

WHEN HOME IS WORK:

GROUNDING THE VIRTUAL WORKER IN AN ACTUAL WORLD

Submitted to the department of Architecture in partial fulfillment of the requirements of the degree of

Master of Architecture


at the

Massachusetts Institute of Technology


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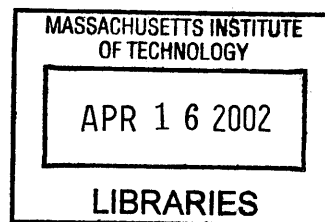
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In our increasingly wired society, the numbers of people who work from their homes is rapidly growing. However, few have the luxury of living in a space designed for office work and as such suffer from a number of problems, including feelings of isolation, lack of boundaries between home and work, and feelings of disconnection from the outside world.

This thesis addresses these issues through the design of a number of architectural elements which can be applied to a living space. Through program layout, window designs and screens, the building lengthens and shortens psychological distances between the homemaker's rest and work, and between the homemaker and nature.

As different professions have very different programmatic needs, this research will culminate in the application of these elements to a building for one profession, the telecommuter. The work is based on interviews and observations I have conducted with a number of telecommuters and the final design addresses their needs and concerns.

Thesis Advisor: Fernando Domeyko
Title: Senior Lecturer in Architecture

ABSTRACT

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To Michael,
We can go out on Saturday nights now.

“I FEEL THAT I LIVE AT WORK AS OPPOSED TO WORKING AT HOME.
[MY HOME] IS BOTH A STRESS AND A REFUGE.”

Michael Kress, telecommuter¹

1



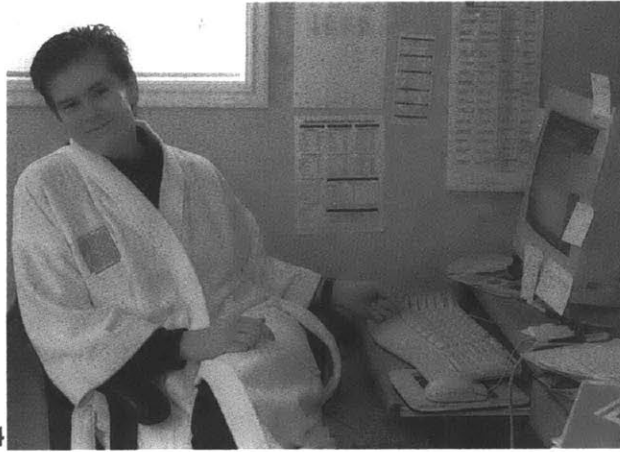
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THE HOMEWORKER

INTRODUCTION



When space is tight, a home office could be nothing more than an area in a room dedicated to another function. Here the disarray of the home further blurs the line between home and work in this dining room office.

In today's globally networked business world, over 21 million workers opt to work from their homes.² Working at home provides people with greater time flexibility and the freedom to control their schedules. They are able to work during non-business hours, when they may be more productive, and parents can spend more time during the workday with their children.³ However, spending all day and night in one building can easily lead to an unhealthy situation. Surveys of homeworkers show that their main complaint stems from a lack of physical or psychological boundaries between their work and their rest, which breaks down the rhythm that naturally exist between these two extremes. Under pressure from work, and expected to operate as efficiently as machines all day long, it is too easy to keep working even though the body needs a period of rest. Natural cues that usually act as timegivers for when we work and rest, such as the cycles of daylight, go unnoticed by the homeworker, who often stays indoors for days at a time. It is easy for the homeworker's day to turn into a loose 24-hour period that is mixed with work and rest and to lose any sense of the time and rhythms of society.

When the home is a place for both work and rest, the boundaries between these various activities is blurred. For many homeworkers, this blurring is a valuable asset: the

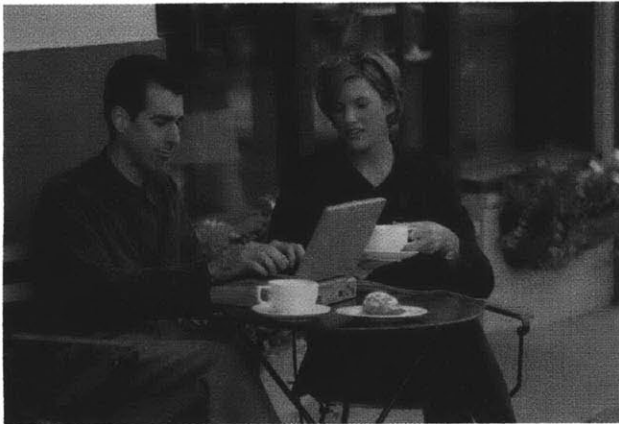
workday becomes more flexible. One can attend to domestic tasks at the same time as doing professional work and choose the most optimal times for productivity. However, this blurring of spheres can quickly lead to a situation where one feels like one is never truly at work or truly at home. Distractions of personal phone calls, visitors, and family demands lead to unproductive workdays, and true rest is prevented by constant concerns for work. For those who work outside the home, the ritual of the daily commute creates a physical and psychological distance between professional and home life. Lacking physical distance between work and home, the homeworker needs a spatial or ritualistic boundary to keep these two extremes separate.⁴

The homeworker's tendency to spend long stretches of time indoors can lead to feelings of unwellness, stemming from a lack of coordination with the diurnal rhythms of nature. The human body has many independent rhythms, controlling times of focus and productivity as well as times of sleepiness. Our brains use natural cues such as daylight and darkness to synchronize our bodily rhythms to the rhythms of the planet. Without coordination with natural cycles, the body's rhythms free-run at daily cycles of approximately 25 hours. This disjunction with the diurnal cycles of light and dark causes feelings of malaise. It is easy to



6

The ladder between the second floor office and first floor living space in the Rosenberg residence by Belmont Freeman Architects creates a physical and ritualistic separation between work and rest.



7 Some homeworkers create a workplace community by meeting other homeworkers in cafes and other public areas for work sessions.

lose sight of what time it is, and to keep working even when one's body needs rest. When we are synchronized, our bodies follow nature's cues for when we will be most productive at work (daytime) and when we will feel most like resting (nighttime.) This daily rhythm of work and rest is reflected in our hormone levels, body temperature, and blood pressure.⁵ Of course, everyone's body chemistry is slightly different. Some people are highly productive at night while others thrive in the early mornings. Awareness of these rhythms would aid productivity: taking frequent breaks when one's body is naturally down and sleepy lets the mind and body rest up to be focused during the next productive period. With sufficient cues from the natural world outside, the worker can keep track of time and keep his or her body in a cycle that oscillates between periods of rest and work.

Another problem common to homeworkers is feelings of isolation from humanity. The traditional workplace is a community where workers socialize and the loss of this contact is sometimes difficult. As Ahrentzen states, "We are a nation of strangers...One of the major reasons why people come to work is to be with other people."⁶ When interviewed, homeworkers say that one of their biggest adjustments to working at home was the lack of social and professional contact, especially for those who live alone. David Cassidy, a

telecommuter in Virginia, shares his home with his wife and ten-month-old daughter. His entire company works from home and they often arrange conference calls to keep up with each other. Despite this, he still complains of feelings of isolation, and tries “to get out of the house at least once every couple of days and...build a larger social circle locally” to dispel these feelings.⁷

These psychological problems have never been addressed by ergonomists, which is the only field concerned with creating a healthier working situation for the modern worker. Ergonomics, the study of humans at work, creates solutions for the musculoskeletal disorders that arise from poorly designed work situations. Ergonomic solutions often involve chairs, furniture systems, keyboards, pens, and other objects that have been specially designed to respond to a specific motion or position of the human body on a one-to-one scale with the body.⁸ While ergonomists have offered advice regarding the psychological health of office worker, such as suggestions concerning office lighting and ventilation and the timing of breaks, there is no literature concerning homeworkers. Also, since ergonomists concern themselves with fixing existing situations, their solutions tend to be limited to objects, as opposed to larger conceptions of architecture or space. Although the suggestions of

ergonomists are helpful in solving some of the homeworker's problems, such as alleviating the physical strain of sitting before a computer all day, the larger problems remained unaddressed. These psychological problems are larger than an intervention into an existing space, and need to be solved at the level of the spatial configuration of a building and its relationship to a site.

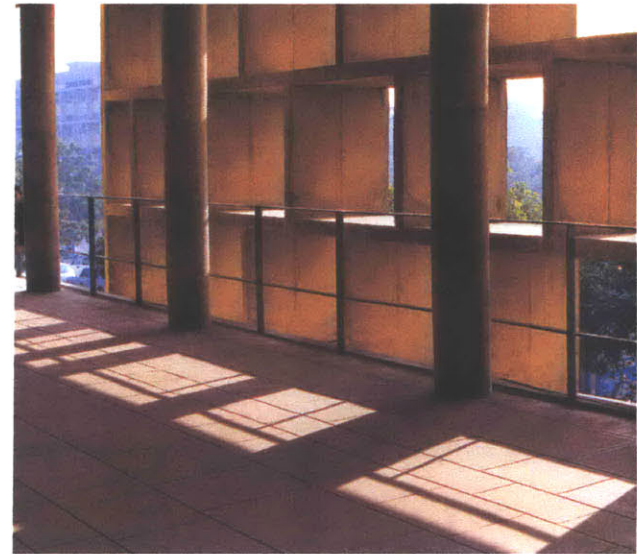
DESIGN PHILOSOPHY

My design for this thesis project was heavily inspired by the writings of phenomenological philosophers. I am drawn to this school of thought for its discussion of the highly subjective and unquantifiable needs of humans, such as the need for comfort and delight. The home office is one building for all aspects of living, and living is a dynamic process filled with varying rhythms and moods at different times and seasons.

If the body has natural oscillations between the various poles of feelings and moods, the architecture of its home has to account for all of these extremes. Sometimes we want cozy places of intimate retreat, and other times we want our homes to be grand and expansive. A home must be filled with varied spaces: private and public, enclosed and open, light and

dark.⁹ Gaston Bachelard writes about the importance of such variations and about the need for these different spaces to be anchored by a center of the house. Bachelard's house is a vertical being, existing in the tension between the darkness and mystery of the cellar/earth and the rationality and clarity of the attic/sky. Our home becomes like our own bodies, which contain alternations around a perceived center, and thus becomes a dynamic structure that resonates with our bodies.¹⁰ It is a place that accommodates our delight and provides us with a rooted foundation.¹¹

The second vital purpose of a home is to receive and focus its environment. Christian Norberg-Schulz states that every site has a *genius loci*, a spirit of its place, which changes with the hourly variations in daylight and wind, and the larger seasonal changes of weather. A building, through the way it meets the ground and receives the sky, can make the *genius loci* manifest and understandable for the home's inhabitants. Through architecture, people understand their relationship to this place and the earth. They can identify their place in the world and orient their body relative to the earth.¹² As the mediator between man and nature, the house also serves as a measure for the passage of time. Our sense of reality is strengthened by the home's interaction with our five senses and by its exhibition of light



8 The bris soliel in LeCorbusier's Lawyer's Quarters in Chandigarh use shadow patterns to mark time.

and shadows.¹³

PROGRAM

The goal of this thesis was the design of generic architectural elements and relationships which address the psychological problems that all homeworkers share. Homeworkers have many different professions with varied needs for their home offices, and also many different types of families and living habits. Today every profession has its work-at-home counterpart, ranging from doctor's offices which require parking spots, waiting rooms, multiple office rooms and a separate entrance, to telecommuters who work largely in a small space in front of a computer and have very few business visitors. The elements designed in this thesis could later be applied to these sorts of specific cases, which allow for homeworkers' varying programmatic needs. The final building design for this thesis would be a specific application of these elements to a program set by the needs of a certain profession.

This project proposes the application of the research to three buildings, each housing two apartments, on shared property in the Davis Square area of Somerville, Massachusetts. The design would focus on the design of the office as it relates to the other areas of the house.

NOTES

- ¹ Michael Kress, personal interview with author. August 2001.
- ² United States Department of Labor, Bureau of Labor Statistics, stats.bls.gov/news.release/homey.nws.htm 8/01
- ³ Rani Lueder, ed. *The Ergonomics Payoff* (1986, Holt, Rinehart & Winston), 369.
- ⁴ Sherry Ahrentzen, *Blurring Boundaries* (1987, Univ. of Wisconsin-Milwaukee), 92.
- ⁵ Gay Gary Luce, *Body Time* (1971, Pantheon) vi, 8, 258.
- ⁶ Ahrentzen, 42-3.
- ⁷ David Cassidy, email interview by author, August 20, 2001.
- ⁸ The Ergonomics Society, www.ergonomics.org.uk, 2/2001
- ⁹ Gaston Bachelard, *The Poetics of Space* (1958, Beacon Press), 65.
- ¹⁰ *Ibid.*, 52.
- ¹¹ Bernd Jager "Body, House and City" in *Dwelling, Place and Environment*, David Seamon and Robert Mugerauer, eds. (2000, Krieger Publishing), 223.
- ¹² Christian Norberg-Schulz, "Genius Loci" in *Theorizing a New Agenda for Architecture*, Kate Nesbitt ed. (1996, Princeton Architectural P.), 421-5.
- ¹³ Derek Clements-Croome, "Consciousness, Well-Being and the Senses," in *Creating the Productive Workplace*, ed. Derek Clements-Croome (2000, E & FN Spon), 34.

2



SITE SELECTION

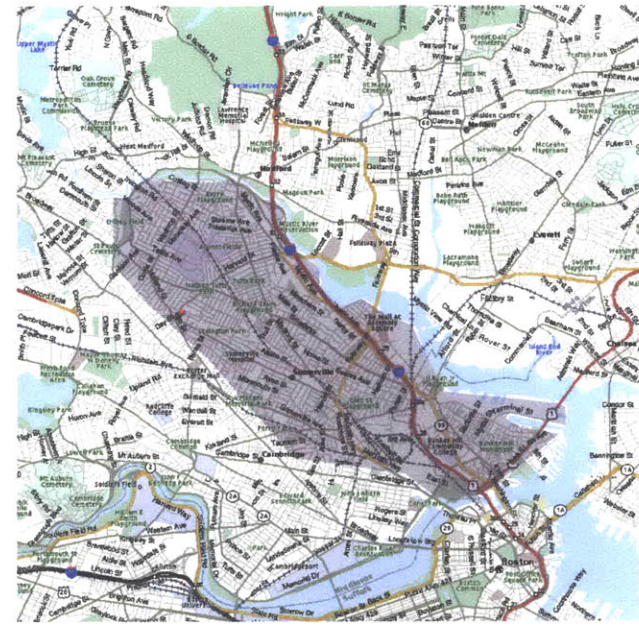
CRITERIA

The criteria for the site were established by data gathered in my interviews with homeworkers, as well as the research compiled by Sherry Ahrentzen in her book *Blurring Boundaries*.¹ The research emphasizes the importance of community and neighborhood to the homeworker. Spending all day indoors, the homeworker lacks the casual contact with neighbors and connection with nature that comes with outdoor trips. While there is, of course, no way to direct the behavior of individuals, a location in a neighborhood with an active street life and pleasant areas for walking encourage the homeworker to take more breaks outdoors.

The neighborhood selection criteria consisted of three aspects. First, the area needed to have a strong community. Since homeworkers spend mostly stay in one location, their sphere of social activity shrinks and their immediate surroundings become essential. An area with an active street life creates opportunities for casual contact with neighbors. Second, the area needed to have certain services, such as copy/fax stores and places for lunch and coffee, within walking distance to the site. These stores are not only important in a very practical way for the worker, but they also can become destinations for the crucial breaks that give the homeworker a respite outside their homes. Lastly, a variety of pleasant areas to walk during the day are essential. Park areas, walking paths and streets all qualify.

The research also suggested a number of criteria for the specific site. The site needed to be within close walking distance to the neighborhood's services and pleasant pedestrian areas. Preferably, these destinations would be found at a variety of distances, so that one could choose between a 30-second walk, a five-minute or ten-minute walk, etc. It was also important to locate the site in a residential area, for this project is at its essence a home. Residential areas are usually defined by their quietness, and it is important for a home to be able to achieve quiet spaces. Second, the site should border on both an active street and a more rural setting. Most homeworkers interviewed stated a desire to view either a busy streetscape or a pastoral view of trees and fields from their offices, and the site should allow for both conditions.² Lastly, for pragmatic reasons, the site needed to be close to public transportation lines.

After looking at a number of neighborhoods, the Davis Square area in Somerville, Massachusetts, quickly became a first choice. The square itself, a busy pedestrian area populated by independent bookstores, cafes, and other services, occurs at the junction of four major



9 Map of the Boston Metro area, with the city of Somerville highlighted in purple. Davis Square is marked with a red pin.

DAVIS SQUARE



10



11

Views of Davis Square

10 The Somerville bicycle path as it appears on Davis Square.

11 A shot of Elm Street. The store to the right is McIntyre & Moore, a popular independent bookstore.

12 Au Bon Pain's outdoor cafe.

13 The summer farmer's market.

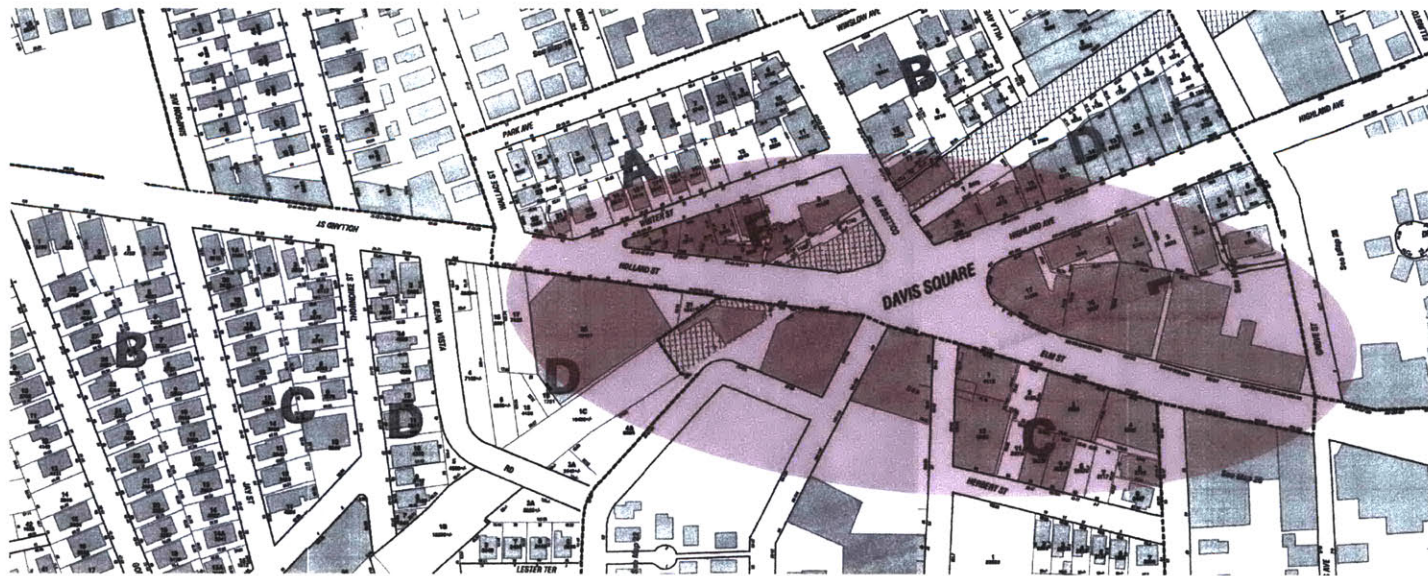


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13

thoroughfares. Visiting in the summertime, I watched people gathering at a weekly farmer's market held in a parking lot, diners sitting at outdoor tables on the sidewalks, and neighbors chatting casually over fences. Davis Square contains all the requisite services, including copy shops, banks, and a post office, as well as a MBTA stop, all within a limited walking area. The Somerville bike path, a pleasant park-like area for walking, jogging or riding, passes through the square. Most importantly, since the business district of Davis Square radiates out from this center for a few blocks and then quickly becomes residential, it was feasible to find an appropriate site in a residential area that would be only a few short blocks from the center of activity. Davis Square has a thriving street life and community, and this drew me to it.



14 Surveyor's Map of Davis Square in Somerville. The business district is outlined in purple.

Scale: 1" = 300'



15

Locating the site at the corner of Holland and Thorndike streets was ideal for many reasons. It is a residential block which faces Holland Street, a relatively busy street that runs between Tufts University and the T-stop. The lots on this block meet the requirements for the dual site conditions of street life and nature. The houses on this block all back onto an overgrown tangle of trees, bushes and grass. Currently, each lot has fenced off its own backyard area, but the potential exists to join a number of sites and create a larger quiet garden space in the back.



16



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18



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15,16 Diners eating at Mr. Crepe restaurant and sidewalk cafe, across Holland Street from the site.

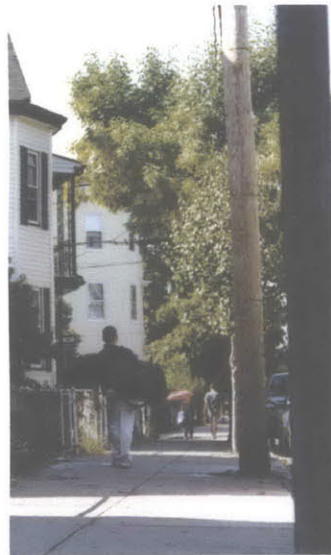


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17,18 Views from Holland Street of the foliage in the rear of the site.

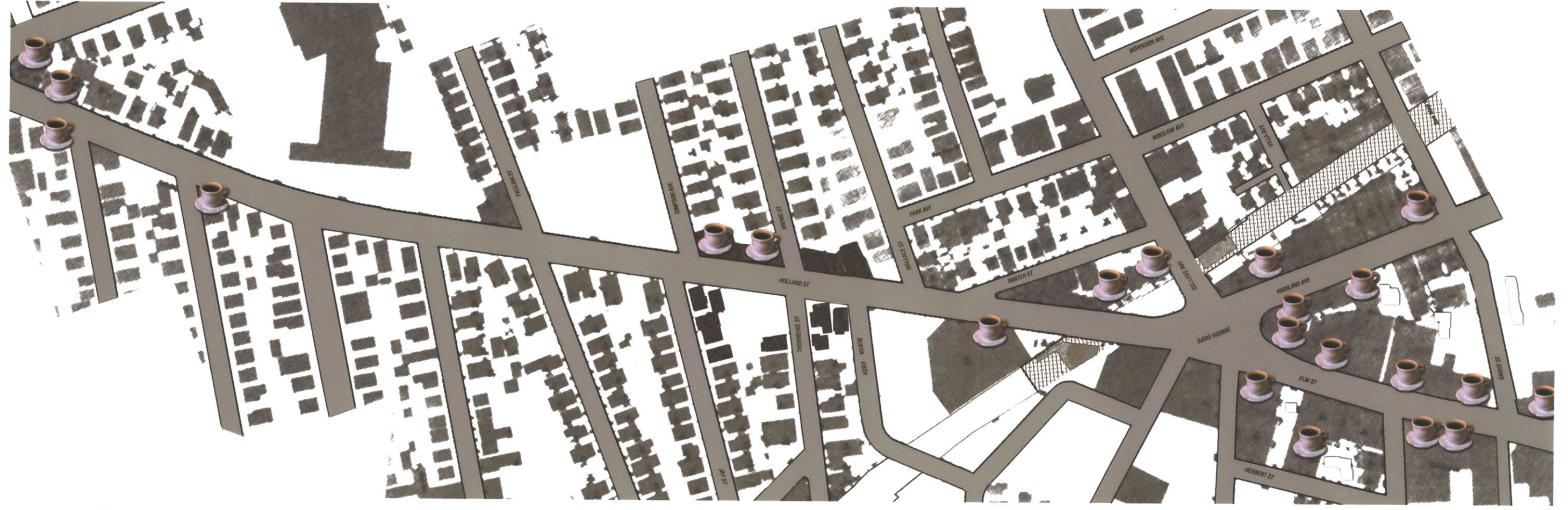
19 View of the site from across Holland Street.

20 The block of businesses and restaurants across the street from the site.



Two views of Holland Street adjacent to the site. Above, neighbors enjoy a morning chat over a fence. The afternoon commute begins on the right.

Another positive element of this site is its proximity to Holland Street. There are always many people walking on the sidewalk, making it an exciting view for homeworkers wanting a connection with humanity. This site also provides the variety of length of possible walks that I had hoped to provide. Across Holland Street from the site, two restaurants provide quick access to lunch and coffee. If a longer walk is desired, the heart of Davis Square is only a few blocks (and minutes) away, and Teele Square, another area providing cafes and restaurants, is about a ten-minute walk down Holland Street in the opposite direction. The site plan, featured on the opposite page, locates the site relative to the area's various places to buy coffee. The plan is scaled to a walking scale, measuring the average time between destinations in seconds.

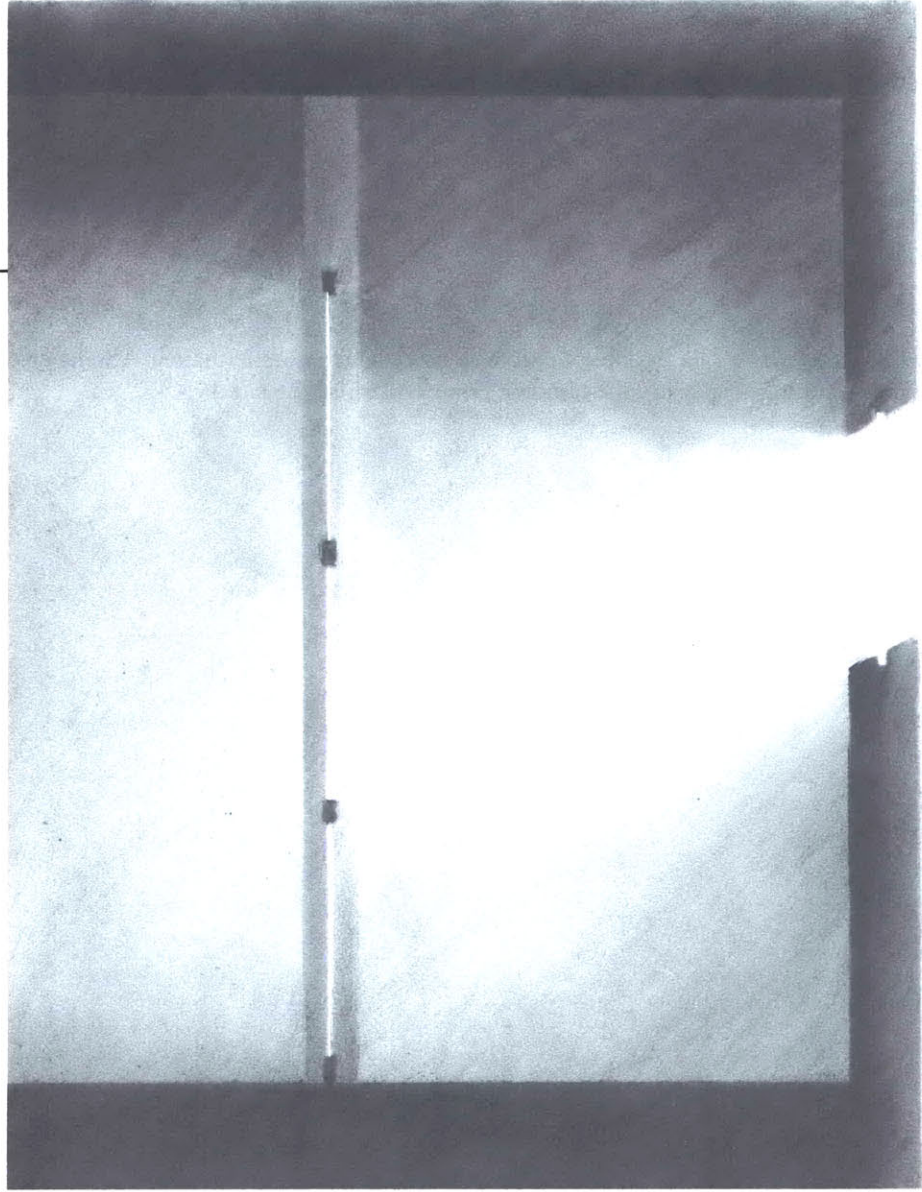


Site Selection 27

NOTES

- ¹ I interviewed four homeworkers in different professions via email questionnaire. Ahrentzen conducted personal interviews with one hundred homeworkers in the late 1980's.
- ² Ahrentzen, 46-8.

3



DESIGN

GENERAL DESIGN PROCESS

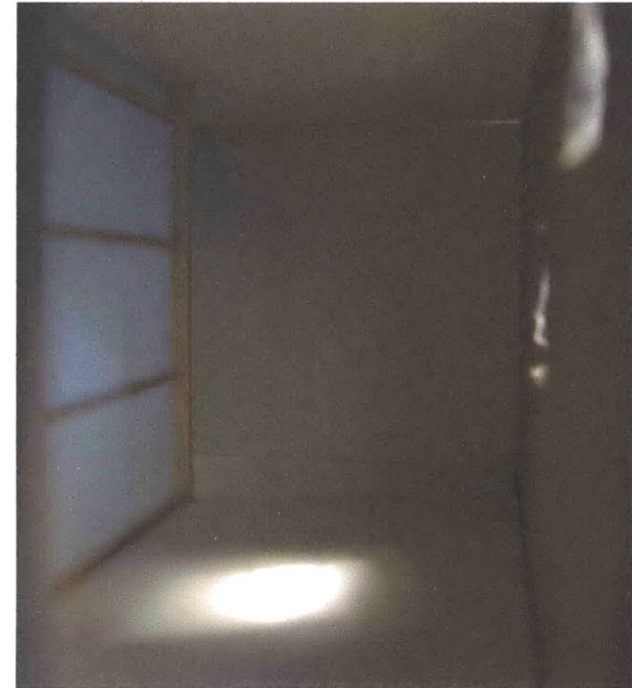
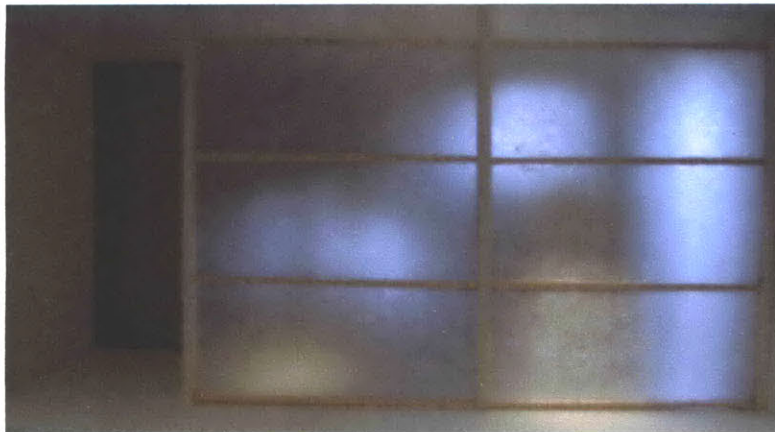
The design proceeded with constant movement between two scales: $\frac{1}{4}$ " equals a foot (the scale of the details of an apartment) and $\frac{1}{8}$ " equals a foot (the scale of the larger buildings and site). Designing began from the inside out, with $\frac{1}{4}$ " study models of interior spaces and relationships between rooms in the house, and expanded out to include the entire building and the other buildings on the site. The investigations at different scales informed each other and aided the overall design.

FIRST REACTIONS

The design phase began with consideration of the interior of a generic office space. Two models illustrated the beginnings of what would become the major architectural elements of the scheme.

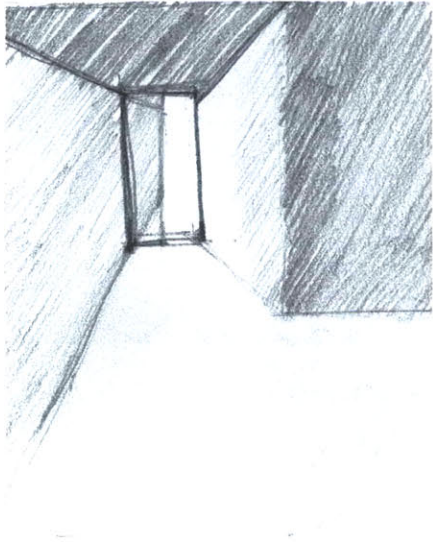
The first model described the ritual of entering and leaving the workspace. A translucent paper screen, 5 feet away from the wall, defined this passage. The wall was punctured by small square windows, designed to catch the rays of the setting sun. The sunlight and skylight from the windows project onto the screen, constantly shifting throughout the day.¹ By watching the different projections on the screen, one is able to track the time of day

through a direct connection to nature. The screen would only receive direct sun at sunset, creating a signal to the homeworker that it is time to stop working. The passage between the wall and the screen, which is the only time that the windows are used for viewing, defines a ritual that creates a psychological distance between work and rest.



The space between the screen and the windows becomes the passage from office to living areas.

Inside the office, the screen receives projections of light from the windows. The more defined yellow shapes are sunlight, and the blue blurs are the projection of skylight. Even if there is no direct sun, the skylight will still track across the screen.

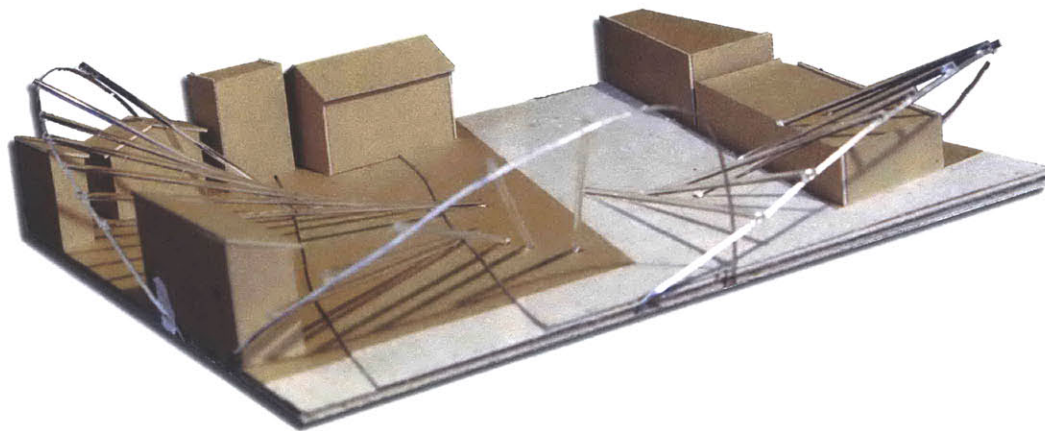


*Right, window model.
Above, design sketch.*

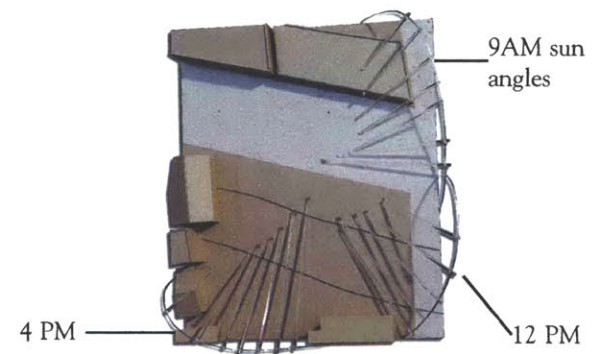
Another model explored the use of exaggerated perspective in the building. The design is for a floor-to-ceiling office window framed by slanting walls that extend outside the plane of the glass. The walls exaggerate the perspectival view outside the window and the extensions carry the eye fluidly outside. This not only encourages the homeworker to rest his eyes during the day by glancing outside, but also begins to blur the boundary between interior and exterior. The exterior view becomes an integral part of the room, connecting the homeworker to his neighborhood and its daily and seasonal changes.



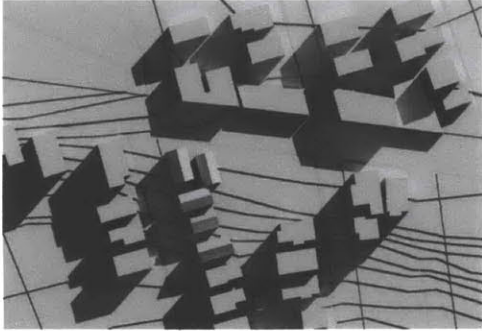
The first moves on the site were inspired by investigations of the light conditions at the site. I began by studying the light on the site in person, through photographs taken at different times of day. In order to study the light at throughout the year, I used computer renderings of the site model to yield the varying sun angles and intensities on the site. From this data, a light model of the site made visible the intangible rays of sun and their directions. Sun angles were grouped according to time of day, and showed their annual variations. This model clarified which areas of the site were in sun and shade at different times of day and year.



SITE INVESTIGATION

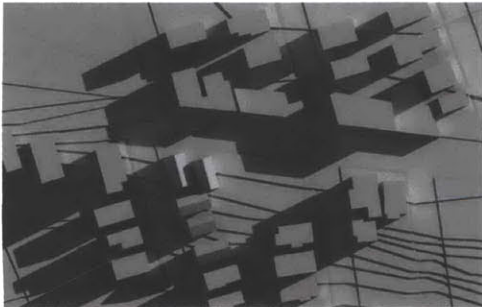


Above, plan view of light model.
Left, view of same model, at corner of
Holland and Thorndike.



28

Lightscape rendering of the site at 9 AM on June 21.



29

The site at 9 AM on September 21.



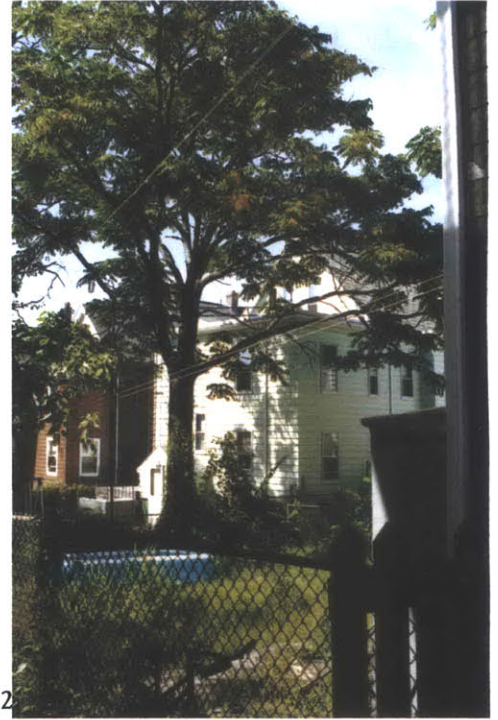
30

The site at 9 AM on December 21.



31

9:30 AM

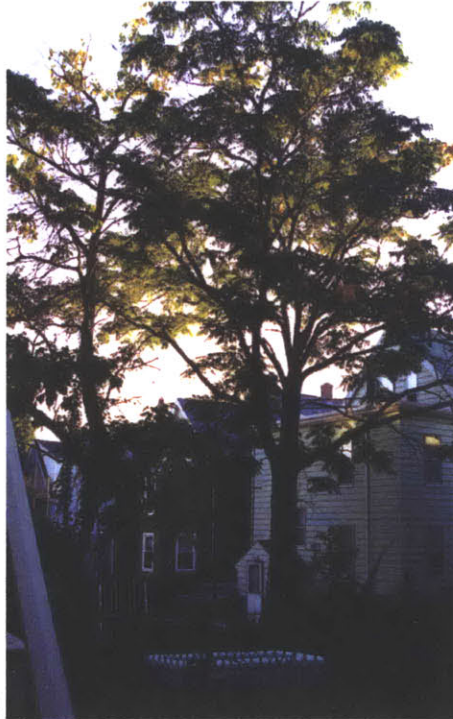


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12 PM



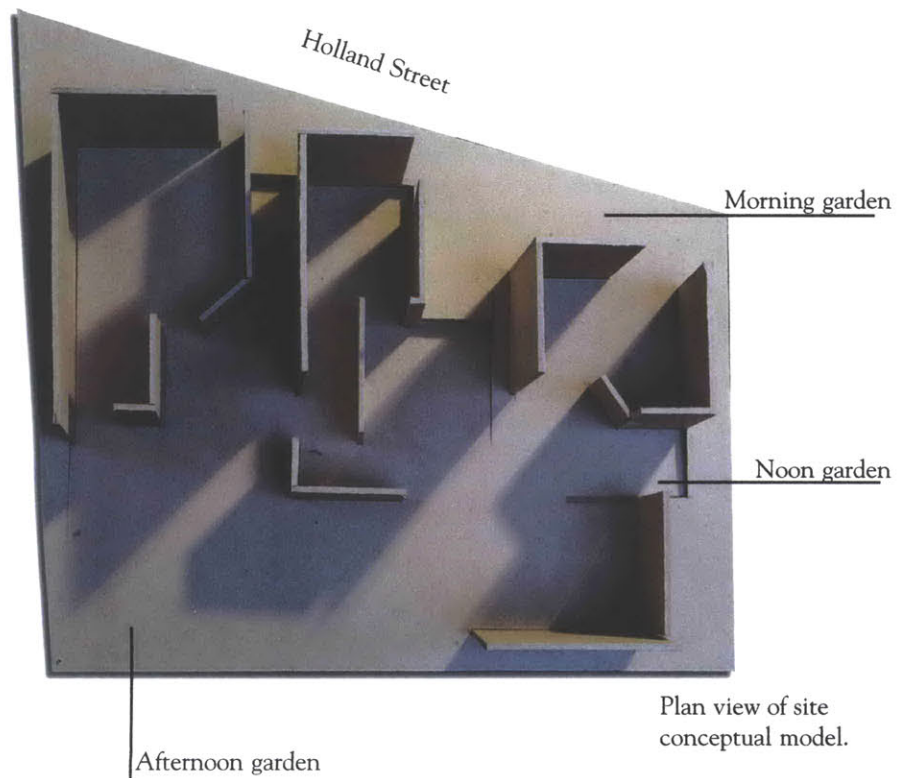
4:30 PM



7 PM

Figures 28-30 are three of the Lightscape renderings done to study the light on the site. I studied them in groups according to time of day and examined the changes in angles and intensity of sunlight. These studies led directly to the light model featured on page 35.

Figures 31-34 document the changing qualities of light over the course of one day in August.



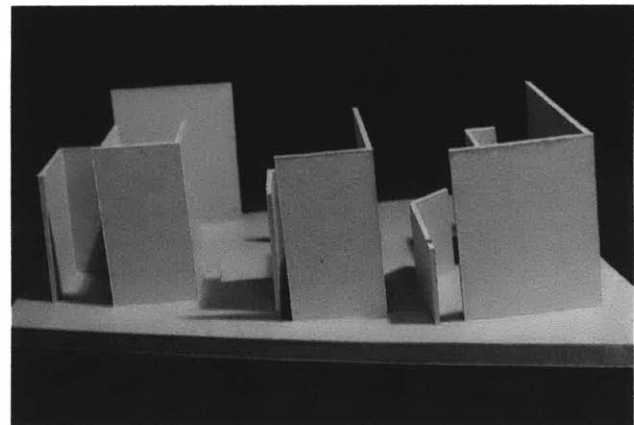
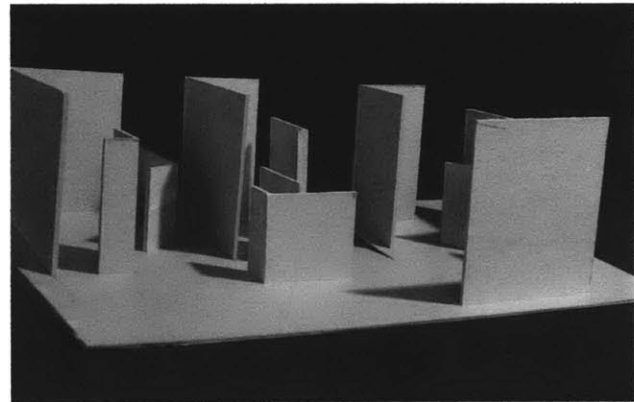
The light model inspired the design for the communal gardens in the back of the site, which would be located according to time of day. Communal yards and gardens are often unused and neglected: since they belong to no one, everyone is hesitant to use them. I tried to combat this by designing the gardens to be specific destinations. The morning garden is found at the front of the site, and is a space that mediates between the activity of the sidewalk and the privacy of the back gardens. This garden is defined by a large existing hard wood tree whose foliage filters the early morning sunlight. The afternoon gardens are in the rear of the house and entirely private to use by the inhabitants of the complex. They receive strong sunlight in the afternoon and have much vegetation, including bushes, trees and flowers. This garden is more introspective and meditative. In addition, each apartment would also have

small private gardens. The apartments could then open up more generously onto the private gardens, connecting the interiors with nature without sacrificing privacy.

A site conceptual model shows the origins of the site's gardens. Three buildings are spaced out on the site, represented only by planes. The planes shift vertically towards the rear of the site, opening the building up to the view and creating space for the communal rear gardens. The planes shift horizontally as well, creating space for private gardens between the buildings. The narrow spacing between buildings creates canals of view, typical to its urban neighborhood, from the sidewalk to the gardens in back.

Top, conceptual model from rear, showing back gardens.

Bottom, conceptual model from Holland Street with morning garden at left.



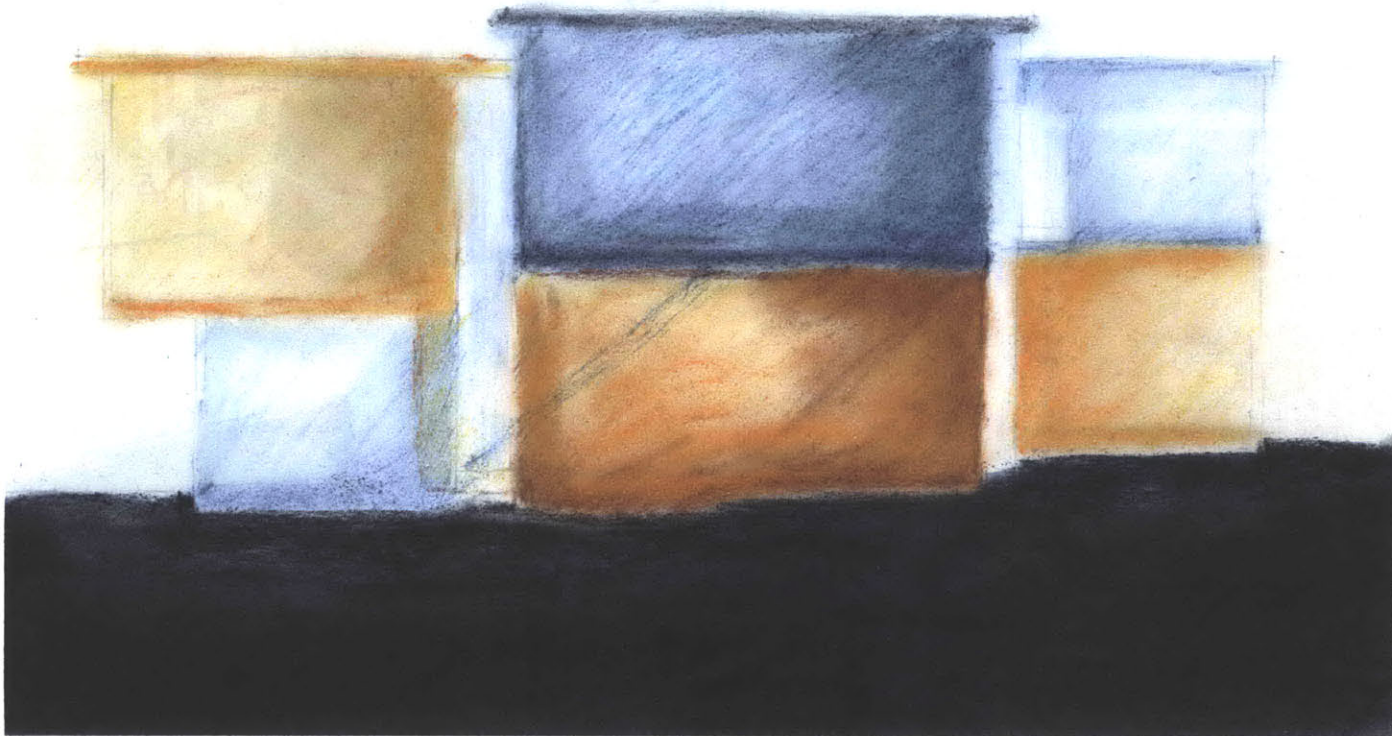
EXPLORING POSSIBILITIES



This sketch expressed the idea of public spaces as an anchor, with private spaces adjoining.

Initial ¼” models of one apartment, and then of one building with two apartments, defined the basic layout of the building. Namely, the apartments run lengthwise through the building, spanning from Holland Street to the rear gardens. Each apartment benefits from both site conditions. Bedrooms and offices are located at either end of the apartment, directly addressing either the street or the rear gardens. The public spaces of the apartment, such as the living area, dining area and kitchen, separated the two and became the anchor of the home. This layout creates distance in a small urban apartment, creating a quasi “commute” to work.

The topology of the apartments also helps create distance between the various areas in each apartment. Each apartment occupies part of the ground floor and part of the second floor. The first floor apartment has its living areas tucked slightly below grade in the front and rises to its office on the second floor. Its office space is in the quieter rear area and addresses the rear gardens: rising to it is like climbing into a tree house. The upper apartment has its entry and living spaces on the second floor, and descends to its bedroom in the rear. There is a few step rise to its office space, which is just high enough off the street to afford a good view of the activity below. Although this shift is slight, the climb of even a few steps creates



Longitudinal section of the schematic layout. Holland Street is to the right and the back gardens to the left. The darker public areas for both apartments are in the center, with offices and bedrooms facing the street and rear views. The upper apartment (blue) has its office in front and bedrooms below; the first-floor (orange) apartments have the reverse arrangement.

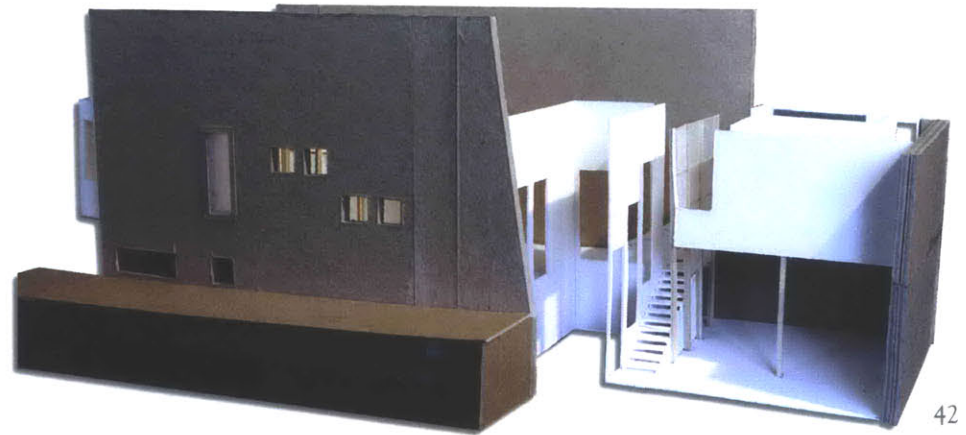


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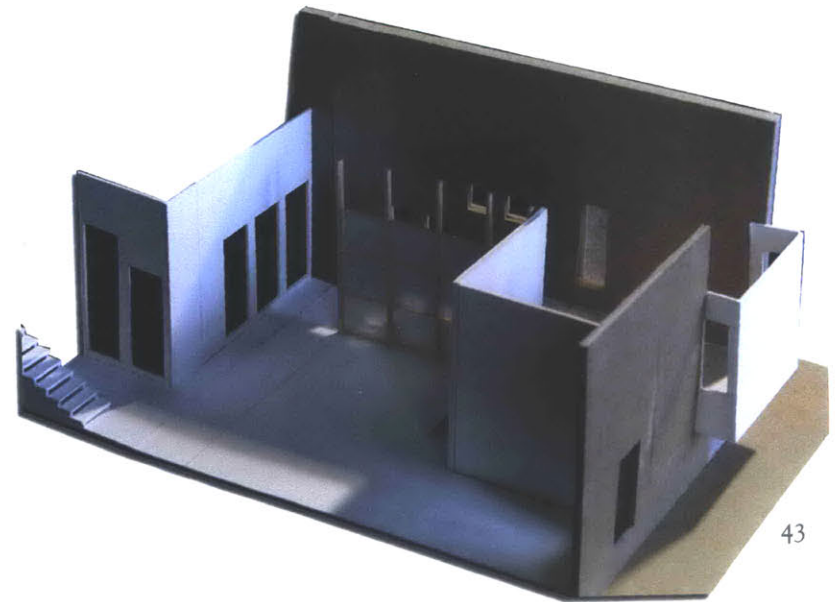


41

This first 1/4" model, exploring just one apartment, helped define some important aspects of the design. The entry was into a living room, shown in figures 40 and 43, with the office elevated and facing the street (figure 41 depicts the passage from office to living room.) The stairs shown in the left of figure 43 are the stairs to the bedroom, shown at right in figure 42, with another living room below. Although the topology was later altered, the basic plan and use of screens was defined here.



42

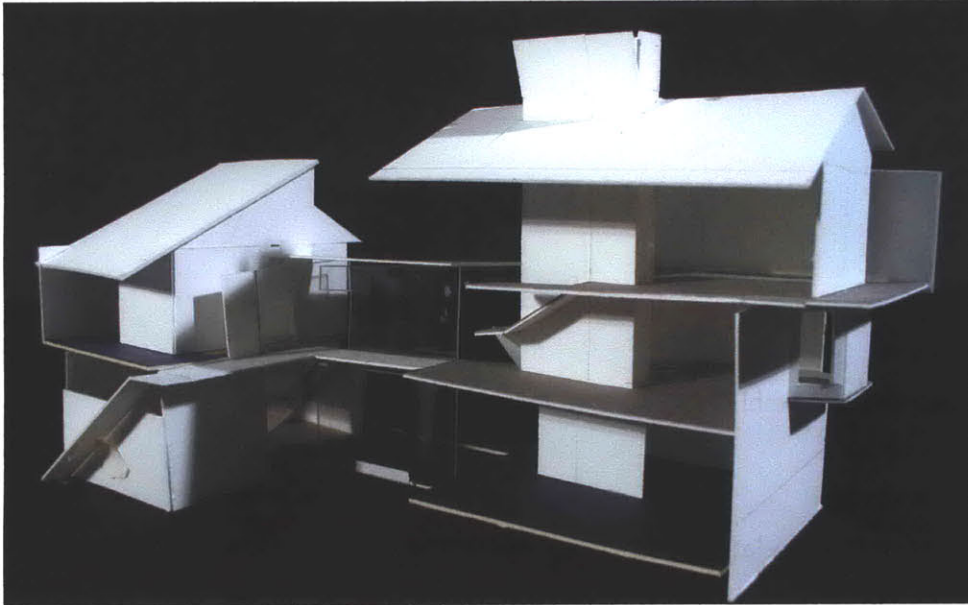


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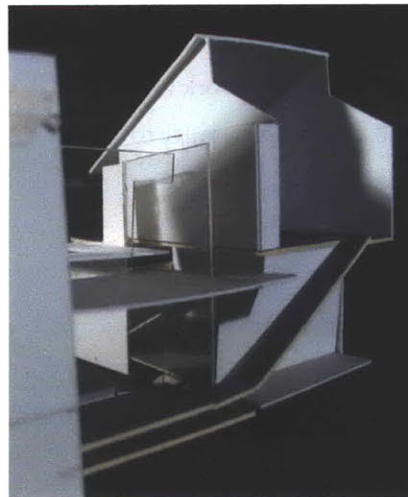
a break in the monotony of walking and psychologically heralds a transition. This topological shift further defines the ritual of moving between work, rest and leisure and establishes the vertical dimension of the home.

Design iterations of the buildings at $\frac{1}{8}$ " scale brought forth various possibilities of relationships between the two apartments, as well as between the office spaces and living spaces of each unit. In this exploration, the question of integration became paramount. Some home offices have office areas which are completely separate from the living spaces, often in an entirely different building. While this succeeds in creating boundaries between work and rest, it almost negates some of the positive features of working at home, such as proximity to kitchen, amenities of home and the ability to complete domestic tasks at the same time as work tasks. In other homes, the office is just another room or a nook in the house. This certainly gives the homemaker all the amenities, but has no psychological separation between living and working. Three typologies of relationships emerged from these thoughts.

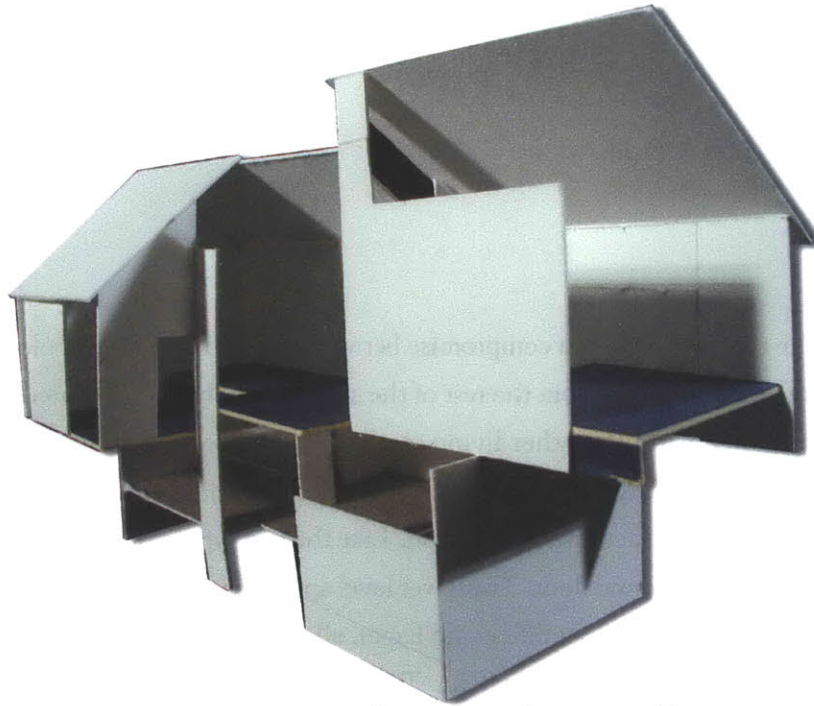
One typology was that of the greatest separation between work areas and living areas within a single building. The apartments in this unit had the same basic floor plan and section as



The upper apartment (gray floorplates) begins on the second floor, with a third floor office. Its bedroom is on the first floor, accessible by stairs visible in the photo at right. The smaller lower apartment (blue floor plates) occupies most of the first floor and part of the second. The balcony connecting the two offices and leading to the backyard is visible above.

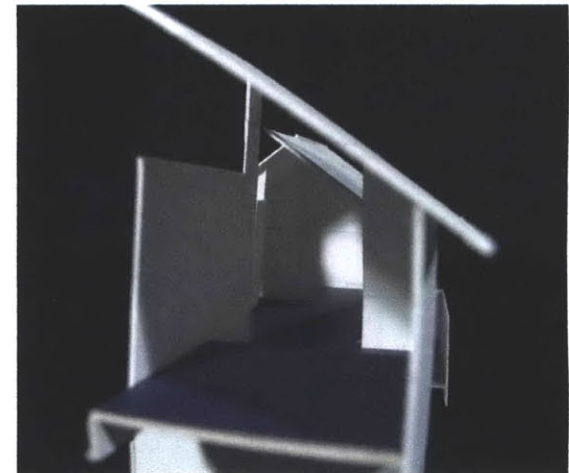


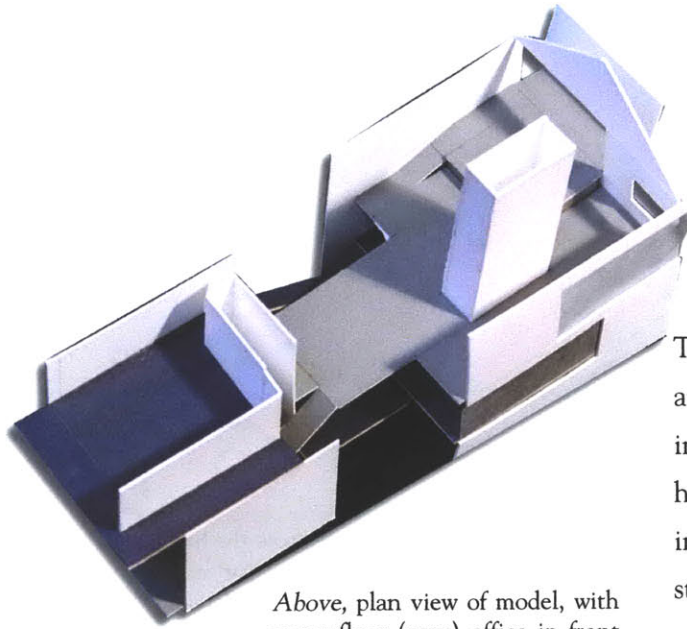
mentioned above. The first-floor apartment has living spaces centered on its private courtyard, whose patio becomes an extension of the living room. A stairway connects the central living room with the second floor office. The upper apartment also has entry into central living spaces. This apartment descends to its bedrooms on the first floor, and ascends to an attic office. As both office spaces are the only rooms on their respective floors, this layout has the greatest physical separation between work and living spaces. Because of elevation shifts and varied floor-to-ceiling heights, the attic office and the second floor office are actually level with each other. Outdoor balconies and walkways create an external connection between the two working areas: the homeworkers have a common area, outside of the home, where they can have casual contact with other homeworkers. The balconies have stairs descending to the gardens, opening the possibility of using the external walkways as a more public entry directly into the office.



Left, a view of the model from the back, showing the topology of one apartment; Below, a view of the open floor plan and visual connections.

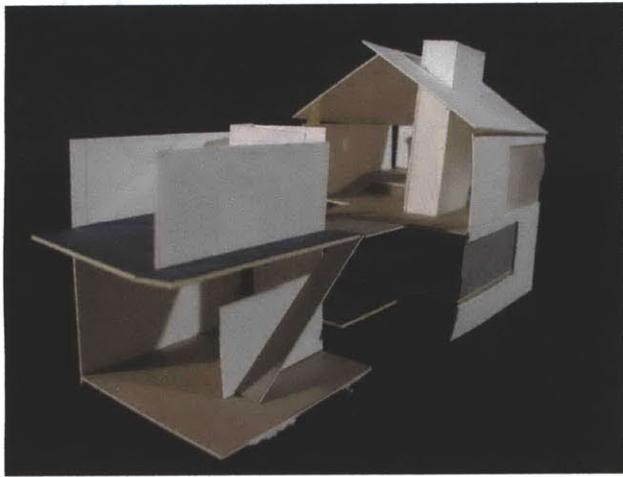
Another typology was that of the most integration between work space and living space. This unit contains smaller apartments with the same basic floor plan as the others, but with topological shifts limited to only a few feet. The floor plan is very open and replaces permanent walls with movable partitions. Each apartment is entirely flexible: for less demanding work needs, the office can be delineated with partitions as a separate space. If either work or home life requires more space, the entire apartment can be opened as needed. The slight shifts in elevation provide some ritual of transition, but are slight enough to keep the entire space visually connected when opened. In this scheme, there is no connection between the two occupants of the building beyond the shared entry paths and gardens.





Above, plan view of model, with upper-floor (grey) office in front and lower-floor (blue) office in back.

Below, view of model.



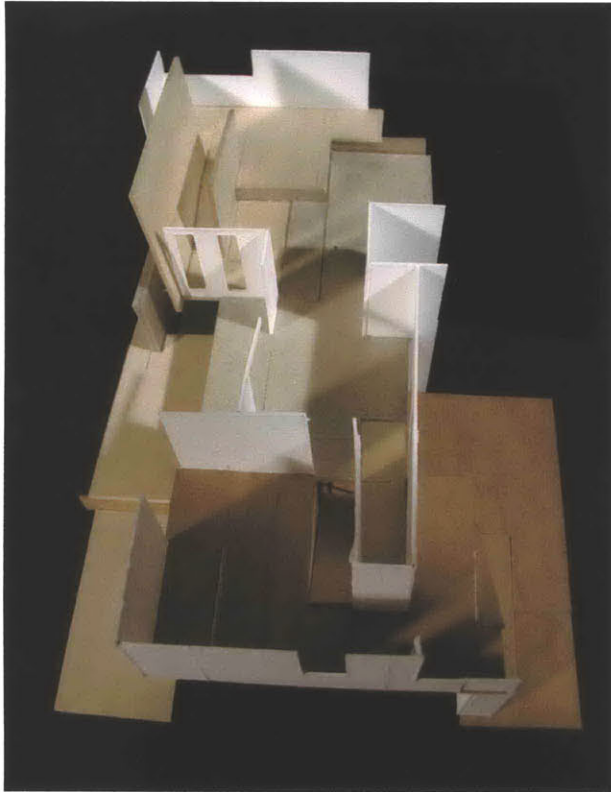
The third typology is a compromise between the two previous typologies. Its office spaces are clearly separate from the rest of the apartment while also located close to, and so more integrated with, the other living spaces. The office for the upper apartment is two feet higher than the rest of the living spaces, high enough to create a ritual while still maintaining a visual and acoustic integration. Like the first typology, this unit's bedrooms are downstairs on the ground floor. The lower level apartment is much the same as the first typology, except its second-floor offices are larger, allowing the possibility of having other rooms in that space along with the office. This integration of purpose, combined with visual and acoustic connection between floors at the stair, helps the homemaker feel that he or she is not isolated. With each apartment occupying some portion of each floor, the opportunity exists to make connections between the two apartments on the interior.

Of these three typologies, I found the last to be the most interesting and challenging. I perceive the home office as one space that must encompass all of the activities of life: working, playing, sleeping, bathing and eating. I aspired to design a home of balance for the homemaker, with all the activities of life in an equal proportion. The typology of quasi-integration provides opportunities to have some level of psychological separation between



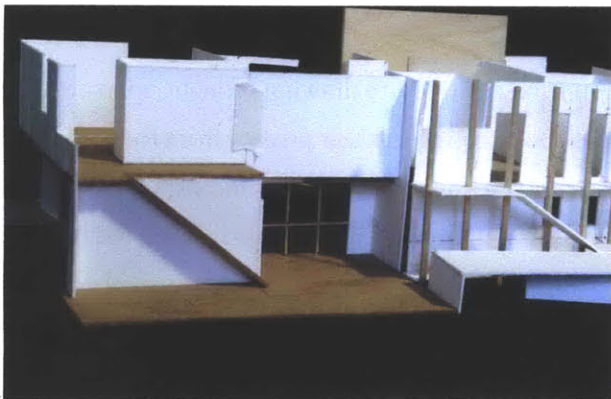
life activities, such as permanent walls and a door for the office. At the same time, the office is somewhat integrated with the rest of the apartment: it is one area for a life activity among other areas for living.

These $\frac{1}{8}$ " iterations also fleshed out some issues about the building's relationship to the site. An investigative site drawing brought up issues of the placement of the buildings relative to each other and to the site. The two interior buildings close down to protect their privacy from their neighbors on one side and open up on the other (south-facing) side. The corner building closes down on two sides against the noise and exposure of its two streets. The buildings pull back from the street allowing for each to have a view down the street past its neighbor (purple streaks.) With the buildings thus set, private gardens were determined by consideration of the shadows on the site. Areas that are in shadow of other buildings, or for other reasons more unpleasant spaces, were rendered in darker green, revealing the more pleasurable areas. A model expresses these findings with color-coded

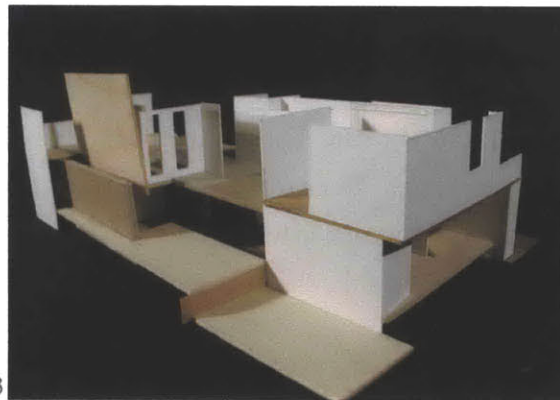


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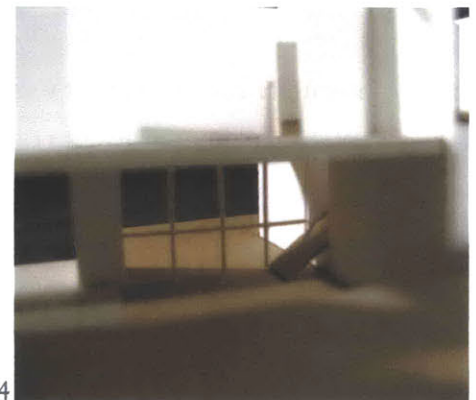
gardens: the upper apartment's basswood floor and the lower apartment's cherry floor both spill out past the confines of the walls to define the garden space as well. The lower apartment has a garden on the southern side of the house, and in this scheme, the upper apartment's gardens are located on the northern side. Figure 54 shows the garden for the lower apartment, which is flush with the floor inside and seems like an exterior room. Here, as elsewhere in the building, the line between inside and outside blurs, bringing nature into the realm of the homemaker.



52



53



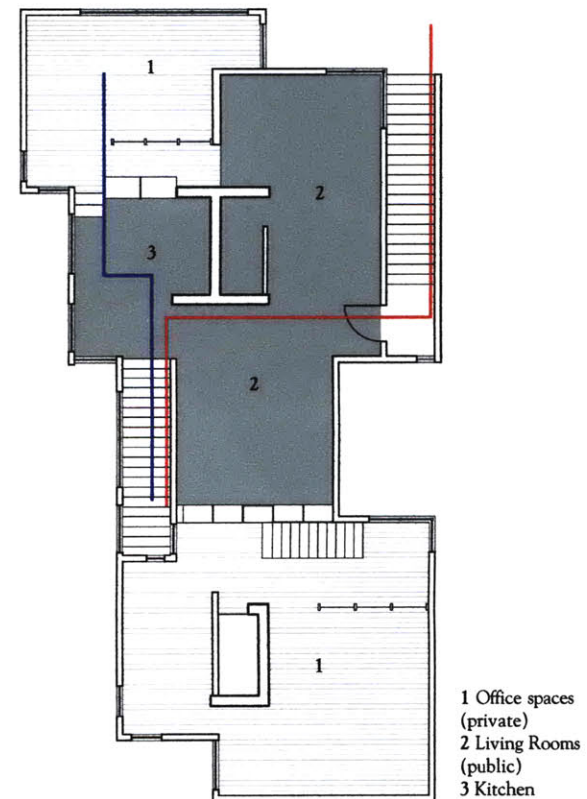
54

At this point, the investigation had yielded four general elements of home office design. Each one aims to ease the psychological stresses of the homeworker, and each would be further elaborated in the final ¼” exploration.

On the level of the whole apartment, psychological distance between home and work is achieved through the layout and topology of the spaces. The central location of the apartment’s public spaces creates a distance between the two private extremes of work and sleep, which is accentuated by the topological shifts at the transition points. The homeworker now has psychologically distinct realms for living: a place to work, another to sleep, another for eating, resting and living.

Abstracted second floor plan.
Red line traces the entry into the upper apartment, into the public areas, and downstairs to private areas.
The blue line traces the “commute” to work: upstairs from the bedroom, through the public spaces, and upstairs again to the office.
Scale: 1/16” = 1’-0”

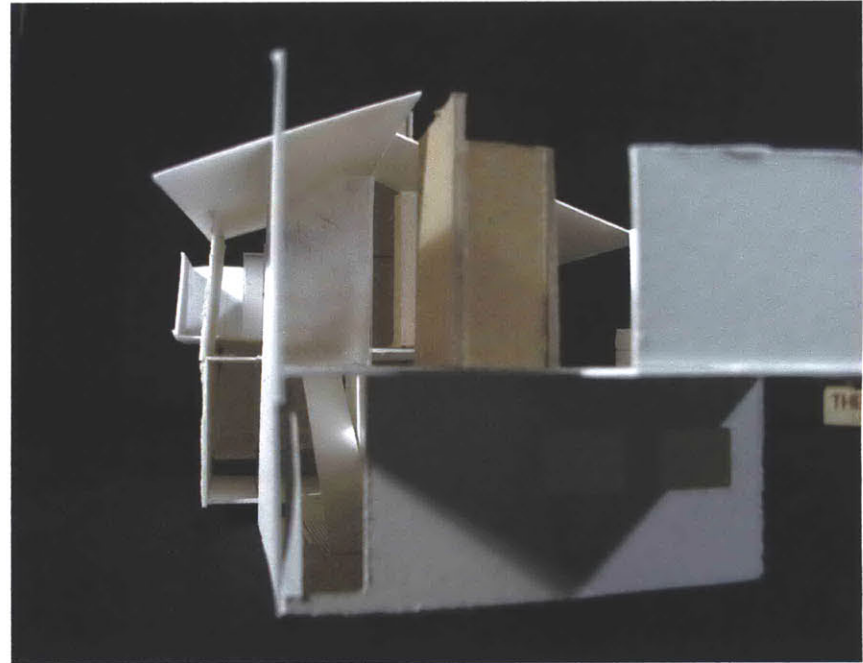
ELEMENTS





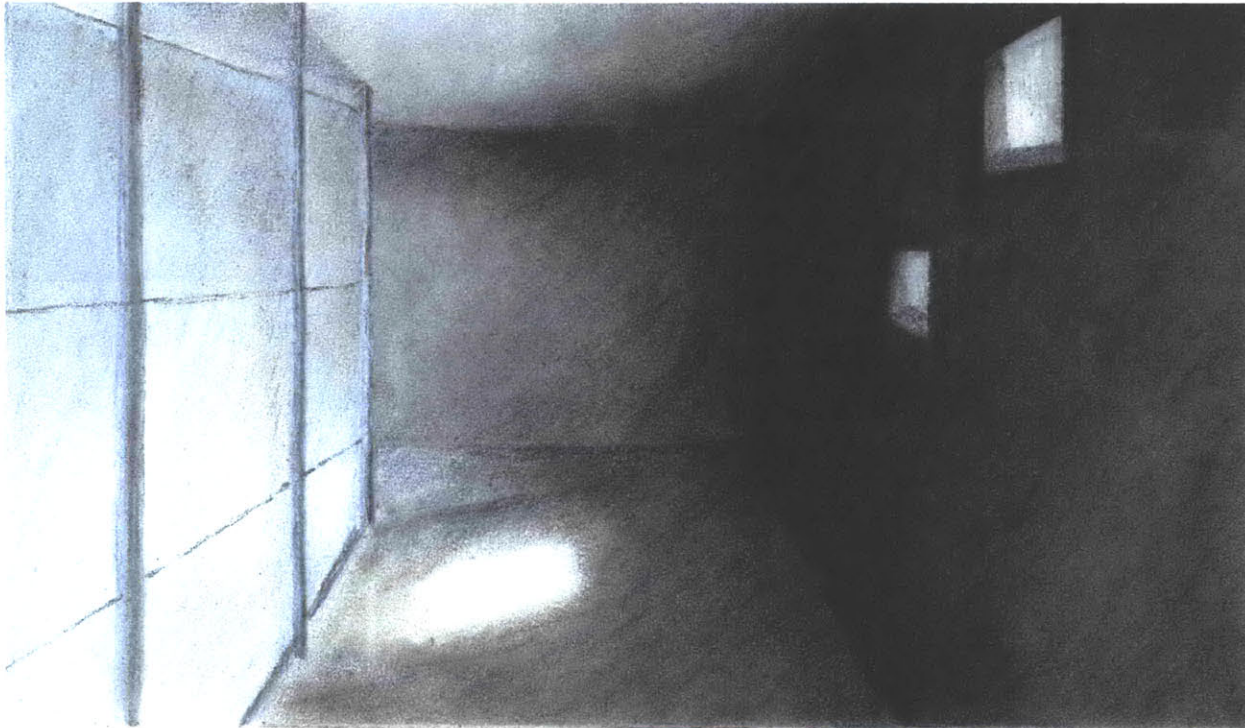
Windows, which are portals to the cyclical changes of time outside, are important to help the homemaker feel connected to his world. In numerous places, the building pulls away to open up a narrow canal of vision out to the gardens or to the street, leading the eye outside and into the distance. The living rooms of both apartments are designed with similar goals. In the lower floor apartment, a picture window to the outside garden is covered with a small overhang that extends the boundaries of the room to include the outdoor space. On the second floor, the front corner dissolves into large windows that begin just off the floor level. This panoramic view feels more “real” for including peripheral vision and the occupant feels that he can almost step outside.

Left, corner window at top of second floor landing.



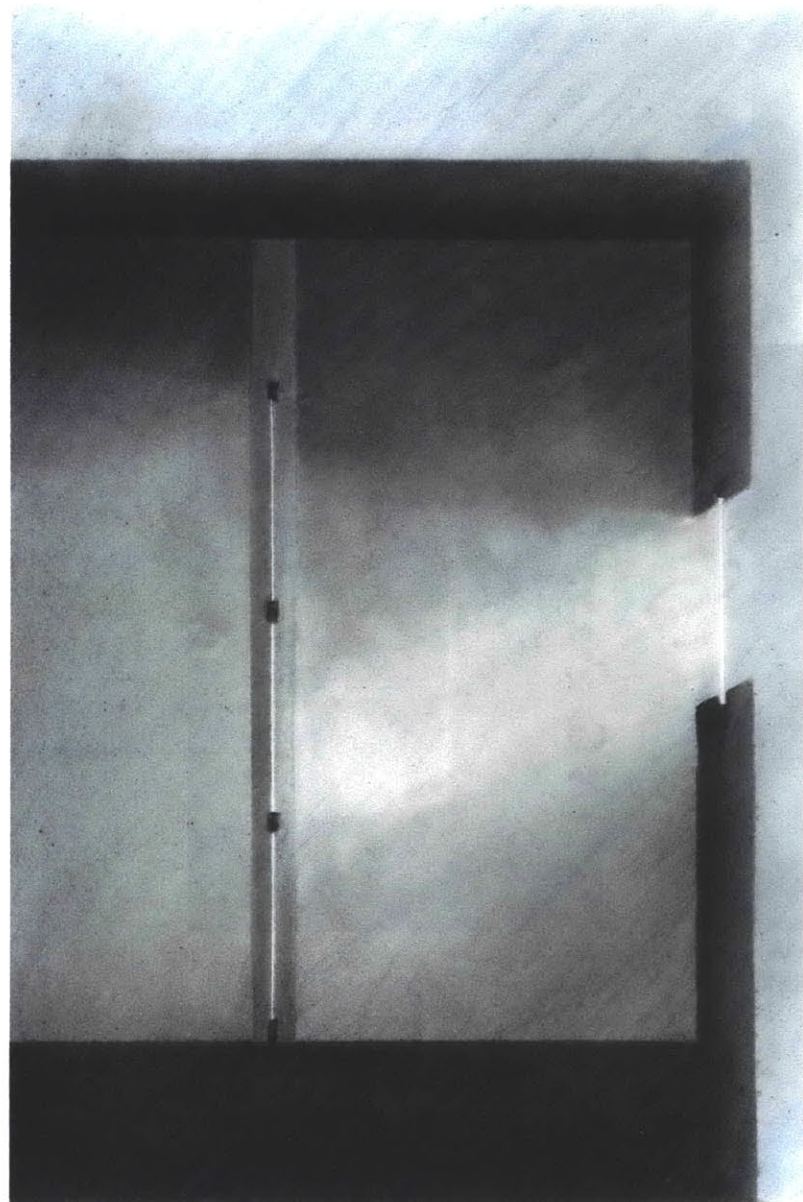
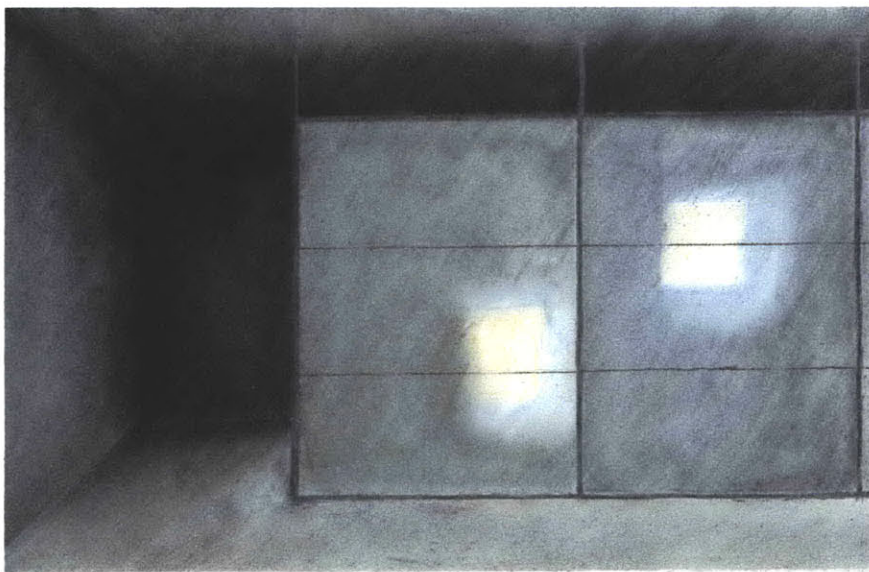
Left, view of lower floor apartment's living room and garden.

Right, 1/8" model showing building form pulling way to create canals of view.

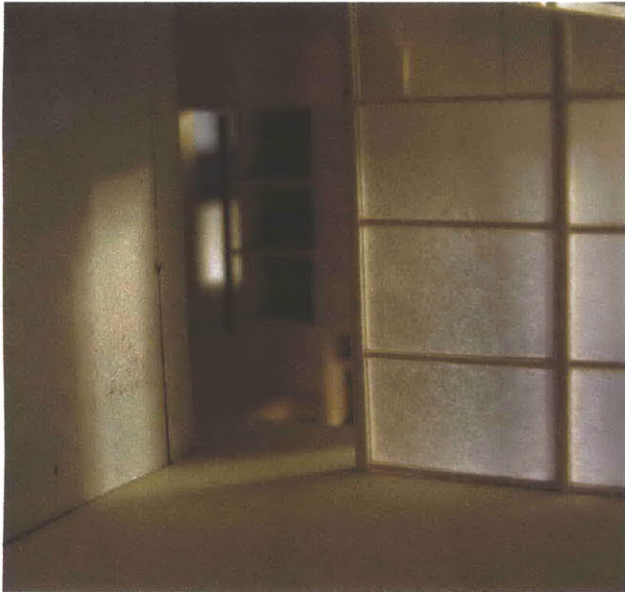


Inside the office itself, backlit translucent screens are not only pleasant sources of ambient light, but also markers of time. Both office spaces would have one screen wall near its entrance that tracks the sun's movements. The screens also help define the ritual of transition between living and working: as a homeworker leaves his office, he must pass through a volume of light between a window and its projection onto the screen.

Pastel renderings of the translucent screens and their effects on surrounding space.

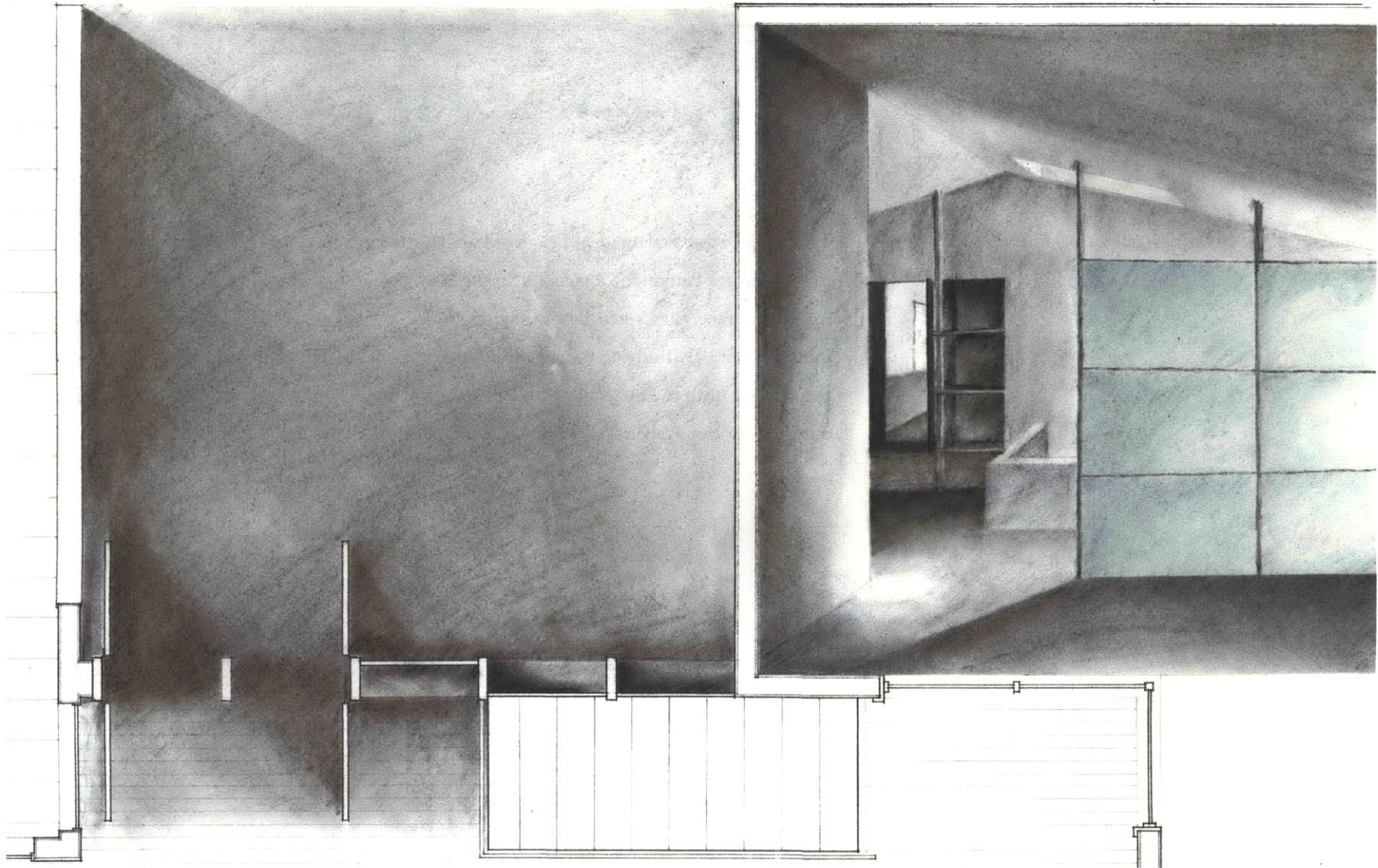


Design 53



View of connector bookshelves, from the final model.

The last element provides a connection between the two occupants of the building and combats feelings of isolation. This connection occurs at the place where the two apartments switch floors, where the office hallway of the lower floor apartment is adjacent to the living room of the second floor apartment. Here, a built-in cabinet opens to create a passageway between the two apartments. Privacy of each is guarded by a slight elevation change between the two rooms (18") and by locked doors on either side of the opening: both occupants need to agree before the connection occurs. This not only allows the homeworkers in the building the possibility of community, but also opens the house up to its longest perspective, making both apartments seem larger.



Rendered plan of bookshelves & perspective view from back office.

NOTES

¹ This design was based on ideas I explored with my teammates, Edward Pitts and Laura Bouwman, in a project for Fernando Domeyko's Spring 2001 Design Workshop. Our project involved layering white trace, punctured by overlapping holes, over an existing window that only receives indirect light. By studying it over the course of the semester, we learned that the projection of the skylight onto the trace allows one to trace the imperceptible movement of the sun throughout the day. See Appendix for documentation.

Design 57

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APPLICATION

The final-review model was the application of these elements towards a specific profession of homeworker. With a specific program of working and living needs, the building was designed at a larger scale that enabled me to further explore and define the general elements.

PROGRAM: THE INTERNET TELECOMMUTER



Michael Kress in his home office.

This building is designed for individuals whose jobs involve computer work. The program is based on the compiled needs of three telecommuters I observed and/or interviewed: Michael Kress, David Cassidy and Holly Rossi. These homeworkers' jobs are computer and Internet based, and their work rarely takes them further than their computer terminals. They perform most of their tasks online or via phone and rarely have the need for business meetings in their home offices. Their main complaints/ design needs involve the psychological problems stated above, as well as needs for space, natural light and view.

Based on my research, I chose the typology of compromise between integration and separation. This decision was based upon these homeworkers' need for psychological distance, as well as my research into typical working habits. Most homeworkers do not work in long

Chart based on Michael's work habits. Periods of work (red) are charted against periods of sleep (blue) and the cycle of the sun (yellow). His work periods are punctuated by breaks of different intervals as he tires over the course of the day and is re-energized after dinner.



stretches of time but rather in shorter bursts of a few hours each, punctuated by various breaks. Michael loves working at home for the ability to quickly take breaks by running to the kitchen or living room. For him, having an office in a separate building would negate many of the benefits of working at home. With the quasi-integration typology, the office space would seem sufficiently distant from the living areas as to allow for productive working (and restful breaks away from the office) but would be close enough to the living areas to allow for quick breaks and multi-tasking between work and domestic tasks.



Site Plan
Scale: 1" = 30'-0"

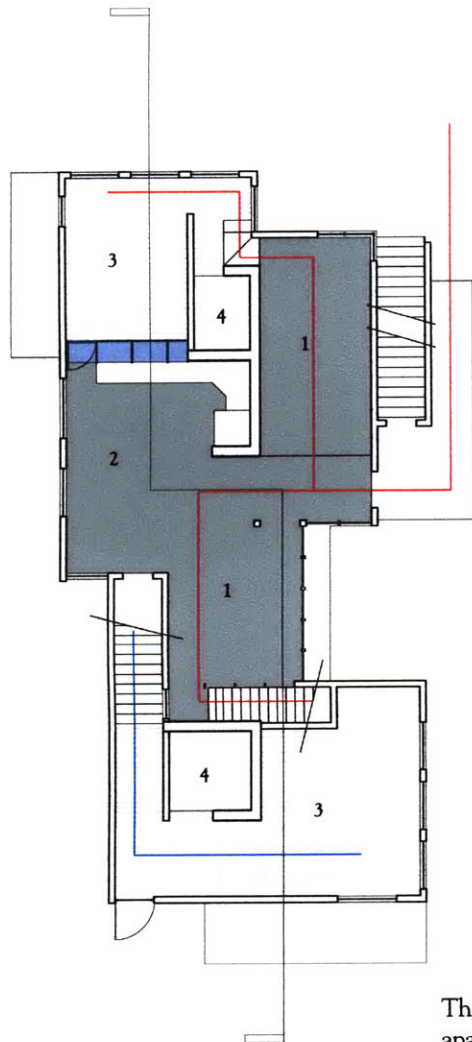
62 Application

FINAL MODEL

The addition of materials furthered the design goals of the elements. The public spaces have polished concrete floors throughout while the office and bedrooms have hardwood floors. The materiality shift between the unyielding concrete and the softer wood is yet another signal in the transition between home and work. All movement through the apartment rotates around this concrete mass, which is emphasized by the concrete “cores” which house the kitchen, bathrooms and plumbing. Each apartment has two public rooms, one in the center of the building and the other facing Holland Street, which could be used for a variety of purposes. The entry to both apartments is in this central area. An enclosed stair runs along the outside of the south wall, providing entry to the upper apartment. For the lower apartment, one descends along a gravel path and, with the private courtyard in view, enters into the living room.

All of the bedrooms and offices are separated from the concrete public areas by delineated transitional spaces. For the front areas (bedrooms on the first floor and office on the second), this zone is partly defined by deep built-in cabinets. Some cabinets open into the kitchen and others into the front room, and still others open completely to create a view corridor throughout the apartment. For the second floor office, one must pass behind the

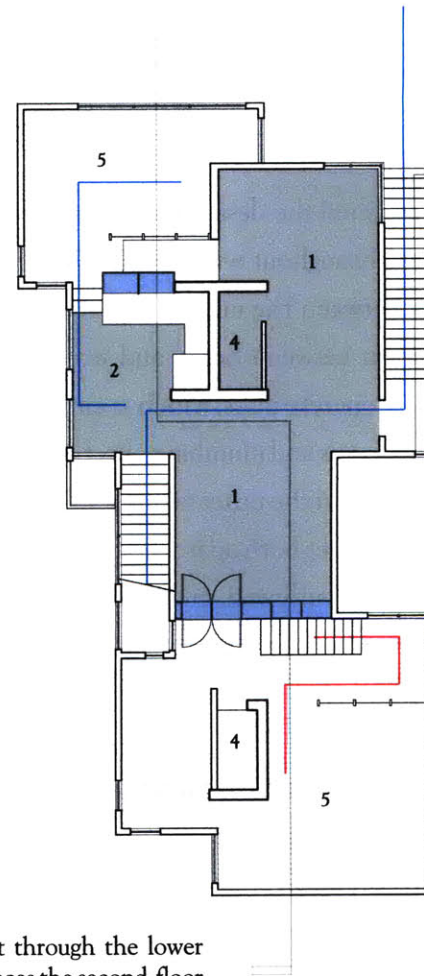
First Floor Plan.
Scale: 1/16" = 1'-0"



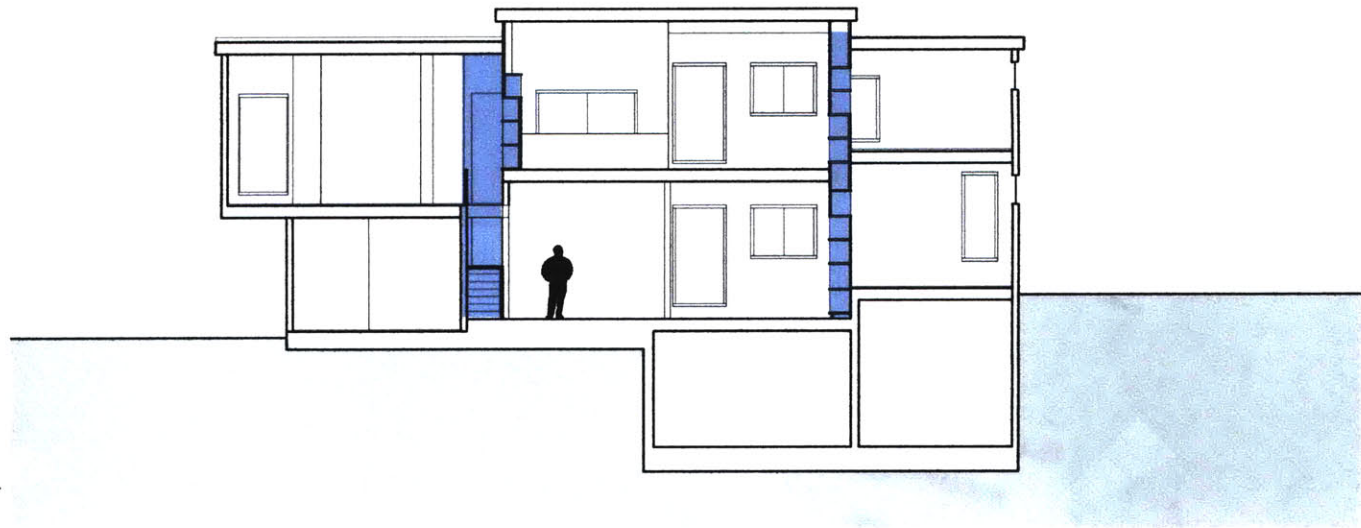
Holland Street

- 1 Living rooms
- 2 Kitchen
- 3 Bedrooms
- 4 Bathrooms
- 5 Offices

Second Floor Plan.



The red line traces movement through the lower apartment, and the blue line traces the second-floor apartment. Areas of possible connection are highlighted in blue.



Longitudinal Section
Scale: 1/16" = 1'-0"
Blue indicates zones of separation between public and private spaces.

Application 65



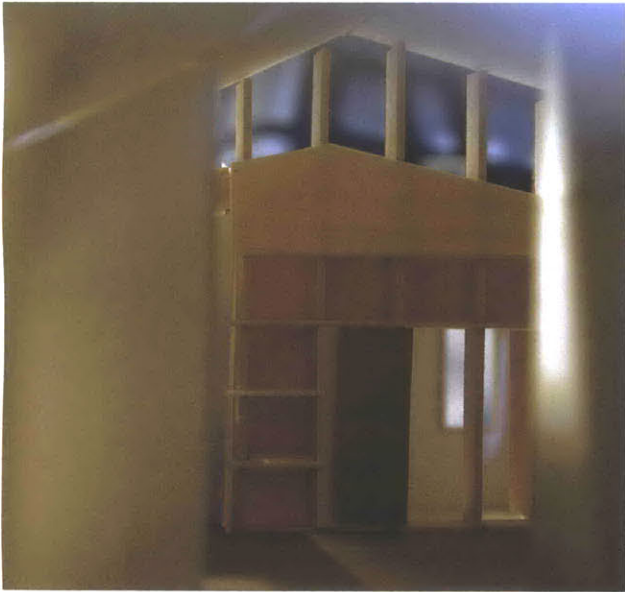
*Left, views of the second-floor apartment's office space.
Right, looking into the office past the bookshelves/cabinets
between the office and kitchen.*



screen and either slip through the 30" threshold of this cabinetry to the kitchen, or pass down a ramp enclosed by the screen on one side and the wall on the other. For the lower apartment's office, one passes behind the screen and into the hallway, greeted by a corner view into the gardens: the hall and stairs form its transitional area.



Left, an interior view of the first-floor apartment's office shows the screens, lit by the windows at the stair landing. *Right*, the stair landing and windows are part of the ritual.



The living areas become an integral part of the transitional experience between work, living and sleeping areas. In the upper apartment, one rises in the morning in the ground floor bedroom, which is still dark. Climbing the stairs, one enters the spacious and open living areas, which is brightly lit from the front windows, offering rays of morning sun as well as a view of the waking city. One then enters the office area via ramp, passing by the translucent screen. The office area is also brightly lit: a few windows are low enough to allow the respite of view, but the others are high clerestories, allowing light without being overly distracting. In the afternoon, windows in the rear of the office allow in the setting sun, which pass over the screen, signaling the end of the day.



Far left, two views into the living room from the front of the house. Clerestory windows in the living room face the rear gardens, providing a view of the foliage. Left, looking up the ramp connecting the living room and office.

In the lower apartment, the bedroom begins the day brightly lit. One exits the bedroom into the living areas, passing windows that view the street before turning to face a view of the gardens. These windows will admit direct sun around noontime. Skylights above the stair light it from above, and as one climbs the area gets gradually brighter. Passing by another view of the gardens at the landing, one passes by the screen into the office. Here the clerestory windows provide view of the foliage in the backyard and admit direct light in the midafternoon.

Top, view of glass wall towards garden, taken from entry to apartment.



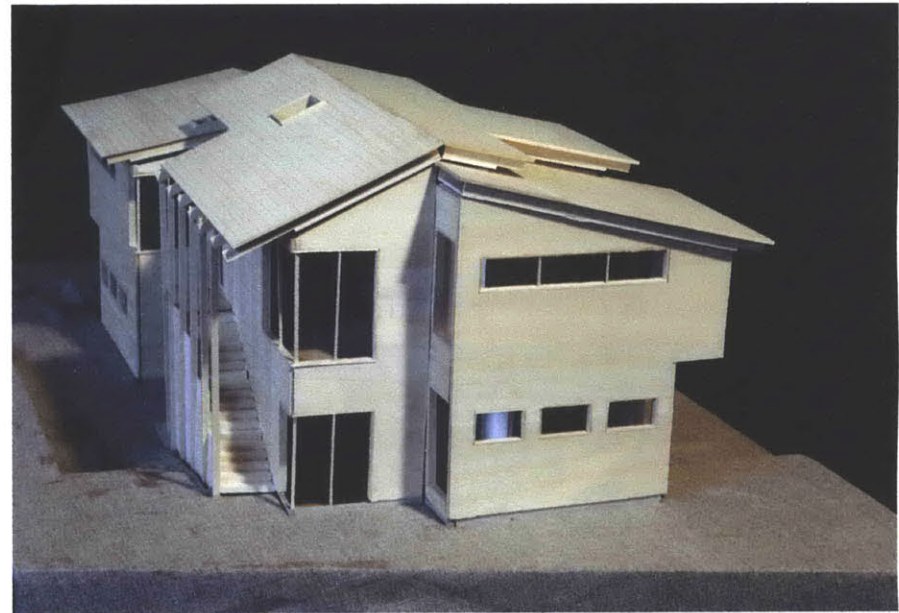
Application 69



Sectional view of the building, from the north. In the center are kitchens for both apartments, and to the right is the second-floor's stair to its bedroom. The long rectangular window is translucent, providing light to the first-floor apartment's stair on the other side.

The built-in furniture that connects the two apartments marks a special moment of sharing between the apartments. Both apartments have their main stairways in this area, and the windows and shared built-in bookcases all allow for communication between the two apartments. Like the kitchen cabinetry, the bookshelves contains some shelves that open up to one apartment and some to the other, and two 30" wide panels have doors on both sides. When both doors are opened, both occupants benefit from a visual and acoustic connection through the entire building. The translucent glass between the two apartments in this area protects the privacy of the occupants, but allows for a different kind of sharing. The translucent area will provide light to both stairs at different times of day as the sun moves around the house, and each will witness the ghost-like passages of their neighbors behind the glass.

Exterior views of the building and its gardens. Below, approaching the site from Davis Square. One either climbs the stairs to the second-floor apartment or descends a gravel ramp to the first floor's entry. Right, the view from Holland Street. Bottom right, a view from the rear gardens.



SITE DESIGN



View of the morning garden and the entryway to two buildings, with gardens in back.

The building elaborated in the final ¼" model was designed to be the middle building on the site, flanked on either side by another building of homeworkers. The corner building is smaller than the other two by necessity, as a tree in the front yard necessitates a setback, and the building cannot extend too far into the backyard with closing off much of the direct sunlight to the gardens. This front setback defines the area of the morning garden. The corner building has a different site condition from the two interior buildings, as it faces both Holland Street and the residential Thorndike Street. For reasons of privacy and acoustics, the two street sides of this building would be more shut down and the building would open itself to its side gardens and the rear gardens. Each of the two interior buildings creep as close to the street as possible, giving each building a view down Holland Street unobstructed by its neighbor.



Top, a view up Thorndike Street towards Holland Street.

Bottom, a site plan collage helped determine the design of the site. The black paths designate gravel, and the different terraces of the site are denoted by the various shades of green.





All three buildings are located close together, creating narrow canals between them. These canals seem very tight upon viewing from the street but open up as the buildings' forms shift, creating side spaces for the private gardens of the first floor apartments. This area is terraced so that the garden is 18" lower than the pathway that runs alongside it, delineating the private zone. The second floor apartments have their private gardens in the rear of the house, accessible from its interior stair. In the rear of the site, the public gardens drop another 12" to be level with the neighboring yards behind the site. This drop defines the entry into these gardens, which are quiet and meditative. Isolated from the noise of the street, this area is a place for the noises of nature, of wind and trees.

Left, the view from the rear gardens to Holland Street. The forms of the two buildings push and pull against each other, creating narrow visual canals and wider gardens.

Opposite page, two views of the site from Holland Street and an aerial view of the street.



5

CONCLUSIONS

The course of this research revealed the complexities of the design task. Working at home is strongly defined by profession and personality, and attempting any sort of generalizations was extremely difficult. I spent much of the semester hoping to achieve a design that was sufficiently general as to meet the needs of many, if not all, homeworkers. I quickly realized the impossibility of this task. The critics at the final review, some of whom had worked at home themselves, described their needs as architects and how the final design would not accommodate them. The programmatic needs of different professions and living situations are so varied and often contradictory that only two solutions were feasible: the design of an infinitely flexible space or the design of adaptable elements. I rejected the first option early on as being inappropriate for the project. When a space can be a space for everything, it becomes a space for nothing. It is designed for the lowest common denominator and does not fulfill the needs of any life activity. One basic assumption of this project was that a home office needs to be its own defined space, and have certain qualities relative to the rest of the house. This assumption is antithetical to the idea of very flexible space, and so I chose to design adaptable elements. The fact that the final application is based the needs of the thirty-year-old, urban computer-based professional reflects the category of homeworkers

that I interviewed for this project. For other home-based businesses, such as doctor's offices or retail operations, the same elements could be modified and used to great effect.

The next stage of this research would be numerous applications of these ideas, accompanied by more specific research into the programmatic needs of different homeworkers. The few interviews I did for this project were extremely helpful and I could not imagine designing for a different set of needs without a like amount of data. In the coming years, we will see the numbers of homeworkers continue to rise, as technology makes it possible for people to work and also be with their families, and work from great distances away. This telecommuting workforce has always been a silent minority, spread out and each isolated from the other. Homeworkers have recently begun to find their voice with the publication of several home working magazines, among other developments. We will begin to see the development of housing that includes workspaces, marketed towards homeworkers, and we will be able to see how others address this particular design challenge.

APPENDIX

WINDOW INVESTIGATION



The translucent screen studied in this thesis was based on a full-scale window intervention I designed and studied with my teammates, Laura Bouwman and Edward Pitts, in Fernando Domeyko's Spring 2001 workshop. We chose a window in a 4th floor hallway at MIT which rarely receives direct sunlight. As a result of this, the space is often very flat (far left). Our intervention consisted of four layers of white trace paper suspended from the ceiling. Three layers had varying holes cut into it, and the fourth (the furthest from the glass) was solid. We studied the window through drawings for 2 months, and observed

the screen made the window more sensitive to changes in weather and the cycles of the sun. Even when the light was indirect, the projections of the holes on the solid sheet was constantly changing; both in position and in color over the course of the day.



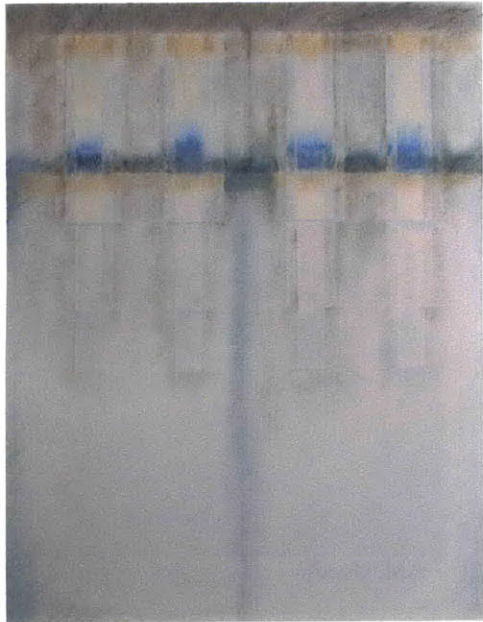
11 AM, sunny



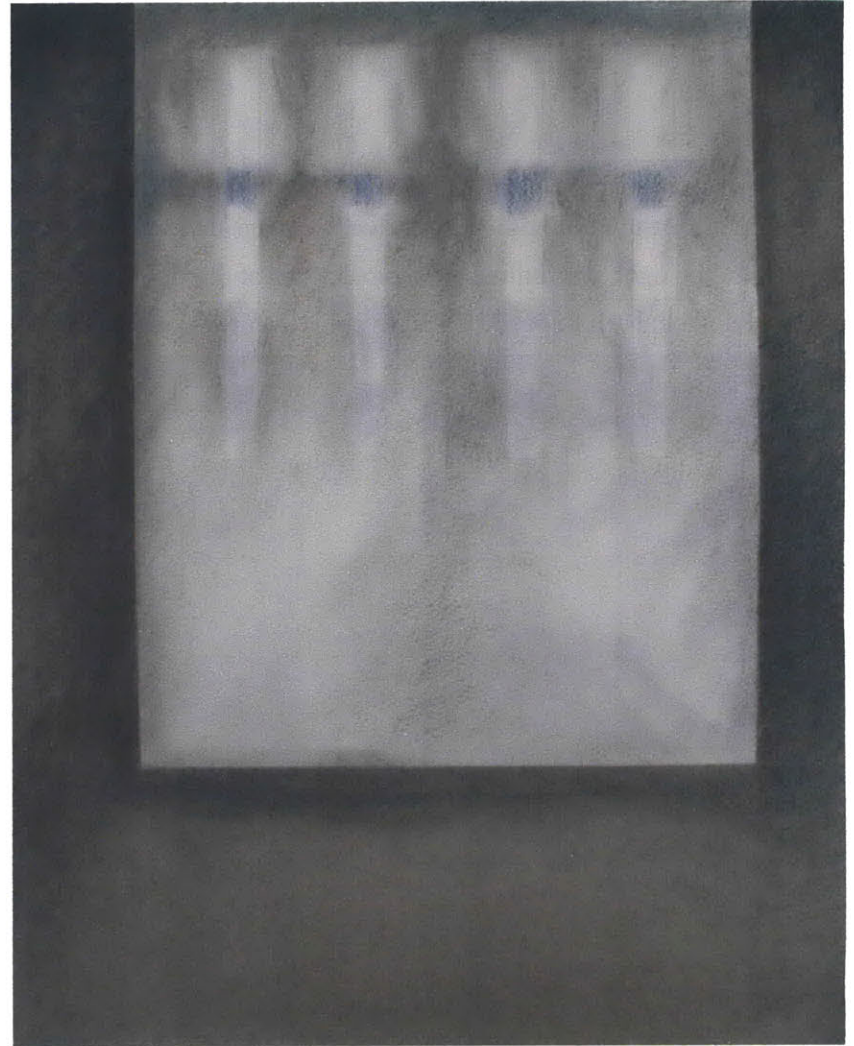
1 PM, cloudy



7 AM, cloudy



Pastel studies of the window:
1 PM and 7 AM studies, left;
Final drawing, 1 PM, below.



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LIST OF ILLUSTRATIONS

all photographs and illustrations are
by the author unless listed below:

- 1 House of Business, cover image.
- 2 Home Business Magazine, p. 86.
- 3 Home Office Computing, p. 4.
- 4 House of Business , p. 53.
- 6 Living + Working Spaces, p.67.
- 7 Home Business Magazine, p. 92.
- 8 Le Corbusier, Alive, p. 122.
- 9 Mapquest, www.mapquest.com
- 14 Surveyor's Map, courtesy of City of Somerville

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