VERTICAL NEIGHBORHOODS:
A RESIDENTIAL HIGH-RISE DESIGN EXPLORATION

by

Jan Tokuichi Taniguchi

Bachelor of Science in Art and Design
Massachusetts Institute of Technology
1976

Submitted in partial fulfillment of the requirements for the degree of Master of Architecture at the Massachusetts Institute of Technology, May 1979

Signature of Author _____
Department of Architecture, May 8, 1979

Certified by _____
Robert J. Slattery, Thesis Supervisor
Associate Professor of Architecture

Accepted by _____
Imre Halasz, Professor of Architecture, Chairman
Departmental Committee for Graduate Students

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ABSTRACT

The generation of an alternative high-rise design, sensitive to social and collective concerns is the focus of this dissertation. The design alternative proposes the concept of a "vertical neighborhood," or a situation analogous to a suburban residential neighborhood in terms of human behavior within a tall building form. The design alternative is an exploration of the possiblity of promoting human interaction and community sense with regard to collective identity and shared responsibility. It is intended to serve as a prototype to broaden one's conception of high-rise living.

The thesis contains research of problems associated with high-rise living, socio-psychological studies concerned with the influence of the physcial environment upon human behavior, case studies of five existing high-rise residential buildings and a high-rise design alternative. The high-rise design alternative is directed at alleviating the socio-psychological problems associated with conventional high-rise living - isolation, lack of identity and individuality, and security - through the proposed implementation of a "vertical neighborhood." The case studies and socio-psychological studies serve as design criteria. Included is an evaluation of the design alternative based upon critiques from professors, professionals and student peers, serving as a test of the success or shortcomings of the design alternative in fulfilling stated objectives. The thesis is concluded with a summary and suggestions for further research.

Thesis Supervisor: Robert J. Slattery

Title: Associate Professor of Architecture

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This thesis is the result of four months of intensive research, design and exploration, combined with seven years of academic preparation. At this point I would like to acknowledge those people who proved indispensible during these four months and during my academic life at M.I.T.; in particular, those who took a sincere interest in my education and provided moral support at times when it was needed.

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PREFACE

This thesis explores various aspects of high-rise residential buildings. As the title, Vertical Neighborhoods: A Residential High-Rise Design Exploration suggests, the emphasis of the thesis is upon exploring the possibility of creating a physical condition within a high-rise building form which resembles a conventional neighborhood in terms of human behavior. It is hypothesized at the outset that conventional residential buildings are

incapable of providing a physical context for the development of a "vertical neighborhood."

The thesis represents the author's conceptions and feelings toward residential high-rise living. The author's personal experience with high-rise living contributed significantly to the decision to research this area of housing, with the intention of proposing an improved alternative to what is regarded as a conventional high-rise apartment building. The text contains research on high-rise residences, socio-psychological studies of physical factors influencing human social behavior, case studies of existing residential high-rise buildings, and a high-rise design alternative, which is believed to remedy some of the problems associated with conventional high-rise dwellings through the incorporation of a "vertical neighborhood."

Chapter One familiarizes the reader with a brief history of high-rise buildings, and some of the problems and merits associated with them. Chapter Two introduces the concepts of territory and defensible space and discusses some of the physical factors influencing human territorial behavior. Chapter Three presents some socio-psychological studies

concerned with the influence of the physical environment upon social behavior patterns. Five case studies of existing high-rise residential buildings are presented in Chapter Four. These case studies illustrate alternative building organizations and forms to serve as models against which the design exploration of Chapter Six may be compared. Chapter Five is a short discussion of the vertical access service cores and their influence upon building organization. The design exploration is presented in Chapter Six, describing both the neighborhood living cluster and the entire apartment complex. Chapter Six also includes an evaluation of the project based on critiques of professors, practicing architects, and student peers. Chapter Seven concludes the thesis with a summary and closing remarks.

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TALL BUILDINGS & PEOPLE

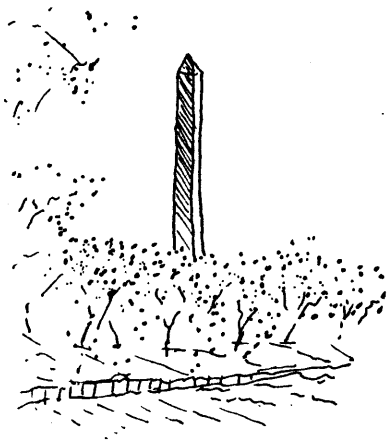
INTRODUCTION

... human behavior is like running jelly - not formless, but wobbly and changeable ...
Maurice Broady in
Planning for People

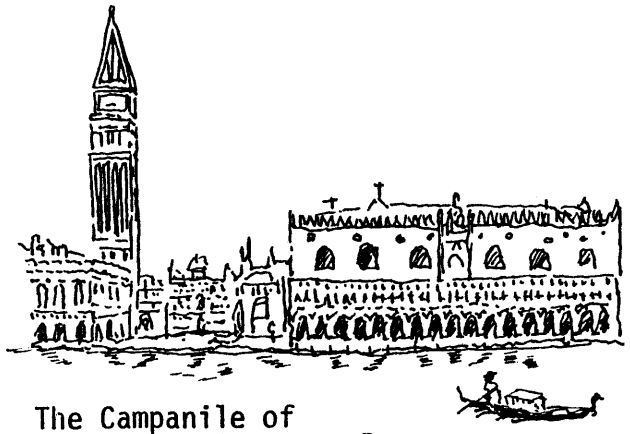
Tower of Babel [1, p. 15]

1. George Clarke and Ken McDonald, "The Economics of Tall Buildings," Proceedings of the Australian and New Zealand Conference on the Planning and Design of Tall Buildings, Sydney, August 14-17, 1973, pp. 234-235.

Tall buildings have been a part of human experience from the days of ancient civilization. One need only look to the Pyramids of Egypt or the mythical Tower of Babel to realize that man's urge to build upwards is not a recent phenomenon. In the past tall buildings represented the aspirations of civilizations involving a communal participation in their erection and appreciation. The tower proclaimed the existence of power or the identity of a unique civilization or social group. The tendency of the tall building to be comprehended as a unique whole, rather than an assemblage of parts, provided the characteristic of identity or prominence. The concept of ancient tall buildings was more symbolic than utilitarian.[1]



The Washington Monument



The Campanile of
St. Mark's [2, p. 97]

Contemporary tall buildings, on the other hand, are functional; they provide places of human habitation or work. Symbolically tall buildings may represent a corporate image, an affluent way of life, or the existence of power. Whereas tall buildings of the past fulfilled a symbolic function, their significance is diminished in contemporary cities as each building is merely one of many, all with comparable vertical dimension. In European villages and towns, the clock tower or church steeple stood alone as a punctuator of the natural landscape and performed the unifying function of representing the town as a whole. Contemporary tall buildings signify the existence and identity of only those isolated owners or inhabitants or buildings and, rather than embracing their context, alienate adjacent buildings and street life. The tall building is more often than not viewed not as a source of civic pride and community identity, but as an

instrument of private enterprise.

The high-rise in the modern sense of the word has evolved out of the industrialization and urbanization, first in the 1750's in Great Britain and later, in the United States in the 1850's. The Industrial Revolution brought with it the discovery and use of iron (and more recently, steel) in building construction. To achieve higher densities, first for work and later for habitation, buildings moved skyward.[2] Only since 1869 have those who considered themselves above the laboring class been willing to share their homes under one roof. Prior to that time, it would have been unthinkable for a family of even modest social aspiration to live in anything but a single family dwelling.[3]

While the existence of contemporary tall buildings symbolizes one of the greater achievements of modern technology and corresponding technical conquest of several engineering problems, the social and

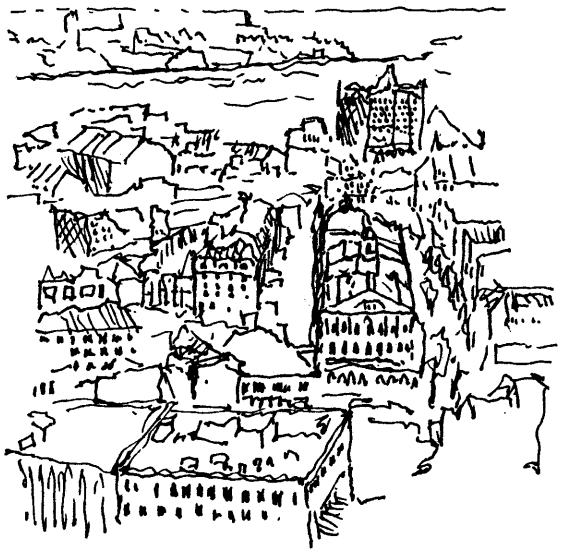
2. Pearl Jephcott, Homes in High Flats, Some of the Human Problems Involved in Multi-Storey Housing, p. 2.

3. Andrew Alpern, Apartments for the Affluent, A Historical Survey of Buildings in New York, p. 1.

psychological problems of high-rise buildings both in terms of user and observer lay virtually untouched.[4] In the development of a successful tall building form, designers have attempted to simplify or reduce complex architectural problems into a workable building form. This attitude unconsciouly or consciously involved the simultaneous simplification of use, user needs and occupancy. Tall buildings resulting from this mode of thought almost exclusively are offices or residences.[5] Buildings designed in this fashion are use specific and consequently do not allow for the variability in human lifestyles and individual needs. In office towers, conventional design procedures lean toward open space planning to accomodate variability of tenants. However, in apartment complexes, the convention is to design repetitive units to satisfy housing requirements of tenants. While high-rise living does provide a sunlit space for habitation,

4. Walter Bor, "High Buildings: A Blessing or A Curse?" Tall Buildings and People?, p. 13.

5. I. Metzstein and A. MacMillan, "Amenity and Aesthetic of Tall Buildings," Tall Buildings and People?, p. 95.



Views

fresh air, acoustical privacy from street noise and human privacy, not to mention the possibility for breathtaking views and a distinctive change of experience from conventional ground level habitation, high-rise dwellings face several social and psychological problems directly attributable to their living environment. At the heart of these problems is the perceived lack of community, or sufficient human interaction. These socio-psychological problems, including isolation, lack of identity, and lack of security transcend the economic boundaries between low-income and luxury housing. The rationale behind the development of these two extremes of high-rise housing differ considerably (low-income high-rise housing developed to increase the population density for a given lot and luxury high-rise developed for the sake of offering accomodations of privacy and convenience, and views). The accomodations provided in either

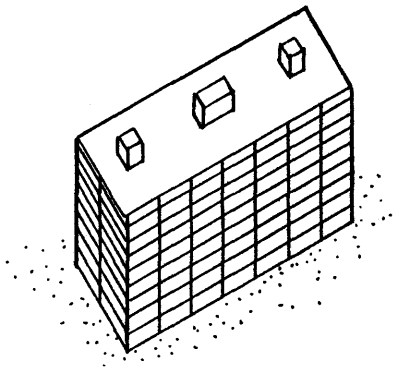
type of conventional high-rise housing does not provide a tenant a choice with regard to the degree of social interaction he or she might desire. Instead, aspects of privacy, efficiency and security have generated a building type that is not conducive to a sense of community, or meaningful human interaction.[6]

A further result of little human interaction in contemporary high-rise apartments is the lack of responsibility for areas beyond the confines of one's apartment, which results in the previously described problems of security, isolation and lack of identity. Consequently, by attempting to encourage a sense of community or neighborhood through architectural design, residential high-rise living may be transformed into a more humane experience, and also help in alleviating the complex problems of isolation, security, and identity.[7]

In both conventional low-income and luxury high-

6. Barbara Adams and Jean Conway, "The Social Effects of Living Off the Ground," Tall Buildings and People? p. 151.

7. Oscar Newman, Defensible Space, Crime Prevention Through Urban Design, p. 3.



"Egg Box" Architecture

8. Jephcott, p. 9.

rise dwellings, the repetitive nature of units and floors is logically unresponsive to the variety of tenants likely to be housed in the building.

> While the men in the street accept the main soaring office block or hotel or university tower, he seems to jib at the idea that human beings with their infinite variety of tastes, needs and capacities should be asked to make their homes in a setting felt alien to the human condition.[8]

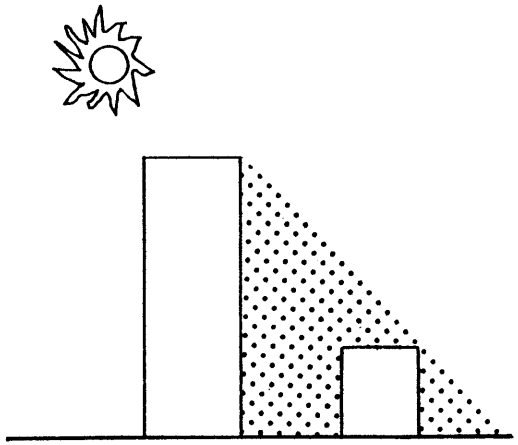
Furthermore, the uniformity of floors of units stacked one upon another inevitably gives rise to the derisive comments about "egg box" architecture and "battery living." The lack of differentiation between floor levels or sets of floors in high rise buildings relegates the act of moving through the building to sign reading rather than orientation based on physical clues and landmarks.[9]

The virtually identical apartments on the second and twentieth story of a conventional apartment complex are indicative of a design attitude that appears to

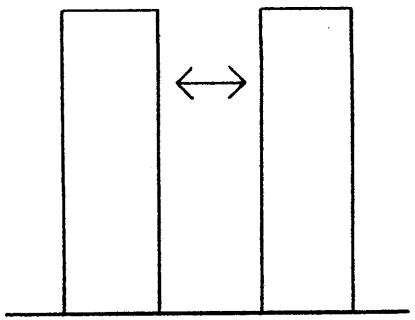
9. Francis J.C. Amos, "High Hopes and Low Life," Tall Buildings and People? p. 59.

view the building as a problem independent of site issues and the change in visual and psychological experience with height. Ostensibly, it would appear to the layman that high-rise apartment buildings are designed first out of context, then placed into a site, as a sculpture in a museum.[10] High-rise apartment buildings often have adverse effects upon adjacent buildings by casting shadows or blocking views. It had been mentioned previously that sunlight, fresh air, acoustical privacy from street noises and views are positive attributes of high-rise dwellings. These attributes preclude a building site that is in the midst of other tall buildings. Adjacent tall buildings may block sunlight and restrict views. In addition, privacy in such circumstances may be difficult to maintain considering the direct visual contact from neighboring high-rises. Consequently, if a high-rise residential building is to benefit from its

10. Metzstein and MacMillan, p. 93.



Shadows



Lack of Privacy
Blocking of Views

vertical dimension, its location must be selected such that it is not amidst buildings of comparable height.

The introduction of a high-rise residential building may place a burden upon support facilities of its location. The impact of a large number of families with living and recreational needs could conceivably upset the balance of supply and demand of an existing social and economic system. Thus, a high-rise residential complex should ideally include at least some of the support facilities needed by the increased population, such as grocery stores, druggists, cleaners, and convenience stores.

A CASE FOR HIGH-RISE LIVING

Itallian Hilltown

The previous section sought to point out many of the negative socio-psychological consequences of the living environment as defined by a conventional high-rise building. In this section, some of the merits of high-rise residences will be discussed in an effort at bringing an awareness of the potential positive attributes of high-rise dwelling that deserve recognition and could possibly serve as clues to high-rise design.

High-rise residences are not recent phenomena. The picturesque hill towns of Italy and cliff dwellings of the southwestern United States attest to the fact that high-rise living has long been an acceptable means of housing. Albeit, the Italian hill towns and cliff dwellings in no way resemble the present day

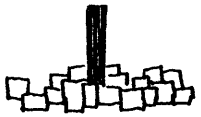
high-rise apartments; however, both examples are similar to present day apartments in their vertical height, in contrast to their surroundings.[11]

The most obvious and inherent characteristic of a high-rise building is that of vertical dimension. By virtue of height, a high-rise dweller is provided with a unique living experience, very different from one or two story dwelling conditions. The high-rise dweller often enjoys spectacular views, which extend immensely the perceptible range of the inhabitant's experience. Whereas the association of a dweller of the suburbs, or of a rowhouse, is restricted to his/her street and neighborhood, the experience of the high-rise dweller is not restricted to the immediate neighborhood but extends to the limits of human vision. Hence, the high-rise dweller may feel more a part of the city fabric on which he/she resides.[12]

In addition, the high-rise permits a large number

11. Brian Mayes, "Aesthetics and Amenity," Tall Buildings and People? pp. 101-102.

12. Jephcott, p. 1.



Tall Building as a Landmark

of people to be at the center of urban activities, with no sacrifice of privacy and security. The population increase resulting from a new residential high-rise may provide a new or enlarged market for goods and services and would stimulate a similar growth or enlargement of such urban amenities as theaters, commercial facilities and professional services.[13] A high-rise apartment can house a sizeable number of families in a building taking up less ground-space than an equivalent development of low-rise units and permits the existence of more open space and the preservation of parks and urban greenery.[14] The human propensity for ambition and prestige may be realized in a high-rise dwelling with a commanding view of the cityscape.[15] The tall building form represents a sense of place that is visible from a great distance (i.e., a landmark).[16] By virtue of physical distance from the ground, the high-rise dweller is isolated

13. Lynn S. Beedle, "On High-Rise Housing," Proceedings of The Twenty-Sixth Regional Conference on Planning and Design of Tall Buildings, High-Rise Housing Workshop, Singapore, December 6-7, 1974, p. 12.

14. Amos, p. 58.

15. Lynn S. Beedle, "Why Tall Building Conferences?" Tall Buildings and People? p. 2.

16. Kevin Lynch, The Image of the City, p. 101.

from the noise of the streets. Also, the apartment is generally bright and easy to manage. People residing in high-rise buildings feel that the air is fresher and cleaner high up.[17]

High-rise living is especially suited to particular lifestyles. The single, unmarried, or childless couple finds that high-rise living is convenient to their independent lifestyles. The convenience and manageability of the high-rise dwelling is compatible with a lifestyle that is not home oriented.[18] Also, the likelihood of the apartment's proximity to places of work eliminates the necessity for long commutes, parking, and eating out. The elderly find high-rise living convenient in terms of access to urban activities and well suited to their physical condition, by virtue of the lack of stairs, direct elevator access to floors and security.[19] The conventional high-rise, however, has been cited as an environment unsuitable

17. Adams and Conway, p. 154.

18. Amos, p. 59.

19. Alice Wong and Bill Lim, "Architectural, Social and Economic Aspects, (Neighborhood and Environment)," Proceedings of the Twenty-Sixth Converence on Planning and Design of Tall Buildings, High-Rise Housing Workshop, Singapore, December 6-7, 1974, p. 30.

for families with small children, owing to the difficulty of visual surveillance, audio communication, and supervision beyond the confines of an apartment unit.

Another advantage of high-rise residential buildings is their efficient use of energy. Individual apartment units require far less energy in terms of heating and colling due to the limited surface area for heat loss or gain. A single family dwelling has a significanly greater surface to volume ratio than a high-rise apartment unit. High rise buildings do, however, have energy requirements not associated with single family dwellings as in water pumping and air handling equiptment and elevator equiptment. These energy requirements still are not appreciable if compared to the total energy requirements for housing an equivalent number of people in single family dwellings.[20]

20. Metzstein and MacMillan, p. 94.

A high-rise building is capable of achieving densities that are unobtainable in low-rise or mid-rise building forms. A high-rise building solution may be effective in rendering a small site capable of supporting a large number of families, and by extension, may increase the economic potential of small sites, especially where land is at a premium.

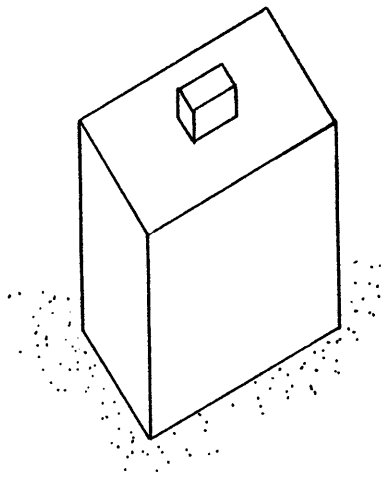
In summary, high-rise dwellings possess many positive characterisitcs. Considerations of the nature of being high above the streets with a commanding view of the city is perhaps the most significant design parameter. In addition, the potential for increased amenities based on population, combined with a building form to signify its existence could enable the high-rise residential building to contribute to, and partake of urban life and activity. The fact that the residential high-rise fulfills adequately housing needs in an urban environment for

particular lifestyles indicates the possibility of creating a more accomodating environment for a variety of human lifestyles within the context of a tall building form. The energy efficiency and capability of achieving high densities lend economic justification for the continued existence of high-rise residential buildings.

A DEFINITION

He [The Emperor] *is taller by almost the breadth of my nail, than any of his court, which alone is enough to strike an awe into the beholders.*

Gullivers's Travels, Voyage to Lilliput



Tall?

The reader, at this point, is perhaps puzzled as to the definition of a high-rise, or tall building, in light of the previous discussion, and may feel that a definition of high-rise, or tall building is in order. Whereas, the characteristic of being tall or short, high or low, or medium are relative measures, based on subjective judgement, no definitive number of stories or feet can be identified as the "cut-off" points for high, medium, or low-rise buildings. However, for the purposes of this dissertation, some notion or sense of what is meant by a high-rise is in order.

> A high building is a building whose most important dimension is that of height, and which dominates its environment.[21]

or

21. Bor, p. 7.

> Buildings that are substantially higher than their surround.[22]

Hence, the definition is concerned with the aspect ratios of height and girth, in addition to its height relative to other buildings. In terms of number of stories, a tall building is generally one which exceeds nine stories; a mid-rise between six to nine stories; and a low-rise, below six stories. Also, a building's height relative to its neighbors may have a considerable effect upon perceived height or tallness.[23]

Another method of defining or differentiating a high-rise building from other types of buildings is on the basis of service access. Buildings relying primarily upon hung elevators for vertical transport may be regarded as high-rise buildings. Buildings with roughly equal dependence upon elevator service and stairs may be considered mid-rise buildings, and

22. Ralph Cowan, "Tall Buildings for People - Aesthetics and Amenity," Tall Buildings and People? p. 85.

23. Samuel Paul, Apartments, Their Design and Development, p. 46.

logically, those buildings primarily dependent on stair access are low-rise buildings.

With regard to housing, high-rise need not be associated with high density, nor with a specific social group. The existence of both luxury and low-income high-rise housing bears witness to this premise. In an article published in the February 1976 issue of Architectural Record, San Francisco architect, Herbert McLaughlin disputes the arguments for high-rise in terms of density, and claims that most high-rise housing projects could achieve comparable densities in low-rise clusters. While McLaughlin's arguments, based upon a comparison of occupied square feet to total site square footage of high-rise and low-rise projects are conceivably deceptive, (i.e., a comparison of occupied square feet to site occupied by building square feet may be a more appropriate measure of density) nevertheless,

he introduces the concept that the development of high-rise housing is based upon a rationale beyond economic arguments for accomodating high density on a given lot.[24] Consequently, the philosophy of high-rise residential design need not be based on economic arguments of density and efficiency alone, but may encompass the notion of providing an acceptable alternative means of housing people.

When one speaks of a high-rise residential building it is usually assumed that the building's function is restricted to housing. For the purposes of this dissertation, a residential high-rise building may be interpreted in light of being devoted primarily, though not exclusively, to residential functions, and may be assumed to include potentially, commercial, office and other entrepreneurial activities. As the high-rise apartment usually houses a significant populace, it is not inconceivable that support

24. Herbert McLaughlin, "Density: The Architect's Urban Choices and Attitudes," Architectural Record, CLIX (February 1976), pp. 95-100.

facilities as shops, entertainment, restaurants, and recreation facilities may prove economically feasible.[25]

In summary, although no clear-cut definition has been presented, (for the purposes of this dissertation), high-rise residential buildings may be regarded as a building type concerned primarily, although not exclusively, with providing housing to inhabitants in a building form, emphasizing the vertical, and dependent upon hung elevators for vertical transportation. Residential high-rise encompasses both low-income and luxury complexes and need not be associated with a specific density or limited to fulfilling a strictly residential function.

25. Beedle, "On High-Rise Housing," p. 12.

2

TERRITORY

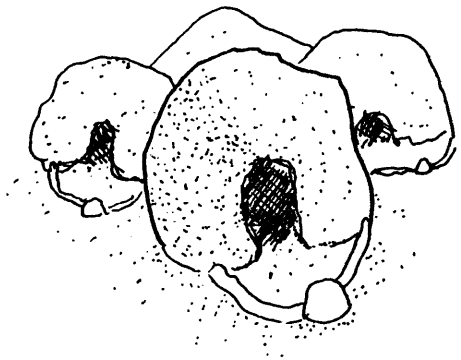
TERRITORIALITY

A territory is an area of space, whether of water or earth or air, which an animal or group of animals defends as an exclusive preserve. The word is also used to describe the inward compulsion in animal beings to possess and defend such a space. A territorial species of animals, therefore, is one in which all males, and sometimes females too bear an inherent drive to gain and defend an exclusive property.[26]

The Territorial Imperative

So begins Robert Ardrey's The Territorial Imperative, a study of animal and human behavior with regard to the defense of territory. The concept of territory is introduced at this point with regard to human territoriality, or sense of territory in high-rise residential buildings. The well known maxim, "A man's home is his castle," is indicative of the human perception of home or abode as the ultimate in human territoriality. The term "home," which includes all types of residences (i.e., apartments, single family dwellings, condominiums, etcetera), defines the

26. Robert Ardrey, The Territorial Imperative, A Personal Inquiry into the Animal Origins of Property and Nations, p. 3.

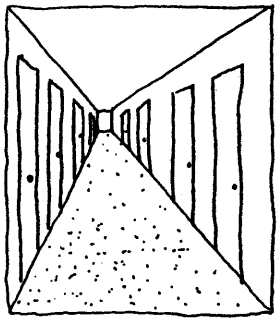


Mud Hut in the
African Sudan
[3, p. 5]

immediate realm of the inhabitant and his sphere of control. In traditional cultures, man employed a variety of devices to define territorial limits of his dwelling. The perceived limits of one's dwelling were generally not confined to the limitations imposed by the physical dwelling unit, but extended instead to adjacent areas, and were indicated by physical clues. The notion of the single family dwelling on a half-acre lot is a familiar analog in our present culture.[27]

27. Newman, p. 6.

With regard to residences in high-rise buildings, the innate human propensity for territoriality is severely limited by the size of floors and corresponding units. The limits of man's territory in the traditional residential high-rise is the apartment unit. In contrast to the traditional notion of territory involved with man defining his territorial realm, territory, as related to high-rise buildings is predefined by the architectural design of the building,



Typical Double-Loaded Corridor

and not subject to alteration or adjustment, as dictated by the needs of inhabitants. There is no perceptible space beyond the apartment unit doors into which tenants are likely to extend their territorial claim. Instead, with each apartment representing a distinct enclosed territory, it is not surprising that the difficulty exists in developing a sense of community or personal interaction. If the concerns of residents lie strictly within their apartment units, the secondary areas, i.e., corridors, lobbys and elevators, are conventionally regarded as distinctly public. The responsibility for these areas is relegated to the building management. Consequently, these spaces, in which there exist the possiblity for human interaction, function strictly as a means of access and are generally not the setting for congregation or the spending of any significant amount of time. A traditional residential high-rise may therefore be

conceptualized as two concentric extruded tubes, the outer of which represents the desirable spaces (i.e., apartments), and the inner space, a secondary space merely providing a means of access and space for mechanical service.[28] If the possibility did exist for a collective sense of territory, these areas of access and service could conceivably provide a basis for sense of community. These secondary areas which presently serve the collective function of access and service, have the potential for accomodating additional collective functions involving the interaction of individuals.

28. Bor, p. 14.

DEFENSIBLE SPACE

Oscar Newman, in his Defensible Space, expressed concern over the safety of multi-family dwellings in terms of crime and vandalism. While Newman's premise did not stem from the encouragement of interaction among residents for the sake of community, Newman believed that a more humane physical environment for dwellers could exist if a collective sense of responsibility was developed for public areas.[29] What Newman described as a "defensible space" in terms of safety may well result in an environment more conducive to social behavior.

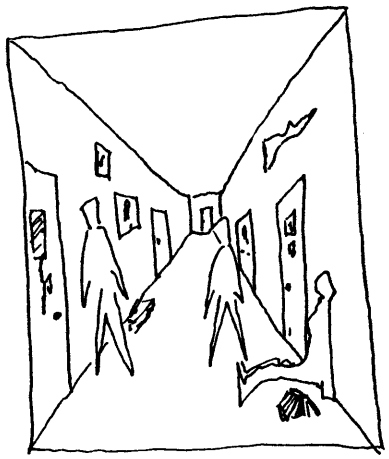
> An environment in which total territoriality and sense of community in the inhabitants can be translated into responsibility for ensuring a safe, productive and well maintained living space.[30]

29. Newman, p. 52.

30. Ibid., p. 3.

In addition, as a "defensible space" is the collective responsibility of individuals, the psychological problems of identity and loneliness are likely to be alleviated. As a group of individuals can be associated with a given collective space, it is likely that a high-rise resident could conceivably identify with a particular group of individuals or apartment dwellers who share in their concern for the condition of the "defensible space."

Examples of collective territoriality are numerous. One of the more direct and familiar examples in multi-level living is the college dormitory. Residents of a given floor are likely to maintain a reasonable degree of collective responsibility for the use areas beyond their individual rooms (i.e, corridors, bathrooms, kitchens). This collective concern helps to bring together residents of a given corridor. The hallway, in dormitories where the author has spent



Typical Dormitory
Corridor Atmosphere

the greater part of his academic life, was not solely to provide room access, but was also an area for conversation or collective celebration. The corridor was perceived not an an anonymous space, but rather one which belonged to the residents of the corridor, and was the logical extension of one's room.

The high-rise apartment building is not a dormitory of people sharing a common way of life; rather, it houses individuals with a variety of daily experiences and diverse lifestyles. Consequently, the dormitory corridor atmosphere does not pervade conventional high-rise dwellings. The individual self-sufficient units of the apartment, and their respective tenants are logically less than prone to interact to the degree that a dormitory situation fosters. Yet, despite the lack of a shared lifestyle, residents of high-rise buildings could conceivably develop a sense of shared responsibility or collaborative sense for an

area which serves the collective whole, as well as the individuals who make up the whole. The dormitory model may serve as a reference from which the residential high-rise designer may begin to uncover clues to resolve the problem of achieving collective territoriality for communal areas. In the following chapter a few studies of dormitory dwelling situations are discussed which bear directly upon residential high-rise design.

For the collective territory to be of significance to residents, it must be of finite size, supporting a collective group of identifiable individuals, and in propinquity to individual units. Research has demonstrated that communal areas, such as swimming pools, meeting rooms, tennis courts, lobbys, etcetera have not contributed to a sense of collective territory or extension of individual units in high-rise residential complexes.[31] While no definite reason can be

31. Judith O'Neil, "The Social Environment of Tall Buildings," Proceedings of the Australian and New Zealand Conference on the Planning and Design of Tall Buildings, Sydney, August 14-17, 1973, pp. 298-299.

identified for the lack of community attitude in spite of the existence of these communal areas, the aspects of distance and numbers may offer some insight into the problem. The fact that the communal areas of high-rise apartment complexes are removed from the actual dwelling units (often even visually) may account for the lack of association, or perceived sphere of influence one senses with regard to these communal facilities. In addition, the number of individuals using these facilities is beyond the collective comprehension of the individual. Consequently, there is difficulty in feeling a part of a group using these facilities. Instead, the feeling is one of individuals using a facility as one would a movie theater, and feeling no sense of ownership or sense of responsibility.

Again quoting Defensible Space:

> Reducing the number of apartment units grouped together to share a collectively defined territory, and limiting the number of buildings which comprise a housing project, are extremely important factors in the successful creation of defensible space.[32]

32. Newman, p. 71.

> The value of a facility shared with others decreases with the number of people involved in the sharing. We have found that an outside play and sitting area, if it is intended for the exclusive use of twelve families, has greater significance for each family than a larger area shared by proportionally more families.[33]

33. Ibid., p. 73

> The location of territorially assigned grounds of amenities such as play and sitting areas washer-dryer facilities and automobile repair facilities will tend to give an area a higher intensity of use and further support any initial claim of territory. The presence of residents involved in various activity, individual or communal - children at play, women chatting or doing wash, or men talking over the best way to tackle a faulty carburetor - brings these areas under casual surveillance by concerned members of the family and further reinforces its defensible space attributes.[34]

34. Ibid., pp. 70-71.

Whereas Newman's comments are directed primarily at low-rise conditions, the logic behind the development of a sense of collective territory may be applied to high-rise dwellings. The concept of subdivision or

consciously considering the number of apartments sharing a hallway or communal facility and their orientation to the space is significant in developing a sense of collective territory.[35]

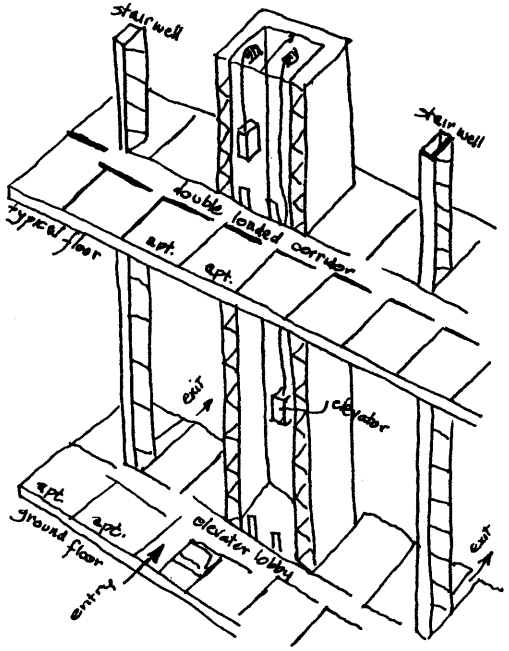
35. Ibid..

With regard to high-rise buildings, serviced by hung elevators, ostensibly economy does not dictate few units per floor; rather, the tendency is toward servicing a large number of apartments both in the building and per floor. However, the capability does exist for organizing units such that identifiable collective territories do exist within the restriction of several unit served by an elevator. As previously mentioned, for an area to work as a collective territory or defensible space, the mechanisms of propinquity and, more importantly, visual contact, combined with the "right" number of units associated with the space should be considered.

HIERARCHY OF SPACE

A deck of cards was built like the purest of hierarchies, with every card a master to those below it, a lackey to those above it.
Ely Culbertson, Total Peace

Another important consideration in the designing of a high-rise is the concept of hierarchy of space, which refers to space ordering on the basis of varying degrees of privacy. The contemporary multi-story residential building as typified in the double loaded corridor apartment slab, is indicative of a hierarchy of space unconducive to the development of a defensible space mechanism or collective sense of territory. Upon entering the apartment building, one moves into a semi-public realm which relates to both the street and the building as a whole. The lobby area serves the entire building and hence may be thought of as semi-public in serving a great number of people, i.e., the residents of the apartment building, though not the populace as a whole.



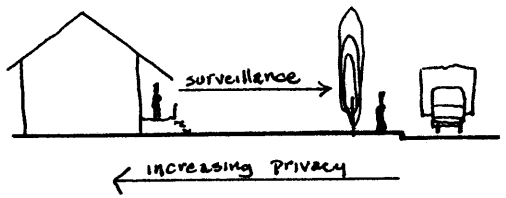
Typical Double-Loaded
Corridor Apartment Building
[3, p. 22]

The individual corridors served by the elevator are also semi-public in nature. The corridor belongs to no one in particular, although it is used primarily by the several residents of the floor. The fact that the corridor is used effectively as a mere access to the elevator lends to the corridor a quality of anonimity and subsequent semi-publicness. Hence, the apartment door is the transition point between an extremely private environment and the semi-public corridor. It is therefore not surprising that doors to apartments are normally closed in defense of privacy. Had the hallway functioned more as a foyer or court to the apartment rather than merely as a means of access, the possibility for the defensible space mechanisms may be enhanced. Consequently, by introducing the foyer or shared entry concept, a semi-private space may be introduced which provides a transition zone between semi-public and private spaces,

eliminating the sharp distinction between private apartment and public corridor. The removal of this marked transition is likely to encourage the spill-over of private functions into the semi-private foyer space.

An analogous situation of the suggested transition between public and private zones may be seen in the typical single family dwelling residential street. If it is assumed that a residential street is an acceptable living condition that fosters a humane environment, the case may be made that the hierarchy of spaces may significantly contribute to the success of personal interaction and territorial sense. If the hierarchy of spaces of a single family residence in the context of the street is analyzed, what may be noted is that there is a sensitive transition between public and private zones.

The street and sidewalk are public areas, as a



Hierarch of Space in a Suburban Dwelling

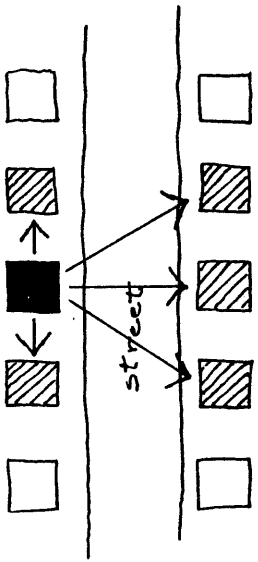
a variety of people are capable of using these areas. As one moves onto the front walk in approach to the dwelling the relationship remains street oriented; however, the fact that the front porch is visually accessible to the individual is indicative of the beginning of a transition toward private space. The front porch of the home or stoop, with visual access to the street, is clearly more private than public. Yet, the distance to the street and the proximity to the dwelling connote a sense of semi-privacy. The sense of privacy is fully realized upon entering the front door to the dwelling. Clues along the path from public to private, such as the degree of personalization (i.e., mailboxes, planting, personal effects) helps ease the transition from public to private spaces, and define the hierarchy of spaces. The visual and physical association between front yard and the house promotes a sense of territory. The

sense of territory may even extend onto the sidewalk, or even the street depending upon the particulars of the residential situation. The visual access to dwellings across the street and to either side of a house lot also helps to promote a sense of community or defensible space beyond the confines of one's dwelling or property line.

In the same way that the single family dwelling is capable of accomodating varying degrees of territoriality, it is felt that an analogous situation can be extended to high-rise dwellings. The lack of collective concern for areas of communal use, combined with the lack of visual and/or physical proximity to these communal areas may well have contributed to the neglect of these areas of potential social significance.

The transition from public to private domains bears directly upon the possibility of developing the

framework for encouraging the existence of a neighborhood, in the conventional sense of the word. The importance of considering ordering spaces in a hierarchical fashion lies in helping to define the levels of territoriality or spheres of influence one may perceive in his/her living environment. The aspect of hierarchy of space is directly related to the degree of intimacy one would care to experience in human relationships. Logically those sharing a semi-private space are more likely to develop a close friendship (or intense animosity) than those sharing a semi-public space. Again, looking to the residential street, a given family may feel close to those families which share a perceived street/sidewalk territory; however, the farther away from the family's dwelling, the less intimate and more casual relationships tend to be. The factors at work in the seeming hierarchy of friendships appear to be the degree of



"Knowable Neighbors"

of shared interest, combined with propinquity and occasion for human interaction.

3

SOCIO-PSYCHOLOGICAL STUDIES

We shape our buildings; afterwards our buildings shape us.
Sir Winston Churchill

In this chapter, the research of a few social psychologists with regard to the influence of the physical environment upon friendship patterns will be discussed. It is the intent of this chapter to provide rudimentary data to help in shaping and understanding the design decisions involved in the presentation of the design exploration in Chapter Six.

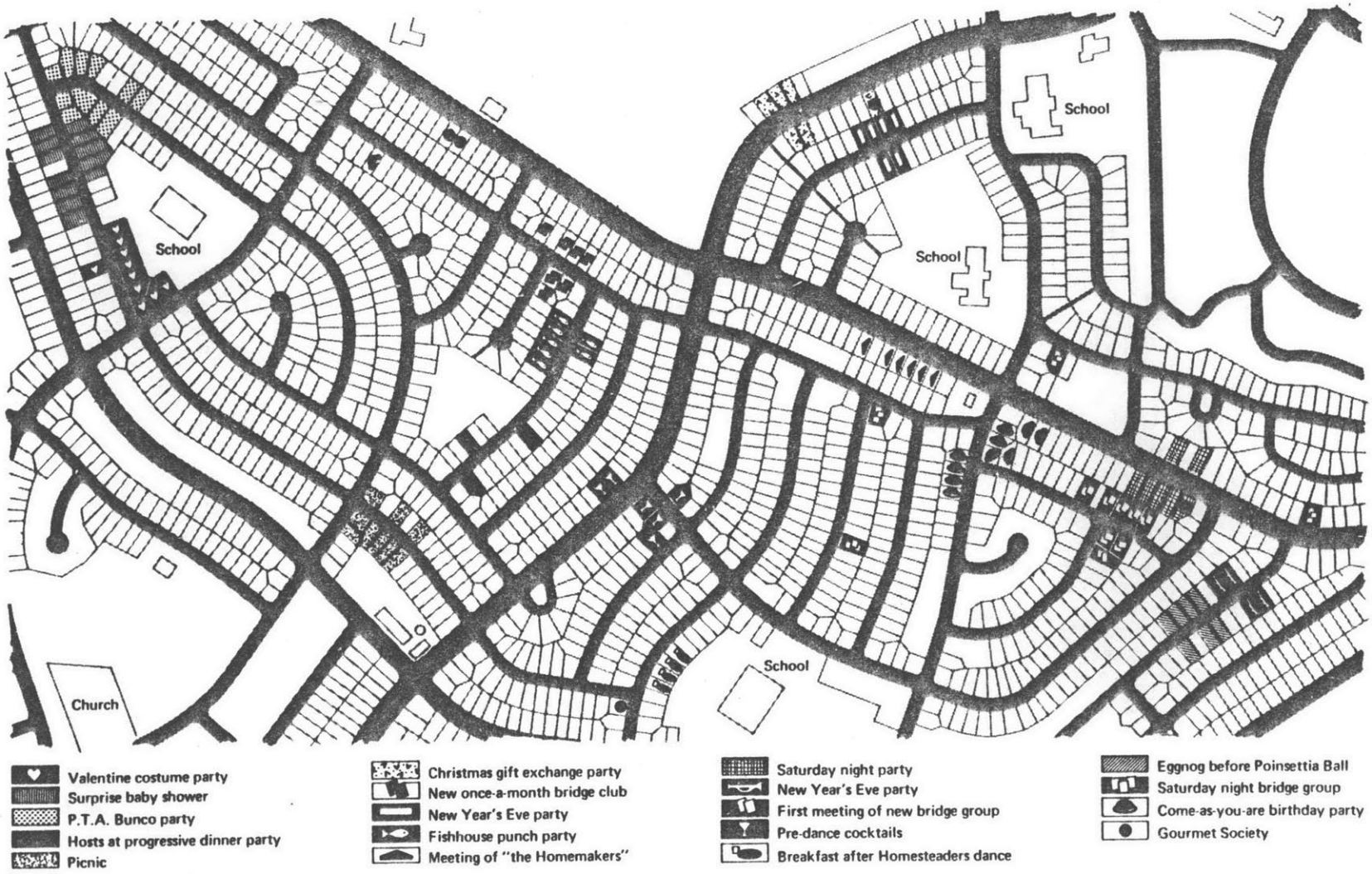
As the thesis is concerned with researching the possibility of introducing choice in high-rise living with regard to the degree of social interaction, this section will attempt to present design clues to accomplish a balance between privacy and social interaction. The thesis assumes that contemporary high-rise developments, predicated upon privacy and efficiency, have neglected to "design-in" the

opportunity for social interaction in close proximity to dwelling units. Hence, high-rise dwellings are relatively devoid of sense of community or communal territoriality, among distinct groups within the building. The socio-psychological studies of this chapter, while not addressing the residential high-rise problem directly, do consider types of interactions that develop between individuals, frequency of interaction and selective notion of "who comes into contact with whom" in non high-rise circumstances. These principles of social interaction and friendship patterns, based on the physical environment, are germane to the design of residential high-rise buildings.

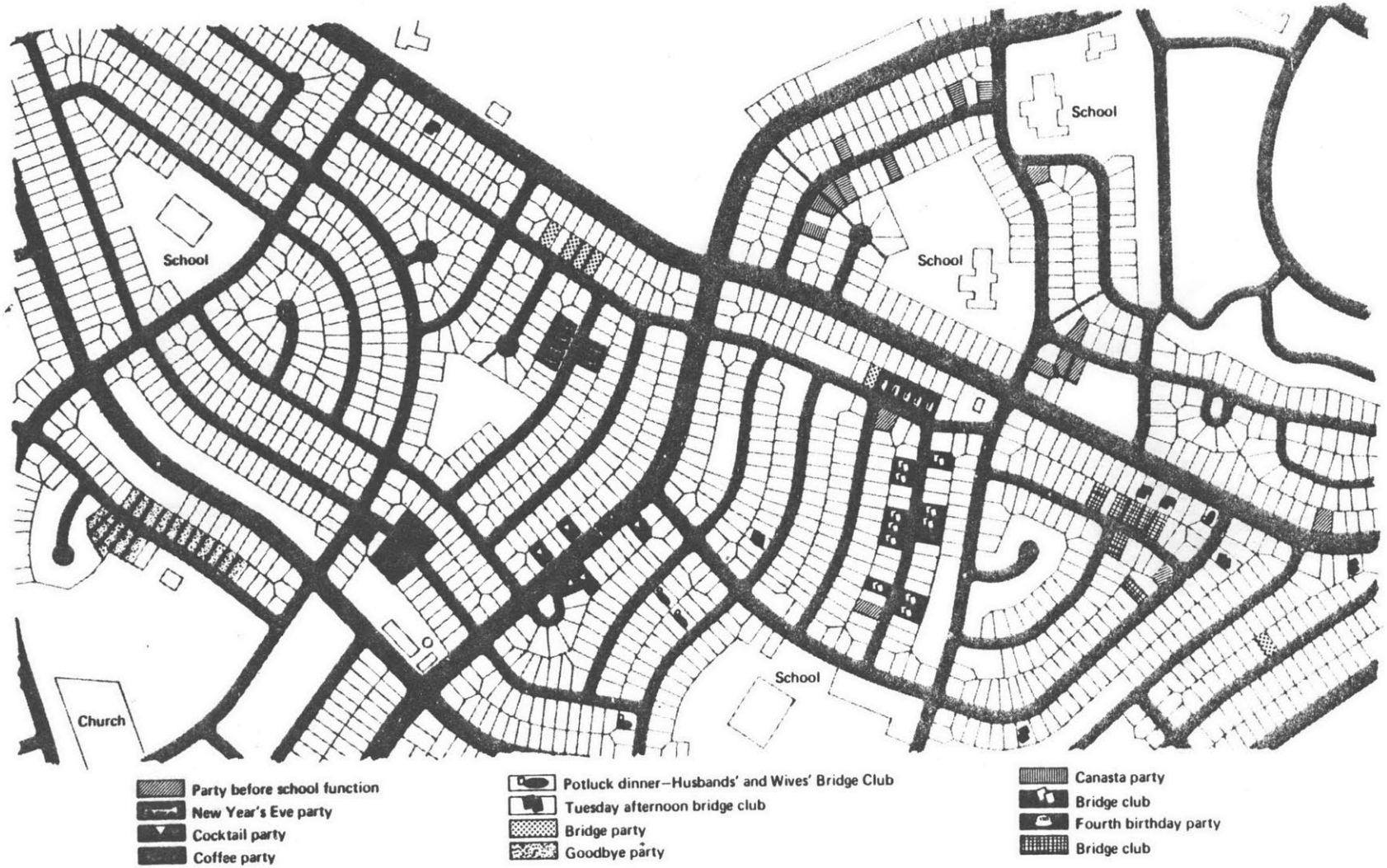
PARK FOREST (Illinois)

A study of patterns of social interaction within the residential community of Park Forest, Illinois was conducted by William H. Whyte, Jr. during the 1950's. In the study, Whyte examined the influence of the

physical environment upon friendship patterns independent of the particular people who happened to be involved in any single point in time. As Park Forest was a developing community at the time of the study, there was a continual turn-over of residents; the opportunity was thus presented to isolate and study the effect of the physical environment in affecting friendship patterns. What Whyte noted was that people who interacted formed distinct groups based upon location. Despite the switch in families, on account of the turn-over in population, those integral groups remained basically intact, independent of their personal composition. The figures on the following two pages depict these social groups, first in 1953 and later in 1956. The number of families comprising each social group averaged between six to seven families. The grouping of six to seven appears to be a reasonable number of families which are



Sampling of Social Groupings in Park Forest, Illinois 1953 [4, p.181]



Sampling of Social Groupings in Park Forest, Illinois 1956 [4, p. 182]

capable of developing close friendships. Also noted in the stuay was the fact that people in the middle of the blocks tended to be those most inundated with friends, whereas, those at the ends of the blocks were less likely to associate with others.[36]

Whyte also studied the social behavior of residents of a two story garden apartment complex with units grouped around courts. With time, each court evolved into a distinct social group.

> One would be known for its wild parties; another for its emphasis on church going; a third would be actively involved in community affairs, while in a fourth the residents would be typified by their constant complaining.[37]

Whyte noted that these social groups remained active regardless of the occasioned switch in resident composition.[38]

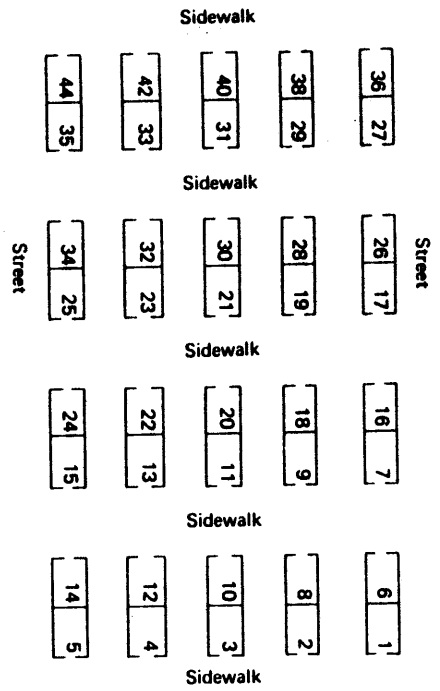
UNIVERSITY VILLAGE (University of Minnesota)

A study was conducted by Theodore Caplow and

36. William H. Michelson, Man and His Urban Environment, A Sociological Approach, pp. 180-181.

37. Ibid., p. 180

38. Ibid..



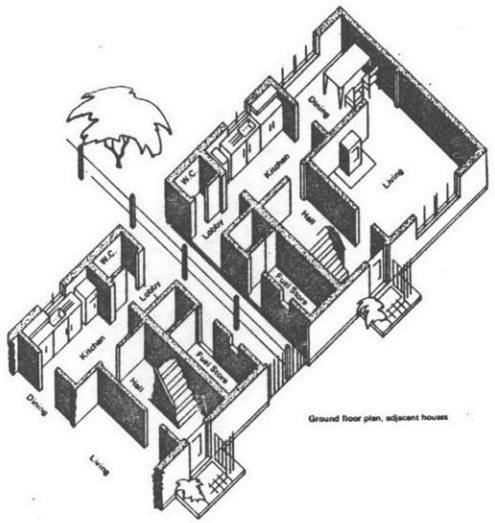
University Village Block
[4, p. 178]

Robert Forman at the University of Minnesota of friendship patterns of married veterans of a subdivision called University Village. The homes were semi-detached part wall housing. What was discovered was that friendships bore a direct relationship to the orientation of front doors and sidewalks. Those residents whose front doors looked onto a common sidewalk were more likely to develop friendships than those whoes front doors may have physically been closer together but were not oriented toward a common sidewalk. The study concluded that one aspect of shared territory or simple awareness of another's existence helps to encourage friendships in those residences which looked out onto a common sidewalk.[39]

POST-WAR HOUSING (Coventry, England)

Leo Kuper in his Living in Towns studied the behavior patterns of semi-detached housing in Coventry. The housing was arranged in pairs under a common roof

39. Theodore Caplow and Robert Forman, "Neighborhood Interaction in a Homogeneous Community," American Sociological Review, XV (1950), pp. 357-366.



Postwar Housing
Coventry England
[4, p. 175]

separated by a centrally positioned party wall. The adjacent house was separated by a small sidewalk. Kuper noted that residents on either side of the party wall were brought together by the poor acoustical separation between units. The entrances to the units were at opposite ends of each house, thereby inhibiting interaction between those residents sharing a party wall. Conversely, the resident apartments separated by the walkway were able to develop friendships quite readily. The placement of doors combined with the notion of private spaces on either side of semi-private space, enabled these residents to talk and wave, at the very least, and more often, witnessed the development of friendships.[40]

PRINCETON DORMITORY (Princeton University)

A study conducted by F. Duncan Case, Jr. of friendship patterns in a Princeton Dormitory provided information in regard to the notion of use as a factor

40. Michelson, pp. 174-175.

in the development of friendships. The dormitory investigated was a four story building divided into four vertical entries, separated by fire doors. Lavatories were allocated two to a floor. The lavatories were positioned next to a fire door separating two adjacent entries. There was much contact between entires sharing lavatory facilities on a given floor; however, little interaction occurred between residents of other floors and members of entries not sharing a given lavatory facility.[41]

In another dormitory, virtually identical to the first, lavatories were allocated to each entry, and located on alternate floors. The study found that those floors sharing a washroom developed friendships more frequently than floors not sharing a lavatory facility. In addition, friendships did not often transcend the fire door boundaries, as they did in the first building of inter-entry lavatories.

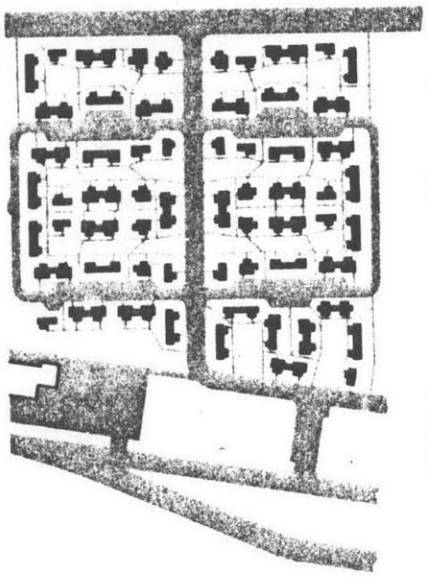
41. Ibid., pp. 173-174.

Consequently, in the Princeton dormitory, friendship patterns were directly related to shared use of facilities.[42]

42. Ibid..

WESTGATE AND WESTGATE WEST (Massachusetts Institute of Technology)

Leon Festinger, Stanley Schacter and Kurt Back conducted a study of married student housing at MIT following the end of World War II. Westgate was a planned residential community for married students attending MIT. Westgate consisted of small detached prefabricated homes arranged about a series of courts. The study concluded that the most important factor in determining friendship patterns was the placement and physical distance between front doors of housing units. The closer the house doors were to each other, the more likely it was for the people of these units to become friends. People of a court were likely to make friends with others of the same court and within a

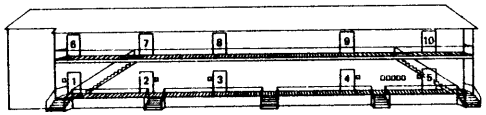


Site Plan of Westgate
[4, p. 171]

given court, residents were most likely to be friendly with those residing closest to them. Hence, a perceived collective sense of courts, and a more pronounced sense of territory developed between units of close proximity.[43]

43. Ibid., pp. 170-171.

Westgate West was a complex of individual two story buildings that had previously been used during the war as barracks. Following the end of the war, the barracks were converted into housing for married students. Each floor consisted of five apartments with access from an exterior corridor balcony and stairs. Festinger, et al.'s study saw that residents of the second floor, who had to transcend the stairs which passed in front of the front doors of certain residents on the first floor, were known to these first floor residents. Conversely, few residents of the first floor were known to residents of the second floor. Hence, the movement pattern conditioned by the



Schematic Diagram of a Westgate West Building [4, p. 171]

placement of stairs influenced the friendship patterns of Westgate West.[44]

44. Ibid., pp. 172-173.

SARAH LAWRENCE COLLEGE (Bronxville, New York)

A comparative analysis was made of two dormitory conditions of the Sarah Lawrence College in Bronxville, New York. The comparison was made between a new college dormitory consisting of a long slab, serviced by an interior double loaded corridor, and an older set of dormitories, consisting of three detached buildings, each with an interior corridor and stairway. Both sets of dormitories housed approximately an equal number of students. Through interviews with residents, it was discovered that a strong communal sense existed in the older buildings (called "houses"), and was virtually non-existent in the new building. Students in the new house had resisted attempts by councillors and other students to shape social groups. The residents of the new building were generally recluse

and conducted their lives within the confines of their rooms, and expressed little concern for the building as a whole. The older dormitory was cared for by the student inhabitants carefully; whereas, in the new building, there was a high incidence of vandalism and disregard for building maintenance, cleanliness and condition of lounge furnishings. The Sarah Lawrence College study demonstrates that the impact of numbers with respect to living arrangement bears a significant relationship to the development of community sense and territory.[45]

45. Newman, pp. 75-77.

SUMMARY

In summary of the research projects discussed, three factors can be identified as contributing to the development of sense of community and collective territoriality. These are 1) objective/physical distance and orientation/visual contact of individual living units, 2) functional distance, or the likelihood

of interaction based upon use and movement patterns [46] and 3) the number of individuals sharing a facility. While the research previsouly discussed is in no way exhaustive, it nevertheless presents the thesis with research data which is of significance to design. The studies have elucidated, through documentation, some principles of socio-psychological behavior in response to the physical environment, which might be otherwise regarded as mere speculation or a hypothesis based on no evidence.

46. Paul A. Bell, et al., Environmental Psychology, pp. 180-181.

4

CASE STUDIES

In this chapter, five case studies of high-rise apartments will be presented in an effort to familiarize the reader with the existing state of the art of residential high-rise building design. Three of the five cases are drawn from the Boston area - Peabody Terrace, Harbor Towers and Hawthorne Place. The remaining two are the Marseilles Block in Marseilles, France and the Price Tower in Bartlesville, Oklahoma.

The case study investigation is divided into two parts. The first part consists of a brief description of each project and attempts to characterize a sense of the physical environment. The second part is a graphic comparison of the five projects in terms of organization and transition from public to private

spaces. The graphic comparison consists of matrices which attempt to summarize the various physical conditions in a diagramatic format. The cases were selected to represent a variety of building organizations and design concerns, manifest in the building products.

HARBOR TOWERS

... Watch your ship come in...
Harbor Towers Billboard

Location: Boston, Massachusetts
Use: Luxury Housing
Maximum Height in Stories: 40
Number of Units: 320
Architect: I.M. Pei and Partners
Completion: 1972

Punctuating the Boston skyline at the waterfront are the twin towers of I.M. Pei and Partners. Each tower rises forty stories above the street below; its white concrete exterior conveys the nautical flavor of its location. The two buildings are built about a central vehicular drop-off circle and are oriented to provide unobstructed views from each apartment unit of the harbor and/or city.

Each building is organized about a centrally located elevator bank, which provides vertical access to apartment units. Each apartment floor was designed to accomodate eight apartments. The eight unit floors permitted the "tower" appearance of the building and eliminated the necessity of long corridors. The designers felt that limiting each floor to eight units was conducive to floor-wise social interaction.[47] The short corridors of the tower combined with the manageable number of eight units was believed to increase the likelihood for social contact; however, the configuration of the units, and emphasis upon privacy nullify in part this design intention.

The communal facilities used by Harbor Tower residents are physically removed from dwelling units. Laundry facilites are located in the basement of each building. An open-air swimming pool and wading area

47. Interview with A. Preston Moore, AIA, I.M. Pei and Partners, September 26, 1978.

are located at the base of the towers. Retail facilities, tennis courts, and garage funcitons are housed in a seven story parking garage structure across the street from the apartment complex.

The sense of community, or neighborhood was not emphasized in the building design; rather, the designers apparently felt that most social functions should occur in areas removed from the apartment units; privacy and security were considered foremost among design parameters.[48]

48. Ibid..

Each floor of the apartment complex is identical, consisting of a mix of one, two and three bedroom units. The corner units are provided with small exterior balconies, each oriented away from one another. The two apartment towers are identical and maintain a consistent elevation in all four directions, providing no visible reference to orientation. The repetitive nature of the floors lends an air of

anonymity to the residents of the building and suggests a lack of variety in human activity and individual experience. The building is perceived by the casual observer as subjugating the scale of the individual to the expression of a symbolic building form, indicative of prestige and exclusion.

Through its emphasis upon providing security and privacy in a high-rise tower form, Harbor Towers effectively suppresses and discourages social interaction within the building. This sense of exclusion and anonymity is evident even to the street observer in the building's elevation and seeming absense of human presense.

HAWTHORNE PLACE

... if you lived here you'd already be home ...
Charles River Park Billboard

Location: Boston, Massachusetts
Use: Luxury Housing
Maximum Height in Stories: 17
Number of Units: 300
Architect: Victor Gruen, Associates
Completion: 1962

Hawthorne Place, one of the several apartment building making up the Charles River Park apartment complex, provides luxury high-rise apartment living in the medical and government areas of downtown Boston. Due to its urban location, Hawthorne Place fulfills the requirements of supplying luxury living in close proximity to areas of work, easily accessible on foot or by public transportation. The building may be identified by its brown brick facade

and patchwork of enclosed and open balconies. In addition to residential units, the building houses on the first floor a small number of professional offices.

Hawthorne Place may be classified as a double-loaded corridor apartment slab. Units are organized along either side of an internal corridor. Hawthorne Place is organized vertically in one story increments with all units in the building as flats. The building consists of efficiencies, one bedroom, and two bedroom units, all of which are provided with exterior balconies. End units of the building are two bedroom units with two face exposure. The upper stories of the building look out onto Boston Harbor and the Charles River. Parking is provided for residents in a two level underground parking garage.

Public areas of the building are a ground level

lobby and basement laundry area. The Charles River Park complex also provides for residents recreation facilities which consist of a year-round swimming pool/health club facility and tennis courts, removed from the Hawthorne Place building. Additionally, there are restaurants, retail facilities, play areas for children, and green areas for walking and/or jogging.

In elevation, Hawthorne Place conveys some sense of the variety of inhabitants residing within the building. Each apartment is provided with a balcony, which could either be left open or enclosed at the request of the tenant, and provides a limited sense of individuality and identity. In elevation, the building appears as a patchwork of enclosed and open balconies. Consequently, the possibility for individual expression does exist within the restrictions of what may be thought of as a building

organization and form not conducive to individual expression. Yet, these expressions of identity probably resulted from resident needs of additional interior space, rather than from architecturally designed alternatives.

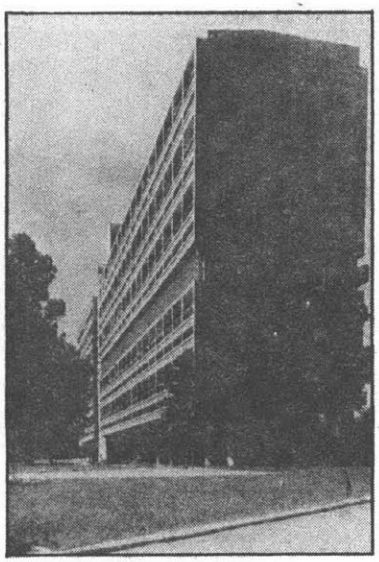
The building's organization and space planning do not attempt to encourage interaction among residents of the building, even at the level of individual apartment floors. The interior double loaded corridor is not an effective organizational tool in promoting resident contact. Also, the laundry facility, because of its location in the basement of the building, does not appear to promote sustained human interaction. The design parameters of privacy and a minimum amount of circulation space (to serve a maximum number of units within the building code restrictions of fire egress) do not allow for the possibility of positive human

interaction and sense of community.

In summary, Hawthorne Place appears successful in providing the city dweller with a conveniently located and well equipped residential accomodation. The option of an open or enclosed balcony lends a sense of identity or individuality to residents of the building. Yet, the design parameters of security and efficiency in "packing" have yielded an organizational solution that appears to hinder social behavior.

THE MARSEILLES BLOCK

A house is a machine for living in.
Le Corbusier



[8, p. i]

61. Charles Edouard Jeanneret, LeCorbusier: The Marseilles Block, pp. 13-27, 58.

Location: Marseilles France
Use: Family Housing
Maximum Height in Stories: 17
Number of Units: 337
Architect: LeCorbusier
Completion: 1952

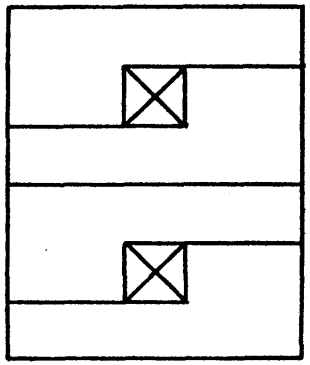
Unite d' Habitation, the Marseilles Block is a manifestation of LeCorbusier's philosophy of housing families in a common apartment block. Originally designed as a facility to house low-income families, the Marseilles Block strives to provide a neighborhood atmosphere for apartment living. The building is a seventeen story apartment block, within which coexist apartment units, stores and recreation facilities.[61]

The building sits on thirty-eight large piers which give the apartment building the illusion of "floating in the natural landscape." The building is organized so that all units receive sunlight and are shaded by the balcony dividers and shutters.[62]

The units are duplexes, designed with a two story tall living area. Sleeping areas are located either on a floor above or below the living area. The Marseilles Block consists of units for a variety of household sizes, ranging from childless couples to families of eight children. Each apartment is independent of the others, not only in concept but also in construction. Each unit is complete unto itself and is virtually inserted into a concrete framework, as one would place drawers in a dresser.[63]

The Marseilles Blcok is provided with a cooperative store located on the eighth and half of the seventh floors. The cooperative store was intended

62. Ibid., p. 52.



Overlapping Duplex Apartments and "interior streets"

63. Ibid., p. 54.

to satisfy the tenant's daily needs without requiring them to leave the apartment block. A small restaurant and individual shops also exist at those levels within the building. These communal facilities are respresented in elevation by closely spaced vertical shading devices. A hotel of eighteen rooms is provided to house an occasional guest, or to serve as a spare room to apartments.[64]

64. Ibid., p. 58.

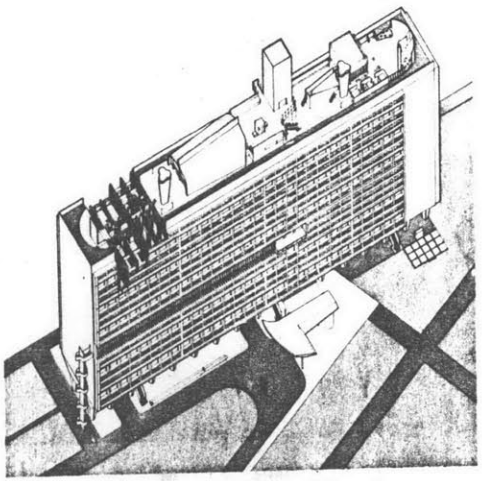
In the attempt to supplement the living quarters provided by the units, the Marseilles Block is equipped with a kindergarten on the seventeenth floor, a swimming pool, playground facilities, a covered and open-air gymnasium, a solarium and a three hundred meter running track on the roof.[65]

65. Ibid..

The apartment block is served by means of a skip-stop elevator system which tops on "interior streets: located on floors, 2, 5, 7, 8, 10, 13, and 16. The skip-stop elevator service enables

overlapping duplex apartments to exist, with one level of the apartment at the "interior street" level and the other level either above or below. The apartment units on levels not served by the "interior streets: become "through apartments" with views on both sides of the building.[66]

66. Ibid., pp. 54-55.



The Marseilles Block, Axonometric [5, p. 121a]

One would imagine that the Marseilles Block has laid a generous foundation for the development of a sense of community and human interaction. The effort given to insure that the complex is self-sufficient would lead one to believe that the residents might develop a thriving and active social sense. However, the apartment concept has not proven successful in fulfilling the design intentions. The apartments are narrow and the "interior streets," dark and long. The space beneath the building is virtually unusable. The communal store was a failure and is currently being used as office space. Despite the emphasis

upon the family and humanistic concerns, it is surprising that in elevation, the building appears to consist of cells stacked one upon another. The elevation makes little reference to the inhabitants within or to the variety of activities occurring within the building. The roof top forms, combined with the stilting of the building, are removed from normal human experience, and make no discernable effort at acknowledging human presence. The cast-in-place concrete used throughout the building appears cold and lends the characteristic of monumentality to the humanistically conceived apartment building. Despite its shortcomings, the Marseilles Block is probably one of the most studied apartment buildings of the twentieth century.[67]

In summary, the social consciousness involved in the conception of the building, combined with actual erection, bears witness to the fact that

67. Roger Sherwood, Modern Housing Prototypes, p. 125.

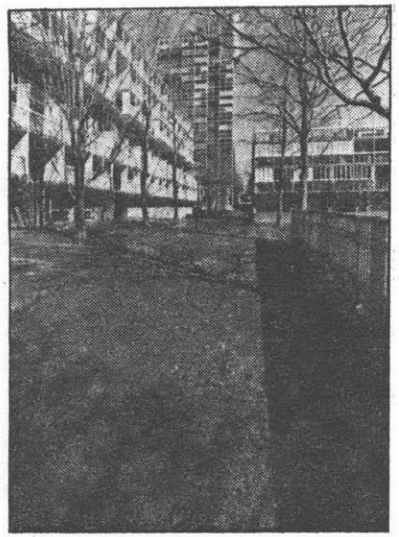
innovation in housing is possible, and that high-rise apartments need not present an air of unsociability and anonymity. Although unsuccessful in achieving the type of building centered community LeCorbusier may have intended, the Marseilles Block revolutionized the concept of high-rise apartment housing. The ideas of a cooperative store, kindergarten, hotel, athletic facilities, along with duplexes serviced by a skip-stop "interior street," as a means of promoting social interaction and community sense, although conceivably altruistic in nature, nevertheless broaden one's perception of what apartment living might or could be.

PEABODY TERRACE

... and for Sert, a continuing awareness of Le Corbusier's example - particularly of the ideal that architectural form is derived from embracing and expressing the many aspects of daily life.

Architects on Architecture

Location: Cambridge Massachusetts
Use: Married Students Housing
Maximum Height in Stories: 22
Number of Units: 500
Architect: Sert, Jackson and Gourley
Completion: 1964



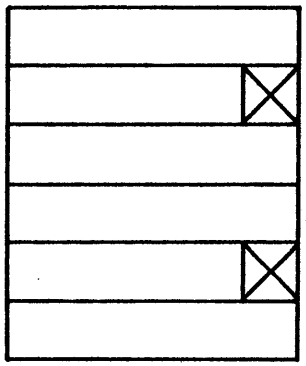
Peabody Terrace, an apartment complex located on the Harvard University bank of the Charles River, stands apart from its traditional red brick neighbors in its distinctive use of bright colors, vertical sun-shading elements, and playful elevational manipulation. The complex consists of three twenty-two story towers and seven story terraced apartment buildings connected by a system of internal corridors. The buildings are oriented to form small quadrangles in keeping with

the existing dormitory arrangements on the Harvard University campus.[49]

The towers of Peabody Terrace are among the few buildings in the United States to employ skip-stop elevator servicing. The skip-stop arrangement provides elevator service to only one of every three floor levels. Each elevator stop floor has a corridor, which the floors above and below lack. Those floors are connected by interior stairs. The absense of corridors on the first and third floors of each elevator stop group provides apartment units on these floors views on either side of the building. There are efficiencies and one bedroom units on the corridor level and two bedroom units on non-corridor floors. The one and two bedroom units have balconies which serve an additional function as fire escapes.[50]

The Peabody Terrace complex was an experiment in community living:

49. Bastlund, Knud, Jose Luis Sert, Architecture City Planning, Urban Design, p. 220.



Skip Stop System

50. Ibid..

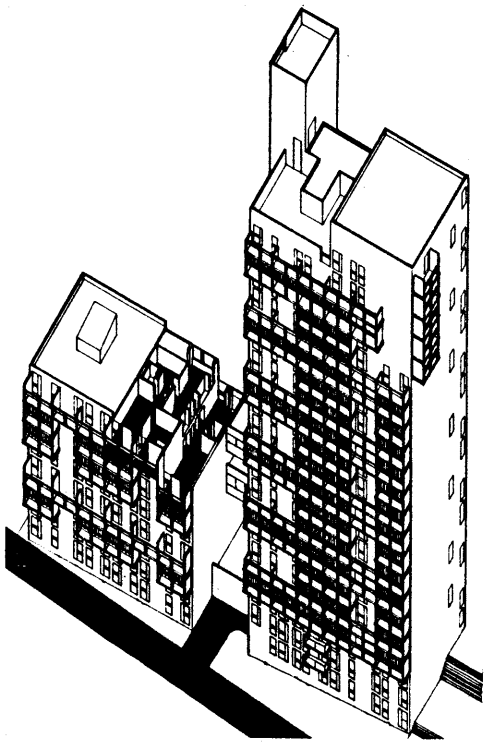
> These apartments for married students were designed as a community - to bring people together by giving them facilities to know one another better.[51]

51. Ibid..

Meeting and seminar rooms are provided for discussions and community gatherings. Roof tops are often utilized as sunbathing and gathering areas. The placement of laundry facilites at the roof top levels, lifts this usually mundane task physically and socially from a dreary, utilitarian basement to a pleasant, light-filled area, conducive to social interaction. A convenience store is located within the complex, supplying residents with food and sundry items.[52]

52. Ibid..

The three towers were oriented to provide views from each apartment unit unobstructed by the other towers. The living areas of the units face the river, while the corridor and "back sides: face an existing neighborhood and elementary school. Peabody Terrace bears little physical resemblance to conventional



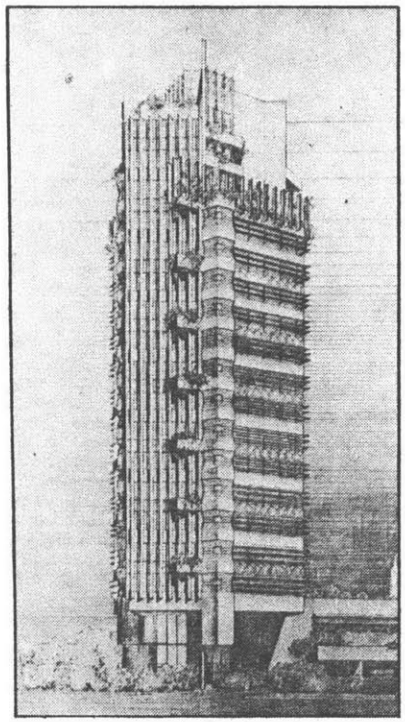
Peabody Terrace
Axonometric [5, p. 160]

apartment slab-block structures. Its elevation is light, playful and refreshing in its use of vertical sunshading elements, colored ventillation panels, and scale bars. These elevational elements strongly suggest, even to the casual passer-by, the existence of human activity and life within the building. The skip-stop elevator servicing is also depicted in the elevation with a strip of corridor windows every third floor at the back of each tower, and a change in balcony configuration at the front. The terraced configuation of the seven story buildings help to scale the tower to the neighboring buildings and helps to harmonize the complex dimensionally with existing Harvard University buildings. The stepping divides visually the building's lengthy horizontal appearance into a more appealing vertical "set" of buildings. The balcony arrangement serves similarly to "break" to towers up horizontally.

The concept behind Peabody Terrace was to provide high-rise apartment dwellers with a living condition highly conducive to and strongly supportive of social intercourse. Although nothing definite is known of its actual success as an experiment in community living, Peabody Terrace at least presents the outward appearance of a pleasant and socially acceptable living environment.

H.C. PRICE TOWER

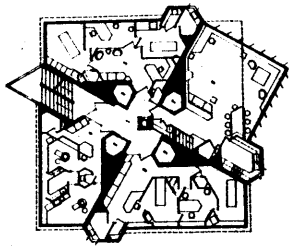
The Tree That Escaped The Crowded Forest
The Story of The Tower



[6, p. 100]

Location: Bartlesville, Oklahoma
Use: Office and Housing
Maximum Height in Stories: 20
Number of Units: 19 Office, 9 Housing
Architect: Frank Lloyd Wright
Completion: 1956

The Price Tower, a product of the architectural genius of Frank Lloyd Wright, is probably the most unique example of high-rise construction in the United States and perhaps, in the World. The building is distinctive, not only its elaborately articulated copper and glass exterior, but also in its construction method. Floors cantilever from interior piers, leaving floor areas and the building exterior



"Segmented Quadruple"
[7, p. 65.]

column free. The piers, which Wright referred to as a "segmented quadruple," are arranged in a cruciform configuration defining a central lobby space on each floor and individual units. They divide the building into four parts, three of which are used as offices and the remaining, a duplex apartment, and carry mechanical equipment and elevators within hollow cavities.[53]

In elevation, Wright differentiates the office areas from apartment units by means of shading fins. Office spaces are denoted by horizontal fins and the apartments complemented by vertical fins. Through careful use of materials, forms and rhythm, combined with the mixed-use of the building, Wright conveyed his belief that life at home should be "lively and exciting, touched with novelty and adventure, rising high and proud in the midst of mundane banality."[54] Wright saw that by combining office and residential

53. "Frank Lloyd Wright's Concrete and Copper Skyscraper on the Prairie for H.C. Price Co.," Architectural Forum, XCVIII (May 1953), p. 98.

54. Frank Lloyd Wright, quoted in Norris Kelly Smith, Frank Lloyd Wright, A Study in Architectural Content, p. 42.

functions, the strong disassociation of work from home may be alleviated.

The Price Tower was the result of several previous experiences with cantilever high-rise construction. The first example of Wright's intended use of cantilever construction in high-rise building was the tower of St. Marks project of 1929.[55] St. Marks was designed as an apartment complex, also based upon a "segmented quadruple." Other projects, including a hotel complex in Washington, D.C., Crystal Heights and an apartment complex for Chicago, have designs based upon the cantilever principle;[56] however, the Price Tower and the Johnsons Heleo-Laboratory in Racine, Wisconsin are Wright's only high-rise projects actually constructed.[57] Tower forms similar to the Price Tower and St. Marks were part of Wright's scheme for Broadacre City.[58] Broadacre City was a projected utopian community that

55. "Frank Lloyd Wright's Concrete and Copper Skyscraper on the Prairie for H.C. Price Company," p. 98.

56. Henry-Russell Hitchcock, In the Nature of Materials, 1887-1941, The Buildings of Frank Lloyd Wright, captions from Figs. 42,108.

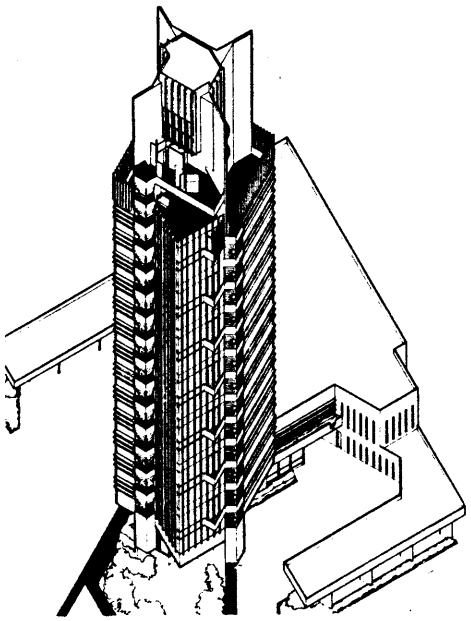
57. Martin Pawley, Frank Lloyd Wright, Public Buildings, Library of Contemporary Architects, p. 120.

58. Frederick Gutheim ed., Frank Lloyd Wright, On Architecture, Selected Writings, 1894-1940, p. 159.

witnessed the marriage of urban and rural America. The tall building forms were juxtaposed with single family dwellings and cultivated fields. In such an environment, Wright believed, the tower could stand free as a tree removed from the forest.[59]

The living units of the Price Tower are duplex apartments. The first floor of the apartment serves living and dining functions, and the second floor is a bedroom. The office areas which comprise three of the four wedges of the "segmented quadruple," occupy one story high spaces. The mechanical equipment servicing both apartment units and offices is located both in hollow portions of the cantilever floor slab and in the interior piers. By virtue of the "segmented quadruple," combined with cantilever construction, the attitude of the building is one of reaching outwards. While the building is organized by means of the interior piers, the offices and

59. Frank Lloyd Wright, The Living City, p. 122.



The Price Tower
Axonometric [5, p. 146]

apartment units appear to relate to the surrounding landscape rather than to the building interior or adjacent units. "...each apartment is unaware of the other or the offices, as all look outward."[60] Wright drew the analogy between an upright tree and the tall building form. However, he believed that the tower should stand free, so that the building could receive sunlight, air and unobstructed views. In Bartlesville, Wright's free-standing tower saw its realization.

Despite Wright's intention of providing an exciting living environment for the high-rise dweller, the Price Tower appears to be unconducive to a sense of individual expression. The "completeness" of the architectural expression does not encourage inhabitants to personalize their living and working environment beyond the confines of the building interior. The elegance of the building's presence

60. Frank Lloyd Wright, The Story of the Tower, The Tree that Escaped the Crowded Forest, p. 15.

does not alow for additions and/or alteration. The building is a finished product complete unto itself.

The Price Tower represents a refreshing solution to conventional high-rise buildings, not only in its outward appearance, but also in its method of core cantilevered construction. Although the concept of combining places of work with that of habitation is commendable, little is known of the success of the Price Tower in encouraging human interaction and friendships, based upon its physical environment. The totality of the building solution, combined with its outward reaching cantilevered floors, does not appear to be indicative of a physical condition conducive to the development of friendships and social intercourse.

GRAPHIC COMPARISON

A graphic comparison of the projects previously described will be presented in this section. The matrix display illustrates the various building organizations, unit types and design attitudes.

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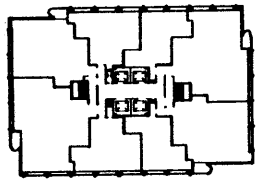
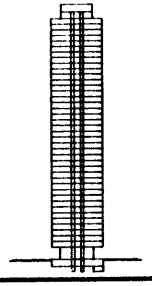
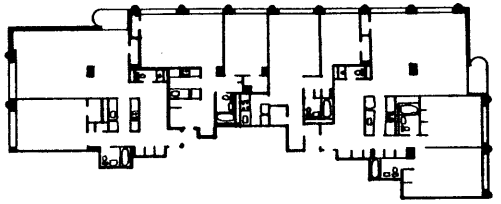
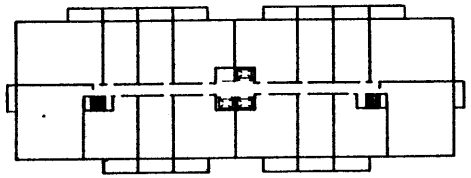
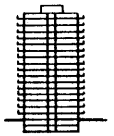
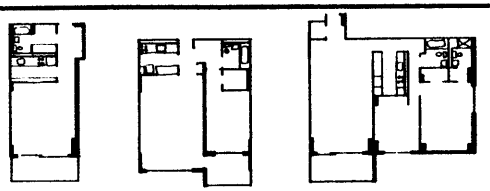
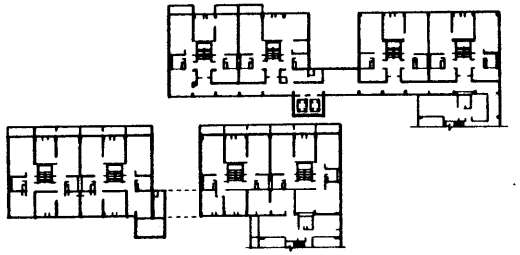
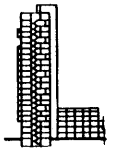
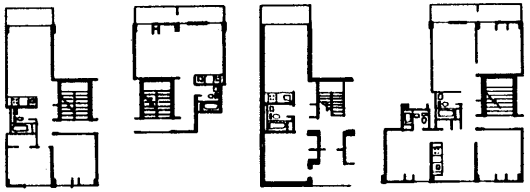
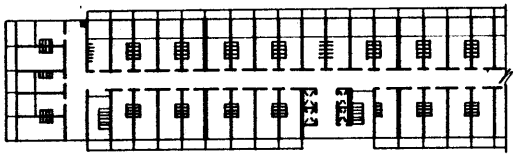
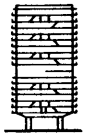
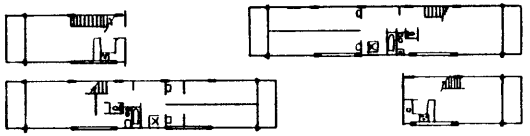
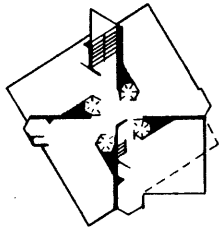
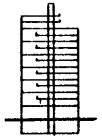
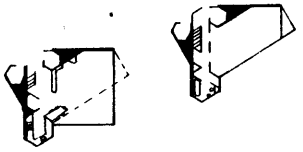
HARBOR TOWERS			
HAWTHORNE PLACE			
PEABODY TERRACE			
MARSEILLES BLOCK			
PRICE TOWER			

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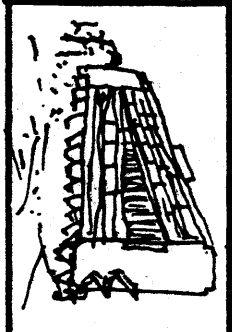
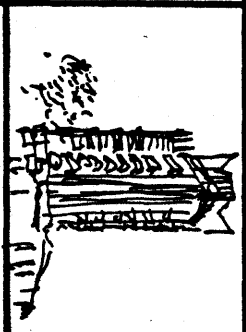
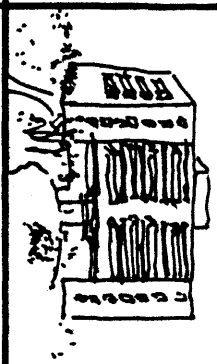
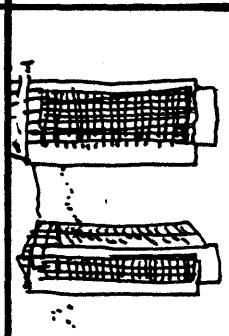
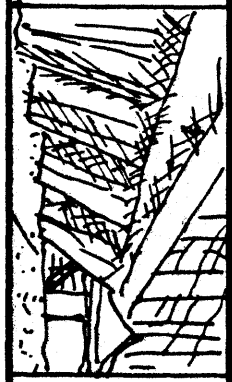
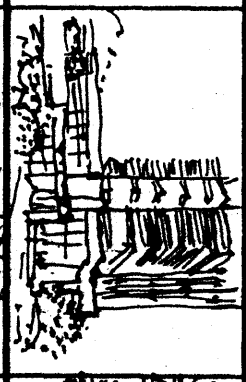
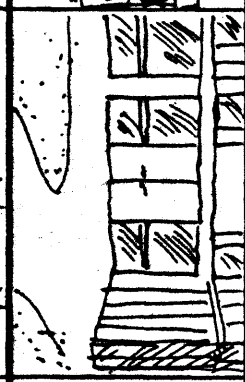
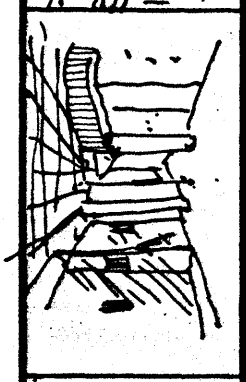
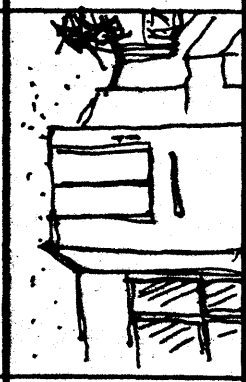
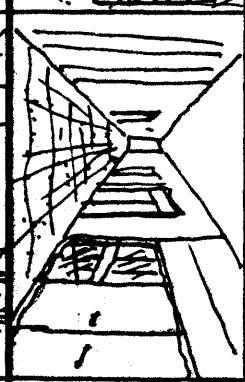
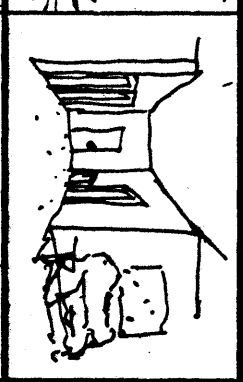
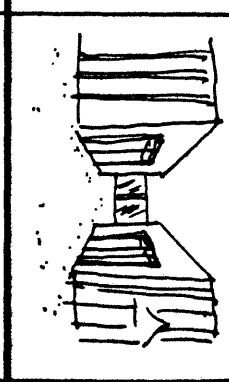
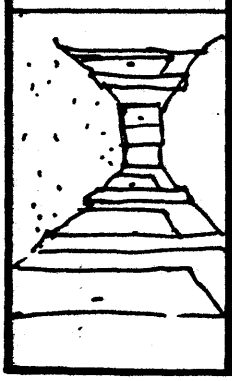
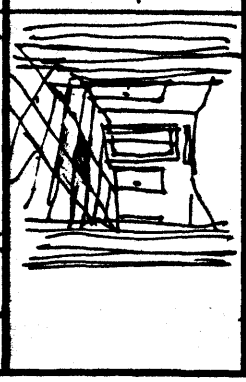
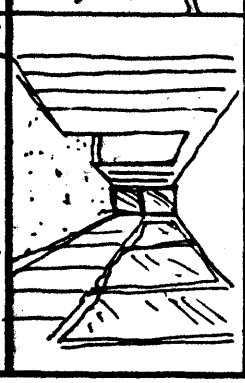
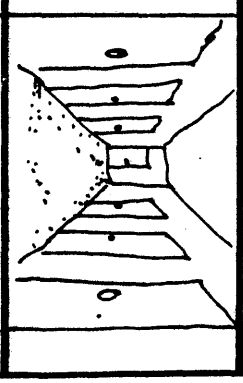
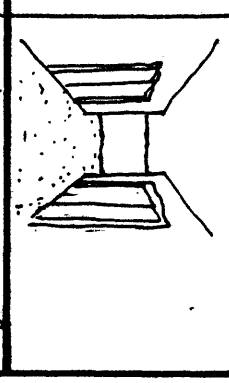
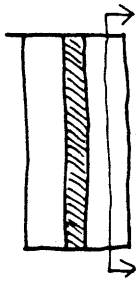
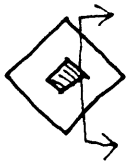
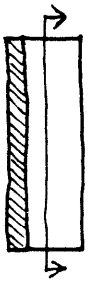
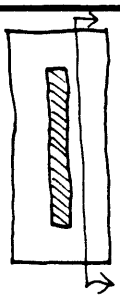
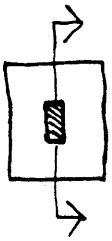
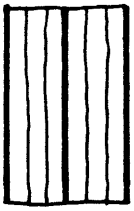
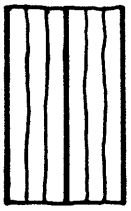
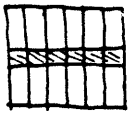
					APPROACH
					ENTRANCE
					LOBBY
					CORRIDOR

ORGANIZATION

	MARSEILLES BLOCK	PRICE TOWER	PEABODY TERRACE	HAWTHORNE PLACE	HARBOR TOWERS
PLAN					
SECTION — LONGITUDINAL					
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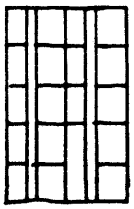
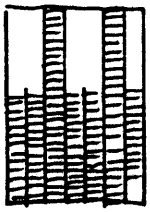
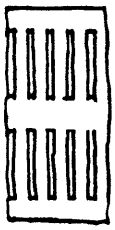
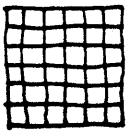
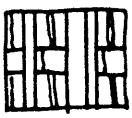
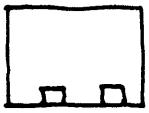
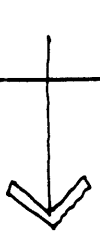
ELEVATION — LONGITUDINAL					
ELEVATION — TRANSVERSE					

UNITS

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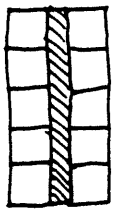
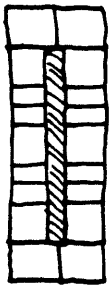
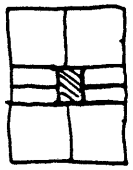
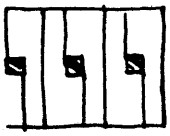
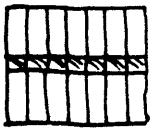
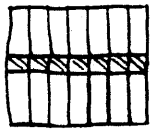
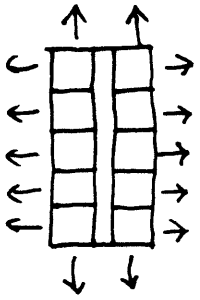
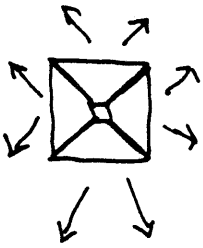
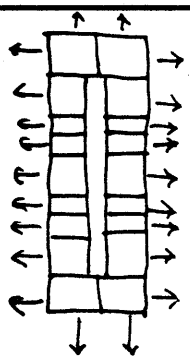
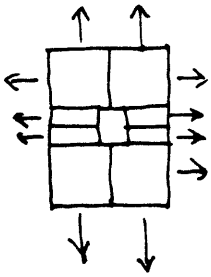
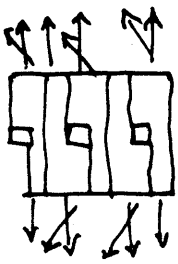
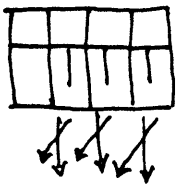
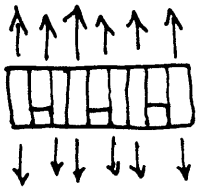
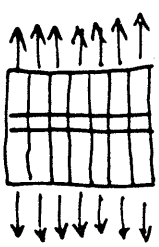
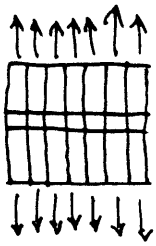
ORGANIZATION	PLAN					
	SECTION					
EXPOSURE/VIEWS	PLAN					
	SECTION					

5

SPATIAL CORES

This chapter will discuss the influence of service core configurations upon high-rise apartment building organization. The analysis of the five case studies have demonstrated that elevator and stair cores contribute significantly to overall building organization. The elevator and fire stair cores are essential elements in all high-rise buildings. Elevators are required for vertical transportation and fire stairs are needed to insure the safety of inhabitants. The following are some guidelines extracted from the Uniform Building Code, 1976 which relate to core organization.

> In all occupancies, floors above the first story having an occupant load of more than 10 shall have no less than two exits. (Sec.3302 (a)) [68]

68. International Conference of Building Officials, Uniform Building Code, p. 497.

> The maximum distance of travel from any point to an exterior exit door, horizontal exit, exit passageway, or an enclosed stairway in a building not equipped with an automatic fire-extinguishing system throughout, shall not exceed 150 feet or 200 feet in a building equipped with an automatic fire-extinguishing system throughout. (Sec. 3302 (d)) [69]

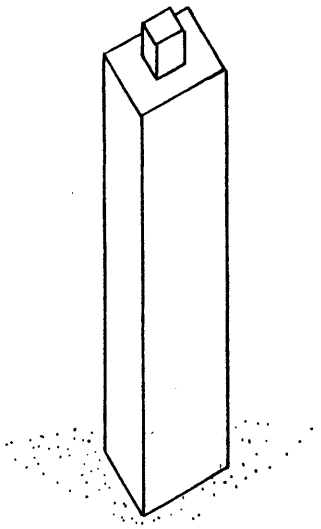
69. Ibid., p. 498.

> When more than one exit is required, they shall be so arranged that it is possible to go in either direction from any point in a corridor to a separate exit, except for dead ends not exceeding 20 feet in length. (Sec. 3304 (e))[70]

70. Ibid., p. 501.

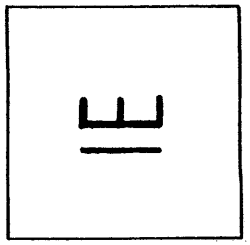
These guidelines impact building design significantly by placing restrictions upon methods of building organization.

Two distinct types of high-rise apartment forms may be identified based upon the location of service cores: 1) tower and 2) slab.

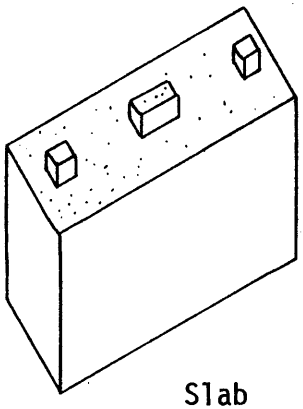


Tower

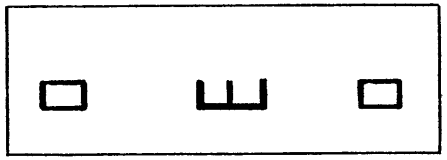
The apartment tower is generated from a building centered bank of elevators and fire stairs. Harbor Towers and the Price Tower are examples of tower organization. Apartment units make up a ring around the central service core. The tower configuration



Tower Plan



Slab

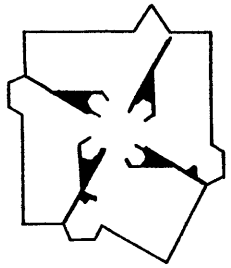


Slab Plan

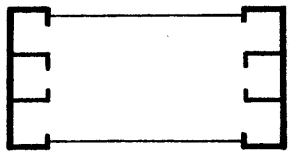
eliminates the need for long corridors, but limits the number of units per floor. In general a tower building is one in which vertical dimension exceeds horizontal dimensions.

The apartment slab as opposed to the tower form is characterized by greater horizontal than vertical dimension. Apartment units are serviced by means of a corridor, running the length of the building. The elevator bank usually lies at the midpoint of the corridor with fire stairs at either end. Hawthorne Place is a classic example of a double loaded corridor slab. Variations upon the slab organization are the Marseilles Block and Peabody Terrace.

In both the apartment tower and slabs, the service cores are generally not space defining elements, but are strictly a means of vertical passage, serving a horizontal passageway, or corridor. The Price Tower may be regarded as an exception to the rule. The core



Price Tower
"Segmented Quadruple"
[7, p. 65]



Federal Reserve Plaza,
Core Configuration
[9, p. 117]

elements of the Price Tower help to define a building centered lobby space as well as the individual office and apartment units. Yet, the "segmented quadruple" essentially maintains the tower format of a ring of units surrounding a central (although this time defined) circulation space. The circulation space, however, has become a "positive space," with sufficient dimension to support human activity (i.e., a use space).

The architecture firm Hugh Stubbins and Associates has designed a high-rise office building for the Federal Reserve Bank in Boston, completed in 1978 which presents an alternative to the core configurations described. The Federal Reserve Plaza has its core elements at the ends of the building, converting the space between the service core elements into a primary use zone. Although the requirements of an office building, such as the Federal Reserve Plaza

differ considerably from that of an apartment building, the former with an emphasis on open space planning and the latter upon unit privacies, the difference in attitude between the core locations in the Federal Reserve Plaza and the conventional buildings is significant to understanding the impact of core configurations upon building organization.

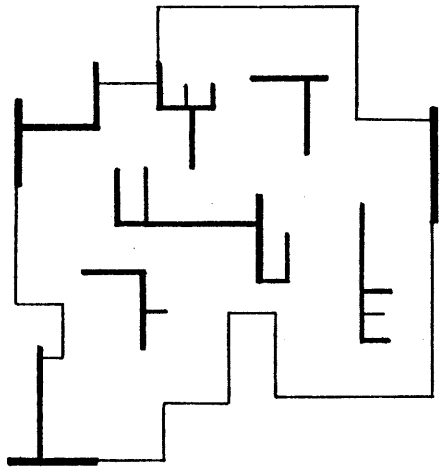
The Price Tower and the Federal Reserve Plaza illustrate that service cores need not be restricted to points of vertical passage, but may function as space defining elements as well.

An Architectural design studio at the Massachusetts Institute of Technology, under the direction of Associate Professor Robert J. Slattery, has been experimenting with the possibility of using service cores and shear walls to define space in high-rise buildings. What Slattery terms "spatial cores" is a catchword for the re-definition of service cores

from points of vertical passage to space defining elements. This attitude toward service cores is not generated from engineering logic or space efficiency, but emphasizes a rethinking of the traditional high-rise in terms of these space organizing cores.[71]

71. Lecture by Robert J. Slattery, February 1979.

The flexibility permitted by these "spatial cores" may enable the designer to create a building organization more conducive to a sense of communal responsibility and social behavior. The tower and slab configurations appear incapable of accomodating common areas that will function effectively with regard to social behavior. The introduction of communal areas at any location in these traditions forms does not fulfill the defensible space characteristics described in Chapter Two. A common area in either the tower or slab enjoys neither visual nor physical proximity to apartment units. Common spaces in these traditional apartment forms would in all



Spatial Cores

likelihood function as a "left-over" space that would not actively participate in promoting a communal sense or social behavior.

Hence, in a high-rise building situation where the designer is restricted by both functional and code requirements of vertical access, a change in social behavior requires a rethinking of building organization altogether. The traditional tower and slab building configurations appear inadequate to accomodate design intentions distinctly dissimilar from those which generated these building forms initially. The flexibility of the "spatial cores" is felt to be one method of facilitating a reworking of apartment building organization to meet the design intentions of increased social behavior and communal responsibility.

6

DESIGN ALTERNATIVE

In this chapter, the design exploration conducted in conjunction with the research presented in the preceeding chapters will be presented. The design proposes an alternative to what are regarded as conventional residential high-rise projects. The emphasis of the design exploration is to investigate the possibility of providing a physical setting for the development of a neighborhood within the context of a high-rise building. The neighborhood strives to provide a range of living conditions to permit the high-rise dweller choices in the selection of a living environment based upon the desired privacy, family size and lifestyle.

The problems associated with high-rise living discussed in Chapter One - identity, isolation and

security - are addressed in the design exploration. The concepts of communal territoriality discussed in Chapter Two and the socio-psychological studies of Chapter Three are believed to have been implemented in the design. The design exploration's success in fulfilling or alleviating some of the problems associated with high-rise living is assessed at the end of the chapter by means of critiques.

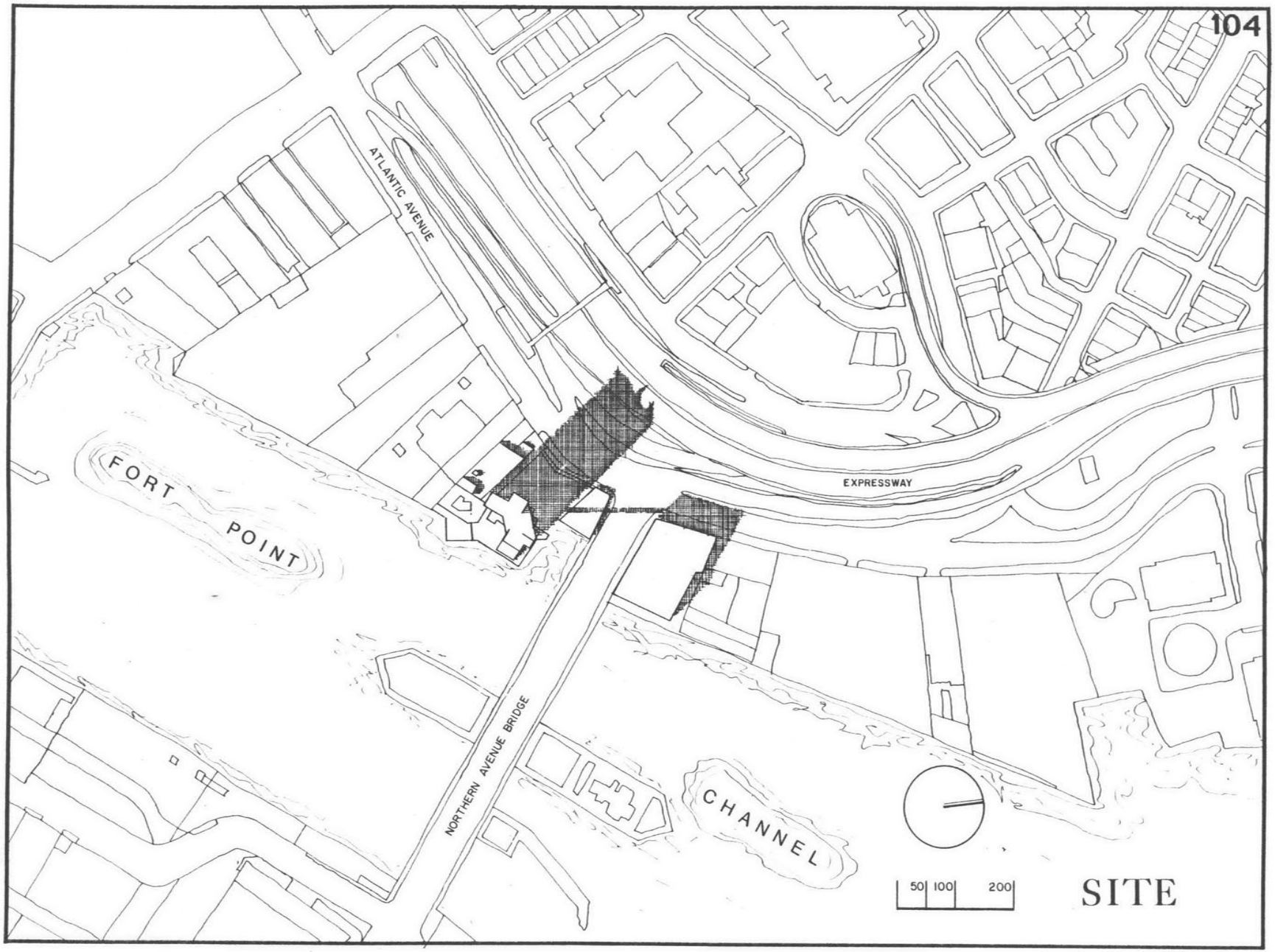
Chapter Six begins with a presentation of some factors and intentions which entered into the generation of the design alternative. These factors include, a description of the site, a building program, and design parameters (developed from the discussion of the preceeding chapters). Chapter Six then deals with the neighborhood; first via a description of its physical traits, and later with an explanation of the design in terms of the stated parameters. Next, the entire apartment complex is

discussed, once again through a two step process of physical description followed by explanation. The project's assessment by design critics is then presented, and serves as an evaluation of the design alternative.

DESIGN CONSIDERATIONS

SITE

The site selected for the project is located in Boston, Massachusetts in close proximity to the Boston Waterfront, an area currently undergoing a renaissance with regard to building reuse and rejuvenation of the vacinity of the water's edge. The site is bound by Atlantic and Northern Avenues, the Fort Point Channel and an adjacent office building. The site is presently the location of a commercial lobster facility, with boat access to the facility via the Fort Point Channel, and truck access from Atlantic Avenue. In terms of square footage, the site is approximately 44,200 square feet. For the purposes of the dissertation, the entire site is


ATLANTIC AVENUE
EXPRESSWAY
FORT POINT
NORTHERN AVENUE BRIDGE
CHANNEL
50 100 200
SITE

assumed to be in the water, requiring piers for support. A parking garage is located across the street (Northern Avenue) from the site and provides parking for both residents, workers and shoppers using the facilities of the apartment complex. From the high rise apartment floors, views extend to Qunicy, the North Shore and the City of Boston.

BUILDING PROGRAM

Parcel Area	44,200 sq. ft.	
Land Use	Primary:	Residential
	Secondary:	Commercial/Office/ Recreation

Building

One residential-mixed use high-rise, containing ca. 25 living floors plus 3 stories of resident recreation use, a 4th floor lobby, and service access basement corridor. A low-rise wing, containing, 4 floors of office and commercial space.

Floor Areas

Apartment Tower

25 living floors at 9,000-10,000 sq. ft./fl.	237,500 sq. ft.
3 recreation floors at 9,000 sq. ft/fl.	27,000 sq. ft.
Lobby	1,500 sq. ft.
Basement	3,000 sq. ft.
Total Apartment Tower fl. area	269,000 sq. ft.

Office/Commercial Wing

4 office/commercial floors at 31,000 sq. ft./fl.	124,000 sq. ft.
Total Complex fl. area	393,000 sq. ft.

Number of Dwelling Units

25 living floors grouped in 4 story increments of 14 units = 84 dwelling units

Height

330 ft. above street level

Parking

Off site; connected to lobby by an overhead bridge.

DESIGN PARAMETERS

1) Encourage a sense of community amongst distinct groups within the building.
2) Provide accomodations for a variety of life-styles, family sizes, and degrees of privacy.
3) Try to alleviate the socio-psychological problems of identity and isolation.
4) Provide a secure living environment.

CRITICAL DESIGN PARAMETERS

1) Group units about a communal space.
2) Size living groups to permit inhabitants of a living group to be able to "know one another."
3) Provide activities which will make the communal space one which will see the interaction of residents.
4) Provide space/areas/accomodations to permit residents to extend territorial claim beyond the confines of his/her unit.

5) Promote security and shared responsiblity for communal areas by locating areas of frequent use in dwelling units with views of the communal space.

6) Create efficiencies, one, two and three bedroom units within a given living group to to provide for a variety of family sizes and lifestyles.

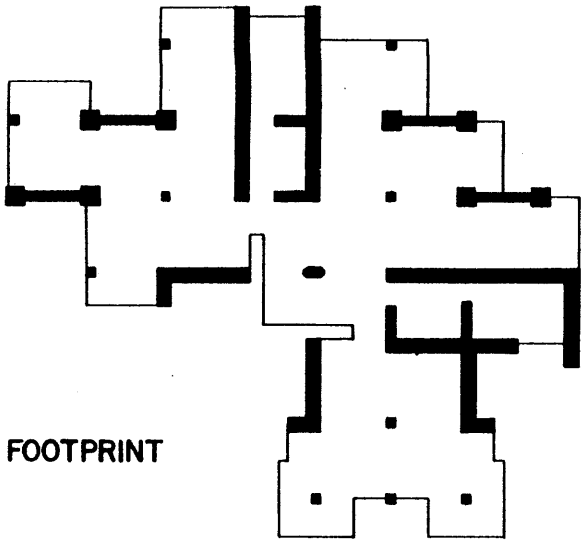
THE NEIGHBORHOOD

DESCRIPTION OF A NEIGHBORHOOD

The apartment tower houses six neighborhoods, each organized in four story increments. Each neighborhood contains no more than fourteen units, most of which are duplexes, with kitchen, dining and living areas on the entry level and bedrooms on a level either above or below the entry level. Entrys are located in the middle two floors of the four story tier.

Access to each neighborhood is provided by means of two elevators, which stop at two points in each neighborhood. The major stop is at the third level of each neighborhood where mailboxes and a bulletin board/notice area is situated. The secondary stop, accessible only via a key held by the residents of a

ORGANIZATION DIAGRAMS



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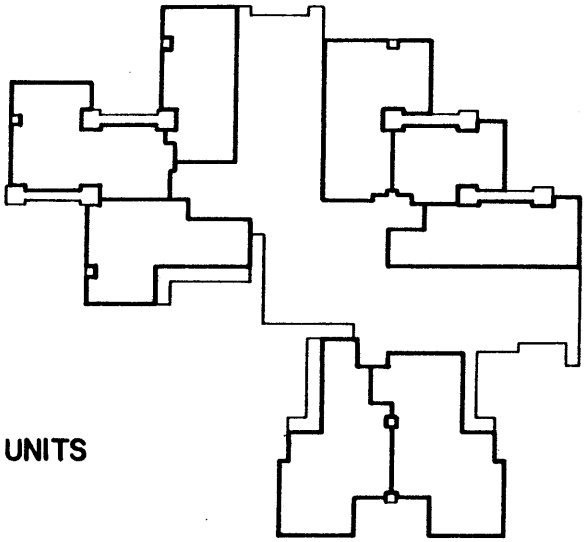

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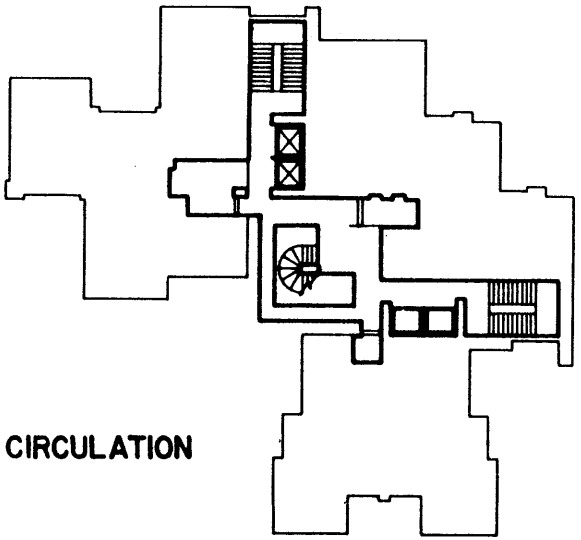

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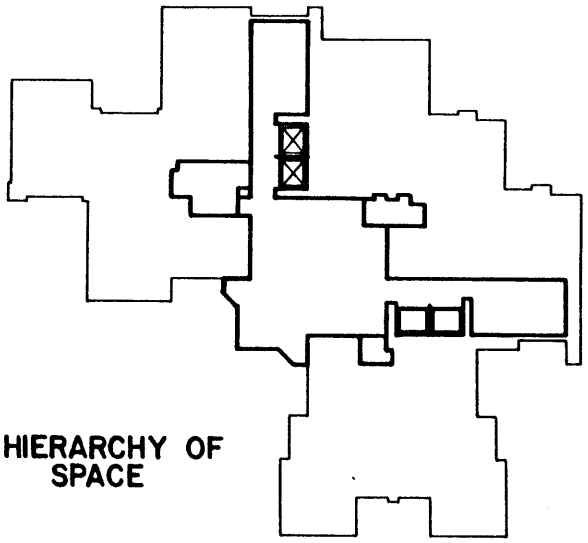
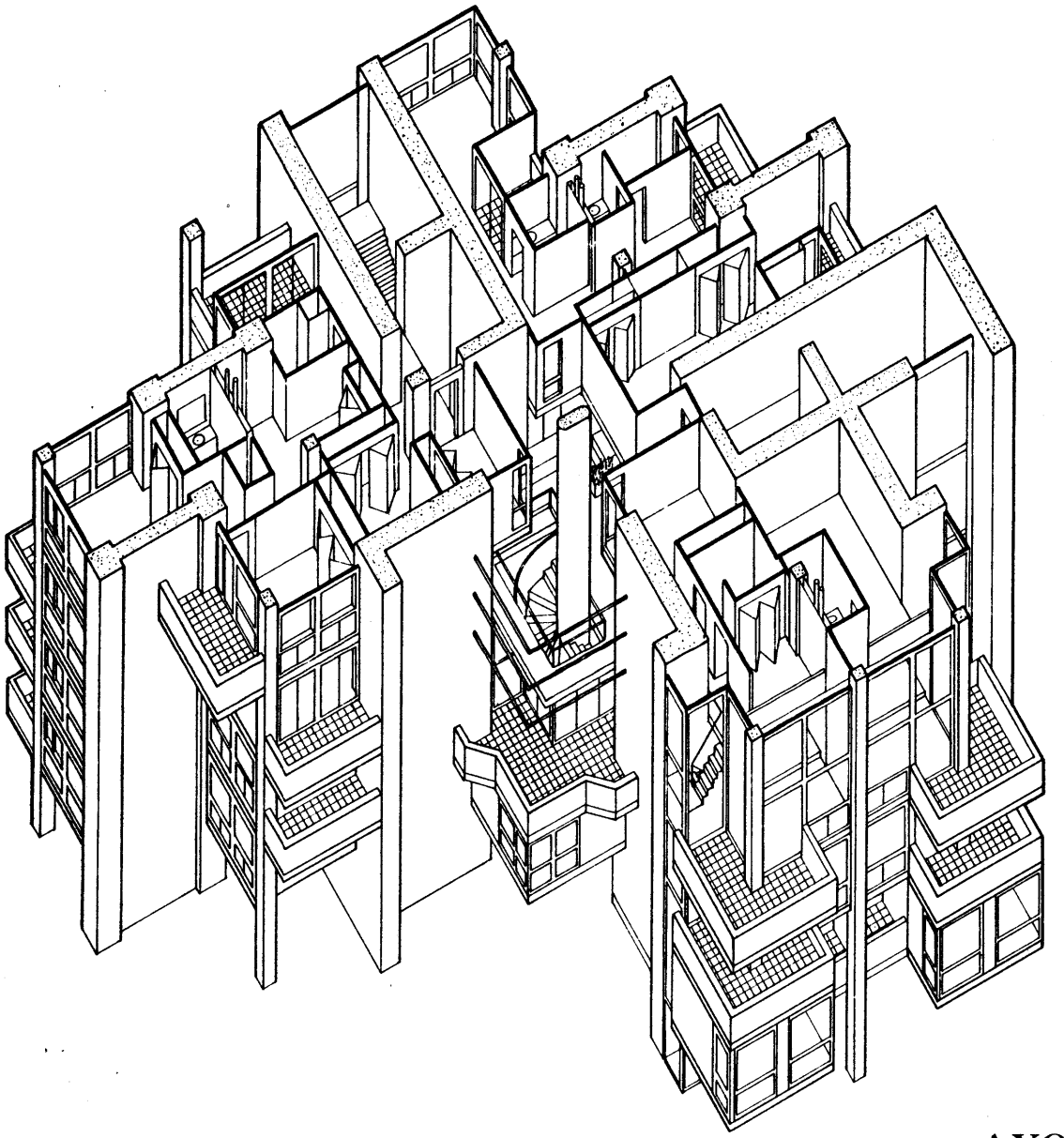
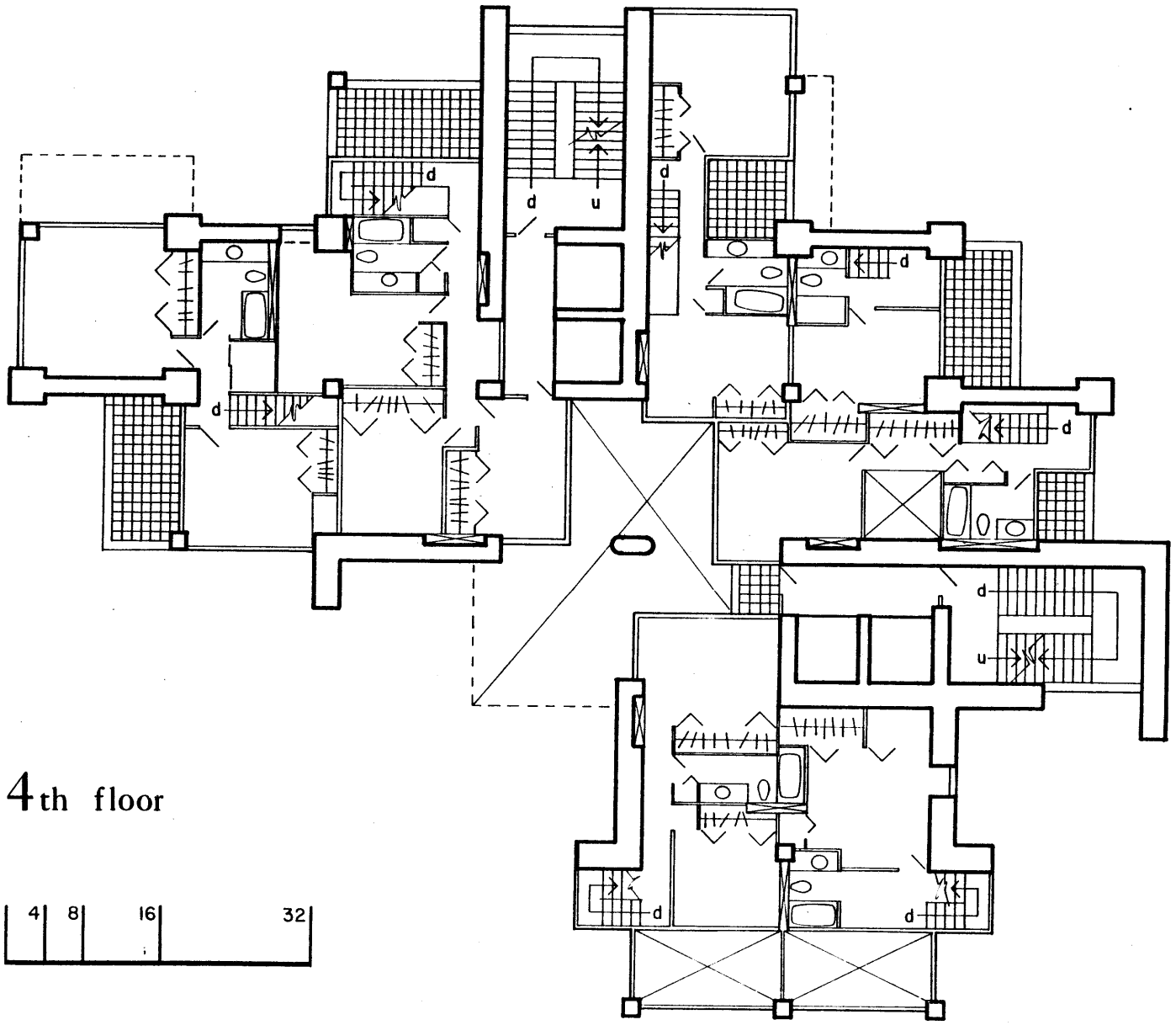


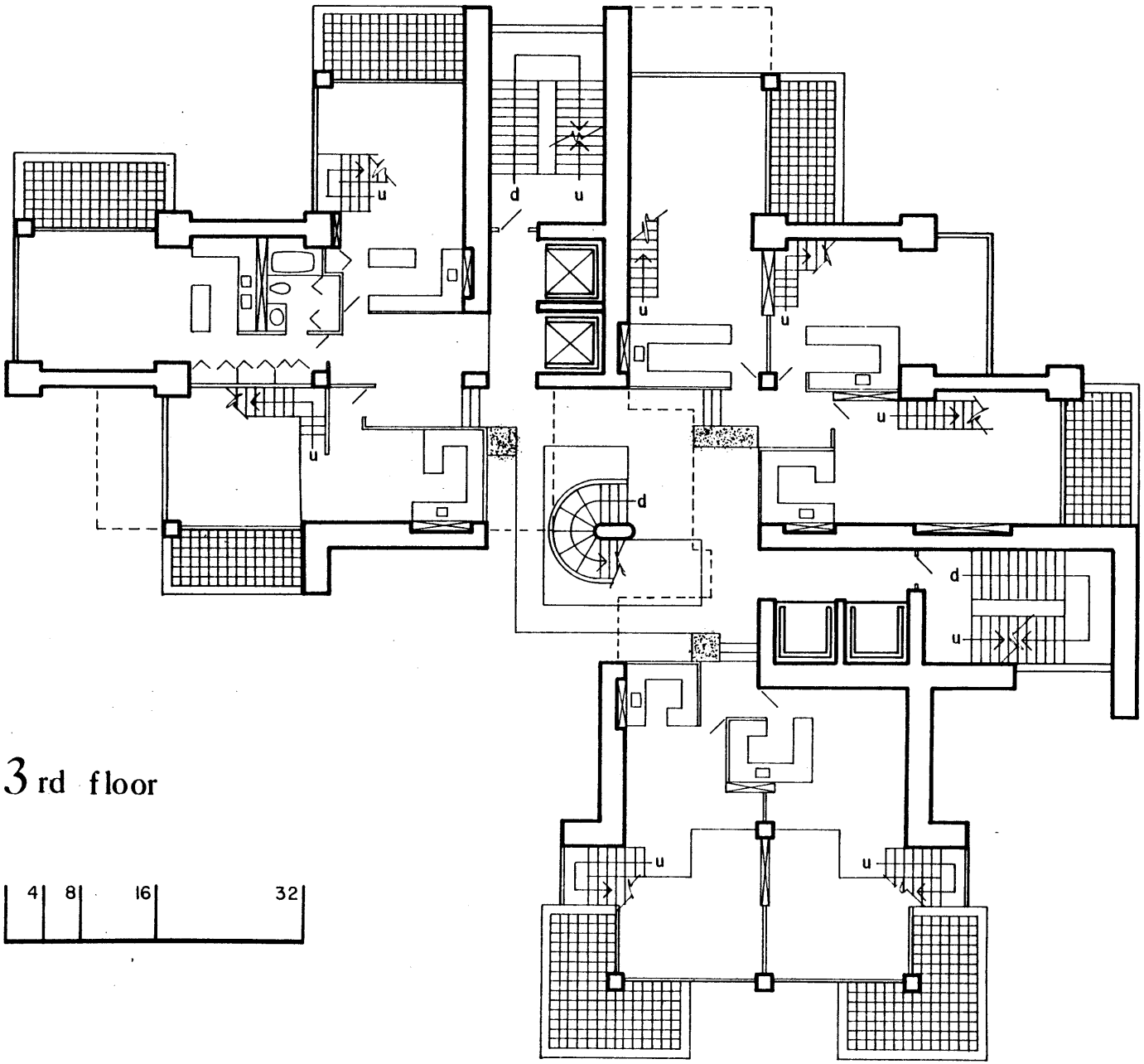
HIERARCHY OF SPACE



AXONOMETRIC

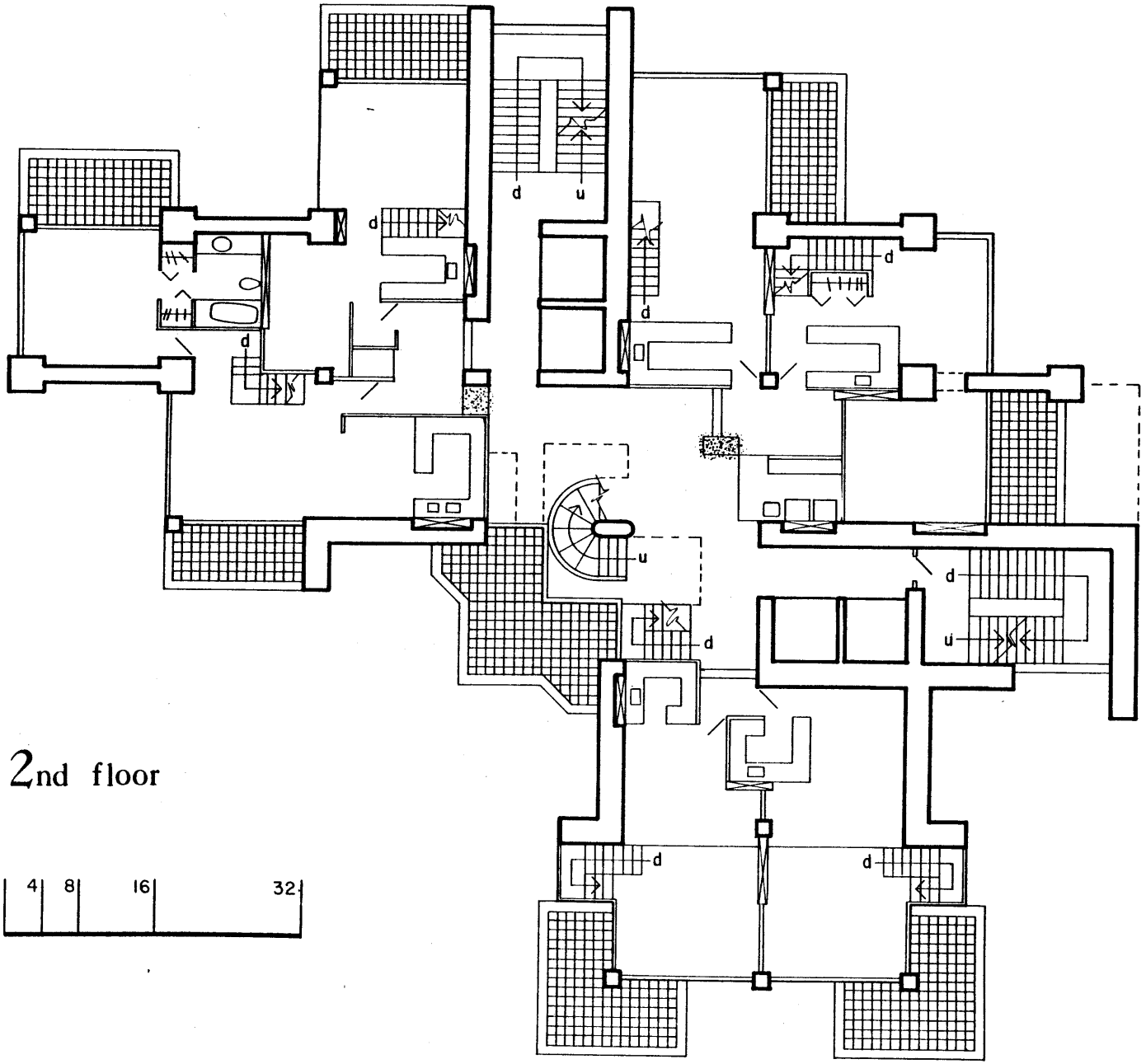


4th floor



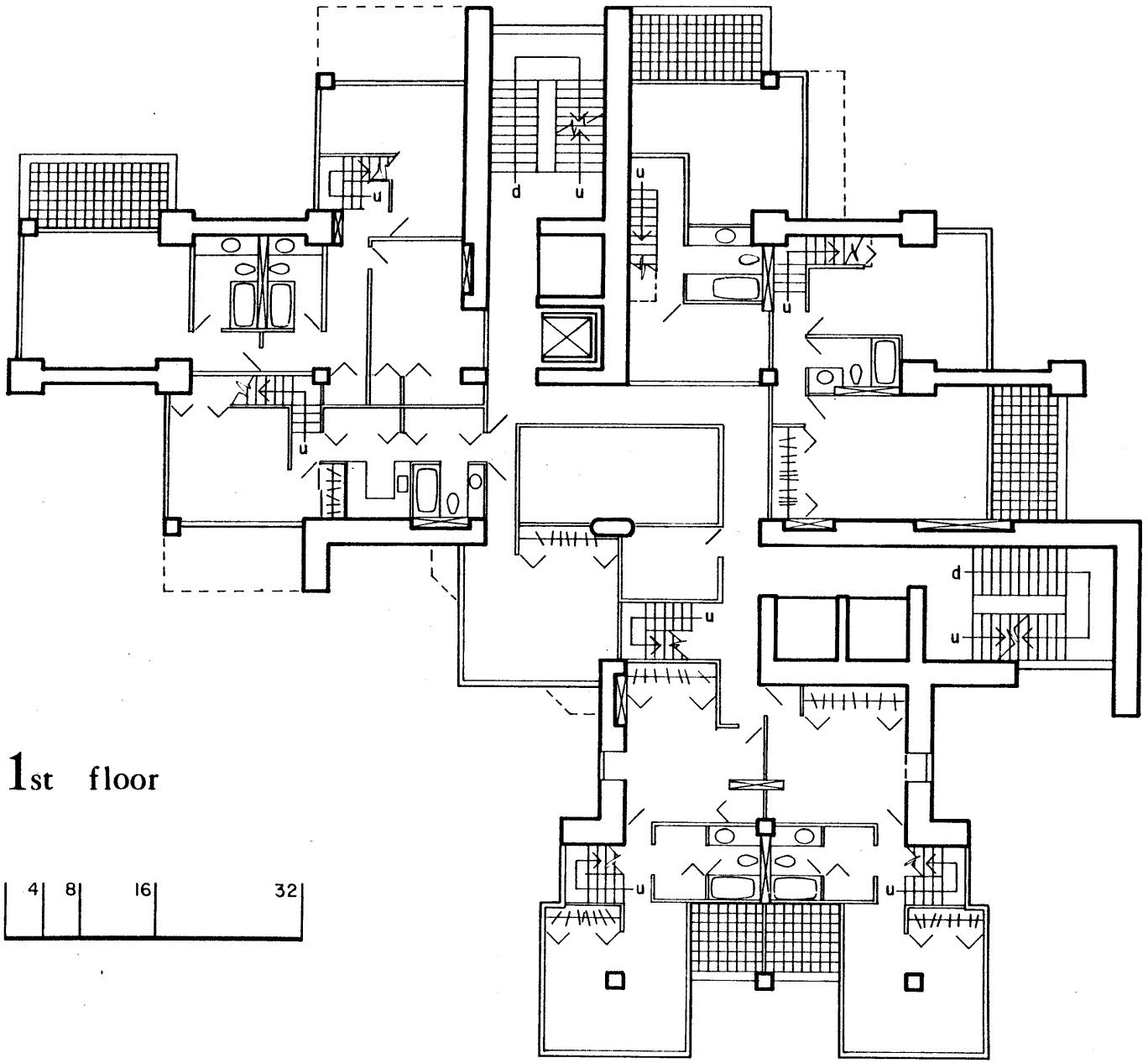
3rd floor

4 8 16 32



2nd floor

4 8 16 32

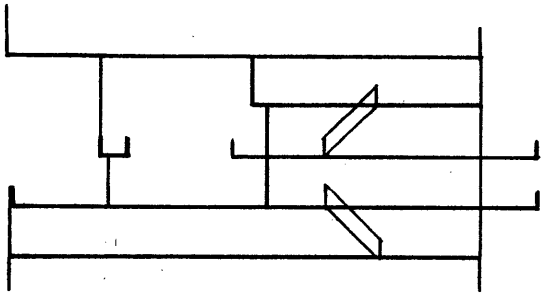


1st floor

4 8 16 32

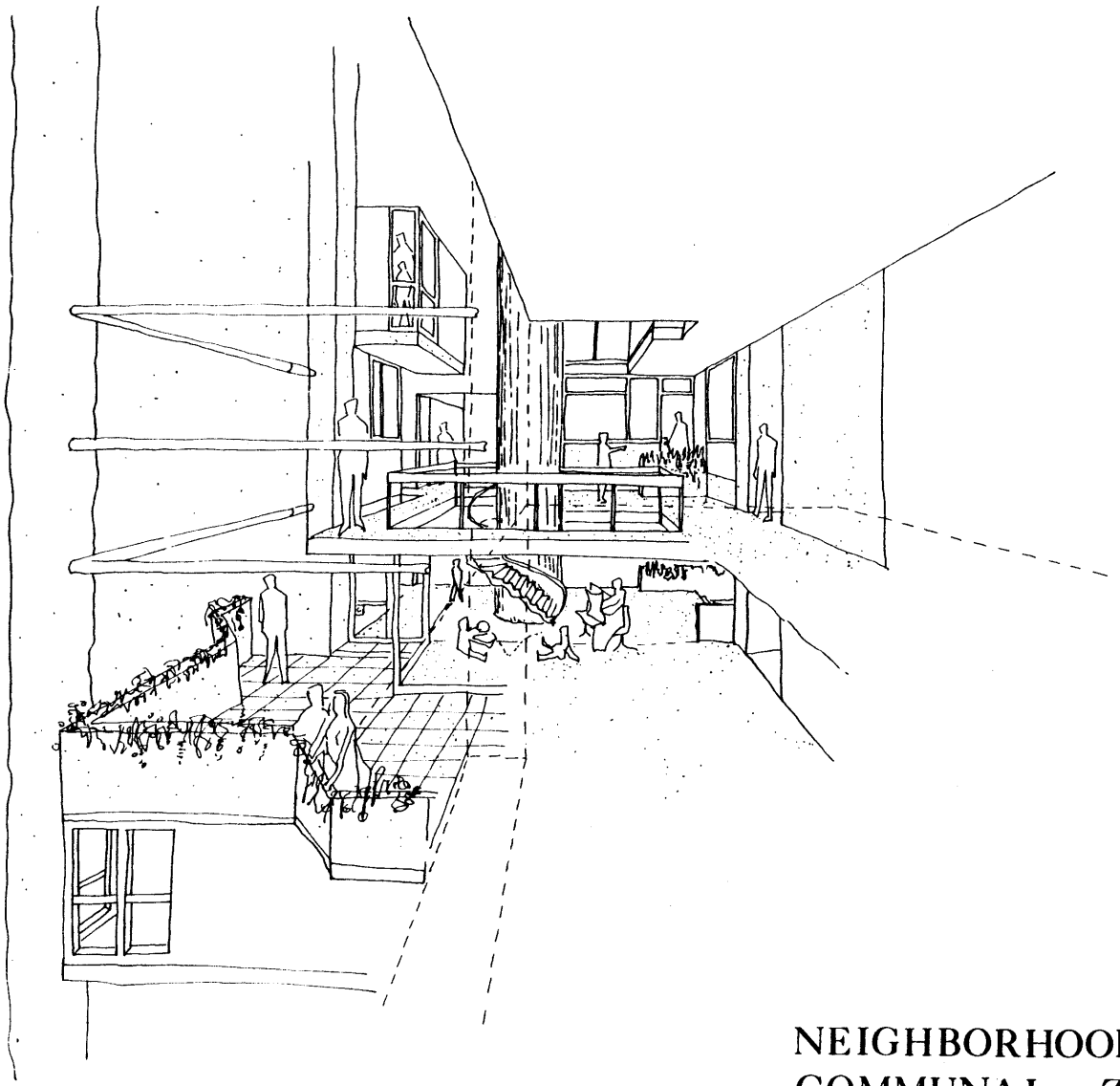
neighborhood, is located at the first level of the neighborhood. The secondary stop is used primarily to service the storage area of the neighborhood.

Six to eight units are accessed on the third floor of the neighborhood, and approximately an equal number on the second level. The second level is connected to the third level via an open stairway located in the center of the communal space. Those units with entrys on the third floor have bedrooms on the fourth floor. The units with entrances on the second floor have their bedrooms on the first floor.



Four Story Neighborhood, Section

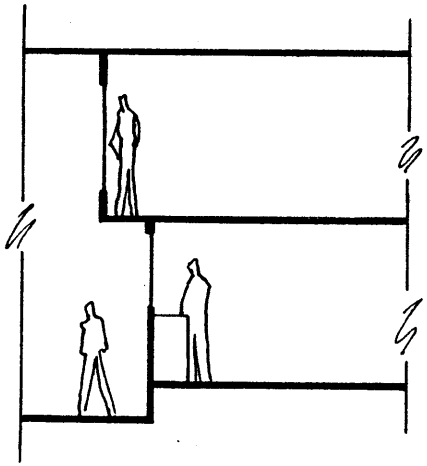
The communal zone of the neighborhood is located on both the second and third floors, and extends three floors in height. The larger use area of the communal zone is located on the second floor. Also on the second floor are the laundering equipment and a sizeable exterior balcony. The third floor



NEIGHBORHOOD
COMMUNAL ZONE

of the communal zone is a mezzanine; it overlooks the second floor communal zone and enjoys the same sunlit Southern exposure of level two, so that the three story tall communal zone receives sunlight throughout the day, in all seasons of the year.

Most units of each neighborhood are duplexes. The duplexes are entered via shared entry stoops located on the second and third floors of the neighborhood. Two to three units share each entry stoop. Kitchens look out over entry stoops and the communal space. The bedrooms of those units entered on the third floor overlook the communal space. The walls of units looking out onto the communal space are partially glazed and equipped with operable windows. The units sit two feet above the level of the communal space on both the second and third floors. Stairs or ramps provide access from the communal levels to the stoops and units. The lower two floors



Relationship of Units to Communal Space

of the neighborhood are primarily two and three bedroom units; those on the upper two floors are efficiencies, one and two bedroom units.

Each apartment unit or residence has at least two faces of exterior exposure; most have a three face exposure. Each unit has at least one balcony; many have more. In general, balconies are located on the entry level, off either the living or dining areas.

DISCUSSION OF THE NEIGHBORHOOD DESIGN

The neighborhood's physical characteristics were designed to fulfill the underlying concept of providing a physical setting conducive to social intercourse.

Number of Families

Nieghborhoods are made up of no more than

fourteen units in recognition of the fact that close friendships have been found to develop in numbers of six to eight families in a conventional residential street neighborhood (Park Forest Study, Chapter 3). The number of families likely to develop friendships has been shown to depend in part on the means of visual contact. Therefore, to place fourteen families within close physical and visual proximity in each neighborhood appears a fairly reasonable "allocation," allowing for a natural gravitation among two or even three "groups" of families. The selection of fourteen families is also a number that is believed to be within the collective comprehension of one individual. In other words, limiting the neighborhood to fourteen families permits a resident to identify himself/herself as a part of a given living group or neighborhood.

Visual Surveillance/Contact

The primary use zone of the apartment, the kitchen is located with a view over the communal space and shared entry stoop. Providing the kitchen with both visual and audio contact throughout the neighborhood allows a casual and frequent survey of the entire neighborhood by residents. The location of the kitchen further enables supervision of children playing in the communal zone by parents.

Hierarchy of Space

There has been an attempt in the design of the nieghborhood to provide for a hierarchy of space apparent to both residents and visitors of the neighborhood. The semi-public communal space used primarily by the fourteen neighborhood families is perceived as the largest of spaces, extending three stories in height and approximately thirty two feet

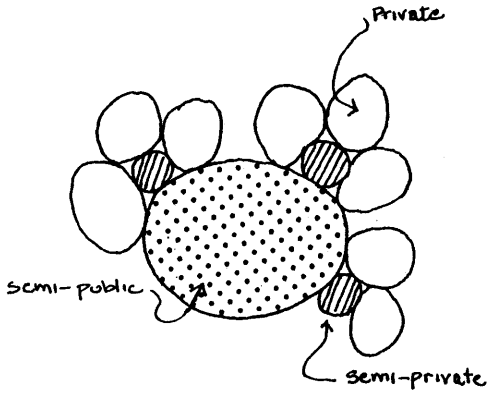


Diagram of
Hierarchy of Space

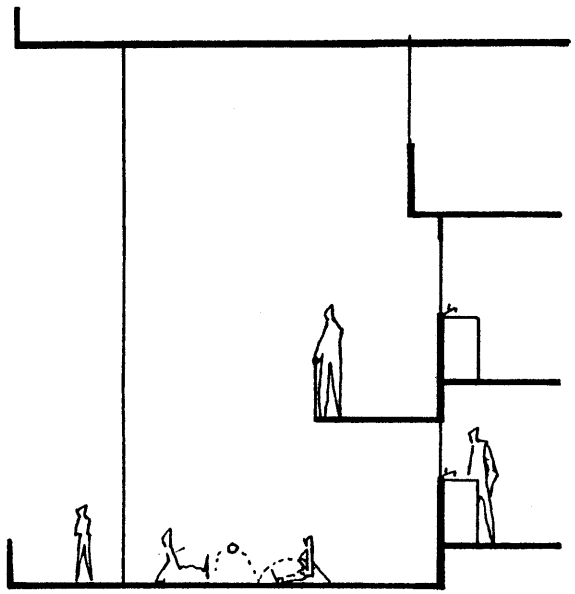
in plan. The semi-private space or shared entry stoops are considerably smaller than the communal space and are differentiated from the semi-public levels by means of a level change of four steps, or two feet. The private spaces or apartment units are entered via the shared stoops, and maintain surveillance over the stoops and the neighborhood as a whole. The stoops serve a purpose behind that of mere entrance and exit. They function further as a transitional device between public and private spaces; and further defines and extends each occupant's territorial bounds.

The hierarchy of space, as provided by the architectural designer is believe to be incomplete without the contribution of residents. The hierarchy of space may be enhanced by personalization of spaces. Apartment doors may be decorated and entry stoops adorned with plantings and personal belongings.

The nature of the semi-public communal space may also vary among the neighborhoods, depending upon the interests and disposition of the individuals and families comprising a neighborhood. The fact that individuality obviously plays a major role in the use of these communal spaces emphasizes at once the flexibility of the design and the premium placed on accomodating individual tastes and idiosyncrasies.

Skip-Stop Elevator Service

The primary elevator stop in each neighborhood is located on the third floor level of each neighborhood. The building is a skip-stop system with a stop occurring at every fourth floor of the building. Whereas in Peabody Terrace and The Marseilles Block the skip-stop elevator system was employed to provide residents with "through" apartments on non-corridor floors, in the design alternative, the skip-stop



Communal Zone and Surveillance

system was employed as a means of increasing the opportunity and occasion for human contact. The MIT Westgate West study in Chapter Three had indicated that movement patterns bear a relationship to friendships. Consequently, by creating a design requiring that residents walk to dwellings, increases the possibility for human contact. The placement of the large communal area on the second level, one floor removed from the entry level, makes it a safe play area for children and allows for supervision from either the balcony above or the second floor units. In addition, the possibility for festivities of neighborhood scale may be enhanced by removing the large communal area from the level of elevator access.

By locating the laundry facilities on a level not serviced by the elevator, the residents of the units occupying the third and fourth floors come into contact with those families residing on the second

and first floors, at least when performing laundering chores. The situation is analogous to the Princeton Dormitory study in which the placement of lavatory facilities proved critical in the determination of friendship patterns (i.e., functional distance). The larger communal space and exterior balcony is envisioned to be a pleasant space, encouraging sustained human contact while laundering clothes, supervising children, or repairing bicycles. The desirability and use associated with the second floor level and primary access on the third level are likely to reduce the severity of the vertical barrier between the residents of the upper two and lower two floors of the neighborhood.

Units

The units were designed to accomodate a range of family sizes, lifestyles and desired degrees of privacy. Each neighborhood is comprised of

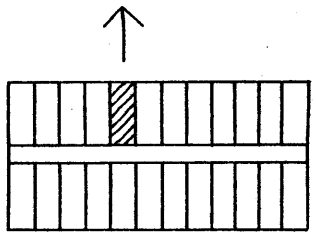
efficiencies, one, two and three bedroom units. This range in unit size is believed to help the neighborhood achieve a mix in sizes of families. The units capable of supporting larger families are located in the lower two floors of the neighborhood. It is anticipated that these units will house families with children. The large communal space of the second floor is intended to function partially as a play area for children, within easy surveillance from dwelling units. The units of the upper two floors may also accomodate families with children; however, it is projected that these floors will be primarily for singles and childless couples.

Residents are capable of exercising choice in the selection of their apartment unit, not only on the basis of family size, but also with regard to degree of desirable privacy. Certain stoops and apartment units have been intentionally positioned

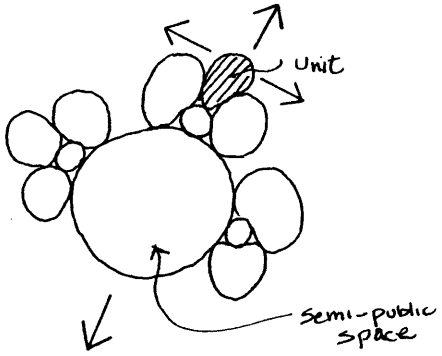
such that they are more removed, both visually and physically from the activities of the communal space than others. In addition, it is anticipated that the residents of the lower floors will be decidedly more prone to social interaction than those of the upper floors by virtue of their units' proximity and orientation to the large communal space.

Communal Space

The communal space is oriented towards the south-east, making it a pleasant sunlit space year round. Due to its orientation, the communal space encourages activities such as sunning, socializing and recreation. With abundant sunlight, the communal space is an ideal location for the raising of plants, especially those varieties requring more sunlight than may be available in one's apartment. The communal space will probably see a good deal of human interaction during the winter months when the balconies



Orientation of Unit
and Views of
Conventional Apartment
Slab



Orientation of Unit
and Views of
Design Alternative

of units are covered with snow, or in times when the apartment balconies are in shadow. The units of a conventional high-rise are restricted to one or two views depending upon their particular location in the building. Hence, the resident of a unit is virtually oblivious to the events transpiring on the other side of the building, and is only aware of the existence of the "other half of the world" by venturing outside the building at the ground level. With the communal space of the design alternative oriented in a direction opposite to that of most units, the neighborhood dweller is more aware of the complete context in which he/she lives. The residents of the neighborhood may, therefore, establish a territorial sense for the communal space, as it does indeed function to enhance each individual family's living environment, and could conceivably be an extension of one's dwelling unit.

The fact that the use of the communal space is largely restricted to the fourteen families of the neighborhood helps to establish a living environment in which residents can easily develop friendships, or at least casual acquaintances. The considerable use envisioned for the communal space is believed to promote a resident based responsibility for the upkeep of these areas, especially if the communal zone is the location for small children playing, or adults socializing. The frequent use of these areas, combined with the surveillance over these areas from within the units would probably decrease the likelihood of these communal areas falling into neglect.

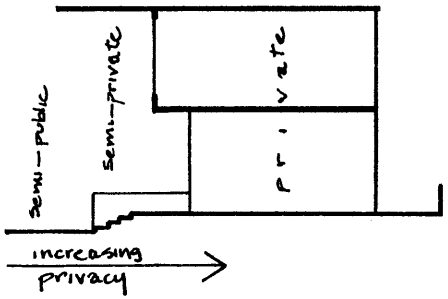
These communal areas may even be furnished cooperatively by members of the neighborhood, in the spirit of neighborhood pride and extension of dwelling units. As previously mentioned regular use of the communal areas provides considerable incentive for

for self-maintenance and would eliminate, or at least lessen, the need for regular maintenance crews.

Circulation proceeds at the fringes of the communal spaces. On the third floor circulation is provided by a path between the dwelling units and communal space (depending upon one's perspective, the communal space may include the circulation paths). The circulation path is wide enough to accomodate the parking of bicycles and toddler vehicular traffic in addition to pedestrian movement. The circulation on the second floor level is located directly beneath that of the third level, and boarders the large communal space.

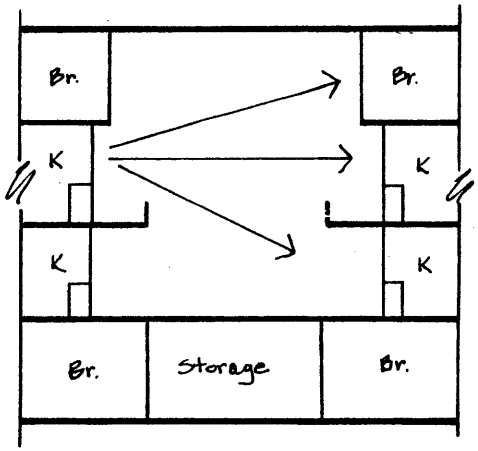
Residential Street Analogy

As indicated in the section on hierarchy of space, it has been demonstrated that the design alternative has attempted to make the transition from



Hierarchy of Space

public to private space apparent to both resident and visitors by means of physical clues. In establishing this hierarchy of space, a situation analogous to the residential street presented in Chapter Two is believed to have been created. The communal space functions as a front yard and street to residents. It is from the communal space that units are accessed and across which visual and audio communication to other units is possible. Also, the communal space is an area for social gathering and human interaction, as is the residential street and front yard in a suburban residential neighborhood. The front porch of a suburban dwelling, which denotes the beginning of a private zone, is removed from the street by means of a front yard, a buffer zone. In a high-rise where horizontal distance is at a premium, vertical distance is used in lieu of horizontal separation. Consequently the two foot level change between the



Visual Contact of
Four Story Neighborhood

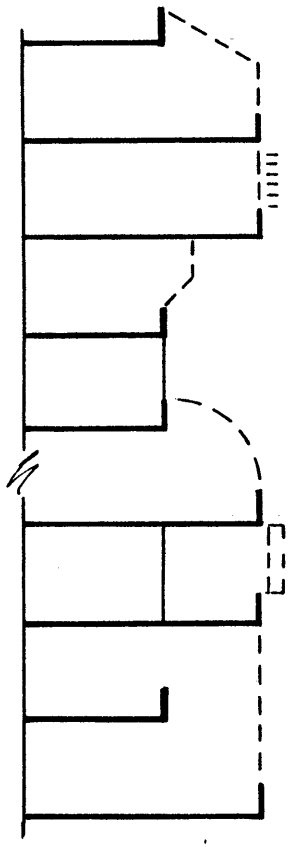
circulation level and that of the units is a substitute for the horizontal distance between wholly public and private areas. The shared entry stoop provides a transition zone from the semi-public to private domains as does a front porch. The stoop's semi-private characterisitcs may permit residents to comfortably converse or sit on stoop steps, as one may on the front porch steps of a suburban dwelling.

It has been mentioned earlier that in a suburban neighborhood friendships are likely to develop on the basis of visual and vocal contact. The units of the design alternative are arranged about the communal space and are equipped with operable windows which open onto the communal space. The fourth floor bedrooms overlook the communal space as do the second level bedrooms of a suburban dwelling. By means of orientation of units and outfitting them with operable windows (and areas of glazing) the residents

are capable of visual and vocal contact with each other as are residents in nearby suburban dwellings.

Personalization and Extension of Territory

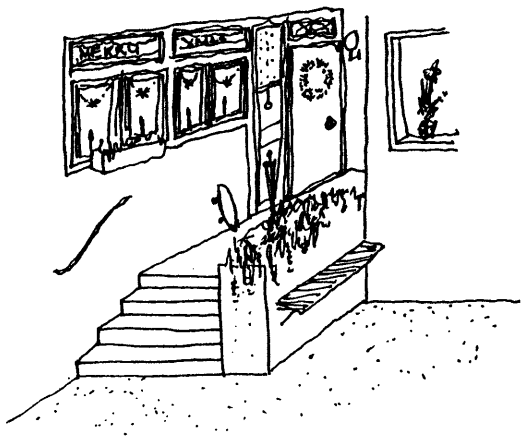
The design alternative has attempted to lay the foundation for the participation of residents in the shaping of their living environment. The large balconies of each unit provide the opportunity for residents to enclose their balconies in a variety of ways (Hawthorne Place, Chapter 4). The manner of enclosing a balcony may add to the variety in the building's elevation, while permitting the individual resident to proclaim his/her existence and identity through personalization. The building is expected to see within its lifetime individual elevational additions, perhaps in the form of sunshading devices (both vertical and horizontal), bay windows, or balcony enclosures. While these types of additions involve construction techniques beyond the



Individuality Through
Balcony Additions

capabilities of most of the apartment dwellers, the exterior edge of the building is designed in a manner that could accomodate these "tack-ons" with contractorial facility. Admittedly, the building as designed is relatively stark; however, the building has created the opportunity and basis for additions by residents to shape their own living environment.

The shared semi-private stoop to apartment units is also an area which may see an extension of an apartment dweller's sense of territorial claim. The stoop is provided with a planter for resident use, the first step in personalization of the stoop area. Also, the stoop may be a logical location for decorative personal belongings, which extend the domain of the apartment dweller beyond the apartment door. These personal belongings may be in the form of umbrella racks, sculpture, planter boxes, or other paraphernalia which carry the stamp and personal



Personalization of Stoops
Units Fronting on the
Communal Space

imprint of the resident. The surveillance over the stoop and communal space from the kitchen windows also contributes to the extension of the dweller's claim over areas adjacent to their dwelling units.

Depending upon the composition of the neighborhood, the apartment dwellers could conceivably extend their personal domain into the communal space, provided that the extension is not opposed by the other members of the neighborhood.

Summary

The design exploration has attempted to provide a physical environment conducive to the development of what the author believes will be a situation similar to a suburban neighborhood. The residents of the high-rise neighborhood are capable of identifying themselves with a distinct living group, which is able to develop its own identity in terms of the life-styles and attitudes of the neighborhood as a whole.

By subdividing the apartment into distinct groups of fourteen families, it is believed that the problems associated with conventional high-rise residences (i.e., isolation, identity and security) may be alleviated.

The opportunity for residents to personalize their apartments by enclosing balconies, elevational "tack-ons," decoration, and extending their own territory into the communal space is expected to aid in fostering a sense of identity within the context of the neighborhood group, and the building as a whole. The stoops to apartment units may serve as areas into which the apartment dweller may extend his/her territorial claim, through decoration or display of personal belongings.

The positioning of the major use area on the second level of the four story neighborhood and the elevator stop on the third level encourages social

contact through movement patterns and communal use. Additionally, this vertical organization attempts to break down the barrier cause by the vertical separation of levels within the neighborhood.

The hierarchical arrangment of communal spaces, semi-private spaces, and private spaces helps to make the transition from semi-public to private space an identifiable and natural act. Physical clues such as level changes, size of space and degree of personalization help to denote the transition in a logical fashion to both residents and visitors.

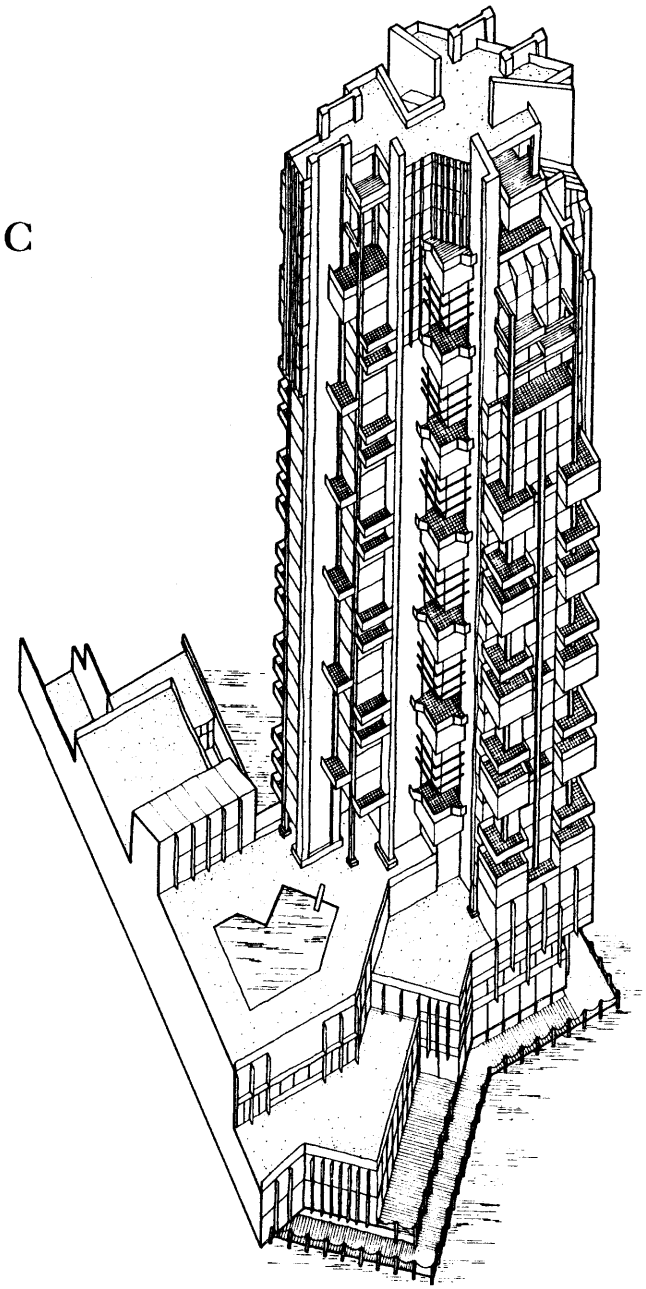
THE APARTMENT COMPLEX

DESCRIPTION OF THE APARTMENT COMPLEX

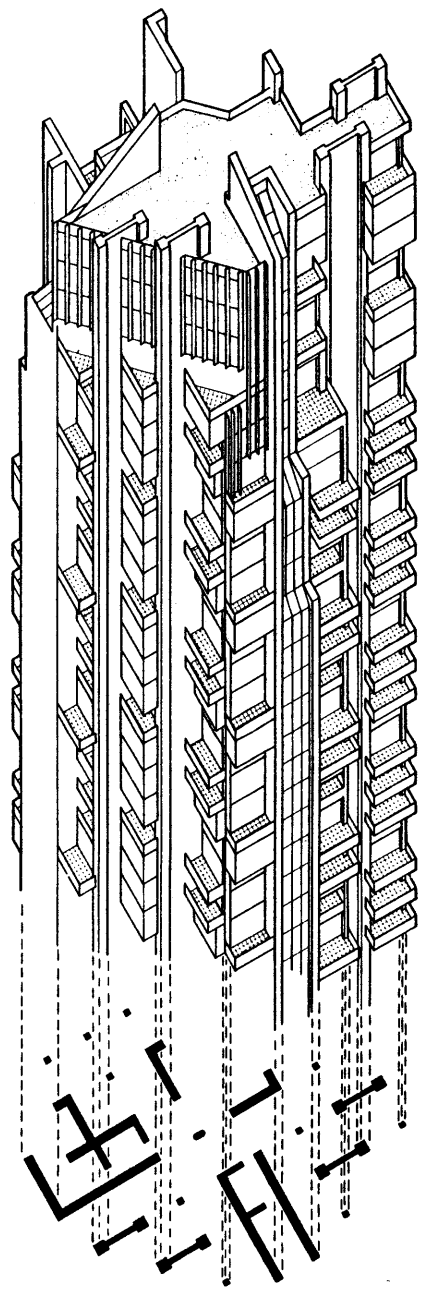
The apartment complex consists of a twenty-eight story apartment tower and a four story commercial/ office wing. The complex is organized in an L shape with the apartment tower situated at the tip of the L at a distance from both the Atlantic Avenue and Northern Avenue Sidewalks. The entire complex sits on piers above the waters of the Fort Point Channel. A seven story parking garage for the complex is located across Northern Avenue.

The apartment tower is a cast-in-place shear wall building. Lateral loads are resisted by shear walls and elevator stair cores. The floors of the building are one foot deep two-way flat slabs. Bay spacing for the tower is 16' X 16' throughout.

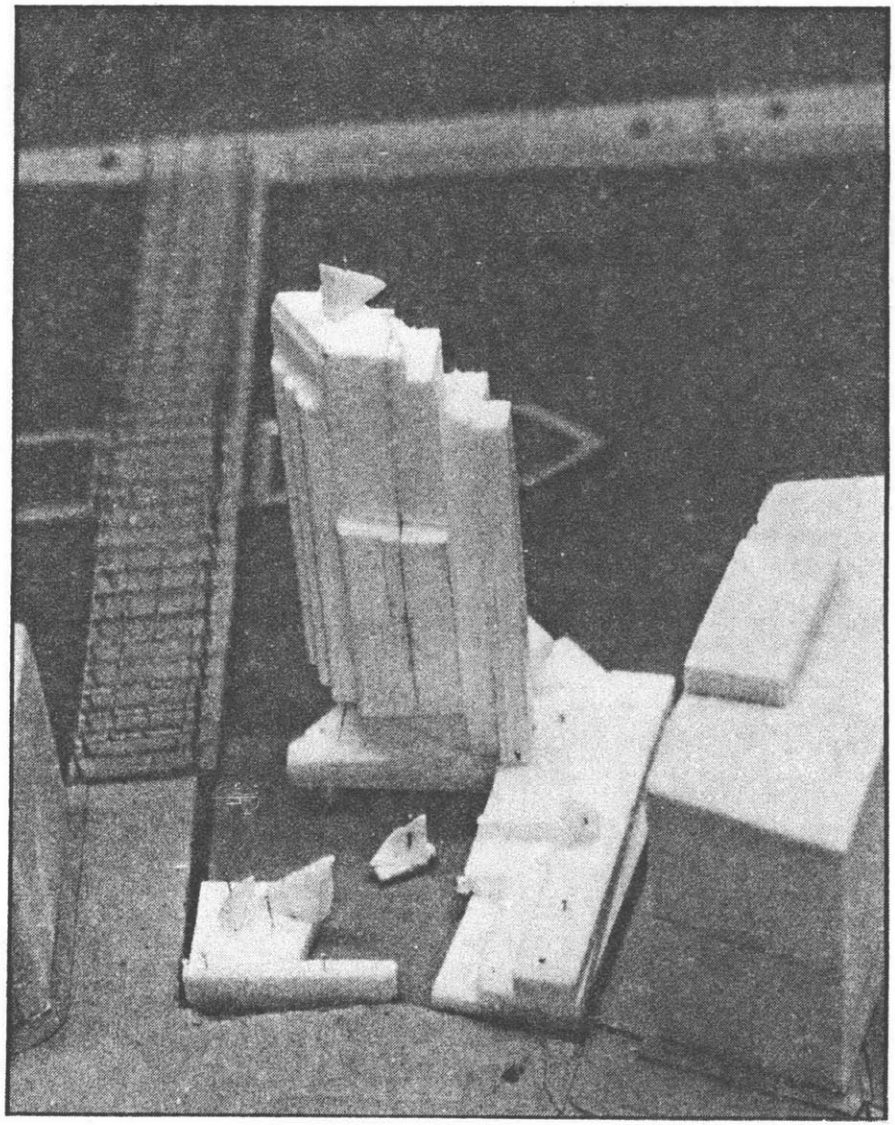
SOUTH
ISOMETRIC



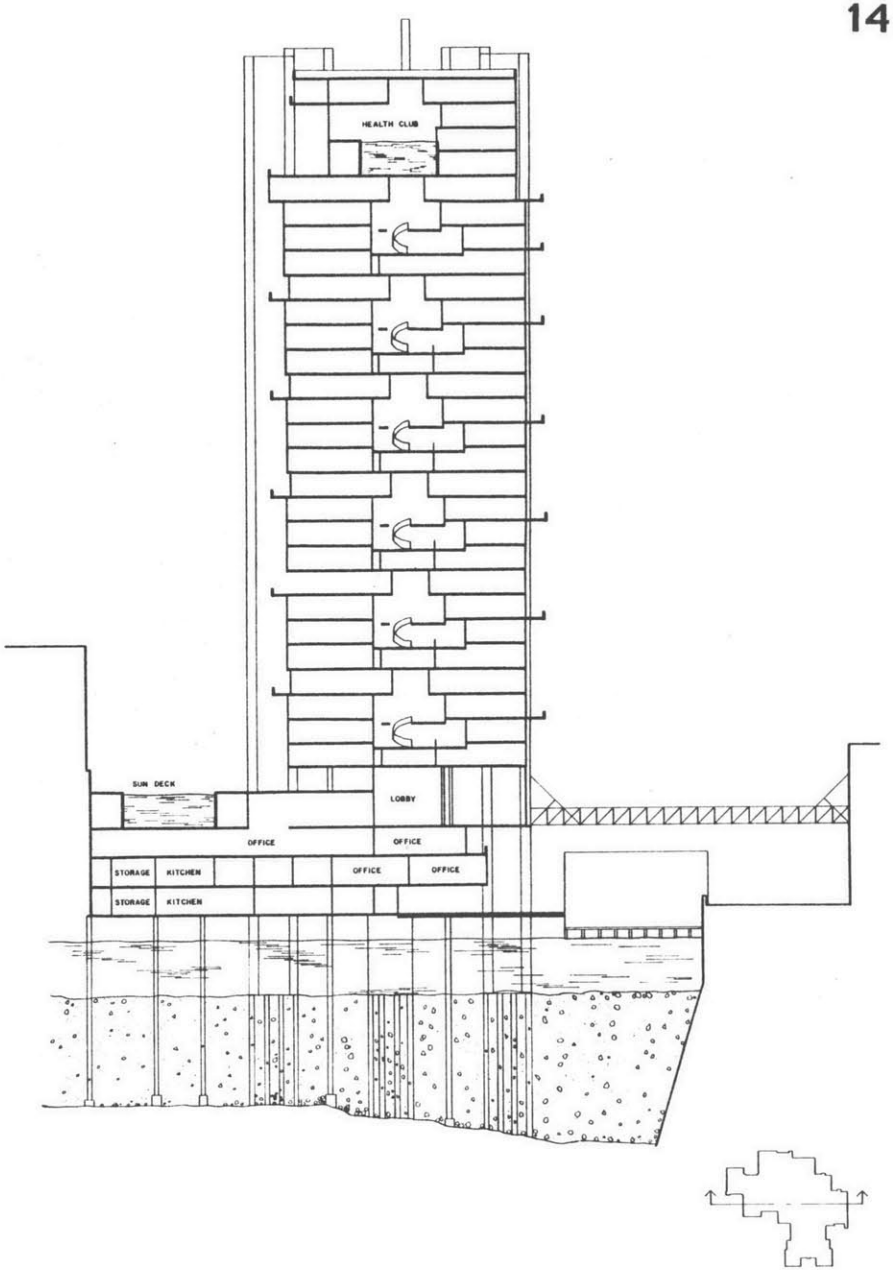
NORTH
ISOMETRIC
& CORE CONFIGURATION



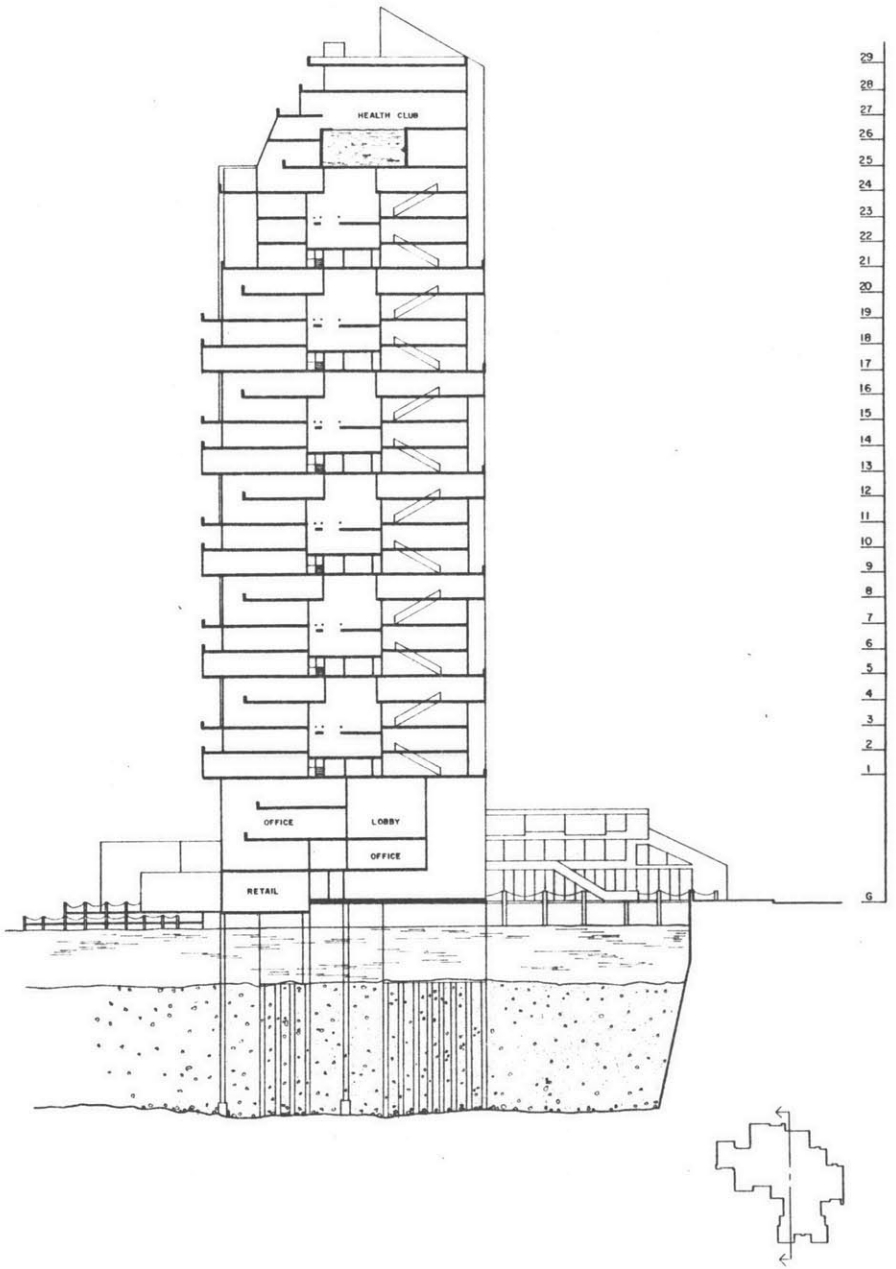
EARLY
MASSING
MODEL

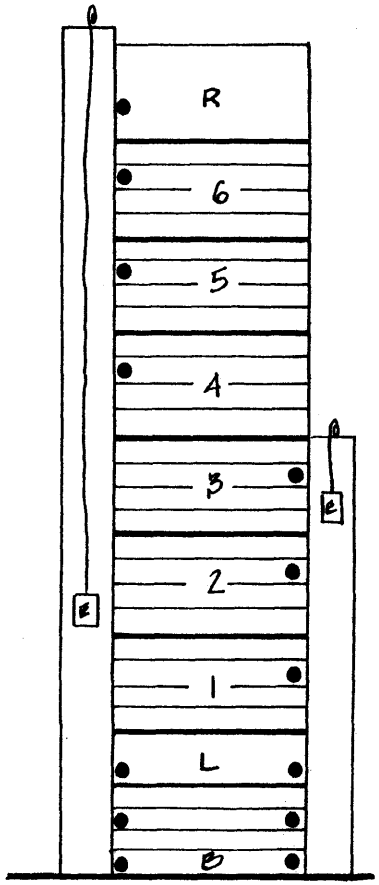


LONGITUDINAL SECTION



TRANSVERSE SECTION





Schematic of Elevator system

Gravity loads for the building are taken by the shear walls, service cores and columns. Edge conditions of the building see floor slabs cantilevered from column lines to a maxiumum of 8'.

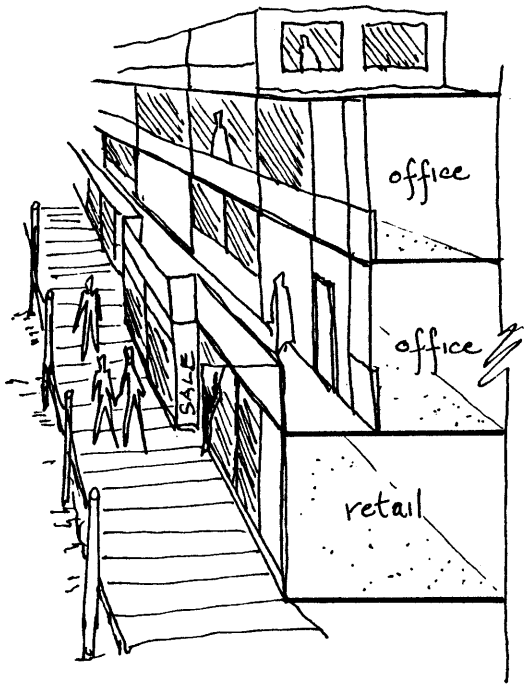
Residents' primary access to the fourth floor apartment lobby is by means of a trussed bridge, connecting the lobby and the parking garage, and spanning Northern Avenue and the water below. A secondary access to the apartment units is located off of the first level shopping arcade.

The apartment tower is organized vertically in four story neighborhood tiers. A skip-stop elevator system services each neighborhood, stopping at the third and first floor levels of each neighborhood. Two elevator banks of two high-speed elevators each serve the apartment complex. One elevator bank serves the lower three neighborhoods and the other serves the upper three neighborhoods and the communal

facilities at the top of the tower.

In elevation, the apartment tower is articulated by a combination of large massing elements and small scale elements. The major elevational components are the concrete shear walls and service cores. These major elevational components extend the full height of the building. Balconies and projected living units are secondary elevational elements. These secondary elevational devices reflect the unit sizes of apartments within the complex and the neighborhood zones. The tertiary elevational elements include window sizes and types, shading devices, scale bars, bay windows, and differentiation of opaque and transparent areas. The tertiary level of elevational elements involves a combination of architect designed givens and elements added by the residents of the building. The tertiary elements reflect the human scale of the building.

There are two areas of recreation provided for the residents of the apartment complex. One recreation area is located on the roof of the commercial/office wing, and the other is located in the top three floors of the apartment tower. The recreation area atop the roof of the commercial/office wing of the complex features an open-air swimming pool and sun deck. Locker facilities are provided for residents in a structure adjacent to the pool area. This recreation area is used primarily during the summer months. The other recreation facility located at the top of the apartment tower includes an enclosed swimming pool, that is to be used year round by residents. In addition, the tower recreation facility is equipped with squash and handball courts, weight rooms, sauna and locker facilities. The top three floors of the apartment building, also contain rooms for a nursery school for small children, which could

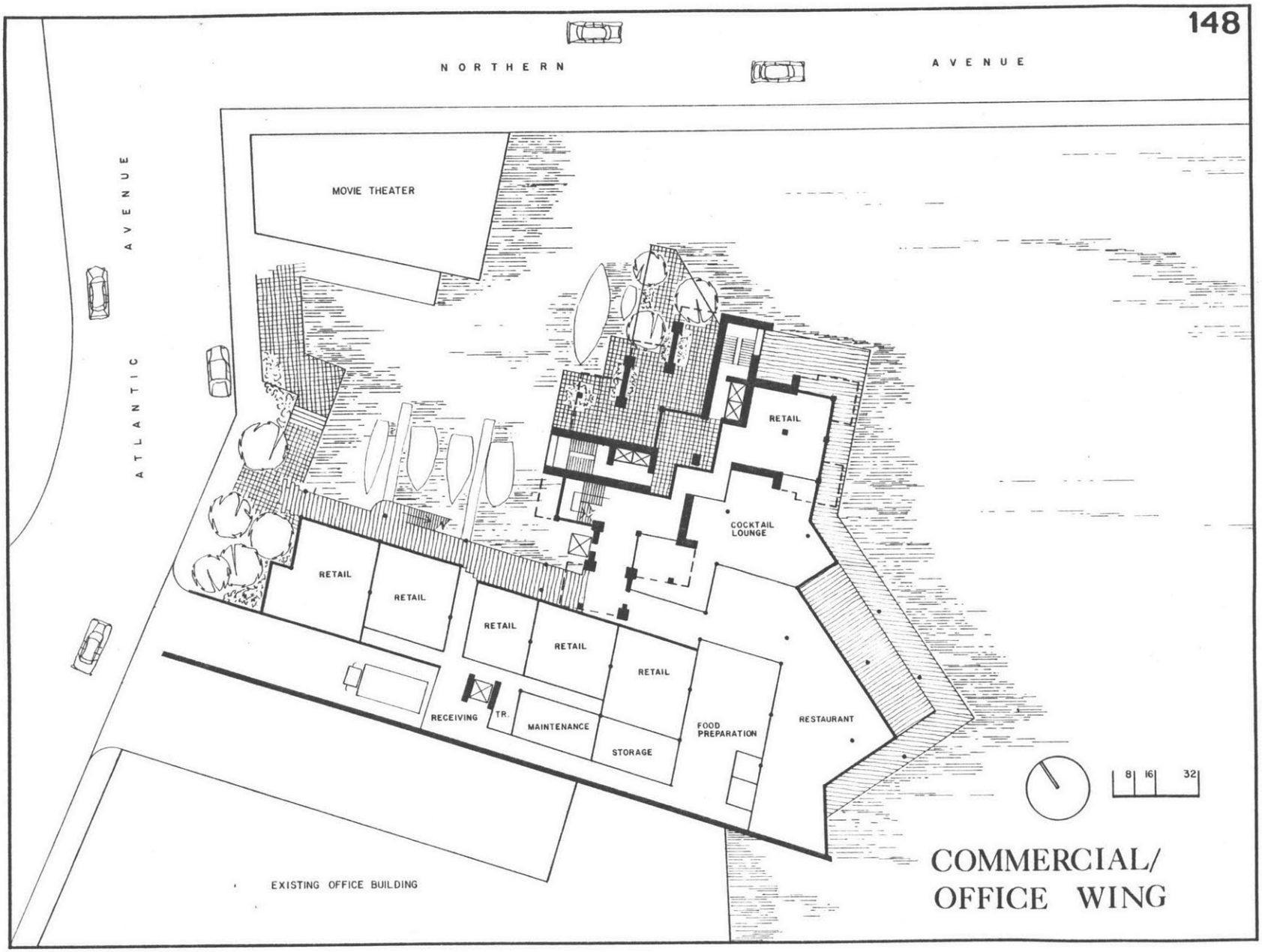


Retail/office Arcade

double at nights as meeting rooms for resident groups and/or continuing education classes. The roof of the apartment tower contains a small jogging track and picnic area.

A small pub for residents is located in the three floor recreation facility, overlooking the pool area. It is anticipated that the pub will be run by residents of the complex and will operate during hours established by the residents of the building.

The four story commercial/office wing of the complex features a shopping arcade with approximately half a dozen shops, including a convenience store to serve the needs of apartment dwellers and tenants of the commercial/office wing. The arcade also contains two restaurants and a cocktail lounge with views to the South over the Fort Point Channel The upper levels of the commercial/office wing are devoted to



COMMERCIAL/ OFFICE WING

small professional offices of approximately 3,000 square feet. On the third level of the wing, a 16,000 square foot office space is provided for a medium sized business. This larger office space is provided with views to the South and a generous outdoor deck.

DISCUSSION OF THE APARTMENT COMPLEX DESIGN

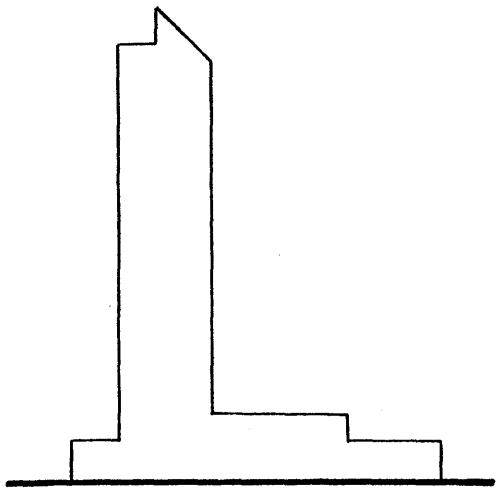
This section will explain the design of the apartment complex in terms of fulfilling the design objectives outlined at the beginning of this chapter. The design of the entire complex was undertaken with the same goals as was the design of the four story vertical neighborhoods, with a special emphasis upon encouraging communal sense and human interaction.

The apartment complex was designed with recognition of the fact that the most coherent social groups are the four story neighborhoods. Consequently, in

designing areas to be used by all of the residents of the building, the underlying intention was to provide an interface between members of different neighborhoods and to encourage inter-neighborhood interaction.

Massing/Siting

The apartment complex consists of a high-rise tower and a low-rise wing. The low-rise wing functions as a base to the tower and helps to make the transition from vertical to horizontal less abrupt than in conventional apartment buildings, such as Harbor Towers and Hawthorne Place. The low-rise refrains from disrupting the harmony of the scale of the existing buildings and presents a human dimension to the user and observer of the complex, by serving as a transition between the horizontal street/sidewalk and the vertical tower. The apartment tower is placed at a distance from the street's edge so that

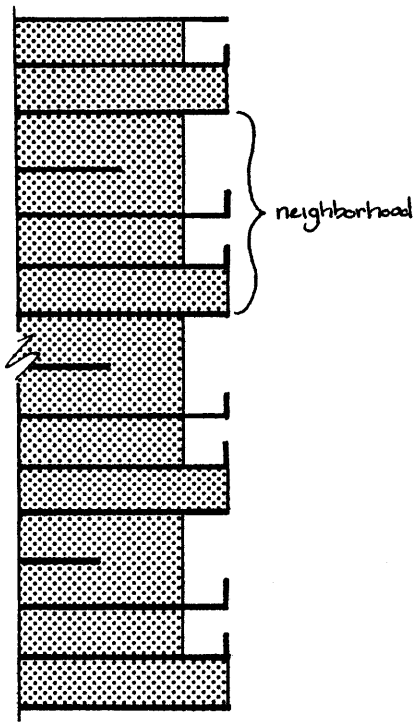


Massing of
Apartment Tower and
Commerical/Office
Low-Rise

the building does not create a barrier at the street's edge to pedestrian views. The configuration of the tower and low-rise wing permits the waters of the Fort Point Channel to contribute to the Atlantic Avenue pedestrian experience, by setting the water's edge at Atlantic Avenue. Also, by situating the apartment tower at a distance from the Atlantic Avenue sidewalk, observers may be able to enjoy viewing the apartment tower in its entirety, much as one may better appreciate a painting when viewed from a distance. The distance of the apartment tower from the street's edge may also be regarded as "breathing space" in an otherwise congested urban fabric of expressways and buildings.

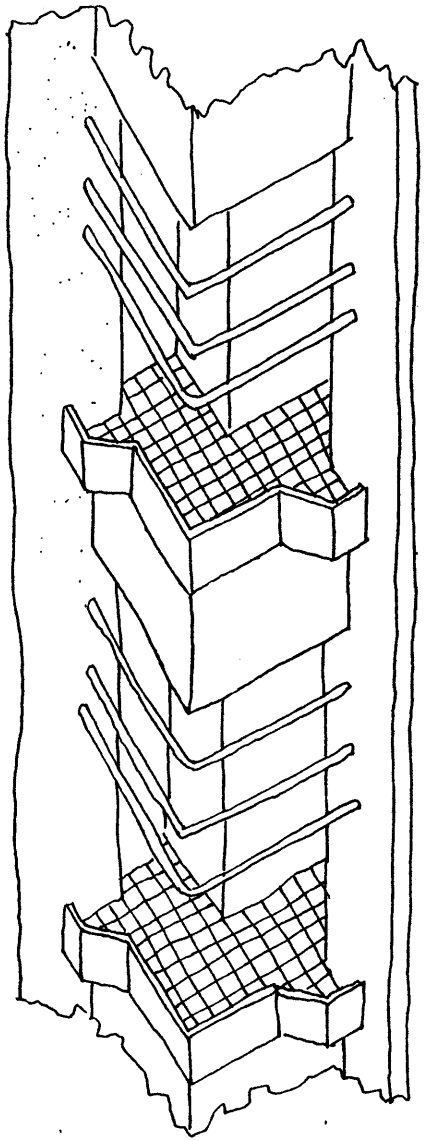
Elevation

The apartment tower attempts to convey the sense of identifiable neighborhoods in elevation by means of balcony placement. Balconies are repeated in



Balcony Rhythm in
Apartment Tower

recognizable four story increments. Although the repeating order of the balconies varies throughout the several faces of the building, the sense of neighborhood, or four story rhythm is maintained. The elevation attempts to remedy the repetitive nature of consecutive floor by floor elevational treatment of a conventional high-rise. Harbor Towers and Hawthorne Place are examples of the floor-wise elevational treatment. The balconies of the design alternative are used in the elevation in a manner analogous to Peabody Terrace, in which the three floor elevator service zones are reflected in the elevation. The balcony treatment conceivably contributes to a sense of identity by enabling a resident to spot his/her dwelling unit easily on the building elevation; first by locating the neighborhood in which he/she resides and secondly, by isolating the specific unit. Tertiary elevational elements (i.e.,



Isometric,
Communal Zone

bay windows, window treatment, scale bars, and shading elements) described earlier, most of which are to be added by residents of the complex may further serve to establish a resident's identity in terms of the tall building form. Hawthorne Place had demonstrated that resident participation in a building's elevation is possible and contributes variety in building articulation. The individuality and personality add a defnite human quality to the elevation, and remove the building from the realm of a physically static entity to an everchanging and dynamic one.

The communal space of each neighborhood appears in elevation as three story high areas of glazing bound by the communal balcony and the first floor unit, of each succeeding neighborhood. This treatment establishes an identifiable four floor zone (i.e., a neighborhood) on the building elevation.

The communal balcony configuration, different than those of the apartments, helps to differentiate the neighborhood communal zones from apartment units.

The shear walls and elevator/stair cores establish the entirety of the tall building form. These prominent vertical elements convey the impression that the four story neighborhoods comprise a complete entity, and that residents of the specific neighborhoods are also members of the entire apartment tower.

Communal Facilities

The recreational facilities attempt to draw users from all of the various neighborhoods of the building. In contrast to the recreational facilities of Hawthorne Place and Harbor Towers, discussed in Chapter Four, the recreation facilities of the design alternative are to be used exclusively by the eighty-four families of the tower. Whereas the recreation facilities of Harbor Towers and Hawthorne Place serve

two or more apartment buildings, the facilities in the design alternative are for the residents of one apartment tower.

As the people using the recreation facilities are the residents of the apartment tower alone, it is anticipated that the users may identify themselves as comprising a collective group. While residents using the recreation facilities may tend to socialize with members of their own fourteen family neighborhood, it is believed that inter-neighborhood social behavior will occur in these areas of collective use. Relationships between various members of different neighborhoods may develop according to the coincidence of habitual use of certain recreational facilities, e.g., a 5:00 p.m. swim every weekday.

The recreation/education facility located in the top three floors of the apartment complex serves to foster building-wise community interaction. The

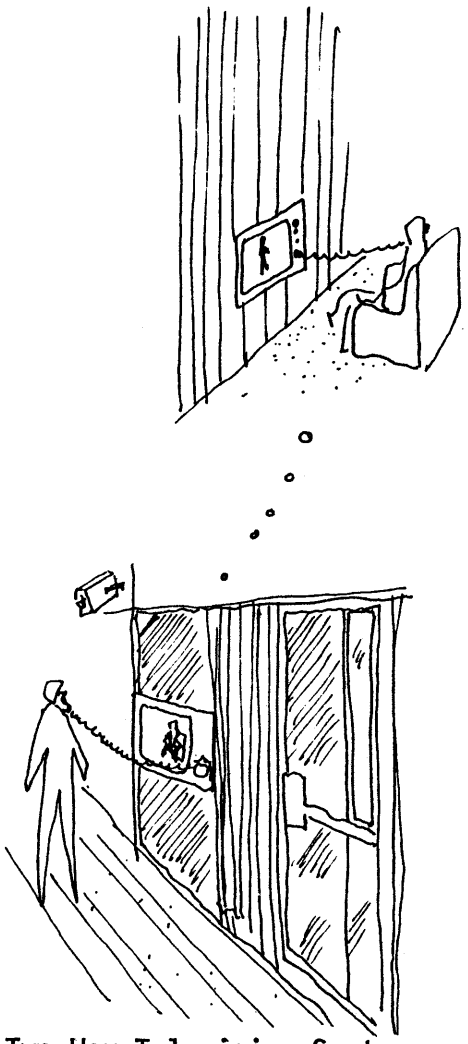
nursery school is expected to draw children from the various neighborhoods of the building, much in the same way that a suburban school draws its students from the various neighborhoods making up a school district. Use of the rooms for continuing education classes or club meetings results naturally from the congregation in an apartment building of a large number of people, some or many of whose interests will inevitably coincide.

Oscar Newman inferred from his studies that one characteristic of a defensible space was its propinquity, or visual accessibility to dwelling units. While the recreational facilities of the complex are physically removed from the apartment units (most times even visually) the use of a two-way closed circuit television is employed to permit visual and oral accessibility to these facilities from dwelling units. With the capability of the two-way closed

closed circuit television, residents are able to communicate both visually and orally despite the separation of the apartment unit and recreation area. While the closed circuit television system is in no way an equivalent substitute for physical proximity, it nevertheless attempts to draw the apartment unit and recreation facility closer together.

Entry and Service

The apartment tower is enter primarily via a glazed overhead trussed bridge servicing a common lobby to the apartment building. The trussed bridge enables residents to view people entering and leaving the apartment building from their units as one may observe passer-bys on a residential street. The trussed bridge is also monitored by a closed circuit television in order that residents may maintain visual and audio contact with other residents or visitors



Two-Way Television System

entering and leaving the apartment building/

The lobby is secured by a glazed locked door. Residents open the door with a common building key. Visitors are admitted to the building by calling up to apartment units on an intercom two-way closed circuit television system. Residents in apartment units are able to electronically open the lobby door for visitors to enter. The two-way closed circuit television system enables apartment dwellers to visually identify visitors prior to admitting them into the building.

The other entrance to the apartment tower is located off of the commercial/office arcade. The entry's location at the first floor arcade level of the commercial/office area is sufficiently removed from the activity of the commercial facilities to provide a more pleasant transition from commercial to residential domains. The secondary access to the

apartment units is also equipped with a two-way closed circuit television communication system.

Freight delivery to the apartment tower is handled by the loading dock at the rear of the commercial/office wing. A basement level passageway connects the service dock elevator to the elevators servicing the apartment neighborhoods.

Commercial/Office Wing

The commercial/office wing of the complex, in addition to fulfilling the formal requirements of providing a transition between a tall vertical element and the ground, serves also to integrate office and commercial activities with residential living. Tenants of the commercial/office wing may well be residents of the apartment tower. The restaurant and cocktail facilities open during late night hours may provide residents with late night activities in close proximity to living units. The

commercial/office wing may house support facilities for the apartment tower, such as a convenience store, cleaners, and druggists. The presence of residential units will also keep the complex "alive" during weekends and after business hours when office buildings and stores become desolate environments.

Summary

In the design of the apartment complex, the intention was multifold: 1) to provide the basis for the development of inter-neighborhood interaction, 2) to allow for individuality and identity within the context of the entire building, 3) to integrate commercial/office functions with residential living, 4) to provide a secure living environment, 5) to permit the defensible space mechanisms to operate in regions beyond the visual accessibility of apartment units, and finally 6) to create a building complex which is sensitive to existing buildings and human

users and observers.

With regard to massing and siting, the apartment complex's low-rise commercial/office wing serves as a transition piece between the vertical apartment tower and the horizontal ground. The commercial/office wing helps to integrate the apartment complex with the existing building adjacent to the site. The removal of the apartment tower from the sidewalk edge permits it to be appreciated in its entirety and creates "breathing space" within the urban fabric.

In elevation, the apartment tower indicates individual neighborhoods by balcony placement. In addition, the balconies reflect unit apartment sizes. Resident "tack-ons" such as enclosed balconies, shading devices, scale bars, and bay windows reflect the individuality and identity of those people living within the building.

The two recreation facilities are for the

exclusive use of the eighty-four families residing in the building. It is the intention that these areas will promote inter-neighborhood interaction, either on the basis of group activities (i.e., clubs, continuing education classes, nursery school) or coincidental interaction.

The use of two-way closed circuit television communication systems permit both security via surveillance, and sense of responsibility through visual and audio accessibility. This communication system is intended to substitute for physical proximity in areas where such propinquity is not possible, as in the apartment lobby and recreation areas.

The low-rise wing attempts to integrate commercial/office functions with residential living. The low-rise is an integral part of the complex and provides both support functions and activities for both the apartment dweller and visiting patrons. The

existence of the apartment tower complements the commercial/office wing by keeping the wing "alive" on weekends and after business hours.

EVALUATION & SUMMARY

Participants:
Professor James M. Becker
John Burke
Michael Charek
Howard Goldstein, AIA
Paul Johnson
Professor John R. Myer, FAIA
Robert Peña
Professor Robert J. Slattery, AIA

This section presents an evaluation of the design alternative based upon the critiques of the participants listed above. The evaluation consists primarily of discussions held on April 20, 1979 and April 24, 1979 at the Massachusetts Institute of Technology. The discussion dealt with the design alternative on several levels. This section will

attempt to highlight the salient points of the discussions and in the process summarize the design alternative.

DISCUSSION OF THE NEIGHBORHOOD

> The intention of the neighborhood was to create a living group of a size that would encourage group identity and social behavior. The physical layout of the neighborhood was directed at reinforcing these goals and permitting residents to extend their territorial claim beyond the confines of their apartment unit through personalization and use.

Critics accepted the fourteen family neighborhood as a "reasonable size" to be regarded as an identifiable group. Fourteen families was also believed to be a number conducive to social behavior. The orientation of the units about the communal space, with an emphasis upon ordering spaces in a hierarchical fashion was believed to be a sensitive manner of dealing with the problems of personal and

and collective territory. Kitchen and stoop locations and orientations were felt to be an acceptable approach to solving the problems of security and extension of private territory beyond the confines of the apartment unit. Sizes of spaces, combined with level changes and personalization were felt to be sufficient to denote levels of privacy and territorial claim. The neighborhood was believed to be a considerable improvement over the conventional apartment building in terms of security, transition from semi-public to private spaces, and personal and collective identity.

The reality of implementing a "vertical neighborhood" was questioned on the basis of the significant portion of potentially rentable floor area given over to communal functions and circulation. Useable (rentable) space, including balconies accounts for only sixty-five percent of the gross

floor area of each four story neighborhood. In marketing a "vertical neighborhood" it is anticipated that a portion of each unit's cost would be devoted to the communal space. Hence, occupants would not only be paying for their individual units, but also a portion of the communal zone, conceivably contributing to a sense of shared responsibility and concern for the condition of the communal territory. It was speculated by critics that the design intentions of the "vertical neighborhood" might be capable of being implemented in a more efficient solution; that which has a higher ratio of rentable square footage to gross floor area.

One critic mentioned that the spatial qualities and relationships of the communal space were not effectively conveyed in drawings. A large scale model would have been a more valuable means of representing the neighborhood. With the large scale model

spatial relationships (i.e., sight lines, shadows, light penetration ...) might be more easily understood and studied.

The dependence of residents upon the elevator was cited as a difficulty in realizing the concept of a "vertical neighborhood." Residents move from the apartment lobby to their respective neighborhoods oblivious to the existence of other neighborhoods and their residents in the building. Despite the effort devoted to encouraging human interaction (primarily within neighborhoods) inter-neighborhood communication occurs primarily at communal recreation facilities as in conventional apartment complexes. Human interaction in elevators is believed to be minimal. The inability of high-rise dwellers to be coginizant of the existence of other human beings within the building beyond those of a residents neighborhood (as is possible in suburban neighborhoods) remains

a problem to be tackled.

> The larger units of the neighborhood (i.e., units of two and three bedrooms) were located in the lower floors of the neighborhood with the expectation that these units would house families with children. The large communal space was designed to be directly accessible from and under visual surveillance of of units of lower floors, with the belief that the communal space would function as a play area for children. In addition, laundry facilities at the second level and primary access and mailboxes at the third level were intended to enhance the occasion for human contact and interaction. The communal space's southern exposure was expected to encourage the use of the space when their own units are in shadow or when winter weather prevents the use of exterior balconies. The communal space was intended to expand the dwelling experience of residents to a side of the building not faced by units.

The communal space was cited as not having enough activities associated with it to function as the location for sustained human contact. While locating the laundry equipment and the larger units

with children at the second level help to generate activity for the communal space, these activities alone were believed to be marginally adequate to promote extensive use of the space.

In addition, the reality of children playing in the second floor communal space was questioned, considering the probability of there existing within each neighborhood children of an age that would require such a play area. It was felt that children from the various other neighborhoods may be required to use a given neighborhood communal space for the space to function with as much activity as intended.

The laundry facilities, combined with the southern exposure and balcony of the second level communal space were believed to promote sustained human contact, and break down the vertical barrier created by vertical organization. While it was agreed that the second level would be the most likely

location for neighborhood gatherings, it was felt that the frequency of these gatherings would largely depend upon the composition of the neighborhood. It would be difficult to assume that these communal areas would witness frequent social gatherings considering that neighborhoods consist of people of distinct lifestyles and interests.

The critics noted that paraplegics would find difficulty in residing in or visiting neighborhoods due to the skip stop elevator system. While it was the design intention that shared stoops could be accessed either by ramps or stairs, those units entered on the second level require one to descend the central spiral staircase, making second floor units virtually inaccessible to paraplegics. A suggestion was made that a keyed elevator stop, similar to that of the first level be implemented to alleviate the problem of second level unit access,

and also to facilitate furniture handling. It is suspected, however, that a keyed stop at the second level may be overused (i.e., in cases not involving paraplegic access or furniture handling) conceivably defeating the purpose of the skip-stop elevator system as a means of promoting occasion for human contact and interaction.

> Units were designed to offer residents choice in their dwelling unit in terms of size, orientation and degree of desired privacy.

The critics felt that the neighborhood did provide residents with choice in regard to the selection of dwelling units. The emphasis given to ensuring units with three or at least two sides of exterior exposure were felt to contribute to the experience of living high up, by taking advantage of multiple views. While the serrated edge of the building provided units with a variety of views, it

was cited as increasing the periphery of the building contributing to energy loss.

Critics noted that shear walls and elevator/ stair cores were not used between units as a means of providing acoustical separation. Instead, the shear walls were used on the exterior edge of the building. While the use of these elements would effectively provide acoustical privacy (in addition to gravity and lateral load carrying functions), this privacy is at the expense of flexibility (e.g., combining units, regrouping units). Acoustical privacy between units is possible through the use of less permanent materials (e.g., concrete block) that may be removed or altered, if so desired.

Critics recognized that all units did not bear the same relationship to the communal space. Some units did not front directly onto the communal space, but instead were one step removed. These units were

intended to be more private than those fronting the communal space. Hence, a choice does exist in the selection of a unit based upon desired degree of privacy.

In summary, the concept of the "vertical neighborhood" appeared viable to a majority of the design ciritics. The size of neighborhoods, organized in four story increments and unit designs were felt to contribute to an atmosphere conducive to social behavior and community sense. Major problems stemmed from, 1) insufficient activities attributed to the communal space, 2) low ratio of rentable square footage to gross floor area, 3) difficulty of paraplegic access, and 4) energy inefficiency.

DISCUSSION OF THE APARTMENT COMPLEX

> In the design of the apartment building complex, the emphasis was upon creating communal areas to be used by residents of the apartment tower as a whole in an effort toward promoting inter-neighborhood interaction.

Critics accepted the premise that the apartment complex communal facilities should attempt to promote inter-neighborhood interaction. Critics felt that eighty-four families of the building was a number that would justify the existence of some communal facilities, while being a number that would not make users of these facilities anonymous. Limiting the use of these facilities to residents of the apartment building, while exclusive in concept, was believed to help in fostering social behavior. Critics felt

however, that eighty-four families did not justify two recreation areas as proposed in the design alternative. It was agreed that recreation facilities might better be handled if combined in one area, most likely at the roof top level of the commercial/office wing. While the intention in locating one recreation area in the top three floors of the apartment towers was to reserve the most desirable space to residents of the apartment tower as a whole, rather than to individual residences, the functions associated with this recreation facility did not justify it location. Squash and handball courts, weight and exercise rooms and a swimming pool do not require a space of prominence with commanding views. The pub, nursery school/continuing education classes and meeting rooms, while enhanced by a high-rise location could be adquately accomodated at a lower level at no sacrifice to frequency of use. It was suggested that

the upper three floors of the apartment tower might be better utilized as apartment suites. By locating the recreation facilities, the pub, nursery school/ continuing education classes and meeting rooms atop the commercial/office wing, activities might spill out onto exterior surfaces in times of good weather. It was suggested that the nursery school might benefit from being at a lower level to be able to draw some of its pupils from parents working in the commercial/office wing.

The revised recreation/education facility atop the roof of the commercial/office wing could conceivably be a combination of permanent and collapsible structures. The permanent structures would house those activities that need to be inside throughout the year, and the collapsible structure (perhaps a pneumatic structure) may house the swimming pool, deck tennis courts and shuffleboard,

which could be enclosed in winter and open to the sky during summer months. Additional functions, such as a wood and metal shop and an area for automobile repair and maintenance were also suggested as communal activities for the complex. These activities would probably be located in the parking garage.

> Entries to the apartment complex were designed with security in mind. The use of a two-way closed circuit television communication system, combined with a limited direct visual accessibility to areas of entry contribute to the security of the apartment tower.

Critics found that two entries created a security problem despite the use of a two-way closed circuit television communication system. Two entries made unwanted entry more likely due to the difficulty of monitoring two entries simultaneously. It was suggested that the two entries might serve a common

two level lobby, if the fourth floor lobby were instead on the second floor (requiring a adjustment in the trussed bridge). By creating a two level lobby, residents and visitors could enter the building via a common lobby from two entrances, alleviating some security/surveillance problems attributable to two distinct entries.

While the trussed bridge did create a movement path from the parking garage to the lobby that was visible from certain apartment units, it was felt that the bridge should be "broken" into two segments, both from reasons of structural economy (i.e., decreasing spans) and to create activity along the parth to the apartment building. The roof top of the movie theater was suggested as a logical location for the "break." The roof top of the movie theater could conceivably become a small park or lookout.

The two-way closed circuit television

communication system was acknowledged as a significant improvement over strictly audio communication systems, both in terms of security and communication beyond the range of human visual and oral accessibility. In particular, the closed circuit television system was believed to be effective at the entrance to the lobby, permitting residents to identify visitors prior to admitting them into the building.

> In massing the apartment complex, the emphasis was upon maintaining the harmony of the scale of existing buildings and being sensitive to the scale of the pedestrian. The commercial/ office wing functioned as a transition piece between vertical tower and horizontal ground, and also attempted to integrate the complex with existing buildings. The tower was placed at a distance from the sidewalk to permit pedestrians to enjoy the apartment tower in its entirety and to create "breathing space" in an otherwise congested urban fabric of expressways and buildings. The siting of the tower and low-rise wing allows the waters of the Fort Point Channel to contribute to the Atlantic Avenue

> pedestrian experience. In order to help accomplish these intentions, parking for the complex was located in an existing parking garage across Northern Avenue.

Critics found that the placement of the parking across the street from the complex was an inefficient use of the site. Why take up two sites when one will suffice? It was felt that parking should have been place on site with direct access to the apartment tower. The placement of the garage on the site, however, might create an unpleasant street edge. In addition, a parking structure would consume a significant portion of the site, which is believed to negate the design intentions of "breathing space" and a street edge sensitive to the pedestrian experience. Consequently, while economy and convenience would dictate the placement of the parking garage on site, its existence on the site would conceivably involve trading off some "aesthetic quality" and also planning activities of the complex about the parking

(rather than planning the garage around human activity).

The commercial/office wing was believed to successfully fulfill the function of providing a transition between vertical tower and ground, while acknowledging the scale of existing buildings and pedestrians. The wing, however, was cited as being disparate from the apartment tower, conceivably requiring elevational treatment such that the tower and wing might read as a complete whole rather than two distinct parts.

The elevation of the apartment tower was designed to convey the existence of distinct four story neighborhoods. Balconies were repeated in recognizable four story increments. The elevation is expected to change over time with resident additions to the building facade in terms of balcony enclosures, sunshading devices, scale bars and bay windows. The intention in encouraging resident participation in elevational composition is directed at allowing for personalization and individuality.

It was the consensus of critics that the apartment tower successfully conveyed the four story neighborhood rhythm in its elevation through balcony placement. However, the balconies, in addition, conveyed the qualities of a "floor-wise" generated building. The repetition of balcony patterns was cited by some as overly regular; by others as providing sufficient variety to the building elevation.

Critics cited the building as being insensitive to orientation in elevation. They found that there was limited reference to sun orientation, as might have been accomplished via sunshading devices (Peabody Terrace, Chapter 4). The building had been designed, however, with orientation in mind, by placing the communal areas on the south facing side of the building at the major inside corner of the tower form; in concept "hugging" the path of the sun. It was believed, nevertheless, that sunshading would

have been a more direct and sensitive approach to signifying building orientation.

With regard to personalization through additions, critics questioned whether residents would actually engage in addition to the building. Hawthorne Place in Boston (Chapter 4) bears witness to the fact that residents may engage in additions if given the opportunity. However, the effort given to ensure that residents would have a wide range of options in terms of personalization were felt to be overly generous and optimistic. Critics felt that personalization might be more effectively handled through a limited range of possible options. These options might assume the form of a catalogue of standardized alternatives. With a standardized set of possible options, the exterior edge of the building might be designed such that these additions might be made with a minimum of difficulty. An alternative to the

standardized catalogue of options was offered in terms of creating variety in building fenestration and color at the outset, which might serve as an impetus to further addtions and participation in elevational manipulation by residents.

> The commercial/office wing of the complex was intended to provide support facilities for the apartment complex. In addtion, the wing serves to integrate office and commercial activities with residential living.

Critics felt that the commercial/office wing played an important role in bringing life to the complex. Critics anticipated that some residents of the apartment tower would work in the commercial/office wing, alleviating the strict distinction between place of work and place of habitation. The existence of the apartment tower within the same complex was believed to keep the commercial/office wing alive and under surveillance during after

business hours and on weekends. The commercial/ office wing, however, was cited as having a major drawback being in a location of shadow throughout a majority of the day.

In summary, the design intention of providing facilities for the apartment complex as a whole was believed to be a viable approach to fostering inter-neighborhood communication. While the two recreation areas were directed at fulfilling this goal, it was suggested that the facilities might function more effectively if combined into one facility at the roof top level of the commercial/office wing. The two entrances of the apartment tower were cited as possible security leaks, despite the use of a closed circuit television monitoring system.

In massing, the complex had attempted to provide a solution sensitive to formal considerations of

the building meeting the ground and siting issues of "breathing space" and a pleasant street edge. While the complex was believed to fulfill these intentions, it was noted that the proposed siting was an inefficient use of space, particularly with regard to locating parking off site.

In elevation, the design intention of a continually changing elevation based upon personalization and individuality was believed to benefit either from a standardized catalogue of options or the introduction of a variety in elevation at the outset as an impetus for personalization through resident additions. The elevation was felt to be insensitive to sun orientation. Critics remarked that the elevation would benefit from the introduction of sunshading elements indicative of building orientation. The elevation, as presented was believed to successfully convey the existence of four story neighborhoods by means of balcony placement and repetition.

7

SUMMARY, SUGGESTIONS & CONCLUSION

SUMMARY

Tall buildings have been a part of human experience since the days of ancient civilization. While contemporary tall buildings trace their roots to tall buildings of old, the present emphasis in tall building design upon economy and efficiency have yeilded a building type pervaded with socio-psychological problems. In response to this conception of high-rise buildings, this dissertation has attempted to explore residential high-rise buildings, directed at proposing a design alternative to the conventional high-rise apartment building. The thesis has presented research of high-rise residential living, socio-psychological studies of the influence of the physical environment upon human behavior, case studies of five existing high-rise apartment buildings, and a high-rise design alternative, incorporating the concept of a "vertical neighborhood." These areas of investigation and exploration are summarized below:

Problems with high-rise living

The attempt to formulate a workable technical solution (i.e., structural,

mechanical system, vertical transportation, circulation) to high-rise residential buildings has resulted in a simultaneous simplification of use, user needs and occupancy. Residential buildings resulting from this logic are plagued with several complex socio-psychological problems -lack of identity, loneliness, lack of security, limited social interaction - which transcend economic and social boundaries of low-income and luxury housing. The repetitive floors and units of a conventional apartment building are not responsive to the variety of human needs and tastes, and do not easily allow for personalization beyond the confines of a dwelling unit. In addition, high-rise buildings also pose problems of blocking sunlight and views of existing buildings.

Positive attributes of high-rise living

High-rise living provides residents with a unique living experience. The views, acoustical proviacy from street noises, fresh air and sunlight were identified as positive attributes of living high. These potential benefits, however, preclude a site removed from other tall buildings. High-rise apartment buildings are a more efficient use of energy than single family dwellings. In addition, high-rise buildings permit small sites to support a significant population, due to the capability of

vertical stacking. The significant number of people housed in a high-rise building may justify the existence of support facilities and could conceivably enable the high-rise to contribute to as well as partake of urban life and activities.

Definition of a Tall Building/High-Rise

No clear-cut defintion of "tall building" was presented, yet tall buildings were described as those buildings emphasizing the vertical and are dependent upon hung elevators for vertical transportation. High-rise need not be associated with a specific density or economic group and need not be confined to a single function (i.e., strictly residential, strictly office)

Territory and Defensible Space

The innate human propensity of territoriality was found to be severly limited in in high-rise residential buildings due to the fixed size of floors and units. Territory in high-rise apartment buildings was predetermined by architectural design and was difficult to extend beyond the confines of an apartment unit.

Defensible Space a concept referring to communal territoriality and shared responsiblity for use areas was felt to be a means of encouraging human interaction aimed at alleviating the socio-psychological problems of loneliness and lack of

identity and security attributable to conventional high-rise living. The characteristics of a defensible space are 1) finite size, 2) serving a collective group of identifiable individuals and 3) in propinquity to areas of frequent use.

Hierarchy of Space

Hierarchy of space refers to space ordering on the basis of varying degrees of privacy. It was proposed that organizing spaces in a hierarchical fashion by means of physical clues, makes the transition between public and private space a natural act with zones of territorial control or spheres of influence apparent. High-rise residential buildings were felt to require a more sensitive approach to transcending from public to private spaces than presently exists in slab and tower buildings.

Socio-psychological Studies

A series of studies of the influence of the physical environment upon social behavior patterns was presented. These studies demonstrated that friendships bore a definite relationship to distance and orientation of living units, the location of areas of common use and the number of individuals sharing communal facilites. Information from these studies was used in the development of the design alternative.

Case Studies

Five case studies of existing high-rise buildings were presented - Harbor Towers, Hawthorne Place, The Marseilles Block, Peabody Terrace, and the Price Tower. Each project was described in terms of physical characteristics and graphically compared by means of a matrix display. These case studies furnished the thesis with a variety of residential building organizations and design attitudes, which served as prototypes for the design alternative.

Spatial Cores

The discussion of service core configurations upon building design identified that functional and code requirements restrict the organization of high-rise residential buildings. The flexibility of the space defining "spatial cores" was believed to have merit in facilitating a reworking of buiding organization to meet design intentions of increased social behavior and communal identity.

The Design Alternative

A design alternative intended to serve as a prototype of high-rise residential living was developed and presented based upon information gathered from the preceeding

studies. The design alternative was evaluated by means of critiques of professors, professionals and student peers.

The design alternative was directed at creating a physical environment that would foster human interaction, shared responsibility and communal identity. It was hypothesized that through the incorporation of a "vertical neighborhood" these intentions and those relating to alleviating the socio-psychological problems of conventional high-rise residential buildings may be fulfilled.

The neighborhood consists of fourteen units organized in four story tiers. Most dwelling units are duplexes with bedrooms either above or below entry levels. Units are organized about a three story high communal space. Kitchen areas of dwelling units look out onto the communal space and provide surveillance and create the opportunity and social contact. The entry levels to units are located on the second and third floors, with primary elevator access at the third floor level. The second level is connected to the third level by means of a large spiral staircase located in the middle of the communal space. Laundering equipment and a play area/function area are located on the second level. Mailboxes are located on the third level. Privacies are elevated two feet above the communal/circulation levels and are entered from shared entry stoops. In the design of the neighborhood emphasis was given to creating an identifiable hierarchy of space, as well as providing the opportunity for

individuals to extend their territorial claim beyond the confines of the apartment unit.

The apartment complex consists of a twenty-eight story apartment tower and a four story commercial/office wing. Recreation/education facilities were provided to encourage inter-neighborhood communication. These facilities were located in the top three floors of the apartment tower and the roof top of the commercial/office wing. The elevation of the apartment tower was expected to change over time with the opportunity for residents to enclose balconies and add to their apartment unit exterior.

The evaluation by critiques found the concepts and intentions behind the design alternative to be a considerable improvement over conventional residential buildings. The neighborhood was judged by critics to be an acceptable vehicle to fulfilling design intentions of increased social behavior and communal identity. The neighborhood's efficiency (ratio of rentable square footage to gross floor area) and siting issues were felt to warrant further investigation.

SUGGESTIONS

The design alternative represents one prototypical solution to the complex problems associated with high-rise living. Undoubtedly other solutions exist which could conceivably better deal with the problems addressed in the dissertation. It is hoped that additional exploration of improving high-rise living may be undertaken in the future to continue the research begun in this study. Further exploration should entail not only exploration in terms of architectural design, but also in depth research of existing high-rise residences and high rise living, documenting problems, their causes, and successful solutions to these problems.

As the data for the design alternative was based upon a limited number of case studies and socio-psychological studies of non-high-rise living conditions, a logical next step may be in undertaking socio-psychological studies of these discussed high-rise buildings, and investigation of additional high-rise residential projects.

The assessment of the design alternative's success in dealing with the discussed problems of high-rise living was difficult on account of the novelty of the solution and the importance of three dimensional relationships. It is believed that

alternatives of this type may be best analyzed through the construction of a full scale mock-up of the "vertical neighborhood. A full scale mock-up would enable more thorough investigation and study by actually being able to experience the space, its dimensions and spatial qualities. Another means of studying these proposed alternatives may be through computer graphics. Computers may be programmed to quickly assembled perspective views of the spaces from a variety of locations within the neighborhood, giving one immediate access to three dimensional information.

The analysis of any design alternative is incomplete without an economic feasibility study. The economy study may help to bring the design exploration more in touch with reality. Feasibility studies may identify economic parameters which may help to achieve more efficient design. The design alternative presented in this dissertation would have benefitted from an economic comparison with a conventional high-rise apartment building in terms of construction costs and anticipated rental fees (or cost in the case of condominiums). If such an economic comparison had been performed, the viability of the "vertical neighborhood" could be assessed and reworked in light of the economic information.

The design exploration did not address the technical aspects of the proposed "vertical neighborhood" (i.e., structural and mechanical systems). Further research

would benefit from such input not only in terms of transforming design intentions into a technically viable solution, but also in terms of allowing technical constraints help guide decision making, conceivably leading to more rational solutions.

CONCLUSION

The fate of the architect is the strangest of all. How often he expends his whole soul, his whole heart and passion, to produce buildings into which he himself may never enter.
Goethe

The design alternative was intended to serve as a prototype to broaden one's conception of high-rise living. Its significance, therefore, is similar to the case studies of Chapter Four; that of an alternative means of high-rise housing. The emphasis of the thesis was upon the development of what the author believes to be a workable "vertical neighborhood." The "vertical neighborhood" is by no means the only solution to community high-rise housing. As suggested in the previous section, other alternatives do exist and are worth exploring. The development of the apartment complex on a specific site was to facilitate decision making from a total building perspective. Admittedly, the design did not sufficiently address the contextural issues (role and need for a residential high-rise in the particular location, traffic patterns, Master Plan for the Boston Waterfront ...) of the building design; rather, it made several assumptions without adequate research to enable the total building design to proceed.

The issues regarding the total building solution were not handled with the same degree of care as the design of the neighborhood. Nevertheless, by attempting to

formulate a total building solution, several issues were raised which contributed to a more complete understanding of the residential high-rise design problem. Effectively, those issues relating to the "top and bottom" of the building and technical aspects were not sufficiently addressed in the dissertation. Had more time and information been at the author's disposal these areas might have been explored more thoroughly. As architectural design may be regarded as an ever continuing process, one which remains incomplete even following the erection and habitation of a building, this dissertation is also incomplete and represents one individual's research and design in process.

> *She rose above the broad panes of shop windows. The channels of streets grew deeper, sinking. She rose above the marquees of movie theaters, black mats held by spirals of color. Office windows streamed past her, long belts of glass running down. The squat hulks of warehouses vanished, sinking with the treasures they guarded. Hotel towers slanted, like the spokes of an opening fan, and folded over. The fuming matchsticks were factory stacks and the moving gray squares were cars. The sun made lighthouses of peaked summits, they reeled, flashing long white rays over the city. The city spread out, marching in angular rows to the rivers. It stood held between two thick black arms of water. It leaped across and rolled away to a haze of plains and sky.*
>
> *Flat roofs descended like pedals pressing the buildings down, out of the way of her flight. She went past the cubes of glass that held dining rooms, bedrooms and nurseries. She saw roof gardens float down like handkerchiefs spread on the wind. Skyscrapers raced her and were left behind. ...*
>
> The Fountainhead

APPENDIX

The Appendix presents various aspects and considerations which could conceivably enter into a high-rise building design in the format of graphic options. The Appendix involves itself with material that goes beyond the thesis intention of exploring a means to promote a sense of community, or neighborhood in a high-rise residential building. The material is introduced at this point to acknowledge that building design is not confined to fulfilling a limited range of requirements, but instead is involved with a spectrum of design considerations and alternatives.

In addition, as the design exploration of Chapter Six is concerned with the formulation of one

building solution, the Appendix presents alternatives in terms of building organization, structure and other additional concerns, which could conceivably have yeilded other solutions. Due to the time and capabilities of one individual, a good deal of the actual exploration involved in evolving a design solution is not always apparent in the design product; hence, material of the Appendix attempts to present some of the considerations that went into the design exploration of Chapter Six.

The appendix is not to be regarded as complete or on the verge of completion. The material represents a small segment of the continuum of information that may be assembled and used in building design. It is anticipated that additional information will be added to the Appendix in the future to supplement existing data.

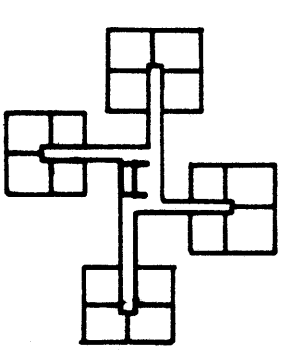
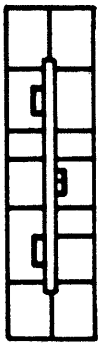
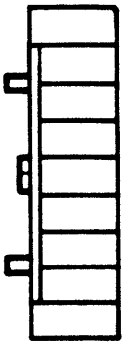
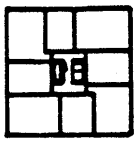
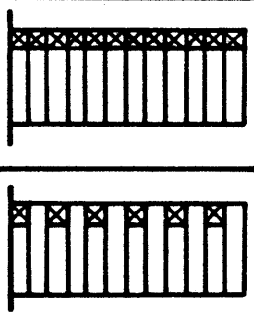
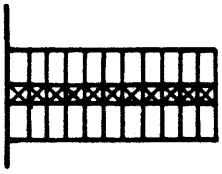
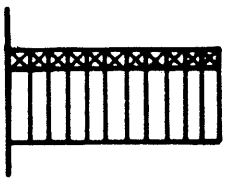
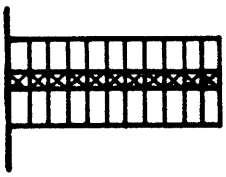
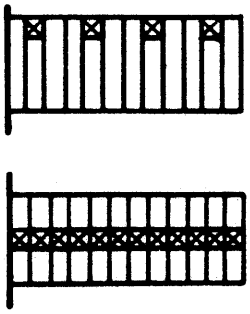
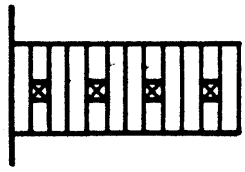
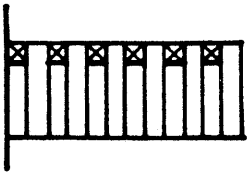
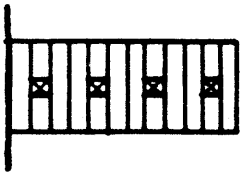
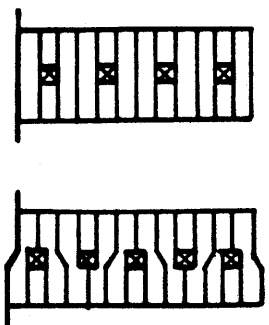
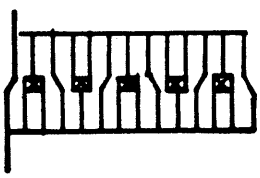
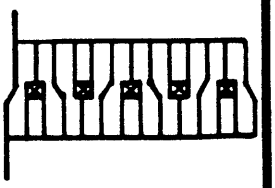
VERTICAL ORGANIZATION

[5]

	EVERY FLOOR	EVERY SECOND FLOOR	EVERY THIRD FLOOR
SINGLE LOADED CORRIDOR			
DOUBLE LOADED CORRIDOR			
DOUBLE LOADED SPLIT-LEVEL			

[10]

ORGANIZATIONS

MULTI-TOWER	INTERIOR CORRIDOR	EXTERIOR CORRIDOR	TOWER	
				PLAN
				SECTION
				
				

[5]

UNITS

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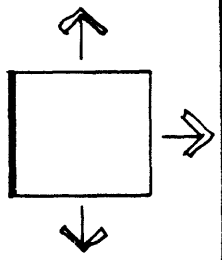
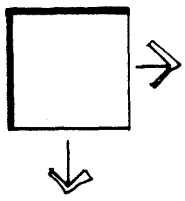
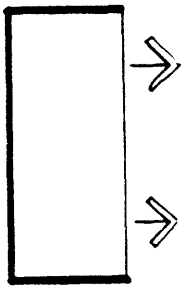
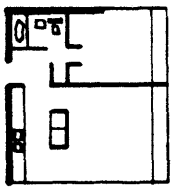
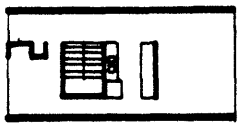
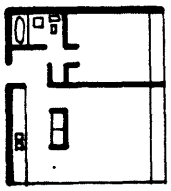
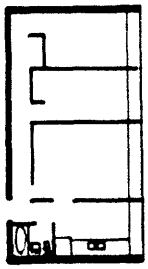
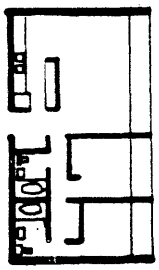
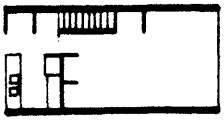
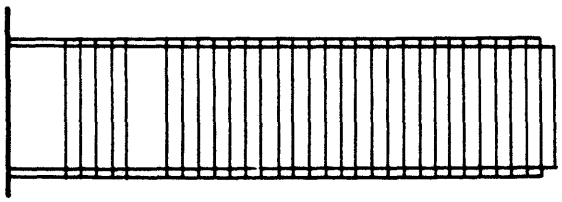
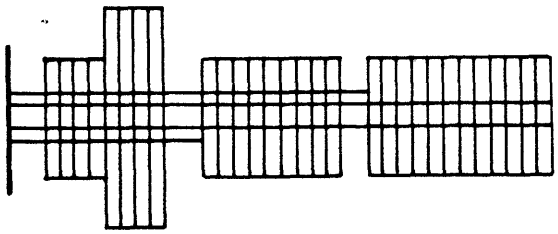
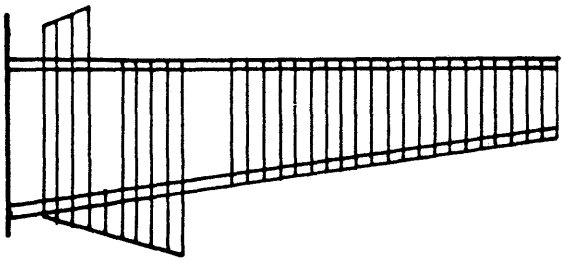
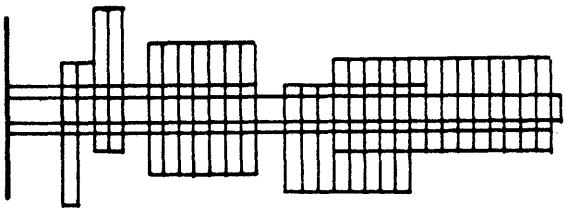
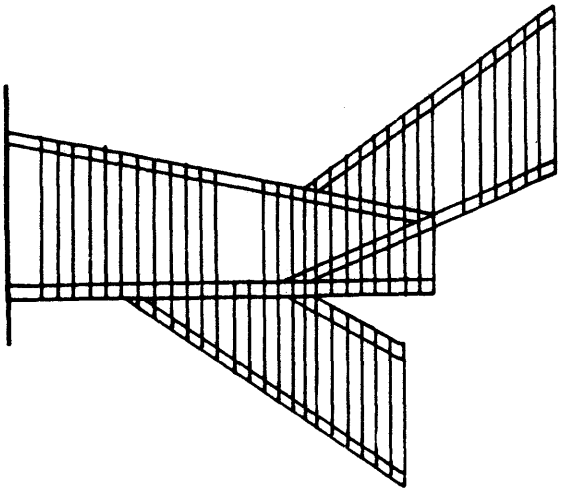
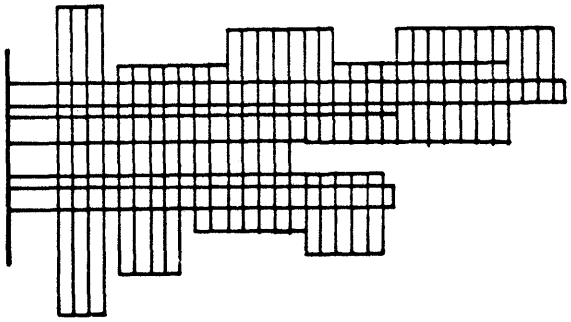
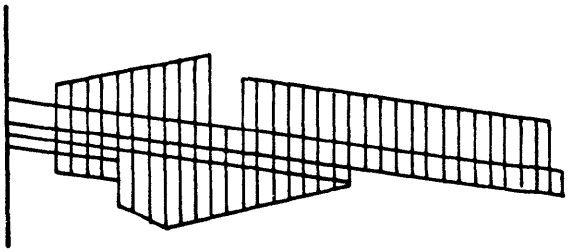
				TYPE
				VARIATIONS
				
				

GRAVITY LOAD CARRYING SYSTEMS [11]

	PLANS	AS A BAY SYSTEM	AS A CANTILEVER SYSTEM	AS A FREE-SPAN SYSTEM
CRUCIFORM				
FREE-FORM				
SLAB				
HEXAGON				

[11]

BUILDING CONFIGURATIONS

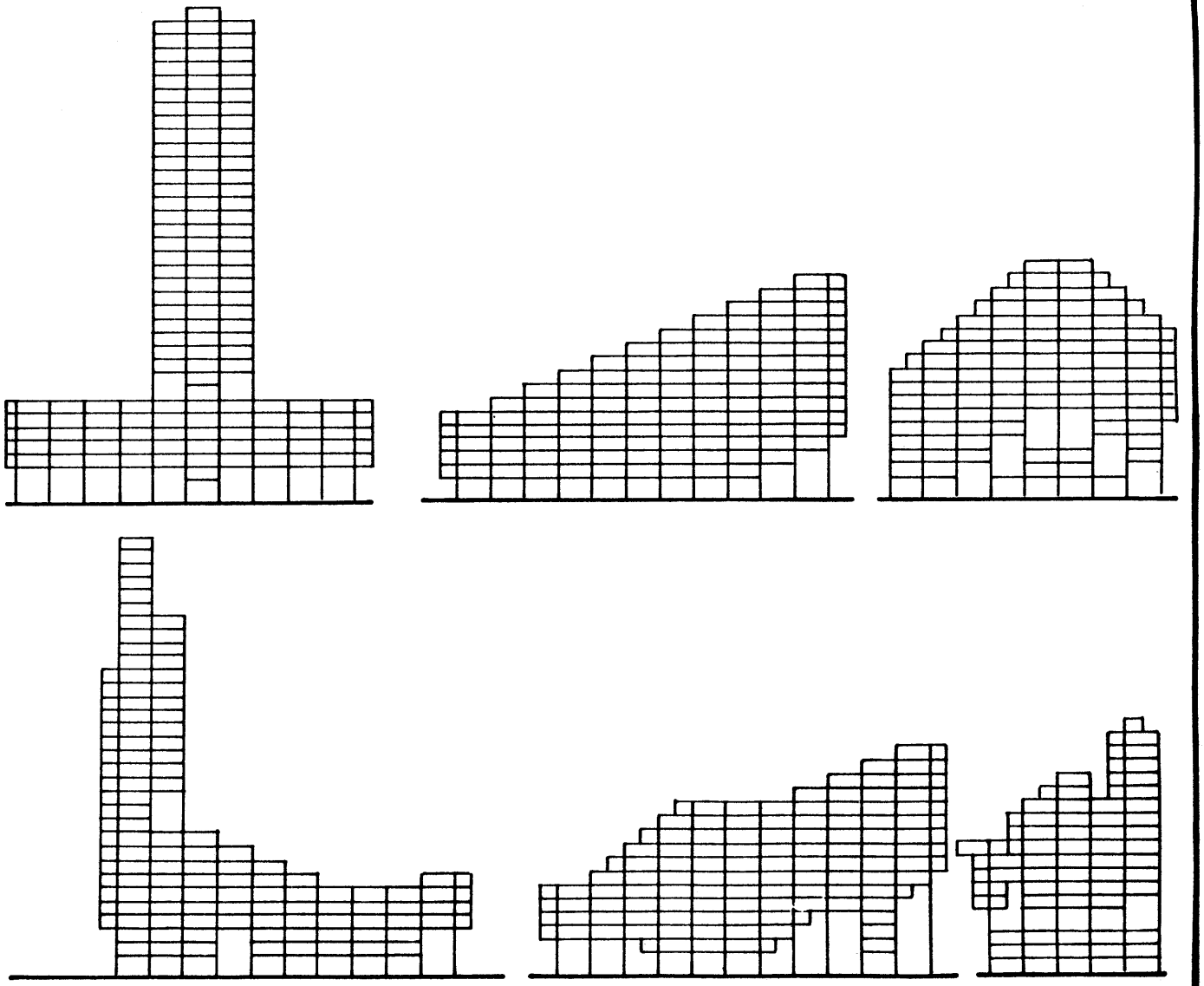
FREE-SPAN SYSTEM	CANTILEVER SYSTEM	
		
		
		
		

VARIATIONS

BUILDING CONFIGURATIONS

BAY SYSTEM

VARIATIONS



[11]

SUN CONTROL

[12]

	TYPE	VARIATIONS
HORIZONTAL		
VERTICAL		
EGGCRATE		

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