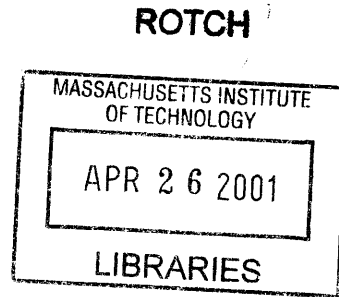


Urban Relay: Circulation Morphology
[accelerator city]

Anthony C. Guma
Bachelor of Design in Architecture
University of Florida
Gainesville, 1998



Submitted to the Department of Architecture
in Partial Fulfillment of the Requirements for the Degree of
Master of Architecture at the Massachusetts Institute of Technology,
February 2001.

Signature of Author

Anthony C. Guma
Department of Architecture
January 19, 2001

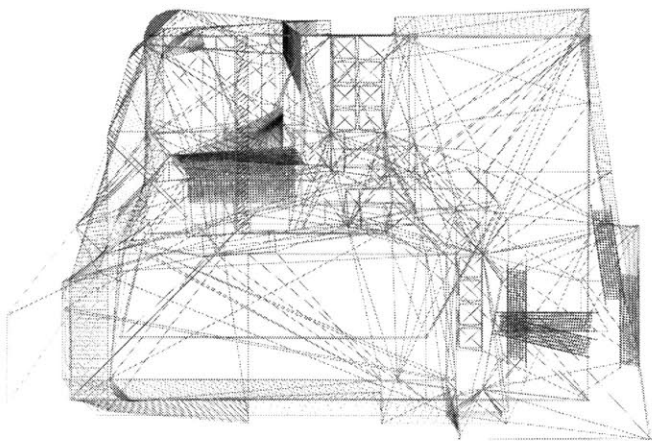
Certified by

Ann Pendleton - Jullian
Associate Professor of Architecture
Thesis Supervisor

Accepted by

Roy Strickland
Principal Research Scientist
Chair, Departmental Committee on Graduate Students

© 2001 Anthony C. Guma. All Rights Reserved
The author hereby grants to MIT permission to reproduce and to distribute
publicly paper and electronic copies of this thesis document in whole or in part.



Thesis Committee

Thesis Supervisor

Ann Pendleton - Jullian

Associate Professor of Architecture
Massachusetts Institute of Technology

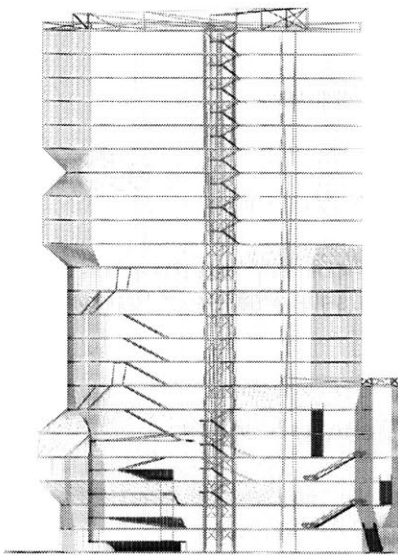
Thesis Readers

William J. Mitchell

Dean, School of Architecture and Planning
Massachusetts Institute of Technology

Ellen Dunham - Jones

Director, Architecture Program
College of Architecture
Georgia Institute of Technology



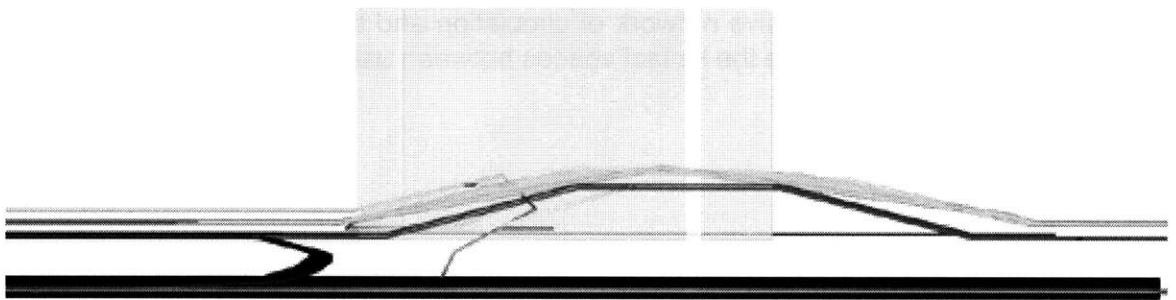
Urban Relay: Circulation Morphology
[accelerator city]

Anthony C. Guma

ABSTRACT

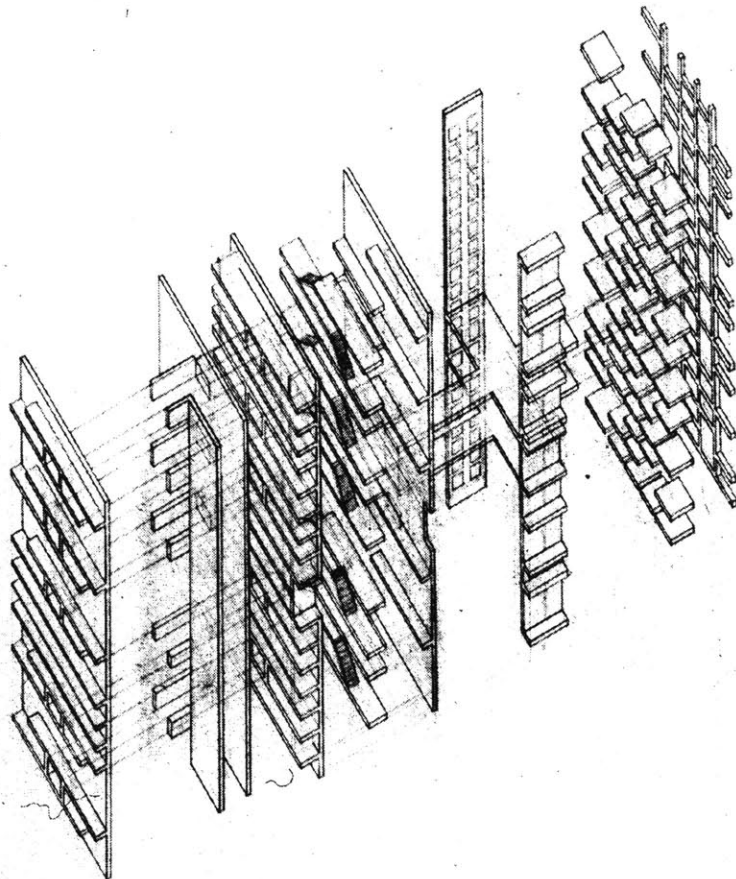
Generally, in the contemporary cities vertical buildings are conceived and implemented as subdivided volumes that set up highly regularized modes of inhabitation. This condition limits the possibility for more complex and adaptive spatial relationships between program and use. This limitation exists at a time when the relationship between individuals and their patterns of living is becoming increasingly more complex. This thesis will explore the design of the mixed-use building through a study of program, circulation, skin, and form. Sited in Boston at a point of intersection between programs, people, and of conflicting physical parameters, this project will develop a system to (re)organize space within a given volume and the flows through it. This system of programmatic organization will be mediated through a responsive network of circulation and the articulation of surfaces that frame the liminal spaces between uses.

Thesis Supervisor: Ann Pendleton - Jullian
Title: Associate Professor of Architecture



contents

■ Background	9
<hr/>	
■ Site	19
<hr/>	
■ Organizational Diagrams	27
<hr/>	
■ Generative Studies	35
<hr/>	
■ Initial Organization	41
<hr/>	
■ Plan Development	49
<hr/>	
■ Vertical (re)Development	57
<hr/>	
■ Skin Development	73
<hr/>	
■ Concluding Representations	85
<hr/>	
■ Bibliography	98
<hr/>	
■ Acknowledgments	101
<hr/>	



sectional analysis drawing

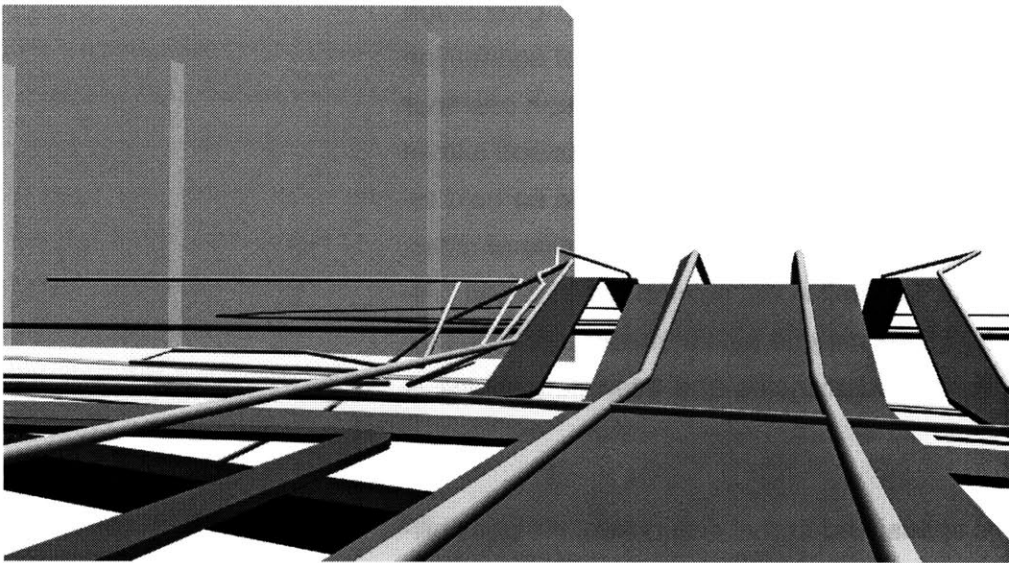
Unité d'Habitation, Marseille
Le Corbusier

vertical division

[over and under]

In many urban contexts, the sectional quality of a typical vertical building reveals repetitive independently functioning floors with minimal connection beyond. Circulation through this section consists of nodal points of connection between one floor and another and also between one floor and the ground. This current scenario does support a level of flexibility by allowing for individual worlds to be held together within a framework. This creates a series of different programmatic uses all encapsulated within a skin. Although such buildings may be called “mixed-use”, their inherent potential for adjacencies and interrelationships is denied.

Along with this spatial and formal disjunction, the possibilities for social and public interaction also conforms to the logic that is imposed by this typical programmatic organization. That of a limited number of interconnection points between the different levels of movement based on a system of similar repetitive floor slabs. Within this, public interaction is reduced to the amount of time that is used to enter and exit the superstructure as well as the time spent within the space of an elevator. These two realities devise a set of issues that can be translated into a design criteria based on the redistribution of vertical (and horizontal) space to accommodate a more active system of social interaction that takes advantage of the heightened velocity of daily activities.



site movement diagram

vertical past

[inside-out]

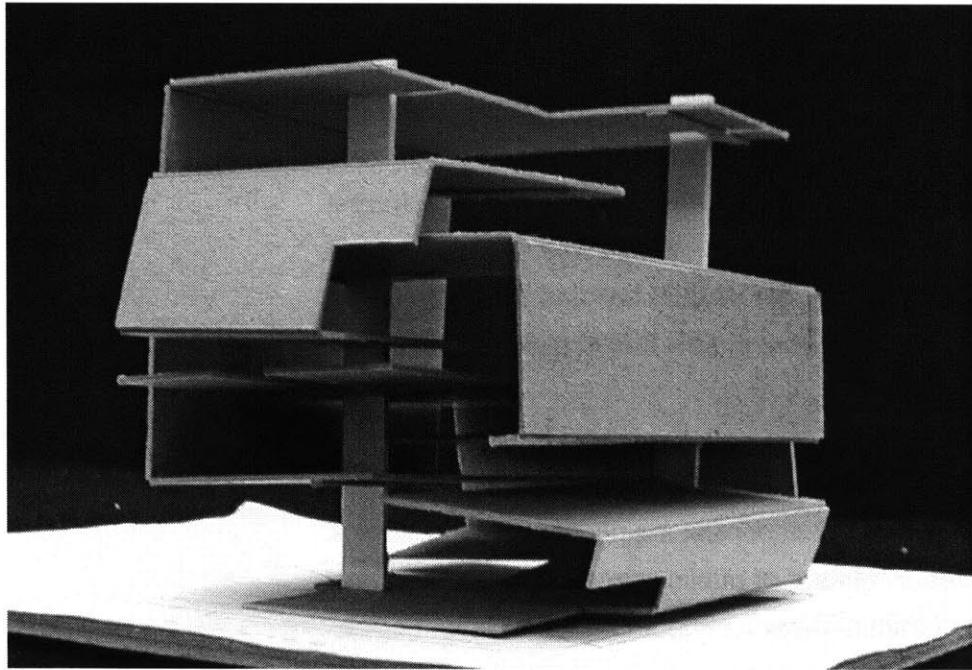
The questioning of the space that creates a vertical architecture has existed since their initial designs themselves. These issues encompass discussions of structural innovations, environmental concerns, and in a large part, formal and aesthetic qualifications. Within this, there is also a history of considering the vertical building in relation to its spatial arrangement from a view that is more see from the “inside-out.”

This shift occurred from in the time between 1960 and 1980 with built examples that consist mainly of vertical buildings with an interior “atrium” of public space.¹ This concept became the dominant means of adding another layer of public space to the previous standards for towers that are dominated by their outward formal expression. Resolutions of these types can be seen in the large interior spaces within the hotels of John Portman and other architects who followed.

Near this same time, the work of Rem Koolhaas in *Delirious New York* was a critical look at New York City. In this book, Koolhaas investigates many aspects of New York and in a several places he discusses the internalized relationships within vertical buildings. In his analysis of the Downtown Athletic Club, Koolhaas describes a “complete conquest - floor by floor - of the Skyscraper by social activity.”² He does this by explaining a world of thirty-eight repeating

1. Paul Golgberger, *The Skyscraper*. (New York: Alfred A. Knopf, Inc. 1981), 139.

2. Rem Koolhaas, *Delirious New York*. (New York: The Monacelli Press, 1994), 152.



initial programmatic folding

floors that exist through containing a wide array of independent and discrete activities that all function within a volume and are all used to achieve a singular goal. This ultimate goal of personal self-improvement for the inhabitants is concluded through the interconnection of many sub-programs. Thus, it is the rigid three-dimensional grid of the steel frame and the elevator that allow for any combinations and adjacencies of programs.

Although Portman proposed one type of solution, and Koolhaas pointed out a problem that may not be a problem, it was years earlier and through the work of Le Corbusier that another type of approach was explored. In his project for the Unité d'Habitation in Marsailles, Le Corbusier combines living units, recreation spaces, a hotel, a co-operative store, and several other communal amenities within a contained rectangular mass.³ Embedded within this arrangement are several modes of circulation including stairs, high-speed elevators, and "interior streets." Through this assemblage, Le Corbusier stitches together a web of spaces for dwelling and living, with the lines of communication and circulation between them. In this sense, the building begins to live up to the metaphor of a city.

3. André Wogenscky, "Description of the Marsailles Block," in *The Marsailles Block, Le Corbusier*, trans. Geoffrey Sainsbury (London: The Harvill Press, 1953), 52-58.

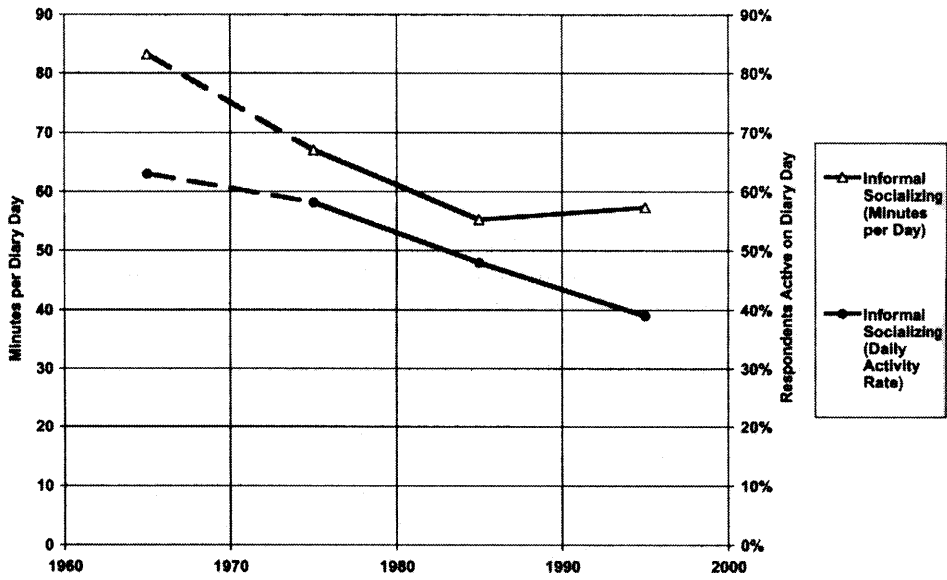


Figure 1:
 Informal Socializing as Measured in Time Diary Studies, 1965 - 1995
 Reprinted from Robert D. Putnam, *Bowling Alone: The Collapse and Revival of American Community*. (New York: Simon & Schuster, 2000), 108.

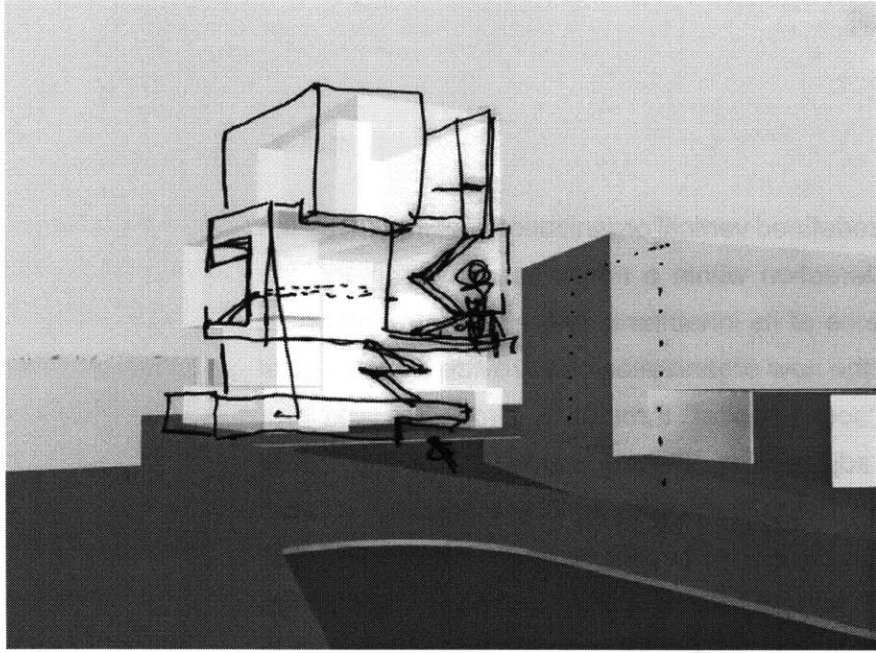
vertical network

[social capital]

Through a redefined vertical organization that increases the physical interaction within a mixed-use environment, the social patterns of its inhabitants can also be transformed. In this way the new organization can provide a system that increases “social capital” through its circulation and programmatic adjacencies. Robert Putnam states that “social capital refers to the connection among individuals - social networks and the norms of reciprocity and trustworthiness that arise from them.”⁴ Putnam also concludes that surveys in 1999 reveal that “America’s civic life had weakened in recent years...and that our society was focused more on the individual than the community.”⁵ In response to this decline, the spatial relationships between several different types on inhabitants and their additional support programs, communal crossings and gatherings can be permissible. Thus, an urban vertical building can promote an increase in the social capital of its inhabitants through a re-organized distribution of spaces, programs and the connective tissue between them. In doing this, a multiplicity of interior public spaces will be created.

4. Robert D. Putnam, *Bowling Alone: The Collapse and Revival of American Community*. (New York: Simon & Schuster, 2000), 19.

5. *Ibid.*, 25.



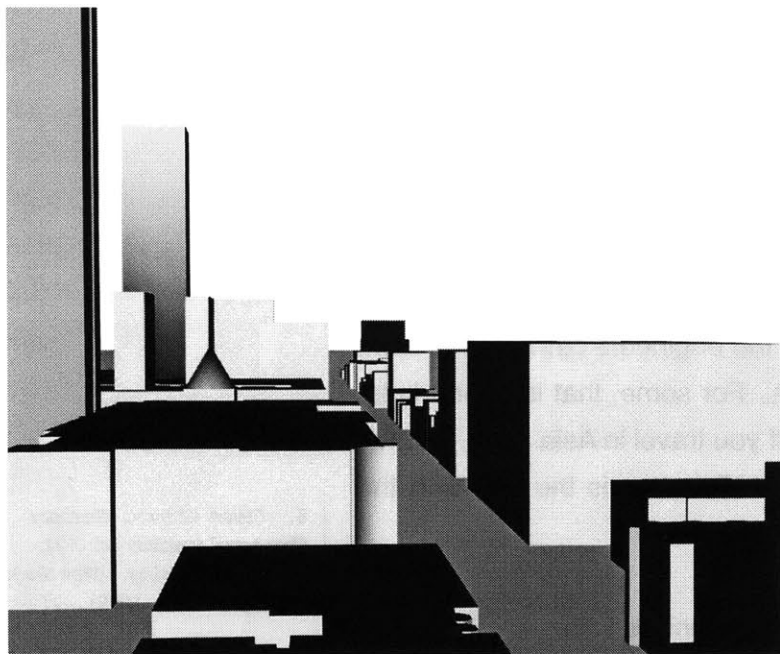
vertical movement

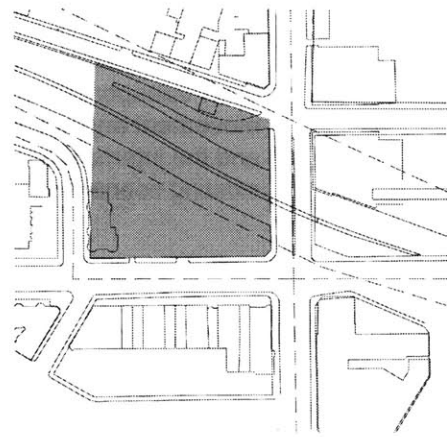
[accelerator city]

Part of this decline in the community as a function of public or social interaction may be related to the increasing number of individuals who exist at a hurried pace. In his book *Faster*, James Gleick explains many scenarios in which people are becoming more and more obsessed with time and speed. These descriptions range from the steps taken to save time cooking to the studies conducted in order to measure the differences and speeds of thinking.⁶ In relation to elevators Gleick explains that “Once on board, our antsiness only intensifies as we wait for the door to close. How long? *Door dwell*, as the engineers call it, tends to be set at two to four seconds. For some, that is a long time. And not just Americans. ‘If you travel in Asia at all, you will notice that the DOOR CLOSE button is the one with the paint worn off...’”

By mixing living spaces with amenities within a volume that are connected by public spaces and a series of movement possibilities, the sense of efficiency can be obtained and promote interaction. The result is a fast environment, yet one that still supports social connections and potentially builds social capital.

6. James Gleick, *Faster: The Acceleration of Just About Everything*. (New York: Vintage Books, 1999), 27.





site

intersection

The site is related to the existing potential development of the air-rights over the Massachusetts turnpike in Boston, MA. This site is at the intersection of the Massachusetts Avenue with the turnpike. This site exists as a condition of intense intersection for the flows of people, vehicles [public and private], and other transportation and commutation systems. By sitting within this web of movement and systems, the building's circulation can be infused with its context and the internalized movement within it becomes an extension of the site's existing connections and flows.

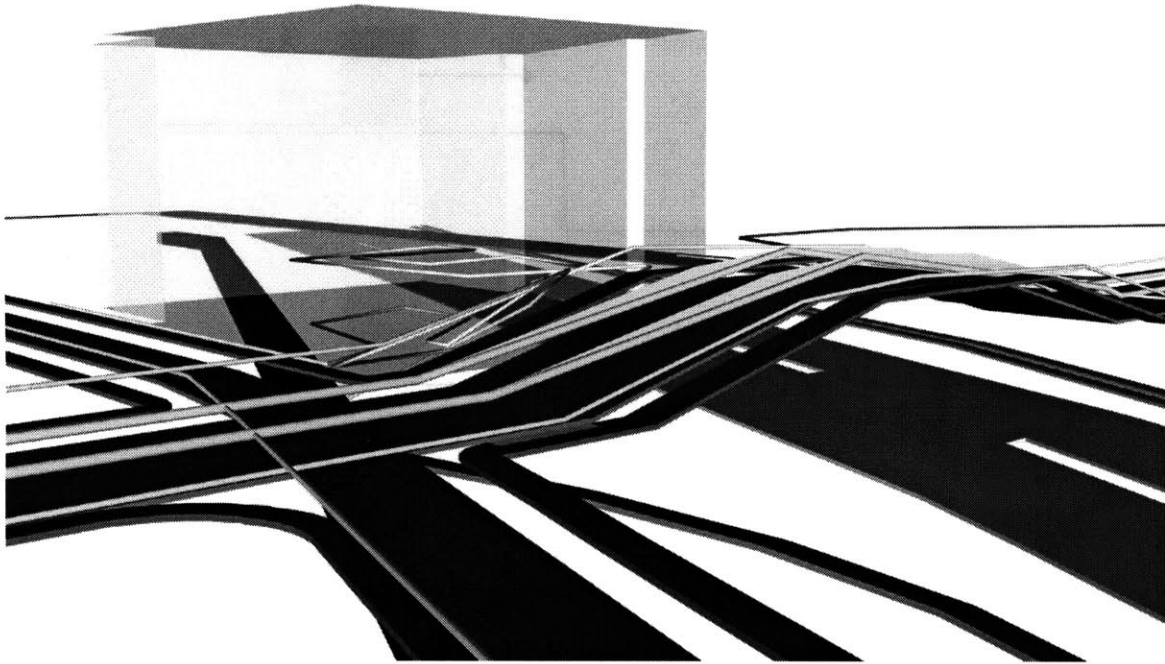




Figure 2:
Reprinted from Massachusetts
Geographical Information System

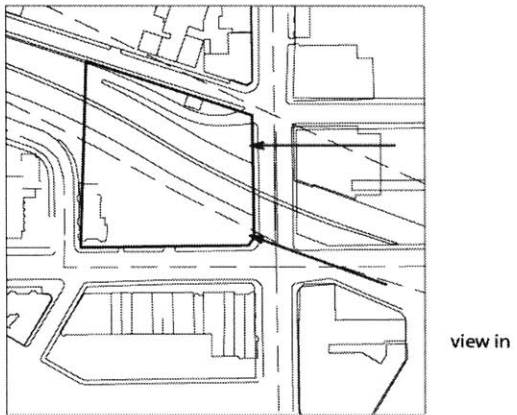
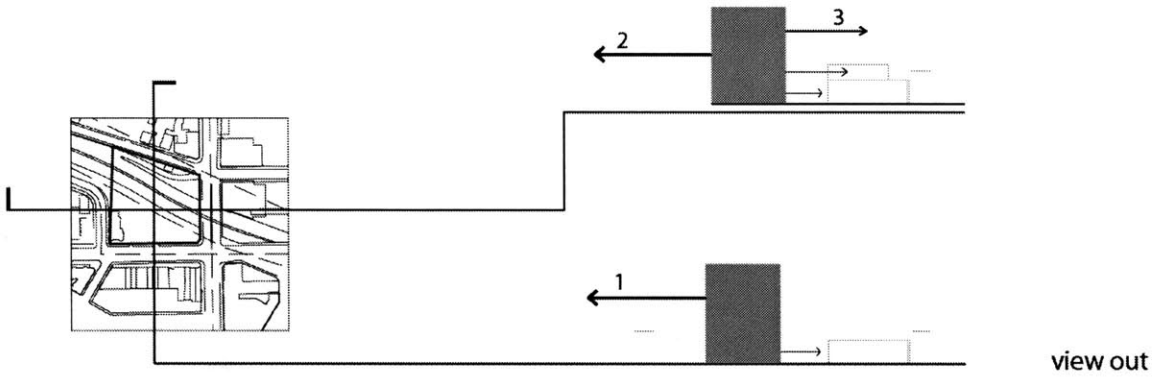


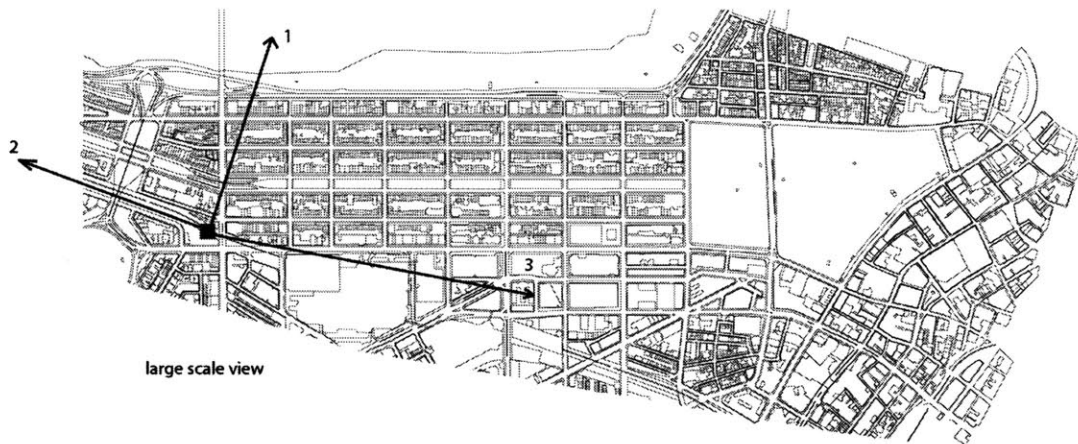




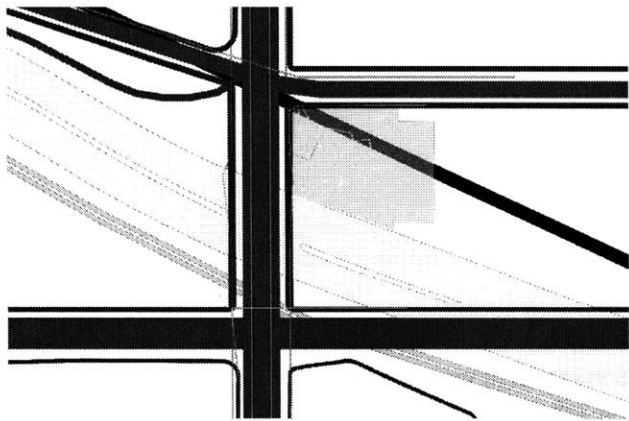
site movement diagram

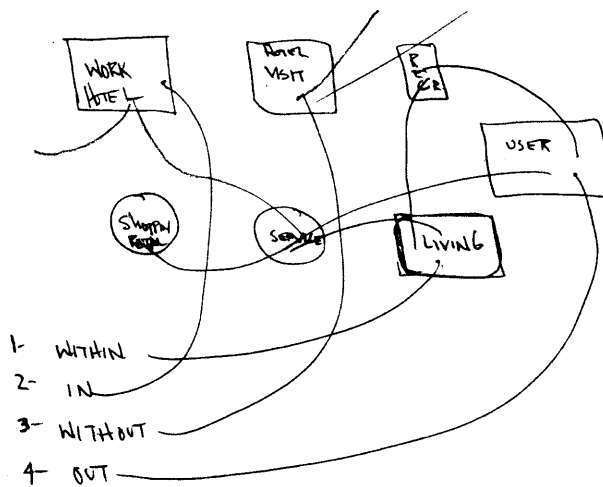
Its position at a node of intense movement and intersection inherently gives to the building a porous and ephemeral quality. It is passed through by shoppers, tourists, inhabitants, and by the vehicles passing underneath.



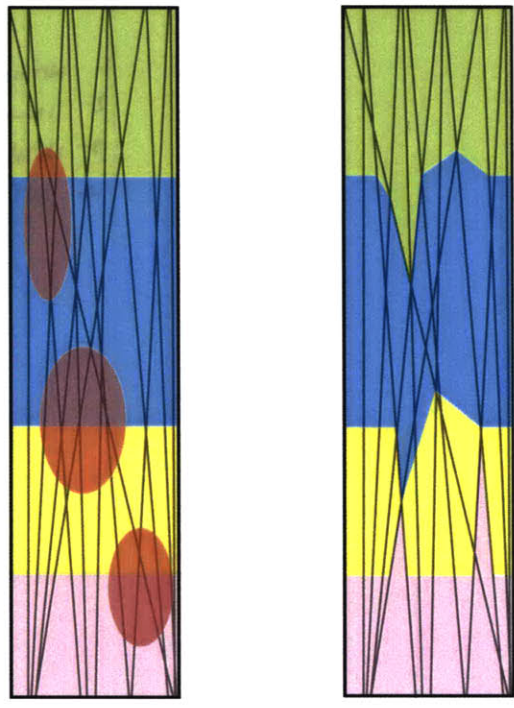
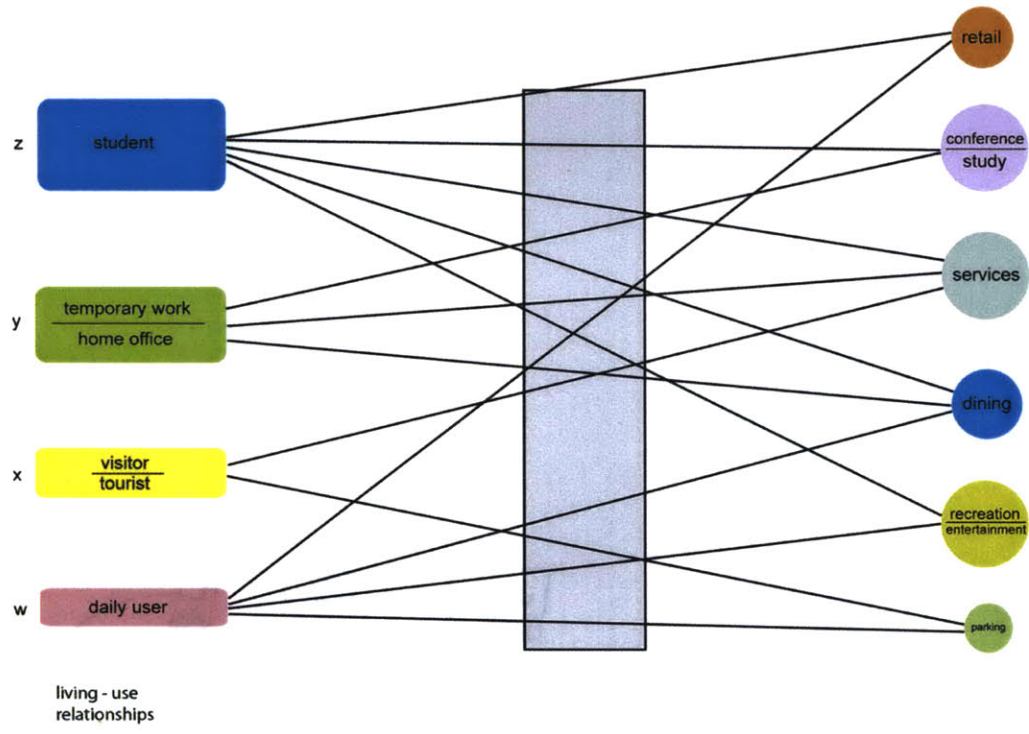


The characteristics of the surroundings in terms of views in to and out of the site create the parameters that will govern vertical placement of programmatic elements. These properties also define a critical level within the project at the eighth floor mark. This point represents zone of change where the contextual pieces of the site are redefined with respect to a vertical building in this specific space. After this level and absolute all subsequent levels take on a similar relationship to the site and creates a flexible zone for the absolute height of the building.

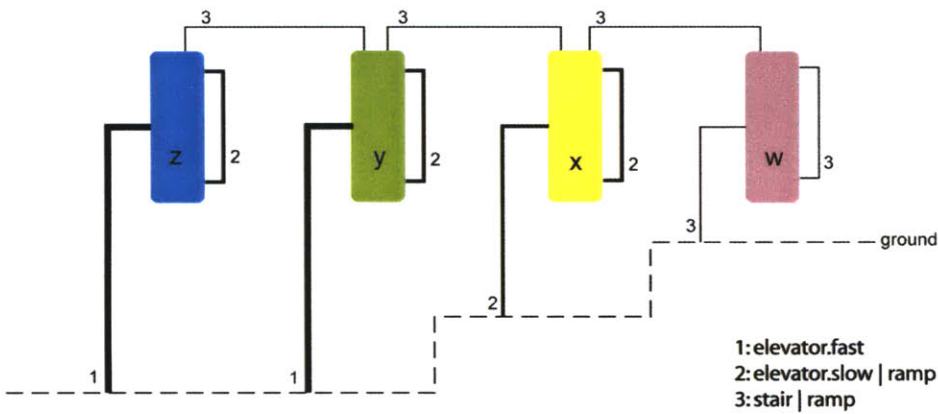




organizational diagrams



programs and overlaps



vertical circulation type associations

program: live - use relationships

The programmatic elements of the building consist of a mixture of uses within two main categories:

- a. living
- b. support

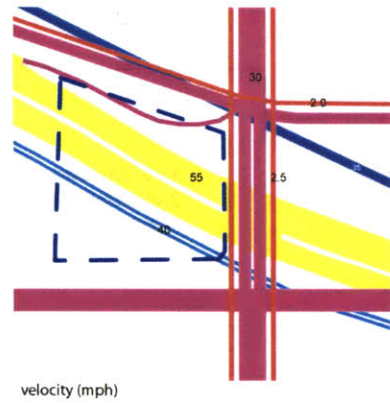
a. The living group contains four types of varying duration and temporality. No residency is considered permanent due to the transient and ephemeral quality of the site and the more rapid patterns of living and working. From this the four inhabitation groups are:

- W - daily user - retail consumers
- X - hotel user - tourists and business travelers
- Y - temporary work / live-work - short term city inhabitants
- Z - student living - supported by the multiple colleges and universities that encompass the site

b. The support programs include spaces for shopping, services, eating, communal work, conference rooms, and recreation.

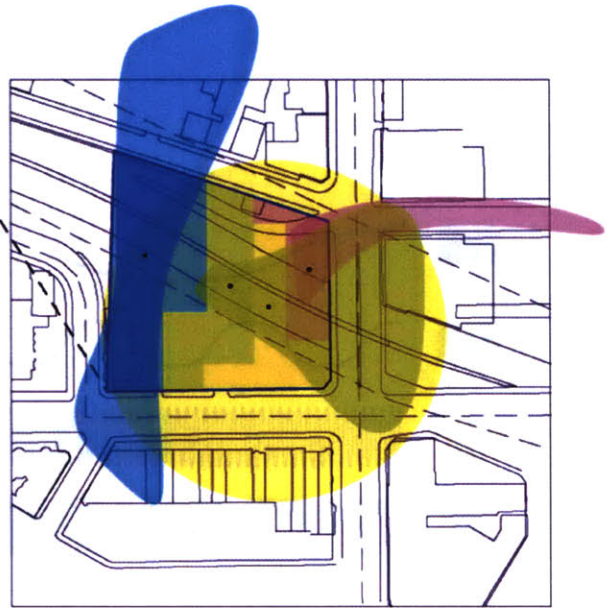
vertical circulation type associations

The vertical circulation criteria was based on a system of assuming connections within the program itself, between the programs, and between the program and the grounds. A logic based on speed was associated with each type of connection.

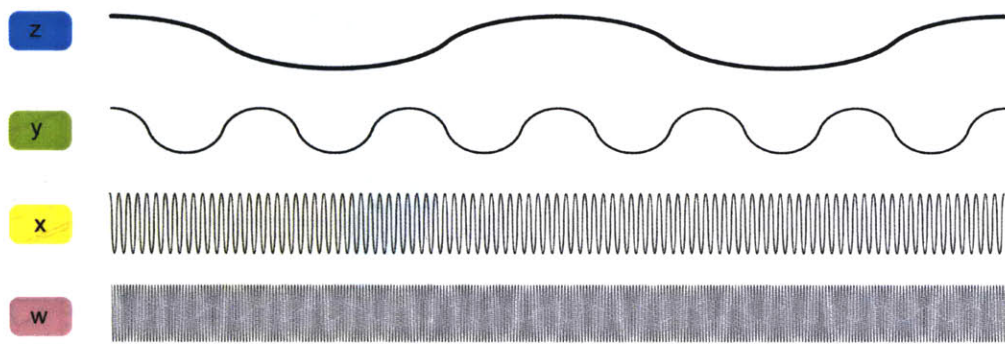


site [plan]

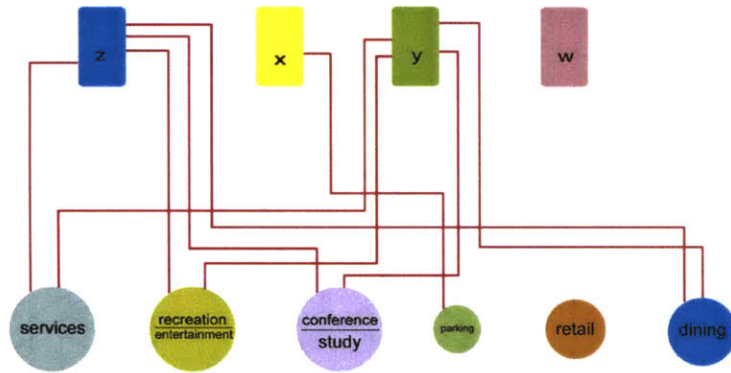
The vertical placement of program within the volume was based on hierarchical relationship with respect to duration. The most short term inhabitant closer to the bottom and the longer term closer to the top. The horizontal placed was loosely determined through a plan based criteria related to possible **site extensions** within the greater area.



site extensions



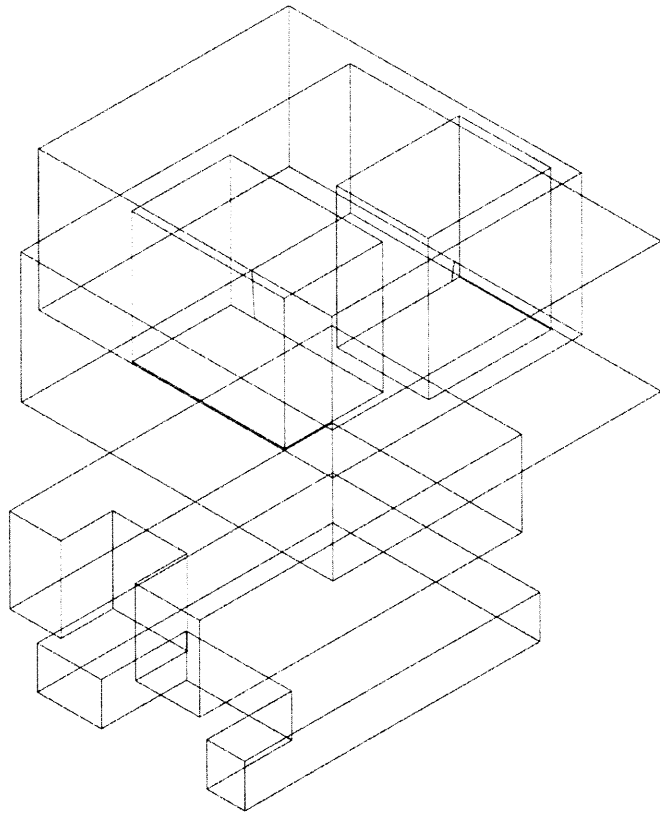
inhabitation frequencies (over two year span)

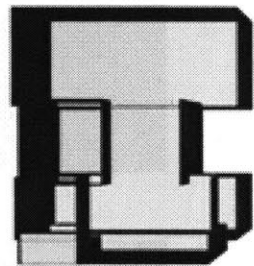
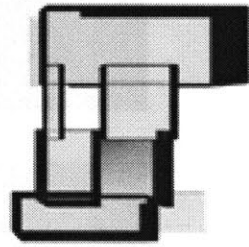


network(ed) | virtual connections

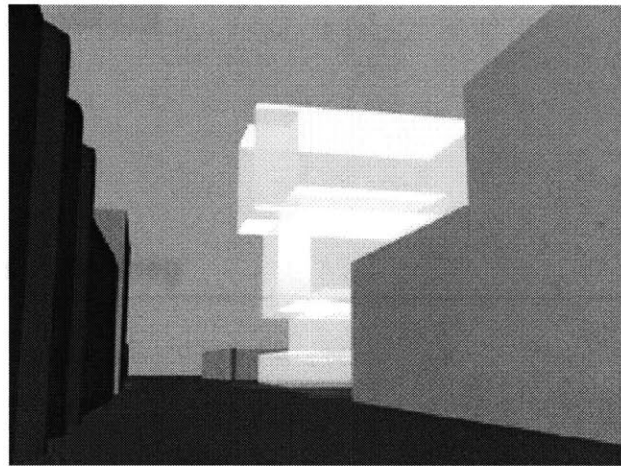
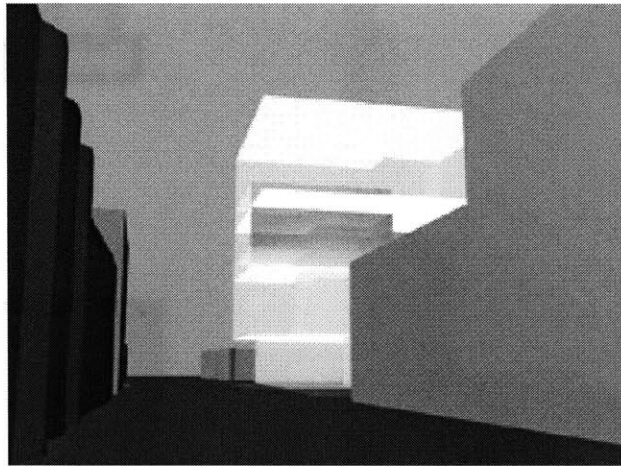
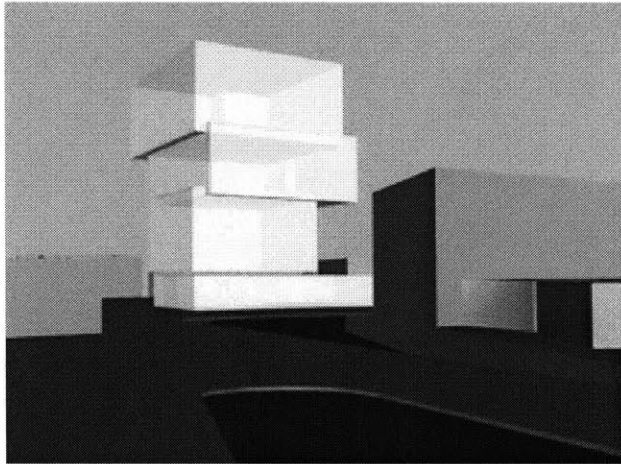
network(ed) connections

Within the physical relationships a networked system will connect the inhabitants with their associated support mechanisms. This system will gain both the efficiency of the virtual connection and also promote the social investment associated with actually traveling somewhere within the volume to pick-up or otherwise complete the said transaction. The virtual system itself will also be used to network the inhabitants both socially and professional to influence a building of ties and as a means of sharing information. A social intranet with a living environment.

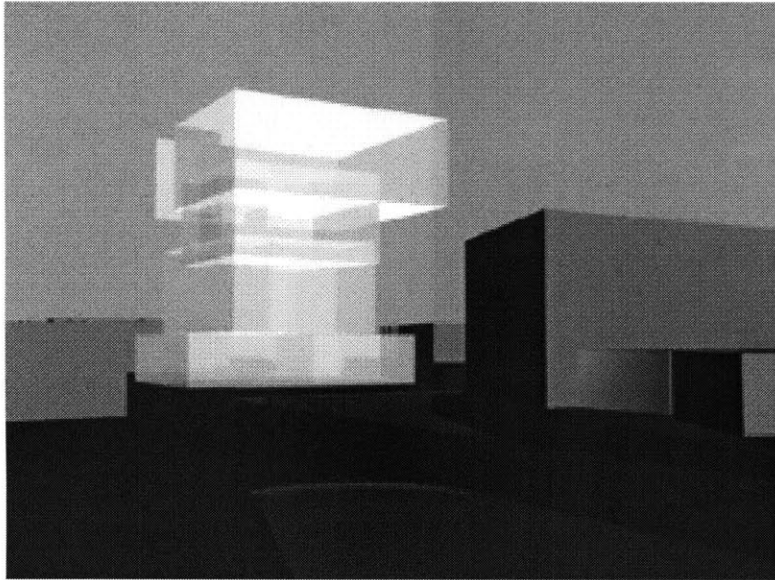




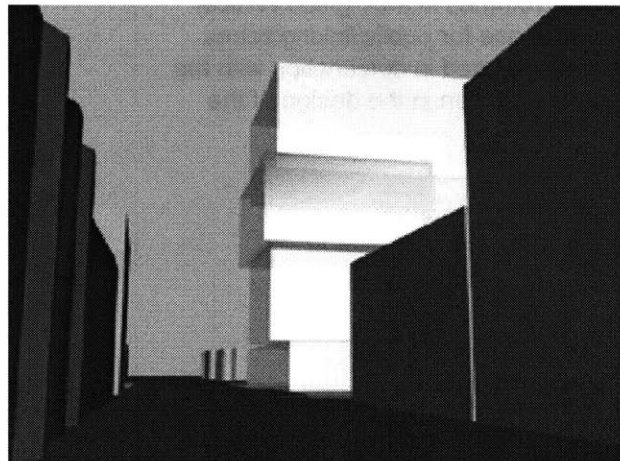
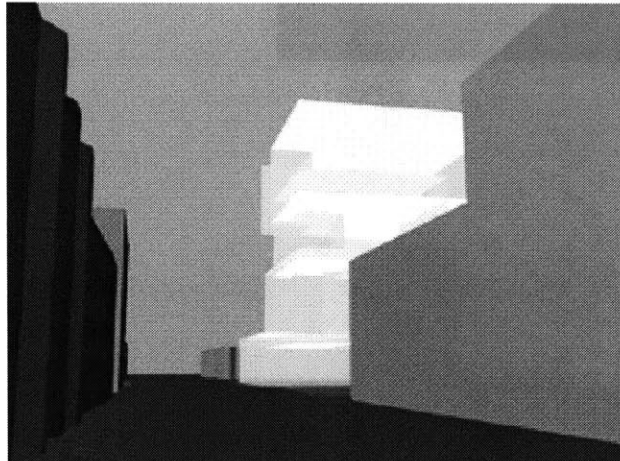
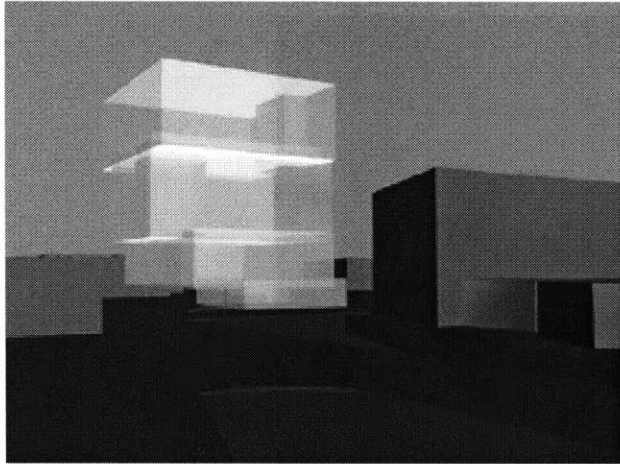
generative studies



perspectives



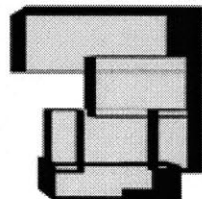
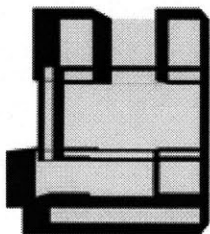
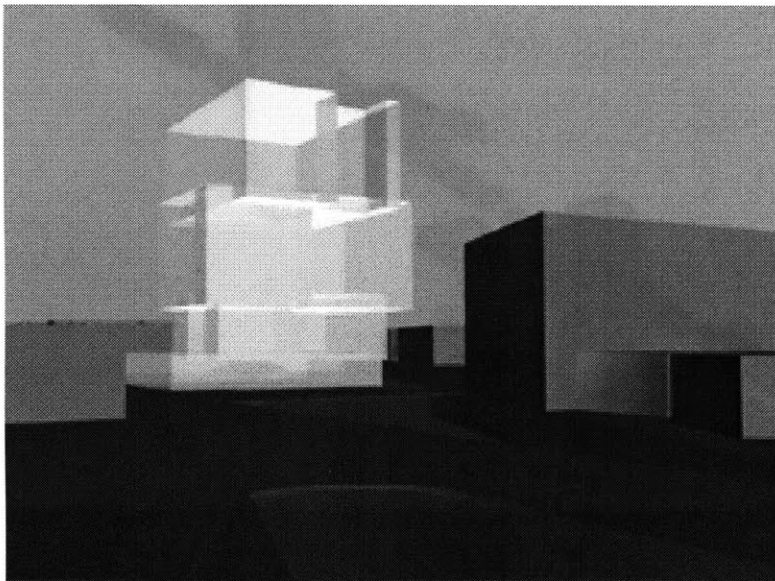
To begin deriving spatial and formal relationships and qualities a tool was created to model the programmatic volumes in their given vertical zones and then systematically removes space for public linking zones and for circulation. These studies were then used in conjunction with the other rules of program placement and connection in the design of the initial massing organizational study.



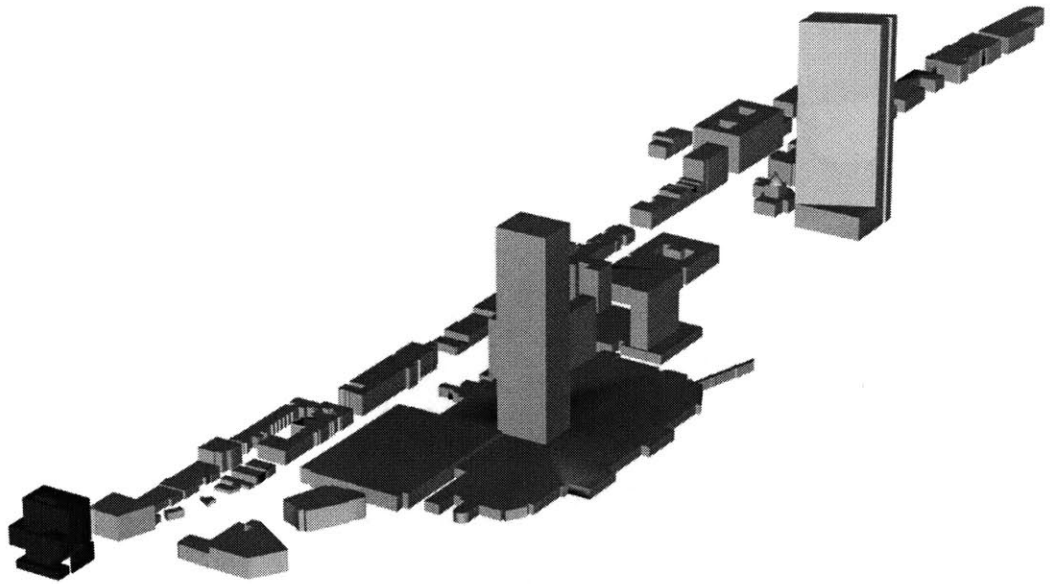
perspectives

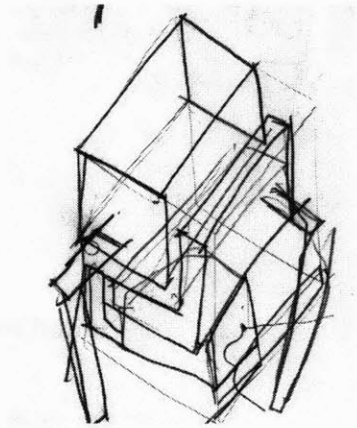
space parameters

Student	550 - 1150 sq.ft.
Temporary Work	550 - 700
Home / Office	500 - 1000
Hotel	250

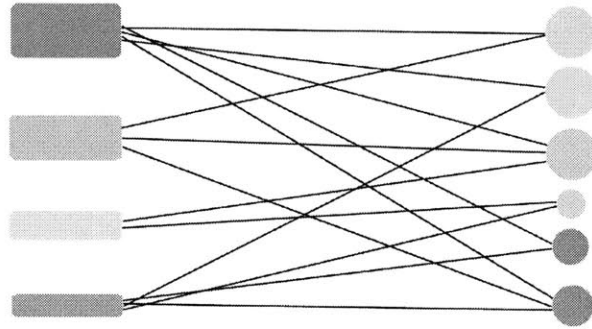


sections



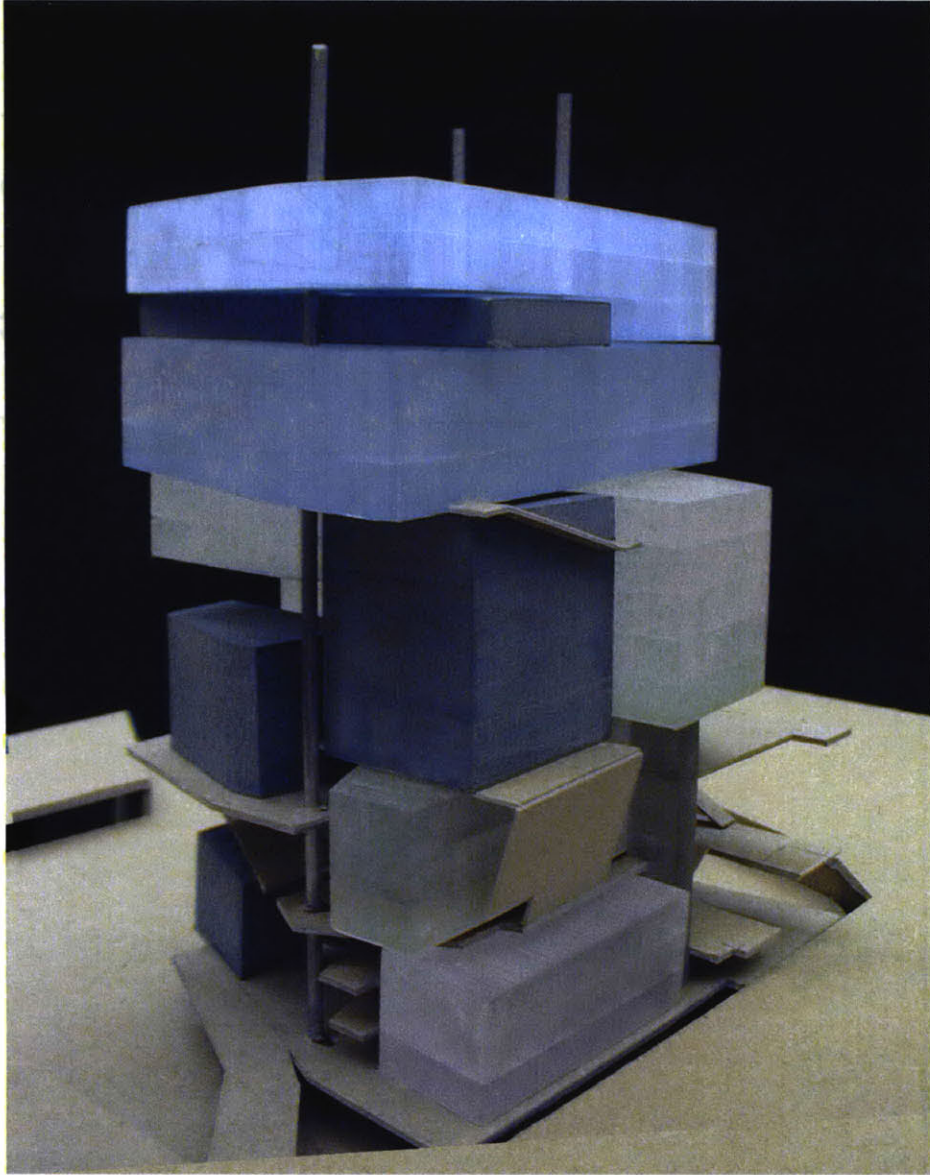


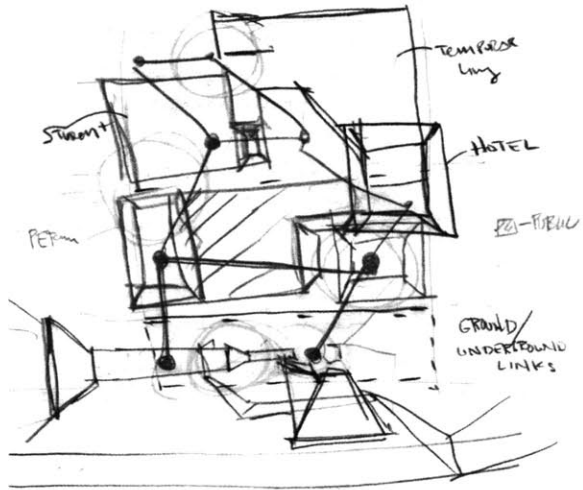
initial organization



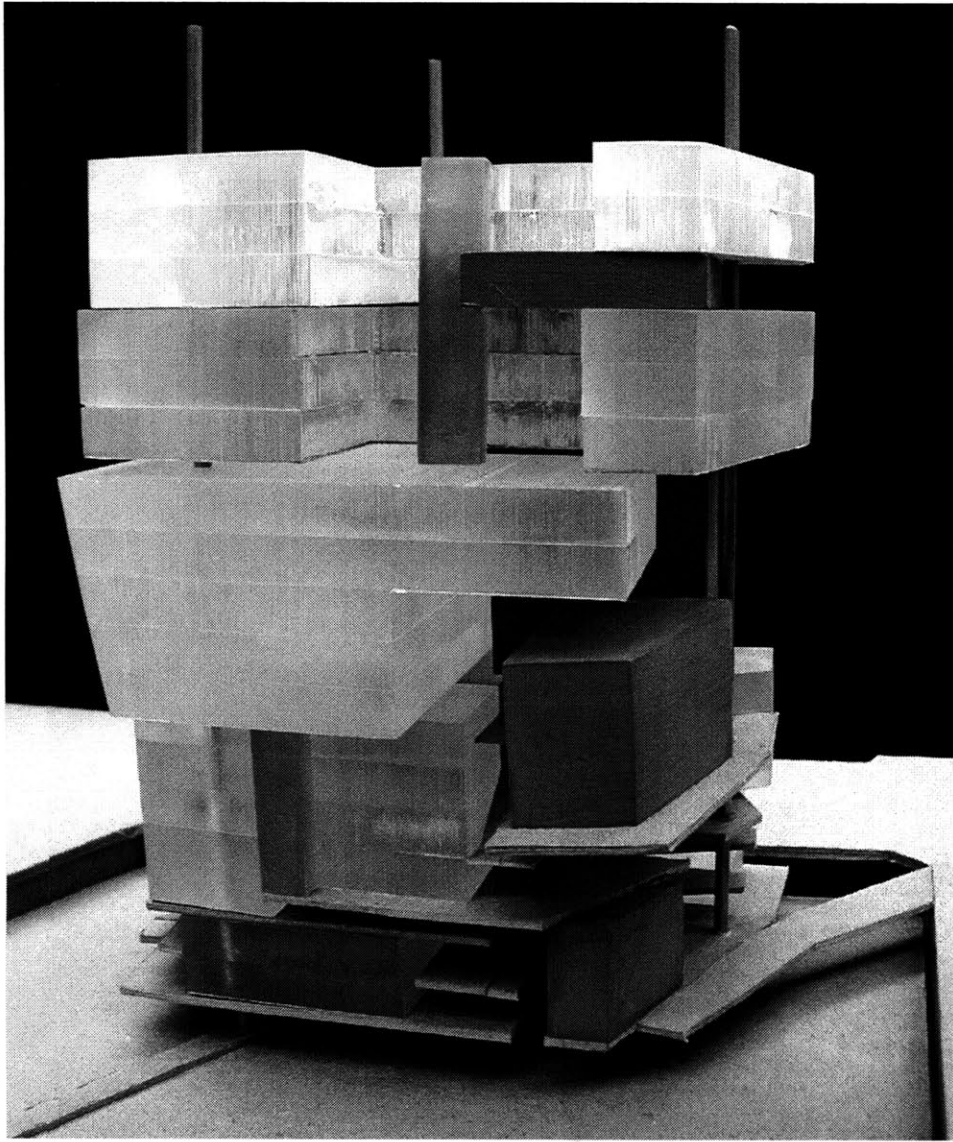
initial massing design

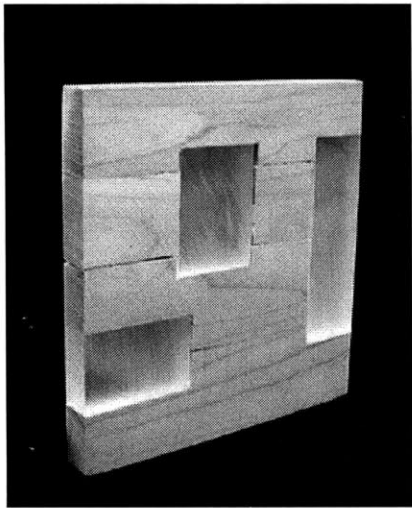
An initial massing design was created from a reading of the diagrammatic principles and the subtracted a volumes of public space derived from the generative studies based on the set number and size of dwelling units.



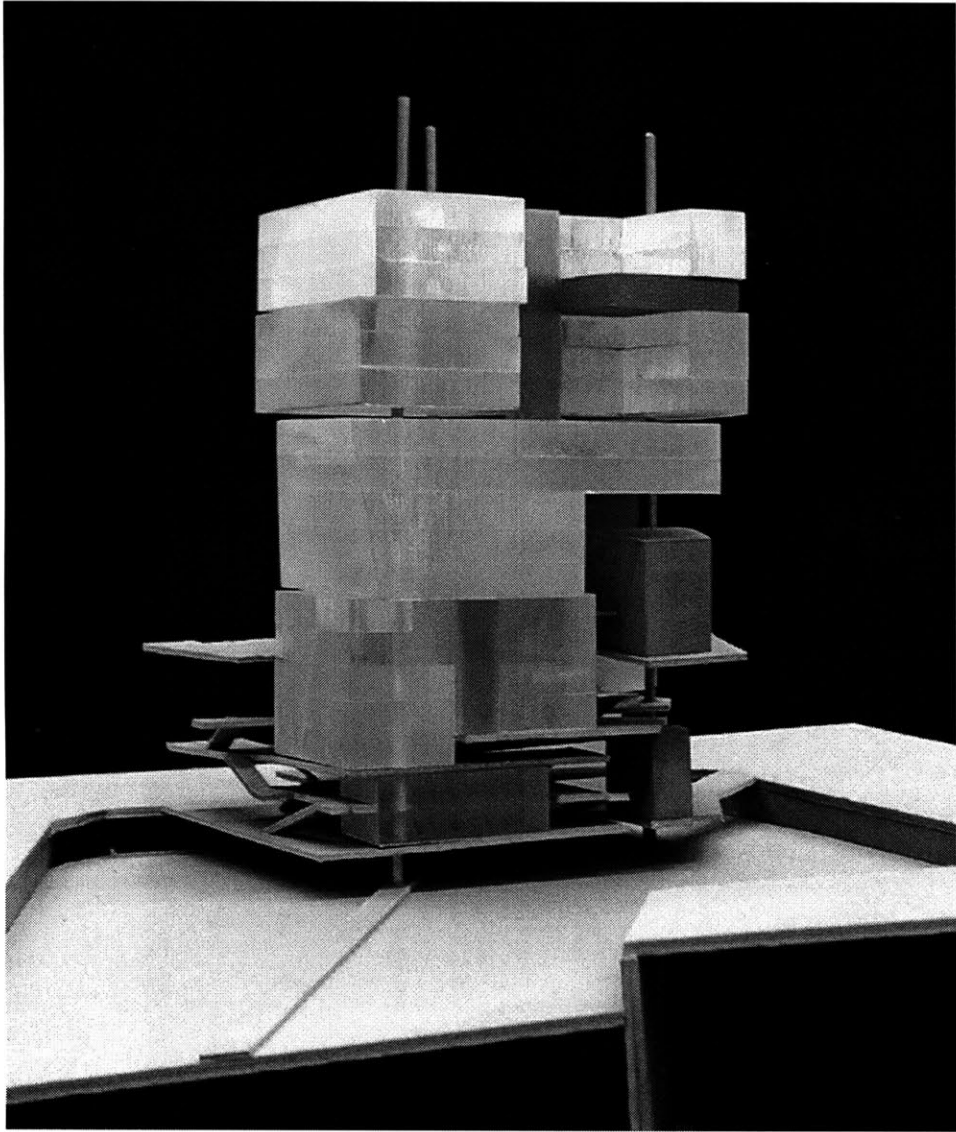


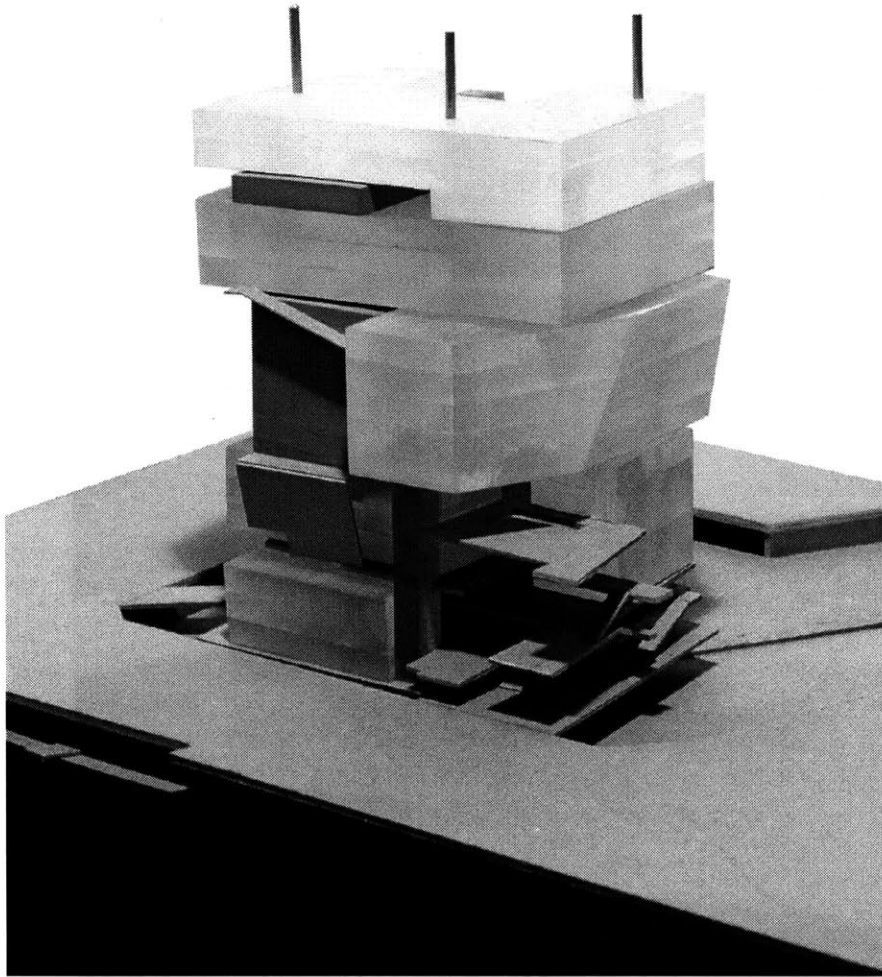
sketch of program placement
and connections

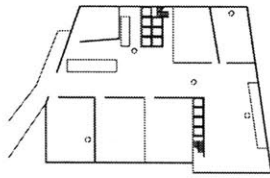




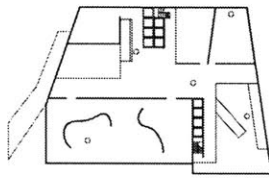
diagrammatic section model



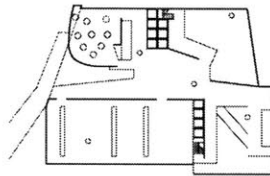




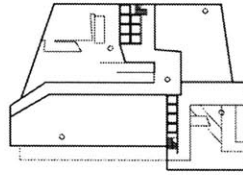
level-01



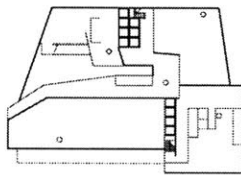
level-02



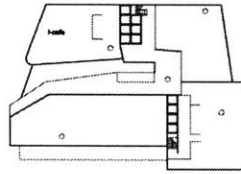
level-03



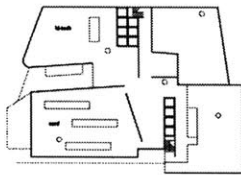
level-04



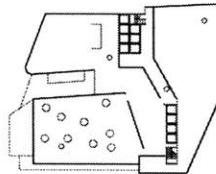
level-05



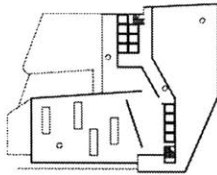
level-06



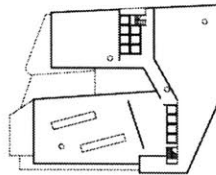
level-07



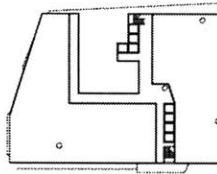
level-08



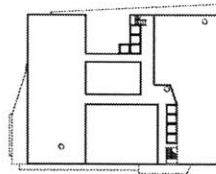
level-10



level-12

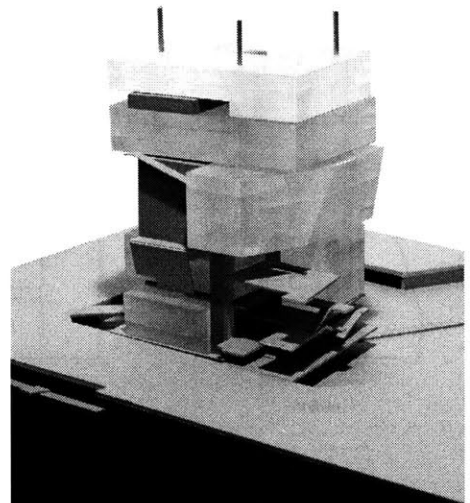
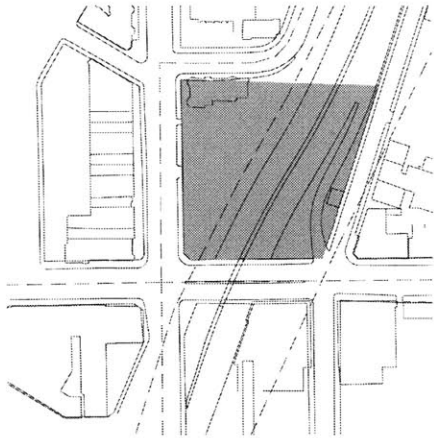
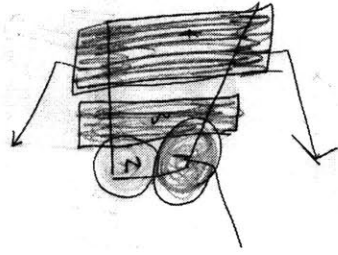


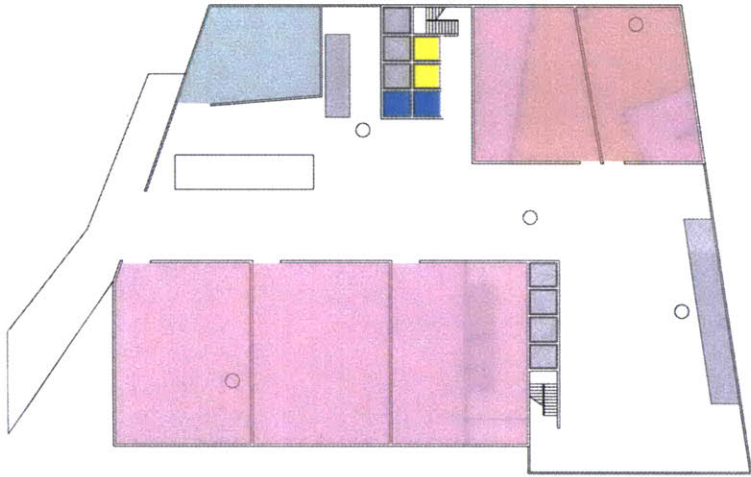
level-14



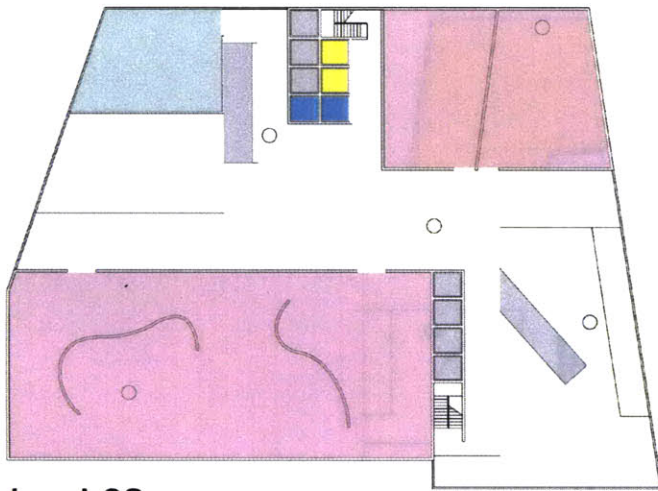
level-17

plan development

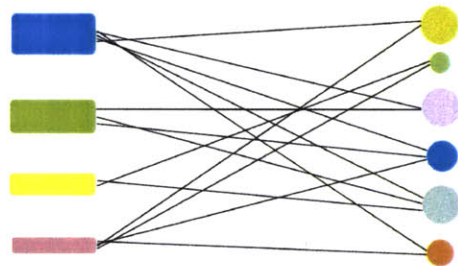


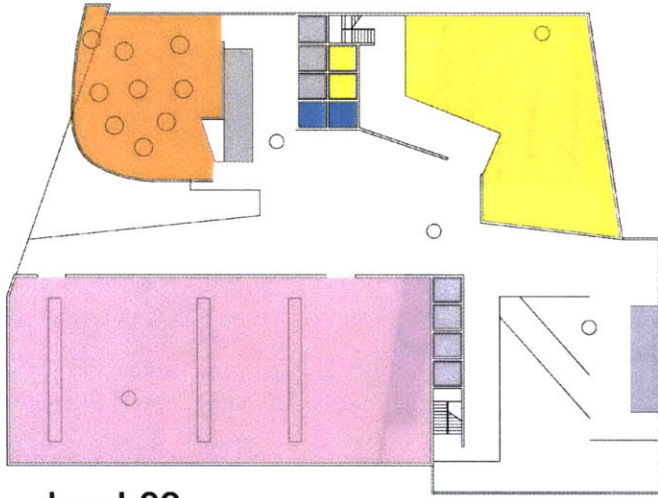


level-01

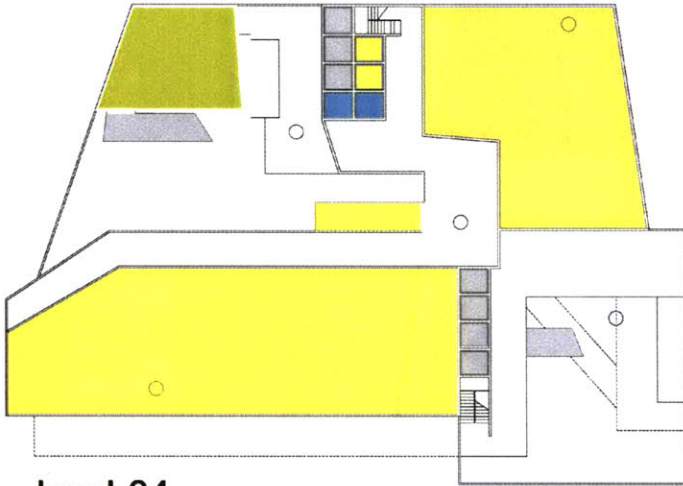


level-02

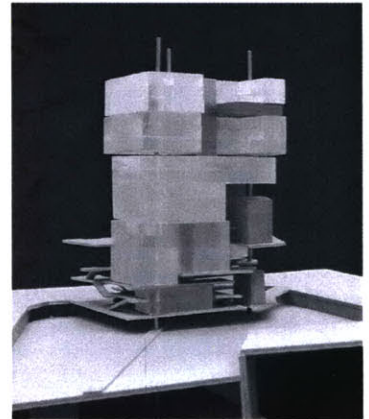


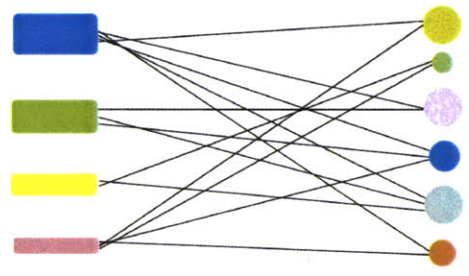
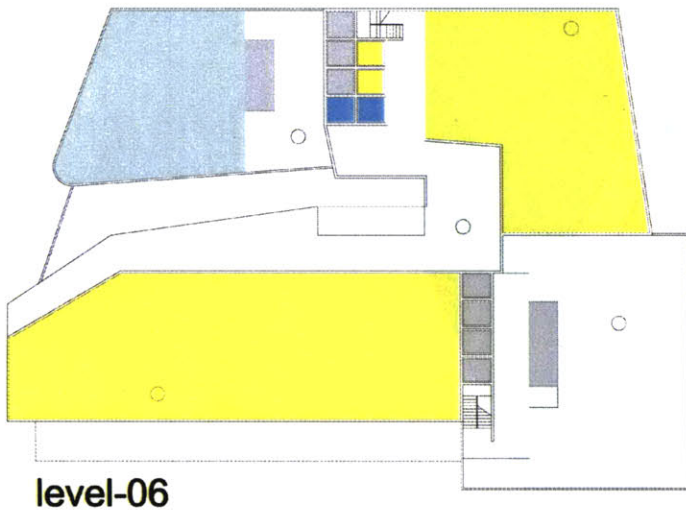
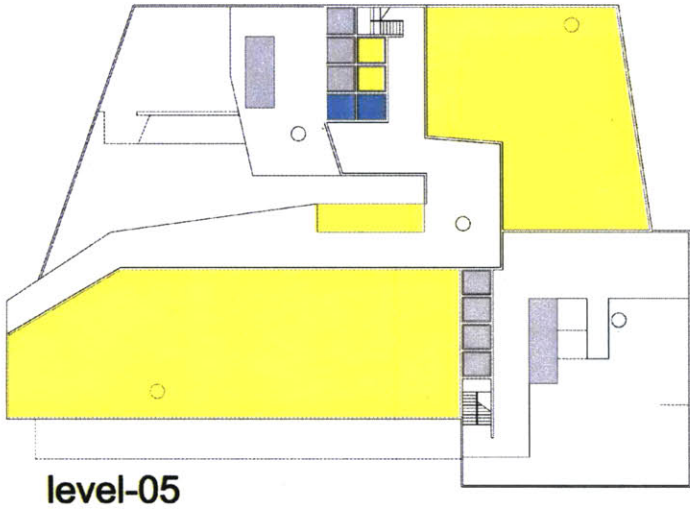


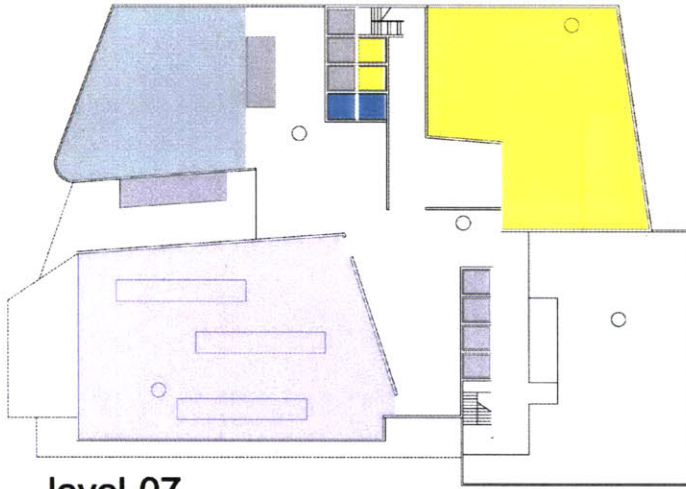
level-03



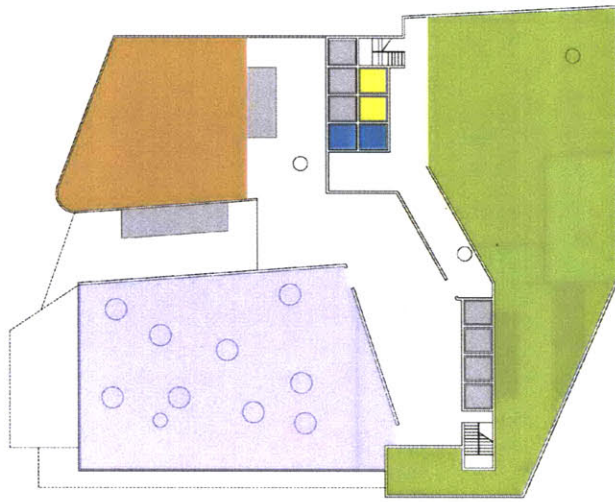
level-04



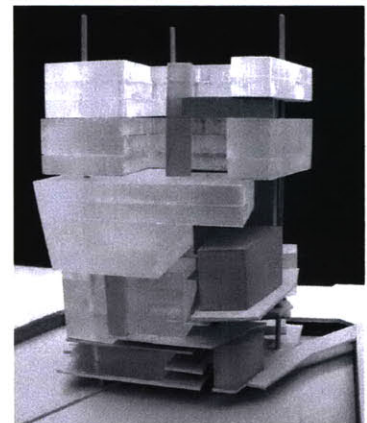


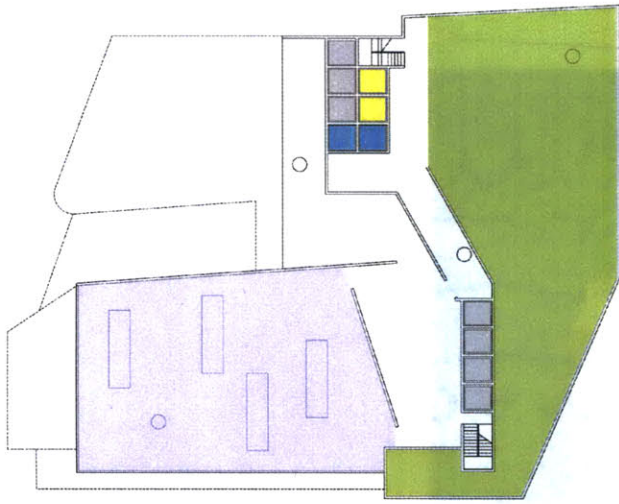


level-07

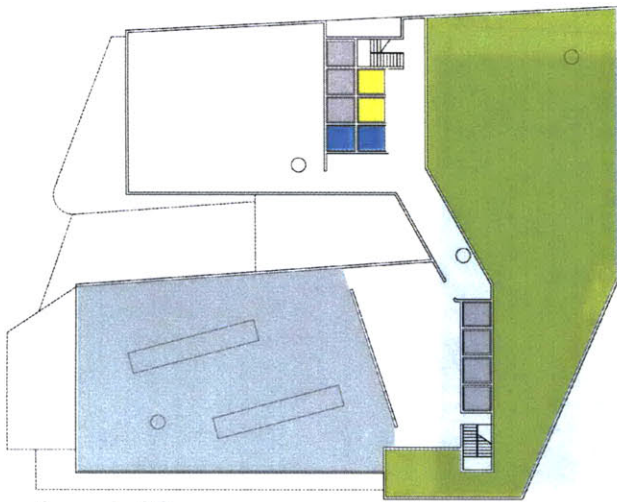


level-08

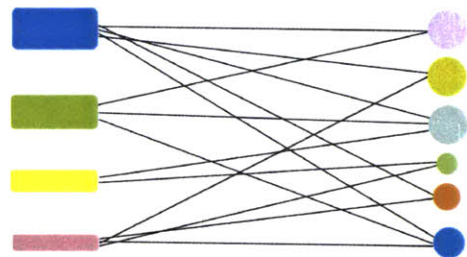


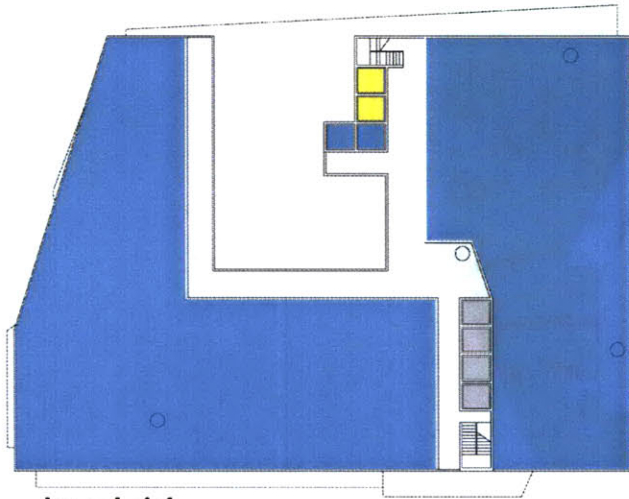


level-10

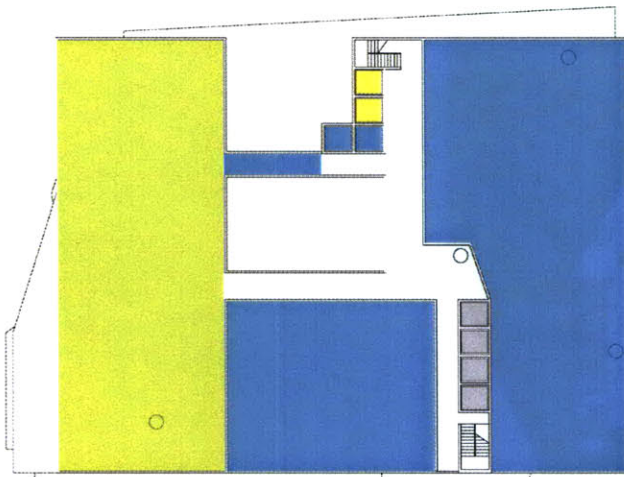


level-12

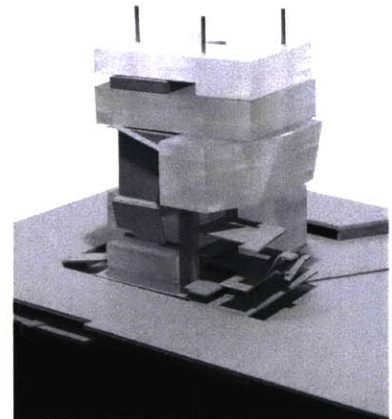


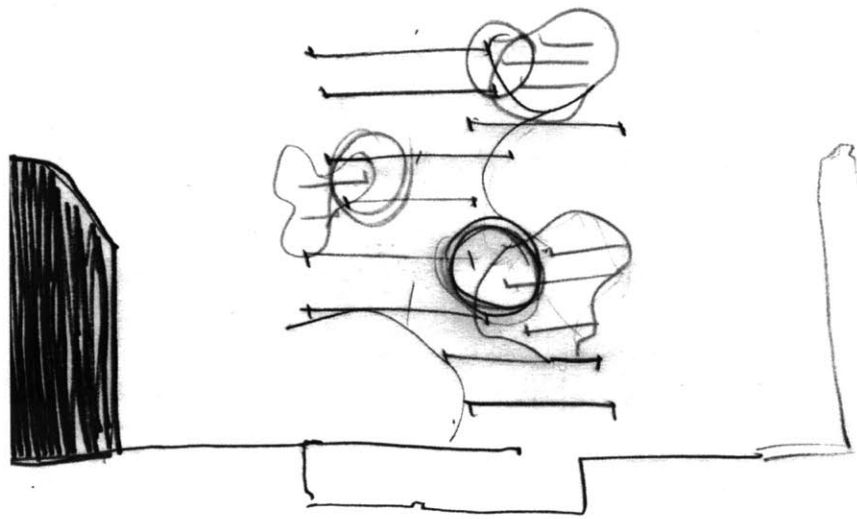


level-14

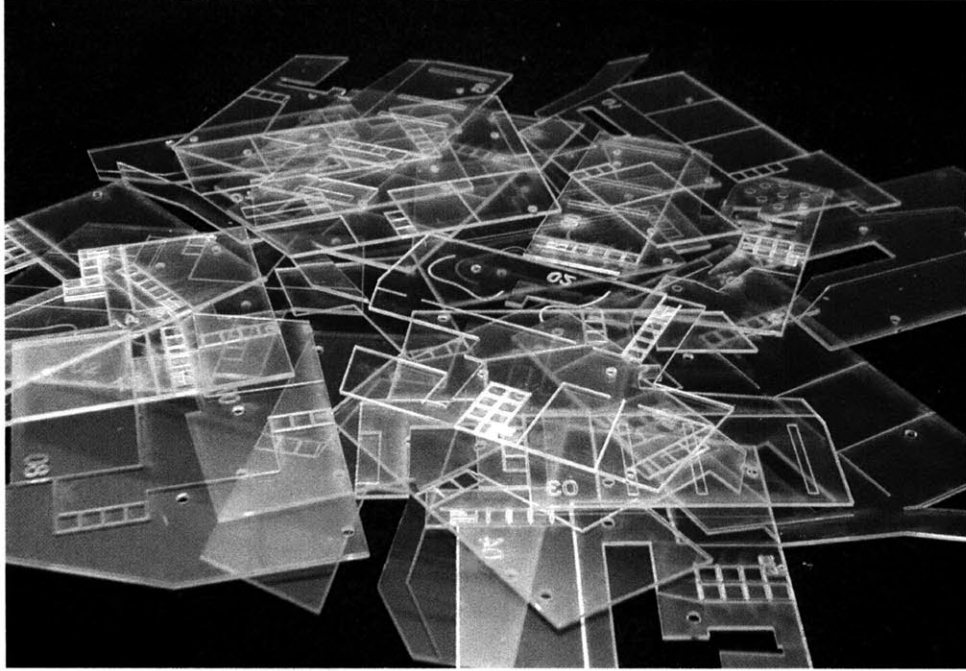


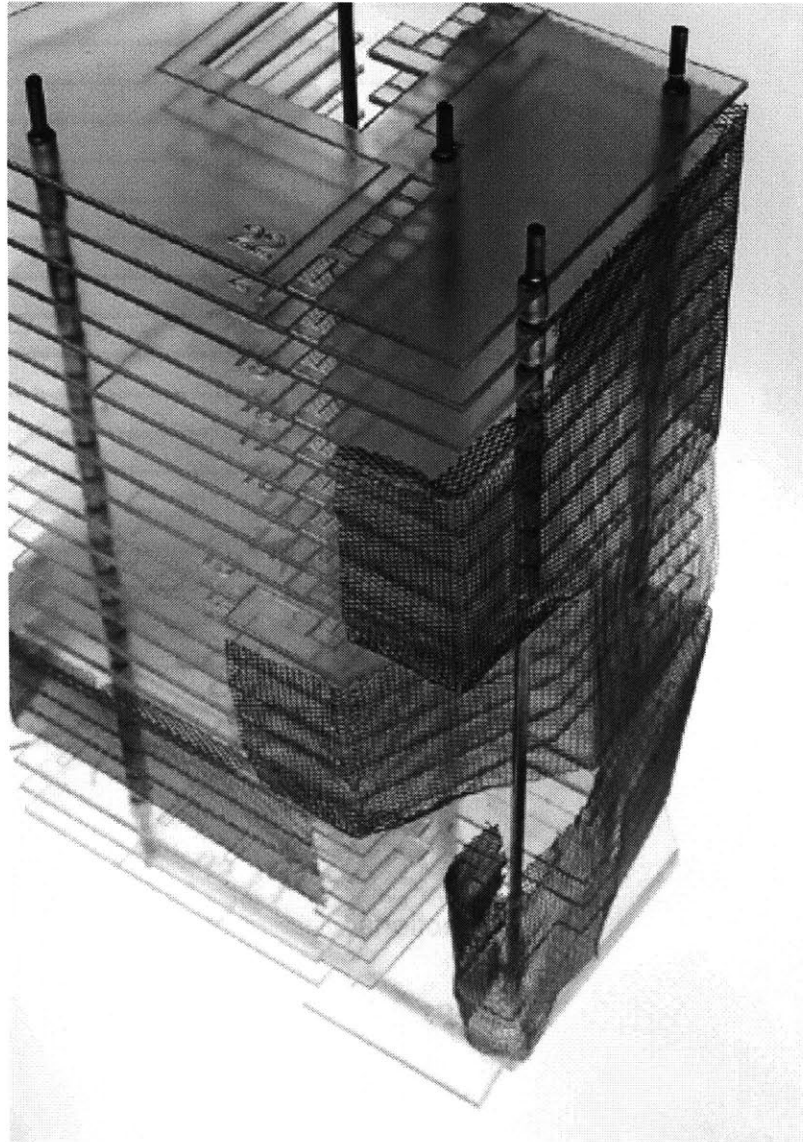
level-17

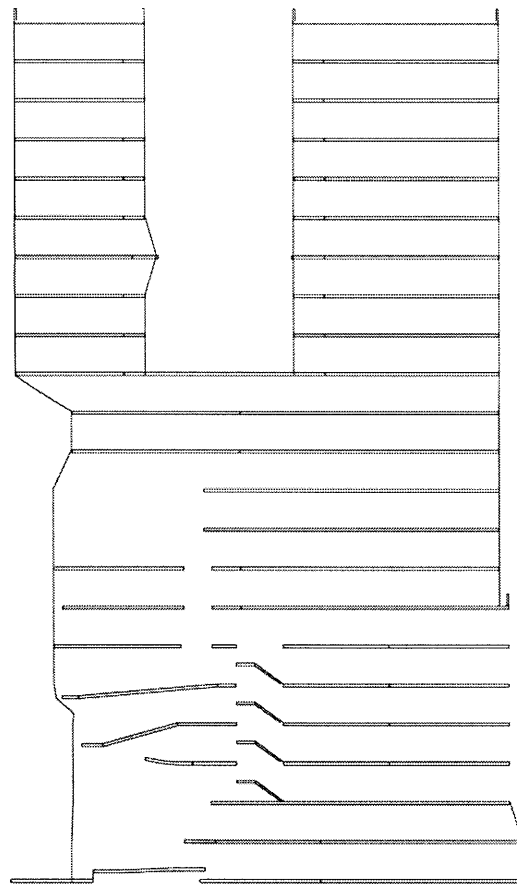




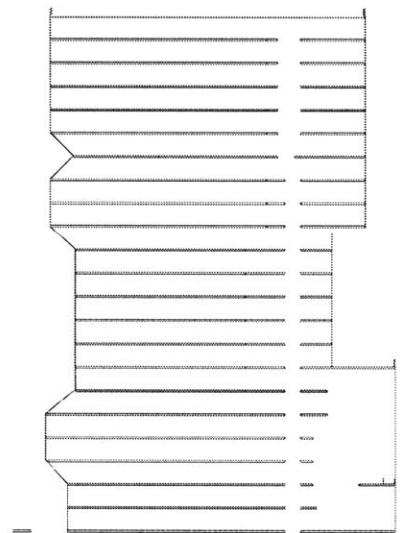
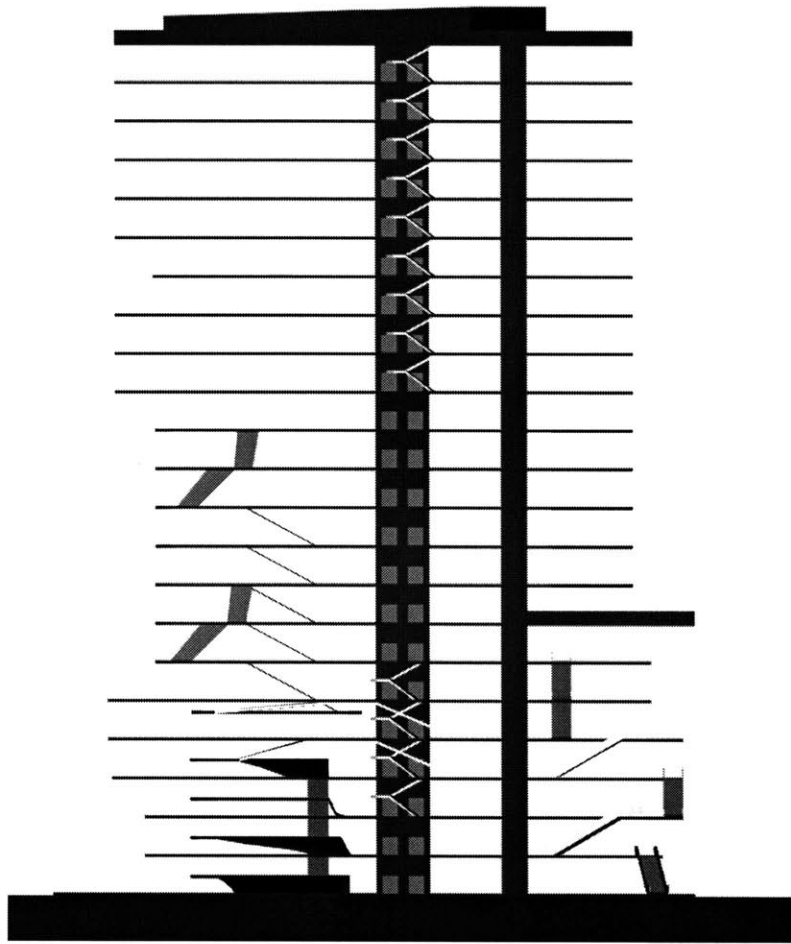
vertical [re]development

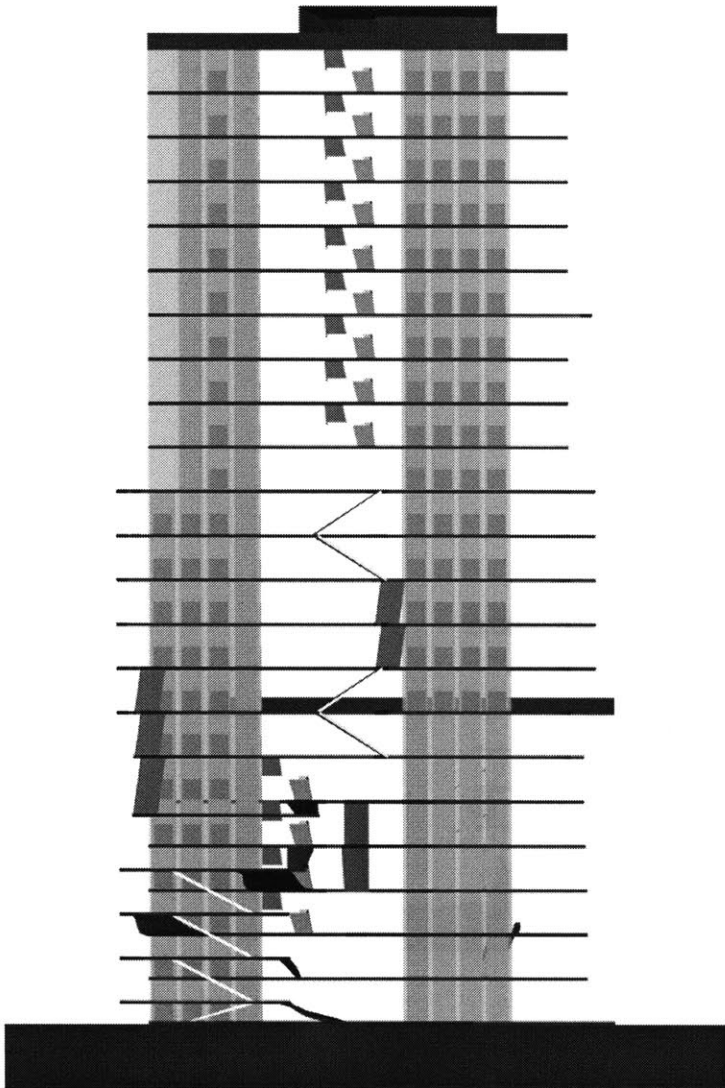




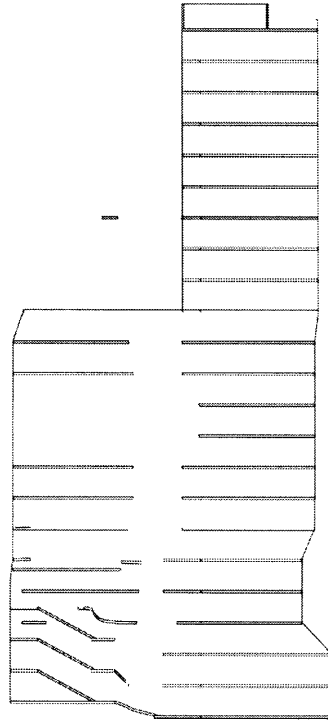
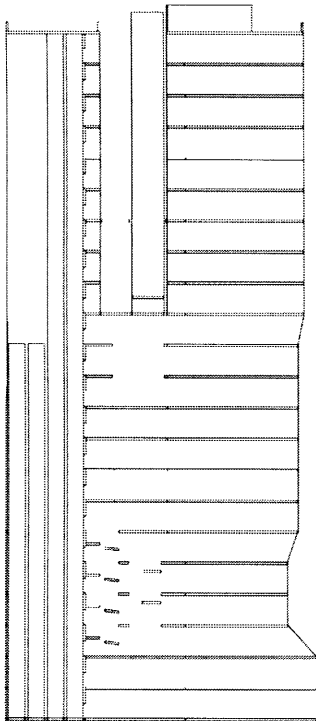
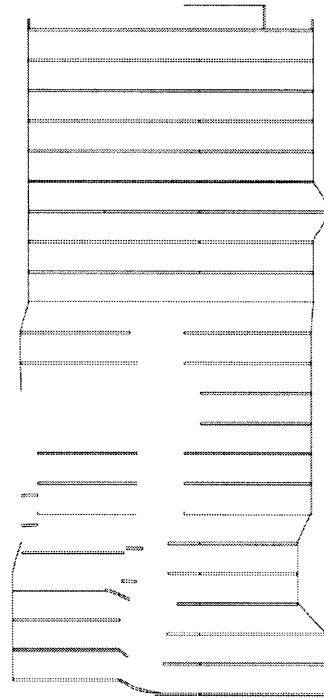
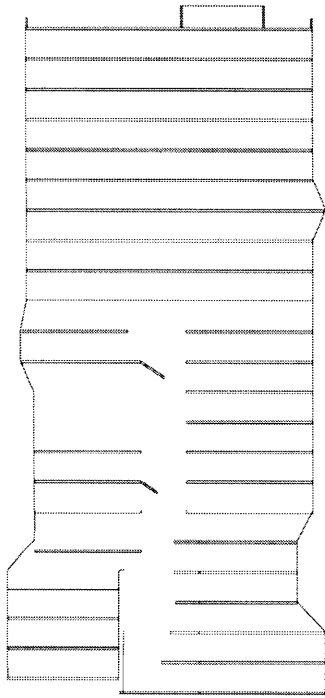


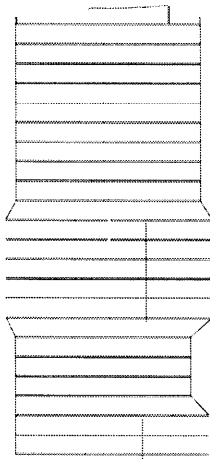
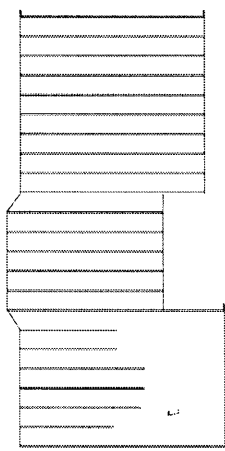
sections



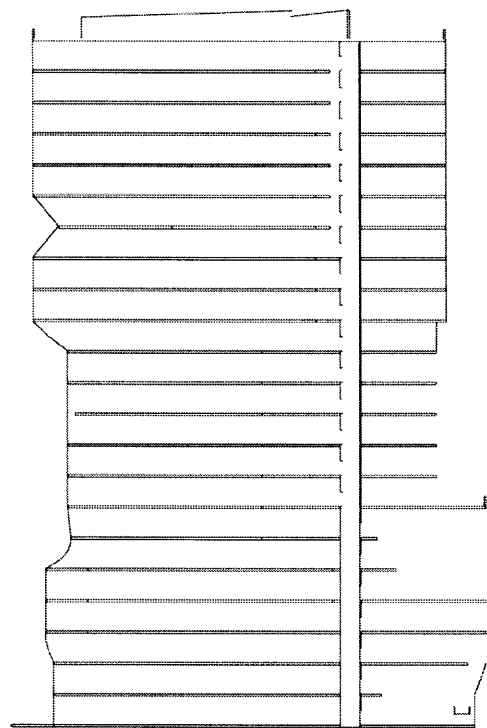
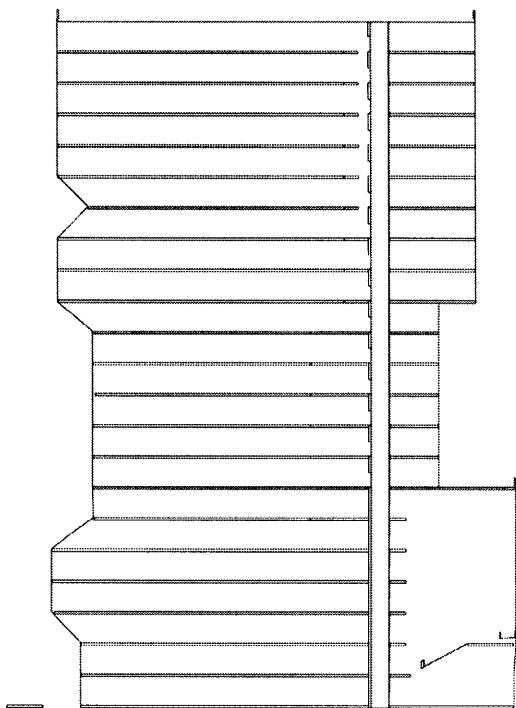


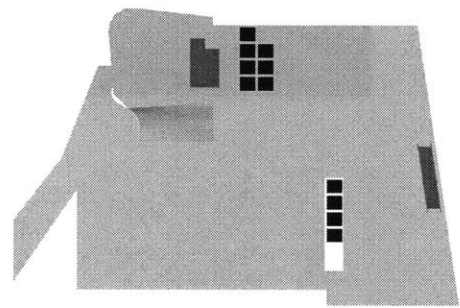
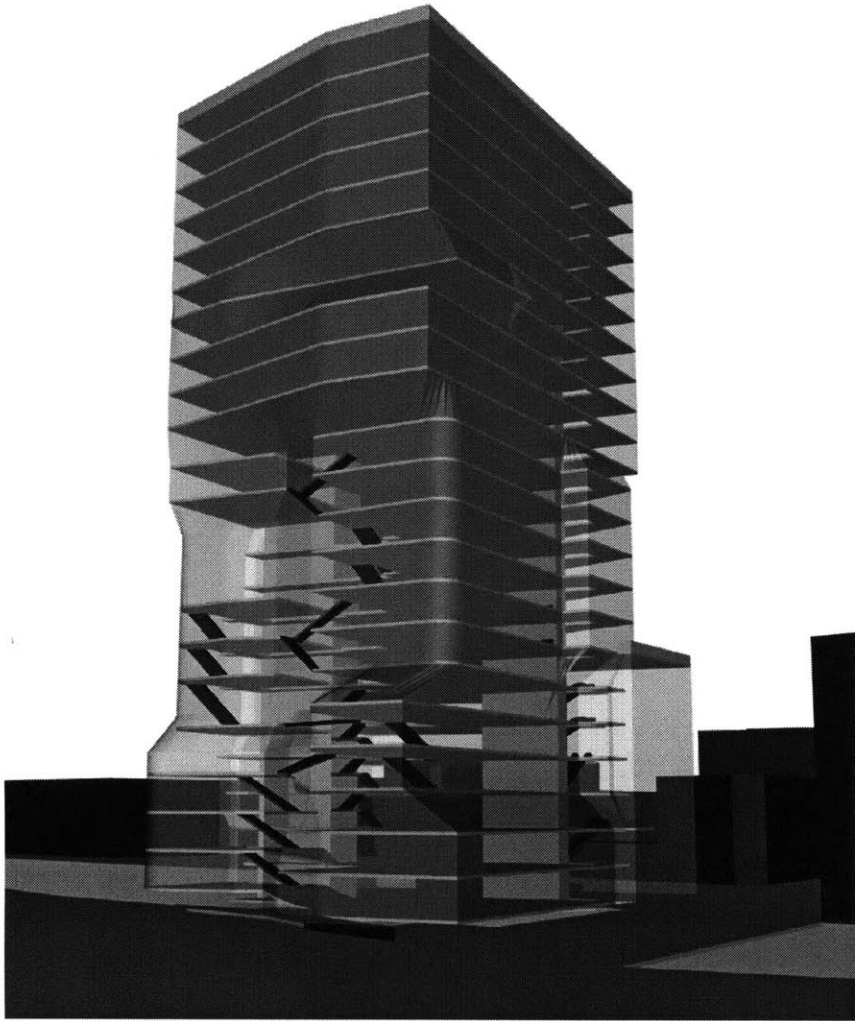
sections

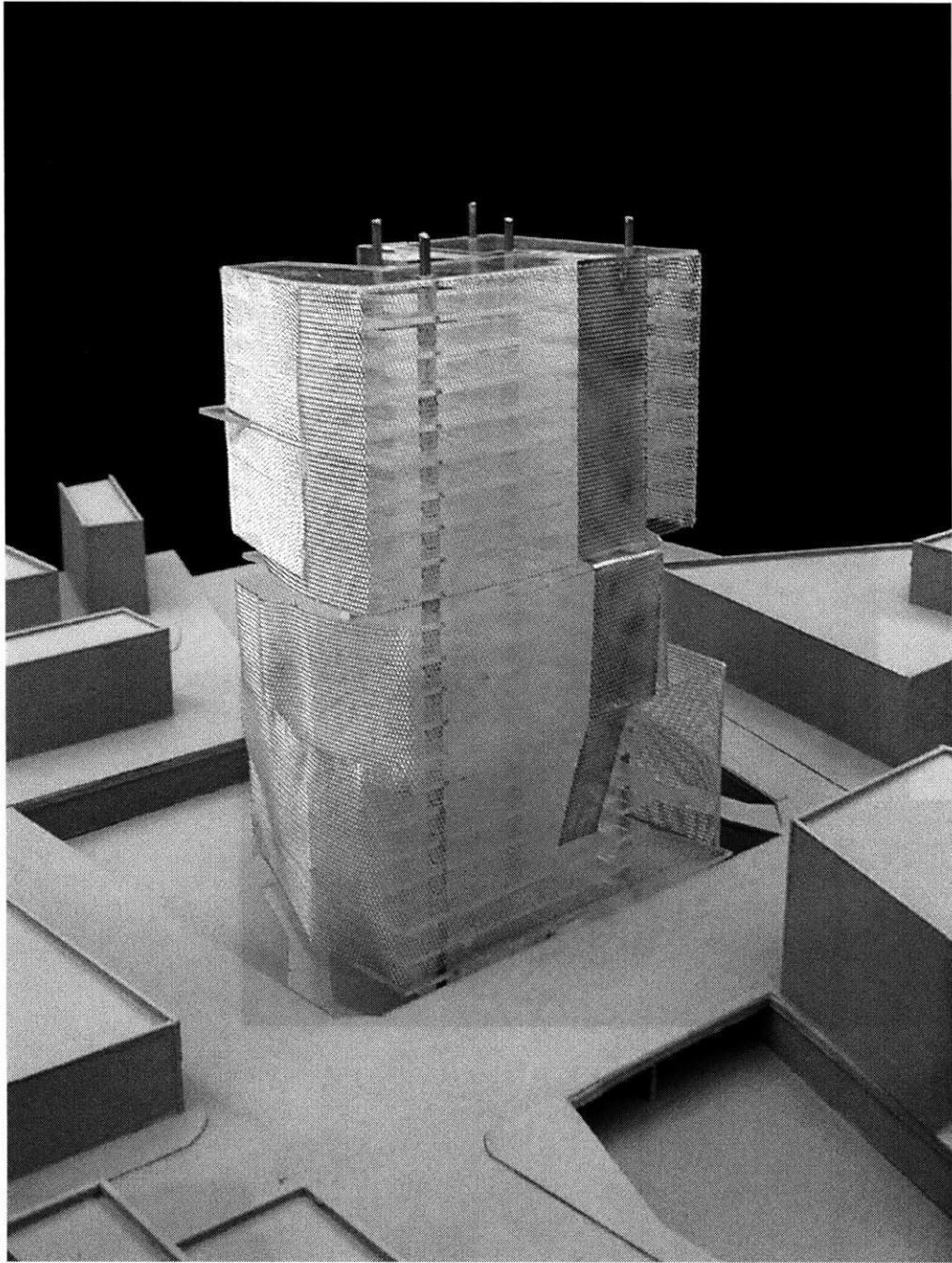


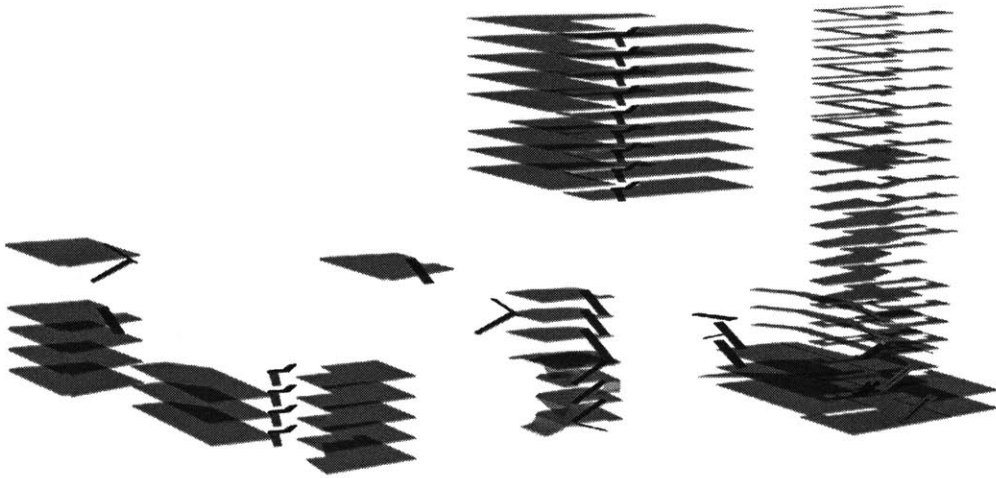
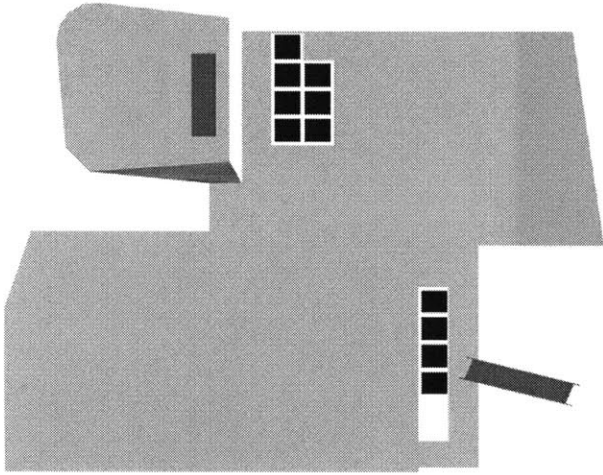


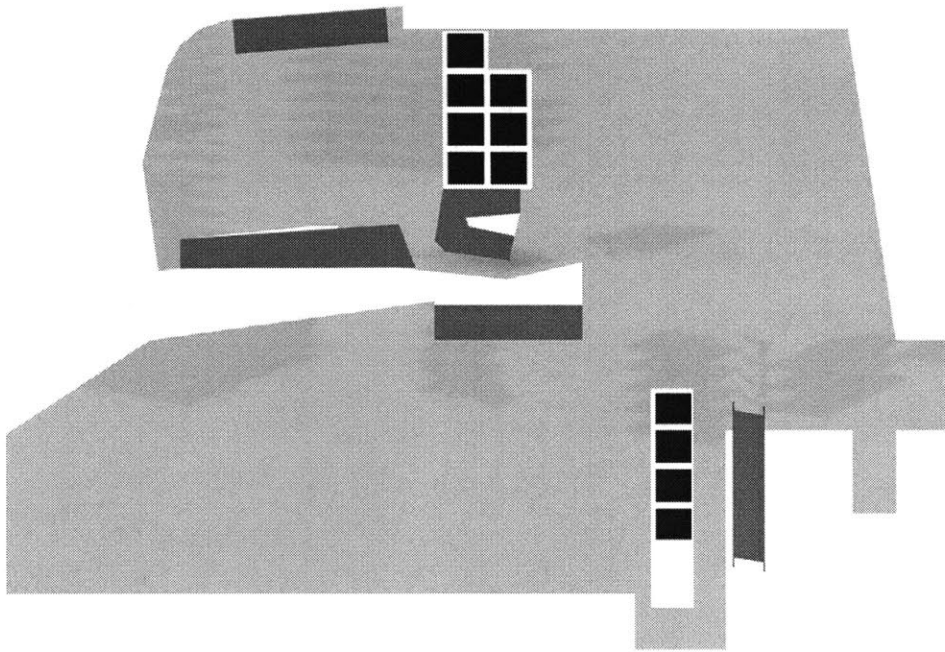
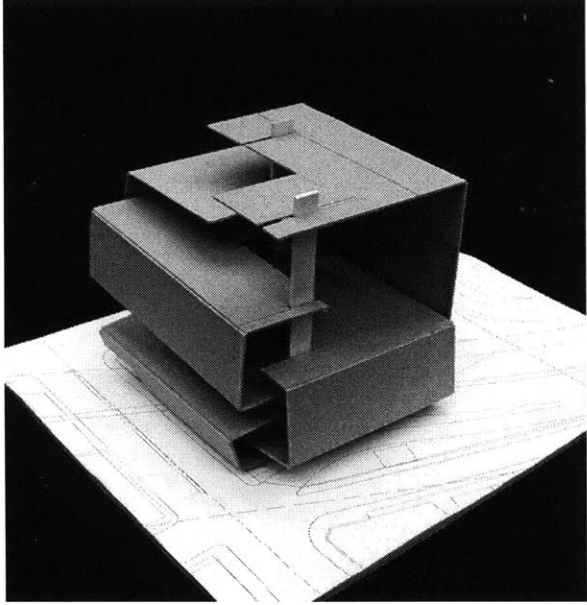
sections

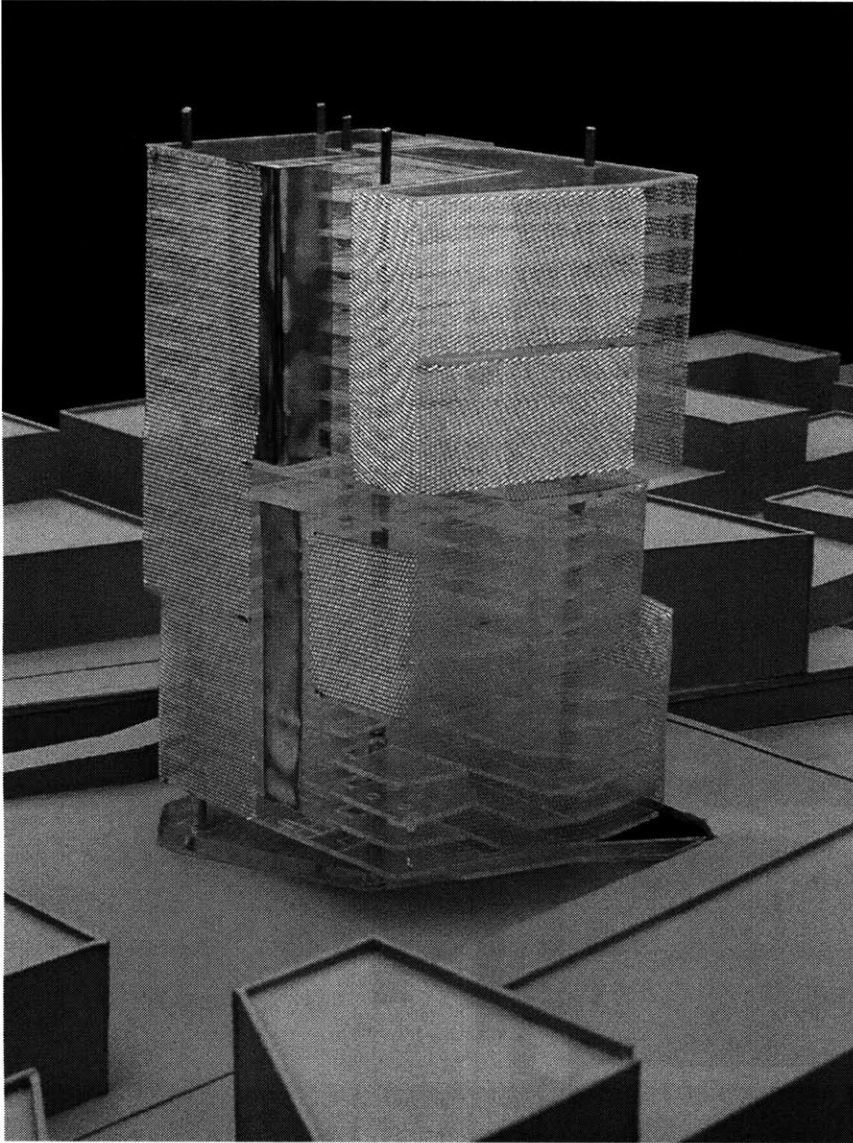


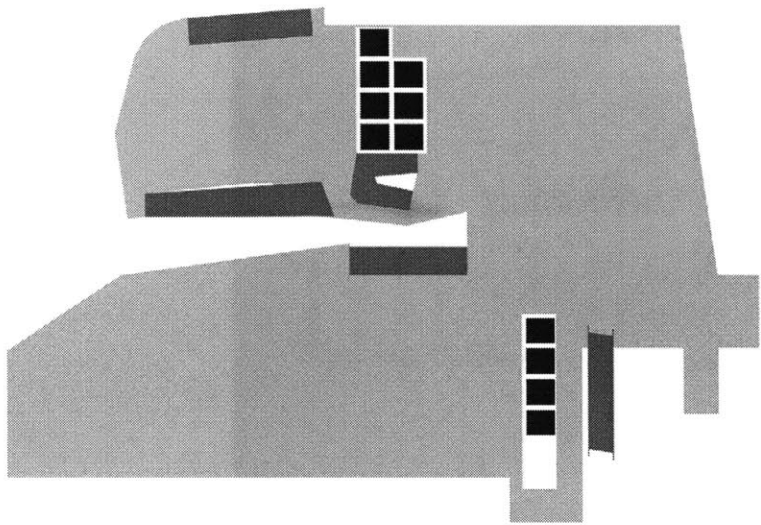


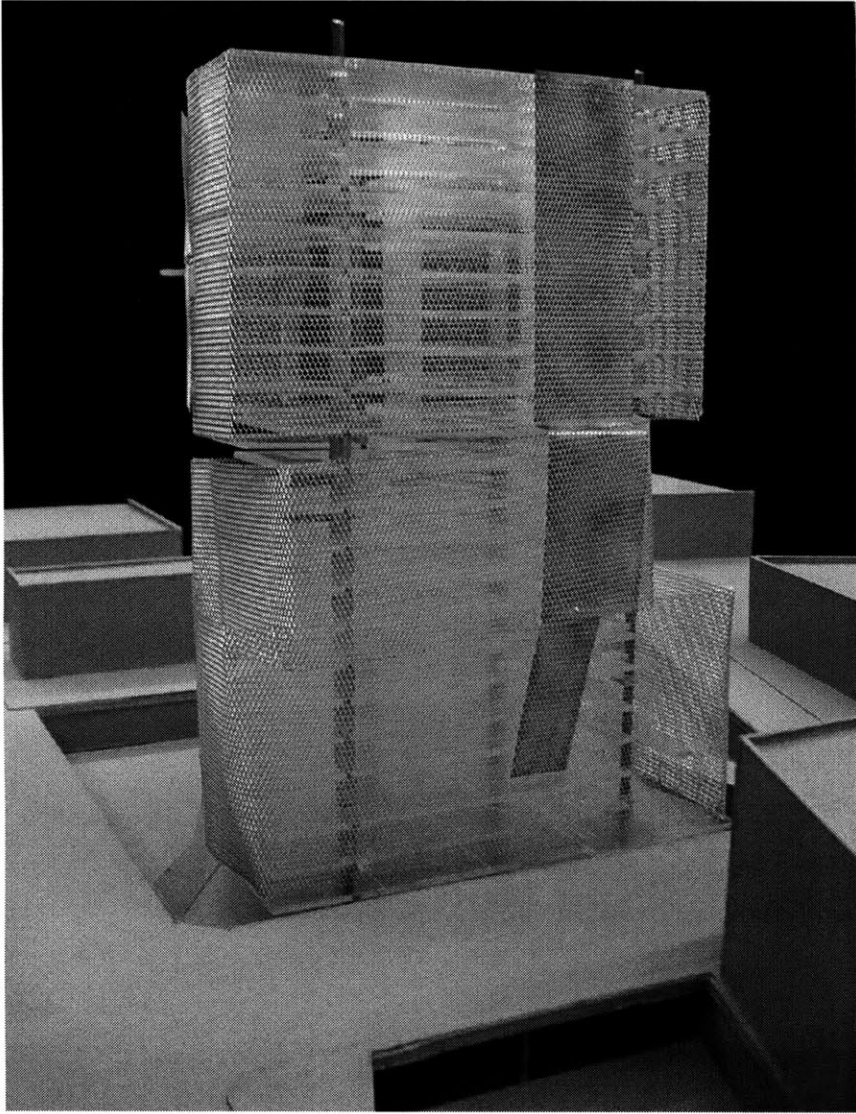


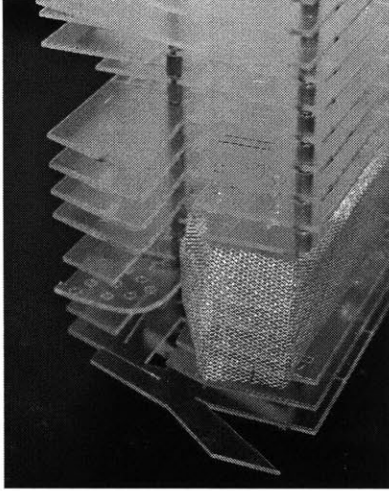


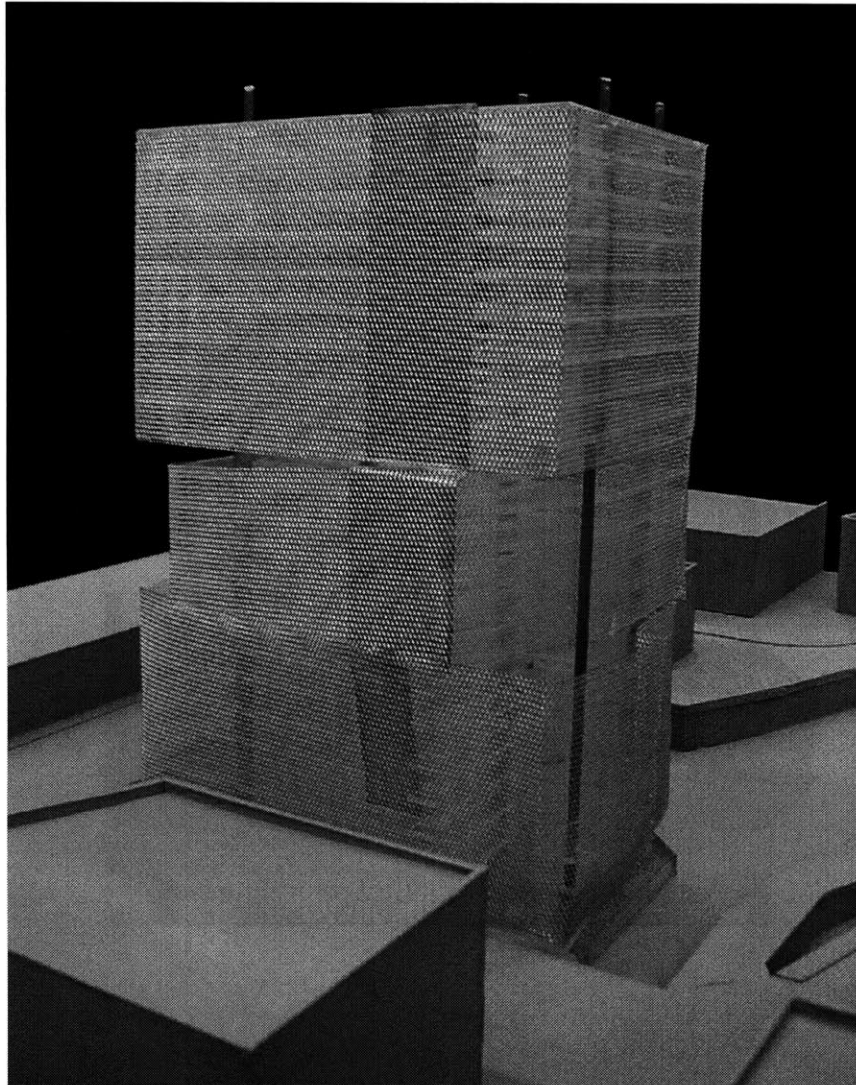




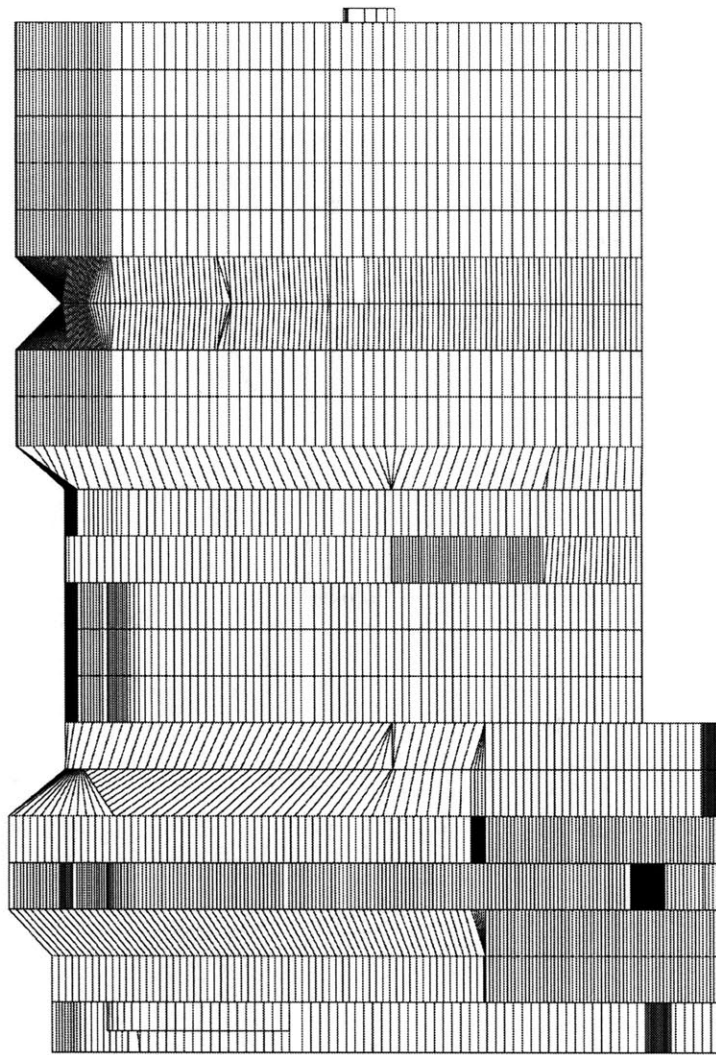


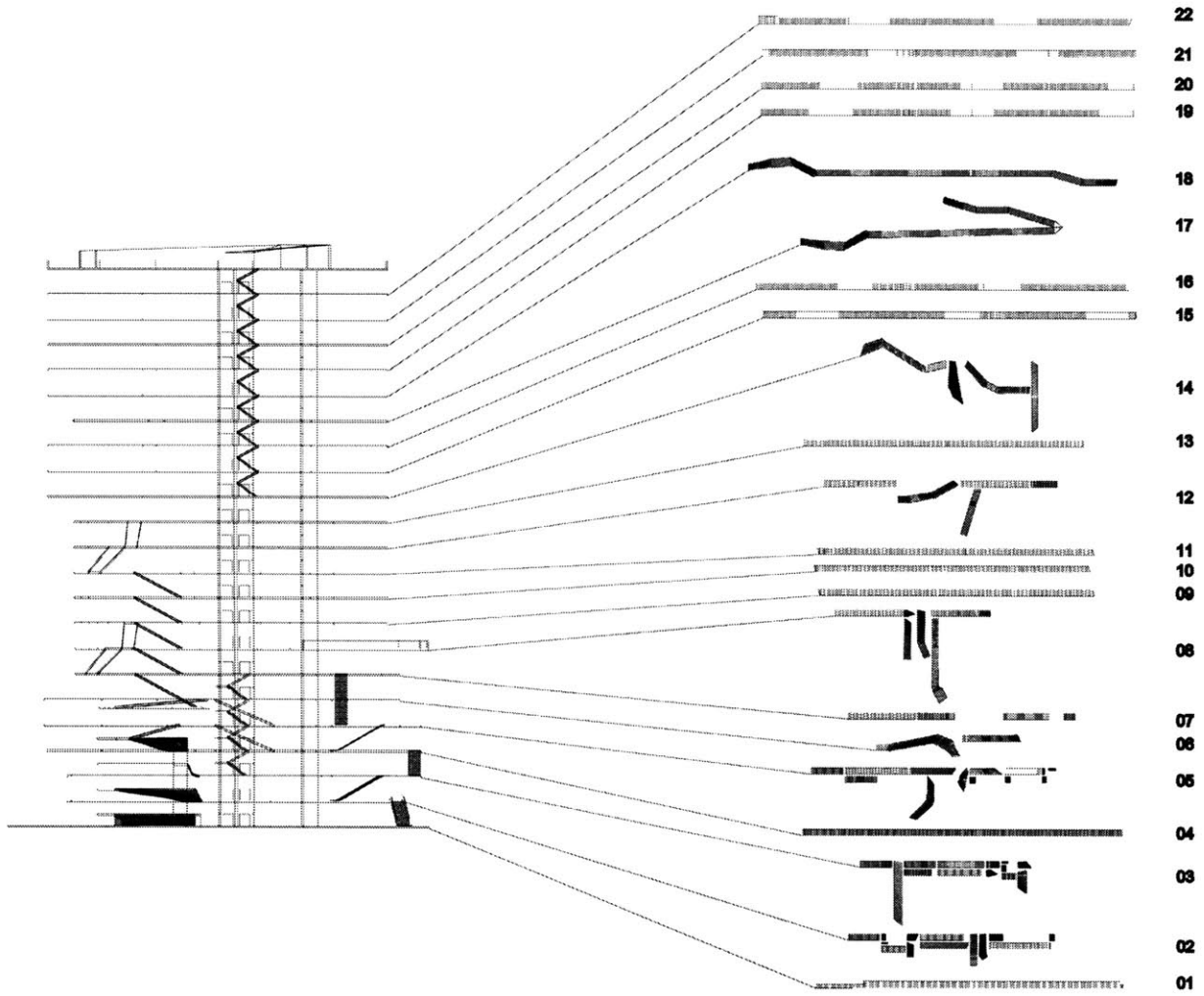















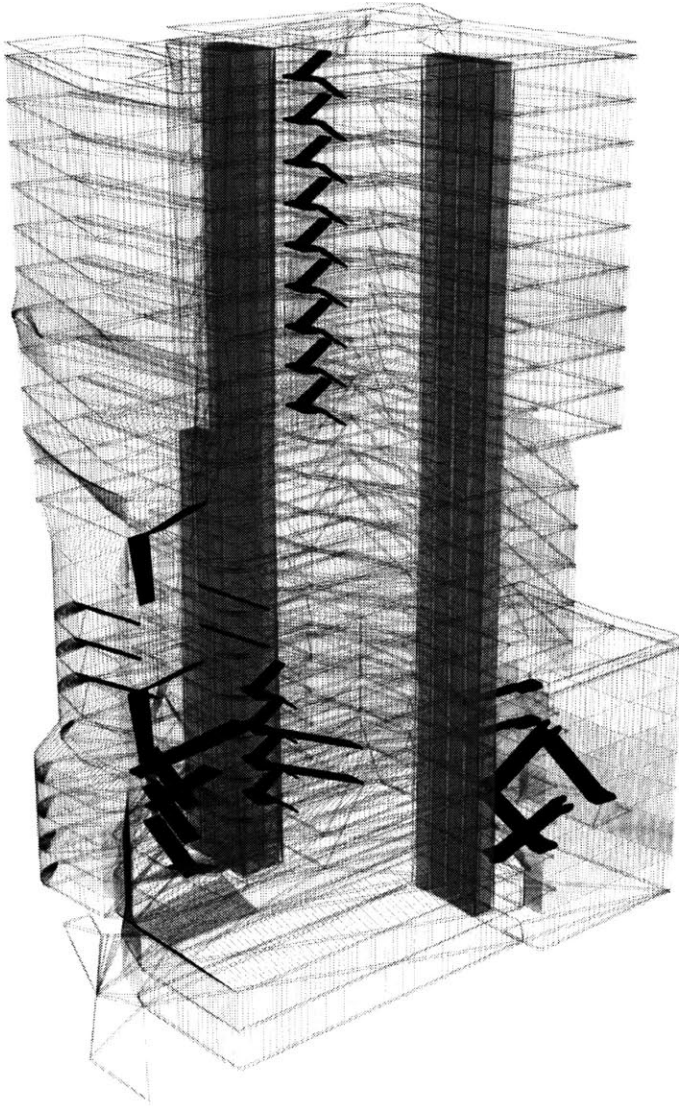
skin development

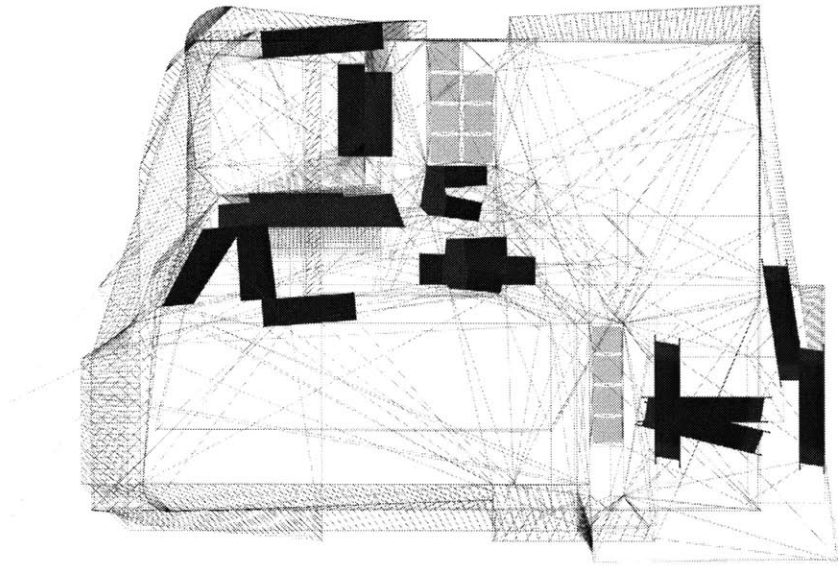


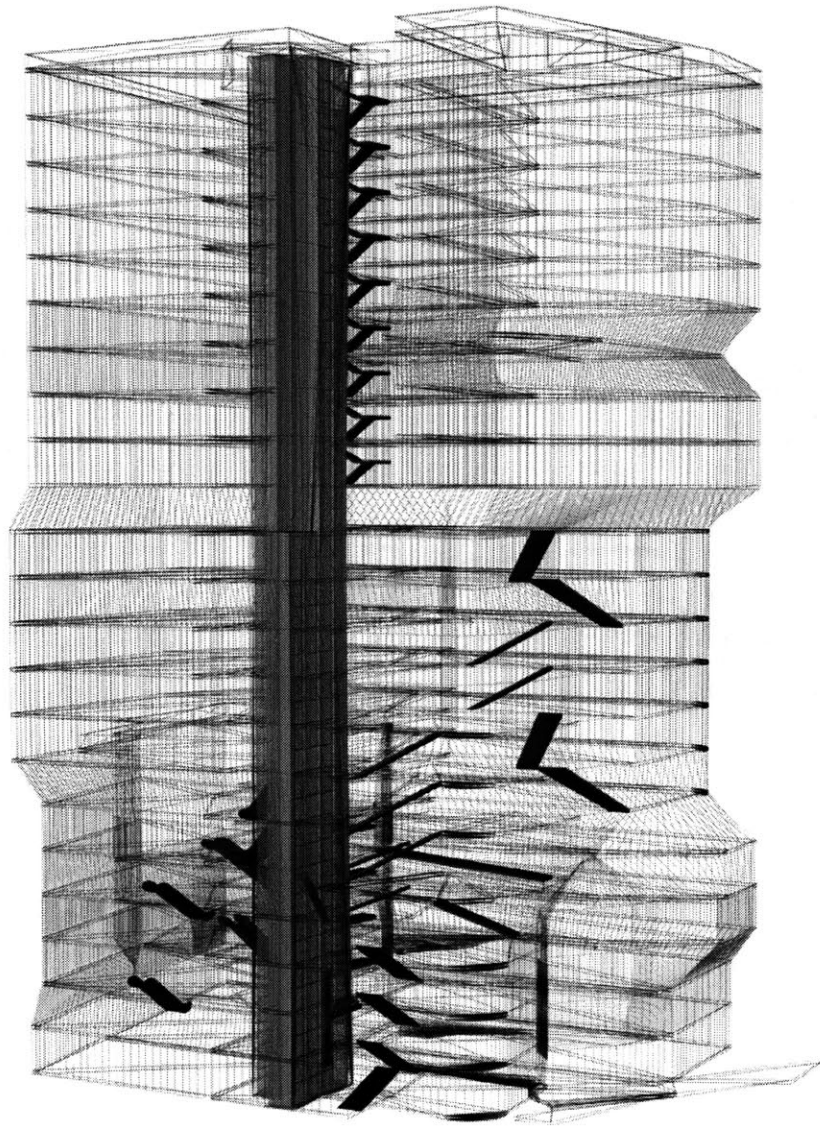


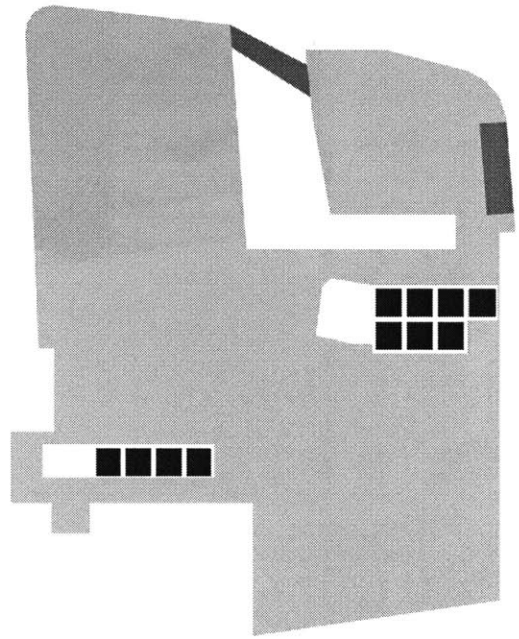
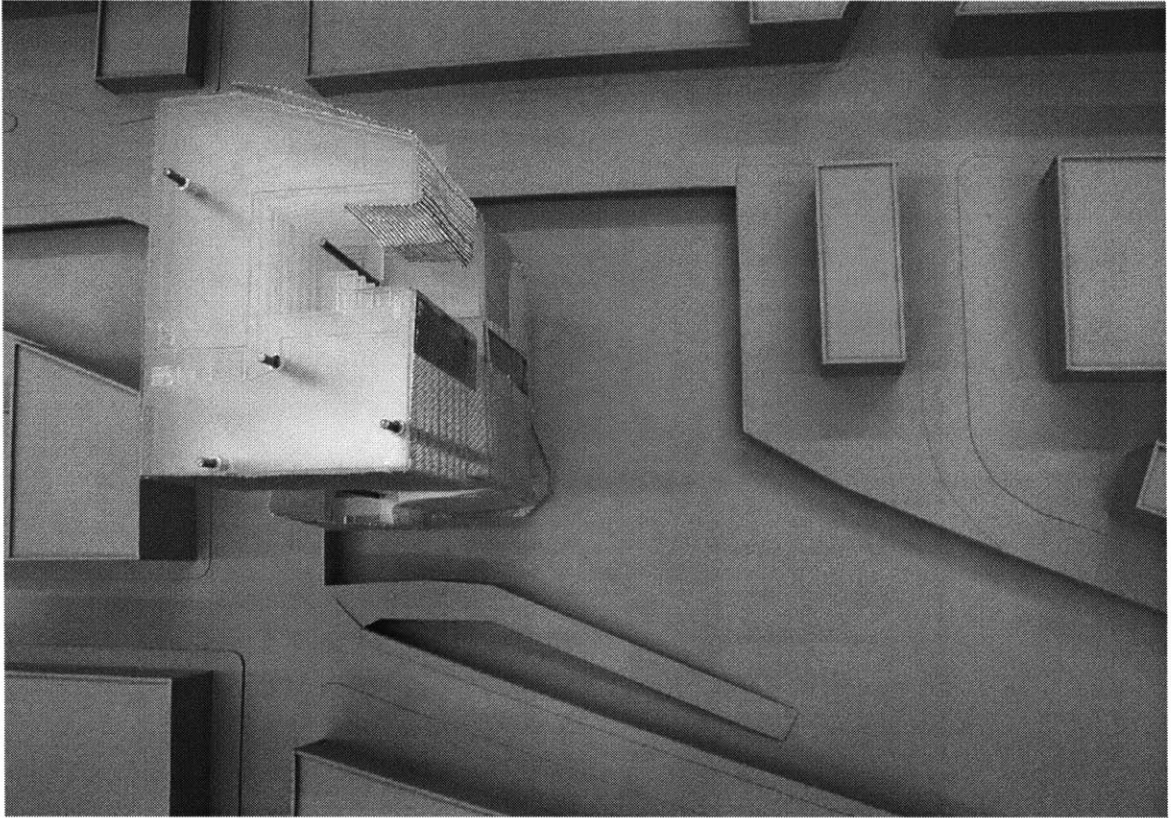
skin unfolded

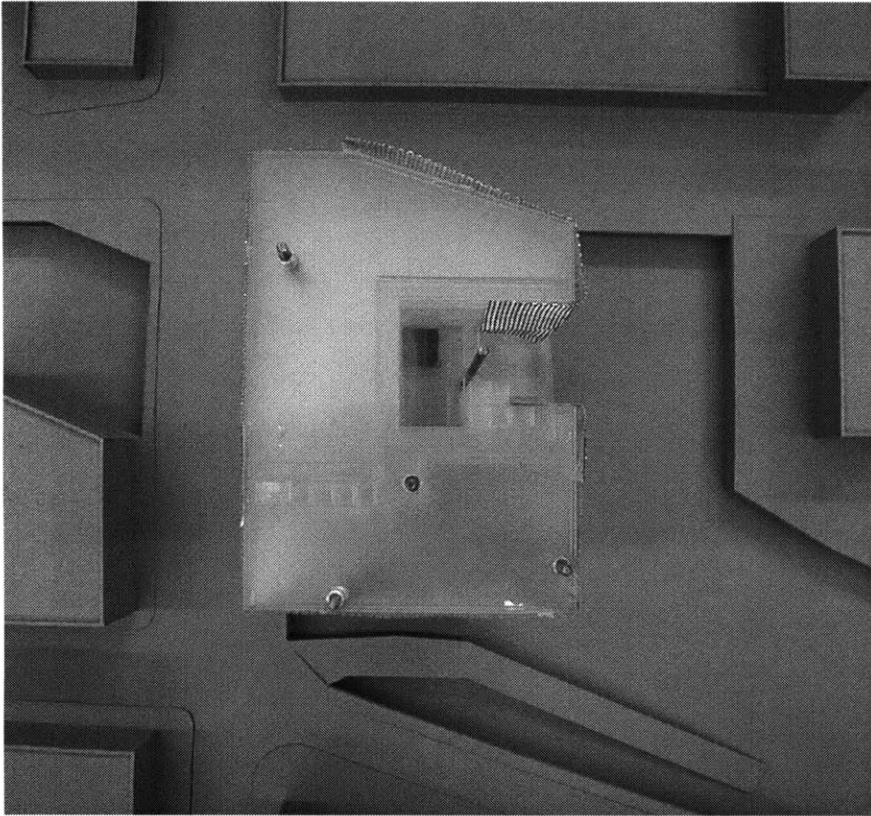
	22
	21
	20
	19
	18
	17
	16
	15
	14
	13
	12
	11
	10
	09
	08
	07
	06
	05
	04
	03
	02
	01

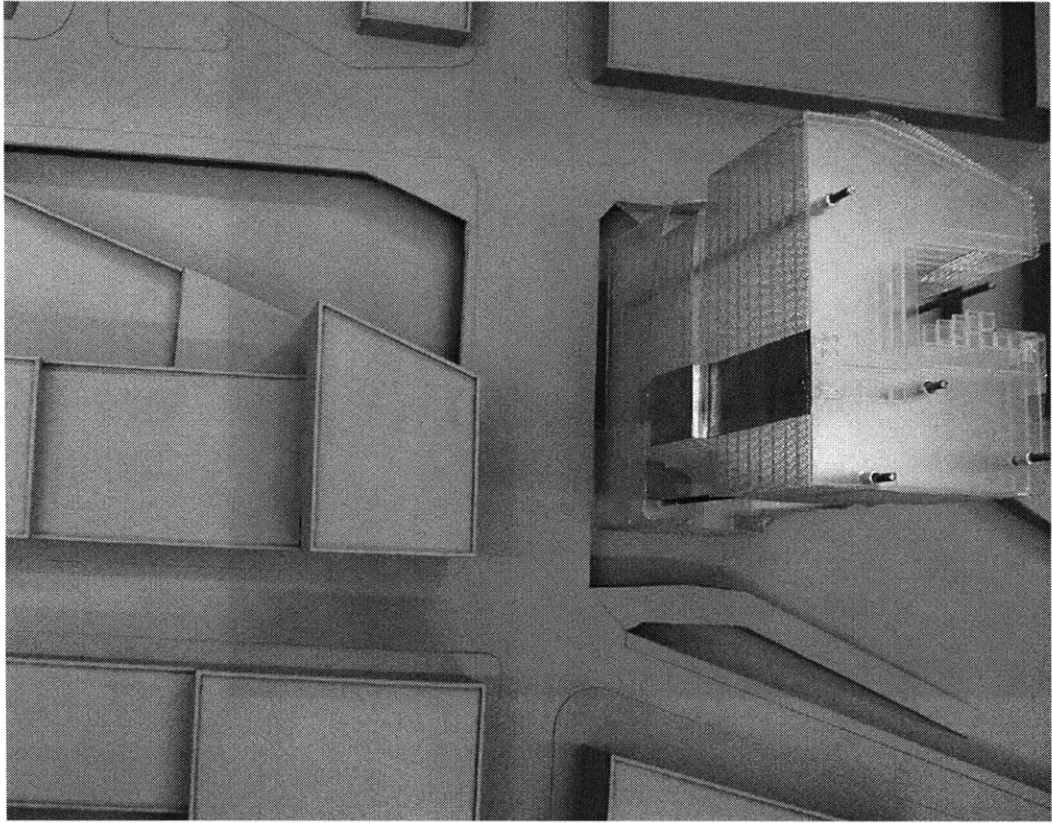


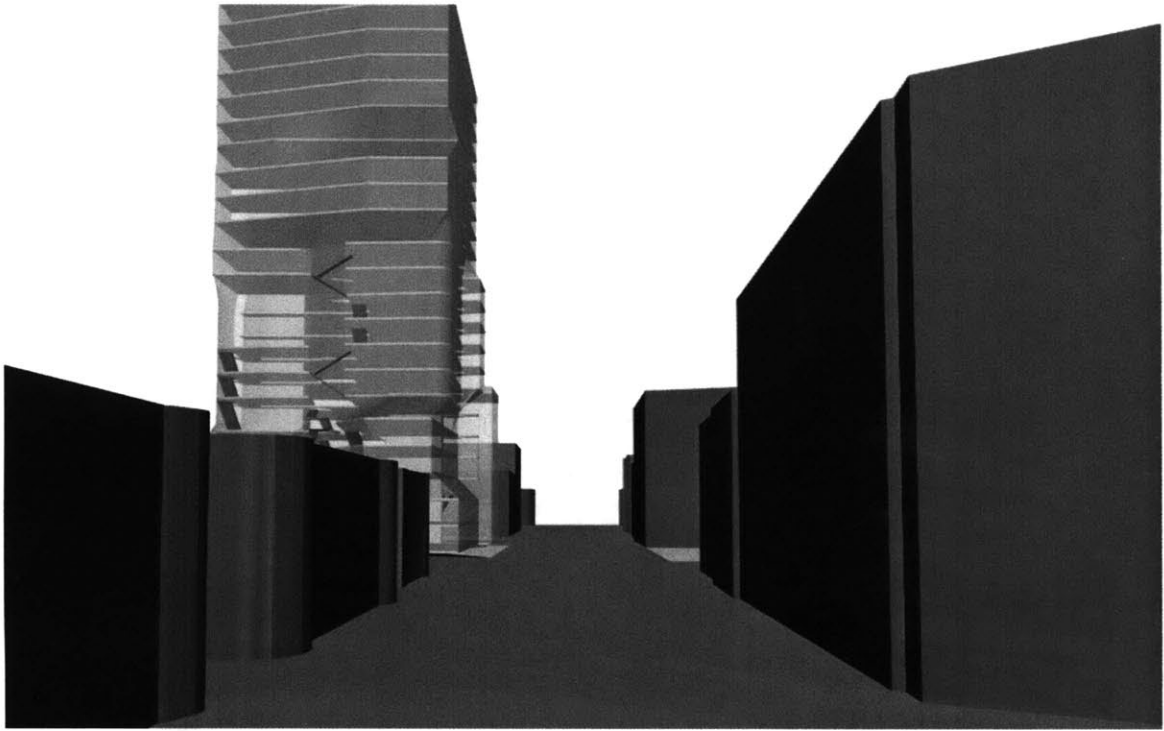


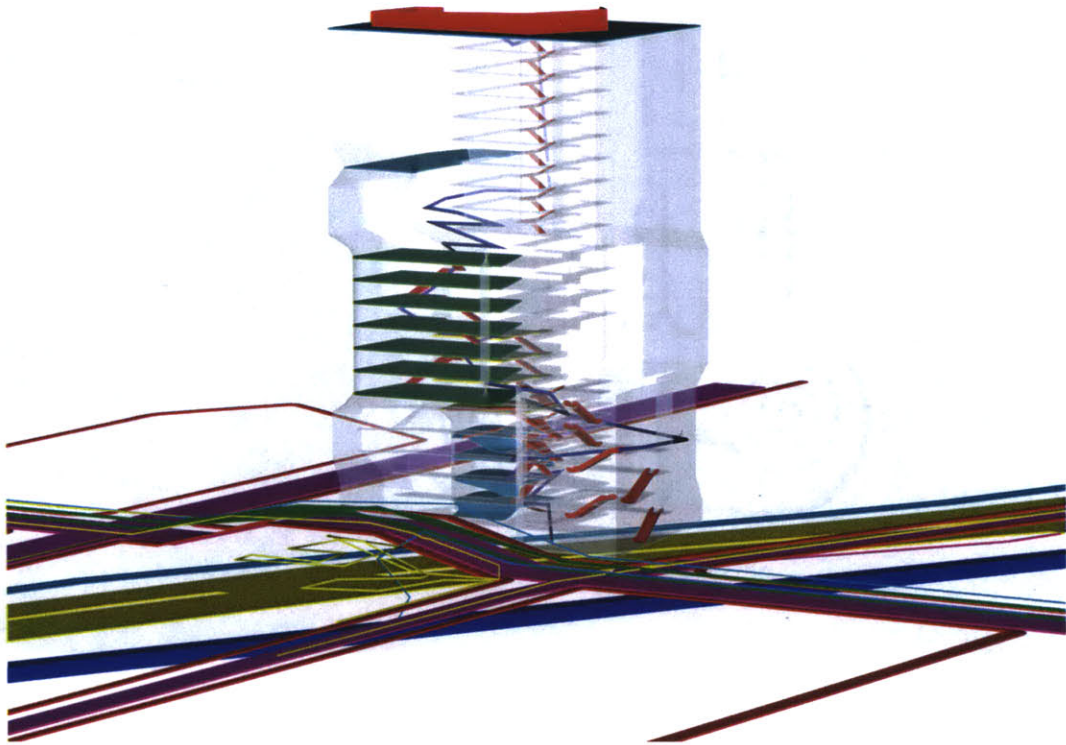




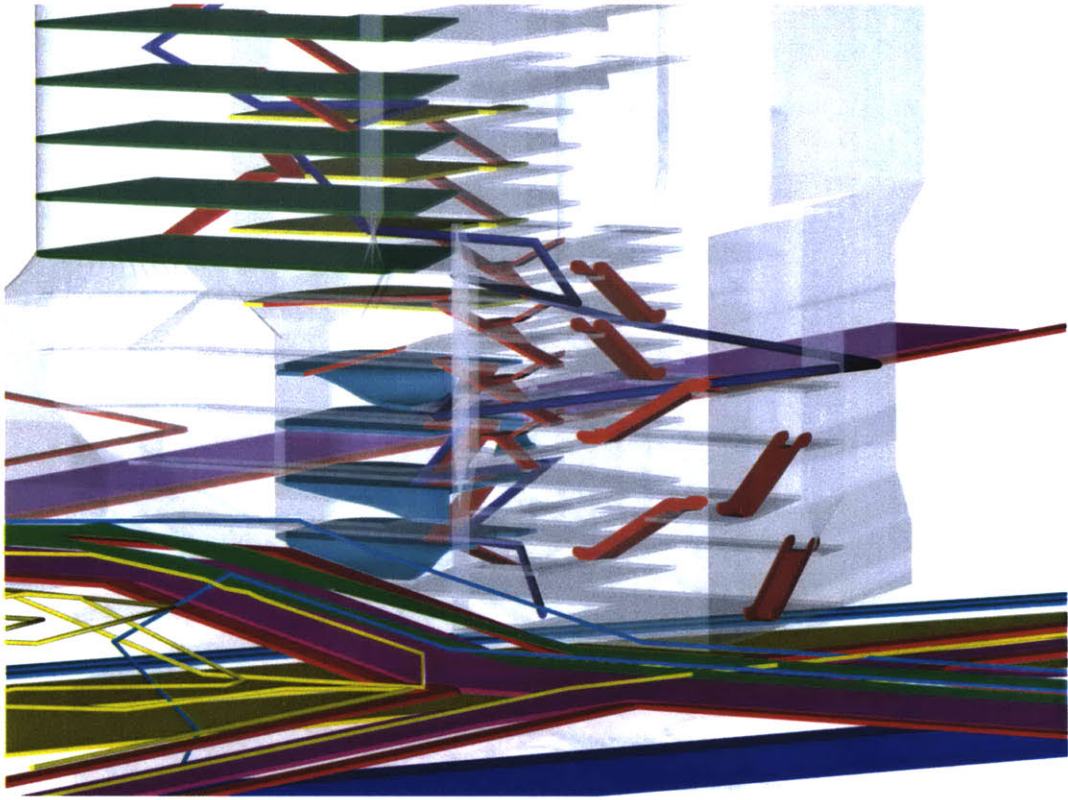


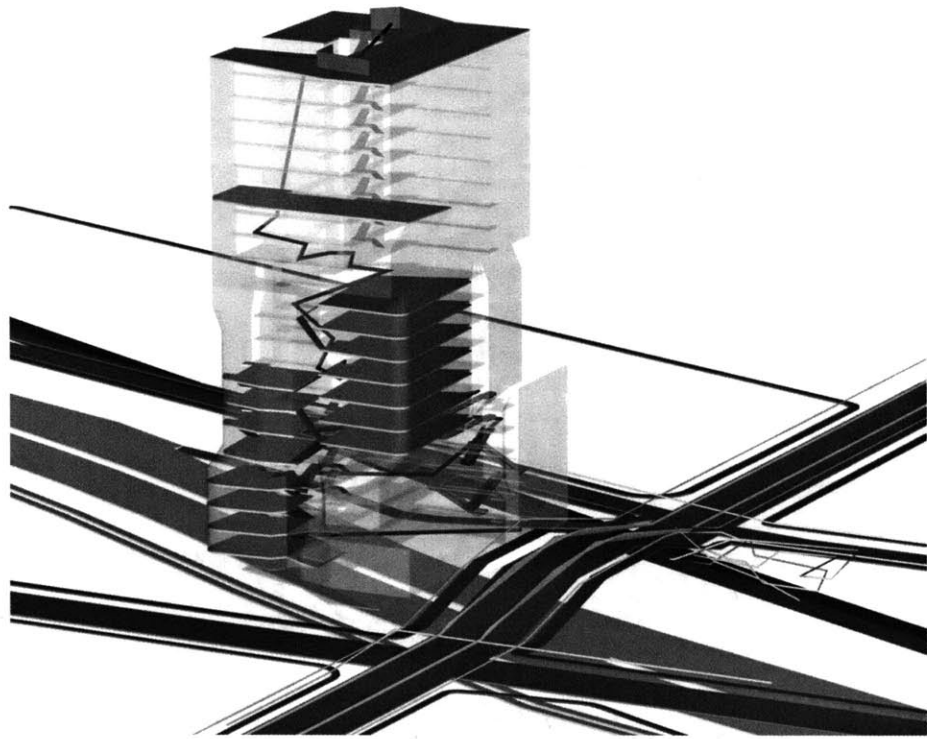


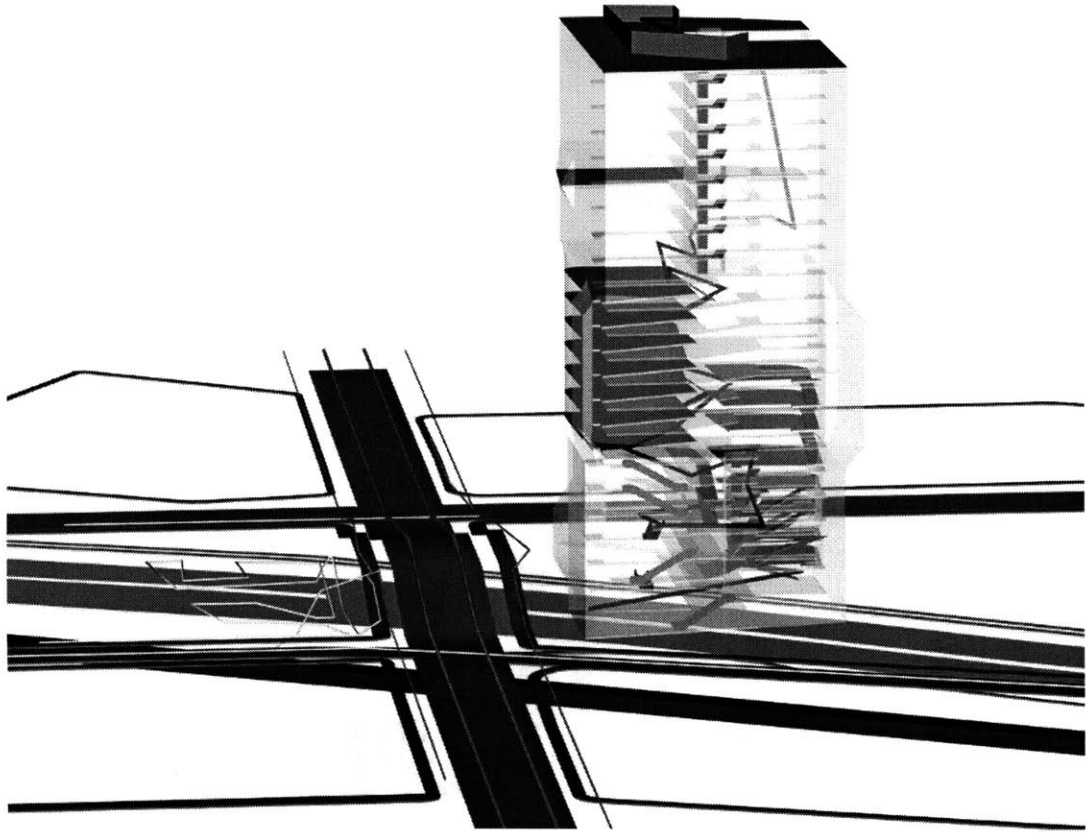


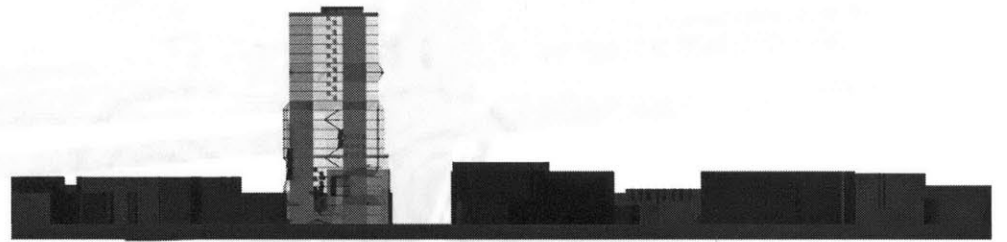


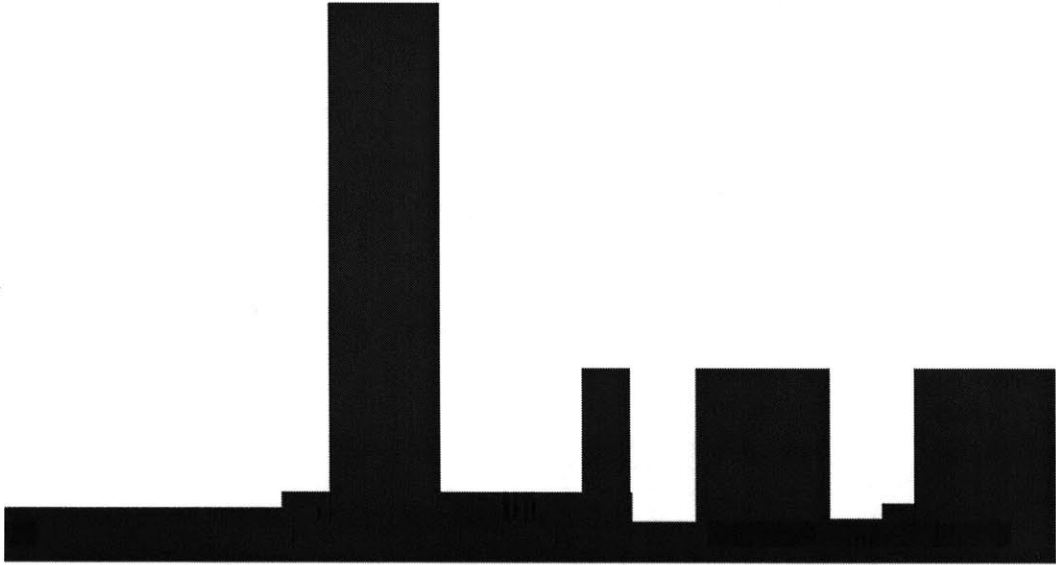
building [systems] within site [mappings]

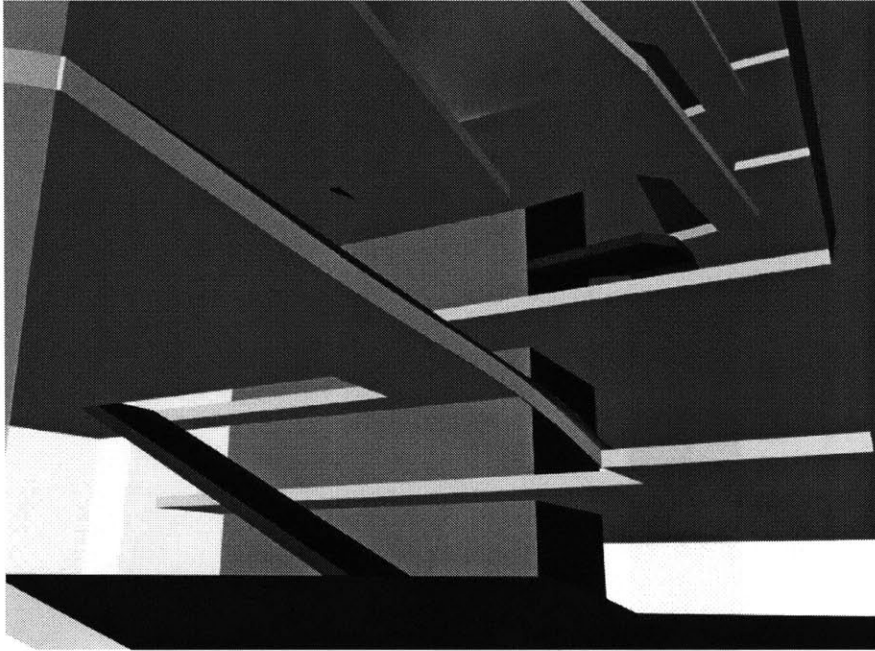




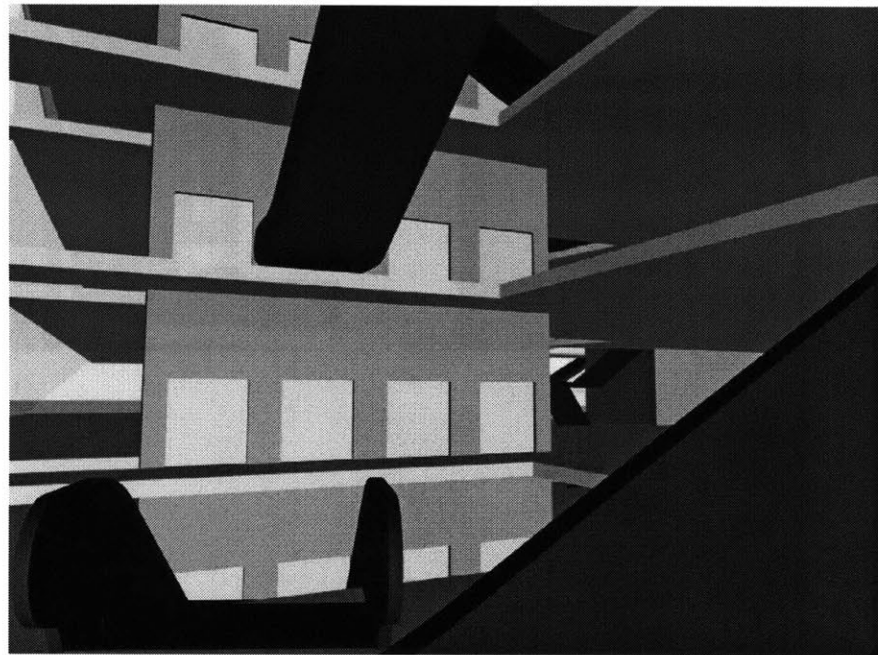
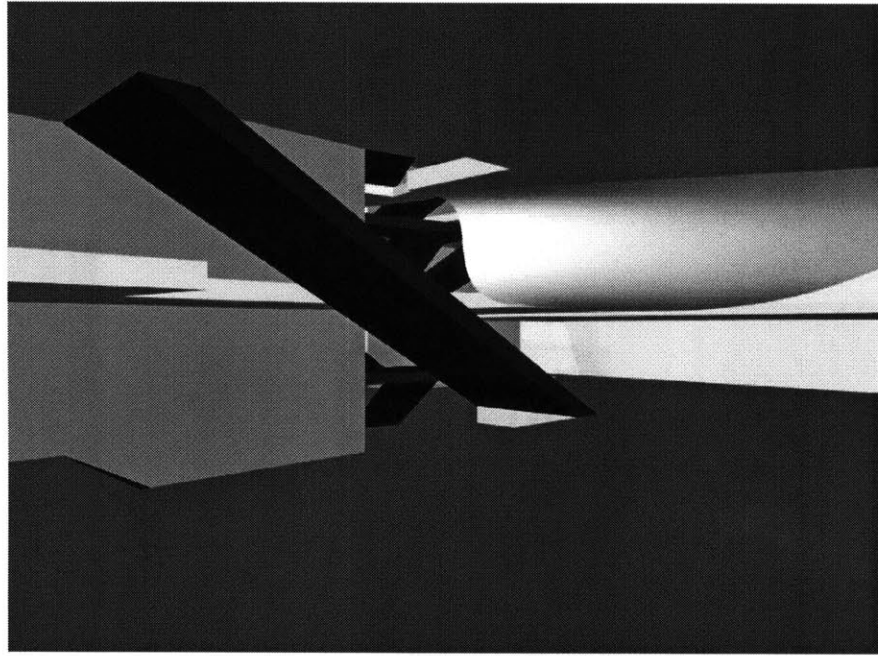


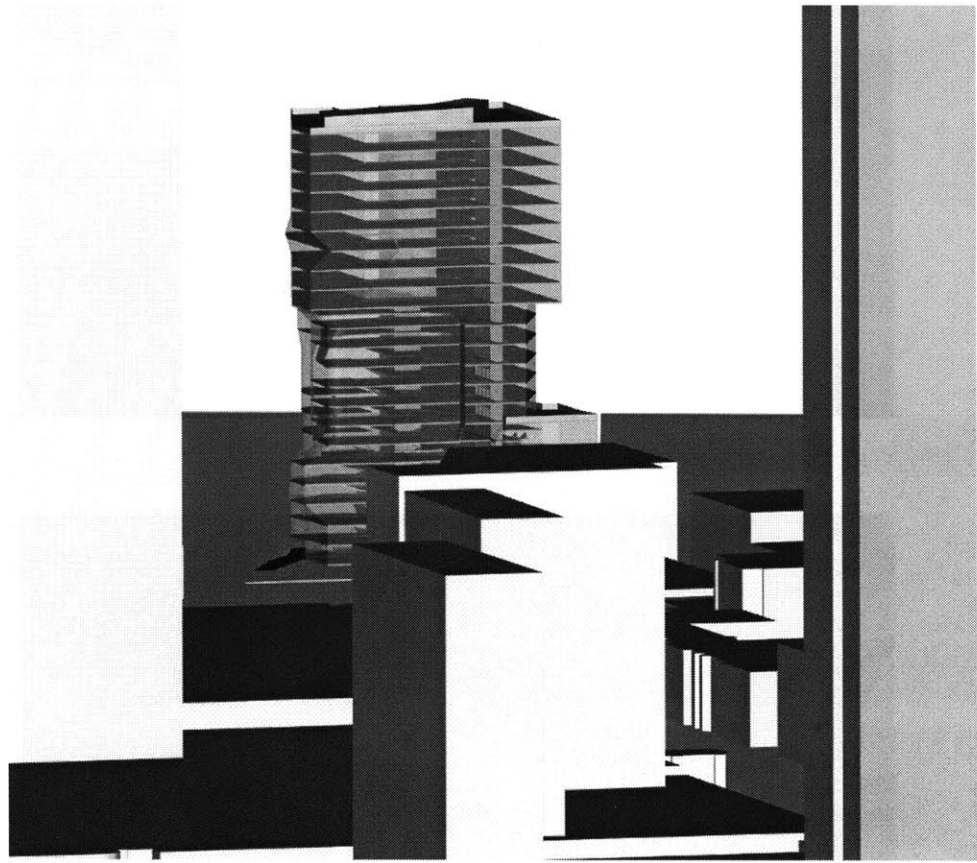


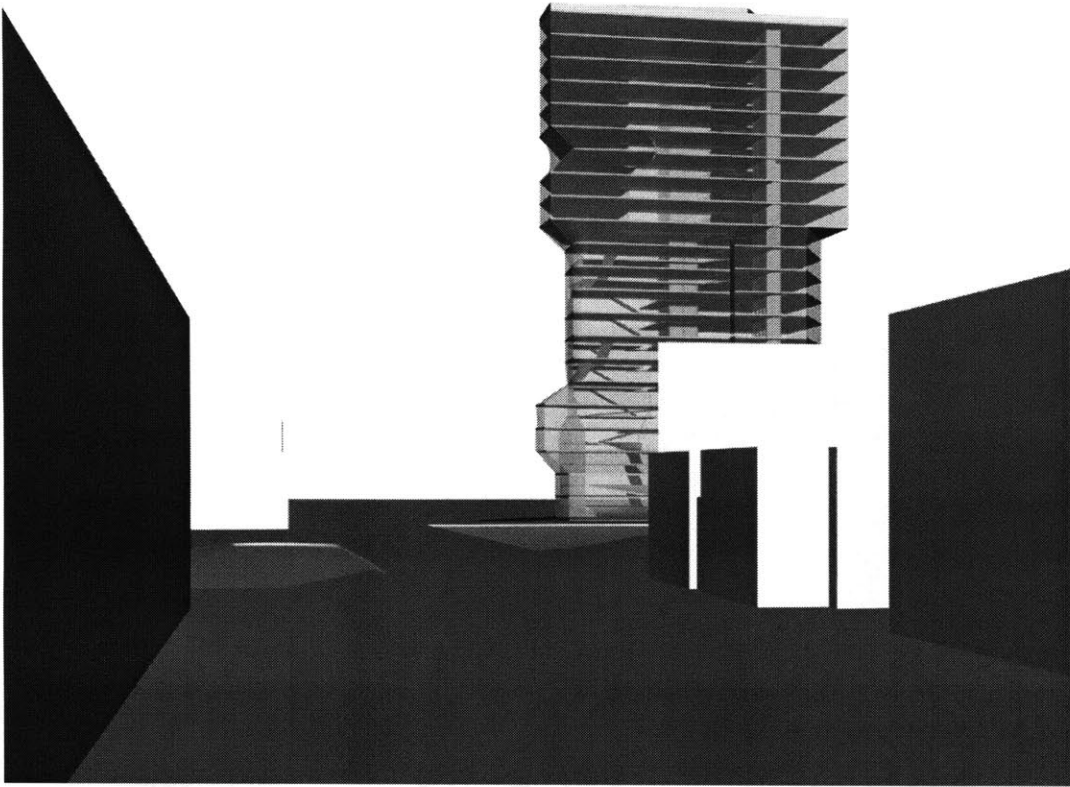


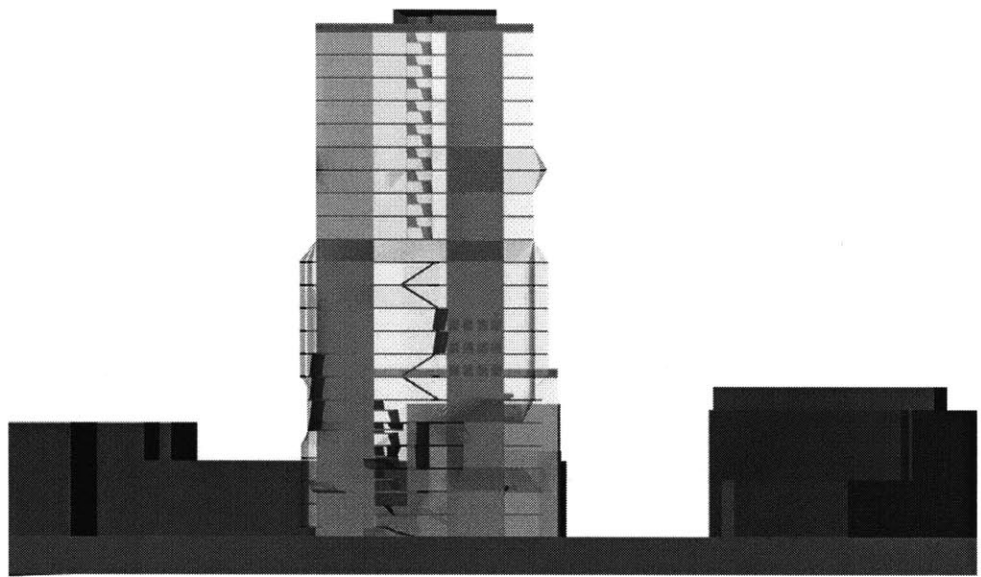


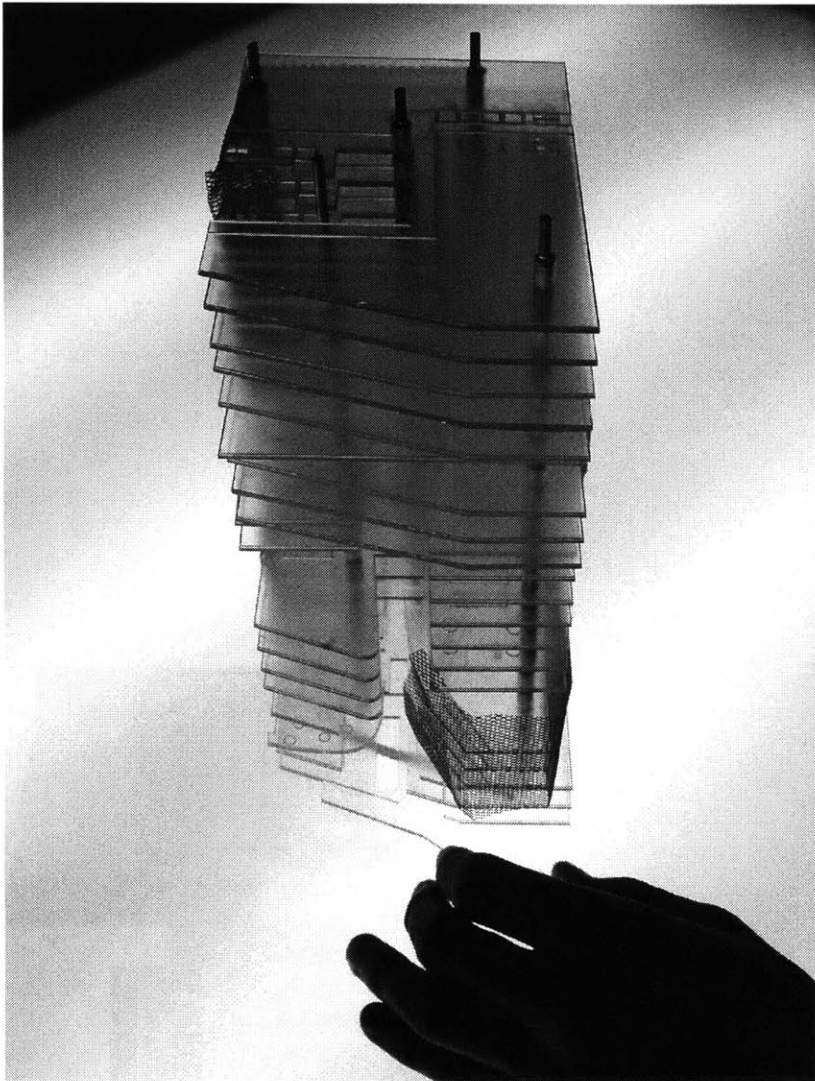
interior spaces

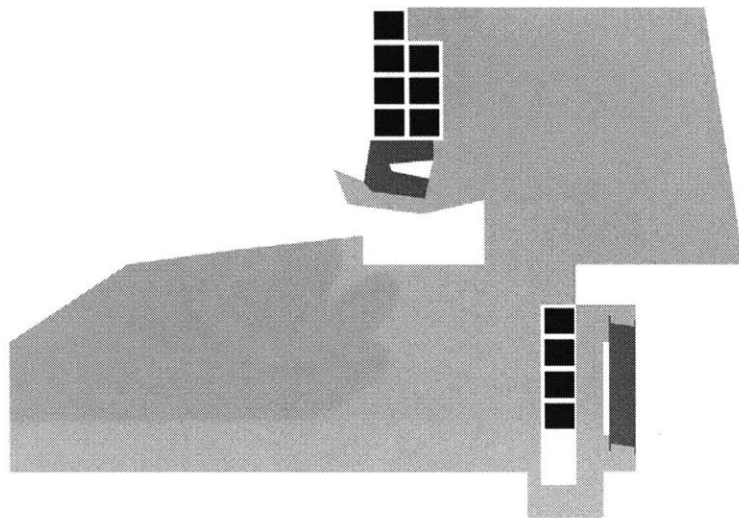












Illustrations

		Page
Figure		
1	Robert D. Putnam, <i>Bowling Alone: The Collapse and Revival of American Community</i> , 2000.	14
2	Massachusetts Geographical Information System	21

All other images produced by the author.

Bibliography

- Berkel, Ben van, and Bos, Caroline. *Move*. Amsterdam: UN Studio and Goose Press, 1999.
- Castells, Manuel. *The Information Age: Economy, Society, and Culture— Volume One: The Rise of the Network Society*. Oxford: Blackwell, 1996.
- Denari, Neil. *Gyroscopic Horizons*. New York: Princeton Architectural Press, 1999.
- Dovey, Kim. *Framing Places: Mediated power in built form*. London: Routledge, 1999.
- Gibbs, Kenneth Turney. *Business Architectural Imagery in America, 1870-1930*. Ann Arbor: UMI Research Press, 1976.
- Hartwig, Lutz, and Lampugani, Vittorio Magnago, ed. *Vertical. Lift Escalator Paternoster. A Cultural History of Vertical Transport*. Berlin: Ernst and Sohn, 1994.
- Jenkins, David. *Unite d'Habitation, Marseilles Le Corbusier*. London: Phaidon, 1993.
- Golgberger, Paul. *The Skyscraper*. New York: Alfred A. Knopf, Inc. 1981.
- Gausa, Manuel. *Housing: New Alternatives, New Systems*. Boston: Birkhauser, 1998.
- Gausa, Manuel, ed. *Spirals. Quaderns*. Barcelona: Actar.
- Glieck, James. *Faster: The Acceleration of Just About Everything*. New York: Vintage Books, 1999.
- Hadid, Zaha. *Ubiquitous Urbanism: Total Architecture*. New York: Columbia Books on Architecture, 1994.
- Holland, John H. *Emergence: From Chaos to Order*. Reading: Addison - Wesley, 1998.
- Koolhaas, Rem. *Delirious New York*. New York: The Monacelli Press, 1994.

Maas, Winy, Rijs, Jacob van, with Koek, Richard, ed. *FARMAX*. Rotterdam: 010, 1998.

Mitchell, William J. *City of Bits: Space, Place, and the Infobahn*. Cambridge: The MIT Press, 1995.

Mitchell, William J. *E-Topia: "Urban life, Jim – but not as we know it."* Cambridge: The MIT Press, 1999.

MVRDV, *Metacity / Datatown*. Rotterdam: 010 Publishers, 1999.

Putnam, Robert D. *Bowling Alone: The Collapse and Revival of American Community*. New York: Simon & Schuster, 2000.

Rowe, Colin. "Chicago Frame," in *The Mathematics of the ideal Villa and Other Essays*. Cambridge: The MIT Press, 1976.

Stephens, Suzanne, and Pearson, Clifford. "Futures to Come." *Architectural Record* 12 (1999): 85-126.

Stephensen, Neal. *In the Beginning...Was the Command Line*. New York: Avon, 1999.

Virilio, Paul. *Lost Dimension*. New York: Simiotext(e), 1991.

Virilio, Paul. *Open Sky*. Translated by Julie Rose. London: Verso, 1997.

Wogenscky, André. "Description of the Marsailles Block," in *The Marsailles Block*, Le Corbusier, trans. Geoffrey Sainsbury, 52-72. London: The Harvill Press, 1953.

Zeidler, Eberhard H. *Multi-Use Architecture in the Urban Context*. New York: Van Nostrand Reinhold Company, 1985.

Acknowledgments

I extend grateful thanks to all of the people who have helped me and contributed to the success of this project.

To my parents and family for having always given me their unconditional support in any way that they could in all of my endeavors.

To all of my friends, both around me during this time and away, for the listening and necessary distractions. To all those within school for supplying their help during all those times when I needed it most. Especially Robert Brown, Winnie Alamsjah, Michelle Auer, Nancy Liao, and Stephen Duck. To Jennifer Mack whose help from outside always kept me in touch.

To my advisor Ann, who always made sure that I was still believing in the project and for helping me to grow with it.

To my readers Ellen and Bill, for all the other angles and thoughts.

