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A Place of Dwelling for Graduate Students

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A Place of Dwelling for Graduate Students

A Thesis Presented

by

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Dedication

To Liz, with love.

ACKNOWLEDGMENTS

Thanks to Joseph and Kathleen for the guidance, support and motivation.

Thanks to Liz and my parents for making it all possible.

Thanks to Katrina for being my best friend, and making it fun.

ABSTRACT

A PLACE OF DWELLING FOR GRADUATE STUDENTS

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M.ARCH, UNIVERSITY OF MASSACHUSETTS AMHERST

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The lives of graduate students are often insular and focused, with high workloads and resultant stresses. Beyond the unifying demands of academia, graduate students have a diverse set of individual challenges. Some students have families, some are visiting the US and learning to live in a new culture, and some are fresh out of undergraduate studies and living on their own for the first time. In addition to these challenges the graduate student body is a diverse and disparate group, representing varied cultures, experiences and generations. Due to these demands and circumstances, the students have little time and energy to build a community with fellow graduate students, and therefore don't have a strong and supportive community when they need it most.

The idea of creating and supporting intentional communities through the design of housing has been architecturally explored for many years. From the mass housing of the early modernist movement through contemporary cohousing, there have been varying degrees of success. The intent of this thesis project is to design a place of dwelling for graduate students within the campus of the University of Massachusetts Amherst. By analyzing examples of intentional

communities and the actual needs of the graduate community at UMass Amherst, I intend to design a place of dwelling for graduate students that supports the development of community, and therefore the individual residents.

TABLE OF CONTENTS

Page

ACKNOWLEDGMENTS v

ABSTRACT vi

CHAPTER

1. INTRODUCTION 1

2. MASS HOUSING 4

3. COHOUSING 9

Cohousing Site Analysis 16

4. EXISTING CONDITIONS 18

5. PRECEDENT ANALYSIS 22

Hearth 22

Individual and collective spaces 25

Activation of collective spaces 28

Gradient of community sizes 29

Democratic exposure to the sun 31

6. SITE 33

7. CONCEPTUAL DESIGN 35

8. SITE DESIGN 39

9. FINAL DESIGN 42

10. CONCLUSION 52

APPENDICES

A Harvard Graduate Housing 54

B Code Analysis 59

BIBLIOGRAPHY 82

LIST OF FIGURES

Figure Page

1. Demolition of the Pruitt-Igoe Housing Complex. 18

2. Roof of Unite d'Habitation 19

3. Space Relations 21

4. Space Relations 28

5. Cohousing section showing public/private space relations. 28

6. Cohousing site plans 29

7. Cohousing site plan diagrams 30

8. One bedroom floor plan 32

9. Two bedroom floor plan 33

10. North Village site plan 34

11. North Village site diagram 34

12. Hearth at Fallingwater 36

13. Existence of the hearth 37

14. Relationships between the collective and individual spaces 40

15. Activation of shared space 41

16. Gradient of community sizes 43

17. Democratic access to light and sun 44

18. Site 46

19. Site section.. 47

20. Paper study of linear forms. 48

21. Paper study of broken linear forms... 48

22. Paper study of circulation path... 48

23. Study model with site manipulation... 49

25. Shadow study... 49

24. Circulation path studies.. 49

26. Conceptual model. 49

28. Process Diagrams 50

27. Final conceptual model... 50

29. Landscape sketch 52

30. The Edge Park- Brooklyn, NY - W Architecture 53

31. The Edge Park- Brooklyn, NY - W Architecture 53

32. Full site plan 55

33. 1st level plan 56

34. Amphitheater.. 56

35. 2nd level plan 57

36. 3rd level plan...58

37. 2 bedroom upper floor 59

38. 2 bedroom lower floor 59

39. 1 bedroom flat..60

40. 1 bedroom split unit 60

41. View from balcony...60

42. Building section...61

44. Building section- central building 62

43. Building section- northern building 62

45. Building section showing shared spaces. 63

46. Covered porch area...63

47. Building section- southern building.......................................64

48. Evening render- central building..64

49. Final model 65

50. Outdoor shared space on 3rd level..66

CHAPTER 1

INTRODUCTION

The majority of university students are, by their very nature and vocation, a transient population. Students travel from across the globe to attend a particular university in the expectation that this chosen university will provide the academic experience they seek. Universities serve many types and levels of students, and in serving these students must create a supportive community in which the students can live and thrive. For undergraduates, the University of Massachusetts has various programs in place to build this feeling of community, most notable residence halls. These residence halls act as a social condenser for the students, bringing them together into a collective group with a collective identity, which leads to a supportive community.

The process of entering the University of Massachusetts for graduate students is a very different experience, and understandable so. Most graduate students are in a very different stage in life than the typical undergrad, having already been through the transformative undergraduate years. In addition to this level of experience, the graduate student population is an extremely diverse group: over 46% of the students are non-white[1], with over 25% coming from outside the US.[2] Beyond these easily quantifiable statistics, the students come from many different cultures with many different life experiences and expectations. There are few

1 "Umass Amherst race/ethnicity of graduate students" Web. 5 May 2012

2 "UMass Amherst graduate student enrollment by country of origin." Web. 5 May 2012.

communities of people that could boast the inclusion of a population with such a diverse background and host of experiences.

When nearly all of the students arrive to start graduate school at the University of Massachusetts, they are leaving a known community behind. Over 60%[3] of these students are arriving from out of the state, and I would presume over 90% are coming from outside the region. The university as a whole acts as a social collector for this diverse student body, but does not provide the framework necessary to create an interdisciplinary community for the graduate students, as it does for the undergraduate students. Where the undergraduate students have residence halls to help integrate into their new community, graduate students must find their own housing. Unfortunately Amherst and the area immediately surrounding the UMass campus has very little housing available, so many grad students are forced to commute from the surrounding towns. By spreading the population of graduate students geographically, it becomes even more difficult to create a strong community on the UMass campus, leading to a weak overall graduate student community.

Community is a necessary asset for most humans, as we are typically social animals dependent on each other. Graduate students need community to provide support during a time that can be more difficult and demanding than any other time in their lives, yet that community will not form without the proper setting. To build a meaningful community usually takes time and effort, two things in

3 "State Residency Classification Within Degree Program" Web. 5 May 2012

amazingly short supply among the graduate student population. Without excess time or effort, or geographic proximity, the idea of creating a strong community among graduate students is nearly impossible.

My proposition is to create graduate student housing on the UMass campus which would initiate and support the formation of a strong and lasting community among its residents. As an inherently transient and diverse population with little free time and energy, graduate students are not an easy target for community creation, but they are a group that is in great need of the support network provided by a strong community. By providing an architecture that would support community building among its residents, I believe those residents would be a happier and stronger, an asset to the larger university community.

CHAPTER 2

MASS HOUSING

Creating ideal housing for groups of people has been an interest in architecture for many years, and through many movements and eras. The idea of mass housing was an early fascination of the modernist movement, and since the early modernists adopted the challenge of mass housing, many experiments have been built. Le Corbusier famously designed his radiant cities with the intent of reinventing the urban landscape, providing quality housing to all. This idea of a grand solution for mass housing came from a time when there were too many people in the large cities of Europe, and not enough decent housing. Though Le Corbusier's Radiant cities were never actually built, the general idea was copied to varying success around the world.

On the failure side of the spectrum is the Pruitt-Igoe housing complex in St. Louis, Missouri (1954). The Pruitt-Igoe was designed very much in the image of Le Corbusier's Radiant City: a series of tall seemingly anonymous residential towers separated by open park space. The project was built to be low-income housing on the outskirts of the city, offering its residents what had been determined they 'should' want, with the intent of making their lives better. The complex was advertised by the housing authority as "bright new buildings with spacious grounds, indoor plumbing, electric lights, fresh plastered walls and other conveniences expected in the 20th century."[1] Unfortunately for the housing

1 Kimmelman, Michael, "Critics Notebook, Tower of Dreams: One Ended in Nightmare," The New York Times, Jan. 26, 2012 Page C1

Figure 1. Demolition of the Pruitt-Igoe Housing Complex.

authority and the residents of the complex, reality did not match the aspirations. The project quickly descended into chaos with scores of vacancies, and was famously demolished in 1974. (Figure 1)

On the success side of modernist experiments in mass housing, we could use another Le Corbusier example: Unite d'Habitation at Marseilles (1947-53). This building is not an effort at redesigning an entire city, but at creating quality mass housing within a city. Like the Radiant City, the design of Unite was based in times in which it was built. Following the destruction of the war, there was a serious shortage of housing in France, as well as a shortage in labor and money. Le Corbusier designed a building that was based on a modular principle, which could utilize mass production and therefore rapidly help to alleviate the housing shortages. Though the scale of the design was much smaller than the towers of his radiant city, the general theories of an ideal new urban landscape were incorporated into the design. Le Corbusier wanted to allow all the residents of the building to be able to experience ample natural light, and fresh air[2]. Each apartment spanned the entire width of the building, allowing all the apartments to share the ideal sun exposures. Each apartment had open balconies and double height living rooms, so no one was stuck in a small, dark, cramped space.

Possibly the most important piece of the design of the Unite is the provisions for the collective community within the building. Unlike a typical apartment building which housed only living spaces, Le Corbusier designed the Unite to include shared collective spaces which would help form a community

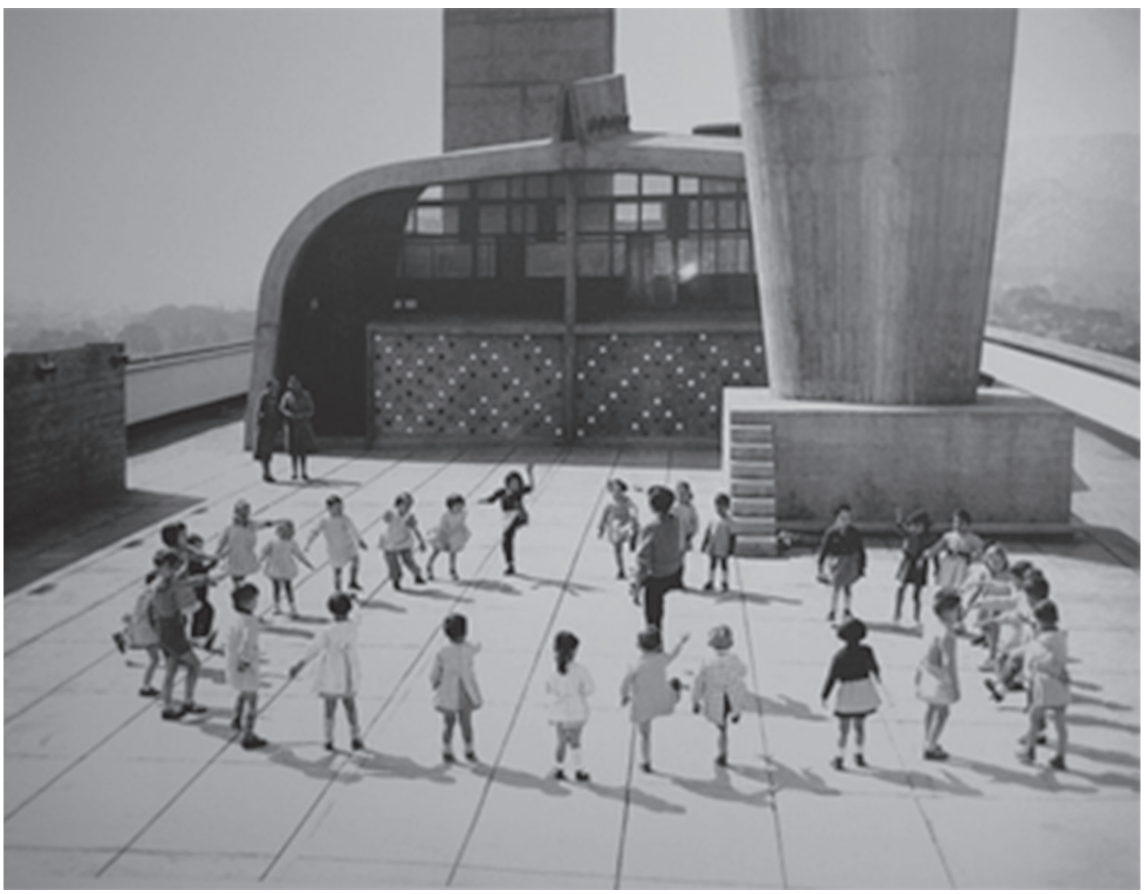

Figure 2. Roof of Unite d'Habitation

2 Modern Arch

within the building. The two notable spaces are the rooftop amenities, and the rue interieure. On the roof of the building Le Corbusier created a world unto itself, both programmatically and formally. (Figure 2) The roof contains a childcare center for the residents, swimming pool, running track and gymnasium, as well as a series of odd sculptural forms. This rooftop area was a place the where the residents of the building could gather as a group and bond as a community. On the inside of the building is another grand Le Corbusier experiment, the rue interieur, or interior street. This interior streetscape was intended to house commercial businesses for and by the residents of the building. This interior commercial district would allow the residents of the building to have more spontaneous interaction with their neighbors, further building the community within the building.

Beyond the experiments and theories of Le Corbusier, Alvar Aalto was another modernist architect who experimented with mass housing on a large scale, notably the Baker Dormitory (1946-49) at MIT. As in the earlier design of the Paimio Sanatorium (1928-33), Aalto was intent on each residential unit sharing the same ideal southern exposure. To accomplish this task, the building is a long and meandering shape, with the rooms loaded on the south side and circulation and communal spaces on the north side. Due to the complex design of the circulation, "Each open corridor is unique in its spatial topography, broken down into small, differentiated sub-zones and providing distinct spaces for spontaneous social gathering outside the adjacent rooms."[3] In addition

3 Trencher, Michael. "The Individual and Mass Housing: the Delicate Balance." *Arq: Architectural Research* Quarterly. 4.3 (2000). Print. Page 252

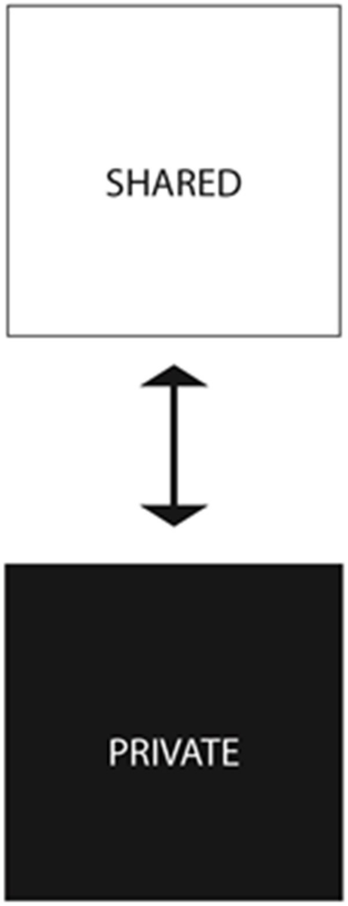

Figure 3. Space Relations

to providing the small shared spaces for the collective group, Baker Dormitory also provides a large collective space in the form of a dining hall.

The relation between the private individual spaces and the public collective spaces is an important aspect in many of the designs for mass housing. In the designs of the Unite, Paimio, and Baker Dormitories these spaces are clearly separate with no apparent gradient or bleed between them (Figure 3). Residents are unable to remain within the general confines of their own space while having some interaction and connection with the community around them. Unlike the stoops of Brooklyn or the large front porches in the South, residents of Unite were either inside their units unable to interact with their neighbors, or in the public areas with full interaction. This lack of gradient between the public and private spaces allows for less spontaneous bonding and interaction between the residents, leading to weaker community within the complex.

CHAPTER 3

COHOUSING

Another important model for group housing which has seen popularity much more recently than the modernist mass housing schemes is the cohousing model. The term 'Cohousing' is a rough translation from the Danish word Bofaellesskaber. Though the term cohousing has stuck in the United States, literal translation of Bofaellesskaber is 'living communities', a much more evocative and multifaceted word.[1] The term cohousing is obviously derived from two words: cooperative and housing, both of which are merely building blocks to the idea of living communities.

The idea of cohousing is by no means a new one, as it is most likely the oldest type of community in human history. Millions of years ago humans did not live in large structures separated by yards and fences and walls and windows, they lived cooperatively in a community. To allow for survival in all the varied and disparate environments on the earth, humans have depended on a living community. These communities would have contained the same shared services on which we depend today: food, shelter, safety, childcare and even waste disposal. By living in a community, early humans were able share all the necessary requirements for survival, as well as allow them to live happy and full lives.

1 ScottHanson, Chris, and Kelly ScottHanson. 2005. *The cohousing handbook: building a place for community*. Gabriola Island, BC: New Society Publishers. Page 3

Humans lived and evolved in these shared communities for millennia, really up until very recent history. The first offensive on the small cooperative community was agriculture. Though the advent of agriculture did not necessarily destroy small cooperative communities, it allowed for a greater division of labor, as well as an increase in hours of work and therefor a decrease in hours of rest and socialization. Along with increasing work hours agriculture also allowed for the creation of large and powerful empires. Whether in South America, Northern Africa, or Europe, agriculture introduced the great class stratification and uneven distribution of wealth that we know today.

Even though the advent of agriculture was the first offensive against cooperative communities, it was not a lethal blow. Cooperative communities can, and do, thrive using an agricultural base, especially a subsistence agricultural base. Subsistence farming communities are a great example of living communities that exist even today in both the first and third world economies.

The truly lethal blow to small cooperative communities was industrialization and industrial capitalism. The rise of industrialization through time has forced people out of their cooperative communities and into the urban environment, and eventually into a suburban environment, both of which typically lack the ideals and benefits of a small cooperative community. In these large scale urban and suburban communities it is more difficult for people to be involved in their immediate surroundings, and therefor become more detached from their community and environment.

Until the establishment of industrialism in the twentieth century, the majority of everyday problems that human beings had to solve collectively had been at the community or neighborhood level. It is only recently that people have become involved in matters and decisions about which they have scant knowledge but which affect the lives of millions of people.[2]

In spite of being forced into an urban environment lacking the cooperative nature of small communities, humans still have a longing for connection and community. Millions of years of human evolution while living in small cooperative communities cannot be overturned by a few hundred years of disconnected urban and suburban living. As Gifford Pinchot states in the introduction to The Cohousing Handbook, "We are built to live connected to others in a community- to do some things together and to see people we know as we go about our business. We are also built to live connected to the land.[3]

It is this deeper desire to live connected to both the land, and the people around us which has led to the current cohousing movement. As I have stated this is not a new invention, but a return to our past:

The co-operative culture is not an atavistic and irrational reaction to existing cultural structures. It is a mode of organization which grows out of the 'old' structures to reveal the latent possibilities that lie within them and presents a rational opportunity to remedy the maladies constantly being reproduced in them[4]

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2 Andrusz, Gregory D., and Bo Bengtsson. 1999. *The co-operative alternative in europe : The case of housing.* Aldershot; Brookfield USA: Ashgate. Page 35

3 ScottHanson, Chris, and Kelly ScottHanson. 2005 Page xi

4 Andrusz 1999 Page 34

By revisiting these 'old' cultural structures, the cohousing movement has been able to define its ideals and goals, which can inform the design of the communities and the structures within those communities. The underlying ideals of a cohousing community are to provide support for its members. In today's world the idea of support is automatically coupled with money. If someone needs food, give them money to buy food. If someone needs childcare, give them money to pay someone else to provide childcare. In the world of cohousing support is based on community involvement. Many of the necessities of everyday life are shared among the community members, so the load carried by each individual is reduced. If someone needs a babysitter or a meal, they can turn to community members who they know and trust.

In addition to these physical needs, cohousing presents a model that provides for the social needs of its members, a need that is often overlooked in an intensely capitalist society like our own. It would be utopian to dismiss the concern that national governments have with economics; however, the current preoccupation with the subject is almost fetishistic in that 'efficiency' and 'competitiveness' have become objectives in their own right and at the expense of a concern for the 'social'.[5]

This need for social inclusion and connection may be the most important aspect addressed by the concept of cohousing. As a cohousing community is intentionally designed, at it's core is community, both physically and theoretically.

5 Andrusz 1999 Page 57

The design and layout of a cohousing community allows, and in some ways forces, the residents to interact on a frequent basis, which then helps to build the sense of community. Unlike a traditional apartment building where neighbors who share a floor may never come in contact with each other, residents in a cohousing community will have frequent physical and social interaction.

The general structure of a cohousing community is based on the following five principles[6]:

•Participatory Process
-Residents are active participants in all aspects of the community from the design phase and beyond.

•Intentional neighborhood design
-The neighborhood is designed around the model of a cohousing community, not a typical suburban type neighborhood.

•Private homes, common facilities
-All residents retain their own private homes and autonomy within the community, but share common spaces.

•Resident management

•Non-hierarchical structure and decision making

Working within this structural framework are four main design features:[7]

•Separating the car from private residence

•Designating pedestrian pathways linking the access to each residence

6 ScottHanson, Chris, and Kelly ScottHanson. 2005 Page 3

7 ScottHanson, Chris, and Kelly ScottHanson. 2005 Page 5

•Locating the active area of the home (kitchen) on the pedestrian pathway side

•Centrally located common house

By following these social structure and design principles, the resulting cohousing community provides the following benefits:

•Safe and supportive environments

•Opportunities for social interaction

•Contribution

•Sharing resources

•Raising children

•Environmentally friendly

•Preserve green space

•Lower living costs

•Time saving

•Resident participation

An important aspect of the cohousing model is the relation between the private and collective spaces. Unlike the modernist mass housing model where the private and collective spaces were clearly separate, cohousing allows for a more permeable separation. Cohousing designs typically allow for the most private spaces to remain private, notably the bedrooms. The more socially oriented spaces are increasingly more open to the public areas, with the living room and kitchen allowing direct interaction with the collective spaces, helping to building a stronger community through increased interaction between the residents. (Figure 4, 5)

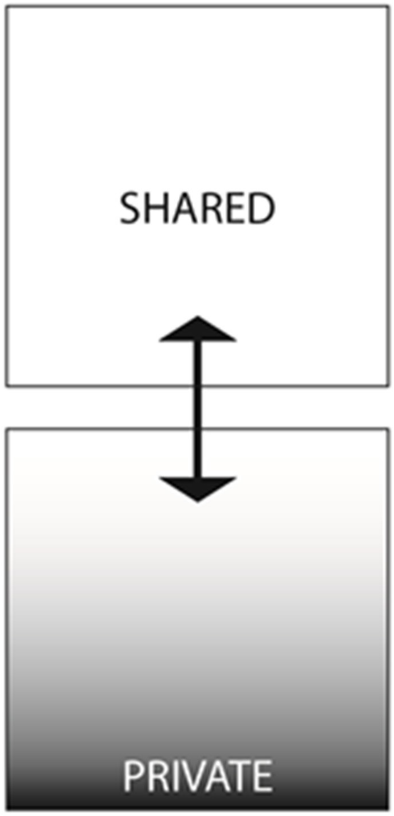

Figure 4. Space Relations

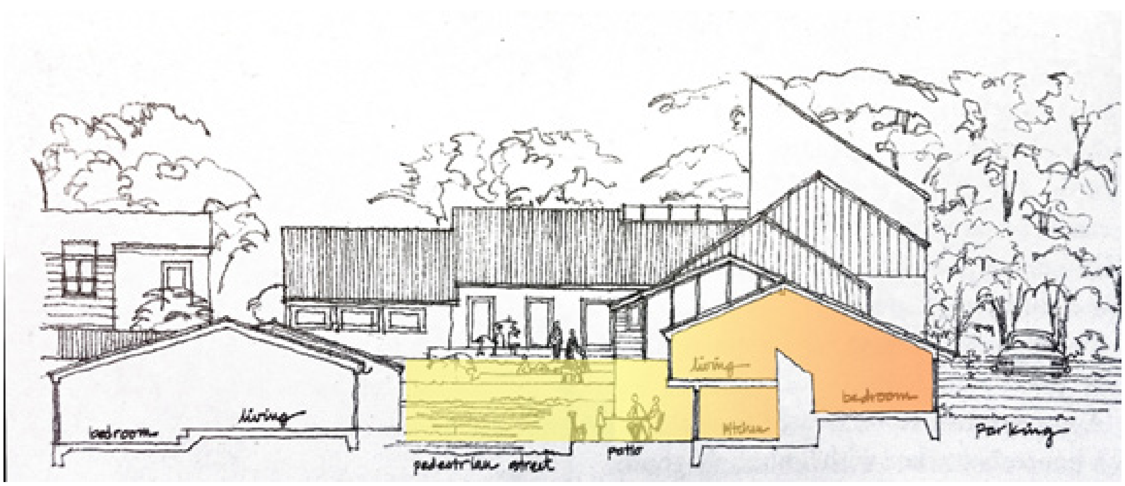

Figure 5. Cohousing section showing public/private space relations.

Cohousing communities come in many different shapes and sizes and are found in urban, suburban and rural areas. Among the communities I've analyzed, there seems to be six general forms: central communal building with a housing perimeter, central open area with housing and communal building perimeter, rectilinear closed block, rectilinear open block, multi-nodal, and spinal. These six layout designs are typically dictated by the location and size of the community; rectilinear blocks are usually in urban areas, multi nodal designs allow for larger communities, and the others are usually smaller communities in rural settings. (Figure 6, 7)

Figure 6. Cohousing site plans

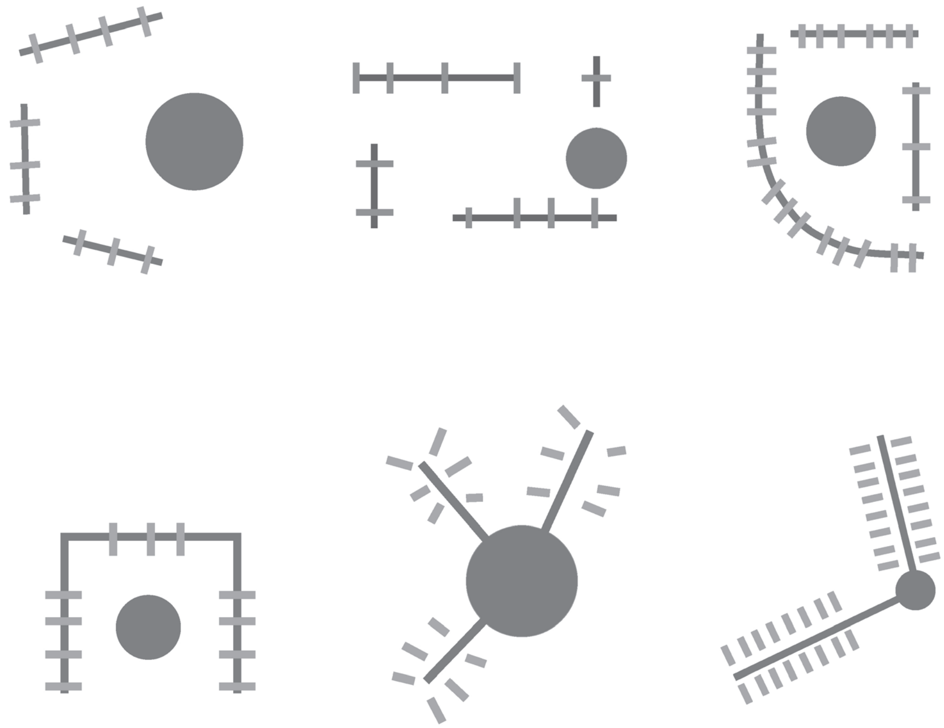

Figure 7. Cohousing site plan diagrams

The size relation between the communal building and the residential buildings also varies greatly between communities. The sizes of the communal buildings have typically grown since the formal concept of cohousing was initially formulated and the first cohousing communities were built.8 In the various plans (Figure 6), it can be seen how the different communities valued their own individual private spaces versus the collective shared spaces.

8 "Friday Keynote: Cohousing in Denmark - a Look Back and Forward | The Cohousing Association of the United States." Web. 17 April 2012.

CHAPTER 4
EXISTING CONDITIONS

North Village Apartments were built in the late 1960's to make room for the influx of students due to the GI bill, and the coming of age of the baby boomers. The units were designed and constructed as temporary housing, using panelized assemblies for the walls and flat roofs. All the units rely on electricity for 100% of their energy use, including heat. In addition to the all-electric design, all the units share one central electrical meter and costs are divided equally. This practice may have worked well when both electricity costs and demand were low, but today it's a major problem for the residents. Because all residents pay the same no matter their individual use, there is no incentive to conserve, and therefore cost for everyone goes up. This has been a major driver of rent increases, following the increases in energy costs.

The units were originally constructed with flat roofs, which over time suffered from degradation and water infiltration. To combat these issues, major renovations were carried out in the early 1980's including the addition of over-built pitched roofs and new siding. New back doors were added to all units to make them compliant with egress code, and the front doors are currently being replaced. The walls of the units are minimally insulated, and some insulation was added during the pitched-roof additions. All the windows are single paned with leaky aluminum frames. The heating for the units is all electric, with only one zone per unit. There is no central cooling available, so many residents use window mounted air conditioning units (which often remain in the windows through the winter).

Due to the turnover of units consistent with a student population, maintenance is constantly performed, but at a minimal rate. Interior finishes are cheap and poorly applied; thin cheap carpeting and bland paint on rough walls. Cabinetry and appliances in the small kitchens are low-grade, and show their age clearly. The grounds of the complex are generally well cared for, with a well-used and maintained playground area with considerable open grassy space. The parking areas and roads are very poorly maintained and are often sighted as major problems for the residents. The exteriors of the structures are relatively well maintained with no obvious signs of degradation.

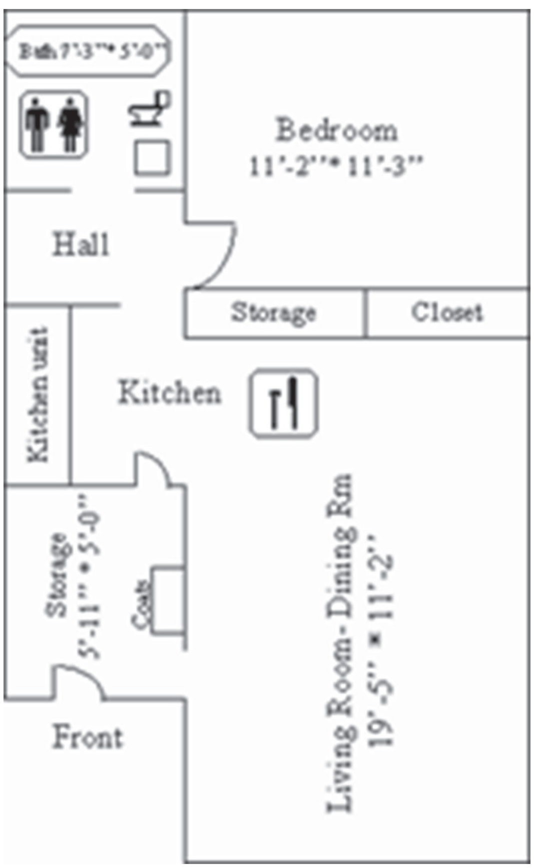

Figure 8. One bedroom floor plan

North Village apartments consist of 371 sq ft one bedroom (Figure 8) and 505 sq ft two bedroom (Figure 9) units available at North Village. The one bedroom units consist of an open living/dining room, which is connected to the kitchen area. Beyond the kitchen is a small hall with the bathroom and bedroom connected. The two bedroom units consist of an open living/dining area, with a hallway connecting the two bedrooms and kitchen area, which is on the back side of the unit.

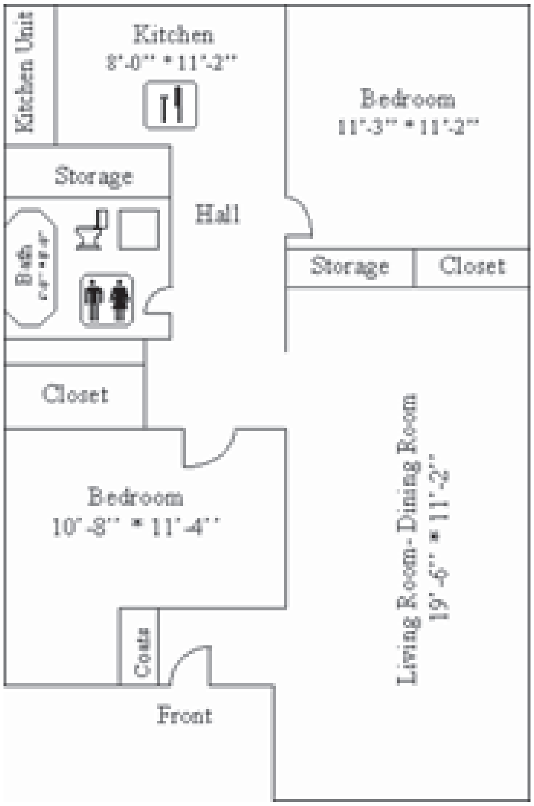

Figure 9. Two bedroom floor plan

Storage in the one bedroom unit is limited to the entry closet, and two closets in the separation wall between the bedroom and living room. The two bedroom units have an extra storage closet in the kitchen area. There is no auxiliary storage available in the complex. There is one shared laundry room, and one very small community room available for resident's use.

The village is designed around a series of nodes with a hierarchical structure. The main set of nodes lies on a linear pedestrian path on an east/west axis. Each of these main nodes is an open grassy area, around which groups of units are assembled in a radiant pattern. Between the groups of radiant units there are smaller nodes of open area which are closed on one side with another group of units to make a triangle-like shape. Radiating out from the main nodes are also pedestrian pathways alternating between every two groups of units. This layout allows each unit to have "back yard" and "front yard" type exposures. Beyond this central core of triangular groups are additional outlying groups of units. All of the units are connected in groups of four to six, sharing a wall between them. The parking lots are located on the outside edges of the complex, with the access road weaving around the groups.

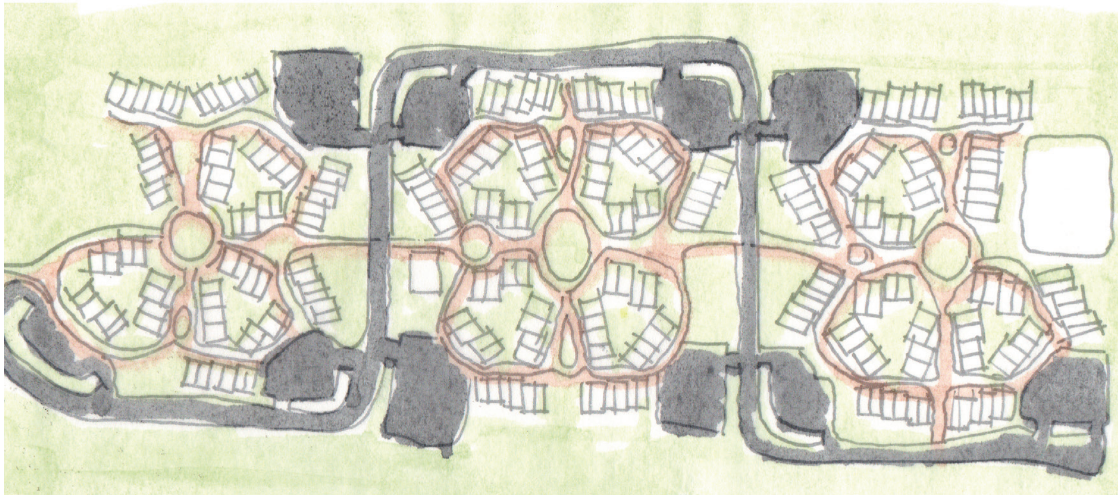
Figure 10. North Village site plan

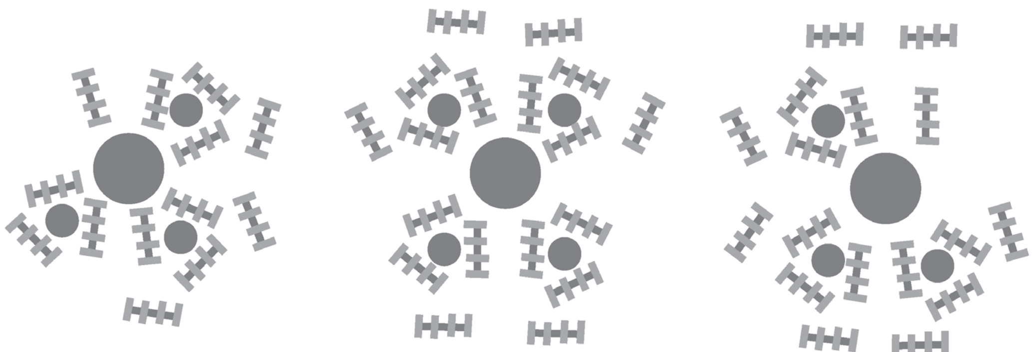
Figure 11. North Village site diagram

Overall, the layout (Figure10, 11) of the village is promising, and has many features consistent with the cohousing model in spite of predating the cohousing movement in the US. The cars are separated from the housing, and the complex has major and minor pedestrian pathways throughout. Unfortunately, the most important factor in a cohousing community, the common building is lacking at North Village. This detrimental lack of common space greatly reduces the possibility of group interaction in an organized interior setting, and therefore reduces the strength of the community within the village. The floor plans of the units themselves also fall short of the cohousing ideal, in that the public and active area (kitchen) is hidden in the back of the units, while the private areas are in the front

CHAPTER 5

PRECEDENT ANALYSIS

In an effort to better understand my design goals, I choose to analyze three buildings, and one building type. The three buildings are: 1)Unité d'Habitation (1952) in Marseilles, France designed by Le Corbusier 2) The Baker House (1946 in Cambridge, MA designed by Alvar Aalto 3) Smith College Campus Center (2003) in Northampton, MA designed by Weiss Manfredi 4) The cohousing model used in many developments around the world (I will consider the general cohousing model a building). I choose these precedents because they all explore the gathering of community, and present disparate design solutions. By analyzing these four precedents I was able to find common links and themes present in all, in spite of the great discrepancies in their eras and intents.

After analyzing these four buildings, I deduced five themes that I believe are important to their designs and functions as community support. The themes are: 1)The existence of a hearth. 2)The relationship of the collective space to the private space. 3)The activation of the collective space. 4)Democratic exposure to the sun and light. 5)The presence of spaces that support a variety of community sizes. These themes can be seen in all the precedent buildings, some with greater success than others. It is my contention that these five themes are required to exist in order to have a strong community oriented group of dwellings.

Hearth

The existence of a hearth may be one of the few constants within dwellings throughout history. The existence of a traditional hearth is obviously as a utilitarian tool, both for cooking and for heating. As dwellings have developed to be more than just simple shelter, the hearth has become a much more important role than basic utility. The hearth provides a central node of gathering, from which the rest of a dwelling radiates. Frank Lloyd Wright may be one of the most prominent designers to use the hearth as a central design element in nearly all his residential projects. Possibly the most famous example being *Fallingwater* (1947), in which Wright placed the hearth within existing rock, connecting the house to its site in a very literal way. Dominating the hearth at Fallingwater is a large red wine kettle for making mulled wine, signifying the strengthening of the community within the house. (Figure 11.12.)

In each of my precedent buildings I was able define the existence of a hearth, some in the form of the traditional fireplace, and some as a space or design element which promotes the gathering of community. In each of the precedents the area I've designated as the hearth is one that promotes the gathering of the

Figure 12. Hearth at Fallingwater

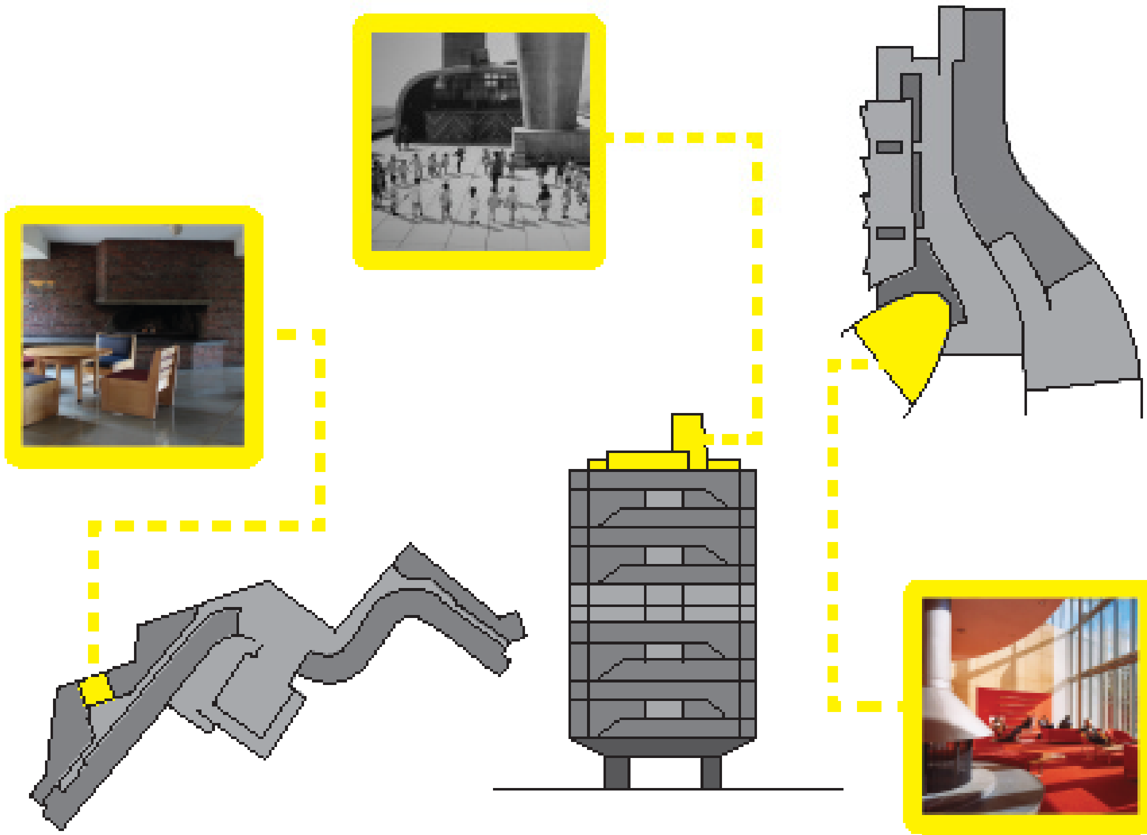

Figure 13. Existence of the hearth

community, and acts as a centralizing node.

In both the Baker House and the Smith Campus Center the manifestation of the hearth are in the actual form of functioning fireplaces. These spaces fulfill the traditional goal of a hearth in providing a warm and cozy gathering place for various sized communities. (Figure 13) The Baker House hearth is a small diversion from the main corridor yet remains connected and open to the main corridor, allowing interaction between those gathering at the hearth and passers by. This placement allows for an intimate gathering space within the communal circulation corridors.

The hearth in the Smith Campus Center is similar to the Baker House in that it is located as a diversion from the main circulation path. The Campus Center hearth is a much larger space than that of the Baker House, and allows for varied community sizes within the space. The Smith hearth plays a very important formal role within the building; instead of fitting the hearth into the predominant space and form, the hearth is contained in a formally independent space which reads as a separate yet connected structure. In addition to being formally distinct, the hearth area is treated with specific finishes and colors for further differentiation from the rest of the spaces. The Smith hearth is also very much a passive solar space, creating a warm and inviting space whether there is a fire burning or not. This allows the space to act as the central hearth, without depending on the traditional fireplace to create the alluring warmth.

The existence of a hearth in Unité d'Habitation is a bit more abstract and interpretive than the Baker House or Smith Campus Center. Unité does not contain actual fireplaces, either in a centralized community manifestation as in Baker or Smith, or within the individual apartments. I choose to view the open roof area as the hearth of Unité. The roof area is a community space, containing mostly recreation and leisure areas, which allowed the residents a space to interact. Like the hearth of the Smith Campus Center, the Unité roof is very much a formal element of the building, and creates an environment which is unique to the building. The roof area is a central focal point of the community, allowing various community sizes and connections. By offering these central node of community the roof takes on the qualities of a traditional hearth.

Individual And Collective Spaces

The relationship between the collective spaces and the individual spaces is an important factor in the activation of both types of space, and in the interaction of the community members. The relationship between these space types varies between my chosen precedents, and has an important impact on how the residents and users interact with each other and the community as a whole. As the level of separation between the individual and collective spaces changes, the level passive of involvement of the individual within the community will also change. This could have a great effect on the strength of the community, and the level of support the community provides.

Though all my precedents provide both collective and individual spaces, the level of direct connection between these spaces varies. In both the Baker House and Unite, the larger community spaces are separated from the individual spaces (apartments). Both of these examples have shared corridors directly connected to the individual spaces, but these corridors only provide limited gathering spaces and have no direct connection with the individual spaces other that a door. This connection can be seen in the figures, yellow and orange indicate collective spaces and gray indicates individual spaces. By placing the larger community gathering spaces far from the individual spaces, it allows the residents to choose if they want to interact with the larger community, reducing the amount of passive community interaction.

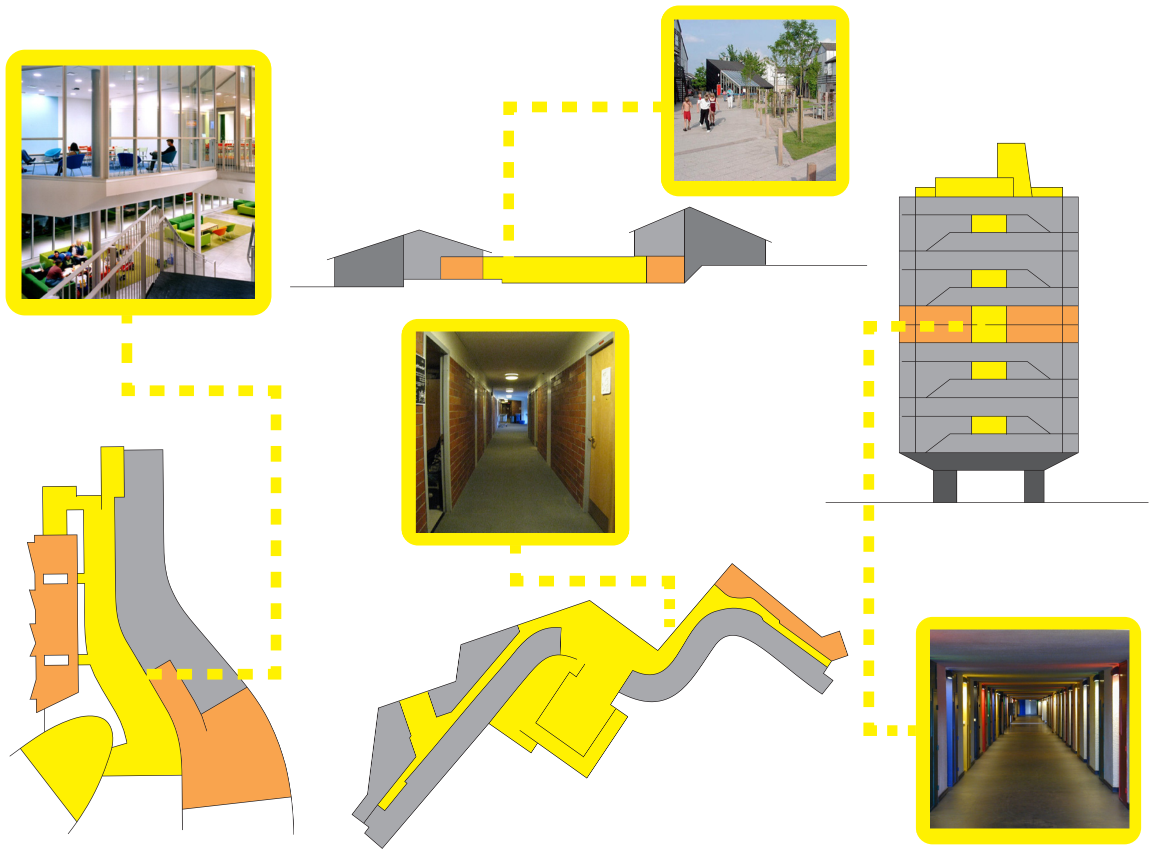

Figure 14. Relationships between the collective and individual spaces

In the Smith Campus Center the relationship between the individual spaces and the collective spaces is much stronger, and the barriers between them less defined. This can be seen in the plan of the Smith Campus Center, the yellow and orange designating the collective and the gray designating the individual. Though the Smith Campus Center has a different program, in that it is not residential, it does provide spaces designed for the individual or small group. Throughout the Campus Center these spaces are intertwined and have direct connections with both the larger collective spaces and the main corridor space.

This strong spacial relationship between the collective and the individual is possibly the most important driving factor in the design of cohousing

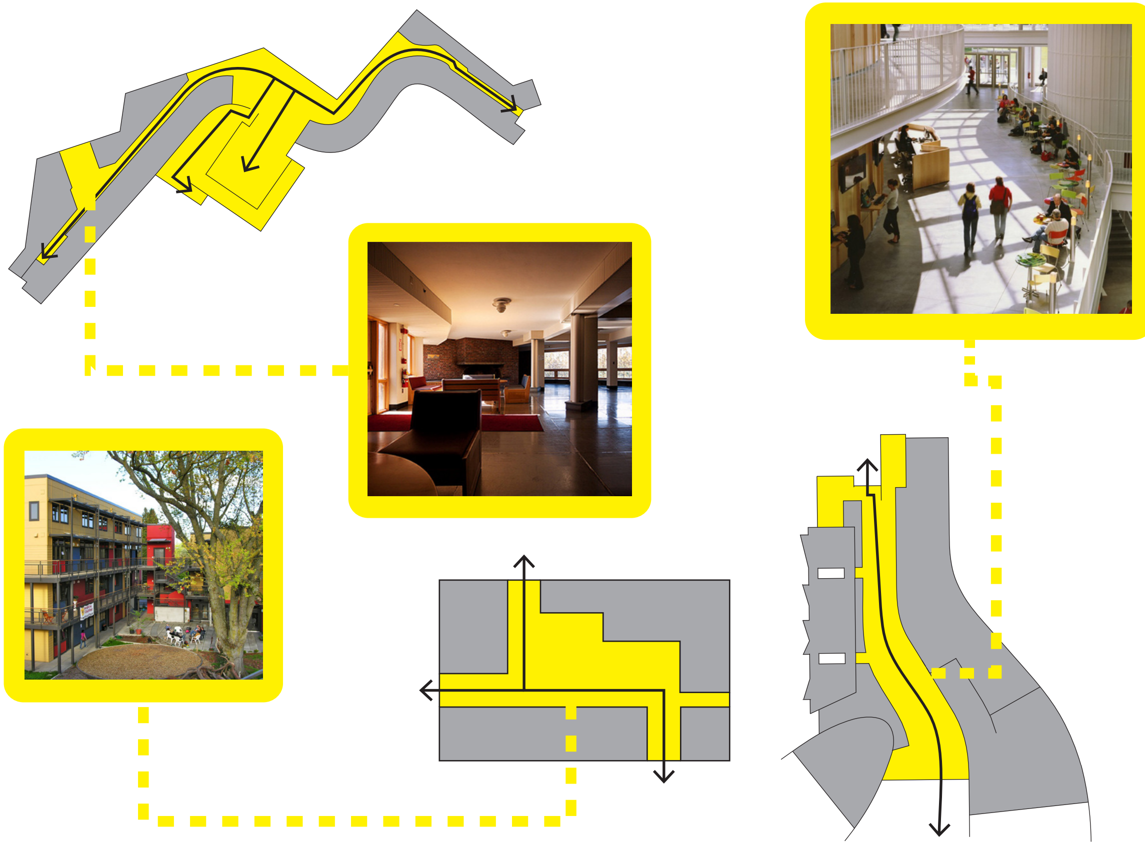

Figure 15. Activation of shared space

neighborhoods. By removing the barrier between these two types of spaces the residents are forced to interact more frequently, therefore building the strength of the community. Cohousing neighborhoods are typically designed with the more public living areas (kitchen, living room) open to the community areas, creating interaction between the individual and collective spaces.

Activation Of Collective Spaces

Closely related to the previous concept of individual and collective space relationships is the activation of collective spaces. In order to assure the consistent use and usability of a collective space it must be active. A great way to activate these spaces can be seen in all of my precedents, which is integrating the spaces with the circulation of the building or site. A prominent example of this activation can be found in many cohousing site plans. The typical cohousing layout combines the central collective space with the main circulation, to create a consistently active environment.(Figure 15)

The plan of the Smith Campus Center shows the main circulation through the center of the building, with gathering spaces loaded on either side. An important characteristic of this design is the existence of gather spaces within the main circulation path as well. Similar to the cohousing layout, the intermingling of gathering collective space and circulation makes for an active gathering space. The gathering spaces not directly in the path of the circulation have open visual contact with the main corridor, which helps in activation.

The Baker House achieves space activation by channeling the main circulation path through and around the gathering spaces. Similar to the Smith building, this circulation design allows for activation of these collective spaces, and therefore greater use of the spaces.

Gradient Of Community Sizes

Spaces to support a variety of community sizes is vital in supporting a diverse and thriving overall community. There must be spaces that can support just one or two residents working together, or a large gathering of the entire

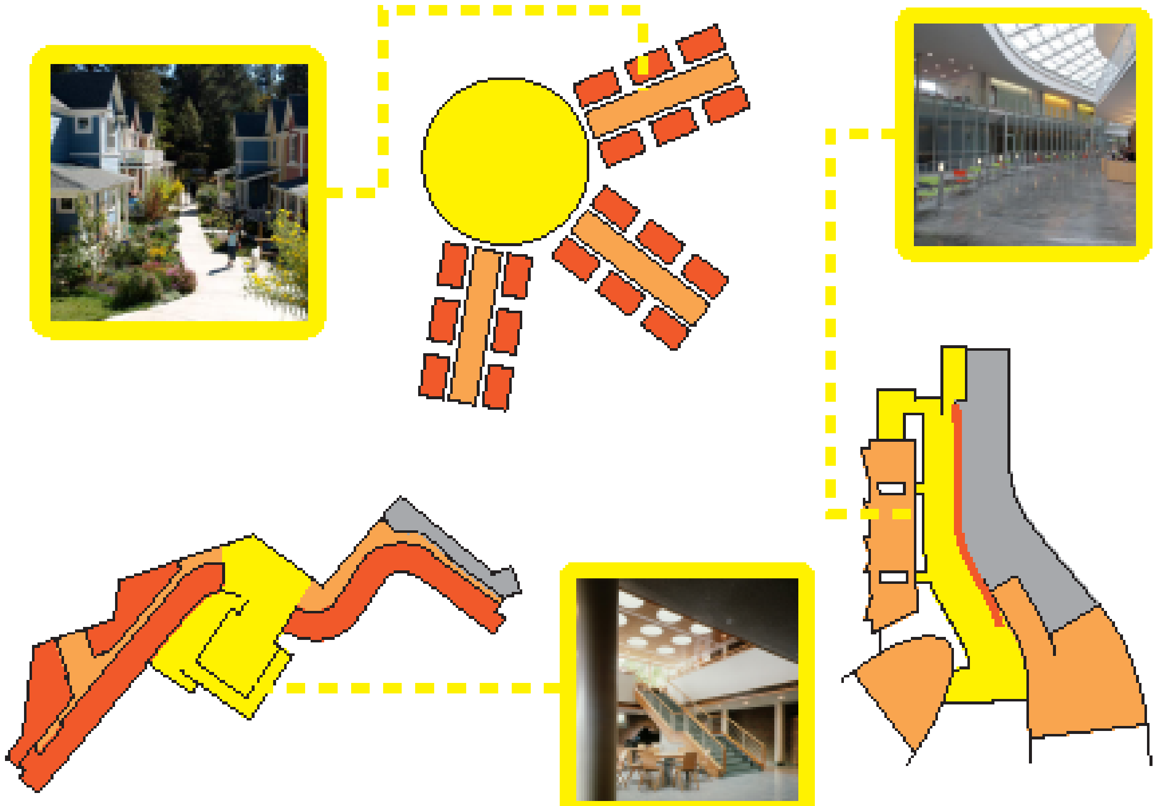

Figure 16. Gradient of community sizes

community. This variety can be seen in all my precedents, some more successful than others (Figure 16). Many cohousing plans pay particular attention to community sizes in their site plans: individual and family spaces in the private unites, medium size spaces between units, and typically and central gathering space for the entire community. The Baker House has a clear hierarchy of space sizes, ranging from the private dorm rooms, to medium size gathering spaces placed on the north side of the corridors, and a large central dining and gathering space in the center of the building. The plan of the Smith Campus Center has a very clear delineation of community sizes, with its main large corridor acting as the dominant space, loaded with medium sized spaces on either side. One very successful aspect of the Campus Center design is the existence of small one or two person tables located within the central circulation space. This design mixes

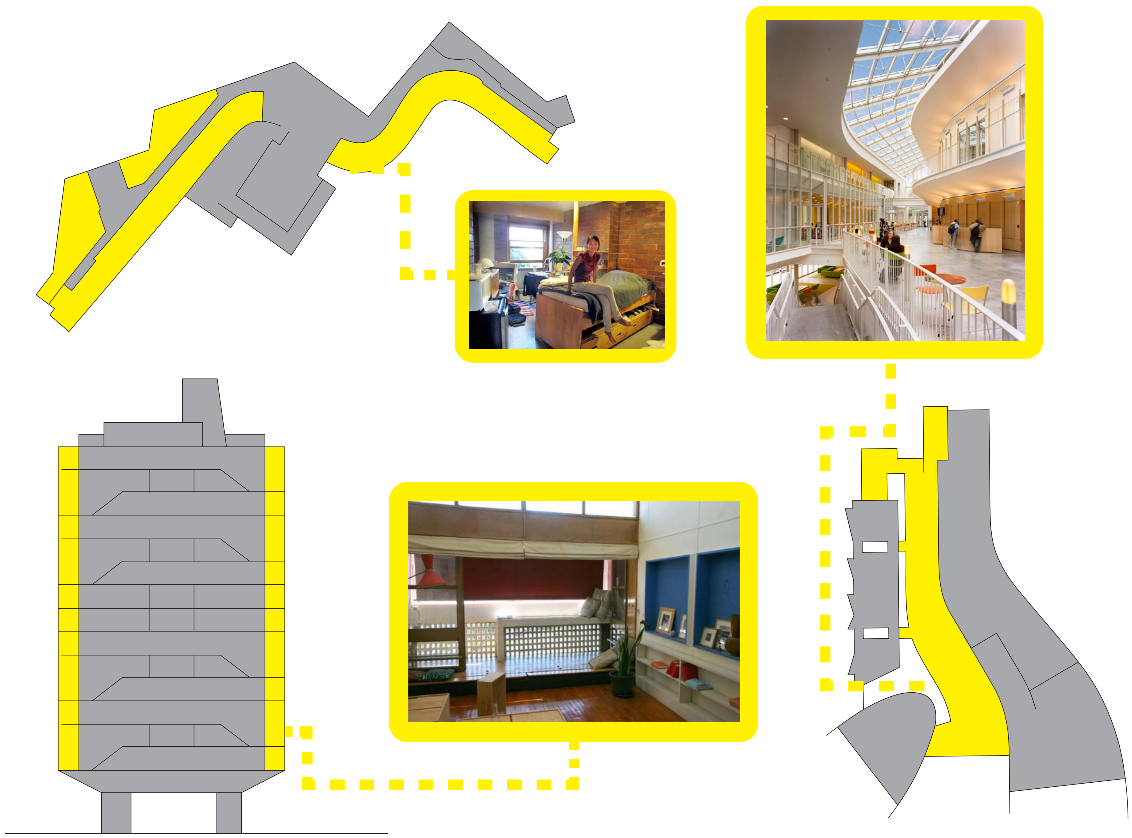

Figure 17. Democratic access to light and sun

the small community spaces with the large spaces, creating a vibrant atmosphere and helping to activate the entire space. The Smith Campus Center also places very visible medium sized spaces adjacent to the central corridor, allowing visibility into all the spaces, aiding in the comfort and security of the building.

Democratic Exposure To The Sun

The idea that all inhabitants in a building should have equal access to the sun and light can be seen clearly in the designs of the Unite and the Baker House. (Figure 17) This idea was an important driver of the famous building section of the Unite, which allows all units both northern and southern exposure. Aalto cites this principle as a driving factor in his design of the Baker House as well, leading to a long meandering building with a large south face. All the dorm rooms in the Baker House are loaded on this southern face, allowing for each resident to have the same flood of natural light. This concept can also be clearly seen in most of the other major projects by Aalto and Le Corbusier.

The design of the Smith Campus Center is also driven largely by the presence of natural light but because it isn't a residence, the resolution is different that the other projects. The outcome of the Campus Center design is a space that is flooded with light via the transparent ceiling of the main corridor. This design allows for an even exposure both throughout the corridor, but also allows the light to spill into the adjacent smaller spaces. In addition to the transparent roof, the Campus Center opens to the south with a large glazed wall, most notable in the hearth room allowing the sun to warm the space.

In the design of my project, these driving themes (hearth, space types and sizes, space activation, and exposure) will act as my guides. By incorporating these themes on multiple scales and levels, my project will be able to support both the individual needs of its residents as well as the development of a strong community. The hearth will help to center the community, and offer an anchor and focus to the project both spatially and theoretically. The variety of active space types and sizes will support the individuals with the variety of community sizes and groups helping to foster an environment of interaction and support. The equality of exposure in spaces for the individuals will promote healthy and democratic living spaces for all the residents, leading to a happy and satisfied population.

CHAPTER 6

SITE

The project site is located on the outer perimeter of the campus of The University of Massachusetts Amherst. The site is on the corner of Butterfield Terrace and North Pleasant Street, midway between the center of Amherst and the center of campus (Figure 20). North Pleasant Street is the main thoroughfare between the campus and Amherst center, with a steady stream of both vehicular and pedestrian traffic. The site has a gentle slope, dropping about 26' from Butterfield Terrace on the east side to North Pleasant Street on the west (Figure 19). Since the location is central to both the campus and the town, it provides the added possibility of the project to act as a gateway to campus and a connection between the two entities. This location also makes for convenient accessibility to services located in town and on campus.

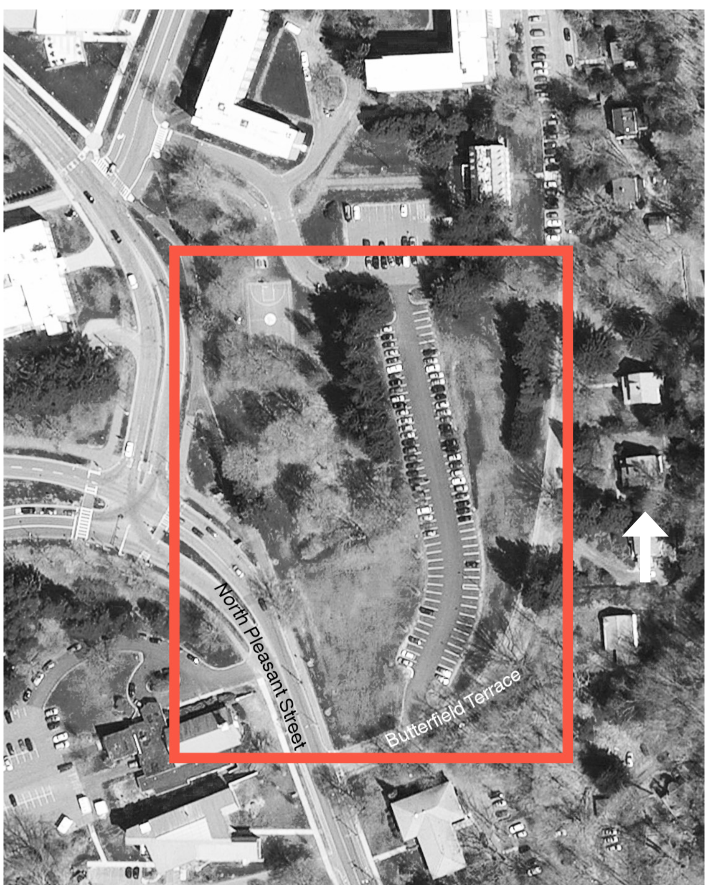

Figure 18. Site

Currently the site is home to a parking lot, grass, and a few mature trees. In the past it was home to the

Figure 19. Site section.

Campus Apartments, which was a housing complex for graduate students. These apartments were demolished in the last decade due to unhealthy environmental factors including asbestos and mold issues.

CHAPTER 7

CONCEPTUAL DESIGN

The conceptual design process was driven by the desire to maximize the southern solar exposure. I started by making small paper models of the site and extruding linear forms (Figure 20) . The forms were spaced far enough away from each other to allow full winter sun, avoiding any shadows from adjacent buildings. The next step was creating an articulation in the building forms with the intention of creating some overlapping space that could act as shared space in the program. (Figure 23)

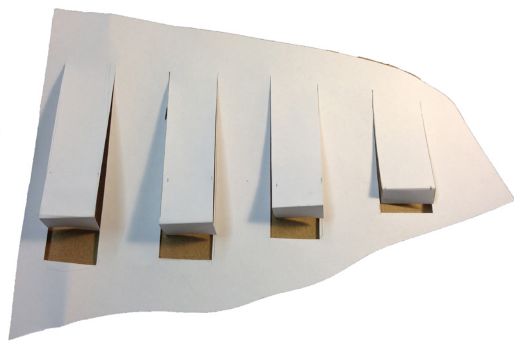

Figure 20. Paper study of linear forms.

In addition to the exploration of building forms and locations, I also started exploring the circulation paths within the site, both as a way to help develop the building forms, and as a way to drive the layout and design of the site itself. (Figures 22,23,24) Through the circulation explorations the site was to get divided into multiple levels, or partial levels. (Figures 23, 24)

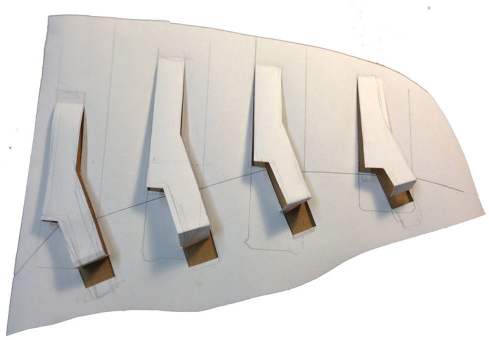

Figure 21. Paper study of broken linear forms.

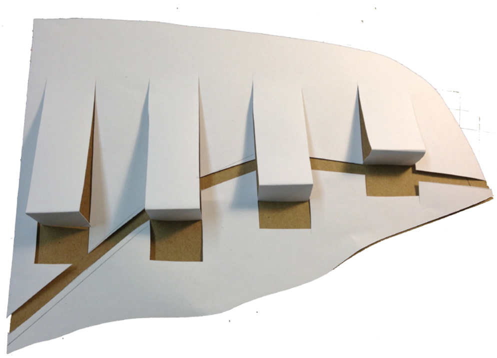

Figure 22. Paper study of circulation path.

Figure 23. Study model with site manipulation.

Figure 24. Circulation path studies.

Figure 25. Shadow study.

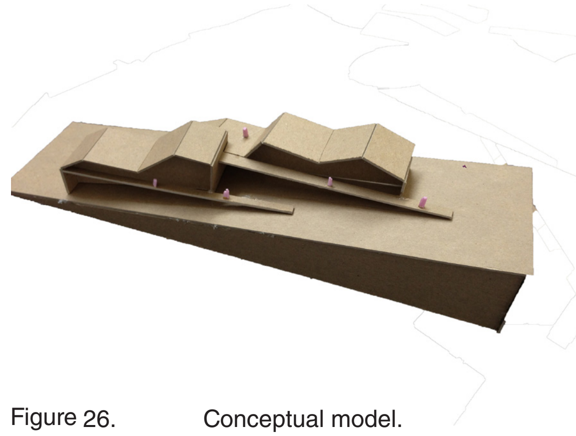

Figure 26. Conceptual model.

The site is divided into three separate levels, to create usable flat space and define usage. The first level is equal to that of North Pleasant Street, allowing for a public usage that would be experienced by passing pedestrians as well as the residents living in the housing. The second level is 12’-0” above the street level, allowing for an intermediate level of privacy and usage. This level allows for open gathering spaces to be used both by the residents and outside community members. The third level creates a more private space dominated by garden and lawn space, to be used predominantly by the residents. The third level also allows for underground parking on the second level.

The layout of the buildings in the final conceptual model reflect the earlier iterations, as well as my original concept themes. Notably, I removed the central

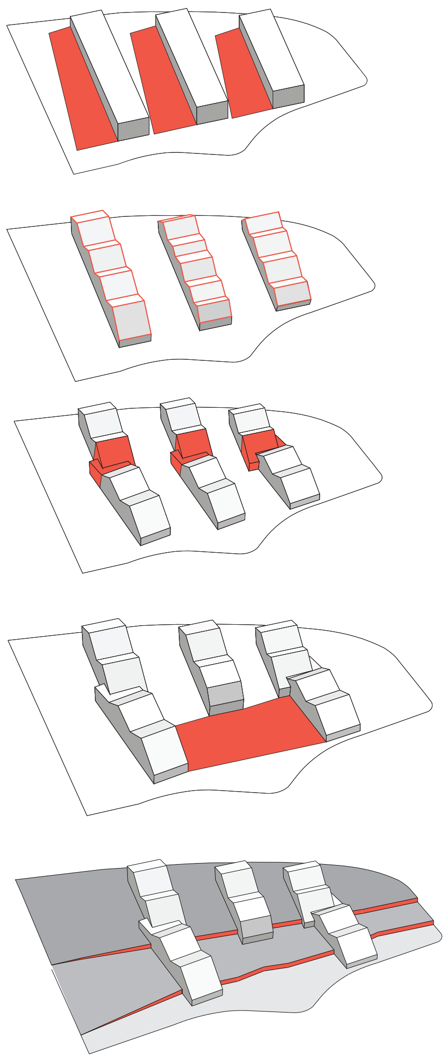

Figure 28. Process Diagrams

building segment in order to open a central space. This open central space is what I consider to be the hearth of the site, an anchoring node. The other two buildings retain both of their segments, which create an overlaped space. This overlap will define the shared central spaces and vertical circulation.

Finally, I worked on the roof forms of the building in an attempt to activate the forms and acknowledge the slope of the site. The undulating roof forms came from the image of a box tumbling down the hill. I wanted the buildings to express the idea that the buildings were tumbling down the hill, even though the actual slope was being

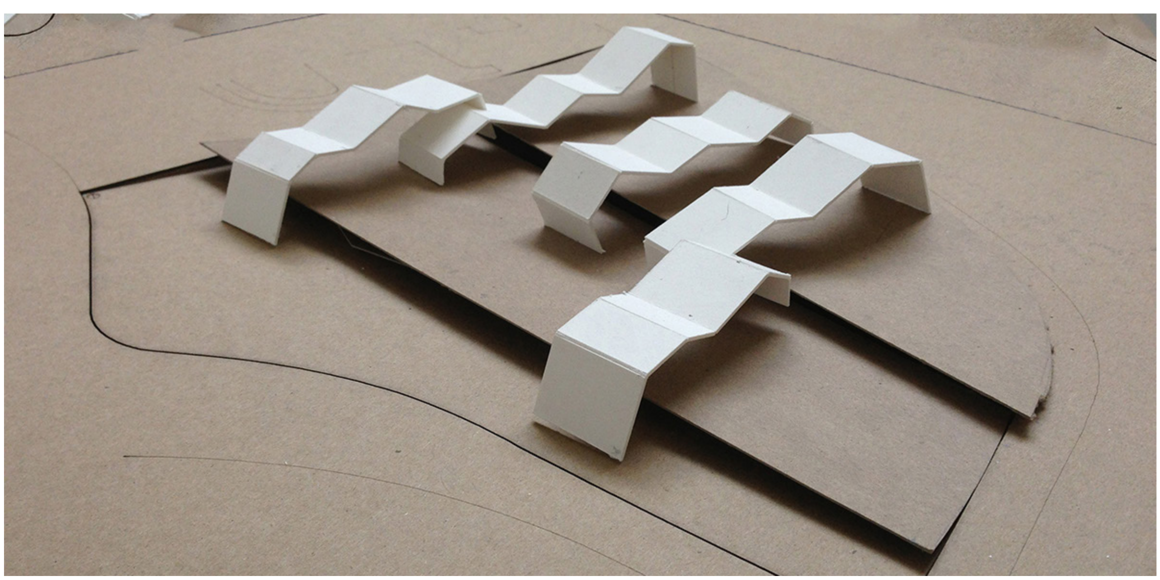

Figure 27. Final conceptual model

transformed into distinct levels. This site construction can be seen in an early conceptual model as well as the final conceptual model (Figures 26, 27).

CHAPTER 8

SITE DESIGN

Much of the design development process was focused on the development of the landscape and the integration of the buildings to the landscape. The goals of the landscape design were consistent with the goals of the building design, which is the support of community. I carried the main conceptual themes into the landscape at various scales as well. The design was driven by the creation of the three levels, and the interaction and use of the levels by the residents and public. The design was also driven by the nature of the construction, which essentially made the entire site a green roof. Because the site would have virtually no permeability for storm water, rain gardens became a major driver of the site

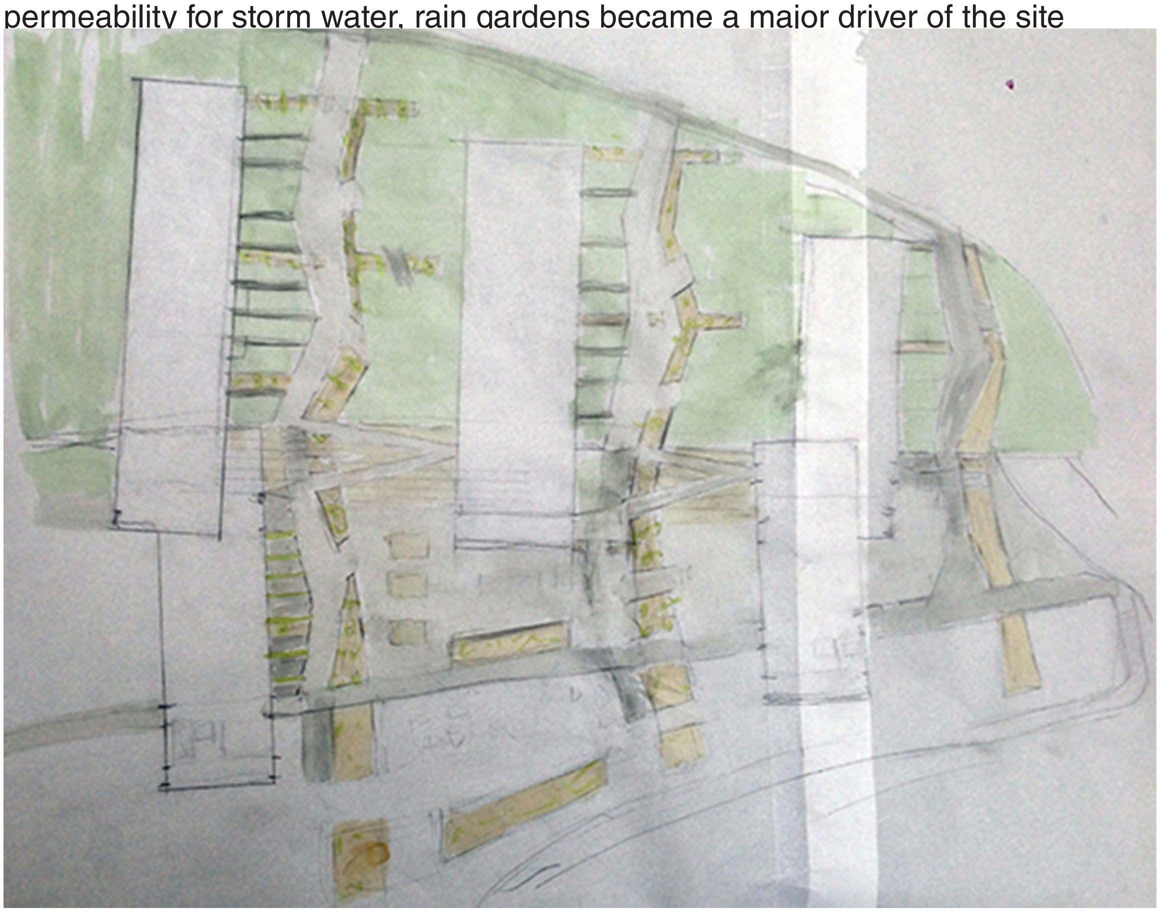

Figure 29. Landscape sketch

Figure 30. The Edge Park- Brooklyn, NY - W Architecture and Landscape Architecture

design. In addition to the practical role of rain gardens, I used them to define edges and create buffers within the site, and create spaces for gathering. (Figure 29)

An important precedent in the landscape design was the Edge Park in Brooklyn, NY designed by W Architecture and Landscape Architecture(Figures 30, 31). The design of this park creates a variety of spaces and conditions using both hardscape and softscape conditions. The variety of spaces in the park support different sized community groups: from a few

Figure 31. TheEdgePark-Brooklyn,NY-WArchitecture

people gathering at a bench, to a small group gathering on a lawn space. I found the geometric divisions of the spaces, and general design language of the park to be consistent with my early sketches and ideas for my landscape.

CHAPTER 9

FINAL DESIGN

The 1st level plan is dominated by services and spaces for the both the surrounding communities and the residents (Figure 33). The perimeter of the site is marked by the sidewalk and North Pleasant Street. Two of the buildings extend onto this first level, creating retail spaces as well as vertical circulation to the upper levels. Between the buildings and slipped under the 2nd level is retail/cafe/restaurant space. These spaces are separated from the street by a grove of trees, allowing for outdoor dining spaces that would attract the passing pedestrians on their walk to and from campus. In addition to the vertical circulation within the buildings, there are two sets of outdoor stairs that lead up to

Figure 32. Full site plan

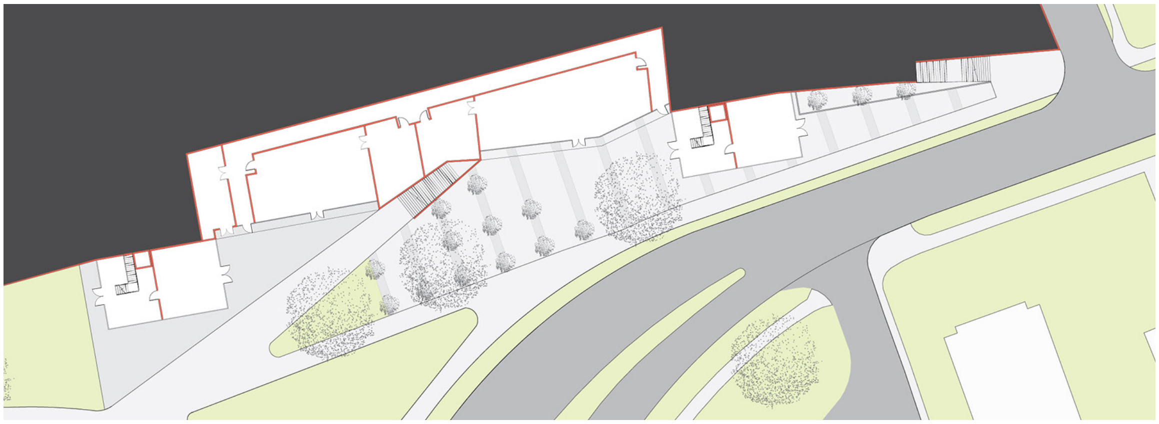
Figure 33. 1st level plan

the second level.

The second level of the project is dominated by a central amphitheater and hardscaped gathering spaces (Figure 35). This level is designed to support the whole community if necessary, or allow outside community members to enjoy the space. Adjacent to the amphitheater is an indoor performance space, which allows large gatherings when the weather doesn't support outside activities. The wall between the indoor performance space and outdoor amphitheater opens to


Figure 34. Amphitheater

connect the spaces when possible (Figure 34).

In addition to housing the indoor performance and gathering space, the second level also hosts apartments, a children's space, bike storage, and laundry spaces. There is vertical circulation (stairs and elevators) housed in the shared overlap spaces in all the buildings which can be accessed from the second level. There is also access to the underground parking in each of the shared overlap spaces on the second level. Exterior circulation from the second to the third level is handled by both stairs and ramps. In addition to the stairs, there are terraced bleachers connecting the two levels, allowing for more outdoor gathering areas supporting a variety of group sizes, from a few people to a large group.

Figure 35. 2nd level plan

The third level of the site (Figure 36) is dominated by green space, either open grassy areas or garden spaces (Figure 35). The circulation hardscape and rain gardens create a buffer between the 'front yard' gardens and the 'backyard' grassy areas. Horizontal circulation across the site is possible on the third level, as well as the second level, through the shared overlaping areas of the buildings. There is vertical circulation on the east ends of the buildings, as well as in the shared overlap central spaces. These stair and elevator towers allow access to the second level, parking area, and apartments on the upper levels.

There are three types of apartment units in the buildings: two bedroom,

Figure 36. 3rd level plan

one bedroom split, and one bedroom flat. All the units carry common characteristics, most notably a large living area on the southern side with an 11'-0" ceiling height and full glass wall. This living area opens to a 5' deep and full width balcony (Figure 41). The access to the units is on the north side of the building, which houses all the horizontal circulation to the untis. All the units are designed for universal access, with 5' corridors and accessible bathrooms. There are three ADA accessible two bedroom one-floor apartments, and all one bedroom flat apartments are ADA accessible.

The unit arrangement is defined by the section of the building, with each unit dependent on the unit above or below to allow for the high ceilinged living

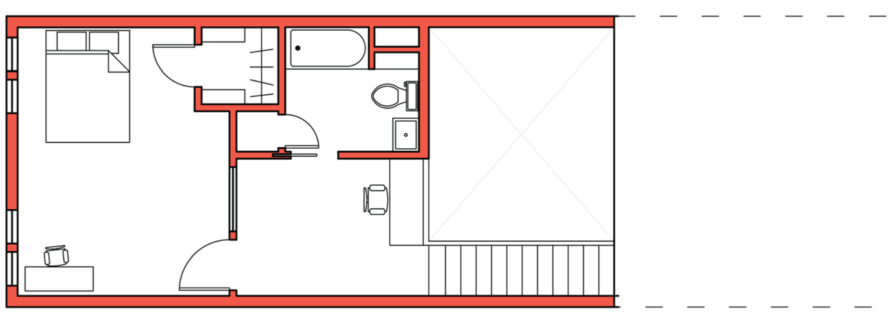

Figure 37. 2 bedroom upper floor

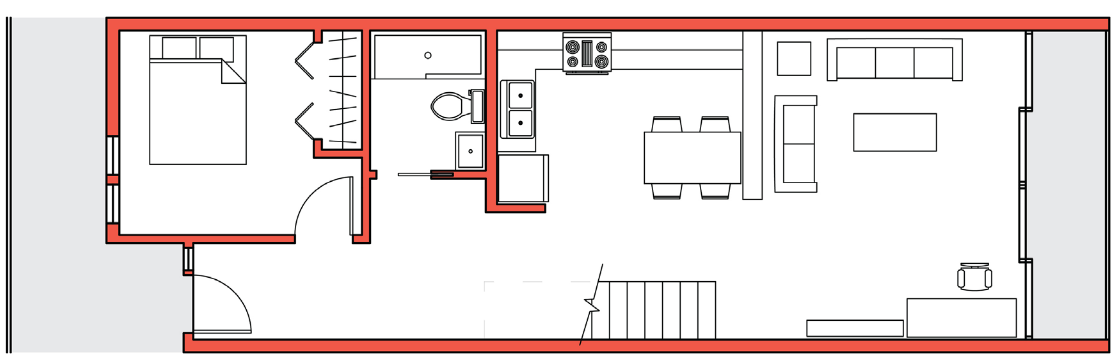

Figure 38. 2 bedroom lower floor

room space (Figure 42). The two bedroom units are two floors. The bottom floor contains a bedroom, bathroom, kitchen, dining and living areas and the second floor contains the second bedroom, a second bath and study area (Figures 37, 38). The one bedroom units both have the same plan, but are differentiated by the 4'-0" drop to the living area in the split unit (Figures 39, 40). The one bedroom flat units are located on the top floor of each building. These top-floor units have sloped cathedral ceilings, determined by the undulation of the

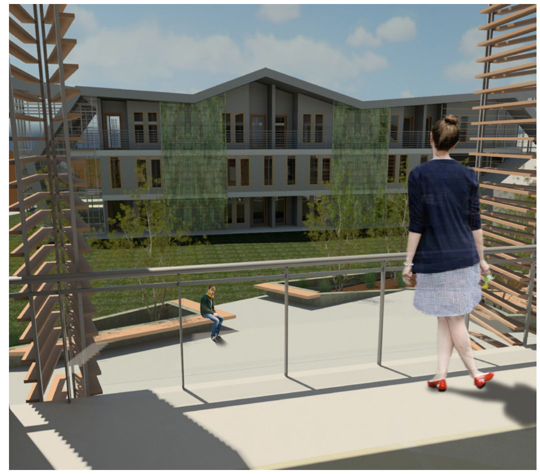

Figure 41. View from balcony.

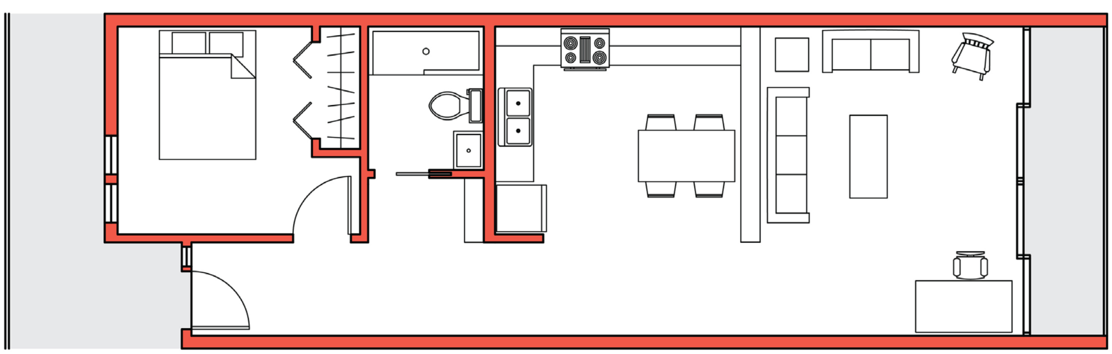

Figure 39. 1 bedroom flat

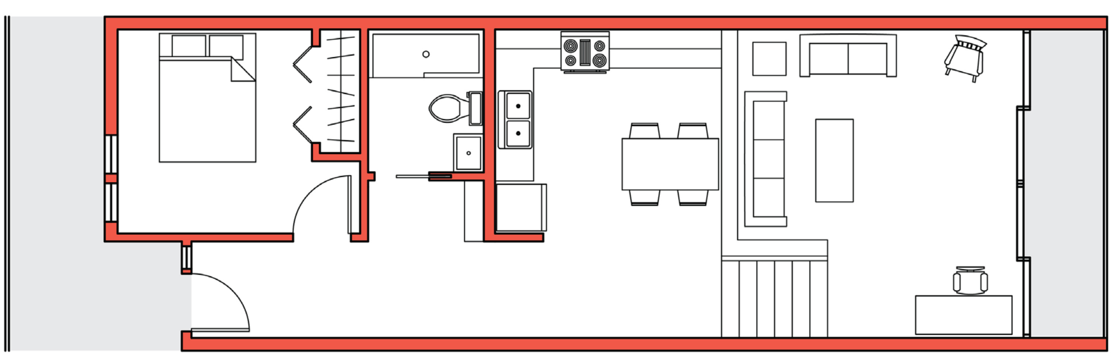

Figure 40. 1 bedroom split unit

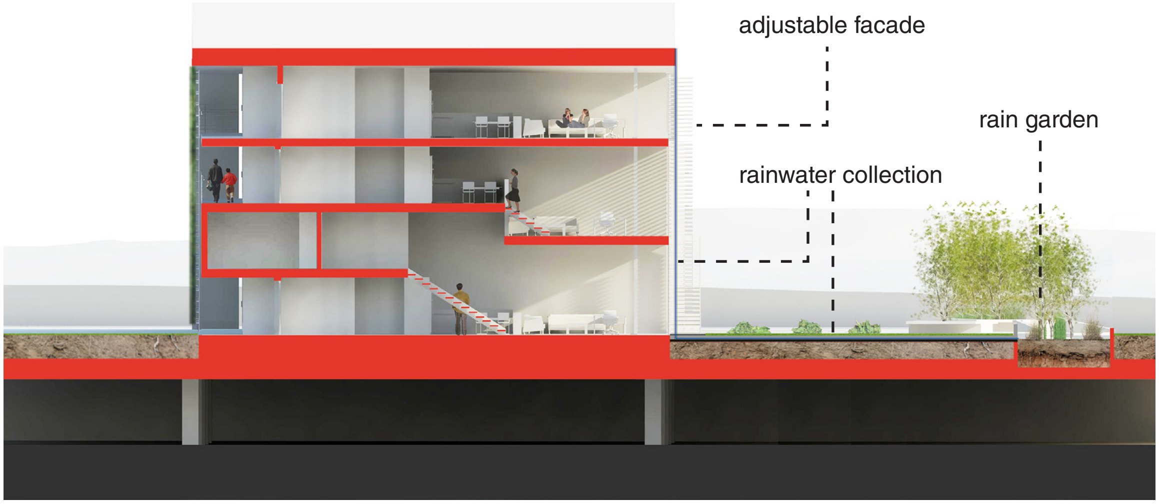

Figure 42. Building section.

roof form. Some of these top floor units also have either a full second floor, or a loft area depending on the ceiling height.

Each of the three building structures contains both apartment units and a central shared space. The central shared spaces in each of the buildings is programed differently to better promote their use by the whole community. All residents have equal and open access to all the shared spaces among the buildings.

The shared space in the central building (Figure 44) holds an indoor performance space, which could house everything from community meetings to plays and music. This space opens to the outdoor amphitheater when the weather permits via a large pivoting wall (Figure 41). These gathering spaces are the hearth of the community and the site, centering the project both spatially and programatically.

Figure 44. Building section- central building

The shared space in the northern building (Figure 43) is the largest and contains the most diverse programming (Figure 45). The first level of the space is dominated by bike storage, workshop, and laundry, as well as general gathering, lounge and study space. The second level hosts the shared community kitchen and dining areas, including the large outdoor covered porch (Figure 46). Continuing vertically, the space contains a variety of terraced balconies which vary in size. These terraces are unprogrammed flexible spaces that could support many different activities from a small study group to a yoga class. All the terraces are connected to the vertical circulation and the horizontal circulation to the apartment units, which helps to activate the spaces and promote chance encounters among the residents.

The shared space in the southern building (Figure 47) is dominated by a designated children's space. This space is designed to support the resident families, and promote a sense of community, and support for the parents. The

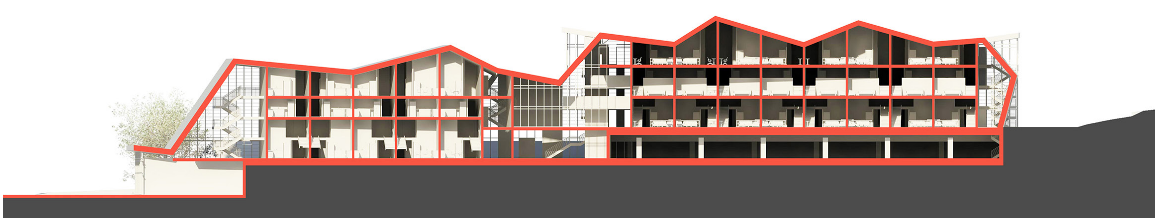

Figure 43. Building section- northern building

Figure 45. Building section showing shared spaces.

indoor space opens to a outdoor playground on the second level, which takes advantage of the elevation change between the second and third levels. The children's area could host either individual parents and their children, or a co-op type daycare among the residents.

The facade of the buildings is designed to play a supporting role in the project, without dominating the design and language. The facade on the southern sides of the buildings is made up of two types of louvered screens (Figure 48). Screening the public areas, the louvers are spaced 16" apart, reducing glare

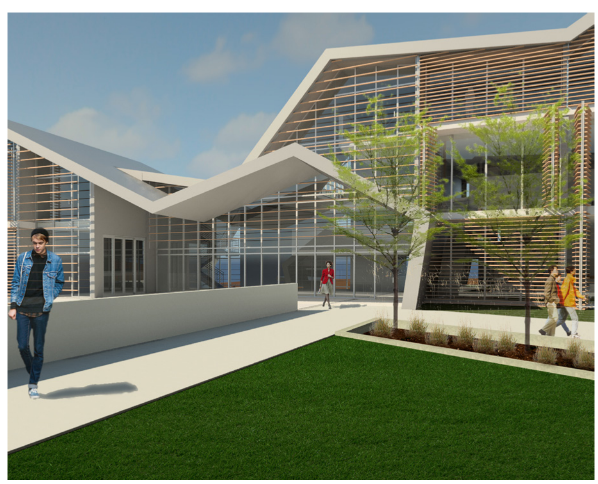

Figure 46. Covered porch area.

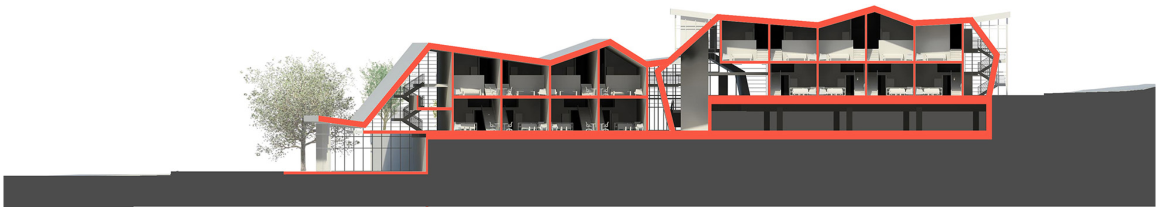

Figure 47. Building section- southern building

when the sun is low. Screening the units, the louvers are spaced 8" apart, and form operable shutters. The shutters allow the residents to either open their apartments fully to the sun, or partially block the sun if desired. In addition to allowing the residents control over their environment and privacy, the shutters create an active and kinetic facade expressing the existence of the individuals living within.

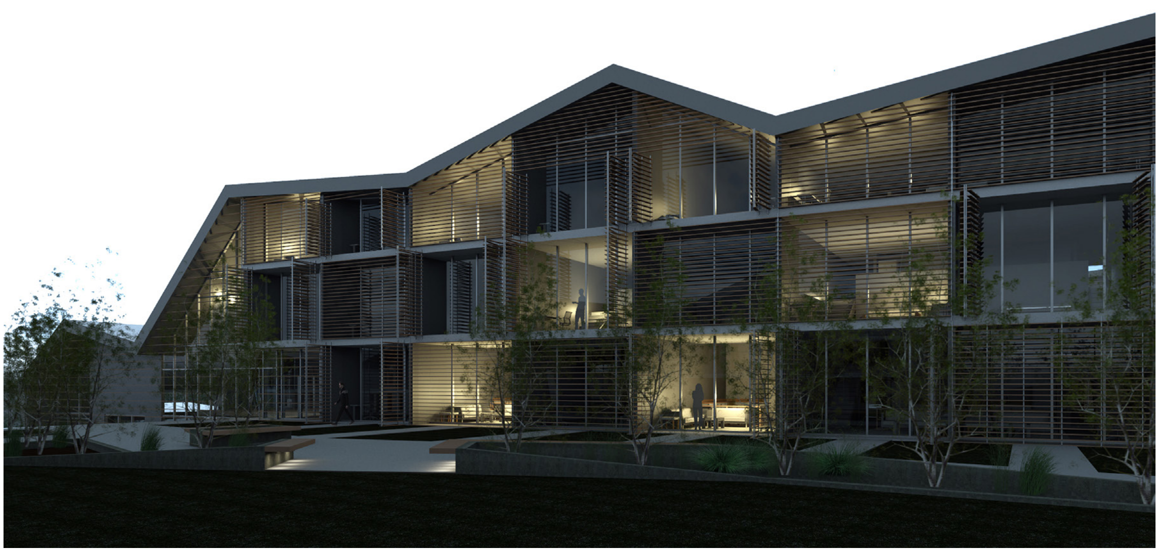

Figure 48. Evening render- central building.

CHAPTER 10

CONCLUSION

Through my initial research and precedent studies I developed key conceptual design themes which I used to guide the design for a place of dwelling for graduate students. The goal of these themes, and therefore of the entire project, was to design an environment that would support the whole community. By supporting the community and its development and evolution, the project also supports the individual residents within by allowing them to live a more fulfilled life during their time as graduate students.

The themes can be seen at muliple scales throughout the project, from the design and layout of the site to the floor plans of the units. Democratic solar exposure not only dictated the building forms and layout, but also drove the design of the building sections and floor plans. This resulted in all apartment units receiving the same southern exposure. The hearth is apparent in the central

Figure 49. Final model

amphitheater anchoring the site, as well as in the open high-ceiling living rooms creating an inviting gathering space withing the apartments. The spaces for the individuals and community are separate, but directly connected via the circulation paths, helping to promote the interaction of the residents and activate the variety of shared spaces. Finally, the project supports the development of community by providing a variety of spaces for community use. There are spaces both inside and outside that support the gathering of community, whether that community is two people having a private conversation, or forty people having a party. In the final resolution of these themes, this project presents a vision of graduate housing at the University of Massachusetts Amherst that supports the individual residents through supporting their community.

Figure 50.		Outdoor shared space on 3rd level.

APPENDIX A

HARVARD GRADUATE HOUSING

Harvard University Graduate Student Housing

10 Akron Street

Total construction cost: $56 million

Gross square footage: 115,000 sq.ft.

Completion date: July 2008

Architect: Kyu Sung Woo Architects Inc.

The graduate student housing building at 10 Akron Street, designed by Kyu Sung Woo (2008) is a contemporary interpretation urban mass housing. The structure is designed to house graduate students in either single or double occupancy apartment style units, and to provide those students with ample shared space for studying and lounging. The structure acts as a gateway on the southern end of the campus between the surrounding residential neighborhoods and the Peabody Terrace undergraduate housing complex. In addition to providing housing, 10 Akron Street has an underground parking structure, and a public courtyard which opens south to Riverside Park. The 10 Akron Street project is part of an effort by the university to house 50 percent of its graduate, professional and doctoral students. This goal is part of an overall effort by the university to reduce the strain and pressure on the local housing market, as well as provide quality housing to the students.[1]

In the design and layout of the structure, Woo made many efforts to reference the surrounding buildings and neighborhoods. The plan of the building is a “U” shape, surrounding a central courtyard and opening to the south. The building is split into two predominant sections, a three story low-rise section on the eastern edge, and a seven story high rise section which wraps around the north and west sides.

The eastern leg of the building running along Banks Street is lower than the rest of the structure, and clad in a light gray wood. This low-rise portion is a nod to the neighborhood on the opposite side of Banks Street, which is made up of low-rise traditional multifamily structures. Protruding from the exterior wall on this east face are contemporary interpretations of bay windows, rising the full three stories of the structure. This feature is again informed by the multifamily structures directly across the street, which all have full height traditional bay windows.

The north side of graduate housing building, which lies on Akron Street, is directly opposing Peabody Terrace. The facade of this seven story segment is clad in red brick with protruding fenestrations. The protruding blocks of windows are similar to those on the east side, but are in wider groups and read as more

1 “Kyu Sung Woo - Harvard Residence at 10 Akron Street.” Web. 5 May 2012.

cube-like forms. These square/cube forms are referencing the facades on the various Peabody Terrace buildings, which are composed of cube like gridded protrusions. This same red brick and protruding fenestration facade is continued on the west elevation as the building turns to follow Memorial Drive.

The base of the 10 Akron Street building is composed of double height curtain wall along with a mix of natural wood siding and large limestone blocks. The main entry into the building is located in the middle of the north segment, and is part of a gateway opening which reveals a view of Peabody Terrace from within the main courtyard. On the corners of the building, behind the double height curtain wall are two story study areas, allowing a sense of community and collaboration for the occupants. The southwest corner of the building is a dominated by a large cantilever, which was designed to retain the street level sightlines to the river from the neighboring buildings (Figure 11).[2]

The first and second floors of the high-rise segments of the building are populated with a variety of shared communal spaces, and large open stairways. These spaces allow for a communal atmosphere on the lower levels, and allow for an open and active image of the building for the pedestrian. The lower levels of the low-rise segment and the upper levels of the high-rise segments consist of a double loaded central corridor, with residential units on each side. In addition to the residential units on these upper floors, small shared spaces are distributed

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2 "Kyu Sung Woo - Harvard Residence at 10 Akron Street." Web. 5 May 2012.

throughout to allow for spontaneous encounters.

There are two types of apartments in the 10 Akron Street structure: single studios, and shared doubles. The single studios are a basic rectilinear shape, with a galley kitchen and small bath located on the interior side opening up to one large room. The shared double occupancy apartments consist of a small galley kitchen a bath area, which is closed off from the two private spaces (Figure 12). The room plans are simple and straightforward, much like Le Corbusier's ideal unit: "the medieval monk's cell with its geometric clarity and associated rectitude."[3] Unlike the rooms in Le Corbusier's Swiss Pavilion where each room has the same southern exposure, the rooms in 10 Akron Street have varied exposures depending on their location in the building. Though the rooms may have differing exposures, they all have large windows allowing for a great deal of natural light.

In the design of the 10 Akron Street graduate housing structure, Woo used some of the important principles developed by the early modernist mass housing, notably housing by Le Corbusier and Alvar Aalto. Both Le Corbusier and Aalto were intent on acknowledging the needs of both the individuals, and the needs of the community living within the structure. Similar to Aalto's Paimio Sanitorium (1928-33), Woo's building uses a simple repeating residential unit for the private individual spaces.[4] These simple units suit the needs of the individuals by

3 Trencher Page 252

4 Trencher Page 253

providing ample private space with positive environmental conditions, and also allowing for varied exposures and occupancy depending on the desires or needs of the individual. In addition to these necessary individual spaces, Woo provides shared space for the collective community. Woo provided both large defined communal spaces on the first two floors of the high-rise segments, and smaller spontaneous spaces distributed throughout the residential floors. These spaces allow for more formal meeting and studying areas, as well as the informal smaller scale intimate areas. Both of these areas assist in creating a community for the residents within the building.

Although Woo provided shared space for the collective within the building, that shared space is limiting in what it can support. The spaces are designed as study and lounge spaces which only accounts for one, albeit important, aspect of the lives of the residents. Because of the limited uses of the areas, the residents can only build their community based on their shared academics, and limited social engagement. What additional community might be formed had the architect included a shared kitchen and dining area? What other collective spaces might help form a bond between the residents that would assist them in their lives beyond academics?

APPENDIX B

CODE ANALYSIS

310.1 Residential Group R.

Residential Group R includes, among others, the use of a building or structure, or a portion thereof, for sleeping purposes when not classified as an Institutional Group I or when not regulated by the International Residential Code.

BOARDING HOUSE. A building arranged or used for lodging for compensation, with or without meals, and not occupied as a single-family unit.

CONGREGATE LIVING FACILITIES. A building or part thereof that contains sleeping units where residents share bathroom and/or kitchen facilities.

DORMITORY. A space in a building where group sleeping accommodations are provided in one room, or in a series of closely associated rooms, for persons not members of the same family group, under joint occupancy and single management, as in college dormitories or fraternity houses.

310.4 Residential Group R-2.

Residential occupancies containing sleeping units or more than two dwelling units where the occupants are primarily permanent in nature, including:

TABLE 503—continued ALLOWABLE BUILDING HEIGHTS AND AREAS[a, b]

GROUP		TYPE OF CONSTRUCTION								
		TYPE I		TYPE II		TYPE III		TYPE IV	TYPE V	
		A	B	A	B	A	B	HT	A	B
	HEIGHT (feet)	UL	160	65	55	65	55	65	50	40
	STORIES(S) AREA (A)									
M	S A	UL UL	11 UL	4 21,500	2 12,500	4 18,500	2 12,500	4 20,500	3 14,000	1 9,000
R-1	S A	UL UL	11 UL	4 24,000	4 16,000	4 24,000	4 16,000	4 20,500	3 12,000	2 7,000
R-2	S A	UL UL	11 UL	4 24,000	4 16,000	4 24,000	4 16,000	4 20,500	3 12,000	2 7,000
R-3	S A	UL UL	11 UL	4 UL	4 UL	4 UL	4 UL	4 UL	3 UL	3 UL
R-4	S A	UL UL	11 UL	4 24,000	4 16,000	4 24,000	4 16,000	4 20,500	3 12,000	2 7,000
S-1	S A	UL UL	11 48,000	4 26,000	2 17,500	3 26,000	2 17,500	4 25,500	3 14,000	1 9,000
S-2	S A	UL UL	11 79,000	5 39,000	3 26,000	4 39,000	3 26,000	5 38,500	4 21,000	2 13,500
U	S A	UL UL	5 35,500	4 19,000	2 8,500	3 14,000	2 8,500	4 18,000	2 9,000	1 5,500

TABLE 503 ALLOWABLE BUILDING HEIGHTS AND AREAS[a, b] Building height limitations shown in feet above grade plane. Story limitations shown as stories above grade plane. Building area limitations shown in square feet, as determined by the definition of "Area, building," per story

GROUP		TYPE OF CONSTRUCTION								
		TYPE I		TYPE II		TYPE III		TYPE IV	TYPE V	
		A	B	A	B	A	B	HT	A	B
	HEIGHT (feet)	UL	160	65	55	65	55	65	50	40
	STORIES(S) AREA (A)									
A-1	S A	UL UL	5 UL	3 15,500	2 8,500	3 14,000	2 8,500	3 15,000	2 11,500	1 5,500
A-2	S A	UL UL	11 UL	3 15,500	2 9,500	3 14,000	2 9,500	3 15,000	2 11,500	1 6,000
A-3	S A	UL UL	11 UL	3 15,500	2 9,500	3 14,000	2 9,500	3 15,000	2 11,500	1 6,000
A-4	S A	UL UL	11 UL	3 15,500	2 9,500	3 14,000	2 9,500	3 15,000	2 11,500	1 6,000
A-5	S A	UL UL	UL UL	UL UL	UL UL	UL UL	UL UL	UL UL	UL UL	UL UL
B	S A	UL UL	11 UL	5 37,500	3 23,000	5 28,500	3 19,000	5 36,000	3 18,000	2 9,000
	S	UL	5	3	2	3	2	3	1	1

Apartment houses

Boarding houses (nontransient) with more than 16 occupants

Congregate living facilities (nontransient) with more than 16 occupants

Convents

Dormitories

Fraternities and sororities

Hotels (nontransient)

Live/work units

Monasteries

Motels (nontransient)

Vacation timeshare properties

602.5 Type V.

Type V construction is that type of construction in which the structural elements, exterior walls and interior walls are of any materials permitted by this code.

Egress

1003.5 Elevation change.

Where changes in elevation of less than 12 inches (305 mm) exist in the means of egress, sloped surfaces shall be used. Where the slope is greater than one unit vertical in 20 units horizontal (5-percent slope),ramps complying with Section 1010 shall be used. Where the difference in elevation is 6 inches (152 mm) or less, the ramp shall be equipped with either handrails or floor finish materials that contrast with adjacent floor finish materials.

Exceptions:

1. A single step with a maximum riser height of 7 inches (178 mm) is permitted for buildings with occupancies in Groups F, H, R-2, R-3, S and U at exterior doors not required to be accessible by Chapter 11.

2. A stair with a single riser or with two risers and a tread is permitted at locations not required to be accessible by Chapter 11, provided that the risers and treads comply with Section 1009.7, the minimum depth of the tread is 13 inches (330 mm) and at least one handrail complying with Section 1012 is provided within 30

TABLE 601 FIRE-RESISTANCE RATING REQUIREMENTS FOR BUILDING ELEMENTS (HOURS)

BUILDING ELEMENT	TYPE I		TYPE II		TYPE III		TYPE IV	TYPE V	
	A	B	A[d]	B	A[d]	B	HT	A[d]	B
Primary structural frame[g] (see Section 202)	3[a]	2[a]	1	0	1	0	HT	1	0
Bearing walls Exterior[f, g] Interior	 3 3[a]	 2 2[a]	 1 1	 0 0	 2 1	 2 0	 2 1/HT	 1 1	 0 0
Nonbearing walls and partitions Exterior	See Table 602								
Nonbearing walls and partitions Interior[e]	0	0	0	0	0	0	See Section 602.4.6	0	0
Floor construction and associated secondary member (see Section 202)	2	2	1	0	1	0	HT	1	0
Roof construction and associated secondary members (see Section 202)	$1^1/_2$[b]	1[b,c]	1[b,c]	0[c]	1[b,c]	0	HT	1[b,c]	0

For SI: 1 foot = 304.8 mm.
a. Roof supports: Fire-resistance ratings of primary structural frame and bearing walls are permitted to be reduced by 1 hour where supporting a roof only.
b. Except in Group F-1, H, M and S-1 occupancies, fire protection of structural members shall not be required, including protection of roof framing and decking where every part of the roof construction is 20 feet or more above any floor immediately below. Fire-retardant-treated wood members shall be allowed to be used for such unprotected members.
c. In all occupancies, heavy timber shall be allowed where a 1-hour or less fire-resistance rating is required.
d. An approved automatic sprinkler system in accordance with Section 903.3.1.1 shall be allowed to be substituted for 1-hour fire-resistance-rated construction, provided such system is not otherwise required by other provisions of the code or used for an allowable area increase in accordance with Section 506.3 or an allowable height increase in accordance with Section 504.2. The 1-hour substitution for the fire resistance of exterior walls shall not be permitted.
e. Not less than the fire-resistance rating required by other sections of this code.
f. Not less than the fire-resistance rating based on fire separation distance (see Table 602).
g. Not less than the fire-resistance rating as referenced in Section 704.10

inches (762 mm) of the centerline of the normal path of egress travel on the stair.

TABLE 602 FIRE-RESISTANCE RATING REQUIREMENTS FOR EXTERIOR WALLS BASED ON FIRE SEPARATION DISTANCE[a, e, h]

FIRE SEPARATION DISTANCE = X (feet)	TYPE OF CONSTRUCTION	OCCUPANCY GROUP H[f]	OCCUPANCY GROUP F-1, M, S-1[g]	OCCUPANCY GROUP A, B, E, F-2, I, R, S-2[g], U[b]
X < 5[c]	All	3	2	1
5 ≤ X < 10	IA Others	3 2	2 1	1 1
10 ≤ X < 30	IA, IB IIB, VB Others	2 1 1	1 0 1	1[d] 0 1[d]
X ≥ 30	All	0	0	0

For SI: 1 foot = 304.8 mm.
a. Load-bearing exterior walls shall also comply with the fire-resistance rating requirements of Table 601.
b. For special requirements for Group U occupancies, see Section 406.3.
c. See Section 706.1.1 for party walls.
d. Open parking garages complying with Section 406 shall not be required to have a fire-resistance rating.
e. The fire-resistance rating of an exterior wall is determined based upon the fire separation distance of the exterior wall and the story in which the wall is located.
f. For special requirements for Group H occupancies, see Section 415.5.
g. For special requirements for Group S aircraft hangars, see Section 412.4.1.
h. Where Table 705.8 permits nonbearing exterior walls with unlimited area of unprotected openings, the required fire-resistance rating for the exterior walls is 0 hours.

3. A step is permitted in aisles serving seating that has a difference in elevation less than 12 inches (305 mm) at locations not required to be accessible by Chapter 11, provided that the risers and treads comply with Section 1028.11 and the aisle is provided with a handrail complying with Section 1028.13.

1021.2 Exits from stories.

Two exits, or exit access stairways or ramps providing access to exits, from any story or occupied roof shall be provided where one of the following conditions exists:

1. The occupant load or number of dwelling units exceeds one of the values in Table 1021.2(1) or 1021.2(2).

2. The exit access travel distance exceeds that specified in Table 1021.2(1) or 1021.2(2) as determined in accordance with the provisions of Section 1016.1.

Exceptions:

1. Rooms, areas and spaces complying with Section 1015.1 with exits that discharge directly to the exterior at the level of exit discharge, are permitted to have one exit.

2. Group R-3 occupancy buildings shall be permitted to have one exit.

3. Parking garages where vehicles are mechanically parked shall be permitted to have one exit.

4. Air traffic control towers shall be provided with the minimum number of exits specified in Section 412.3.

5. Individual dwelling units in compliance with Section 1021.2.3.

6. Group R-3 and R-4 congregate residences shall be permitted to have one exit.

7. Exits serving specific spaces or areas need not be accessed by the remainder of the story when all of the following are met:

7.1. The number of exits from the entire story complies with Section 1021.2.4;

7.2. The access to exits from each individual space in the story complies with Section 1015.1; and

7.3. All spaces within each portion of a story shall have access to the minimum

TABLE 1021.2(1) STORIES WITH ONE EXIT OR ACCESS TO ONE EXIT FOR R-2 OCCUPANCIES

STORY	OCCUPANCY	MAXIMUM NUMBER OF DWELLING UNITS	MAXIMUM EXIT ACCESS TRAVEL DISTANCE
Basement, first, second or third story	R-2a, b	4 dwelling units	125 feet
Fourth story and above	NP	NA	NA

For SI: 1 foot = 304.8 mm.
NP - Not Permitted
NA - Not Applicable
a. Buildings classified as Group R-2 equipped throughout with an *automatic sprinkler system* in accordance with Section 903.3.1.1 or 903.3.1.2 and provided with emer
and rescue openings in accordance with Section 1029.
b. This table is used for R-2 occupancies consisting of *dwelling units*. For R-2 occupancies consisting of *sleeping units*, use Table 1021.2(2).

STORY	OCCUPANCY	MAXIMUM OCCUPANTS PER STORY	MAXIMUM EXIT ACCESS TRAVEL DISTANCE
First story or basement	A, B[b], E, F[b], M, U, S[b]	49 occupants	75 feet
	H-2, H-3	3 occupants	25 feet
	H-4, H-5, I, R-1, R-2[a,c], R-4	10 occupants	75 feet
	S	29 occupants	100 feet
Second story	B, F, M, S	29 occupants	75 feet
Third story and above	NP	NA	NA

:ion 903.3.1.1 or 903.3.1.2 and provided with emerg
with Section 903.3.1.1 shall have a maximum travel
s, use Table 1021.2(1).

For SI: 1 foot = 304.8 mm.
NP - Not Permitted
NA - Not Applicable
a. Buildings classified as Group R-2 equipped throughout with an *automatic sprinkler system* in accordance with Sec
and rescue openings in accordance with Section 1029.
b. Group B, F and S occupancies in buildings equipped throughout with an *automatic sprinkler system* in accordance
feet.
c. This table is used for R-2 occupancies consisting of *sleeping units*. For R-2 occupancies consisting of *dwelling unit*

1009.3 Exit access stairways.

Floor openings between stories created by exit access stairways shall be enclosed.

Exceptions:

1. In other than Group I-2 and I-3 occupancies, exit access stairways that serve, or atmospherically communicate between, only two stories are not required to be enclosed.

2. Exit access stairways serving and contained within a single residential dwelling unit or sleeping unit in Group R-1, R-2 or R-3 occupancies are not required to be enclosed.

1009.4 Width.

The width of stairways shall be determined as specified in Section 1005.1, but such width shall not be less than 44 inches (1118 mm). See Section 1007.3 for accessible means of egress stairways.

Exceptions:

1. Stairways serving an occupant load of less than 50 shall have a width of not less than 36 inches (914 mm).

1009.15 Handrails.

Stairways shall have handrails on each side and shall comply with Section 1012. Where glass is used to provide the handrail, the handrail shall also comply with Section 2407.

Exceptions:

1. Handrails for aisle stairs provided in accordance with Section 1028.13.

2. Stairways within dwelling units and spiral stairways are permitted to have a handrail on one side only.

3. Decks, patios and walkways that have a single change in elevation where the landing depth on each side of the change of elevation is greater than what is required for a landing do not require handrails.

4. In Group R-3 occupancies, a change in elevation consisting of a single riser at an entrance or egress door does not require handrails.

5. Changes in room elevations of three or fewer risers within dwelling units and sleeping units in Groups R-2 and R-3 do not require handrails.

Accessibility

1104.1 Site arrival points.
Accessible routes within the site shall be provided from public transportation stops; accessible parking; accessible passenger loading zones; and public streets or sidewalks to the accessible building entrance served.

1104.2 Within a site.

At least one accessible route shall

connect accessible buildings, accessible facilities, accessible elements

and accessible spaces that are on the same site.

1104.5 Location.

Accessible routes shall coincide with or be located in the same area as a general circulation path. Where the circulation path is interior, the accessible route shall also be interior. Where only one accessible route is provided, the accessible route shall not pass through kitchens, storage rooms, restrooms, closets or similar spaces.

1105.1 Public entrances.

In addition to accessible entrances required by Sections 1105.1.1 through 1105.1.6, at least 60 percent of all public entrances shall be accessible.

1105.1.6 Tenant spaces, dwelling units and sleeping units.

At least one accessible entrance shall be provided to each tenant, dwelling unit and sleeping unit in a facility.

Exceptions:

1. An accessible entrance is not required to tenants that are not required to

be accessible.

2. An accessible entrance is not required to dwelling units and sleeping units that are not required to be Accessible units, Type A units or Type B units.

TYPE A UNIT. A dwelling unit or sleeping unit designed and constructed for accessibility in accordance with this code and the provisions for Type A units in.

TABLE 1107.6.1.1 ACCESSIBLE DWELLING UNITS AND SLEEPING UNITS

TOTAL NUMBER OF UNITS PROVIDED	MINIMUM REQUIRED NUMBER OF ACCESSIBLE UNITS WITHOUT ROLL-IN SHOWERS	MINIMUM REQUIRED NUMBER OF ACCESSIBLE UNITS WITH ROLL-IN SHOWERS	TOTAL NUMBER OF REQUIRED ACCESSIBLE UNITS
1 to 25	1	0	1
26 to 50	2	0	2
51 to 75	3	1	4
76 to 100	4	1	5
101 to 150	5	2	7
151 to 200	6	2	8
201 to 300	7	3	10
301 to 400	8	4	12
401 to 500	9	4	13
501 to 1,000	2% of total	1% of total	3% of total
Over 1,000	20, plus 1 for each 100, or fraction thereof, over 1,000	10 plus 1 for each 100, or fraction thereof, over 1,000	30 plus 2 for each 100, or fraction thereof, over 1,000

1107.6.2.2 Group R-2 other than apartment houses, monasteries and convents. In Group R-2 occupancies, other than apartment houses, monasteries and convents, Accessible units and Type B units shall be provided in accordance with Sections 1107.6.2.2.1 and 1107.6.2.2.2.

1107.6.2.2.1 Accessible units.

Accessible dwelling units and sleeping units shall be provided in accordance with Table 1107.6.1.1.

1107.6.2.2.2 Type B units.

Where there are four or more dwelling units or sleeping units intended to be occupied as a residence in a single structure, every dwelling unit and every sleeping unit intended to be occupied as a residence shall be a Type B unit.

Exception: The number of Type B units is permitted to be reduced in accordance with Section 1107.7.

1107.6.3 Group R-3.

In Group R-3 occupancies where there are four or more dwelling units or sleeping units intended to be occupied as a residence in a single structure, every dwelling unit and sleeping unit intended to be occupied as a residence shall be a Type B unit.

Exception: The number of Type B units is permitted to be reduced in accordance with Section 1107.7.

1107.7.1 Structures without elevator service.

Where no elevator service is provided in a structure, only the dwelling units and sleeping units that are located on stories indicated in Sections 1107.7.1.1 and 1107.7.1.2 are required to be Type A units andType B units, respectively. The number of Type A units shall be determined in accordance with Section 1107.6.2.1.1.

1107.7.2 Multistory units.

A multistory dwelling or sleeping unit which is not provided with elevator service is not required to be a Type B unit. Where a multistory unit is provided with external elevator service to only one floor, the floor provided with elevator service shall be the primary entry to the unit, shall comply with the requirements for a Type B unit and a toilet facility shall be provided on that floor.

TYPE B UNITS

ANSI 1004.1 General. Type B units shall comply with Section 1004.

ANSI 1004.2 Primary Entrance. The accessible primary entrance shall be on an accessible route from public and common areas. The primary entrance shall not be to a bedroom.

ANSI 1004.3 Accessible Route. Accessible routes within Type B units shall comply with Section 1004.3.

ANSI 1004.3.1 Location. At least one accessible route shall connect all spaces and elements that are a part of the unit. Where only one accessible route is provided, it shall not pass through bathrooms and toilet rooms, closets, or similar spaces.

EXCEPTION: One of the following is not required to be on an accessible route:

1. A raised floor area in a portion of a living, dining, or sleeping room; or

2. A sunken floor area in a portion of a living, dining, or sleeping room; or

3. A mezzanine that does not have plumbing fixtures or an enclosed habitable space.

ANSI 1004.3.2 Components. Accessible routes shall consist of one or more of the following elements: walking surfaces with a slope not steeper than 1:20, doorways, ramps, elevators, and platform lifts.

ANSI 1004.4 Walking Surfaces. Walking surfaces that are part of an accessible route shall comply with Section 1004.4.

ANSI 1004.4.1 Width. Clear width of an accessible route shall comply with Section 403.5.

ANSI 1004.4.2 Changes in Level. Changes in level shall comply with Section 303.

EXCEPTION: Where exterior deck, patio or balcony surface materials are impervious, the finished exterior impervious surface shall be 4 inches (100 mm) maximum below the floor level of the adjacent interior spaces of the unit.

ANSI 1004.5 Doors and Doorways. Doors and doorways shall comply with Section 1004.5.

ANSI 1004.5.1 Primary Entrance Door.The primary entrance door to the unit shall comply with Section 404.

EXCEPTION: Maneuvering clearances required by Section 404.2.3 shall not be required on the unit side of the primary entrance door.

ANSI 1004.5.2 User Passage Doorways.Doorways intended for user passage shall comply with Section 1004.5.2.

ANSI 1004.5.2.1 Clear Width. Doorways shall have a clear opening of 313/4 inches (810 mm) minimum. Clear opening of swinging doors shall be measured between the face of the door and stop, with the door open 90 degrees.

ANSI 1004.5.2.2 Thresholds. Thresholds shall comply with Section 303.

EXCEPTION: Thresholds at exterior sliding doors shall be permitted to be 3/4 inch (19 mm) maximum in height, provided they are beveled with a slope not steeper than 1:2.

ANSI 1004.5.2.3 Automatic Doors.Automatic doors shall comply with Section 404.3.

ANSI 1004.5.2.4 Double Leaf Doorways.Where an inactive leaf with operable parts higher than 48 inches (1220 mm) or lower than 15 inches (380 mm) above the floor is provided, the active leaf shall provide the clearance required by Section 1004.5.2.1.

ANSI 1004.6 Ramps. Ramps shall comply with Section 405.

ANSI 1004.7 Elevators. Elevators within the unit shall comply with Section 407, 408, or 409.

ANSI 1004.10.1 Clear Floor Space. A clear floor space complying with Section 305.3, positioned for parallel approach, shall be provided. The clear floor space shall be centered on the appliance.

ANSI 1004.11 Toilet and Bathing Facilities. Toilet and bathing fixtures shall comply with Section 1004.11.

EXCEPTION: Fixtures on levels not required to be accessible.

ANSI 1004.11.1 Clear Floor Space. Clear floor space required by Section 1004.11.3.1 or 1004.11.3.2 shall comply with Sections 1004.11.1 and 305.3.

ANSI 1004.11.1.1 Doors. Doors shall not swing into the clear floor space for any fixture.

EXCEPTION: Where a clear floor space complying with Section 305.3, excluding knee and toe clearances under elements, is provided within the room beyond the arc of the door swing.

ANSI 1004.11.1.2 Knee and Toe Clearance. Clear floor space at fixtures shall be permitted to include knee and toe clearances complying with Section 306.

ANSI 1004.11.1.3 Overlap. Clear floor spaces shall be permitted to overlap.

ANSI 1004.11.3 Toilet and Bathing Rooms. Either all toilet and bathing rooms provided shall comply with Section 1004.11.3.1 (Option A), or one toilet and bathing room shall comply with Section 1004.11.3.2 (Option B).

ANSI 1004.11.3.1.1 Lavatory. A clear floor space complying with Section 305.3, positioned for a parallel approach, shall be provided. The clear floor space shall be centered on the lavatory.

EXCEPTIONS:

1. A lavatory complying with Section 606.

2. Cabinetry shall be permitted under the lavatory provided such cabinetry can be removed without removal or replacement of the lavatory, and the floor finish extends under such cabinetry.

ANSI 1004.11.3.1.2 Water Closet. The lateral distance from the centerline of the water closet to a bathtub or lavatory shall be 18 inches (455 mm) minimum on the side opposite the direction of approach and 15 inches (380 mm) minimum on the other side. The lateral distance from the centerline of the water closet to an adjacent wall shall be 18 inches (455 mm). The lateral distance from the centerline of the water closet to a lavatory or bathtub shall be 15 inches (380 mm) minimum. The water closet shall be positioned to allow for future installation of a grab bar on the side with 18 inches (455 mm) clearance. Clearance around the water closet shall comply with Section 1004.11.3.1.2.1, 1004.11.3.1.2.2, or 1004.11.3.1.2.3.

ANSI 1004.11.3.1.2.1 Parallel Approach.A clearance 56 inches (1420 mm) minimum measured from the wall behind the water closet, and 48 inches (1220 mm) minimum measured from a point 18 inches (455 mm) from the centerline of the water closet on the side designated for future installation of grab bars shall be provided. Vanities or lavatories on the wall behind the water closet are permitted to overlap the clearance.

ANSI 1004.11.3.1.2.2 Forward Approach.A clearance 66 inches (1675 mm) minimum measured from the wall behind the water closet, and 48 inches (1220 mm) minimum measured from a point 18 inches (455 mm) from the centerline of the water closet on the side designated for future installation of grab bars shall be provided. Vanities or lavatories on the wall behind the water closet are permitted to overlap the clearance.

ANSI 1004.11.3.1.2.3 Parallel or Forward Approach. A clearance 56 inches (1420 mm) minimum measured from the wall behind the water closet, and 42 inches (1065 mm) minimum measured from the centerline of the water closet shall be provided.

ANSI 1004.11.3.1.3 Bathing Facilities.Where a bathtub or shower compartment is provided it shall conform with Section 1004.11.3.1.3.1, 1004.11.3.1.3.2, or 1004.11.3.1.3.3.

ANSI 1004.11.3.1.3.1 Parallel Approach Bathtubs. A clearance 60 inches (1525 mm) minimum in length and 30 inches (760 mm) minimum in width shall be provided in front of bathtubs with a parallel approach. Lavatories complying with Section 606 shall be permitted in the clearance. A lavatory complying with Section 1004.11.3.1.1 shall be permitted at the control end of the bathtub if a clearance 48 inches (1220 mm) minimum in length and 30 inches (760 mm) minimum in width for a parallel approach is provided in front of the bathtub.

ANSI 1004.11.3.1.3.2 Forward Approach Bathtubs. A clearance 60 inches (1525 mm) minimum in length and 48 inches (1220 mm) minimum in width shall be provided in front of bathtubs with a forward approach. A water closet shall be permitted in the clearance at the control end of the bathtub.

ANSI 1004.11.3.1.3.3 Shower Compartment. If a shower compartment is the only bathing facility, the shower compartment shall have dimensions of 36 inches (915 mm) minimum in width and 36 inches (915 mm) minimum in depth. A clearance of 48 inches (1220 mm) minimum in length, measured perpendicular from the shower head wall, and 30 inches (760 mm) minimum in depth, measured from the face of the shower compartment, shall be provided. Reinforcing for a shower seat is not required in shower compartments larger than 36 inches (915 mm) in width and 36 inches (915 mm) in depth.

ANSI 1004.11.3.2 Option B. One of each type of fixture provided shall comply with Section 1004.11.3.2. The accessible fixtures shall be in a single toilet/ bathing area, such that travel between fixtures does not require travel through other parts of the unit.

ANSI 1004.11.3.2.1 Lavatory. Lavatories shall comply with Section 1004.11.3.2.1.

ANSI 1004.11.3.2.1.1 Clear Floor Space.A clear floor space complying with Section 305.3, positioned for a parallel approach, shall be provided.

EXCEPTIONS:

1. A lavatory complying with Section 606.

2. Cabinetry shall be permitted under the lavatory, provided such cabinetry can be removed without removal or replacement of the lavatory, and the floor finish extends under such cabinetry.

ANSI 1004.11.3.2.1.2 Position. The clear floor space shall be centered on the lavatory.

ANSI 1004.11.3.2.1.3 Height. The front of the lavatory shall be 34 inches (865 mm) maximum above the floor, measured to the higher of the fixture rim or counter surface.

ANSI 1004.11.3.2.2 Water Closet. The water closet shall comply with Section 1004.11.3.1.2.

ANSI 1004.11.3.2.3 Bathing Facilities.Where either a bathtub or shower compartment is provided, it shall conform with Section 1004.11.3.2.3.1 or 1004.11.3.2.3.2.

ANSI 1004.11.3.2.3.1 Bathtub. A clearance 48 inches (1220 mm) minimum in length measured perpendicular from the control end of the bathtub, and 30 inches (760 mm) minimum in width shall be provided in front of bathtubs.

ANSI 1004.11.3.2.3.2 Shower Compartment. A shower compartment shall comply with Section 1004.11.3.1.3.3.

ANSI 1004.12 Kitchens. Kitchens shall comply with Section 1004.12.

ANSI 1004.12.1 Clearance. Clearance complying with Section 1004.12.1 shall be provided.

ANSI 1004.12.1.1 Minimum Clearance.Clearance between all opposing base cabinets, counter tops, appliances, or walls within kitchen work areas shall be 40 inches (1015 mm) minimum.

ANSI 1004.12.1.2 U–Shaped Kitchens. In kitchens with counters, appliances, or cabinets on three contiguous sides, clearance between all opposing base cabinets, countertops, appliances, or walls within kitchen work areas shall be 60 inches (1525 mm) minimum.

ANSI 1004.12.2 Clear Floor Space. Clear floor space at appliances shall comply with Sections 1004.12.2 and 305.3.

ANSI 1004.12.2.1 Sink. A clear floor space, positioned for a parallel approach to the sink, shall be provided. The clear floor space shall be centered on the sink bowl.

EXCEPTION: Sinks complying with Section 606 shall be permitted to have a clear floor space positioned for a parallel or forward approach.

ANSI 1004.12.2.2 Dishwasher. A clear floor space, positioned for a parallel or forward approach to the dishwasher, shall be provided. The clear floor space shall be positioned beyond the swing of the dishwasher door.

ANSI 1004.12.2.3 Cooktop. A clear floor space, positioned for a parallel or forward approach to the cooktop, shall be provided. The centerline of the clear floor space shall align with the centerline of the cooktop. Where the clear floor space is positioned for a forward approach, knee and toe clearance complying with Section 306 shall be provided. Where knee and toe space is provided, the underside of the range or cooktop shall be insulated or otherwise configured to prevent burns, abrasions, or electrical shock.

ANSI 1004.12.2.4 Oven. A clear floor space, positioned for a parallel or forward approach to the oven, shall be provided.

ANSI 1004.12.2.5 Refrigerator/Freezer.A clear floor space, positioned for a parallel or forward approach to the refrigerator/freezer, shall be provided.

ANSI 1004.12.2.6 Trash Compactor. A clear floor space, positioned for a parallel or forward approach to the trash compactor, shall be provided.

BIBLIOGRAPHY

Andrusz, Gregory D., and Bo Bengtsson. 1999. The co-operative alternative in europe : The case of housing. Aldershot; Brookfield USA: Ashgate.

McCamant, Kathryn, Charles Durrett, and Ellen Hertzman. 1994. Cohousing: a contemporary approach to housing ourselves. Berkeley, Calif: Ten Speed Press.

McCamant, Kathryn, and Charles Durrett. 2011. Creating cohousing: building sustainable communities. Philadelphia, Pa: New Society.

ScottHanson, Chris, and Kelly ScottHanson. 2005. The cohousing handbook: building a place for community. Gabriola Island, BC: New Society Publishers

Curtis, William J. R. Modern Architecture Since 1900. London: Phaidon, 1996. Print.

Kimmelman, Michael, "Critics Notebook, Tower of Dreams: One Ended in Nightmare," The New York Times, Jan. 26, 2012 page C1

Trencher, Michael. "The Individual and Mass Housing: the Delicate Balance." Arq: Architectural Research Quarterly. 4.3 (2000). Print. P. 247-256

De, Botton A. The Architecture of Happiness. New York: Pantheon Books, 2006.

Print.

Frampton, Kenneth. Modern Architecture: A Critical History. London: Thames and Hudson, 1992. Print.

Smith, William L. “INTENTIONAL COMMUNITIES 1990-2000: A PORTRAIT.” Michigan Sociological Review 16 (2002): 107–131. Print.

Web

“Umass Amherst race/ethnicity of graduate students” Web. 5 May 2012

“UMass Amherst graduate student enrollment by country of origin.” Web. 5 May 2012

“State Residency Classification Within Degree Program” Web. 5 May 2012

“Kyu Sung Woo - Harvard Residence at 10 Akron Street.” Web. 5 May 2012.

“Friday Keynote: Cohousing in Denmark - a Look Back and Forward | The Cohousing Association of the United States.” Web. 17 April 2012.