

GIVING EXPRESSION
TO THE POTENTIAL HARMONY OF MAN-NATURE:
a Habitable Space Designed with Nature
in the City of Boston, Massachusetts

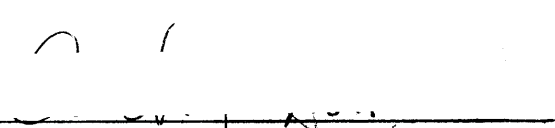
by
Anthony Si-Lai Ho
A.B. in Arch, University of California, Berkeley
Berkeley, California
May, 1986

SUBMITTED TO THE DEPARTMENT OF ARCHITECTURE
IN PARTIAL FULFILLMENT OF THE REQUIREMENTS OF THE DEGREE
MASTER OF ARCHITECTURE
AT THE
MASSACHUSETTS INSTITUTE OF TECHNOLOGY
FEBRUARY 1989

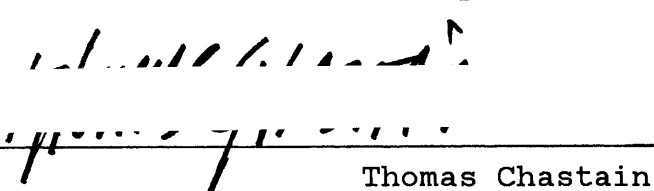
© Anthony Si-Lai Ho, 1989. All rights reserved.

The author hereby grants to M.I.T. permission
to reproduce and to distribute copies
of this thesis document in whole or in part.


Signature of Author


Anthony Si-Lai Ho
Department of Architecture
February 17, 1989

Certified by


Thomas Chastain
Lecturer
Thesis Supervisor

Accepted by


Imre Halasz
Chairman, Departmental Committee on Graduate Students

MASSACHUSETTS INSTITUTE
OF TECHNOLOGY

MAR 07 1989

LIBRARIES
Rotar

GIVING EXPRESSION
TO THE POTENTIAL HARMONY OF MAN-NATURE:
A Habitable Space Designed with Nature
in the City of Boston, Massachusetts

by
Anthony Si-Lai Ho

Submitted to the Department of Architecture
on February 17, 1989 in partial fulfillment
of the requirements for the Degree of
Master of Architecture

ABSTRACT

Human beings are part of the ecosystem. They are interrelated with nature. But in the past few generations, the environment has lost its intrinsic fitness for ecosystems, organisms, and land uses; partially due to the fact that contemporary built forms have often denied the place of nature in their designs. Presently, the human population at large is alienated from nature, their well-beings are degraded, and they are living less meaningfully than before.

This thesis is to propose a new set of design principles in which built forms will once again recognize the place of nature. It is hoped that through the built environment, the harmony of man-nature will be augmented. This document is not to merely reinforce what many other contemporaries have already brought out. It will also take a concrete example to demonstrate how the knowledge may be applied to an actual environment -- because what this generation needs is not a better view on ecology, but a better working method.

There are five parts to this document: an introduction; a discussion of my personal view on the relationship between man, nature, and the built environment; a set of design principles to augment the harmony of man-nature through the built environment; a design project applying those principles to an actual site; and finally, a conclusion retrospectively to the thesis process as well as envisioning the future.

Thesis Supervisor: Thomas Chastain
Title: Lecturer

TABLE OF CONTENTS

1. Introduction	4
2. Discussion: the relationship between man, nature and the built environment	8
3. Design Principles: to augment the harmony of man-nature through the built environment	17
4. Design Project: applying the principles to an actual site	29
5. Conclusion	69

1. Introduction

Why is the harmony between man and nature so important to us? Maybe we should first ask ourselves: why do we like to sit in the sun? Why do we enjoy going to beaches? Why do we love to see plants? Why are we fascinated by the beauty of mountains and caverns? And why do children like to play outside?

The answer is clear. We all love nature, instinctively. And that is why the harmony between man and nature is such an important issue.

What is nature then? Nature may be defined as the consequence of the natural processes of air, water, earth, life and energy. Nature is the context of the environment. It is the co-tenant of the human habitat, the essential partner in survival.

In a sense, everything around us is natural. Yes, we all live in nature and associate with it. This is certain. But the questions at hand are rather: "how" do we associate with nature? And how strong is this association?

Evidence shows that in the past few generations, we have been more and more alienated from nature. For instance, in daily life, we hardly take a look at the sky and notice its importance for the general atmosphere. How about sunlight, fresh air, and free space? We seldom take the opportunity (or do we have it at all?) to enjoy them nowadays, and most of us have ended up sustaining health by indoor exercises. And the gardens around us? They too often deliver a simplistic notion of nature: they concretize nature as an organic totality without addressing

its underlying processes. As a result, our association with nature becomes superficial. Furthermore, our disregard for natural processes have lead to many environmental problems. Floods, landslides, and air pollution -- they all pose serious threats to our health and safety. Finally, looking at today's towns in general, we find that most contemporary built forms tend to be independent, discrete objects in the landscape, interrupting the landscape's continuity. They not only damage the imageability of towns, but deprive us of the satisfaction of one of our most fundamental needs: a meaningful environment.

Just as a large portion of the human habitat suffers from a schism between man and nature, there are exceptions. In "wild" landscapes like Norway, dwellings are set up among rocks, conifers and streams, engaging with the sky above, anchoring solidly to the earth below. Built forms thus become an interaction between man and nature, helping man see nature as a friendly complement to his own being. In the Far East where geomancy often determines the location and orientation of built forms in relation to earth, wind and water, man pays homage to the forces of nature. In Japan, built forms are often integrated with gardens that recreate scenes from the natural environment. Dwellers within such microcosms thus regard themselves not only as an integral part of the garden, but also as an integral part of the greater natural world.

The above models reveal to me that it is actually

possible to associate man with nature through the built environment. I will further investigate into this possibility in the following chapters, in order to find out a set of design principles that will guide the built environment of the human habitat in general to associate man with nature. This thesis will try to understand the relationship between man, nature and the built environment in concrete, existential terms. It will not treat economical and social problems, because socio-economical conditions do not really determine the existential meanings of life. They only offer a "space" for life to take place.

2. *Discussion*

Nature is a complex phenomenon. To let one understand thoroughly its relationship with man, and with the built environment, a few terms must be introduced. They are, accordingly: the concrete properties, the basic elements, and landscapes.

The concrete properties of nature may be seen as the "essence" of nature. They are present at all times, everywhere, within and beyond the human habitat. Furthermore, they do not transform. They are "things" like space, time, universal gravitational force and action-and-reaction. Among them, space is the one that can be associated with man through the built environment. Here, the term "space" does not denote precise, mathematical dimensions. Rather, it denotes an existential dimension, a dimension which comprises the basic relationships between man and his environment. It is immeasurable, such as that between the earth and the sky. Although the sky is always "there", one should not take it for granted. He has to understand its relation to the earth, and exploit such a relation. The sky has cosmic implications, while the earth is concrete and accessible. Moreover, whereas the sky is a variant natural phenomenon (with its ever-changing color, light condition and characteristic clouds), the earth is comparatively constant. The earth and the sky are different in many aspects, but this is what makes one's daily experience richer. Thus, one wants them both -- at the same time, in the same habitat. While normally, every component that makes up one's habitat does work together as a whole,

the earth and the sky are no exceptions. They should be in harmonious equilibrium. But how? The built environment, located right between the two, may help them accomplish this. Built spaces can possibly be the meeting place where the earth and the sky "unite". Dwelling in such a meeting place, one may then understand how these two elements interact. Understanding the "essence" of nature is to go beyond the immediate sensation of the "realities" that carry his existence. It is to make his existence more meaningful.

The five basic elements of nature are: air, water, earth, life and energy. Different from the concrete properties, the basic elements do go through transformations, which are referred to as natural processes.

Air is the most diffusive of all. It exists within and around one's body. It affects his health and comfort, and is necessary for survival. Furthermore, air adds to the richness of one's living experience. For instance, it can deliver smell and moisture to remind him of an approaching summer thunderstorm; or it can transmit the white noise of sea waves to reduce his stress and anxiety. Understanding air's basic properties can help one discover its true value in the human habitat. The same is for water. Water covers three-fourths of the Earth's surface. Although not every man has had the chance to live by water, each certainly has had the experience of living in it -- when he was still a fetus before birth. In a sense, all men have already

acquainted themselves with water way before birth. They are born with an instinct to love water. Water is so appealing to man not only because he can drink it, use it, or play with it. It is also because it can transform: if one does not like it in the form of rain, then maybe he likes it in the form of snow; and if not in the form of a cascade, then maybe in the form of a lake. The history of landscape painting indicated that water had often been associated with man through the built environment. Water was depicted as a romantic, life-spending element of primary characterizing importance, constituting "ideal" landscapes for man. The presence of water, whether in paintings or in real life, gives identity to landscapes. It adds a certain micro-scale to landscapes whose relief lack this dimension, or it adds to the mystery of landscapes which already possess the micro level. Water, thus, is a valuable asset to landscapes.

There is an element that interacts with water to form distinctive natural places such as points, islands, bays, and fiords. It is earth, or ground. Ground alone can also form distinctive places: by simply varying its surface relief (a natural process). One is thus offered a variety of dwelling conditions and experiences. For instance, down in a gorge, one feels like living in an "under-world". He seems to have gained access to the "inside" of the ground. Whereas up on the ridge of a mountain, the spatial complement to a gorge, he feels like "reaching" heaven. What his experiences tell him is that: his everyday life-

world indeed consists of not only the concrete phenomena, but also the more intangible ones such as feelings. Feelings are the actual "content" of his existence, whereas the concrete ground is only the "stage" where his daily activities take place. To dwell meaningfully, he needs a built environment that exploits its geological character, and gets his feelings "out". Only a coexistence of both feelings and activities will make a truly human life possible.

Man is familiar with the ground. It is the extended plane on which he stands. But in the existential sense, the ground can mean a lot more. The ground is a continuous natural phenomenon pervading the Earth: it covers the entire Earth's surface (of course, one has to count the ocean floors as well). So, to recognize oneself as part of the ground is, in fact, to belong to Earth. To belong to Earth means to be an integral part of the cosmos, however tiny. And to be a part of the cosmos is to live in a permanent natural order. This is necessary, for any man to exist. Every man feels the need for something permanent in his environment, just as he feels the need for a permanent home, or a permanent identity for himself. Thus, permanence is a fundamental human urge. To satisfy such urge, one can be part of an order which is more lasting than he is, letting his individual existence transcend. But to begin this, he must first recognize himself as part of the ground. The built environment, thus, should not simply "sit" on the ground. It should integrate with the ground in

such a way that whenever one dwells in a house, he knows he is inhabiting the world.

The fourth basic element of nature is life. This category comprises all living creatures and plants. Plants in general have a very special relationship with man. In the economical sense, man loves plants because they produce fresh air and delightful scenes. They filter dusts and damp noise. They are amenities to man. In the existential sense, man is interested in their concrete manifestation of living reality: they tell him how nature "lives". Every year a tree re-enacts the very process of creation. It demonstrates the constancy in nature. Thirdly, in the spatial sense, trees "unite" man with the sky. Trees belong to the earth, yet they rise towards the sky. As they continue to grow, the "unity" gets stronger and stronger, and the sky looks more and more "tangible". Besides, trees constitute contours in the air, "contracting" and "expanding" space. The environment thus becomes "dynamic". From the economical, existential and spatial standpoints, one should believe that plants are no embellishments. They are, rather, essential forces that affect his daily life. The association between man and plants should not be limited to occur only in gardens and forests. It should occur in the everyday living environment as well. In doing so, the built environment however has to recognize the fact that life is an intrinsic variable -- it varies as a function of intrinsic resources and land uses such as climate, geology, physiology and physiography. In other

words, plants by no means should be treated as static fragments inside the built world. They are alive and they should pervade, naturally.

The last of the five basic elements is energy. Light energy is one of those that can be associated with man through the built environment. Light has always been experienced as an integral part of reality. Man is instinctively attracted by light: by its warmth and its manifestation of spirit. Light conditions affect, and in some cases determine, the patterns of human activities. They also alter the appearance of places over hours, days, and seasons. Light, thus, is immediately connected with the temporal rhythm of nature. These rhythms are indeed the rhythms of man's life, and of plants' lives. Some other living creatures, such as the camels in the desert, also participate in these infinite environmental rhythms. What they are all experiencing in common is time, a dimension of constancy and change (which is a concrete property of nature). Recognizing his position in time, one sees himself as part of history. This makes his existence more meaningful. Therefore, his living environment should be designed with time. To design with time, one has to design with light, and eventually with the sky, because the sky is the comprehensive "stage" for the continuously changing quality of light.

Landscape is a comprehensive natural phenomenon. It is a concrete manifestation of nature, a context man lives in. There is a distinctive quality about landscapes in

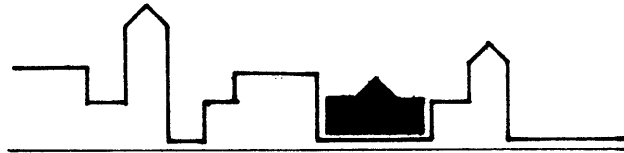
common: their extension. Extension may be more or less continuous, depending on the landscape's surface relief, its vegetation, as well as the "behavior" of the man-made elements. These conditions can also determine the particular character and spatial properties of a place within the landscape; which in turn, determine the degree of human identification and orientation therein. Identification and orientation are the primary aspects of one's existence, his being-in-a-place. Without them, he will be "nowhere". Whereas identification is the basis for one's sense of attachment to a place, orientation is a function that enables him to get adjusted to it. With enough of both, he can then become "friend" with a place. "Friendship" is part of the underlying meaning behind a landscape. One has to realize that the landscape where he lives is not a mere collection of things. It embodies meanings. Dwelling in the landscape, thus, is more than a matter of refuge. It is also a process of understanding a given environment as a system of meaningful places, from the macro down to the micro level, comprehensively. One can say "I dwell" when he can orient himself within and identify himself with an environment -- or in short, when he experiences the environment as meaningful. When the environment is meaningful, he feels "at home". And being "at home" is the value of his existence. But "home" in this case is not denoting only the enclosed, built spaces. "Home" is also the natural spaces that one has acquainted himself with, such as a particular ground he has always

walked on, or a particular sky he has always been embraced by. "Home", therefore, comprises both natural and built spaces. In a concrete sense, this means both the inside and the outside of a built environment are "homes". The two should somehow relate. And man, as dweller, should find himself right in the harmonious "middle", where he may reach "out" as well as "in".

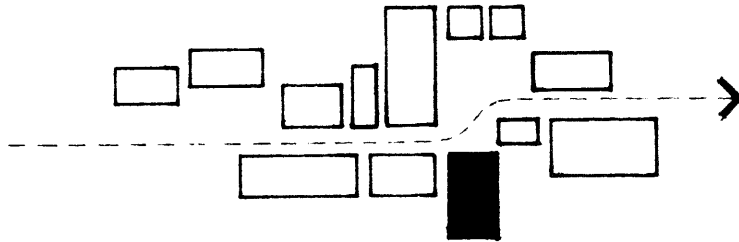
3. Design principles

1. CONTINUITY OF LANDSCAPE ■

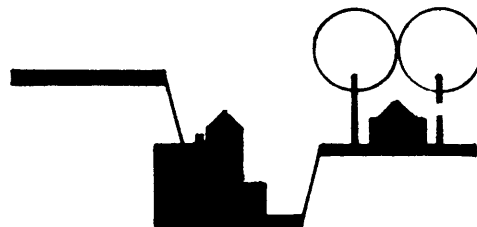
a. The built form may be a transformation of the land or the natural objects around. The built form will assert its presence while remain subservient to the landscape.



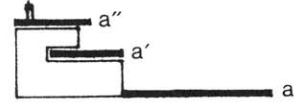
b. The built form may preserve the landscape's meaning as a comprehensive extension by trying not to interrupt the continuity of edges or urban "walls", damage the coherence of collective spaces, or destroy the identity of nodes, paths and districts.



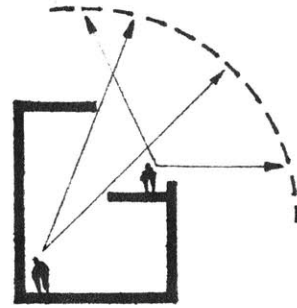
c. The built form may be settled within the natural "insides" constituted by the landscape. A natural "inside" may be as large as the chasm of a canyon, or as small as the space between rocks and trees.



d. The built form may integrate with the earth. Ground materials may be displaced vertically. New "grounds" will then be established, letting one understand that to move up a built space is to go out of the earth.

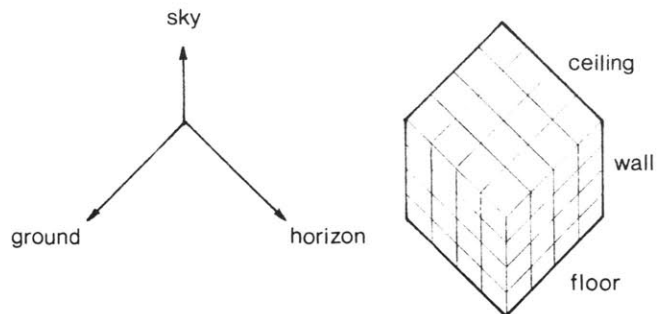


e. The built space may engage with the sky. The built form can break away from its confinement and let the sky become its "ceiling".

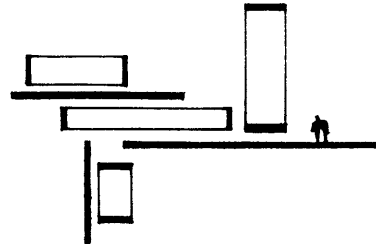


2. RECIPROCITY BETWEEN BUILT AND NATURAL ■

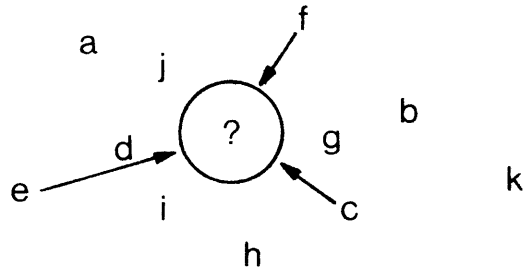
a. Built and natural spaces are structurally similar as far as directions and boundaries are concerned: floor-wall-ceiling is similar to ground-horizon-sky. In both, the distinction between up and down is valid; so are the concepts of extension and enclosure.



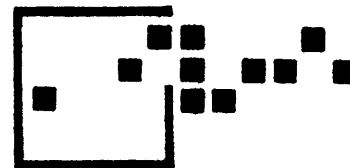
b. The built form and the landscape may be integrated in such a way that spatial overlaps and territorial exchanges will take place. The built form and the landscape will then help each other in defining edges, forming enclosures and performing certain functions.



c. The landscape's vocabulary may be translated into the built. The built form may be constructed with materials that are related to the landscape materials in terms of scale, shape, texture, color and usage.



d. The distinction between indoor and outdoor may be minimized. Materials from the landscape may be continued or displaced into the built space. The boundary between the two domains may need to be more subtle.

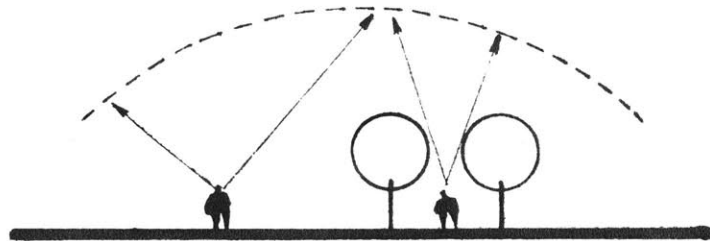


e. The concept of enclosure may be treated in a less strict form. An enclosure may indeed be defined by a continuous boundary that is inferred rather than positively present, such as a dense cluster of elements, or a mere change in the texture of the ground.

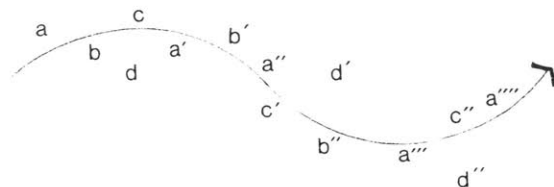
3. INTENSIFICATION OF LANDSCAPE ■

a. The built form's openness to the sky may be increased so that the sky's clouds, color and light can perform their characterizing functions: to constitute the atmosphere for the built space.

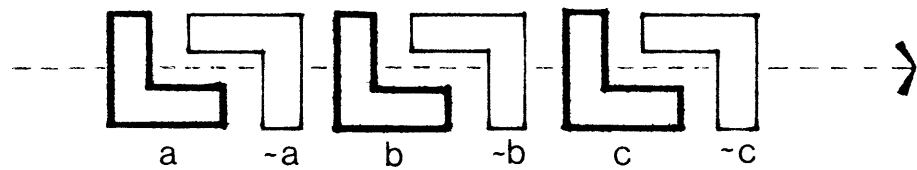
b. Tall trees may be grown to "expand" and "contract" space, as well as to bring the sky "closer" to earth.



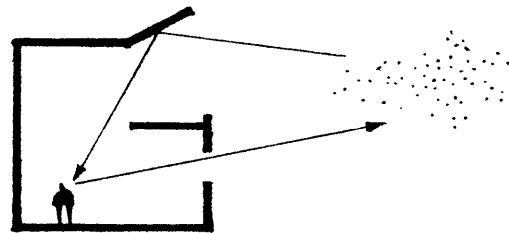
c. Certain phenomena within the landscape may be arranged to reoccur with similar behavior -- similar function, condition and appearance -- throughout one's path of movement, sight and/or hearing. This helps him understand how nature pervades.



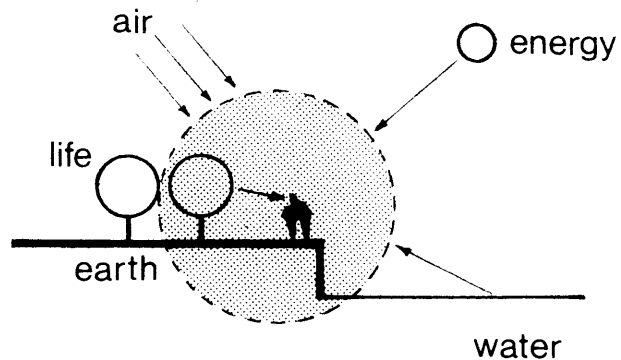
d. The many different phenomena occurring within the landscape may work together to form patterns of continuous contrast. This helps to maintain the high level of mystery and expectation all throughout, thereby keeping up one's spirit of exploration. Some basic contrasts are: public/private, exposed/enclosed, spacious/tight, unbuilt/built, light/dark and loud/quiet.



e. Appropriate choice of materials and spatial properties may help reinforce the visual and audio effects of the natural processes taking place within the landscape.

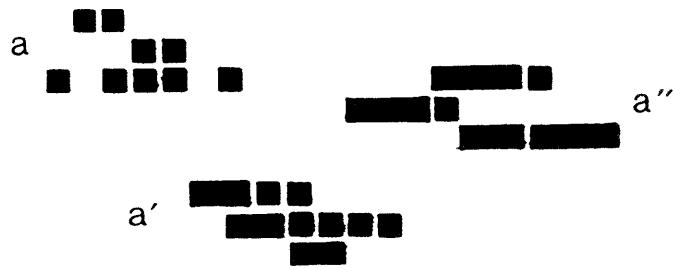


f. The characterizing functions of the basic elements may be exploited; especially in providing amenities and building up settings.

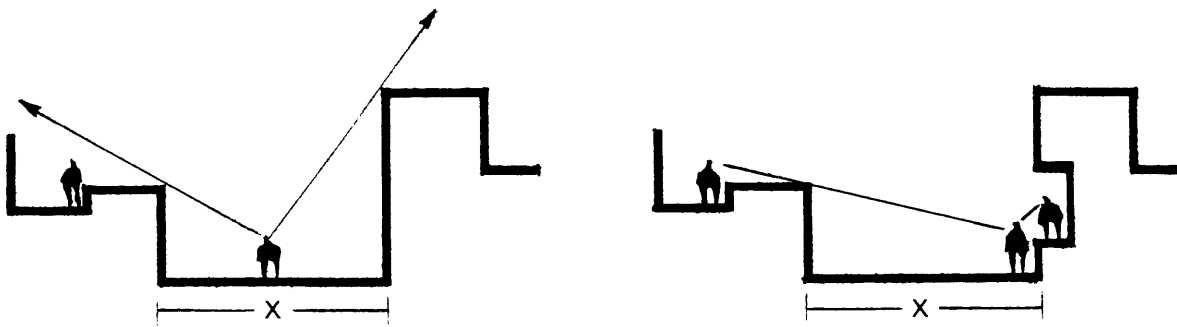


4. HUMAN IDENTIFICATION AND ORIENTATION WITHIN A PLACE ■

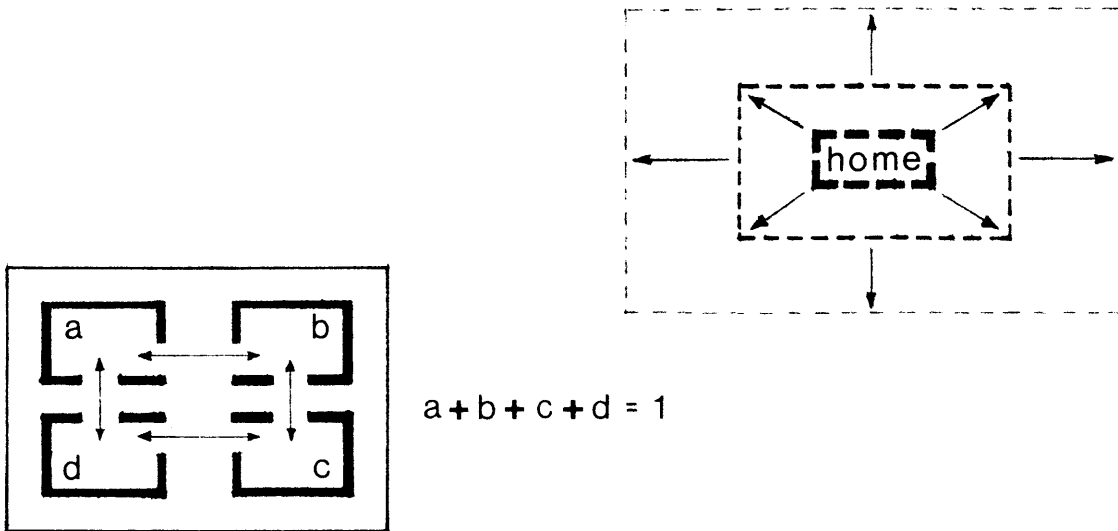
a. Human identification may be strengthened if built forms are arranged in clusters or communities that express a common form of life, or a common way of relating to the earth, or to the sky, or the like.



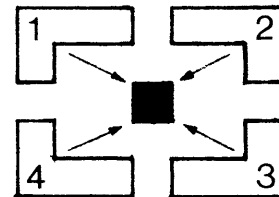
b. Orientation is a function that associates with man through feelings, not scientific data. Therefore, spatial relationships within a place may have to be based on human experience rather than pure mathematical calculations.



c. The fundamental values of "home" -- intimacy, comfort and protection -- may be present outside the private domain of a built form to increase one's sense of belonging. A greater, shared habitable environment will be defined.



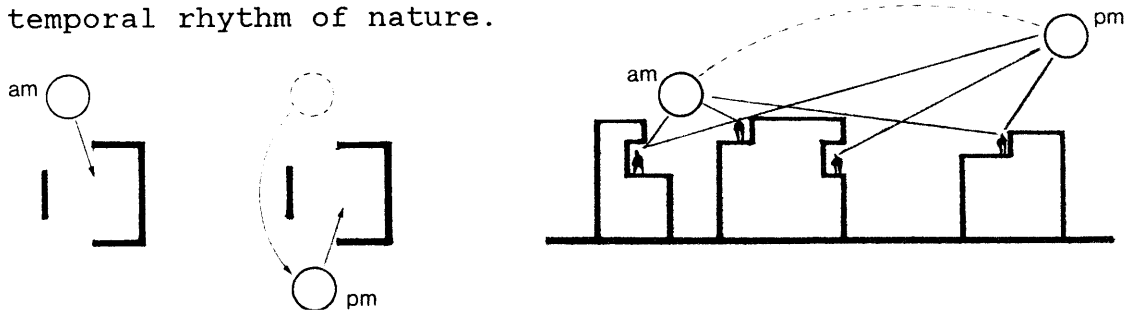
d. The design may provide the appropriate facilities that encourage human interactions, especially at collective sizes, to help one acquaint himself with other users of the place.



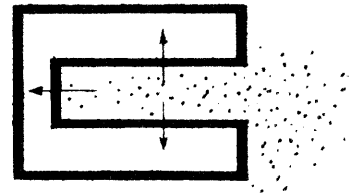
e. The place designed may have to respond to the predominant human behavior if it were to become "friend" with its users without requiring much work of human adaptation.

5. MAN'S ASSOCIATION WITH NATURE ■

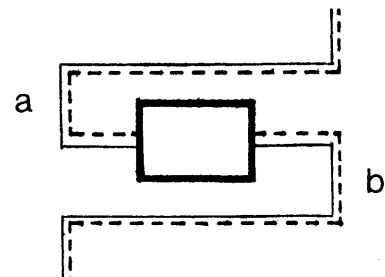
a. Human activities within the built space may be designed in relation to the course of the sun, the moon and the stars. This will help one understand the Earth's relation to the sun, his position in the cosmos, as well as the temporal rhythm of nature.



b. Certain natural processes may be designed to occur at places which one uses frequently, so that they become part of his routine experience. Nature will then "live" with him.



c. Built forms may increase territorial exchange with earth, water and plants, so that one will have more access to them. If possible, built forms may even be located right at the interface between two elements.

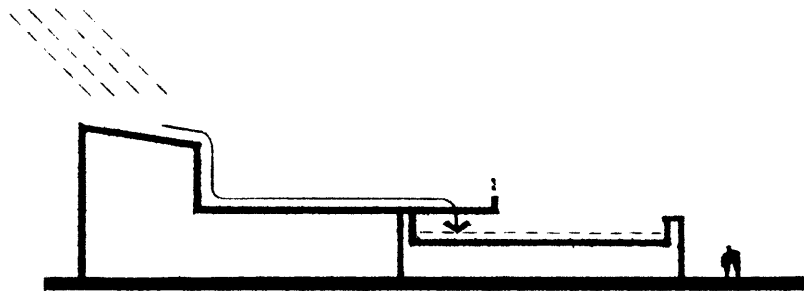


d. The design may provide places where man can have interactions with other forms of life. Those places should have the optimal environmental conditions that permit the organisms' procreational success.

6. IMPROVEMENT OF MAN'S WELL-BEINGS ■

a. Flood damage may be minimized:

-- accurately designed rooftops, plazas and ponds may store floodwater and stormwater runoff with minimal inconvenience to pedestrians, but with maximal visual elegance.

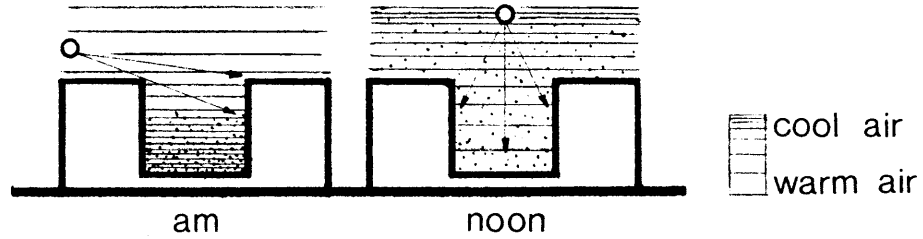


-- built forms may work with the frequency of river overflows and floodplain dynamics. Flood-control structure may be built. If possible, built forms should avoid occupying floodplains at all so that there will be more surface for containing floodwater.

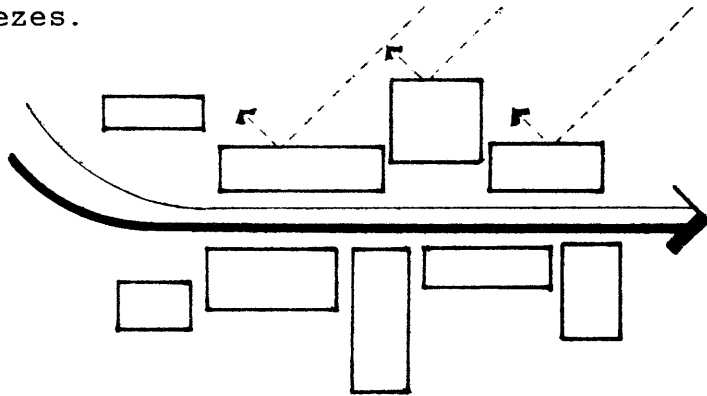


b. Air pollution may be minimized:

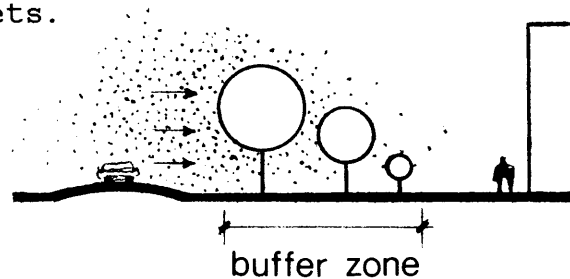
-- to correct locally inverted temperature stratification, the proportion of building height to street width may be adjusted to ensure that sunlight can reach the street by midmorning.



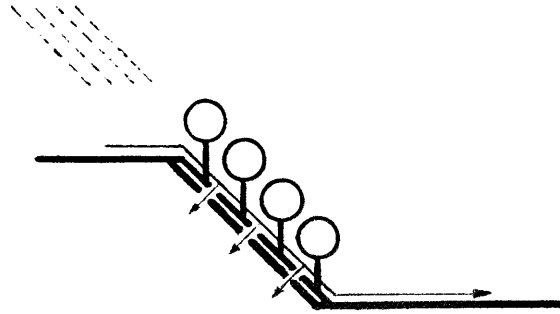
-- to increase ventilation for diluting or removing pollutants, built forms, open spaces and landscape materials may be oriented to block unwanted winds and to funnel desired breezes.



-- to reduce exposure to pollutants and to prevent the formation of stagnant air pockets, built forms may try to maintain a setback from streets.



c. Landslide damage may be minimized by growing plants to absorb stormwater runoff and to stabilize erodable soils.



4. Design project

A. INTENTION ■

The intention is to design built forms in a way to improve man's well-beings, increase his association with nature, and make his life more meaningful. To illustrate as many "principles" as possible comprehensively in a single project, the design will have to cover a wide range of scales of built forms. Therefore, it is decided that the design will include small private residential units, medium size office/commercial buildings, as well as a large public park.

B. PROGRAM ■

1. HOUSING: A. Private

- apartment units for permanent residency
- vacation rooms with direct access to boats

B. Communal

- small library with reading lounges
- exercise rooms, sauna, hot tub, steam room
- neighborhood conference rooms
- indoor/outdoor swimming pool
- elevated courtyard gardens
- trellised outdoor relaxation area
- greenhouses
- rooftop viewing/gathering decks
- indoor exhibition gallery
- housing administration office
- laundry room and storage

- 2.COMMERCIAL:
- A. offices
 - B. retail stores with mezzanines
 - C. food services
 - cafe with indoor/outdoor dining area
 - fast food stands with outdoor eating area
 - kitchen, servery, dishwashing, loading
 - D. sailing club (relocated)
 - gathering/displaying hall
 - small office
 - outdoor swimming pool
 - lawns

- 3.PUBLIC PARK:
- A. visitor's information stand
 - B. floating docks with moorings
 - C. amphitheater with movie screen
 - D. recreational amenities
 - ponds, streams, waterfalls
 - rocky sitting edges, on land and in water
 - waterfront courtyard with steps to water
 - arboretum
 - lawns, sloped at places
 - vegetated atrium
 - cave structures, for birds and for man
 - floating pavilion
 - E. sidewalk parking
 - F. public toilets

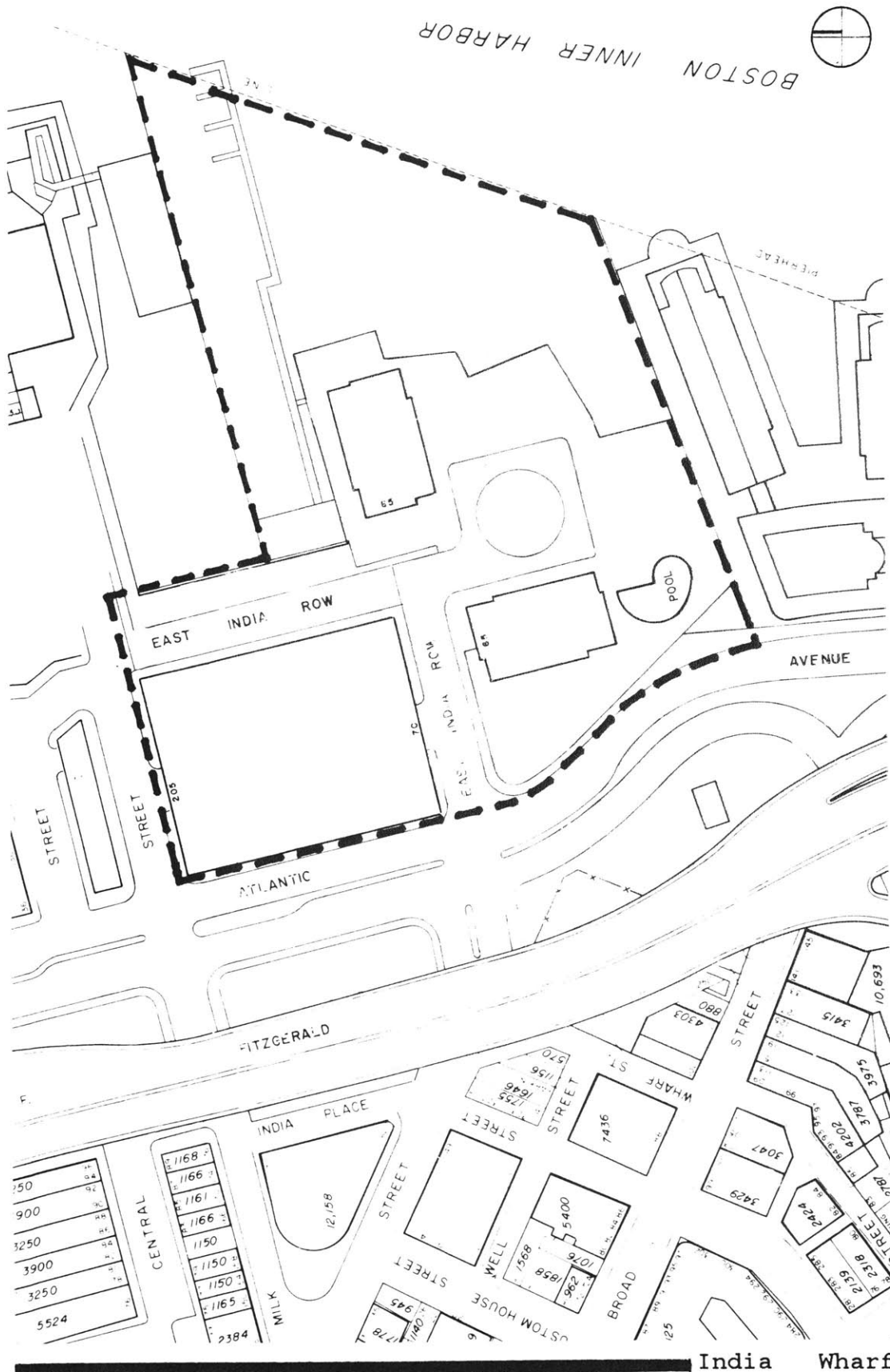
C. SITE ■

1. Selection

For the purpose of experimentation, the project should be located in a place where the harmony of man-nature is the least apparent. One such place is found to be the City of Boston, Massachusetts. Within this city, the site whose existing condition best serves as a counterpoint to the theme of this thesis -- and thus will be the most effective in demonstrating the differences before and after the project's impact -- is found to be India Wharf.

India Wharf has a total buildable area of approximately 6.25 acres, with an F.A.R. of 3.0. Presently, there are two forty-story apartment towers and a seven-story parking garage on it. To the north is the New England Aquarium and to the south is Rowes Wharf Hotel. West is Atlantic Avenue. Boston Inner Harbor is on the east.





India Wharf

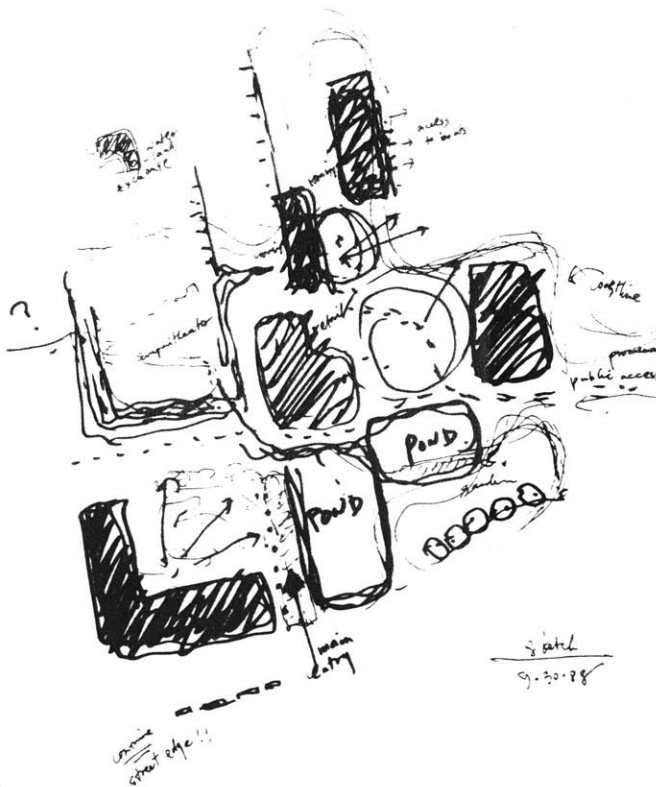
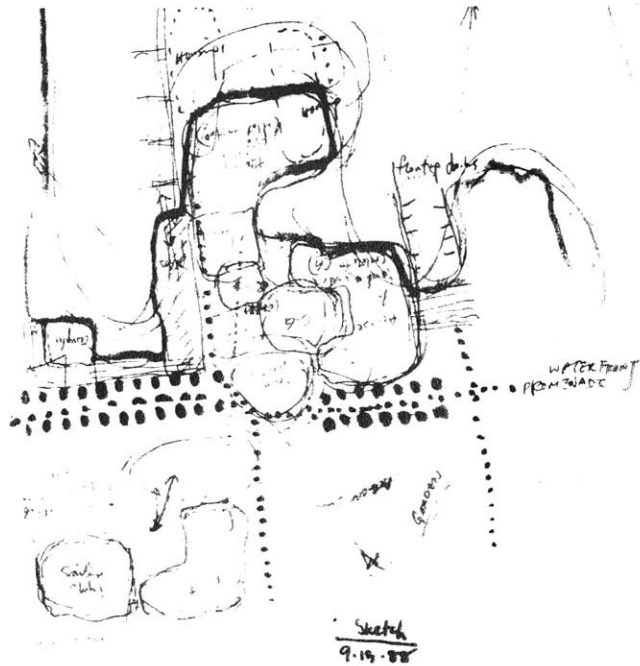
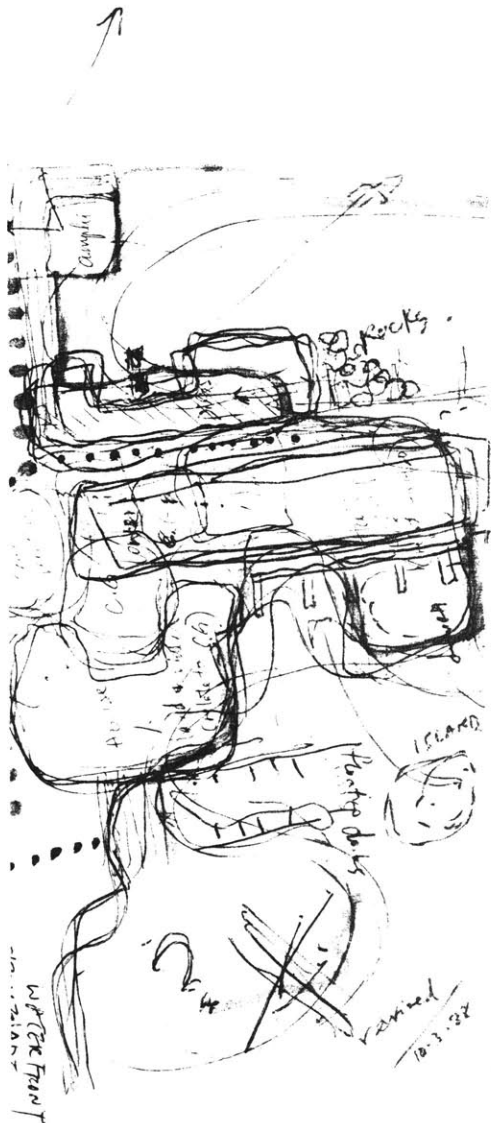


India Wharf

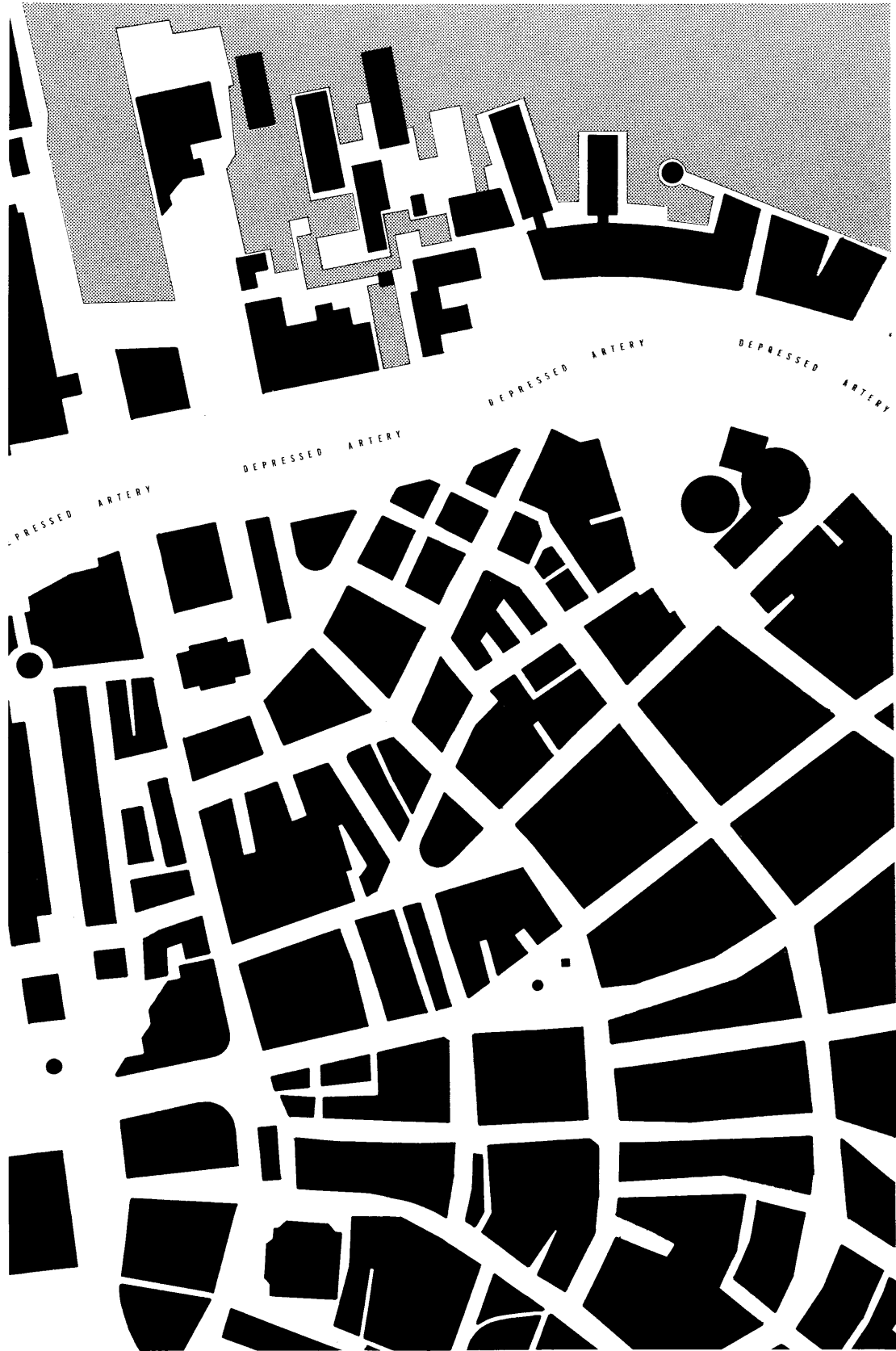
2. Current problems

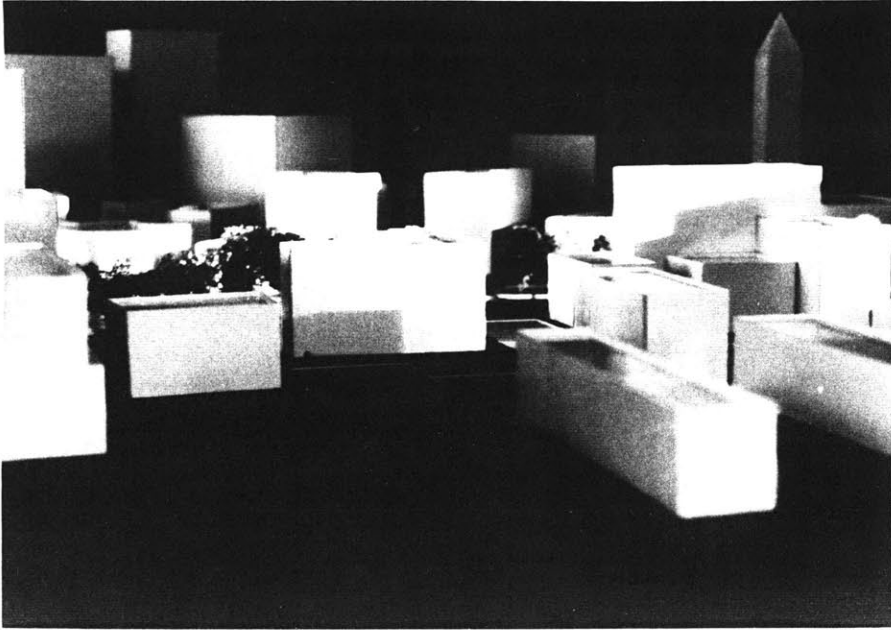
- the artery nearby causes serious air pollution
- the tall twin towers block much of the desired breezes from funneling into the city
- the towers decrease the visibility of water in the city as well as public access to it
- the site fails to connect pedestrians from Rowes Wharf to the Aquarium, a popular spot with thousands of visitors a day. Moreover, it fails to serve as an integral link in the waterfront promenade
- the site is yet to exploit its distinctive geological character, the proximity to water, for recreational and scenic purposes
- One of the towers casts huge afternoon shadows into the waterfront courtyard. Originally a valuable spot to the public, the courtyard is now left unused
- the design of the courtyard has not well responded to Boston's climate. It has not offered enough protection from sun, wind, rain or snow
- vehicular traffic inside the courtyard creates noise, destroying the romantic setting of the place

D. APPLICATION OF THE PRINCIPLES TO AN ACTUAL SITE

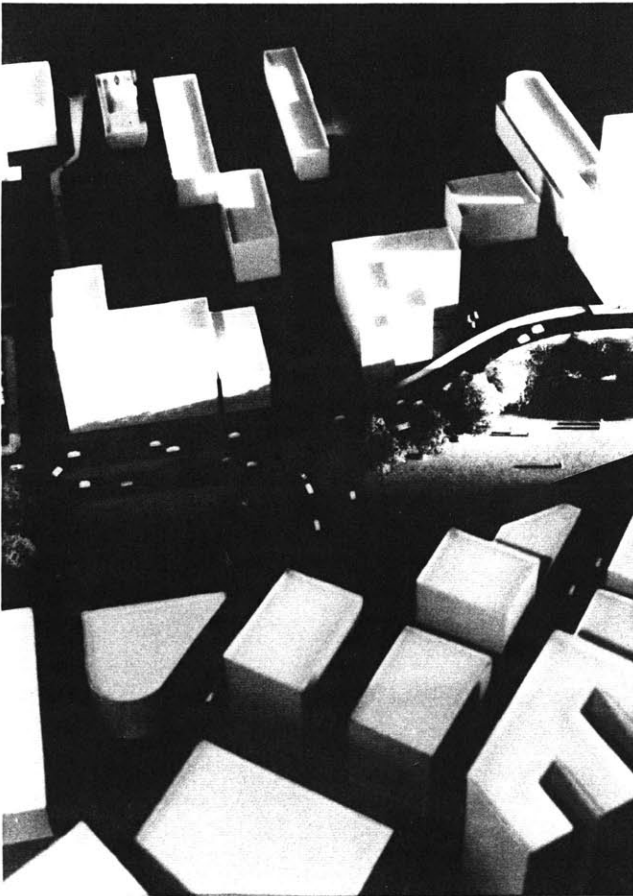


design process

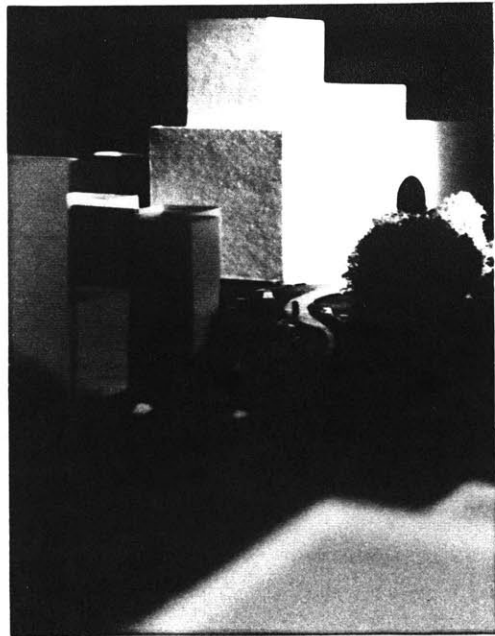




West

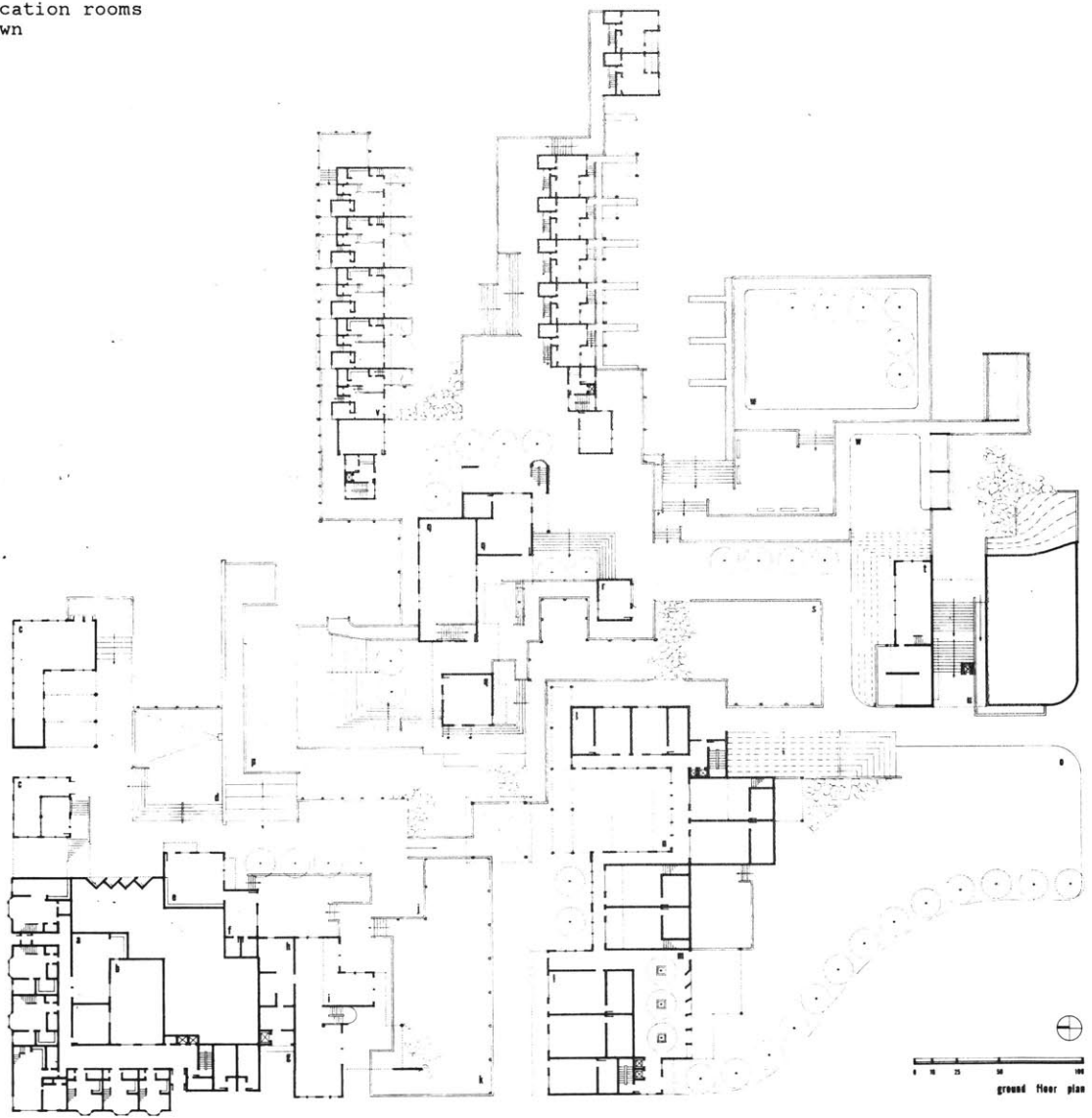


east



south

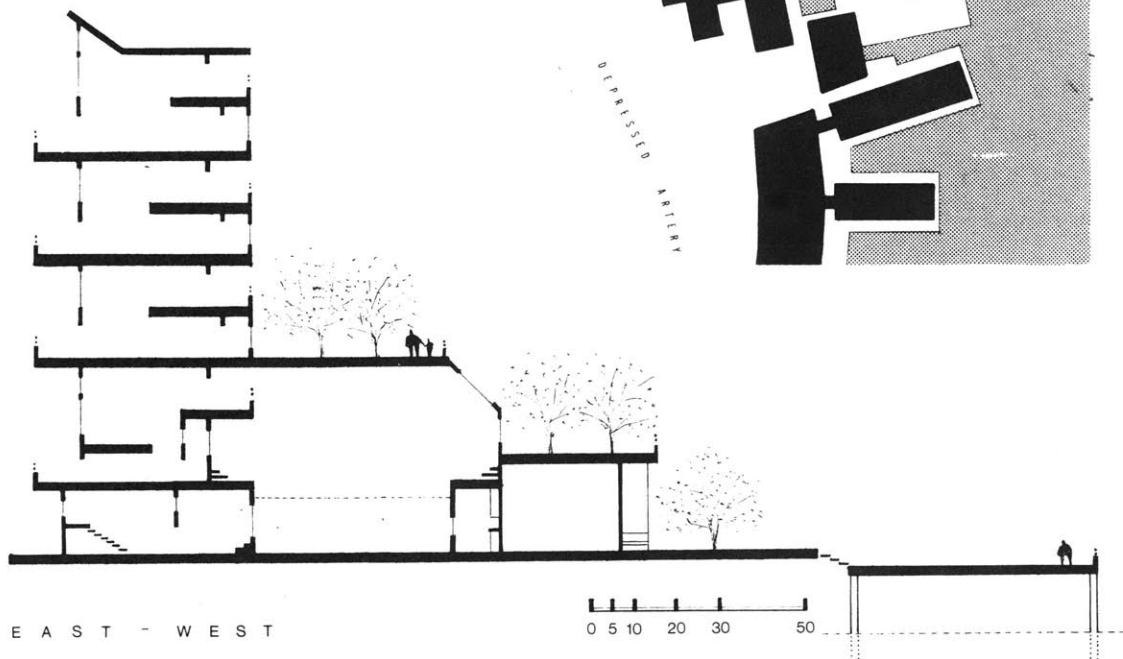
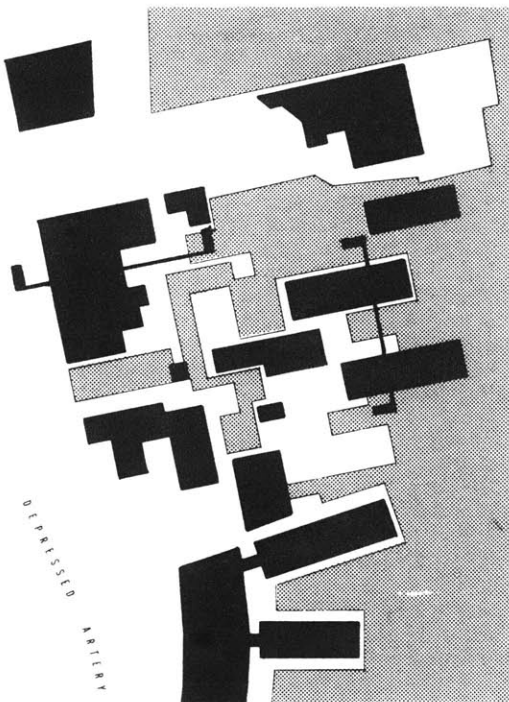
- a. neighborhood conference rooms
- b. swimming pool
- c. greenhouse
- d. amphitheater & movie screen
- e. small library
- f. exercise, sauna, steam rooms
- g. loading dock
- h. kitchen, storage, dishwashing
- i. fastfood stands & eating
- j. outdoor eating
- k. pond & waterfall
- l. retail & storage
- m. atrium
- n. trellised courtyard
- o. arboretum
- p. rushing stream
- q. retail
- r. visitors information
- s. pond
- t. sailing club display hall
- u. cave
- v. vacation rooms
- w. lawn





NORTH - SOUTH

0 5 10 20 30 50

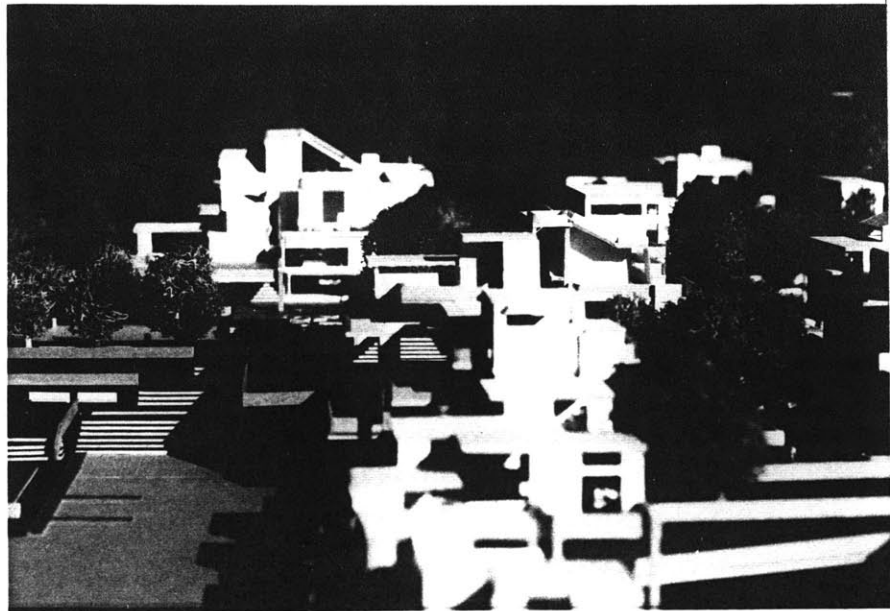
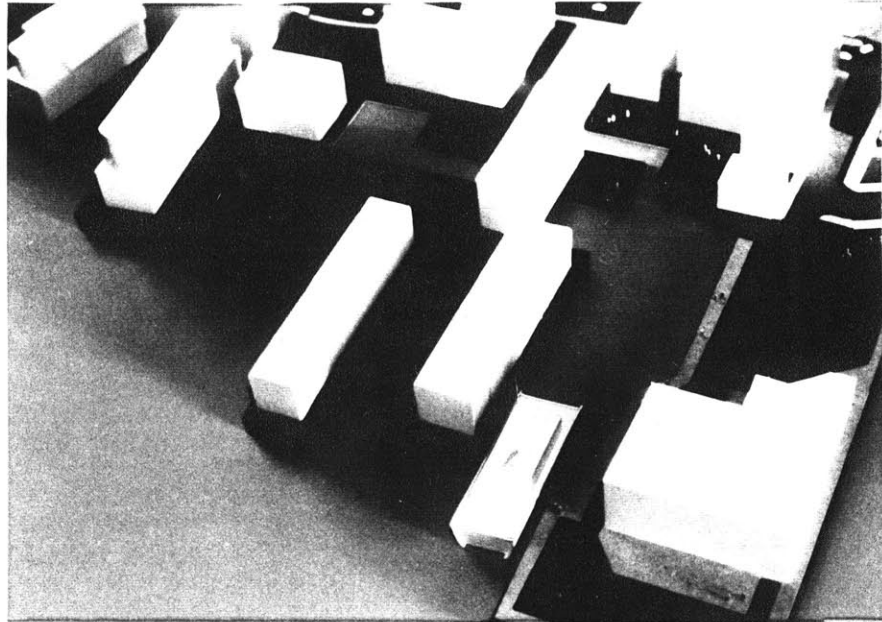


EAST - WEST

0 5 10 20 30 50

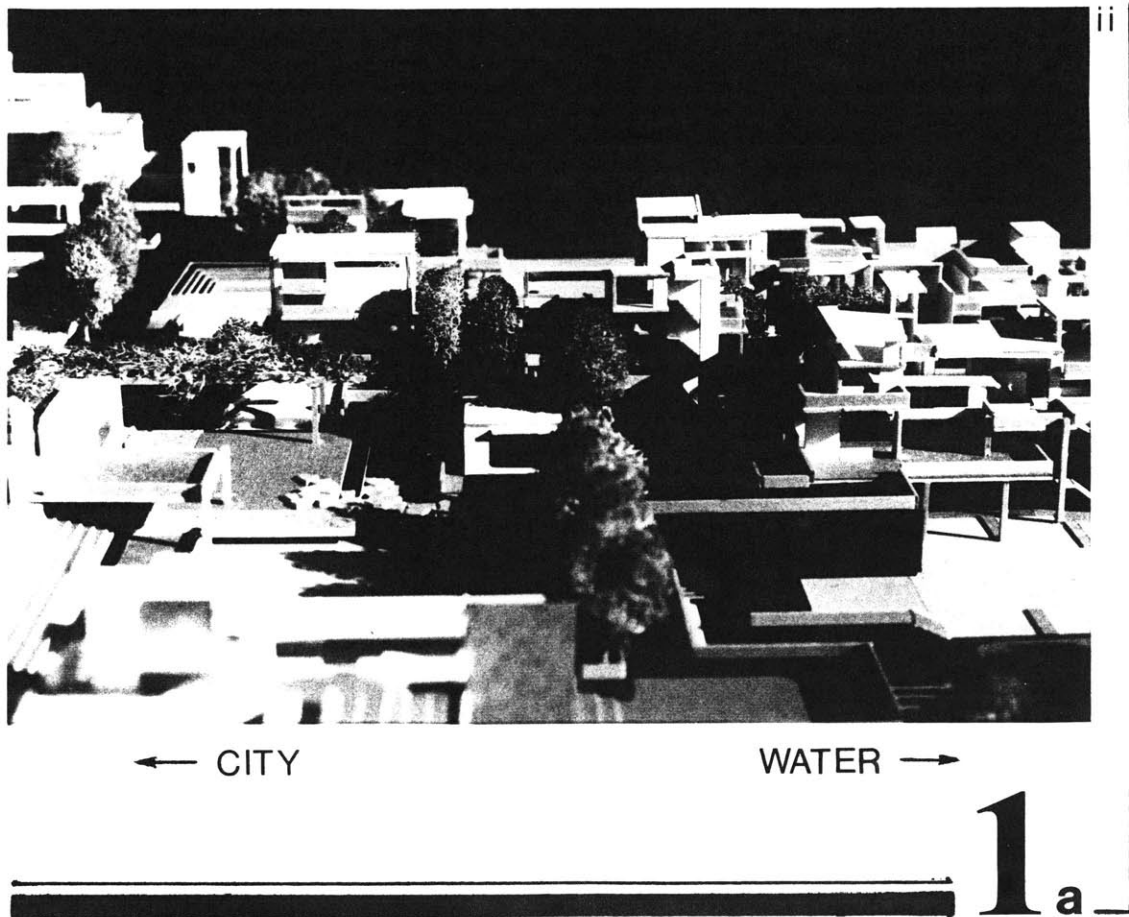
1. CONTINUITY OF LANDSCAPE ■

1.a i) To assert their presence, yet remain subservient to the landscape, the built forms at the waterfront continue the "finger" configuration of the Boston coastline. They also resemble the form of the nearby rocks.

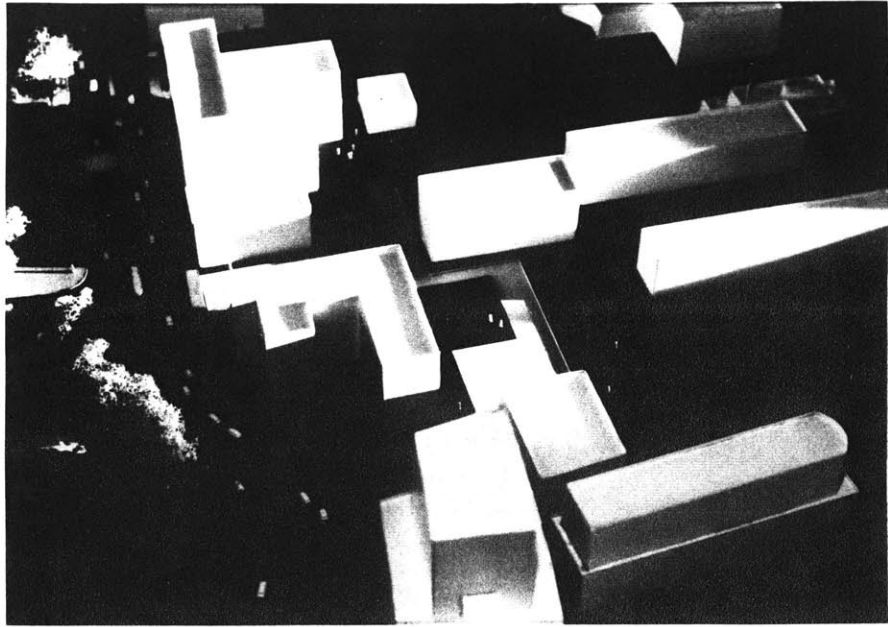


1 a

1.a ii) Profile of the site, read from the city to the water, shows that roof line falls gradually to meet the sea level. Mass disintegrates; density drops. Built forms have established a smooth transition from the built to the unbuilt.

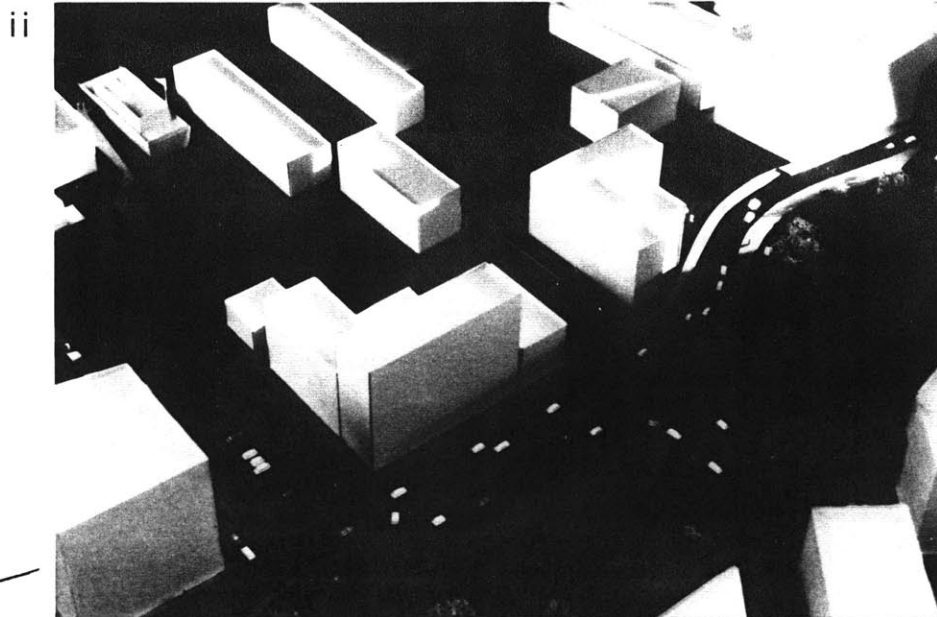


1.b To preserve the urban whole as a comprehensive extension, the site has: i)acted as an integral link in the waterfront promenade; ii)continued the urban "wall"; iii)increased the visibility of water in the city as well as public access to it.

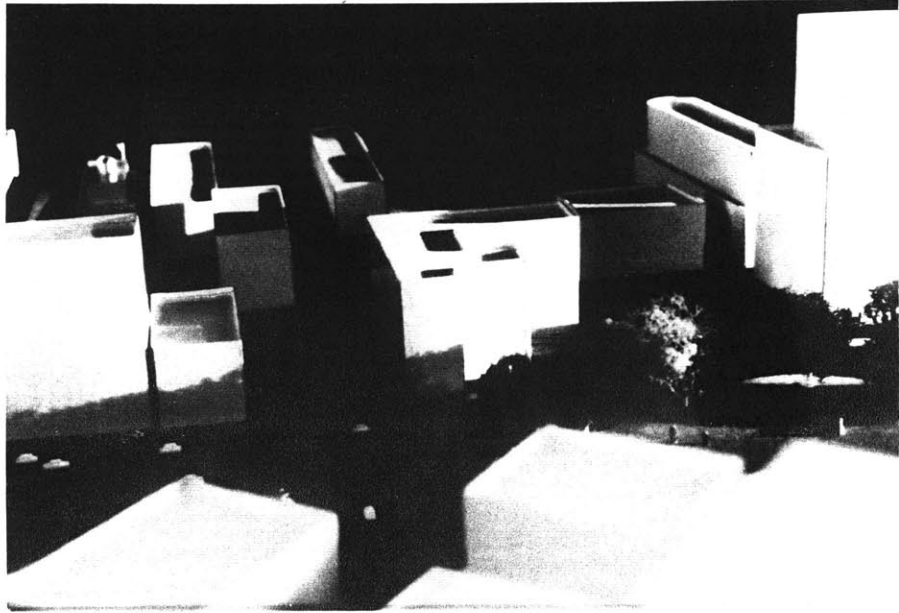


the promenade

urban "wall"

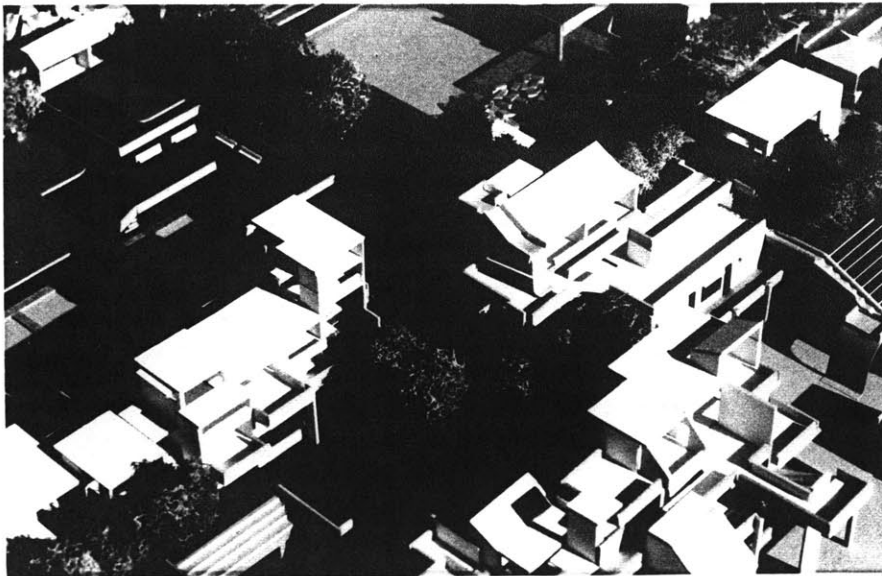


iii



1b

1.c Dense trees have constituted a natural "inside" where a built form can settle. The water paths nearby have also helped to define this "inside".

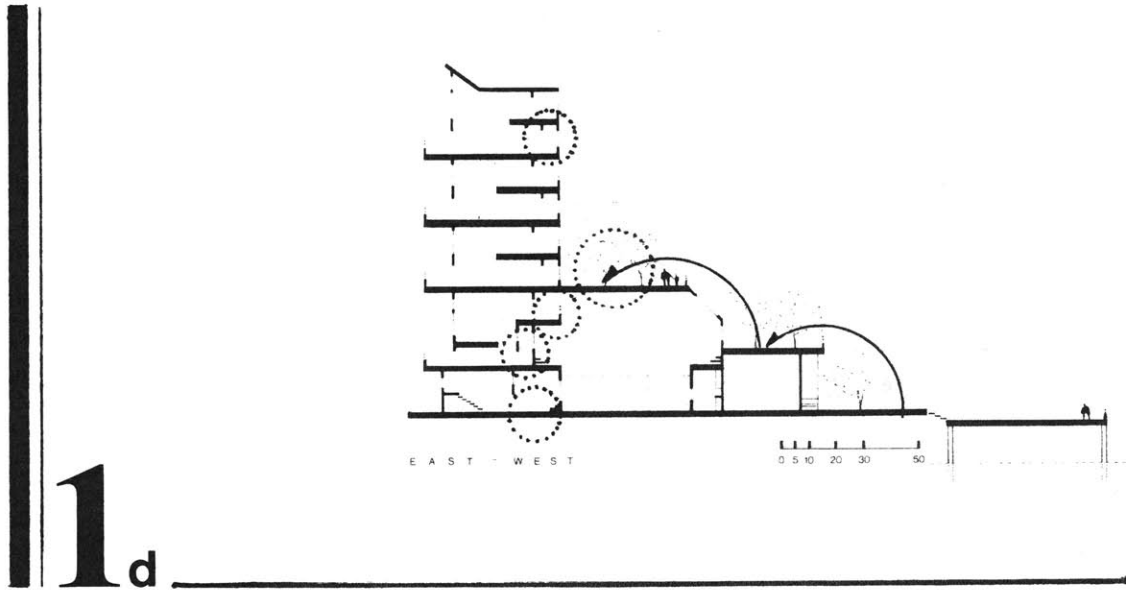


trees

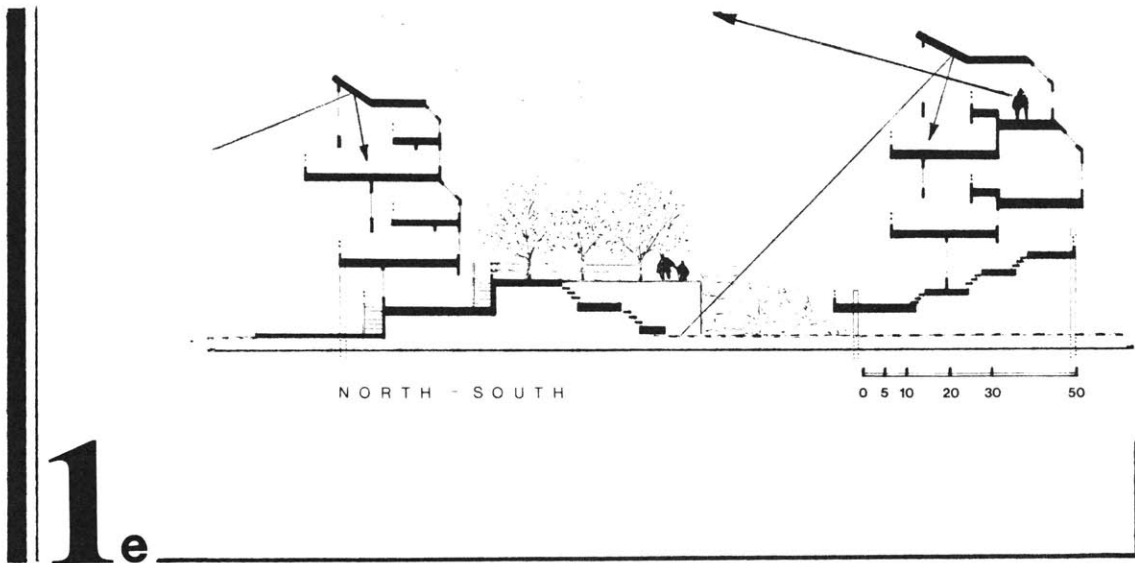
trees

1c

1.d Soil is displaced onto the upper levels of the built form. Besides, reference levels rise from under-water to top-of-water to open space. As a result, when one moves up the built space and discovers the new "grounds", he feels like going out of the earth.

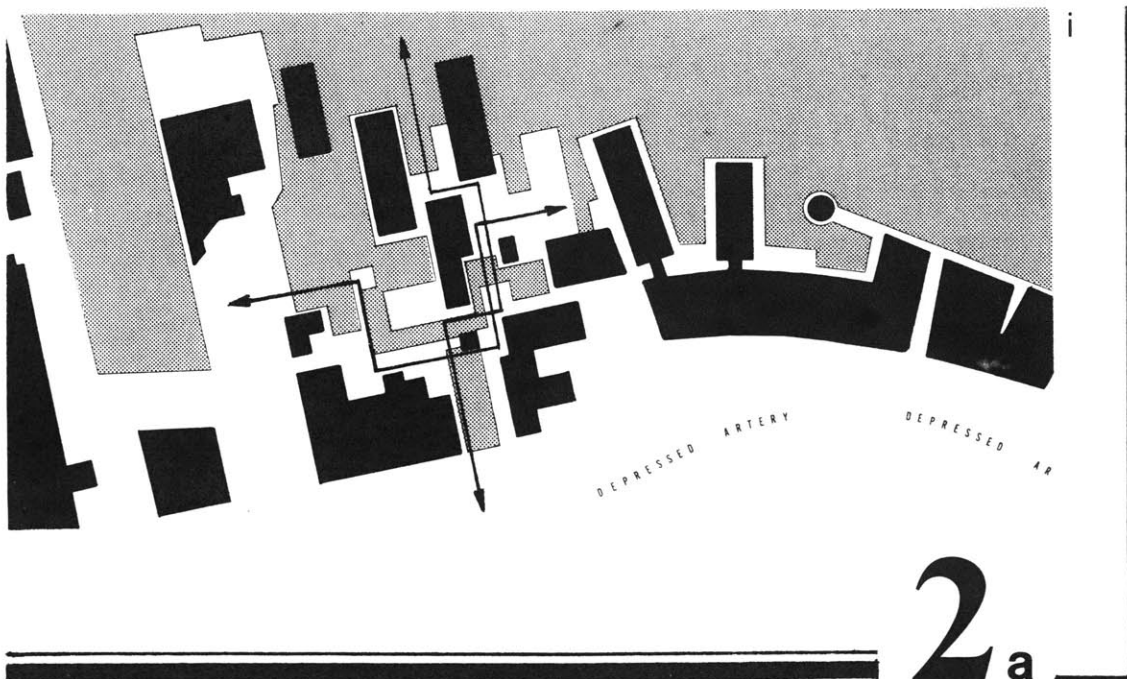


1.e To engage with the sky, the built space opens up and lets the sky become its "ceiling". When the weather is "fine", the "ceiling" is an all-embracing dome. The sky's light, color and clouds give the space a character. Besides, since glitters from the water surface are also reflected into the space, the dwelling becomes the meeting place where the sky and the water "come" together.

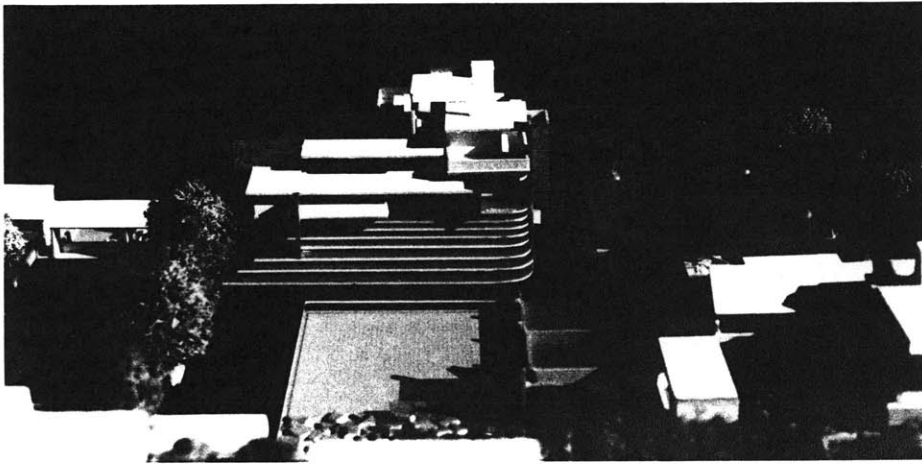


2. RECIPROCITY BETWEEN BUILT AND NATURAL ■

2.a i) The built forms and the open spaces have maintained a Yin-Yang exchange across the site, taking advantage of the fact that the concept of extension is valid for both built and natural space.



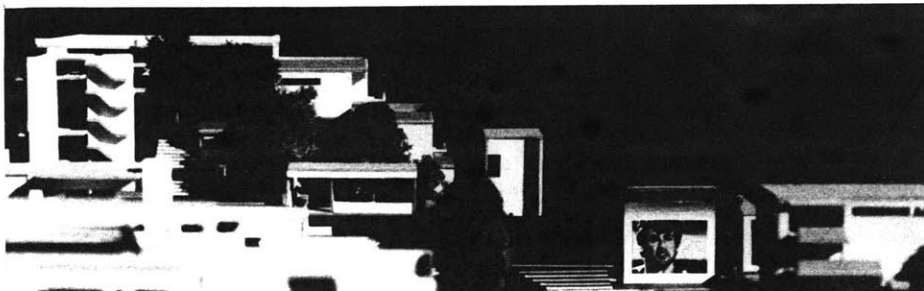
2.a ii) Demonstrating the fact that the distinction between up and down is valid for both built and natural space, the sailing club has its internal space flow up and down with the slope of the hill. The goal is to remind the indoor occupant of his relative outdoor position: his position on the hill.

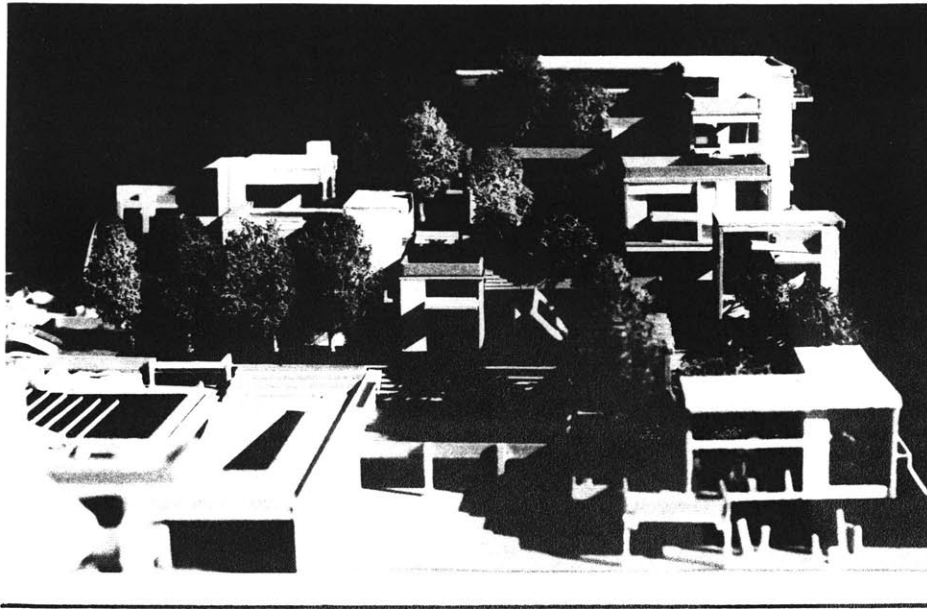


ii

2a

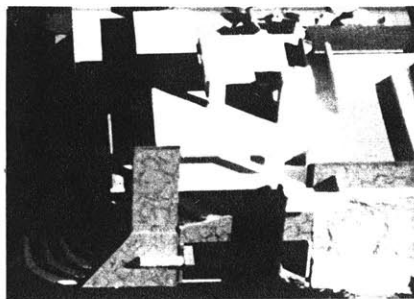
2.b As the courtyards terrace up the soil, so are the built forms. Between them, lots of spatial overlaps and territorial exchanges happen: sometimes a built form is above the soil, sometimes the reverse. At some places, plants embrace a built form, yet at others, the reverse. The built forms help to define the edges for the courtyards, while the courtyards also do the reverse.



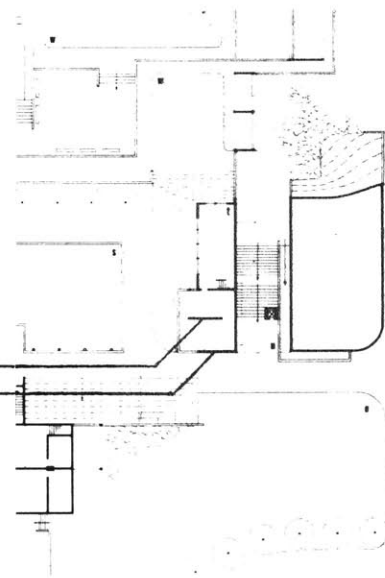


2_b

2.c To translate the landscape's vocabulary into the built, the sailing club employs the hill's retaining wall material, stone, as its interior structural member.



stone
walls



2_c

2.d Certain areas have demonstrated how to minimize the distinction between indoor and outdoor:

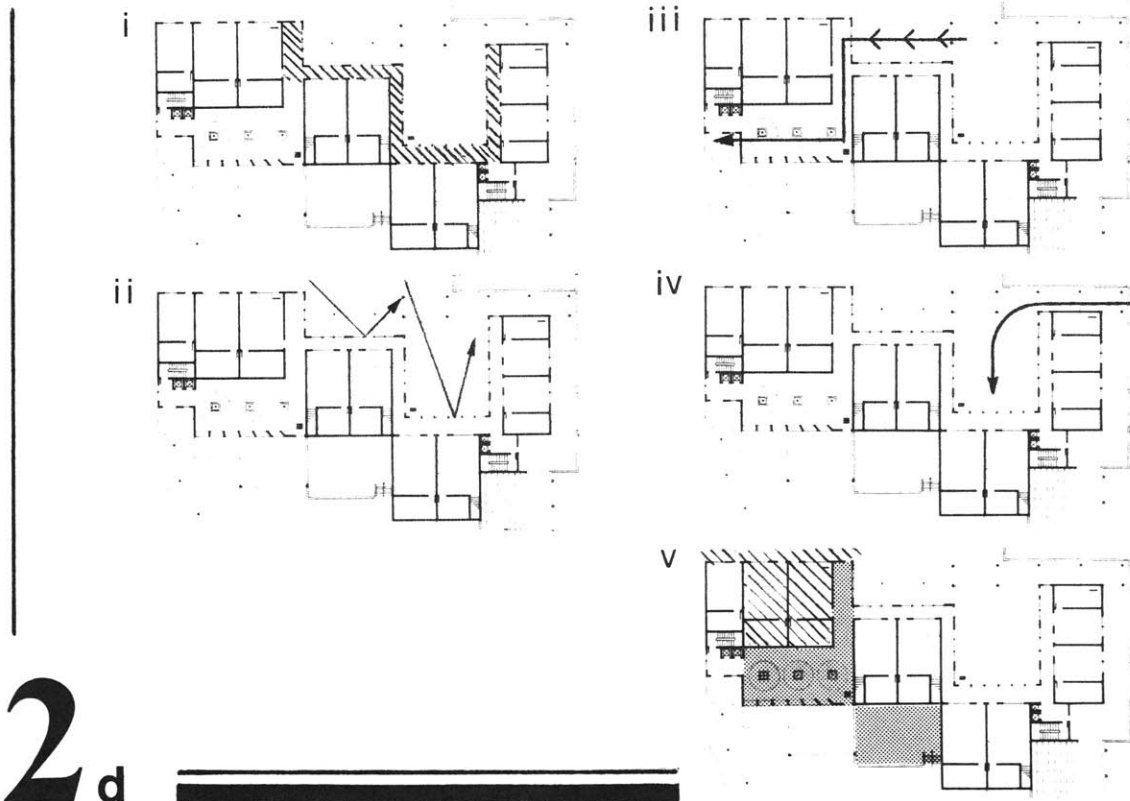
i) glass panels in the corridor are removable, so that in the summertime, the corridor can be opened up to become an arcade.

ii) large glass panels on the shaded side reflect the distant landscapes standing in light, thus minimizing the appearance of vertical barriers.

iii) plants in the open promenade are continued into the atrium.

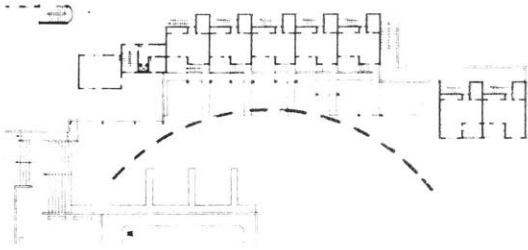
iv) trelliswork above the open promenade extends into the semi-enclosed courtyard.

v) piers and stone pavings extend into the built space under glass sliding doors.

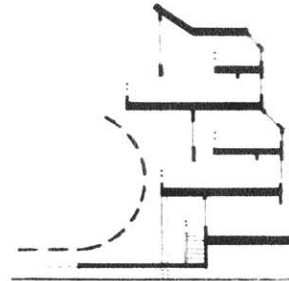
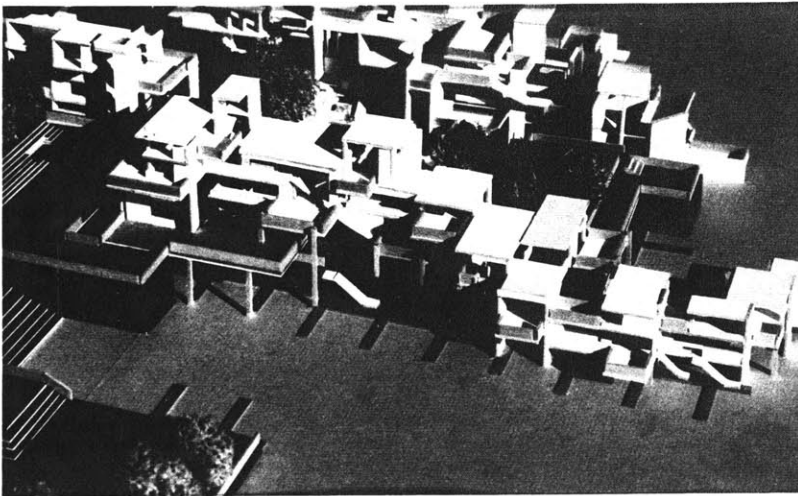


2_d

2.e In the waterfront housing block, enclosure for the water-community is defined by dense clusters of walls, piles, projected balconies and floating docks. This subtle enclosure helps the built and the natural space become one unit.



2_e

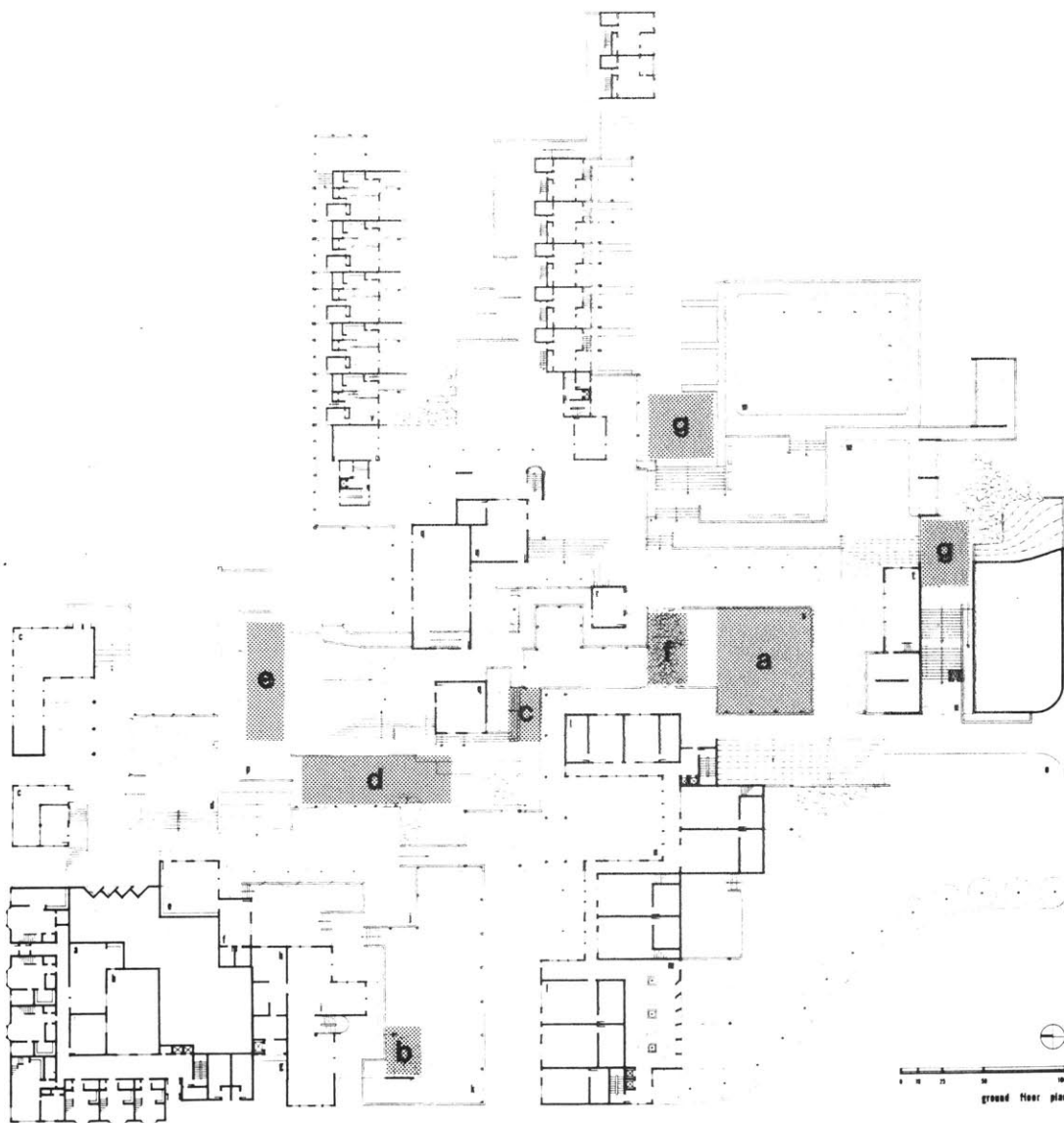


3. INTENSIFICATION OF LANDSCAPE ■

3.c To help one understand how nature pervades, the following phenomena, among the many, have been arranged to reoccur throughout one's path of movement, sight and/or hearing. Each reoccurrence may have a little variation in function, condition or appearance.

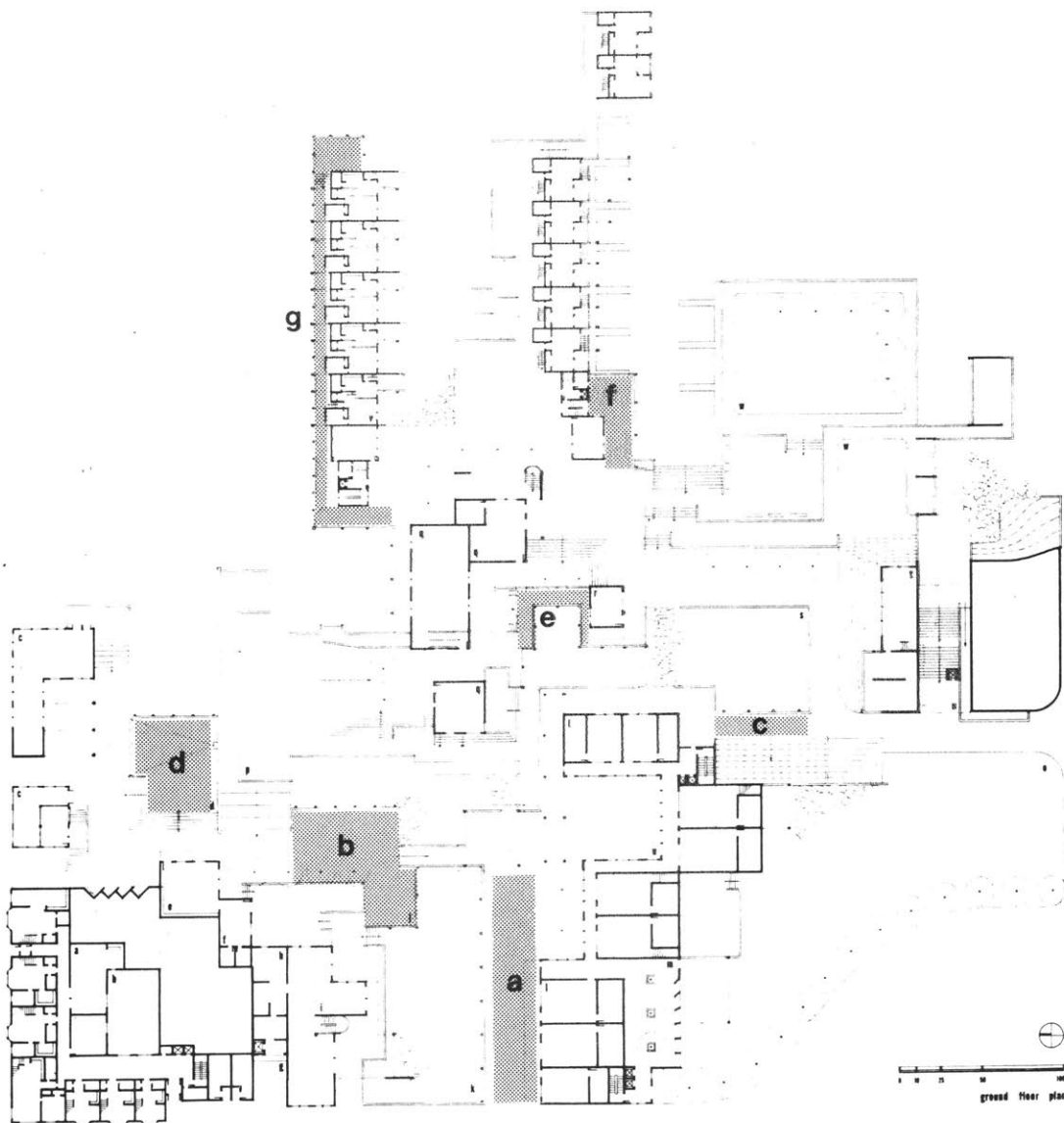
Water:
a--ripples
b--fast waterfall
c--slow waterfall
d--quiet stream
e--rushing stream
f--small current through stones
g--giant ocean waves

3_c



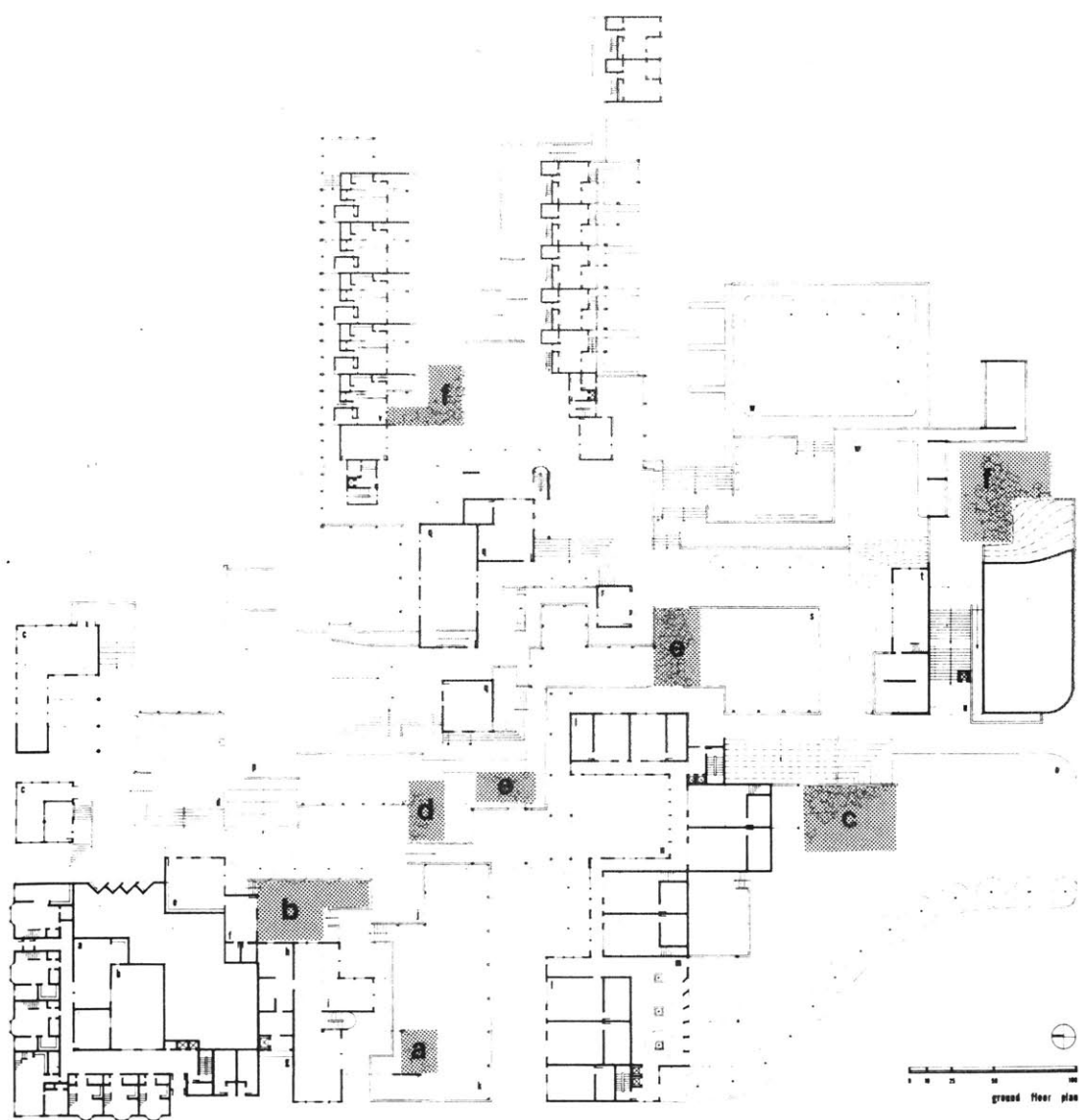
Pier:
a--site entry
b--outdoor eating
c--sunrise viewing
d--amphitheater, movie viewing
e--quiet exploration
f--harbor viewing
g--housing entry

3_c



Rocks and stones:
a--generating splashes
b--for seating
c--afternoon cooling
d--producing small waves
e--for stepping
f--softening white noise of sea waves

3_c



3.d Patterns of contrasting phenomena throughout the site help to maintain the high level of expectation and mystery.



light/dark



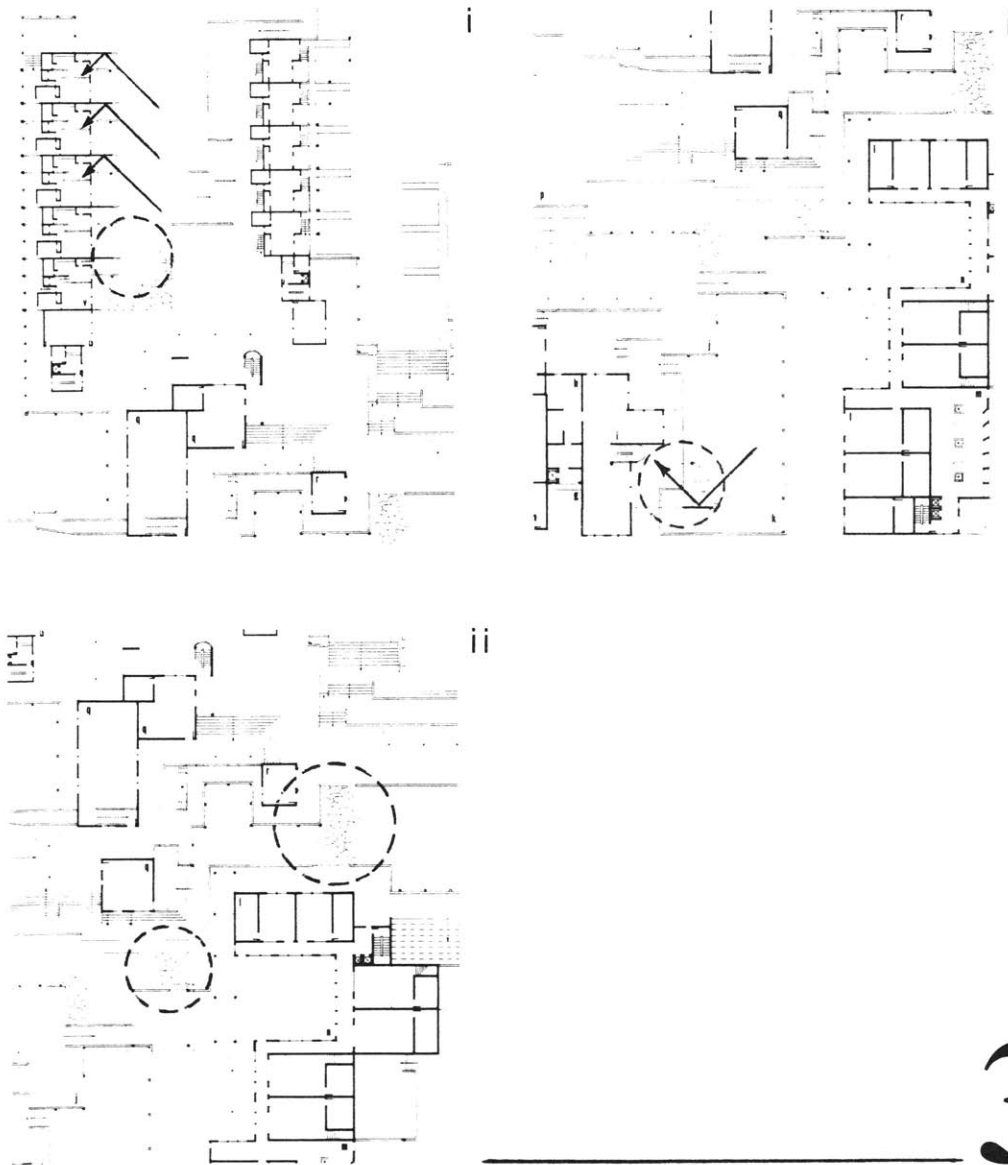
loud/quiet



3_d

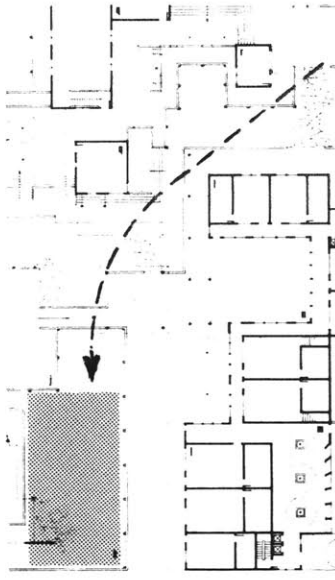
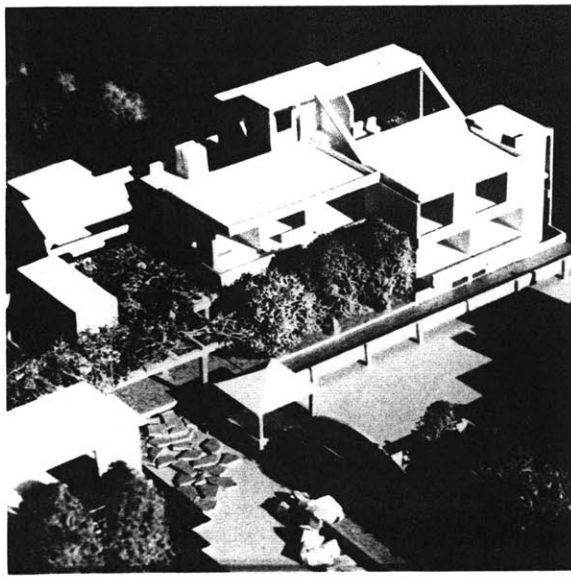
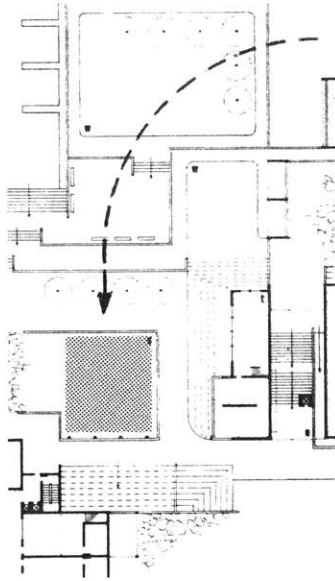
3.e Certain materials and spatial properties have helped reinforce the effects of the natural processes occurring around:

- i) concrete walls reflect water sound into designated areas, enhancing one's intimacy with water.
- ii) stepping stones allow one to walk real close to the water surface to feel the movement of water beneath his feet.



3_e

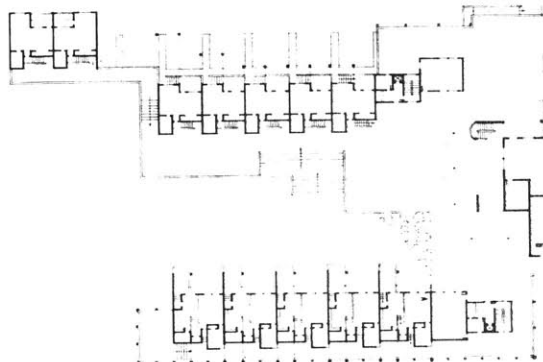
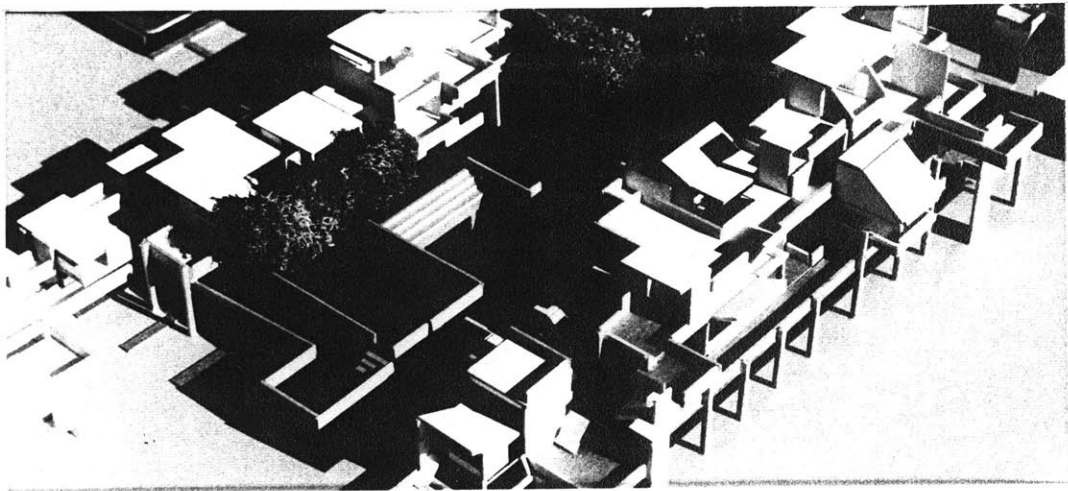
3.f Two areas have demonstrated similarly how the characterizing functions of water and air can be exploited to build up settings. In both, the reflecting surface of the pond has a dematerializing effect which counteracts the stable topographical structure. Moreover, both let in fresh sea breezes, so that the moisture and the ocean-smell will further give the place a "soft" character.



3_f

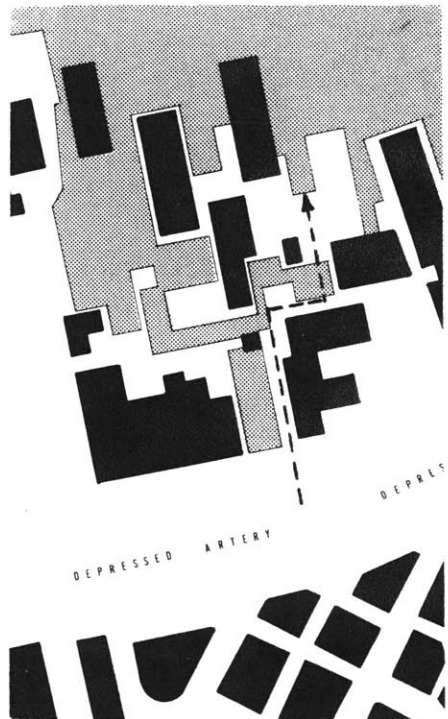
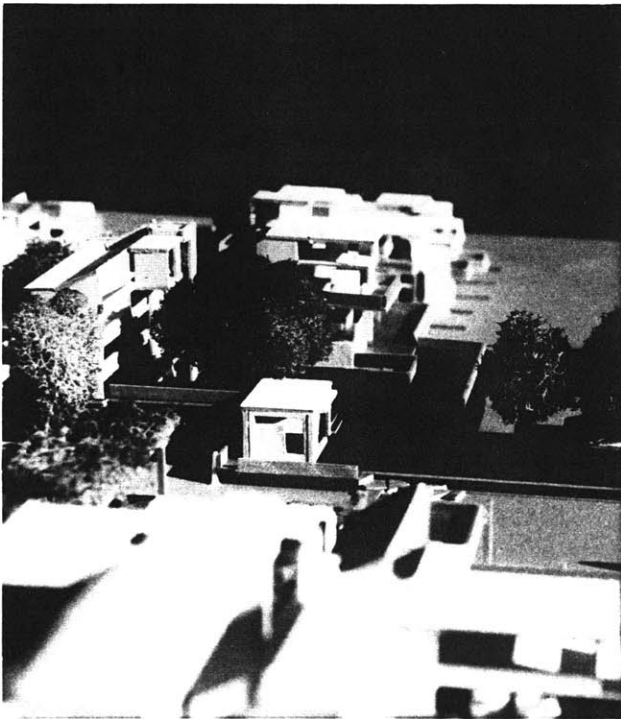
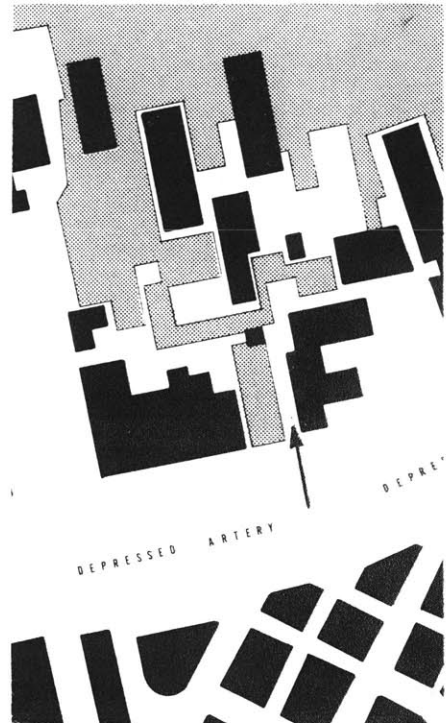
4. HUMAN IDENTIFICATION AND ORIENTATION WITHIN A PLACE ■

4.a Human identification is strengthened by arranging built forms in clusters that express a common way of: extending from land to water; engaging with the sky; forming collective spaces and receiving the sun.



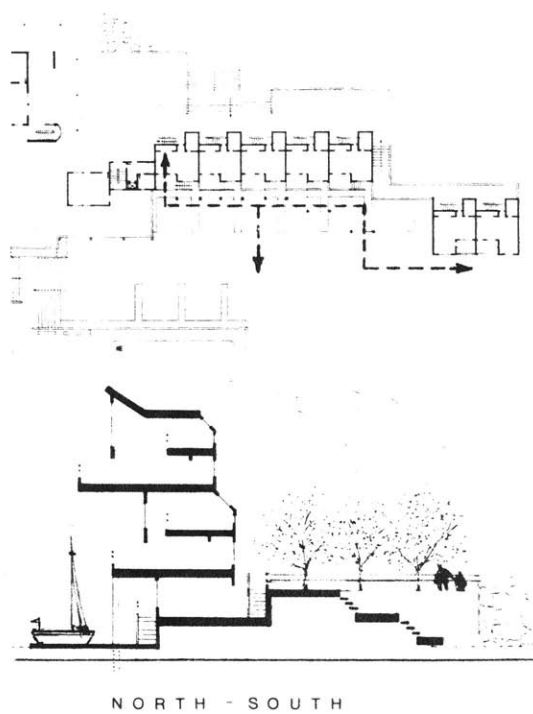
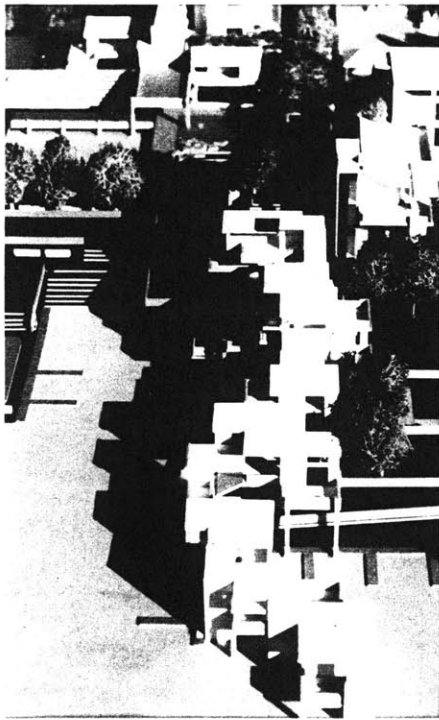
4a

4.b Spatial relationships within the site are based on human experience rather than pure mathematical calculations. Here, the concept of partial view corridor is employed. Since the entire layout of the site cannot be perceived at any fixed position, the visitor will be constantly searching for the unknown.



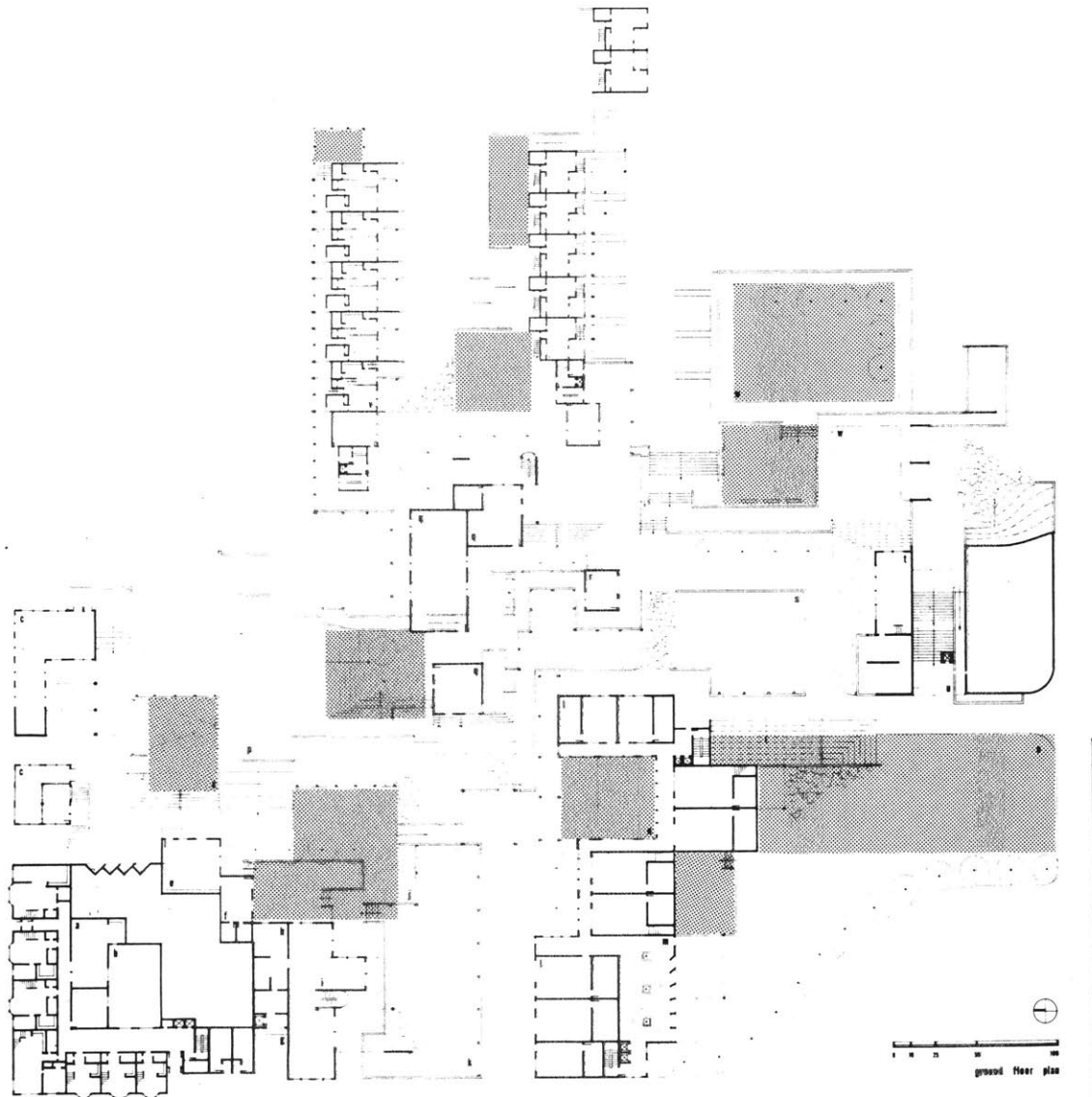
4_b

4.c In the waterfront housing block, the feeling of "home" (intimacy, comfort and protection) is extended beyond the private individual units, all the way down to the water. Since this new "home" is extremely spatially continuous, even the boats parked between the walls and piles have become the "tenants". As this shared habitable environment gets bigger, one's sense of belonging is also increased.



4_c

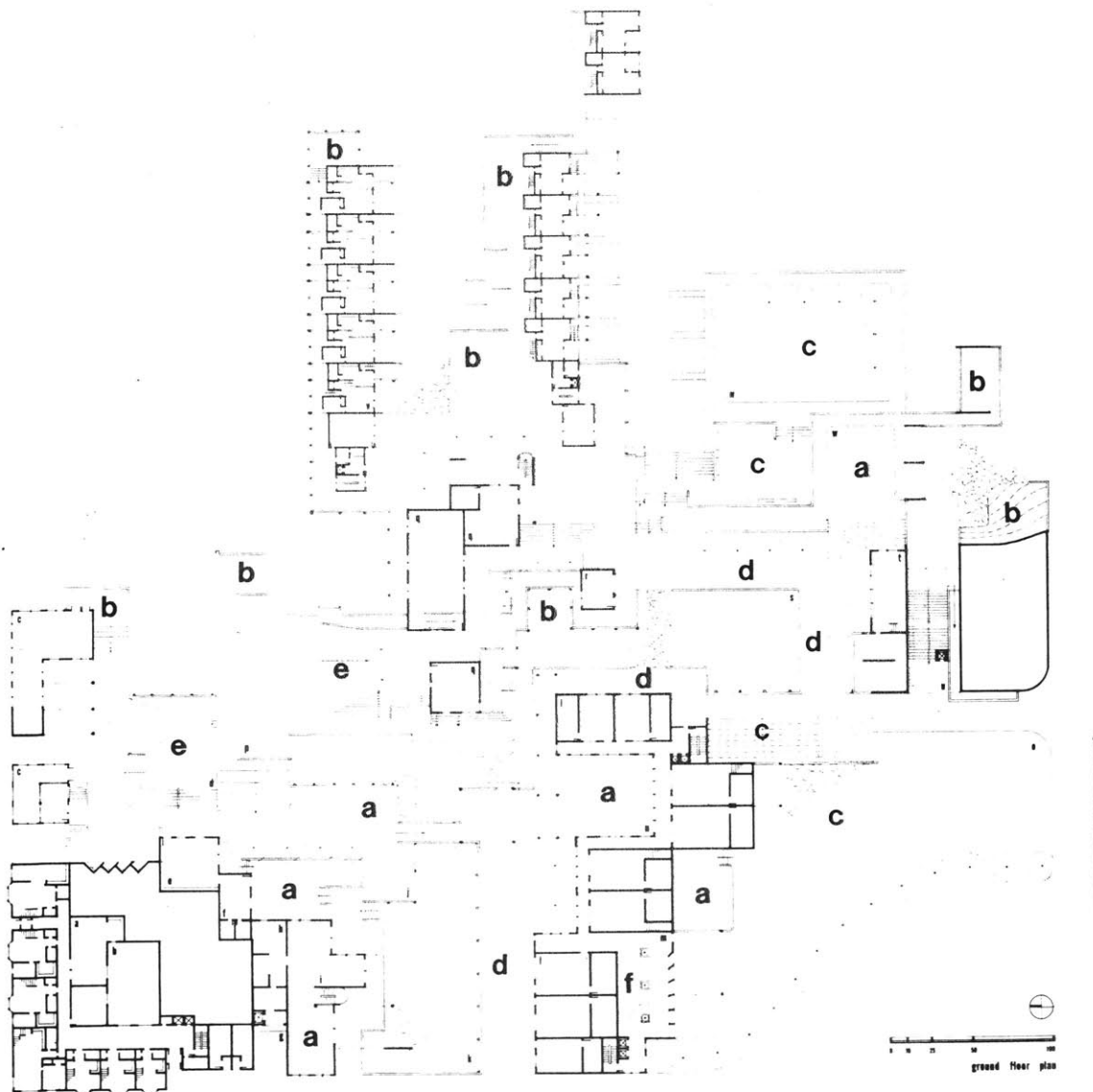
4.d To help one acquaint himself with other users of the place, appropriate facilities and collective spaces have been provided to draw people together to increase interactions.



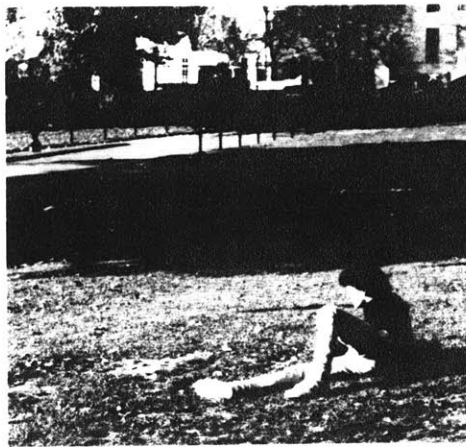
4_d

4.e In order to help the Bostonians become "friends" with this place, the design has responded to their behavior and their culture. Appropriate facilities are provided for their favorite activities to take place. They are:

- a. chatting, eating lunch, reading newspaper
- b. napping, reading poetry, contemplating
- c. watching sunrise/sunset, picnicking
- d. strolling with pets, taking babies out
- e. riding skate-boards, viewing outdoor-movies
- f. watching snowfall



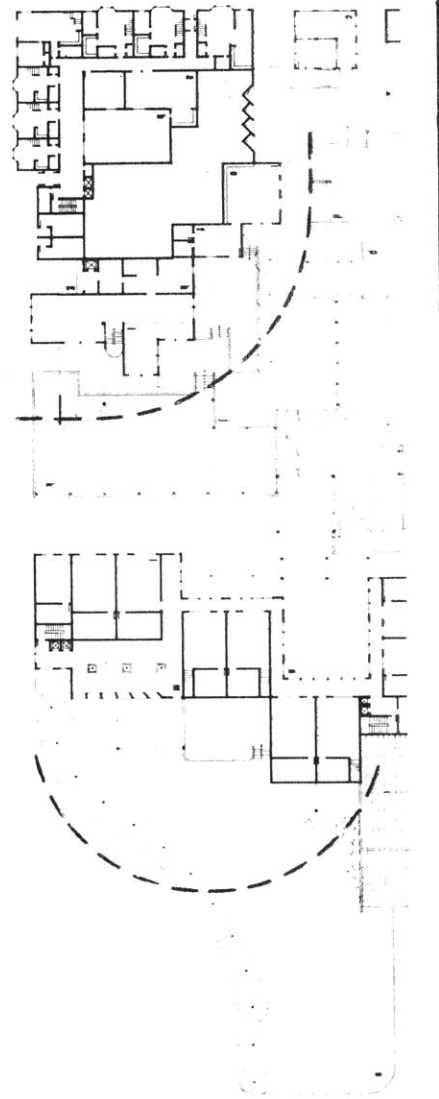
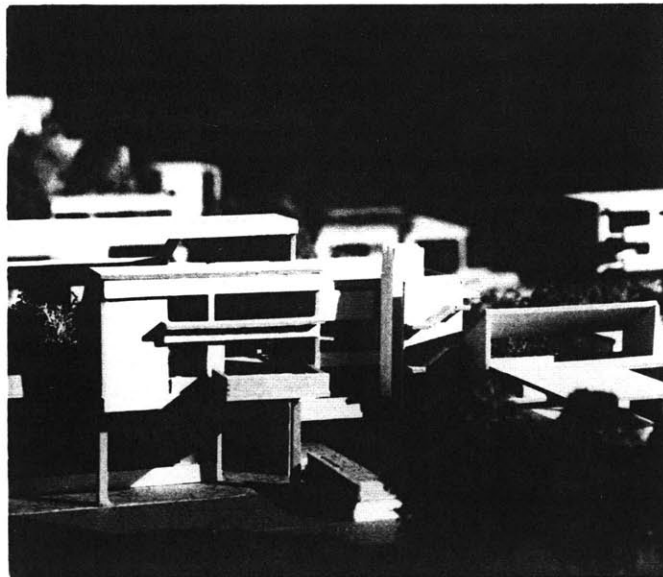
4_e



4 e

5. MAN'S ASSOCIATION WITH NATURE ■

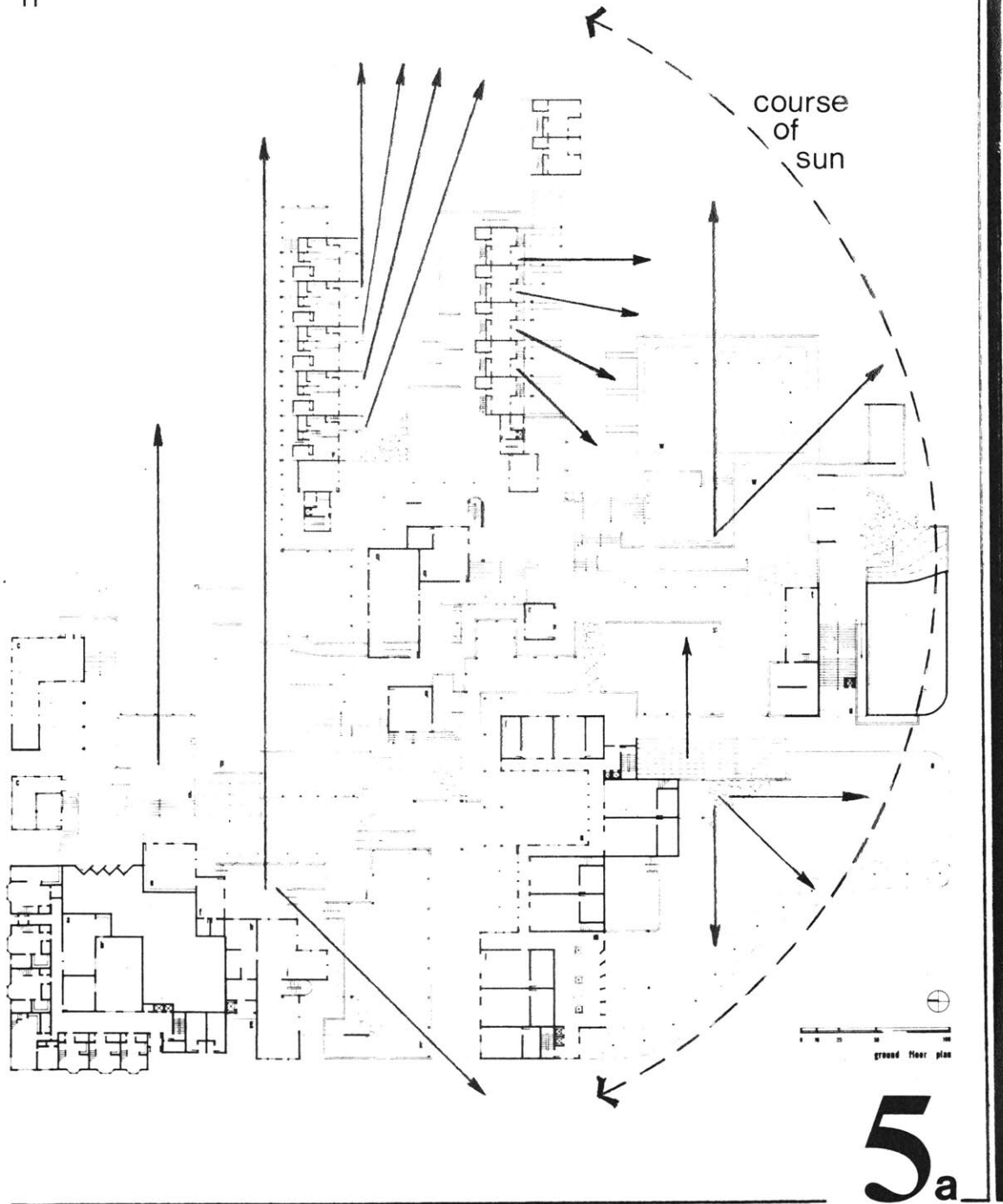
5.a i) Two buildings on the site show that their physical forms are generated from the concern for sunlight. Human activities are designed to occur mostly on the south, whereas the north remains relatively "quiet".



5_a

5.a ii) To encourage one to see himself as an integral part of the cosmos, the site has provided places for him to watch sunrise, sunset and the stars.

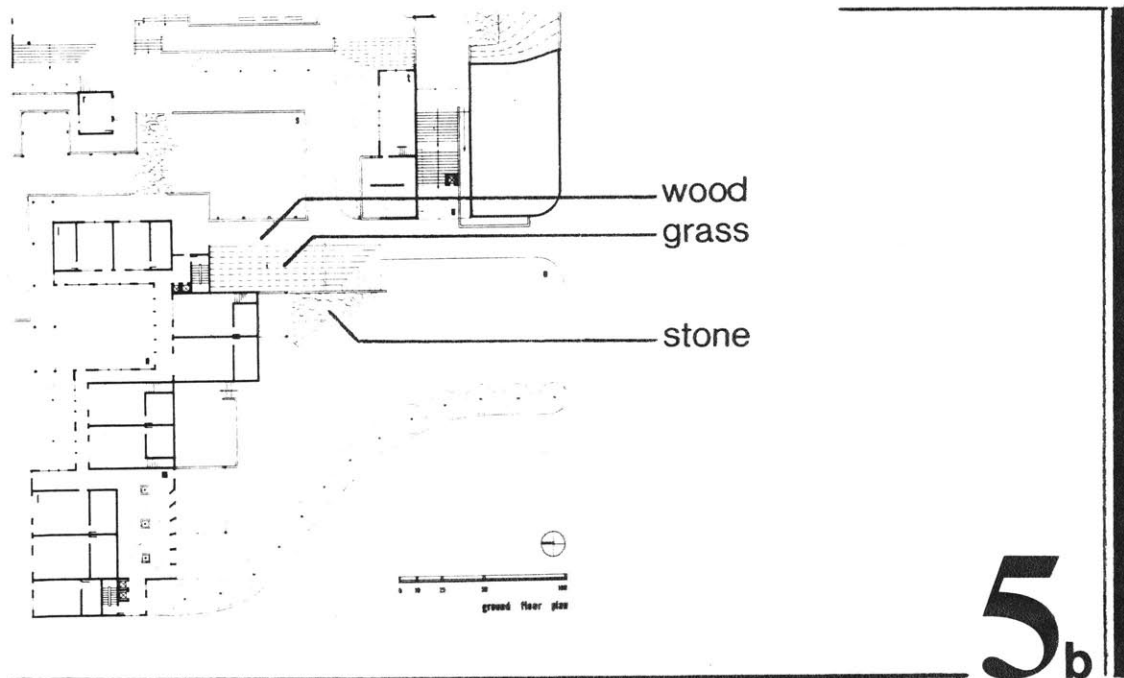
ii



5.b Certain natural processes are designed to occur at places which one uses frequently, so that they can become part of his routine experience:

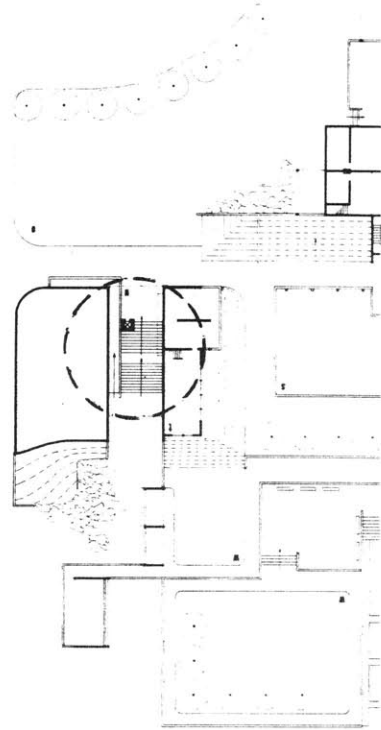
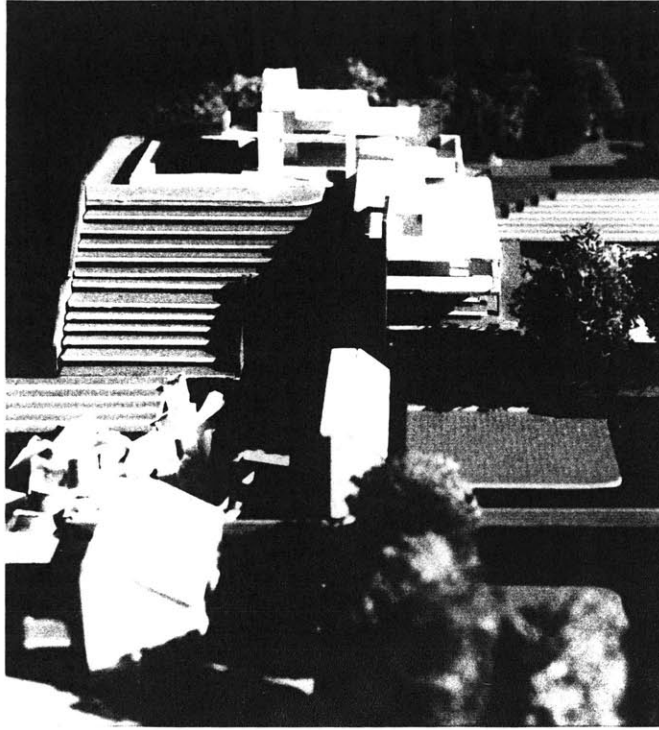
i) grass and wood pave the area for watching sunrise. They emit the desired warmth every early morning.

ii) stone seating fixtures are used in the area for watching sunset. They give one the cool feeling every summer afternoon.



5.c The earth and the water have demonstrated a high level of territorial exchange throughout the site. This exchange not only generates more edges where one can experience the movement of water, but offers more forms of containment, allowing one to associate with water in many different modes.

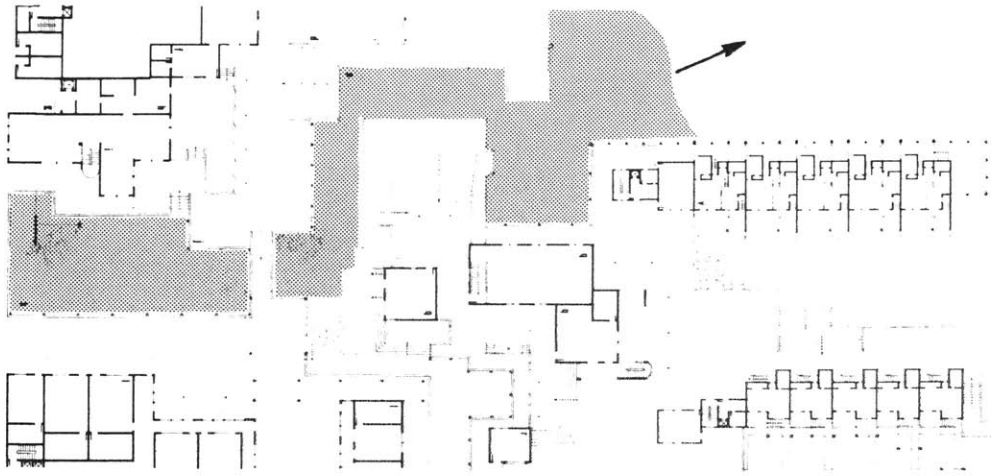
5.d To increase man's interaction with birds, the site has provided special caves where man and birds can "meet".



5_d

6. IMPROVEMENT OF MAN'S WELL-BEINGS ■

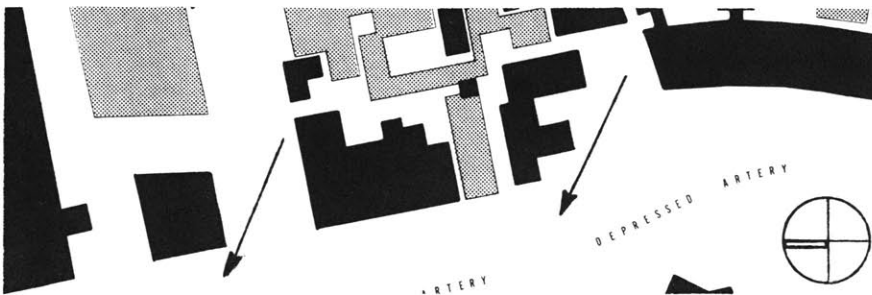
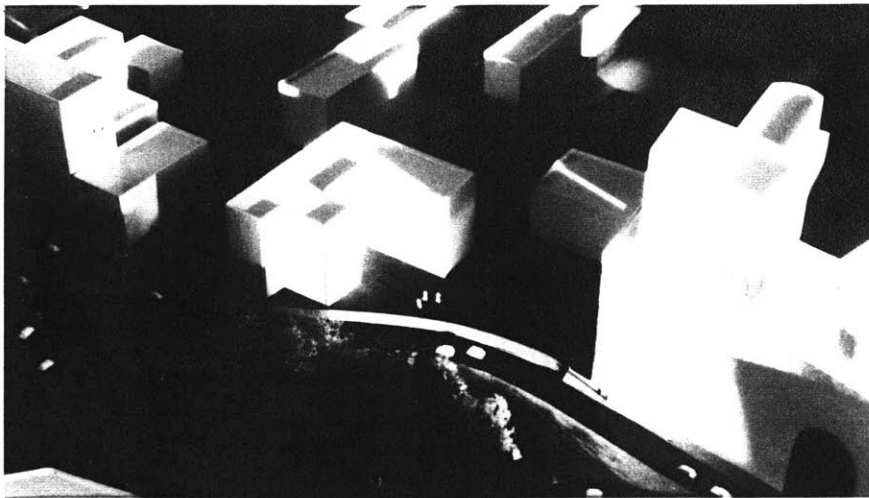
6.a The pond on the edge of Atlantic Avenue is capable of receiving floodwater and stormwater runoff, thus reducing possible flood damage. The water will then be directed to Boston Harbor through a series of streams. This process has minimal inconvenience to pedestrians, but maximal visual elegance to everyone.



6_a

6.b Air pollution is minimized:

i) The street edge of the site has kept enough openings, so that sunlight can penetrate into the street by midmorning to correct locally inverted temperature stratification.



6_b

ii) Built forms, open spaces and landscape materials on the site are oriented to block unwanted winter gust, and funnel desired summer breezes.



5. Conclusion

A. THE THESIS IN RETROSPECT ■

Nature is a difficult thesis topic to me. It is so not only because nature is broad, but because its definition varies from culture to culture. I grew up in Hong Kong, and I was attached to an Oriental culture for the first fifteen years of my life. I had developed my own set of beliefs about nature long before I moved to the States. But here I am in Boston, trying to design for a culture foreign to mine. Although my thesis advisor, who is a native American, had already helped me a great deal in understanding the "ingredients" of the "Bostonian nature", I still had hard times throughout my design process. This is because I was too "controlled" by my previous culture. The design finally came out, but disappointingly, some portions of it looked as if they were done for the Orientals rather than for the Bostonians.

Throughout my readings, I was particularly inspired by two writers. They were Ian McHarg and Anne Spirn. They gave me excellent ideas about nature. However, none of them had said anything about how one could design with nature in a built environment. So I told myself to take on this challenge to see what I could possibly come up with. At the same time, I regarded this challenge as a learning process. After a great many hours of intense work, I still could not arrive at any concrete, satisfactory solution. But at this point, I feel that I have earned my opportunity to conclude that: talking and doing, especially on such a

topic, are totally different things. And doing is a lot harder. Many great ideas, theories and concepts are easy to say on papers, but indeed extremely difficult to be carried out in the real world. There are just an overwhelming amount of limitations and constraints that many writers might not have expected.

To me, the design issues in this thesis were too complicated to be solved by one person within one semester's time. Although I had tried my very best to address most of them, they were only touched upon in a very sketchy way. Some were either over-generalized, or kept on a very abstract basis. Moreover, the project's practicality and its closeness to reality had been put aside. As a result, the project might look like a caricature, to many people. This could be seen in a few occasions, such as in the placement of trees and lawns. These items were only meant to be symbolic in the design. How they would really survive under the existing climatic and geological conditions had not been fully studied. Assumptions were also made on water. The way it would interact with the earth in the real situation was not taken into account. Neither were the microclimates on the site. So far, only two out of the six buildings had used light and microclimate to determine its form and the location of human activities. The other four had not responded much to the climatic difference between north and south. Finally, the public-private relationship remained unsolved. By law, it was actually impossible to use any water surface of the

Boston Harbor for private purposes. Thus, the two waterfront residential blocks were yet another big assumption.

B. VISIONS OF THE FUTURE ■

The schism between man and nature is a problem which, from its necessary relation to the larger problem of the future growth of a city, should be made a subject of responsibility of a very definite and generous character. Although this thesis has proposed a set of design principles to deal with the problem, it is only a stepping stone. Full-scale urban ecological balance actually requires thorough analyses conducted by myriad experts who study and shape the city -- public officials, private institutions, design professionals, natural and social scientists, humanists and all citizens. It is hoped that a single coordinating agency can eventually be established to advocate the resolution of multiple problems with one solution, as well as to provide effective management of resources.

If the principles were one day applied to a situation in the real world, it is hoped that the building designers and the landscape architects would not regard them as limitations to their creativity, but as guidelines to produce meaningful buildings and places for the people. The principles are also expected to help them work with their clients towards a common goal, so that the social value of

nature will be recognized rather than resisted.

With the combined efforts of all man, the harmony of man-nature will be no utopian fantasy. It will be an achievable reality.

BIBLIOGRAPHY

- AIA Journal, "Buildings and Nature". December 1985 issue.
- Alexander, Christopher et.al., A Pattern Language. Oxford University Press, New York, NY, 1977
- Architectural Record, eds., Places for People. An Architectural Record Book, 1976.
- Ardalan, Nader and Baktiar, Laleh, The Sense of Unity. University of Chicago Press, Chicago, IL, 1973.
- Boston Society of Architects, Architecture, Boston. Barre Publishing, Barre, MA, 1978.
- Bye, A.E., Art into Landscape, Landscape into Art. PDA Publishers, Mesa, AZ, 1983.
- Campbell, Craig, Water in Landscape Architecture. Van Nostrand Reinhold Co., New York, NY, 1978.
- Davis, S., ed., The Form of Housing. Van Nostrand Reinhold Co., New York, NY, 1977.
- Fellows, Donald Keith, Our Environment. John Wiley and Sons, New York, NY, 1975.
- Good, Albert H., Park and Recreation Structures. Vols.1-3, U.S. Dept. of the Interior, National Park Service, 1938.
- Halprin, Lawrence, Cities. MIT Press, Cambridge, MA, 1972.
- Higuchi, T., The Visual and Spatial Structure of Landscape. MIT Press, Cambridge, MA, 1983.
- Hyams, Edward, A History of Gardens and Gardening. Praeger Publishers, New York, NY, 1971.
- Itoh, T., The Japanese Garden: An Approach to Nature. Yale University Press, New Haven, Conn, 1972.
- Jackson, J.B., The Essential Landscape. University of New Mexico Press, Albuquerque, NM, 1985.
- Jacobs, Jane, The Death and Life of Great American Cities. Random House, New York, NY, 1961.
- Jellicoe, Geoffrey and Susan, The Landscape of Man. Thames and Hudson, Ltd., London, 1975.
- Jencks, Charles, Architecture Today. Harry N. Abrams, Inc., New York, NY, 1982.

Kelly, Bruce et.al., Art of the Olmsted Landscape. NY City Landmarks Preservation Commission, 1981.

Klee, Paul, Notebooks Vol.2: The Nature of Nature. George Wittenborn Inc., New York, NY, 1970.

Litton, R. Burton and Tetlow, Robert J., Water and Landscape. Water Information Center, Inc., New York, NY, 1974.

Lynch, Kevin, The Image of the City. MIT Press, Cambridge, MA, 1960.

Lynch, K. and Hack, G., Site Planning, 3rd ed. MIT Press, Cambridge, MA, 1984.

Marx, Leo, The Machine in the Garden. Oxford University Press, 1964.

McHarg, Ian L., Design with Nature. Doubleday and Co., Garden City, NY, 1969.

Moore, C. et.al., The Place of Houses. Holt Reinhart and Winston, NY, 1974.

Nairn, Ian, The American Landscape. Random House, New York, NY, 1965.

Neutra, R., Mysteries and Realities of the Site. Morgan and Morgan, NY, 1951.

Newton, Norman T., Design on the Land. Belknap Press, Cambridge, MA, 1971.

Norberg-Schulz, Christian, Genius Loci: Towards a Phenomenology of Architecture. Rizzoli International Publications, Inc., New York, NY, 1979.

Rose, Dan , "The Brandywine: A Case Study of an Ecological Strategy." MIT Press, Cambridge, MA, 1982.

Schaarschmidt-Richter, I., Japanese Gardens. William Morrow and Co., NY, 1979.

Spirn, Anne W., The Granite Garden. Basic Book, Inc., New York, NY, 1984.

Stauffacher-Solomon, B., "Cultivated Geometry: The Tradition of Classical Landscape." Arts and Architecture. Vol.4, no.2. July, 1985.

Sutton, S.B., Civilizing American Cities. MIT Press, Cambridge, MA, 1971.

Treib, M., "Traces upon the Land: The Formalistic Landscape." AA Quarterly, vol.11, no.4, 1979.

Watabe, Kazuji, Architecture and Water Space. Process #24, Process Architecture Publishing Co., Ltd., Tokyo, 1981.

Whiffen, M. and Koeper, F., American Architecture 1607-1976. MIT Press, Cambridge, MA, 1981.

Whitehill, Walter Muir, Boston, A Topographical History. Belknap Press, Cambridge, MA, 1959.

Wright, F.L., The Natural House. Horizontal Press, NY, 1954.

Wright, Richardson, The Story of Gardening. Dodd, Mead and Co., New York, NY, 1934.