout history often had points of expansion and contraction throughout the centuries; as such, this is not meant to represent an ultimately linear timeline of what was. It is apparent, however, that the division of labor started to split as the practice of architecture became more of a respected profession, offering the individuals involved a higher social status in society.

[5] Woods, *Craft to Profession,* 6.
[6] Kostof, *Architect,* 215.



Time Period	Classical Antiquity	Ancient Rome 509 BC to 476 AD	Medieval Period c. 476 AD to c. 1500	Renaissance 14th - 16th centuries
Changing role of the architect	An architect's knowledge should stem from practice *and* theory - Vitruvius	Roman craftsman and workmen under the direction of a master builder	Medieval architect, rising from the ranks of the building crafts	Architects with strong practical knowledge and those with stronger theoretical base, both emerging
Definition of the architect	In Ancient Greece, "architeckton" meant a "master carpenter"		When used, "architectus" referred to masons, while "master-builder" was used to describe an architect in a Classical/ Vitruvian sense	Sculptors, painters, and goldsmiths who were not building craftsmen and did not belong to the construction guilds, but received commissions for buildings, were known as architects rather than master builders
Images	Vitruvian Man 	Roman Craftsmen 	Medieval masons 	Cathedral Builders 
Key Events	c. 15 BC: Vitruvius' wrote the *Ten Books on Architecture:*			c. 1400: Brunelleschi's pattern books & the emergence of architectural drawings c. 1450: Alberti collaborated with Rossellino. A scholar-designer and a man with practical expertise 1514: Bramante, Rafael take over building of new St. Peter's, with da Santallo as their coordinator

Figure 1a: Relationship among making, the architect, and formal education, diagram by author



Renaissance 14th - 16th centuries	16th - 18th centuries	19th century	20th century	??
Gap between architect and craftsman becomes more apparent	More emphasis placed on theory, less on practical expertise in schools	Field of architecture becomes more like a business, with labor valued in different class		
To Alberti, an architect was a scholar and an artist	Architect was an elastic term, but implied a person with authority and responsibility			
Alberti's perspective frame 	Royal Academy of Architecture 	RIBA Building 	SOM Architects and Engineers 	
16th century: the gap between the architect and the craftsman, opened by Alberti, was firmly established in Italy, creating bitter exchanges between the "craftsman-architect" and the "dilettante architect" 1567: Philibert Deloreme defined the roles and working relationship guidelines among the patron, architect, and workman	1671: Royal Academy of Art established which set the stage for the architectural education model: principles of design taught first, practical experience learned later Industrial Revolution 1708 late 1800s: Beaux-Arts Movement: architects wanted to be seen as those with specialized knowledge gained through extensive study with a theoretical base	1884: Institute of British Architects founded, membership was prestigious. Separation between job of architect and of builder seen shortly thereafter 1897: First registration for American architects required by law in Illinois. This was the start of the architecture practice as a business, requiring a division of labor between decision-making and architectural tasks	1939: Skidmore, Owens & Merrill founded; became the archetype of 20th century American practice	

Figure 2b: Relationship among making, the architect, and formal education, diagram by author

Argument for Making – In education

Learning Types/Intelligences

Howard Gardner developed a theory of multiple intelligences which recognizes "many different and discrete facets of cognition, [and acknowledges] that people have different cognitive strengths and contrasting cognitive styles."[7] Through his research, seven intelligences were identified. He posits that although we all possess each of these seven types of intellect, the degree to which specific intelligences are dominant will vary from individual to individual.

Figure 3: Howard Gardner's seven types of intelligences, diagram by author

These seven intelligences are linguistic, logical-mathematical, spatial, bodily-kinesthetic, musical, interpersonal, and intrapersonal intelligence. (fig. 2) Linguistic and logical-mathematical intelligences are traditionally emphasized in schools, as the value of language skills and logical reasoning are stressed for standardized testing. Those with a strong ability to "form a mental model of a spatial world and… maneuver and operate using that model"[8] would have a dominant spatial intelligence. Many architecture and art students would fall under this category as well as the bodily-kinesthetic type of intelligence, which highlights the ability to use the body or

[7] Howard Gardner, *Multiple Intelligences: the theory in practice* (New York: BasicBooks, 1993), 6.
[8] Gardner, *Intelligences,* 9.

parts of the body to problem solve. Musical intelligence favors rhythm and sound and these types of individuals are sensitive to their environments. Interpersonal types learn through interaction with others while intrapersonal types work best independently.

The idea of a "plurality of intellect"[9] is stressed in Gardner's writing; each of us possesses all of these intelligences, with some more dominant than others. Each type can be insightful or flawed in certain situations and for certain tasks. Although a logical-mathematical type of intelligence may be more attuned to the rigors of an engineering program, it can limit someone's creativity if he or she cannot tap into another type of intelligence. At the same time, a logical thinker can offer a unique perspective on the creative process just by the way he or she thinks. There really is no right combination. What is best is to embrace all types of intelligences and allow each person's dominant form to show through.

The Making Continuum

As the definition of *making* is quite broad, it is important to define a few key terms as they will used throughout this thesis. Often used interchangeably, *making* and *fabrication* are actually quite different.

> To **make** is to explore materials with one's own hands and body as an essential tool, emphasizing the relationship between tool and material and what it can offer the creative process.
>
> To **fabricate** is to use high quality and higher performance tools in the creation of an object, such as digital media and machines.

[9] Gardner, *Intelligences,* 7.

The term *make* has a softer, more organic sound to it, while *fabricate* sounds quite rigid and formulaic.

Making and fabrication exist on a broad continuum, which can consist of the act of creating with just your hands and one single material, to creating an object in a computer program, sending a file to a 3D printer, and a machine ultimately creates the artifact. This continuum is expansive with a great deal of overlap among the applicable components, rather than autonomous aspects. Acknowledging the full spectrum is important, as all aspects in the realm of making have benefits to the creative process.

Shop Class as Soulcraft

> If thinking is bound up with action, then the task of getting an adequate *grasp* of the world, intellectually, depends on our doing stuff in it.[10]

Matthew Crawford's *Shop Class as Soulcraft* speaks to the value of manual competence and the self-reliance, humility, and responsibility offered by and developed through the act of working by hand. Noting the positive attributes that such work can contribute to our lives, he rightfully questions why manual work has become less valued as a component of education, as such work allows for an element of human flourishing.[11] A richness is imbedded in such work "cognitively, socially, and in its broader psychic appeal"[12] that could benefit many people in a variety of professions.

[10] Matthew Crawford, *Shop Class as Soulcraft* (New York: The Penguin Press, 2009), 164.
[11] Crawford, *Shop Class*, 64.
[12] Crawford, *Shop Class*, 55.

Crawford also speaks to being a "master of one's own stuff,"[13] an aspect that could be an invaluable asset to any architect. Although the manual work that Crawford regularly performs is related to vintage motorcycles, the insightful observations he puts forth can be applied to the field of architecture as well, as self-reliance, humility, and agency are all extremely useful for those creating the built environment.

The Craftsman

In Richard Sennett's *The Craftsman*, the author offers two arguments for the development of skill: "first, that all skills, even the most abstract, begin as bodily practices; second, that technical understanding develops through the powers of imagination."[14] His first argument speaks to how touch and movement can influence the knowledge acquired in the hand (similar to the bodily-kinesthetic type of learning) while the second explores what it is that pilots the learning of a bodily skill. Can learning a series of chosen skills and the imaginative process involved in such as act make for more informed architects? Sennett concludes his book by discussing "how the craftsman's way of working can give people an anchor in material reality." [15] Architecture is oftentimes divided between practice and theory. What can architecture students learn from the process similar to that of a craftsman that they could then take with them into practice?

[13] Ibid.
[14] Richard Sennett, *The Craftsman* (New Haven: Yale University Press, 2008), 10
[15] Sennett, *Craftsman,* 11.

The Thinking Hand

Furthering this examination of the hand's role in knowledge, *The Thinking Hand* by Juhani Pallasmaa discusses the core of the union of the hand, tool, and the mind in the architectural process, saying that:

> Despite these magical integrations, tools are not innocent; they expand our faculties and guide our actions and thoughts in specific ways. To argue that for the purposes of drawing an architectural project the charcoal, pencil, ink pen and computer mouse are equal and exchangeable is to misunderstand completely the essence of the union of the hand, tool and mind.[16]

Mindfully noting the benefits of various types of knowledge inherent in the non-verbalized traditions of a variety of cultures, Pallasmaa speaks to the need for such knowledge to be preserved. "These traditional cumulative practices of the human hand around the world form the true survival skills of humankind."[17] Like Crawford, Pallasmaa speaks to the humility that comes with learning a skill; arrogance has no place in such an education.

As architects, however, we need to extend beyond just the hand. Although we can develop a great deal of skill by thinking in terms of these authors, the reality is that architecture is experienced by the body as a whole, interacting with the brain, and that learning experience needs to be addressed as well. Although we turn a doorknob with our hand which is connected to the brain, there is another experience that we may not consider. We turn an infinite number of doorknobs in our lifetimes. Rarely are we truly cognizant of the material, shape, color, how it felt to wrap your hand around it. What we may be more mindful of is how easy or difficult it is to open the door, what it felt like to walk through the threshold, leaving one space to enter

[16] Juhani Pallasmaa, *The Thinking Hand* (Chichester: John Wiley and Sons, Ltd, 2009), 50.
[17] Pallasmaa, *Thinking Hand*, 52.

another. This is an experience that uses and affects our entire body. So although skill may begin as a bodily practice with a connection from the brain to the hand, that knowledge can and should be extended to the body as a whole.

Argument for Making – In the architectural process

Ghost Lab

The Ghost International Architectural Laboratory, often referred to as "Ghost Lab," was started in 1994 by the architect Brian MacKay-Lyons of MacKay-Lyons Sweetapple Architects. The tradition of the hands-on master-builder experience, combined with the collaborative mentorship attained through the close interactions of teacher and student, was MacKay-Lyons' response to the "increasingly virtual nature of architectural design."[18] He wanted the focus of these workshops to be on the "timeless architectural themes of landscape, making, and community,"[19] while including material culture in the learning process as well. The initial workshop was a two-week event with nine graduate students, where the first week was spent designing, the second focused on building. Since its inception, there have been thirteen Ghost Lab workshops (the last was held in 2011), with each year's workshop focusing on a different architectural research question. Deviation from the original design throughout the building process was a typical occurrence, teaching the students about the necessary compromises that must be made during such a process.

[18] Ibid.
[19] Ibid.

Rural Studio

Samuel "Sambo" Mockbee, along with D.K. Ruth, was the driving force behind Auburn University's Rural Studio, which began in 1992. Mockbee wanted to translate his beliefs about ethical architecture into both educational and social programs. He was convinced that "everyone, rich or poor, deserves a shelter for the soul,"[20] and that education of architecture students was the place to start the reform that was needed in the profession. Rural Studio embraces practical architectural education, social welfare, but also the *appreciation of place* through the use of "salvaged, recycled, and curious" materials.[21] By sending students out into Hale County, Alabama, the second poorest county in the state, Mockbee forced students "to test their abstract notions about poverty by 'crossing over into that other world, smelling it, feeling, it, experiencing it'…."[22] One of the students of the Rural Studio summed up her experience by stating:

> We grew as we communicated as a team. Many aspect of our experience are very hard to describe or adequately express, but what can be said is that the design/build experience offered us an educational opportunity to make real decision, take responsibility, and provide a service to others.[23]

Although both of the above mentioned studios are connected to a particular university – Technical University of Nova Scotia, and Auburn University in Alabama, respectively – making an argument for the act of making *in education*, the learning-by-doing process is stressed for these students of architecture and therefore

[20] Andrea Oppenheimer Dean, *Proceed and Be Bold* (New York: Princeton Architectural Review, 2005), 7.
[21] Dean, *Proceed,* 8.
[22] Dean, *Proceed,* 7.
[23] Jennifer Bonner, "Building a Pavilion," in *Proceed and Be Bold,* (New York: Princeton Architectural Review, 2005), 171.

each of these examples represents architecture more so than the discussion on the theories of Crawford, Sennett, and Pallasmaa. The design/build aspects of Ghost Lab and the Rural Studio are examples of what could potentially be offered to other students of architecture around the country. According to William Carpenter, the author of *Learning by Doing*, in 1992 there were eight or ten design/build programs in universities; as of 2005, there were thirty or forty, largely due to Mockbee's influence.[24] Could a design/build curriculum be introduced for local universities here in Maryland if a facility designed for such a purpose existed? This is one question that was kept in mind as the programmatic considerations of this thesis project were developed.

[24] Dean, *Proceed,* 8.

Precedents: Representational Institutions

Offering individuals a place to create, think, and make among like-minded individuals is something that can be invaluable to the process of learning and exploration. Haystack Mountain School of Craft and Penland School of Crafts, for example, offer workshops for students of all backgrounds and skill levels to come to create and to learn while fostering a community atmosphere that focuses and encourages creative energy. Some institutions such as the Washington Alexandria Architecture Center (WAAC) and Taliesin and Taliesin West promote a similar mindset and way of working within a more formal academic environment. There are also community and entrepreneurial-based spaces that have become prominent in recent years that promote making and doing in a community center type atmosphere. Elements from each of these types of precedent settings were influential to the design of this thesis – from programmatic to technical aspects of their designs – and how they could be incorporated and translated to a formal academic institution.

Place for Making – Resident/Community

Haystack Mountain School of Craft

> I discovered what happens when I give myself unlimited time and space to drop an idea and follow wherever it leads.[25]

Haystack Mountain School of Craft, founded in 1950 and located on the coast of Deer Isle, Maine, is an international craft school offering intensive workshops in a variety of craft media for beginners to advanced professionals. These studio-based

[25] Jeannie Mooney, "About Haystack," Haystack Mountain School of Craft, accessed April 24, 2014, http://www.haystack-mtn.org/about.php

workshops, held primarily in the summer months and often lasting one to two weeks, provide participants with a unique experience as they not only learn in a focused studio setting, but they live, eat, and work at the school. Students have the opportunity to work with renowned instructors and can explore their chosen craft while being exposed to other art forms as well. Workshop media include ceramics, woodworking, printmaking, weaving, metals, glassblowing, etc., and special classes and workshops have been formed for Maine residents, high school students, and international participation as well. Conferences and symposiums have also been offered at the school and in 2005, a visiting artist's studio was constructed.[26]

The original mission of Haystack, as stated on their website, "was to teach fine craftsmanship, develop latent or inherent creative ability, and carry on research and development in connection with the crafts."[27] This mission statement was later updated to include "the investigation of craft in an aesthetic climate, honoring tradition while acknowledging the rich potential of contemporary visual art." [28] This "aesthetic climate" is both figurative and literal. The community atmosphere allows for a focused energy around the school, one that encourages and supports "a serious exploration of craft, ideas and imagination."[29] The school itself is set on a secluded hillside which overlooks Jericho Bay in the Atlantic Ocean, offering inspiration to those working there, as well as visitors. Designed by Edward Larrabee Barnes in 1960 (the campus' current home is actually its second location), the campus embodies

[26] "About Haystack," Haystack Mountain School of Craft, accessed March 17, 2014, http://www.haystack-mtn.org/about.php
[27] "About Haystack, Mission & History," Haystack Mountain School of Craft, accessed March 17, 2014 http://www.haystack-mtn.org/history.php
[28] "About Haystack, Mission & History"
[29] Ibid

both vernacular and modernist architecture. The school itself is essentially a large staircase in the way it has been positioned on the hillside. A stairway through the center of the campus guides the eye as well as the person from the top of the cliff down to the bay below and the studio spaces, dining hall, living quarters, and gallery flank this central axis in a stair-step manner. The school was awarded AIA's Twenty-Five Year Award in 1994 and was included on the National Register of Historic Place in 2005.

Penland School of Craft

> It comes as a tremendous relief to press hand into clay, to once again make contact with the felt world. I find it all too easy these days to escape into the virtual world for hours at a time, and now I remember that deep longing to lose myself in the sensuous intuitive experience of materials. Through making, I relocate myself back into by body, thus returning to the immediacy of my own experience.[30]

Founded in 1929, Penland School of Crafts is another international craft school located in a secluded, transformative locale, the Blue Ridge Mountains of North Carolina. Similar to Haystack, Penland offers workshops in a variety of craft media for one, two, or eight week sessions, yet these workshops are tri-seasonal (no winter sessions are offered).

Figure 4: Instructor Brian Ransom making a clay horn, from penland.org

[30] Eva M. Tuschman "A Return to the Sensuous: The Work of the Hand and the Life of the Spirit at Penland School of Craft," Penland Stories, Penland School of Crafts, accessed April 23, 2014, http://penland.org/events/stories4.html.

Figure 5: Casting iron in front of the iron studio, from penland.org

Figure 6: Weaving velvet

Built on the desire to promote creative growth through experiential learning, a wide range of individuals and skill levels visit the school. "Some see it as a productive retreat, some as a source of inspiration for their creative lives, and others as a network for the exchange of information. What brings them together is a love of materials and making, and the experience of working in a supportive community atmosphere."[31]

Four core ideas shape the educational philosophy at Penland:

1. Total-immersion workshop education is a uniquely effective way of learning.
2. Close interaction with others promotes the exchange of information and ideas between individuals and disciplines.
3. Generosity enhances education – Penland encourages instructors, students, and staff to freely share their knowledge and experience.
4. Craft is kept vital by preserving its traditions and constantly expanding its boundaries.[32]

[31] "About Penland: History," Penland School of Crafts, accessed March 17, 2014 http://penland.org/about/history.html

[32] "About Penland: Mission," Penland School of Crafts, accessed March 17, 2014 http://penland.org/about/mission.html

Figure 7: Aerial view of Penland School of Crafts, from penland.org

Both Haystack and Penland aim to offer students an aesthetic climate within which they can immerse themselves in a chosen craft. These missions run parallel to one of the goals of this thesis: to investigate how the act of making can awaken creativity in individuals and to offer a space for this creativity to thrive. Could a school of architecture benefit from such a place of immersion?

Place for Making – Pedagogical

Washington-Alexandria Architectural Center

Washington-Alexandria Architectural Center (WAAC), operating as the urban extension of the Virginia Tech College of Architecture and Urban Studies, School of Architecture + Design since 1980, "seeks to explore and expand design pedagogies and design processes."[33] The building which houses the school is itself a laboratory for the architecture students to both learn and build. "Each year students propose, continue, and complete design-build projects and architecture intervensions [sic] of

[33] "Washington-Alexandria Architecture Center," accessed March 18, 2014, http://www.waac.vt.edu/

various scales within the space."[34] The design-build course offered at the school "begins with the assumption that there is a productive realm which lingers within [the] gap between the one who swings a hammer and the one who thinks about it."[35] It then builds on the ideas of other design-build programs, yet offers an alternate method, one of "'practicing' practice." [36] Students at the WAAC have modified the building throughout the years in a series of investigations to explore how the hand and the act of making can affect and influence designs. As a result, students leave a part of their work at the school which can then become inspiration for future students. By eliminating the idea of *completion* from the design-build pedagogical model, students are less likely to become fixated on the potential linearity of "idea to execution" and become open to the opportunities and possibilities that can live and thrive in the "revisions and reconsiderations as is dictated by the continuously evolving project."[37] The WAAC emphasizes prudent thinking, which requires students to not only "project forward through fore-sight [but] reflect backwards through the mirror of experience."[38]

Taliesin and Taliesin West

Another set of pedagogical places of making are Frank Lloyd Wright's Taliesin and Taliesin West located in Wisconsin and Arizona, respectively. The Taliesin Fellowship, now known as the Frank Lloyd Wright School of Architecture,

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[34] "Campus Life," Washington-Alexandria Architecture Center, accessed March 18, 2014, http http://www.waac.vt.edu/#!blank/c1i1x
[35] "Design Build," Washington-Alexandria Architecture Center, accessed March 18, 2014, http://www.waac.vt.edu/#!design-build/c52g
[36] Jonathon Foote, "Design-Build :: Build-Design," *Journal of Architectural Education* (2012): 52.
[37] Ibid
[38] Foote, "Design-Build :: Build-Design," 58.

was formed in 1932 in Wisconsin by Frank Lloyd Wright and his wife Olgivanna to promote learning-by-doing. Their intent was to promote an educational model that emphasized the fine arts, both visual and performing, "in their places as divisions of architecture."[39] The goal was for the Fellowship to live at the school and work on commissions for Wright's architectural practice. Due to the lack of work after the Great Depression, the students would instead assist in the renovations and construction of the school building, which was once a boarding school operated by Wright's aunts and which fell into disrepair after its closure.

In 1937, Wright took the Fellowship to Arizona, where the students continued to benefit from learning-by-doing while participating in the construction of Taliesin West. Once the West campus was completed, students would split time between Wisconsin and Arizona, all while benefiting from other allied arts which continued to be offered as part of the curriculum. Although the school's educational program had to be adjusted over the years to satisfy requirements from the American Institute of Architects (AIA), the National Architectural Accrediting Board (NAAB) and the National Council of Architecture Registration Boards (NCARB), the basic curriculum set forth by Wright and his wife were maintained at the school. "The students continue to learn experientially, augmented by more formal classes and workshops."[40]

[39] "Historic Legacy," Taliesin, accessed April 5, 2014, http://www.taliesin.edu/history.html
[40] "Historic Legacy"

Place for Making – Entrepreneurial and Community-based

Makerspaces

Makerspaces have been emerging across the country and around the world in recent years as the do-it-yourself revolution has been gaining popularity. These spaces are essentially "community centers with tools,"[41] enabling individuals to design, prototype, and make in a way that may not have been possible due to the high cost of resources (i.e. tools and/or space) needed for such work. Makerspace.com explains:

> These spaces can take the form of loosely-organized individuals sharing space and tools, for-profit companies, non-profit corporations, organizations affiliated with or hosted within schools, universities or libraries, and more. All are united in the purpose of providing access to equipment, community, and education, and all are unique in exactly how they are arranged to fit the purposes of the community they serve.[42]

Figure 7 shows a map of existing makerspaces in the United States. This is not an exhaustive list, but rather those spaces listed on the makerspace.com directory. Not surprisingly, there is a concentration of these types of spaces in larger cities such as San Francisco, Seattle, Chicago, and New York, but many small cities around the country have created spaces of this nature as well.

[41] "What's a Makerspace," Makerspace, accessed May 7, 2014, makerspace.com
[42] Ibid

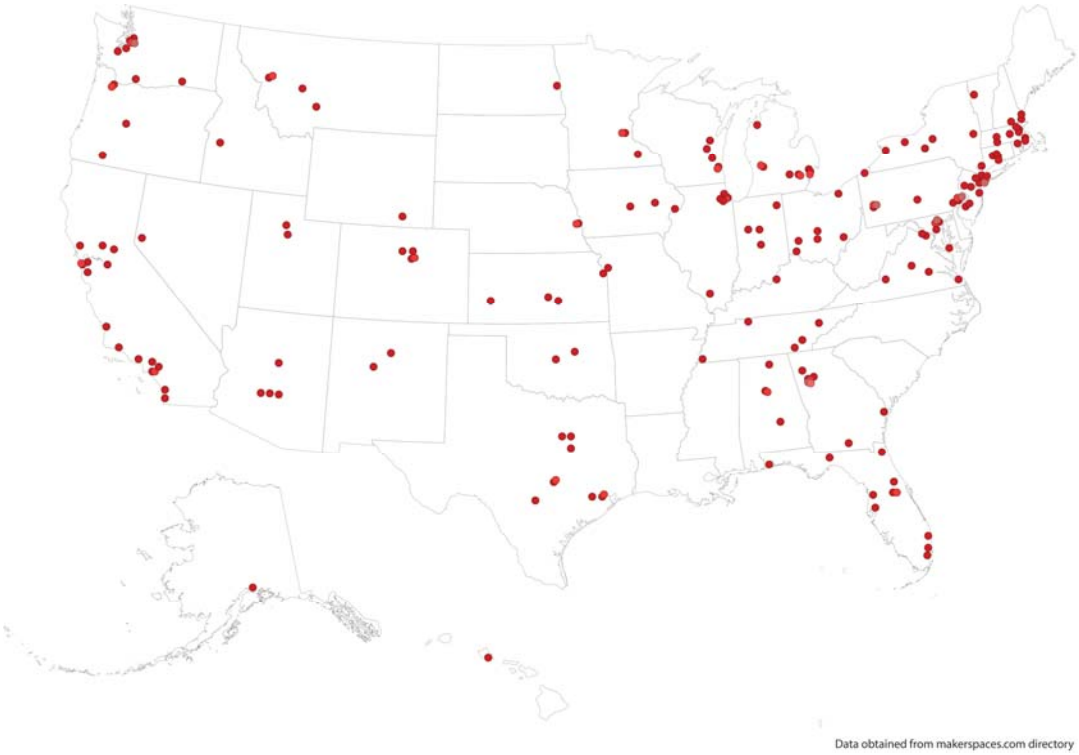

Figure 8: Makerspaces in the U.S., diagram by author

Despite the fact that these spaces are becoming more prominent around the country, they are not without their challenges. After visiting several different types of these spaces – Club125 in Greenbelt, MD which has an emphasis on robotics, FabLab Baltimore in Catonsville, MD, which has a variety of digital making tools, and TechShop in Arlington, VA, which provides access to a fairly complete variety of tools and software for entrepreneurs, hobbyists, or anyone with a creative itch – one of the most common spatial issues is that of storage space: there never seemed to be enough. Money is also an issue for these types of spaces. Oftentimes, they are funded by membership fees, but some spaces, such as Club125, do not require fees and therefore are funded by community donations. Use is also a challenge for some of these spaces. Club125, for example, often has grade school children come into the

use the space or adults, but finds that high school age students are either too busy with other school related activities or are just simply uninterested.

Making as a form of exploration

Doorknobs – the Handshake of the Building

Mike Caldwell wrote a piece to be included in the Pamphlet Architecture Series, which he entitled *Small Buildings.* In his writing, he documented a series of design/build projects he completed in response to his architectural education experience at the time. He described his rationale as such: "the abstractions of modeling, drawing, and writing about architecture became meaningless to me when I no longer knew to what these abstractions referred."[43] Caldwell makes an interesting observation: we, as architects, cannot expect to maintain a hands-on approach in the ever-changing construction industry; we also cannot rely on abstracted representations of our ideas to generate architecture. It is a safe way of approaching design, but not wise, according to Caldwell.[44] One of the most telling moments described in his writing was when Caldwell wrote about the Bride-Box. He stated, "the project was enriched when an obsession with design was replaced by an attention to the realities of construction."[45]

By taking a seemingly every day object, deconstructing it, analyzing it, reconstructing it, using new materials to create it, what can be found and how can it begin to inform design? An investigation of this type was undertaken using door knobs as "the object." These architectural elements are in every building we enter

[43] Mike Caldwell, *Small Buildings* (New York, Princeton Architectural Press, 1996), 5.
[44] Caldwell, *Small,* 6.
[45] Caldwell, *Small,* 9.

and we use them almost every day without offering too much thought. Doorknobs are connected to doors, which are connected to walls, which are attached to columns, to windows, and so on. Such an element, and its inherent variations, can begin to teach us about the experience of turning a doorknob, then walking through a doorway and into a beautifully crafted space.

Figure 9: Initial abstract doorknob models, as "objects," photos by author

In the Afterword for *Small Buildings*, Turner Brooks describes Caldwell's buildings as being distilled down to their essence, "where the power of the act of building, and the ceremonial aspect of the thing that is made, come together in such a way that each is celebrated by the other."[46] This is one goal of the doorknob exploration: to investigate the ceremonial aspect of the knob and how that can be connected to the body as well as to the architecture.

Several methods were used in the making of doorknobs. First, recycled doorknobs were purchased from a local surplus/salvage home improvement center with the intention of using deconstruction as a first step in this investigation. (fig 9 & 10) At the same time, plaster was used as a medium to explore how a door handle and/or door pull can be designed to fit the shape of the human hand (or between two fingers), to begin to explore both materiality as well as form. (fig. 11) A third method of making that was employed was the construction of a working lockset with a

[46] Caldwell, *Small,* 62.

handle, both primarily made out of wood. (fig. 12) The latch hook was made using a 3D printer, due to the thin dimensions of the neck of the component, then fastened to the spindle using a thin metal rod.

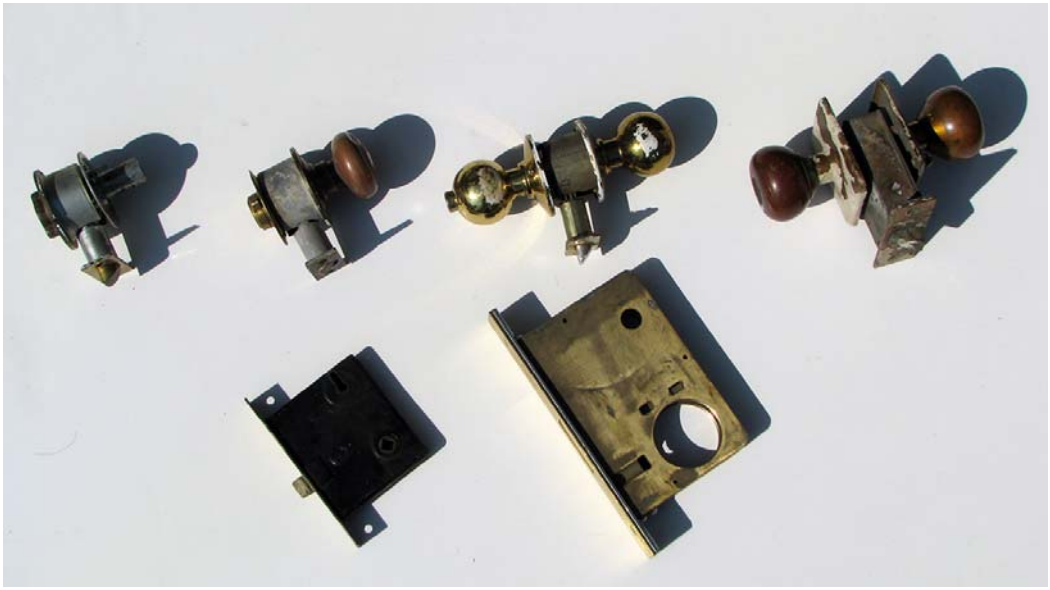

Figure 10: Assortment of doorknobs and locksets, prior to deconstruction, photo by author

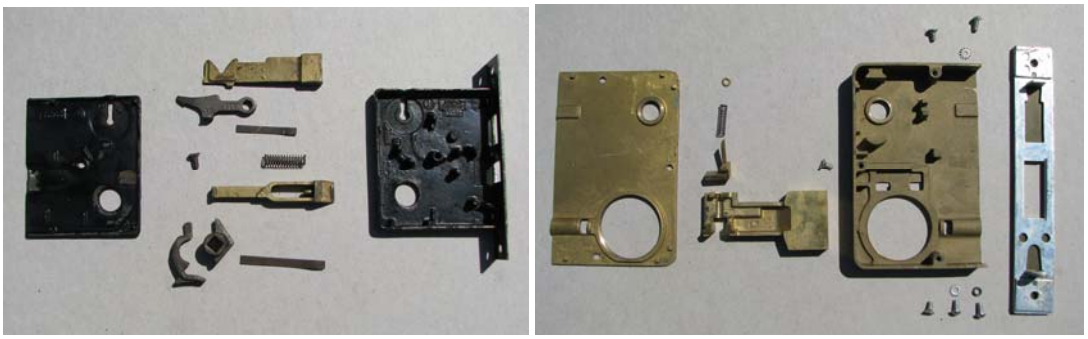

Figure 11: Two different locksets, after deconstruction, photos by author

Figure 12: plaster/balloon experiment, photos by author

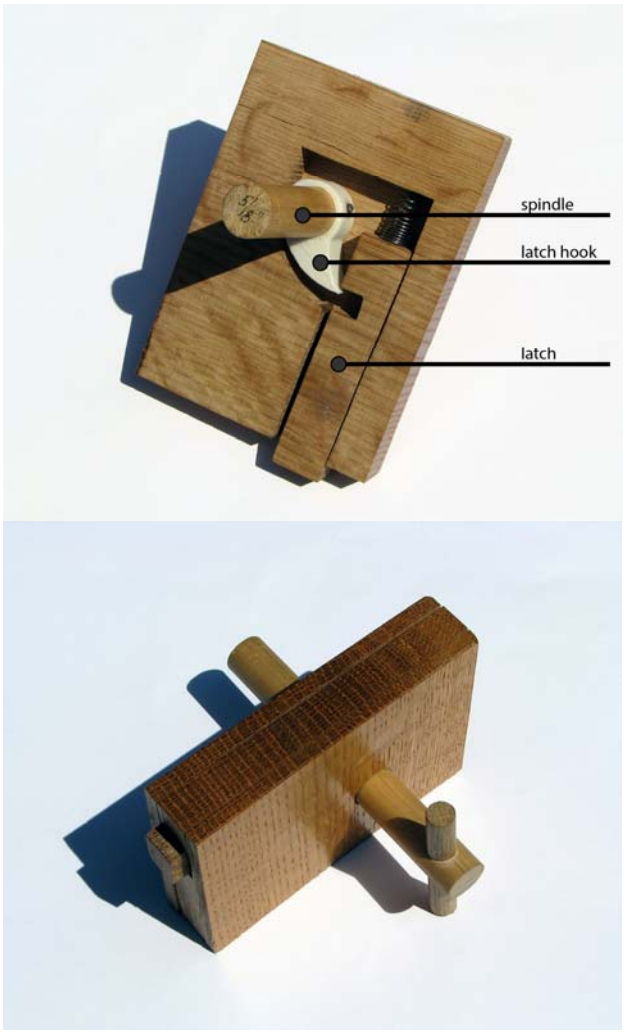

Figure 13: doorknob and lockset model, photos by author

Throughout the continued making of doorknobs, an analytical taxonomy was also compiled using doorknobs designed by Alvar Aalto as a case study. (fig. 13) By organizing the variety of knobs and handles that the Aalto designed for his architecture, it was realized that what is truly at the essence of his collection of doorknobs is the material, the shape, and the placement of them rather than how the mechanism itself worked. Although the performance of a doorknob is an important aspect of the object itself, the making of a working lockset and doorknob did not allow enough mental space to truly understand the material, which, to paraphrase

Pallasmaa, is what creates the impact and the "handshake of the building."[47] While working through the process of making this doorknob, I learned that I needed a more concrete method of exploration for my own design process. Despite the meditative qualities that I felt while tinkering with the mechanical parts, I was unable to see how this could be translated into the design problem I was setting up. The abstract nature of this exercise was not beneficial to my personal architectural design process.

As a result, a new investigation into materials was undertaken. In order to begin to understand different types of materials both visually and kinesthetically, I chose two materials – wood and concrete – and intended to create a series of boxes. The idea was to first make a full enclosure to understand how to work with each material, and then what was learned from the first exercise would translate into second, third, fourth iterations, each changing an aspect of the box (a handle, an opening, etc.). This would allow the study of performance that is seen in the doorknob, albeit more so in the joint and connection performance, but would also allow more space for reflection. At the start, the plan was to make the same types of boxes from each chosen material, with alterations made due to the nature of each type of material and through the ongoing investigation. This, however, was also a project that was altered due to a lack of clarity. As Caldwell put it, it was too abstract of an exercise and I was looking for some form of investigation that was more concrete.

[47] Juhani Pallasmaa, *The Eyes of the Skin* (Chichester: John Wiley & Sons Ltd, 2005), 62.

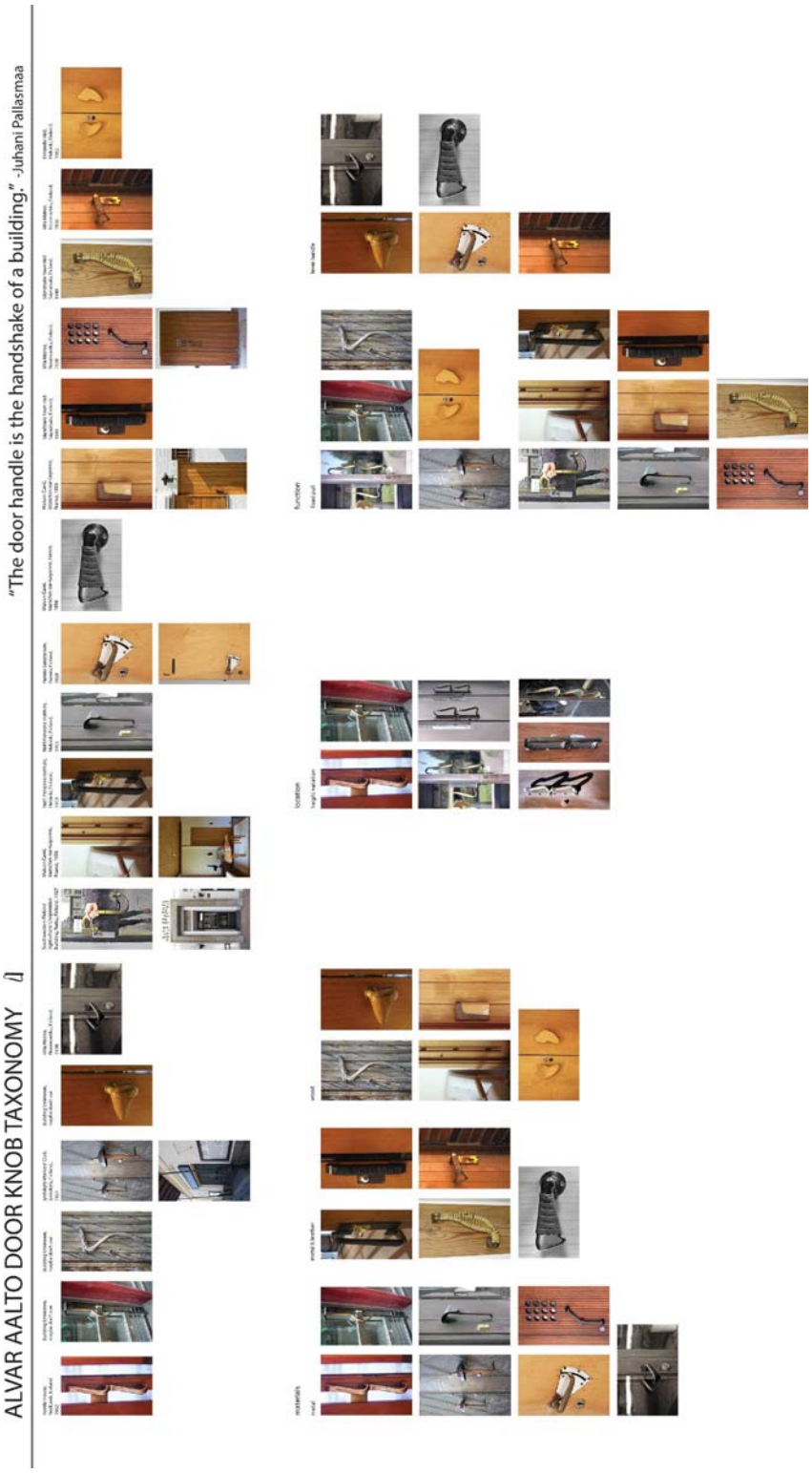

Figure 14: Alvar Aalto door knob taxonomy, by author

Design Analysis

Site/Context/Place

The history of the University of Maryland College Park (UMCP) as a land-grant university offers a compelling context for a project of this type. The first Morrill Act of 1862 offered benefits to designated state institutions of higher education with the mission "to teach agriculture, military tactics, and the mechanic arts as well as classical studies so members of the working classes could obtain a liberal, practical education."[48] Immersion in an academic setting, especially one that is was founded on the values of teaching practical skills in addition to a classical curriculum, will lend itself well to a new facility whose programmatic elements introduce practical knowledge to supplement traditional methods of learning prominent in most universities, including UMCP.

Description of chosen site

The site is currently the only Eastern edge of the Campus Drive/Mowatt Lane traffic circle, situated to the West of the Art and Sociology building, to the North/ Northwest of the UMCP School of Architecture, Planning, and Preservation, and to the Northeast of the new mixed-use building, Domain. (fig. 15) There are several sidewalk paths through and around the site that are frequented by UMCP students and faculty each day. In addition, the Northern edge of the site is utilized as a work space

[48] Association of Public and Land-grant Universities, *The Land-Grant Tradition*, (Washington, DC: Association of Public and Land-Grant Universities, 2012), 1, accessed June 20, 2014, http://www.aplu.org/document.doc?id=780.

Figure 15: aerial of site on UMCP campus, West lawn of the Art and Sociology building and lawn between Art/Soc and the Architecture building, source: Google maps

for studio art classes, with a direct connection to the Art and Sociology building. This open space next to the Art/Sociology building (fig. 15) is roughly 195 feet wide and 185 feet long with an approximate area of 36,000 square feet. The space between Art/Sociology and Architecture (figs. 16 & 17) is roughly 160 feet wide and 500 feet long with an approximate area of 80,000 square feet. There is a 3.5% grade incline from the south to north end of the site. (figs. 18 & 19) The chosen site will also extend across a portion of Campus Drive between Mowatt Lane and Preinkert Drive, which is currently a vehicular street. (fig. 16 & 17) As such, this portion of Campus Drive will be rerouted for the sake of this design proposition.

Figure 16: view of existing site conditions, looking Northeast from Campus Drive roundabout, photo by author

Figure 17: view of existing site conditions, looking East down Campus Drive, photo by author

Figure 18: view of exisiting site conditions, looking West down Campus Drive, photo by author

Figure 19: view of existing site conditions, looking Northwest from Architecture school entrance, photo by author

Rationale for chosen site

The early years of UMCP as a land-grant university was a factor in the rationale for a facility of this type**.** Connection to an academic setting, especially in a location close to several of the disciplines that could utilize this facility to enrich its

curriculum (i.e. Architecture, Preservation, and Art), (fig. 20) offered several options around the UMCP campus. The chosen site is close to one of the three main entrances to the University on Campus Drive. (fig. 21) Hundreds of visitors use this entrance for sporting events alone, and Lot 1 – which is accessed primarily from the West entrances – is one of the largest on campus. This project could be an excellent way to exhibit the activities of the students on campus and will act as a gateway building for the West side of campus, as it will stand at one of the several thresholds crossed as visitors approach the campus from the West. (fig. 22)

Figure 20: diagram of UMCP discipline locations that encourage making and doing in the learning process

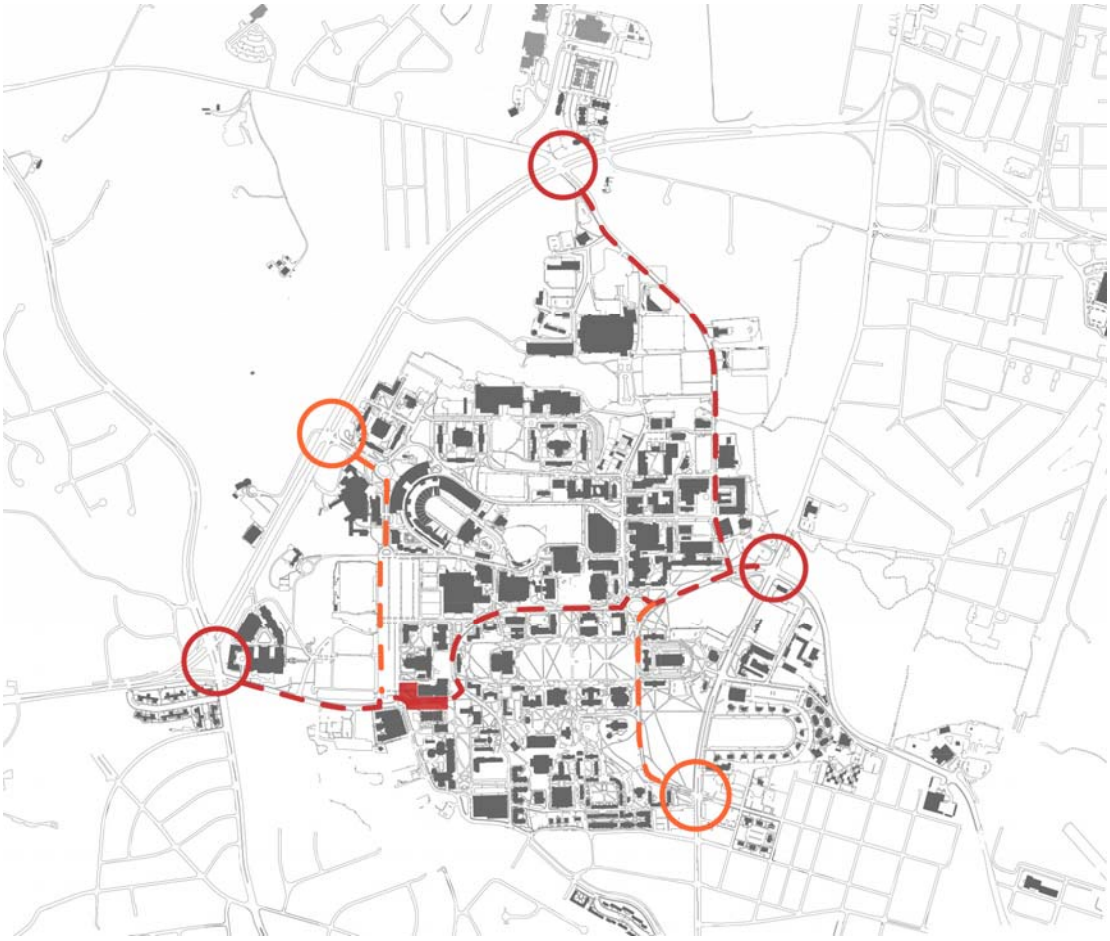

Figure 21: primary (red) and secondary (orange) entrances to UMCP campus

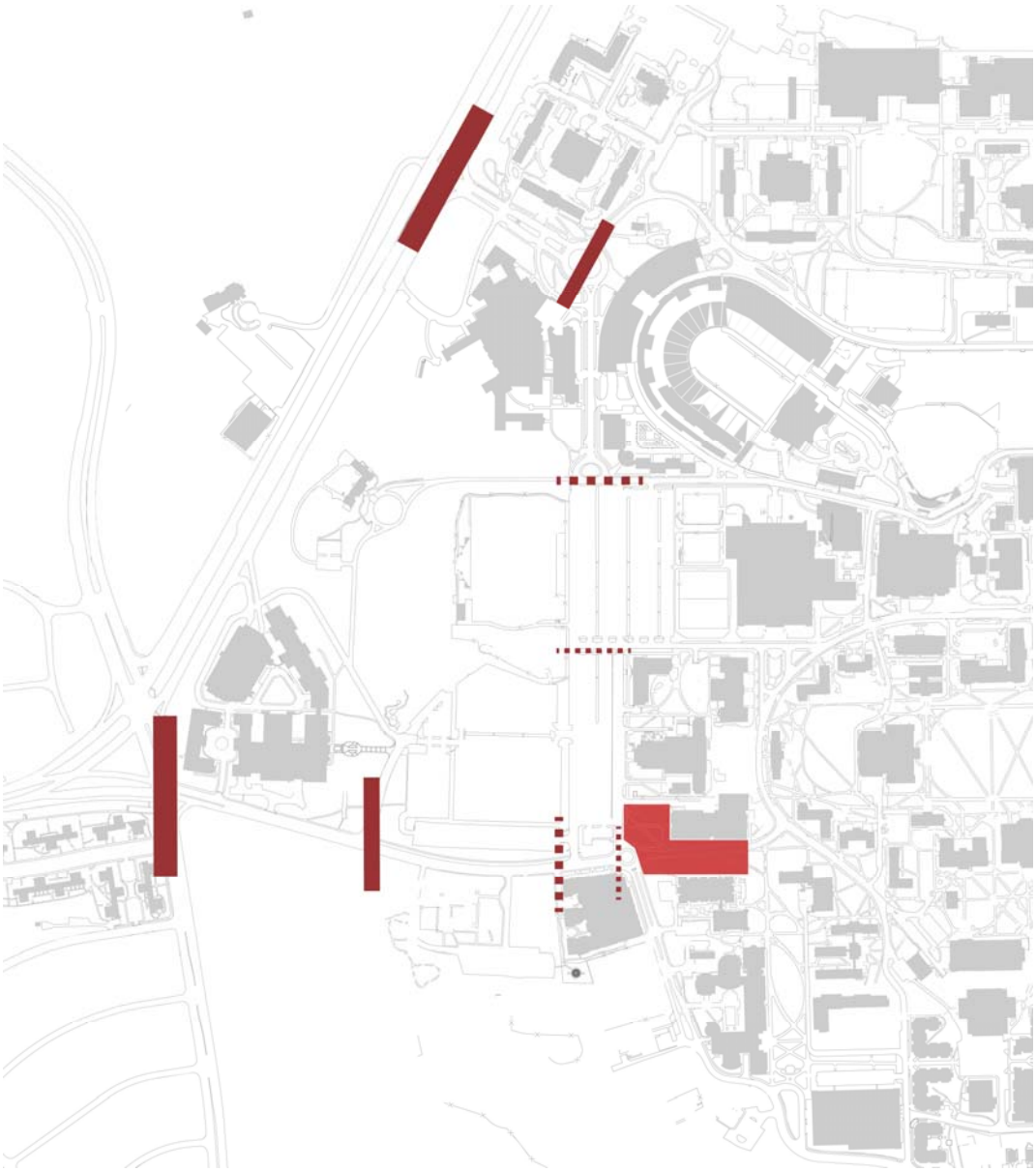

Figure 22: thresholds of campus approach

Analysis of chosen site

In addition to distinguishing the primary and secondary gateways to the UMCP campus, these entrances can be identified even more specifically. The entrances on the East side of campus are closest to the original buildings of campus as well as the iconic McKeldin Mall, and as such can be seen as the “traditional”

building entrances. (fig 23) The entrances to the North and Northwest are closest to the athletic stadiums, fields, and structures, (fig. 24) while the entrances to the West are closest to the buildings that house the art and design related disciplines. (fig. 25)

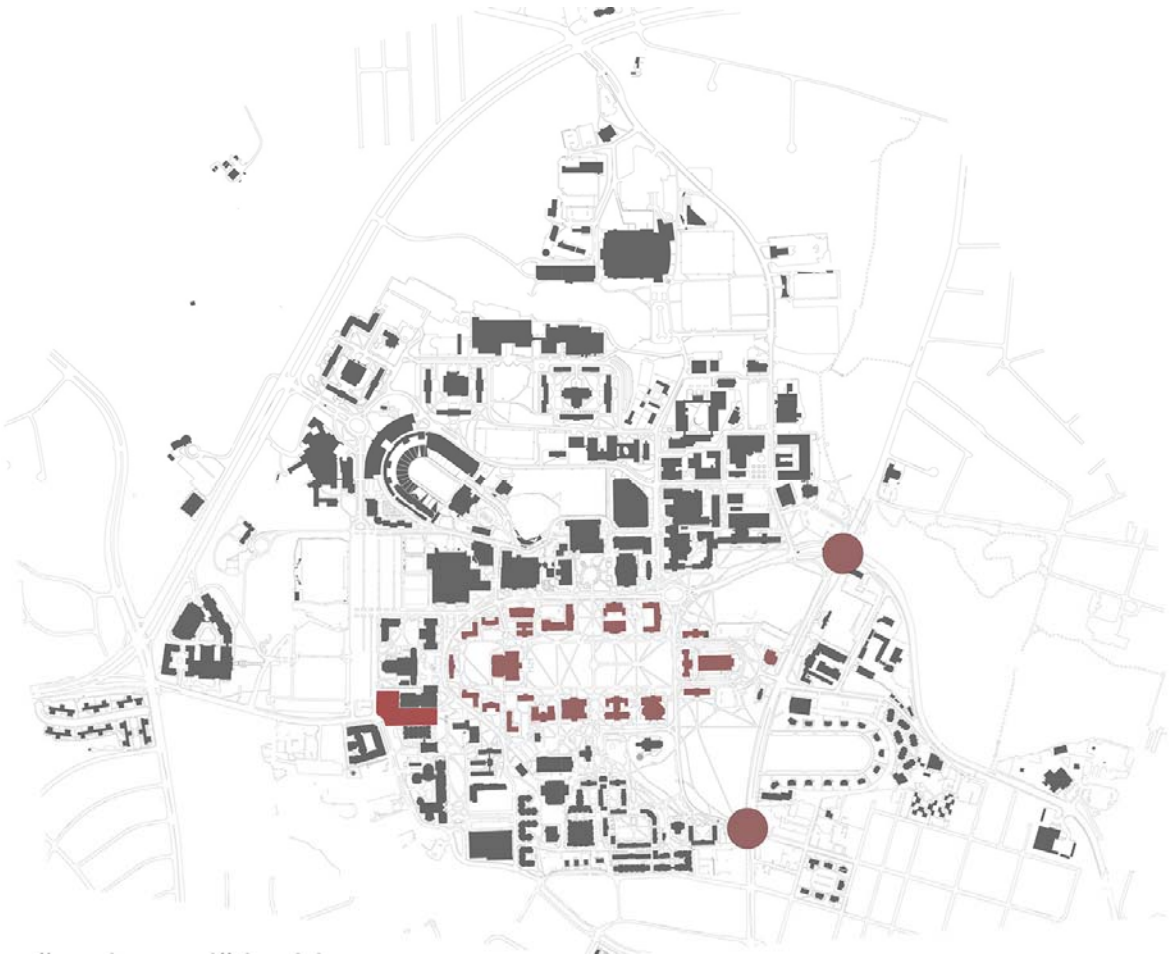

Figure 23: "traditional" building entrances

Figure 24: athletic building entrances

Figure 25: art/design building entrances

As it stands today, the site is located on what is perceived as the back side of campus. Service entrances for the Art and Sociology building, the Architecture building, and the Robert H. Smith School of Business all face the Mowatt Lane/Campus Drive direction. (fig. 26) The proposed building could begin to give a new identity to UMCP's West campus, rather than being consumed primarily by one of the largest parking lots on campus.

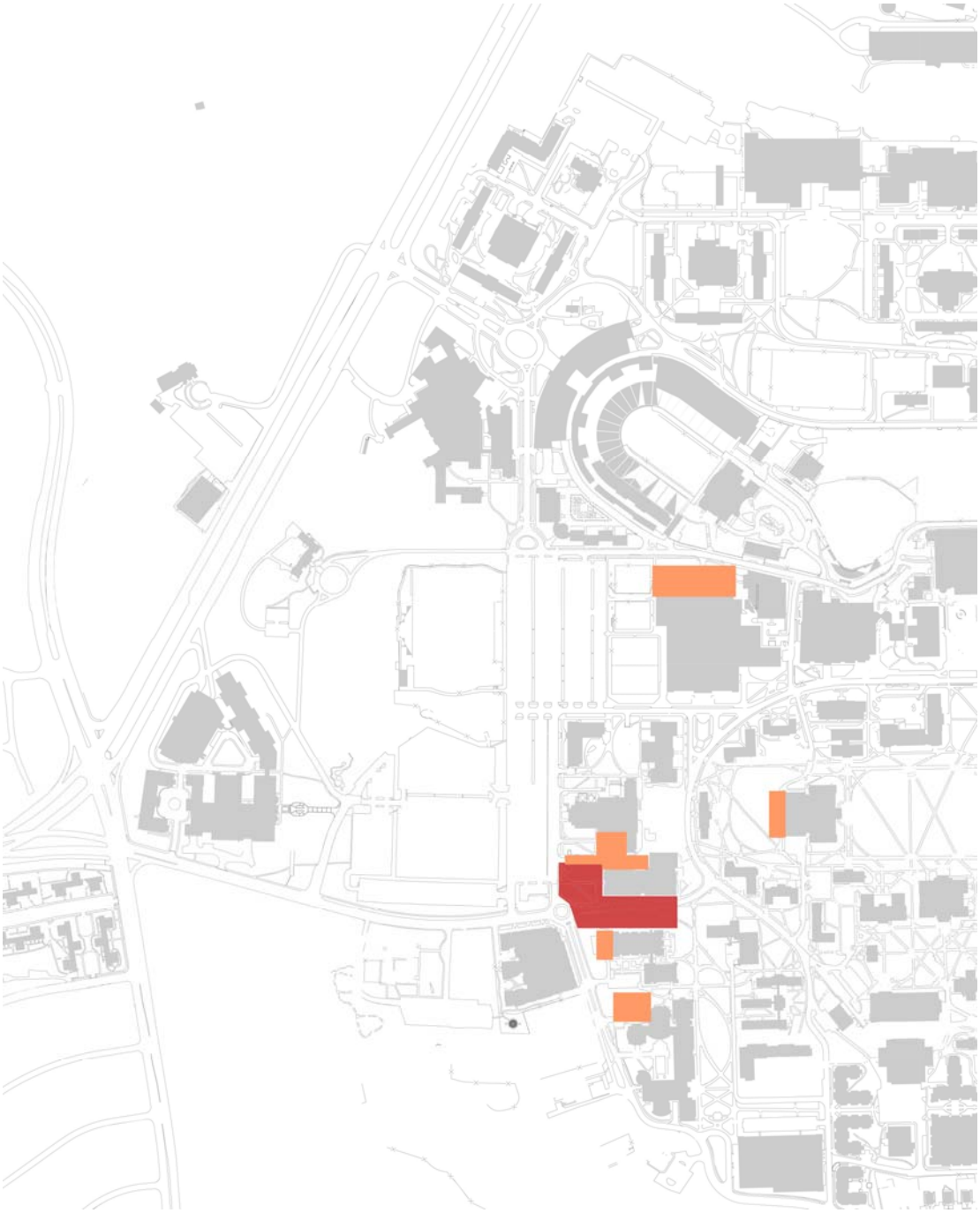

Figure 26: visual "backsides" of buildings

Program

Design objectives

The proposed program for this thesis is a new educational facility for the UMCP campus with two programmatic elements. The first is that of a center for making. It will offer students of a variety of existing UMCP disciplines – such as architecture, engineering, landscape architecture, and art – a space where they could experiment, explore, test ideas, and make messes on a large scale. The WAAC precedent offers the closest example of the potential for the center for making component in relation to an architecture school, while looking at the programs at Haystack and Penland will offer insight into technical requirements which various types craft equipment require.

The second component to the program is a materials library/museum which would not only offer students a chance to understand these materials with all of their senses, but would offer them an understanding of where materials come from and what happens to them in a variety of environmental settings. In a sense, it will catalog the life-cycle of materials and offer this collection of information to students.

Programmatic considerations

Conducting an analysis of a variety of precedents allowed a synthesis of programmatic considerations to be applied to the program for this thesis project.

	PENLAND SCHOOL OF CRAFTS	HAYSTACK MOUNTAIN SCHOOL OF CRAFTS	THE FOUNDERY	CLUB 125	ARTISANS' ASYLUM	FabLab BALTIMORE	WASHINGTON ALEXANDRIA ARCHITECTURE CENTER (WAAC)
Who can use the space?	Adults only (18 & up) Beginners through professional craftspeople	All professions and skill levels 18 and older	Any skill level Must be a member Age?		18 and older Must be a member	Must be a member Anyone interested in producing prototypes, not quantity production for sale of goods Age?	Students at Virginia Tech 4th & 5th year & Grad students & those in the Consortium ture schools
Who DOES use the space?	Ranges of ages (18 - ~90) experiences races professions	Wide ranges: Applicants chosen to create diverse environments		Elementary school age and younger College age and older (teens are harder to get in to use space)	Roughly 250 members		2014 221 students enrolled
Types of activities	Studies offered: books/paper, clay, drawing/painting, glass, iron, letterpress, metals, photography, surface design, weaving, wood	clay, glass, metals, blacksmithing, weaving, woodworking	Welding 101 class "Maker techniques" with industrial grade tools Microcontrollers 102 class	Primary focus: Robotics, computer science, microelectronics Also, knitting, writing, family game play, Legos	metal machining, elec. fabrication, welding, woodworking, sewing, fiber arts, robotics, bike bldg/repair, lampworking, jewelry, CADwork, screen printing	molding/casting, stencil making, wearable electronics, papercraft with laser cutter, CNC engraving, microcontrollers, photography techniques, parametric design	Design-build projects and architecture interventions at various scales 2-story WAAC Library, Circular Stair, cantilevered piano platform with glass handrail, pivoting movie screen panels, photography studio, meeting bench, courtyard
Types of equipment	varies by studio	varies by studio	welding tools, alum. foundery, metal drop saw, plasma cutter, band saw, table grinder, wood drop saw, circular saw, table saw, drill press, south bend shaper, table lathe, table mill, anvil, vices, angle grinders, belt/disc sander, power tools, mitre saw, hand tools	Robotics electronic equipment Projector screen & computer hookup Small bandsaw, miter saw, sander	Industrial grade manufacturing equipment Communal pallet jacks, dollies, overhead cranes	laser cutter, CNC router, plasma cutter, pasma welder/cutter, 3D printers (3 types), vinyl cutter, 3D scanner	
Types of spaces within the space as a whole	open studio spaces divided by craft 400 acres, 51 bldgs: living quarters, dining, visitors' center, store, gallery	(at least) 7 studios, plus living quarters, dining hall, admin offices, library, gallery/meeting space, outdoor pavilions/work-space	2 stories, 2000 sqft each 1st: classes/tools 2nd: coworking benches	One room: ~32'x 38' general work area: 8' x 12' social area: 8' x 10' robotics table sm. workshop: ~ 5' linear, 2' clrnce loading dock: 15' x 24' kitchten: 7' x 10'	Dedicated manufacturing environ, on-site mat'l storage, on-site prj storage, 1200 sqft classroom/comp lab, kitchenette & social area, 15' x 25' ceilings, loading dock and flr level dbl doors		admin. offices, faculty offices, library, classrooms, VTEL room, darkrooms, design studios, computer lab, wood and metal shops
Hours of operation	Spring, Summer, Fall total immersion wkshops, participants have 24 hr access while in session	Summer sessions, 24 hour access for participants while in session	M-Th: 6pm - 10pm Sa-Su: 10am - 4pm (still in beta phase)	T-F: 3pm - 9pm Sa-Su: 10am - 6pm ~ 60hrs/wk	Staffed 7 days/wk M-Th: 12 - 10pm F-Su: 10am - 6pm	M & F by RSVP only T, W, Th: Open Lab	24 hour access for VTech students and those in the Consortium
When did it open?	1929	1950 1961 in current location	July 2013	April 2013	2010	2011	1980

Figure 27a: precedent program matrix diagram

	PENLAND SCHOOL OF CRAFTS	HAYSTACK MOUNTAIN SCHOOL OF CRAFTS	THE FOUNDERY	CLUB 125	ARTISANS' ASYLUM	FabLab BALTIMORE	WASHINGTON ALEXANDRIA ARCHITECTURE CENTER
Where is it located/-type of setting?	Blue Ridge Mountains, North Carolina rural, secluded setting	Deer Isle, ME rural, coastal, secluded	Fells Point, Baltimore, MD urban setting	Downtown Historic Greenbelt along main strip suburban setting	Somerville, MA suburban (near Boston)	Community College of Baltimore County, Catonsville, MD campus setting, suburban	Alexandria, VA urban setting
Why did the space come into existence?	Outgrowth of a craft-based economic development project Local woman offered tools and mat'ls to then market handmade goods	Founded by a group of craft artists	3 new friends decided B'more was in need of a makerspace (hackerspaces existed), where prototypes could be made to help build businesses	Local schools wanted owners to come to the schools to teach robotics. Having a central space allowed more schools access to their help and incl. homeschooled	To provide public access to professional manuf. equip. education, and a creative community network.	Began as an outreach project through MIT's Center for Bits and Atoms (which explores the relationship bw comp. sci and phys. sci.)	"Construction and design are inclusive of all cultures, originating in the common unity of the human condition...."
Mission Statement	-To support artistic growth through craft -Engage human spirit through craft -Teach skills, ideas, and value of the handmade -Close interaction pro-motes exhange of ideas	To teach fine craftsman-ship, develop latent or inherent creative ability, carry-on research and develop connection with the crafts	To provide access to industrial grade tools and education with the goal of sparking innovation within the Baltimore community and to promote entrepreneurship	To develop resources and programs to engage members in activities related to science, technology, arts, and crafts	To make craft a part of life for everone, from beginner to expert To empower people to give form to their ideas		Seeks to explore and expand design pedagogies and design processes related to urban environments
How is the space utilized?	Open studios w/ indiv. workstations close to tools/equipment for particular craft/activity Temp. live-in community	Within each studio: -bench/desk for each student -classrooms made w/in studio space or out on adj decks Temp. live-in community	Classes on 1st floor Workbenches for rent/co-working on 2nd flr Community space	One large space w/ sm. workareas partitioned off Loading dock needs to be used for large projects Community space	40,000 sqft warehouse 140 studios (50, 75, 100 sqft w/ short walls, 200, 250 sq ft walled spaces) 45 pallet storage, 80 shelf storage units, Flex space for short term prj All on first flr level Community space	Primarily for prototyping (small scale)	The bldg and surrounding grounds are a sort of laboratory for learning and building Education purposes
Funded/financed	Class fees, donations, Annual Benefit Auction	Class fees, donations, auctions	Membership fees, rental fees non-profit organization	Donations, grants, sponsorships	Fees: monthly and daily membership for wkend & after hours Space & equip. rental fees Non-profit	Primarily for prototyping (small scale)	
Challenges/Oppor-tunities	Cost, location	Cost, location, application process leads to limited access	Small, narrow spaces One of the owners also owns larger bldg next door w/ the hope to expand one day	Very little space In need of better storage system One large room means noise remediation an issue			Limited to VTech student use only

	Who	What	When	Where	Why	How	
Synthesis	UMD community Visitors for library	-A place for making -For learning about mat'ls -Design/Build/Service	24 hour access for UMD students	UMD campus, diagonal from Arch. School	-Learning by doing -Tapping into benefits of the tactile experience -Visual/Kinesthetic learning	Collaboration spaces Individual spaces Workspaces Service Spaces Library	

Figure 28b: precedent program matrix diagram

Figures 28a and 28b show a matrix which analyzes the questions of who, what, when, where, why, and how in relation to several precedents: Penland School of Crafts and Haystack Mountain School of Craft (craft schools), The Foundery in Baltimore, MD, Club125 in Greenbelt, MD, Artisan's Asylum in Somerville, MA, and FabLab Baltimore in Catonsville, MD, (makerspaces), and the Washington-Alexandria Architectural Center in Alexandria, VA (university-based).

Looking at these spaces from a quantitative perspective through the matrix, combined with a diagrammatic analysis to understand the qualitative aspects of these buildings further assisted in the creation of a synthesis to develop the program for this thesis. (fig. 29) The common thread in all of these precedents, despite the slightly different typologies, was the existence of collaborative spaces, individual workspaces (in the form of studios or workbenches), and service spaces.

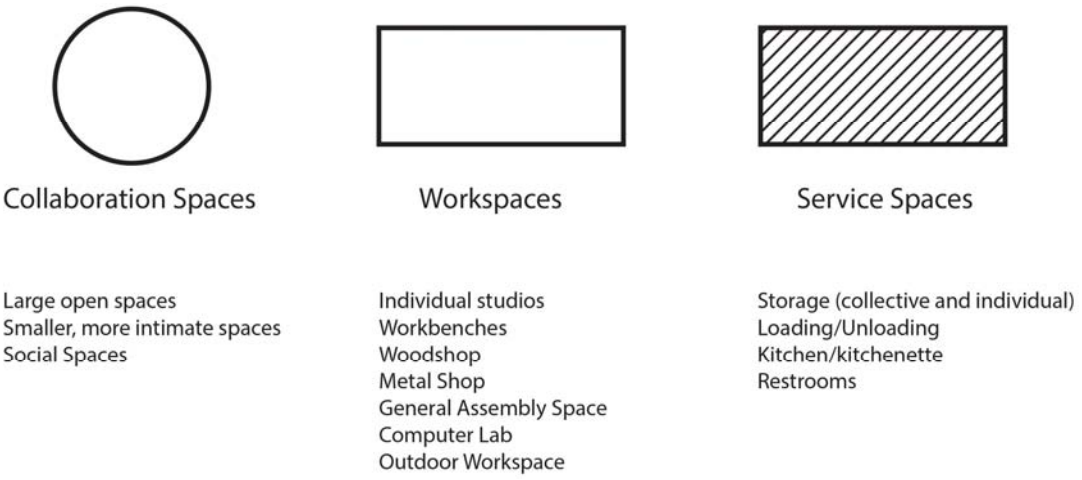

Figure 29: initial programmatic components

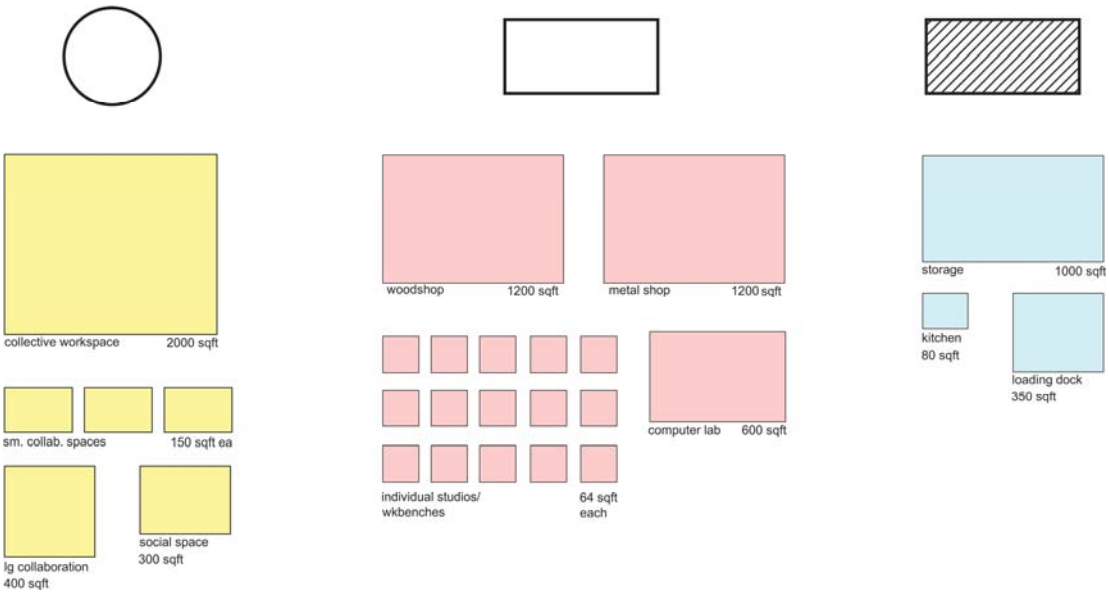

Figure 30: initial space allocation and relationships

The question that remained, however, is how this new facility will be more than just a replication of the facilities that already exists in the Art and Architecture buildings, as that was not the intention of the project. The issue with the current organization is that both the Art and Architecture programs, as well as their buildings, are rather introverted. Occasionally classes with collaborate, and some students cross over to take classes within the other school's program, but that is not apparent to many outsiders and it certainly isn't apparent to visitors of the school. By opening up the facility, both visually and physically, and allowing ideas to be put on display to students, faculty, and visitors, this side of campus can begin to take on a new identity, one that appears to be lackluster as it currently stands.

Technical considerations

Identifying the types of making that would occur in this facility was important here. As the making continuum is so extensive, and the neighboring school buildings

house some facilities of varying degrees of totality, it was important to develop a narrative on how this space would be used. The current facilities – metal shop, casting shop, printmaking, and woodshop in Art, woodshop in Architecture – will remain. The new center will be used to supplement the facilities that exist around the newly designed "making quad" in the hope that new creatively inclined majors – Industrial Design, Fashion Design, New Media Design, for example – could potentially be added to the list of disciplines at UMCP. Proposing the new facility may help to promote collaboration, as it gives students a new place to meet, work, think, and create. Also, offering students outside any of these disciplines a space where they can come and test ideas will be a way to promote creativity through making to a wide range of people.

Ceiling heights will be a necessary consideration. Many of the precedents analyzed have spaces with at least 12 foot tall ceilings. Although this is an adequate height for spaces of this nature, noise remediation becomes an issue. Many of these precedents consist of large, open rooms which exacerbated the noise issue, especially in rooms that house a large number of machines and power tools such as such in FabLab Baltimore.

Storage is also another weakness of many of these spaces. Club125, for instance, is one large room with open bookshelves as partitions, making for a cluttered basement appearance to the space. FabLab Baltimore had a similar issue, where the only "storage" space is within a 4 foot by 10 foot space alongside a CNC router. As the proposed program is to be for large scale projects, the storage of both materials as well as finished and process work with be important.

Design Approach

Framework for Design

Once the site was chosen, the task became determining the strengths, weaknesses, and opportunities of not only the site, but also the proposed building. A strength and challenge of the site is its topography: there is an elevation change of fifteen feet from the Art/Soc building down to the Architecture building's West entrance. This, however, offered a great deal of opportunity to the design of the "making quad," especially once the decision was made to remove a section of Campus Drive. The site's position on the West side of campus also presented a variety of aspects to consider. As mentioned earlier, many of the surrounding buildings have their "front doors" facing directions other than West; (fig. 26) therefore, this new building has the opportunity to be a healing aspect to this side of campus. In addition, there are redevelopment plans within the campus's planning department for the West side of campus. This building can be one among those changes in improve the appearance of this Western gateway to campus. (fig. 32)

Figure 31: existing site plan, as of 2014

Figure 32: proposed West campus site plan, by author

Conceptual Discussion

The idea of healing the West side of campus became a driving force behind the conceptual thinking for this proposed design. Through the programmatic development of the project, it was determined that a replication of the spaces that already exist in the Art/Soc and Architecture buildings was not needed. I intended to create a place where UMCP community members who do not have a place to go to create (such as Design | Cultures and Creativity Honors College) can go and interact with those that already have a space to make on campus (i.e. Art and Architecture); a space where individuals can all collaborate and use facilities together. Due to the location of the site, this facility and its outdoor spaces also become an extension of the Art/Soc and Architecture spaces. A facility like this will continue to encourage this type of exploration and give more space for collaboration.

The current buildings of the art and design fields, especially Art and Sociology and Architecture are rather introverted. Brick walls with minimal glass keep outsiders out and the making and creative thought process on the inside. (fig. 33) Sometimes this type of introverted space is necessary, but what if there was a space that would allow these ideas to be on display, to see the creativity happening. Initially, the design thinking was routed towards maintaining the existing building edge along Lot 1, while keeping the messy nature of the act of making hidden from view on the backside of the building. (fig. 26) The making, however, should be celebrated and put on display, not hidden from the campus community and/or visitors.

Figure 33: introverted facades of the Architecture (left) and Art/Sociology buildings, taken from Campus Drive, by author

As the materials library was seen as the connective space for the various types of making that could be done in this facility, the idea of a hinge opening up a "center for making" for the campus was developed. (fig. 35) Initially, the material gallery was to be located in that hinge with the two wings of the building essentially revealed to the rest of campus to display the activities of the facility. Throughout the design process, however, it was determined that a different space would be more ideal for the material library. The outdoor spaces created by the existing building and the new building opened up additional design opportunities for place making. (fig. 36)

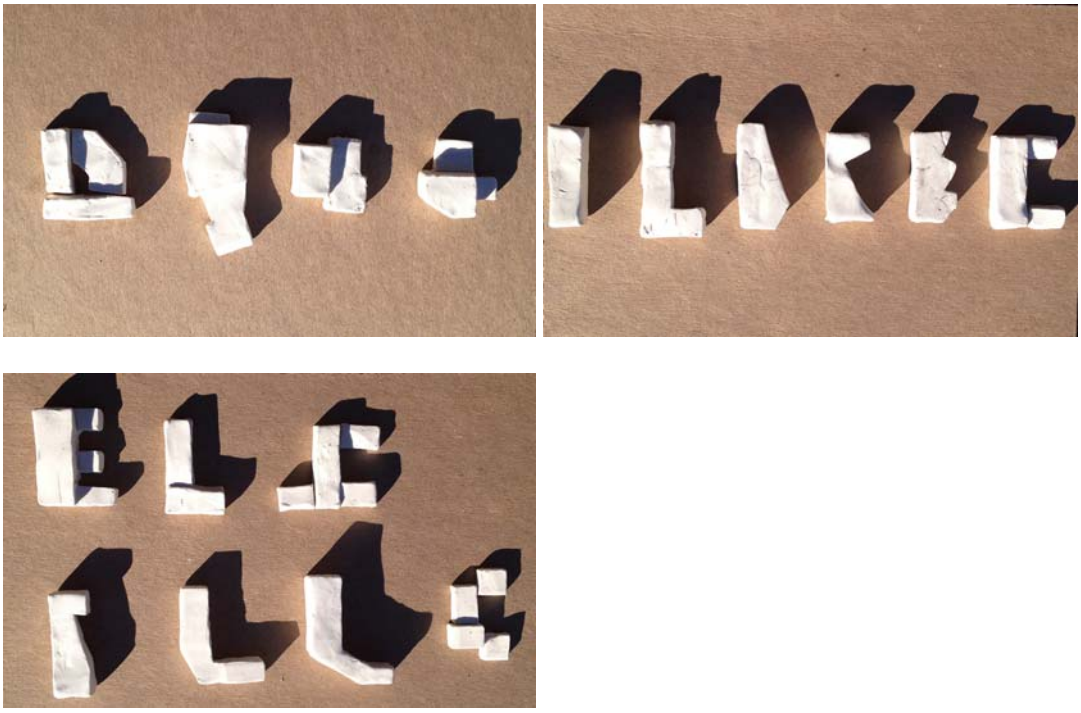

Figure 34: conceptual clay models

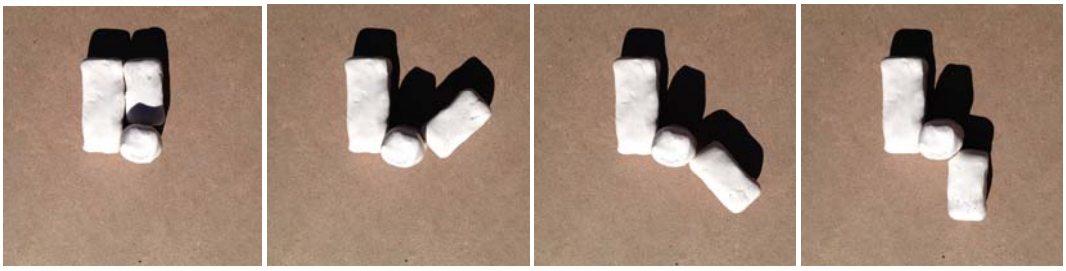

Figure 35: clay model of hinge concept

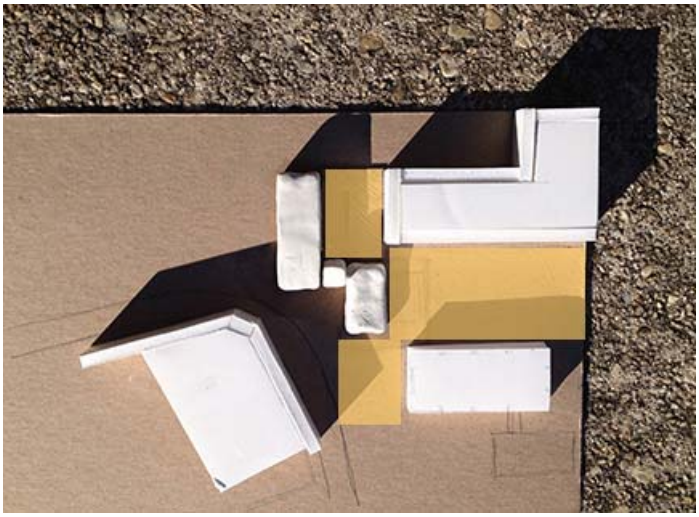

Figure 36: hinge concept placed in context, with newly created outdoor spaces

Schematic options and discussion

At the site level, the portion of Campus Drive between Mowatt Lane and Preinkert Drive has been removed (fig. 37) and instead a pedestrian path has been placed along this route to allow circulation between the two roads. (fig. 38) Paths have also been maintained or redirected for the West entrances for Art/Soc and Architecture, as many students and faculty members use these entrances every day.

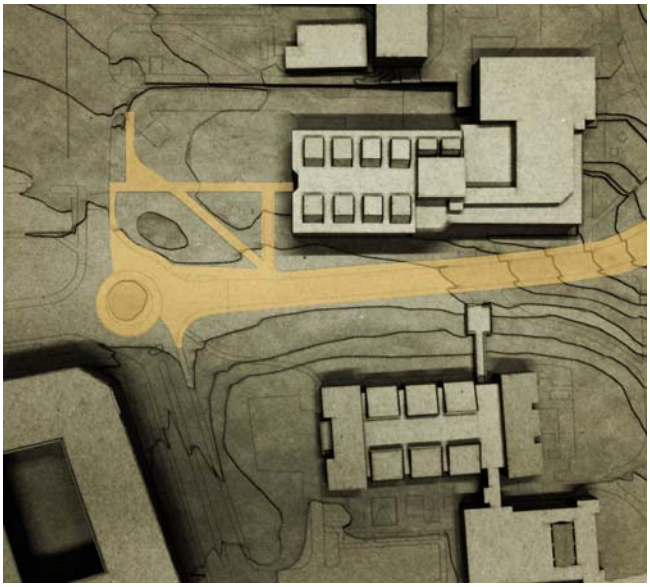

Figure 37: portion of Campus Drive removed for design proposal

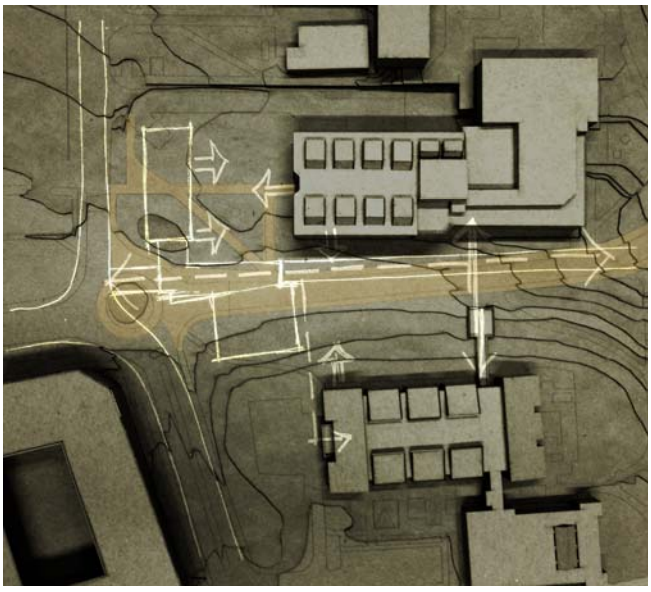

Figure 38: pedestrian path and adjacent building circulation

The yard that currently exists next to Art-Soc has remained, and the space between Art/Soc and Architecture has become not only a circulation path but an outdoor space for work and exhibition as well, allowing creative activity to be on display. (fig. 39)

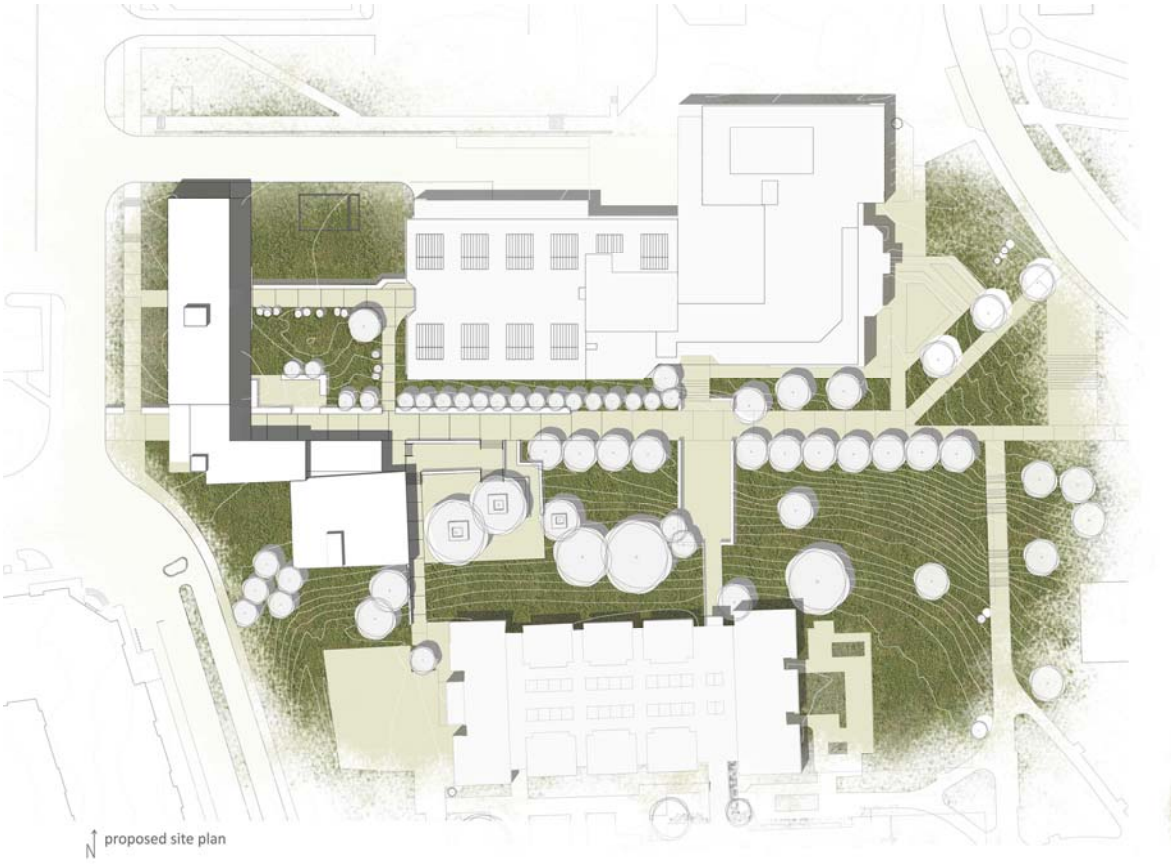

Figure 39: proposed site plan

The form of the building respects both the orthogonal lines of the buildings to the North and East of the site, as well as the slight angle as seen in the buildings to the South of the site. (figs. 40 & 41)

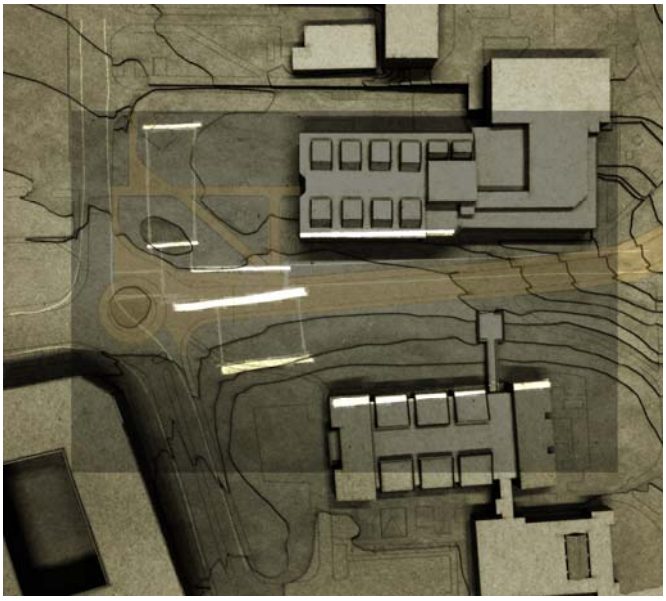

Figure 40: site model diagram of regulating lines of adjacent buildings

Figure 41: plan diagram of regulating lines

At the plan level, the pedestrian path runs through the structure, creating a literal gateway at this initial threshold to campus. (fig. 42) To the North of the path is

the wing that houses workshops (wood, metal, digital) and individual workspaces. (fig. 43) While digital fabrication has its benefits, it has its limitations, as does traditional methods of making by hand. Both types of facilities and resources are beneficial to have and have been included in the design: digital fabrication and computer labs will be offered as this type of making is becoming more prominent in the world, but traditional types of making facilities – wood shop, metal shop, outdoor yard workspace – will also be available to supplement the Art and Architecture program facilities. (fig. 44)

Figure 42: perspective showing gateway path through building

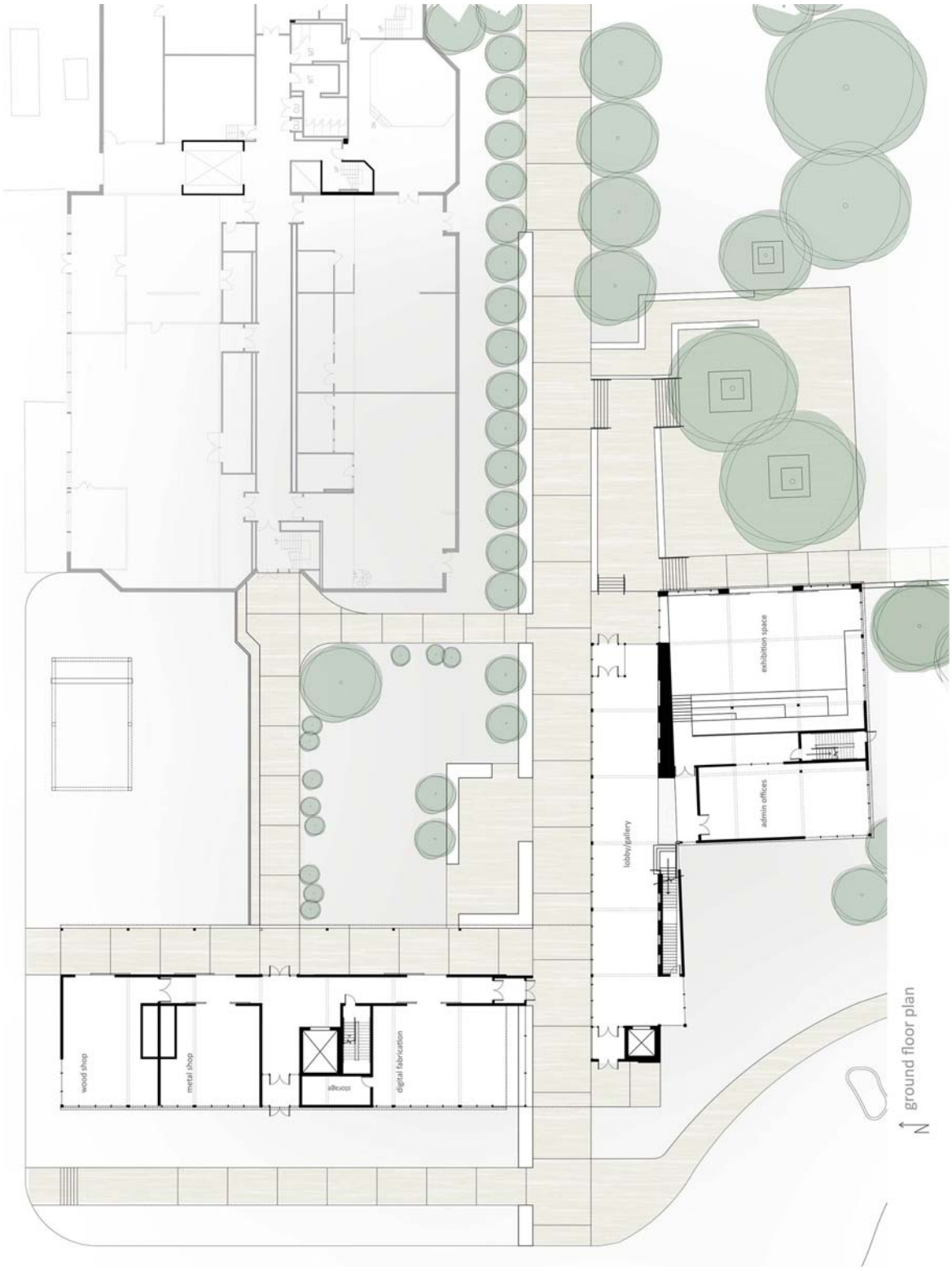

Figure 43: ground floor plan

Figure 44: perspective of North wing loggia and outdoor work yard

The workshops on the first level have windows on the West façade (fig. 43 & 45) to allow passersby to see the work in action, and a connection the work yard on the east side of that wing. (fig. 43) The workspaces, both individual and collaborative are on the upper three floors, and allow for flexibility through movement of furniture. (fig. 46 & 47)

Figure 45: West elevation

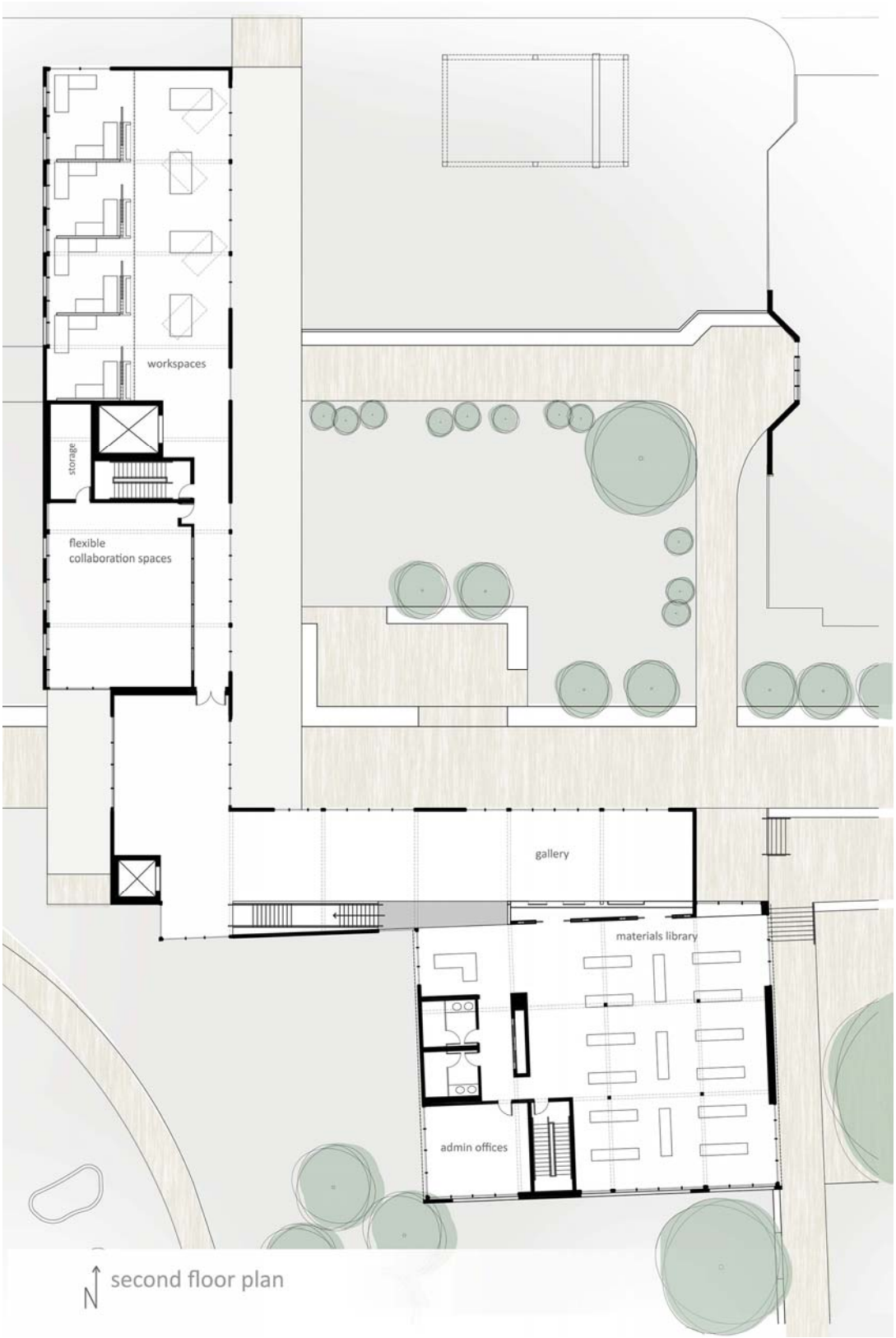

Figure 46: second floor plan

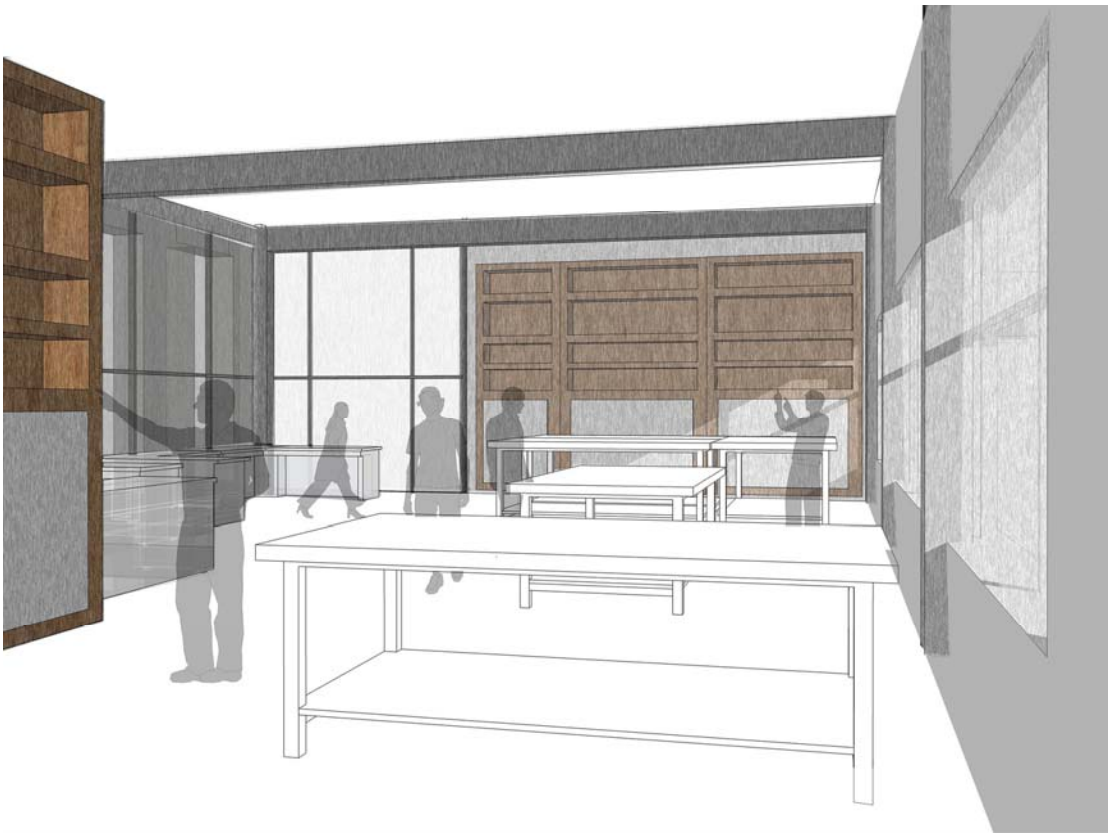

Figure 47: perspective of workspaces, with movable furniture

There is a gallery space running along the length of the building adjacent to the pedestrian path, showing work that is in process and/or complete and, again, transparent to passersby. (fig. 42 & 43) This space is continued on all three floors of this area of the building, along with the main circulation core. (fig. 48, 49, & 50)

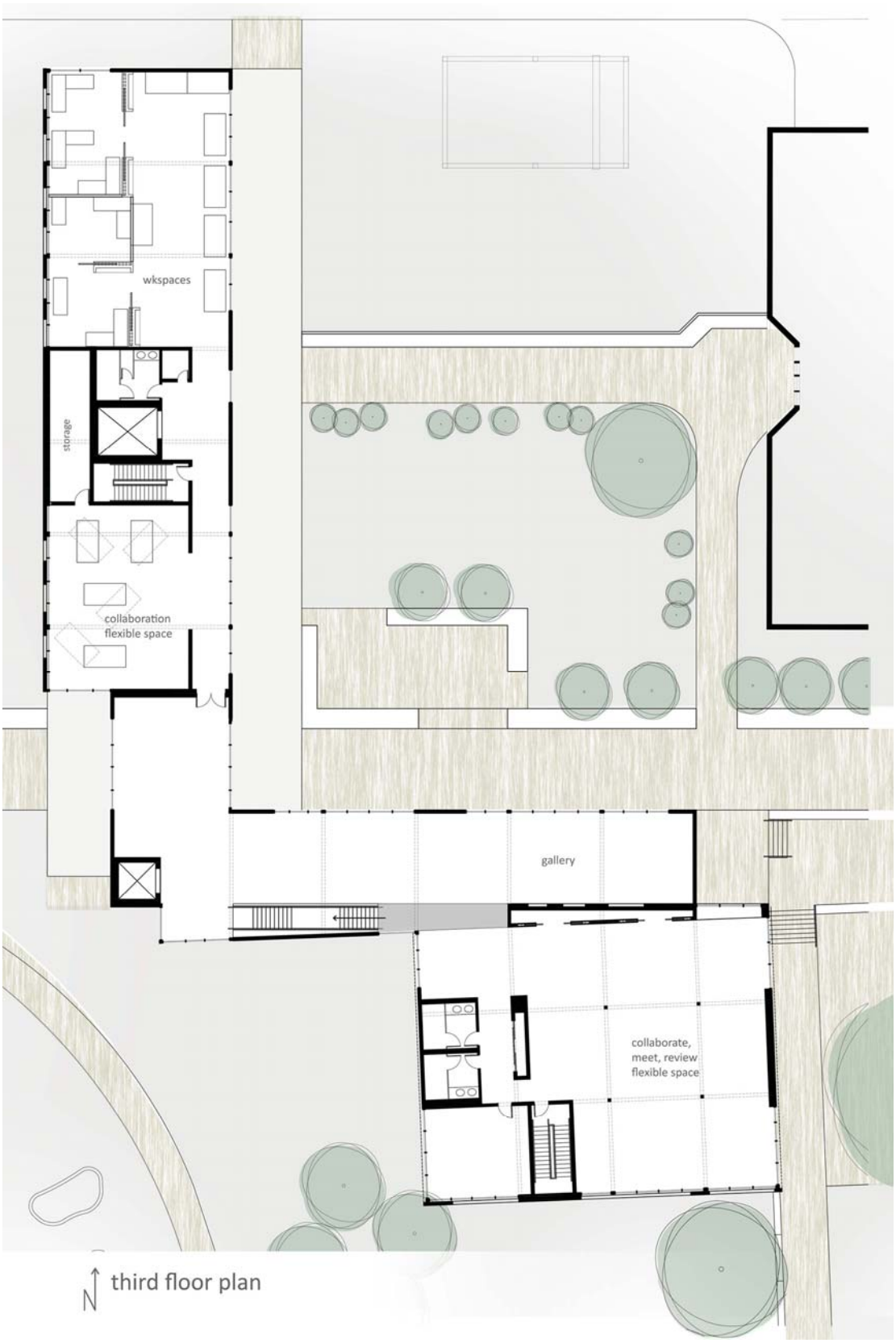

Figure 48: third floor plan

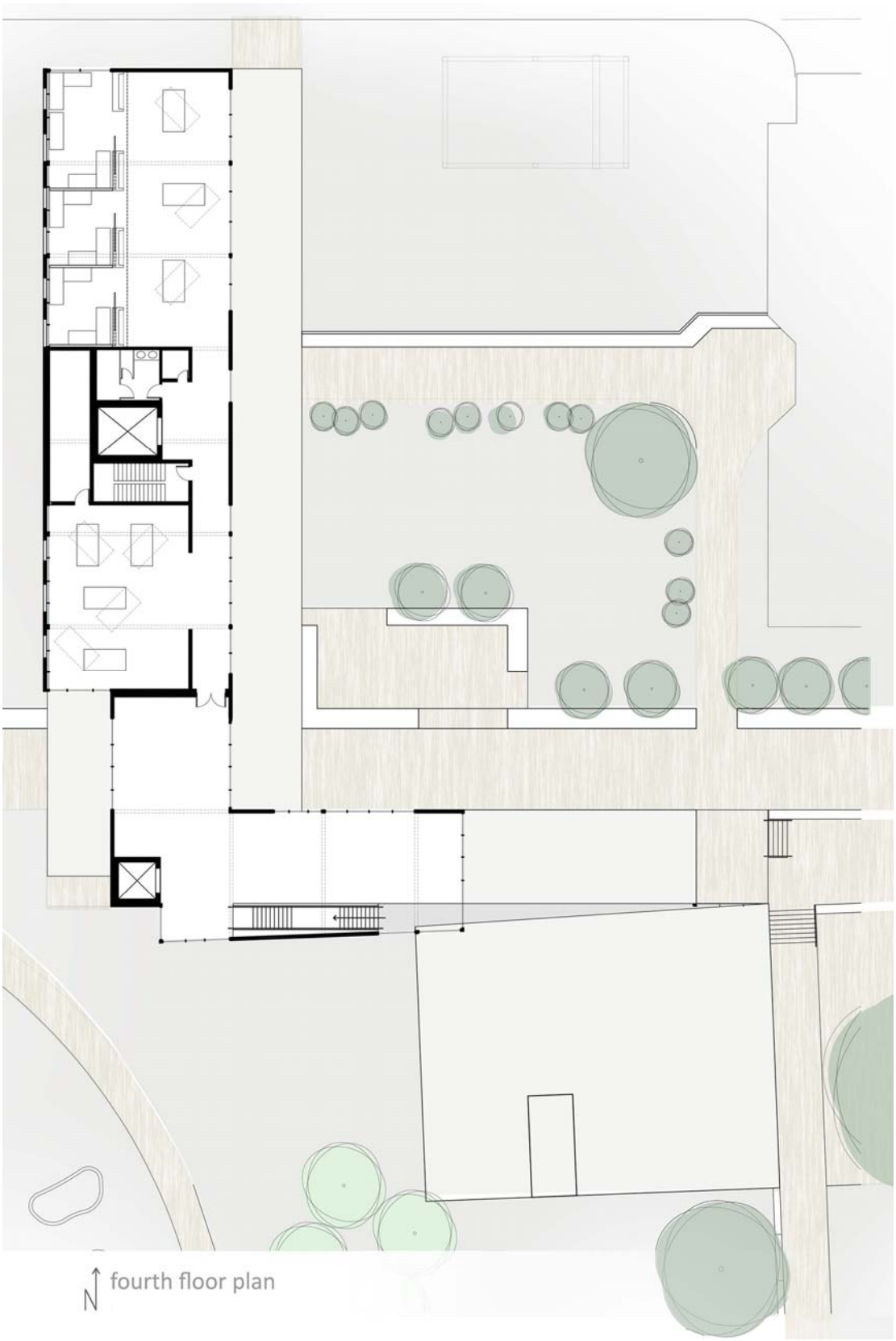

Figure 49: fourth floor plan

Figure 50: perspective of third floor gallery, looking Southeast

To the south of the path are the spaces for a different type of activity: administration, exhibition, materials library, and review/meeting spaces. On the first level, the exhibition space (fig. 51) - which is 6 feet below the grade of the pedestrian path to respond to the topography of the site - is connected to an outdoor terraced area built around the existing trees, (fig. 52) and one that includes a walkway from the main path down to the Architecture school.

Figure 51: perspective of ground floor exhibition space, looking Northeast

Figure 52: section through South wing, looking North

Collaboration spaces interspersed throughout the building were a key aspect to the design as well as the aforementioned materials library, which is something that is not offered at UMCP currently but will extremely beneficial to the architecture

students in particular. In addition, the individual workspaces will be offered for students that may not have another place to go on campus, and these spaces will be flexible so that they can be moved around to not only fit the needs of the students, but also to work with the changing needs of making in the future.

Conclusion

Reflections and evaluation of realization

At a campus scale, the goal of this project was to begin to create an identity for the West side of campus; at the building scale, it was to create a place for people to work, make, and think while fostering collaboration and learning of a different sort. All of the spaces within the project were created with these concepts, as well as the notion of "ideas on display," in mind. By offering a space for individuals on campus who want to make yet do not have access to the appropriate resources, a new community and place for making can begin to form. The added benefit of developing an immersive environment among like-minded students is that it can potentially promote bigger and better ideas. It could also potentially lead to more options being added to the University's repertoire of disciplines.

Post-script

Additional Reflections after Thesis defense

One of the most important realizations that this thesis process offered to me was one that required a great deal of honesty on my part. Despite the initial ideas and propositions for this thesis, the act of making to the extent that I had imagined at the beginning was never part of my process during my time in architecture school. I was trying to force a process that was not my own and, as a result, came up short on the making front. Initially, I had wanted to not only design but build my project, either in parts or in its entirety. This idea was not realistic, however, based on the available resources and facilities here at UMCP School of Architecture. The thesis process was much more challenging that I could ever have imagined, with so many moving parts, that taking on a design/build project at a school that did not support that type of curriculum was not practical.

One question that was broached during the final thesis review was whether the creative process can be fostered through architecture or whether it is inherent within individuals regardless of the location and resources available? Since everyone's creative and learning processes are different, the spaces in which we create can begin to have an impact on how we create. Without having the space to step back and think about what we've made, we cannot expect to gain a sense of how to move forward. This is one aspect of the creative process that I did not give myself, and as such, the making aspect of the design process did not shine through. In the end, however, the ideas of "awakening creative thinking through making" were maintained, despite the

"awakening" being less about a personal creative development and more about the potential for such an awakening to occur through architecture and the spaces it creates.

So can architecture foster the making process? Is it just a case of the right types of facilities for specific types of making? Is it really based on the individual to drive the execution of the creative process? I can only speak for myself, someone who learned a great deal throughout this process about being honest: architecture can foster this type of making, and having a space where like-minded individuals are there to help and want to collaborate can be an encouraging place. I maintain my position on the importance of making in education, and the value in acknowledging and encouraging less traditional methods of learning and thinking. Perhaps a facility like the one I proposed could be incorporated into the campus one day.

Works Cited

Atlantic Center for the Arts. n.d. *History of ACA.* Accessed March 17, 2014. http://www.atlanticcenterforthearts.org/history-aca.

Bonner, Jennifer. 2005. "Building a Pavilion." In *Proceed and Be Bold,* by Andrea Oppenheimer Dean, 168-171. New York: Princeton Architetural Review.

Caldwell, Mike. 1996. *Small Buildings.* New York: Princeton Architectural Press.

Crawford, Matthew R. 2009. *Shop Class as Soulcraft.* New York: The Penguin Press.

Dean, Andrea Oppenheimer. 2005. *Proceed and Be Bold.* New York: Princeton Architectural Press.

Foote, Jonaton. 2012. "Design-Build :: Build-Design." *Journal of Architectural Education* 52-58.

Frank Lloyd Wright Foundation. n.d. *Historic Legacy.* Accessed April 5, 2014. http://www.taliesin.edu/history.html.

Haystack Mountain School of Craft. n.d. *About Haystack.* Accessed March 17, 2014. http://www.haystack-mtn.org/about.php.

—. n.d. *About Haystack: Mission & History.* Accessed March 17, 2014. http://www.haystack-mtn.org/history.php.

Kostof, Spiro. 1977. *The Architect: Chapters in the History of the Profession.* New York: Oxford University Press.

MacKay-Lyons, Brian. 2008. *Ghost: Building an Architectural Vision.* New York: Princeton Architectural Press.

Makerspace. n.d. *What's a Makerspace?* Accessed May 7, 2014. makerspace.com.

Pallasmaa, Juhani. 2005. *The Eyes of the Skin: Architecture and the Senses.* Chichester: John Wiley & Sons Ltd.

—. 2009. *The Thinking Hand.* Chichester: John Wiley and Sons Ltd.

Penland School of Crafts. n.d. *About Penland: History.* Accessed March 17, 2014. http://penland.org/about/history.html.

—. n.d. *About Penland: Mission.* Accessed March 17, 2014. http://penland.org/about/mission.html.

Sennett, Richard. 2008. *The Craftsman.* New Haven: Yale University Press.

Tuschman, Eva M. n.d. "A Return to the Sensous: The Work of the Hand and the Life of the Spirit at Penland School of Craft." *Penland School of Crafts.* Accessed April 23, 2014. http://penland.org/events/stories4.html.

Washington-Alexandria Architecture Center. n.d. *Campus Life.* Accessed March 18, 2014. http://www.waac.vt.edu/#!blank/c1i1x.

—. n.d. *Design Build.* Accessed March 18, 2014. http://www.waac.vt.edu/#!design-build/c52g.

—. n.d. *Washington-Alexandria Architecture Center.* Accessed March 18, 2014. http://www.waac.vt.edu/.

Woods, Mary N. 1999. *From Craft to Profession: The Practice of Architecture in Nineteenth-Century America.* Berkeley: University of California Press.