

**HABITABLE PIERS,
An Alternative for Urban Expansion**

by
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Bachelor of Science in Art and Design
Massachusetts Institute of Technology Cambridge, MA June 1986

Submitted to the Department of Architecture
in partial fulfillment of the requirements for the Degree of Master of Architecture
at the Massachusetts Institute of Technology
June 1990

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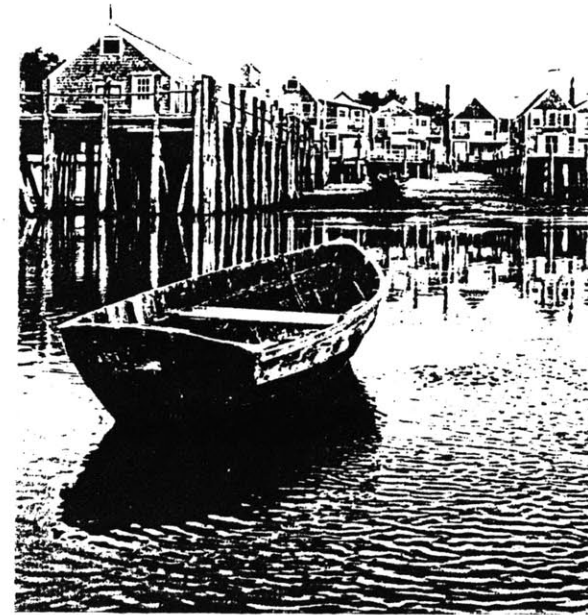
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May 11, 1990

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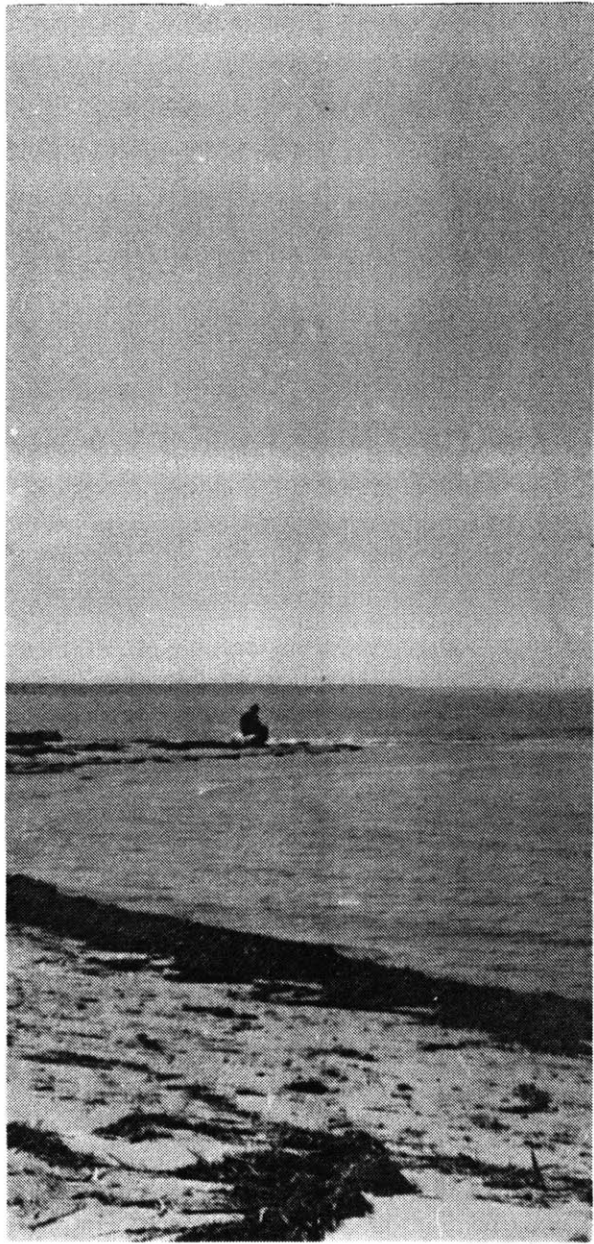
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Orleans, Cape Cod

HABITABLE PIERS

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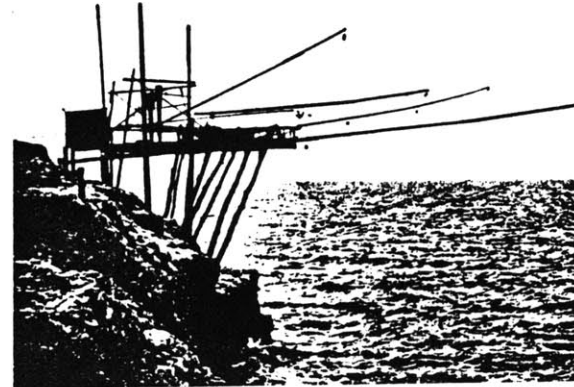
ABSTRACT

This thesis is an investigation into an alternative way of urban expansion for a seaside community. This thesis proposes a habitable urban environment on the water by creating for an exchange between the built urban landscape and the water. The pier being the only element in between the land and the sea is the place where the urban life can extend into the water and where the sea can interact with the urban fabric.

Provincetown MA is the site for this thesis. The ocean is the source of wealth of Provincetown, and indeed it was the harbor that gave birth to the town in the first place. The design is generated through a set of dimensions which is taken from the harbor and the greater landscape. Then an abstraction of the town's urban qualities is overlaid onto this set of dimensions to generate the overall design. Finally the building form and weather enclosures are a result of the conditions imposed by living on the water, the climate, and other physical characteristics of the site.

The two central concerns of the thesis are piers and urbanism. The piers are about being on the water, at the zone of the exchange between the water and the land. Urbanism is about the additive process of collective building where discrete building decisions can add up to a block; and the blocks in turn add up to form the city.

Thesis Supervisor: Imre Halasz
Title: Professor of Architecture





Acknowledgement

Imre, thank you for your unconditional support and guidance through out this year. It was one of the best learning experiences I ever have.

To Ian Whitelaw for introduce me to the Cape and your suggestions for this thesis. To Alan Dodge and Bill Hubbard for your inputs and suggestions. To Kairos for the patience of proofreading and editing of my writing. To my fellow thesis citizens for the support and encouragement. To Mike, thank you for being a friend. To Dan, Luke, Amy, Jason, Chiong, and John for taking time out of your busy schedules to help me. To Johnathon, and Eugenie for coming in at the time I most needed you. To Jennifer who was always there to give me a hand. To a special friend with a warm heart, Wen-Wen, thank you for being there when I needed a shoulder to lean on.

*"In our time, with more known than ever
about the intricate workings of nature and
man, is the world still too thin to bear
contemplation unfattened by myth or too loose
to keep our interest without imposing upon it
some easy dramaturgical structure?"*

*Michael Bennedikt,
For an Architecture of Reality*

Table of Contents

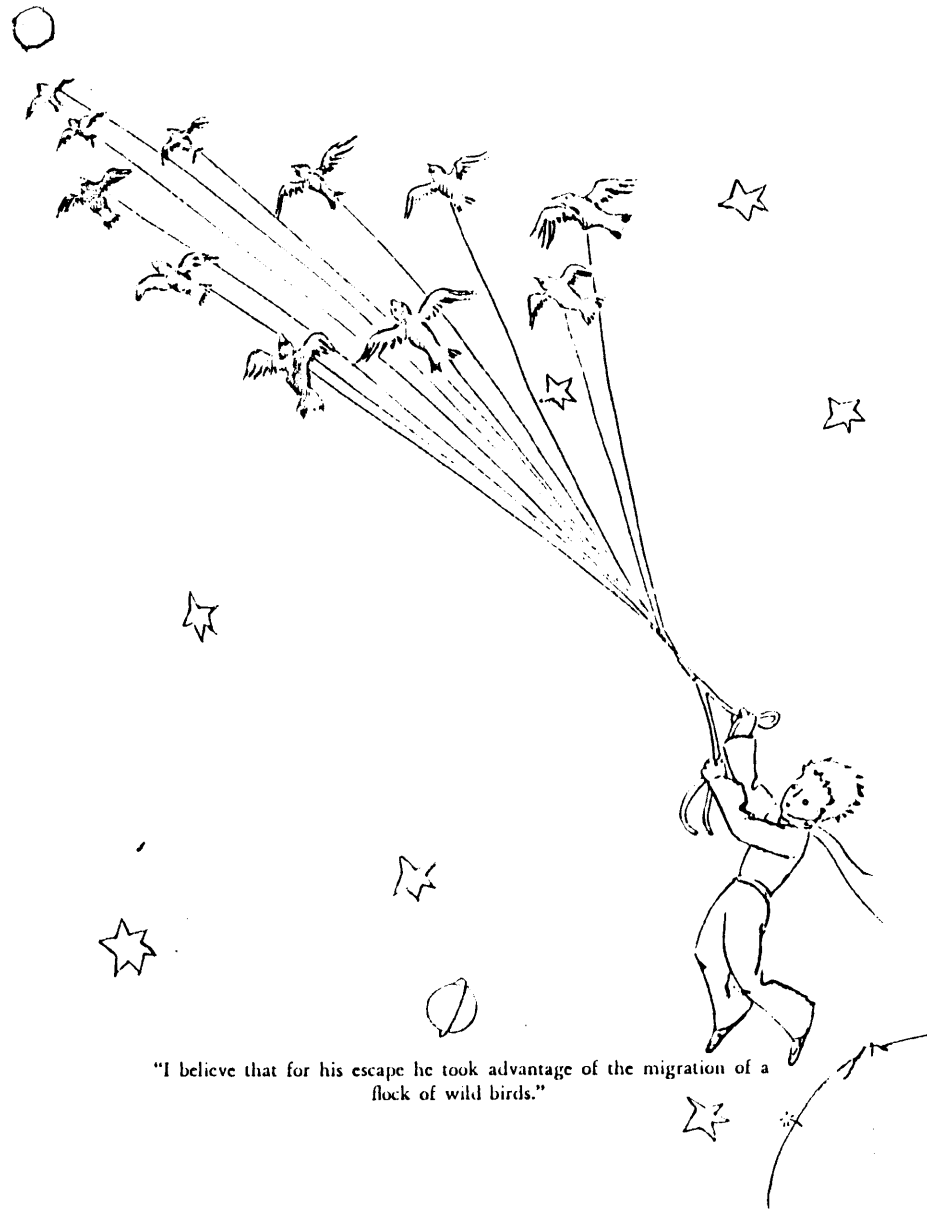
Introduction.....	3
Urbanism.....	6
Site.....	11
Project.Concept.....	19
Waterfront.....	20
Land.....	25
Design	
Geometry and Dimensions.....	29
Landscape Move.....	35
Collective Public Spaces.....	41
Urban Quality.....	51
Sizes.....	55
Bibliography.....	65
Credits.....	69



Introduction

Each time a new idea is presented to the public by a designer, an image of tomorrow is revealed. Each time a building is built, a vision of the future becomes reality. We, the design professionals, are the shapers and creators of the physical world of tomorrow. Like most people living in this society of confusion today, I question the effectiveness of the design professional in the chaos of our living environment. At this time and age where the advancement of science and technology exceeds our intellectual development, there is no clear vision of the world to come. We, the designers, are asked to bring in the future while the world has no collective vision of tomorrow. Our built environment only reflects our lack of a clear understanding of the material and power we possess. Today, we live in cities composed of modern buildings constructed from every imaginable material from all corners of the world. We have all the materials available to us but we design buildings that are seemingly the same.

Whereas Boston's Back Bay was constructed mainly of brick and brown stone, it has more variety than any contemporary development in America. Why can't contemporary architects create buildings as good as the Back Bay row houses? What are we doing wrong? The modern movement created an environment that the Postmodernists criticized as a world without a link to the past. The Postmodernist themselves, however, did not succeed in connecting their buildings any more profoundly with past either. In this world of confusion, every definition is challenged and questioned. Even the role of man and woman and their relationship to each other is no longer clearly definable. What is our view of tomorrow? Where is architecture heading? Where is our society and the human race heading? This thesis is a part of my own search for an understanding of these questions. It is a vision of tomorrow's architecture.



"I believe that for his escape he took advantage of the migration of a flock of wild birds."

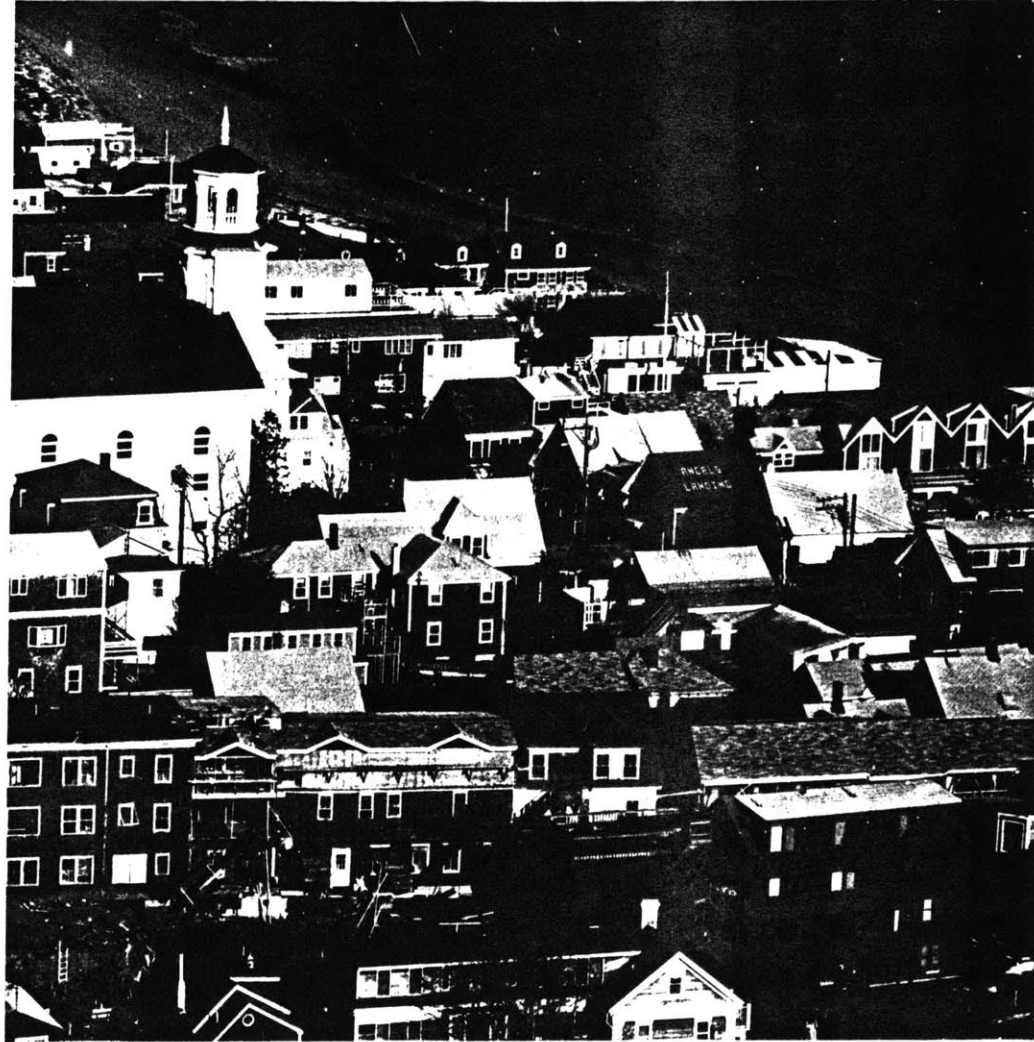
"...Why are the stars in the heaven as crowded as the people on the earth; Why are people on the earth as far apart as the stars in the heaven...."

*Chi-You
form the song "Why"*

image taken from The Little Prince

Urbanism

The main issue in this thesis is the idea of an urban environment. We live in a complex interdependent society. By need and by choice, we live in close proximity of each other. We call this environment a town, city, or metropolis. In general I would define these communities as urban. An urban environment is a community that has reached some density and size where it must function collectively to address issues which arise as a result of the forming of the community. In the information age of today, our lives are interconnected by a complex social and financial structure, linked by intricate communication networks. Any environmentalist can tell you, the survival of the human race on Earth depends on the collective effort to save the planet. Every action we take affects the society, and the planet as a whole. Our lives have been fused together by our civilization. But while our



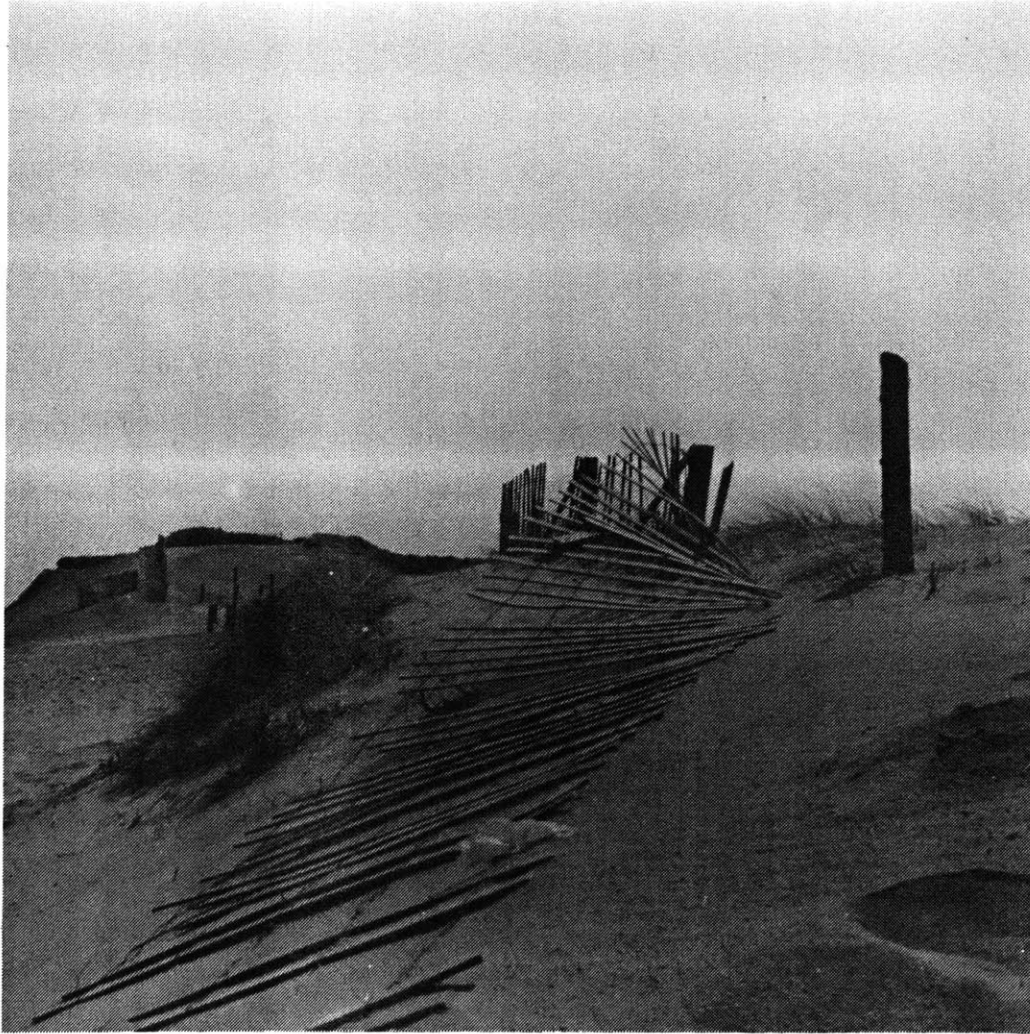
P-town



Mojacar, Almeriaa Spain

lives are hopelessly connected to everyone else on the earth, our physical environment has developed in the opposite direction. The buildings we build are more like individual closed cells with little connection with the rest of the world. It is my belief as an architect that this cellularization of the physical environment must be reversed. We must build an environment which reflects the complex interdependencies of our world. The buildings themselves must therefore encourage communications among its occupants. The urban environment must provide support for, and encourage the interaction of the community. Buildings should not be the fortresses that separate people. The home should not be a jail cell which keeps the world out of one's life. After all, how can we solve the collective problem of our whole planet when we do not even know our next door neighbors? Our complex world needs a built environment to support the interdependence of our lives.





Provinceland, Cape Cod

"...Such beaches as are fashionable are here made and unmade in a day, I may almost say, by the sea shifting its sands."

*Henry David Thoreau
Cape Cod*

"A storm in the fall or winter is the time to visit it; a light-house or a fisherman's hut the true hotel. A man may stand there and put all America behind him."

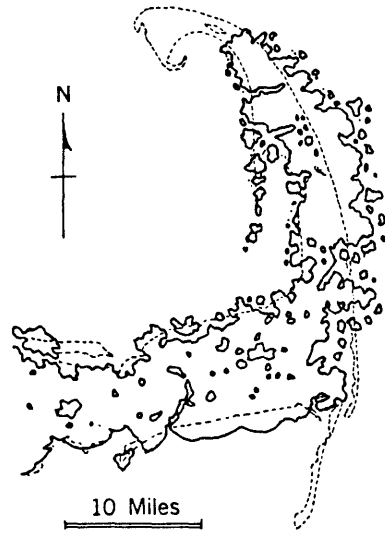
*Henry David Thoreau
Cape Cod*



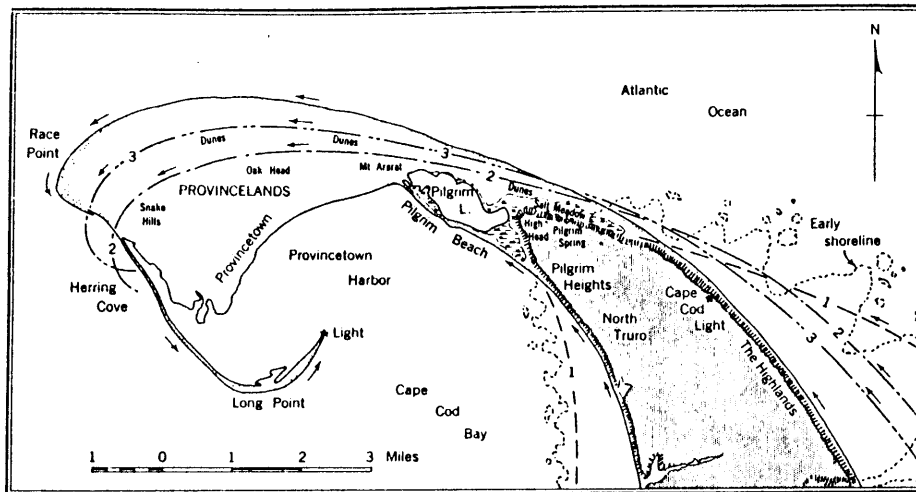
Site

Cape Cod fascinated me ever since I was introduced to this graceful land. It is difficult to imagine this giant sand dune out there in the middle of the Atlantic ocean. There is an excitement about this young peninsular. In the next few hundred years it will vanish into the sea. Like the islands of Nantucket and Martha's Vineyard, the Cape is an unusual geological condition; it is made of the deposits from glaciers in the last ice age, and since then the ocean and the wind have shaped it into its current configuration. The force of nature is evident everywhere on this fragile landscape. It continues to change as the waves move and shape this giant sand dune in the middle of the Atlantic Ocean.

Today, the foundations of the Marconi radio tower stand a few hundred feet away from the shoreline as the ocean side of the outer



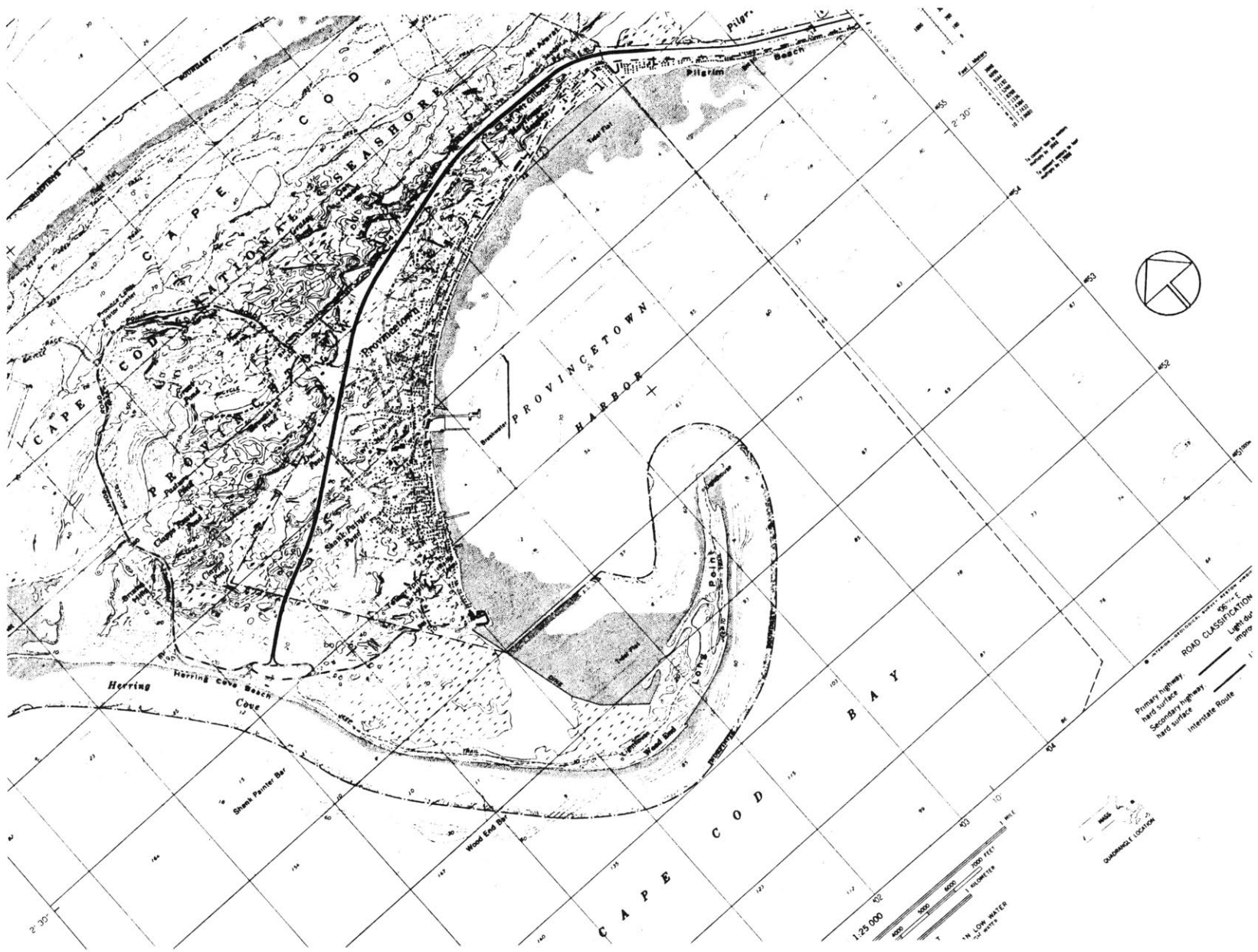
15. The solid line shows a hypothetical shoreline of eastern Cape Cod, as it might have existed about thirty-five hundred years ago. The dashed line shows the present shoreline. (Based in part on a figure in Davis' "The Outline of Cape Cod," 1896.)



32. Growth of The Provincelands is shown in successive stages by shorelines labeled 1, 2, and 3. (Based on Davis' interpretation in "The Outline of Cape Cod," 1896.)

Cape is being eroded away by the waves. The ocean edge and beach front can lose up to sixty feet in a good storm. The entire peninsular is just a sand dune with only a thin layer of soil on top of the sand. There are only bare sand dunes at the tip of the peninsular. The sand drifts in strong winds, changing the landscape right in front of your eyes. Provincetown in particular is very unusual. It is truly at the end of the world if there is such a place. Located along the harbor's edge near the tip of the Cape, it is surrounded by the sand dunes of Provinceland and protected by the drifting sand bar of the Long Point.

Today, one arrives at Provincetown after driving through the dunes and highlands of Wellfleet and Truro, passing the narrow strip of land between Cape Cod Bay and Pilgrim Lake into this densely settled urban





environment of the town. One can also enter the town via the harbor by boat. There are narrow streets, small buildings so close to each other that one can almost shake hands with one's next door neighbor through the windows. The smell of the sea breeze and the salt air is everywhere. The saltwater bleached shingles and protective roof form speak of the natural elements which play such an important role in this graceful landscape at the tip of the Cape.

narrow passage between two buildings,
Commercial St. P-town



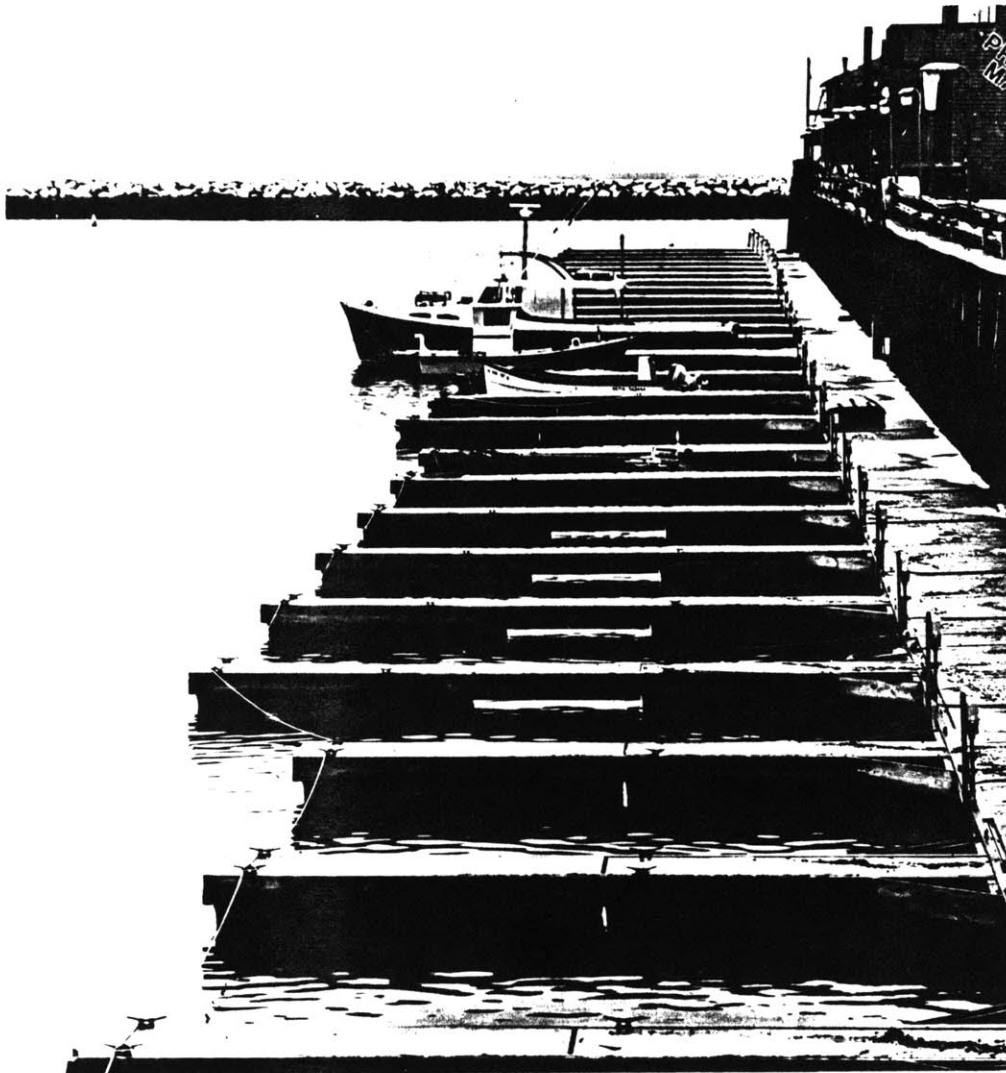


I will use this town as the testing ground for my thesis. What will be the future of this urban environment? If growth is to continue, how might it occur and where? What will it be like?

I have chosen the form of habitable piers to explore a possible alternative for the expansion of this urban environment.

*"Without allowance for filling, a valley will
run dry;
Without allowance for growing, creation will
stop functioning."*

*Lao Tzu,
chapter 39, Tao-Te-Ching*



Project

The idea of habitable piers was chosen as a model for urban expansion in Provincetown for the following two reasons:

- A. Lack of exchange between the town and the water; poor waterfront condition.
- B. Lack of open land for expansion of the town.

Waterfront

Ever since the beginning, the fishing and whaling industries have been a major part of life in Provincetown. The waterfront has therefore always been its focus. Piers finger off from Commercial St. (the front street) into the water. At the peak of the town's fishing history, there were as many as fifty-four piers reaching into the harbor. There are still forty some piers in various conditions of decay today. In the days when they were still used, the piers were not just wooden planks reaching into the water; most of them supported buildings. More often than not, they were some storage or utilitarian building. Most of the buildings in town are perpendicular to the water's edge. Therefore the extension of the buildings into the water on the piers was a natural progression of the town.

Today, the intense commercial fishing industry no longer exists. The ocean

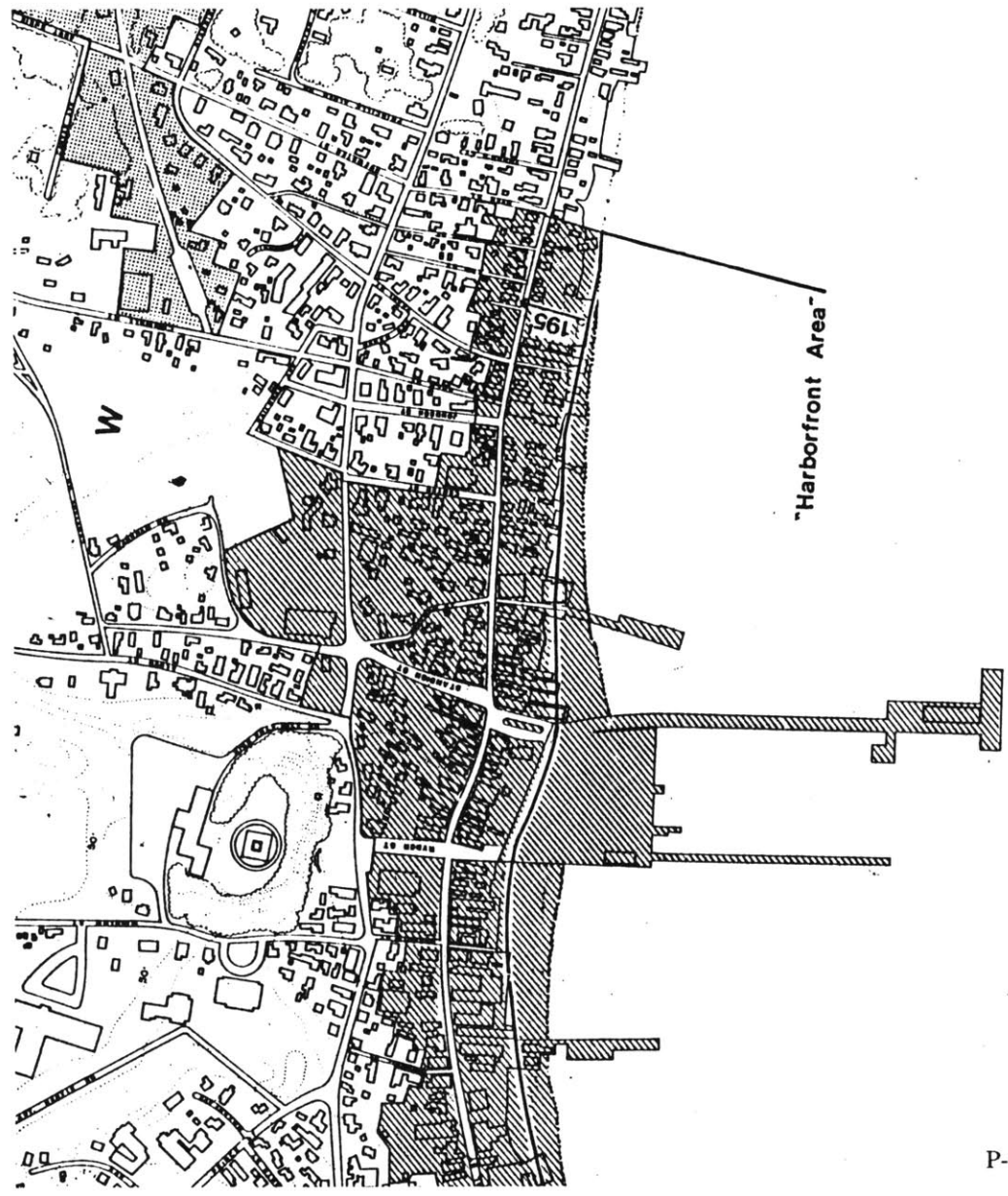


rotting piers P-town



however, is still the greatest resource of this town; not because of fishing, but rather for the viewing of the migration of the whales, the open view of the harbor, the fresh sea air and the recreational boating. With the decline of the fishing industry, most of the piers were left to deteriorate. Today, what is left of most of the piers are only wooden piles -- standing, rotting in the water. The relationship of the town's life with the water has become passive. People passively look at the water from the shore rather than actively engaging with the water. However, the desire for active engagement with the water is still very strong, especially with the rising interest in whale watching, sport fishing, surfing, sailing, and private boating activities. Since most piers are either in need of repair or have been converted into non-water related uses, there are only two* serviceable piers left. There are not enough facilities to support the increasingly active exchange between the town and the water.

* There is a third functional pier in town. However it is owned and used by the USCG only. There is no public access to this pier.



"Harborfront Area"



P-town zoning map, Planning Dept. P-Town



In addition, the town does not have enough public open space for gathering. At present, the largest public open lot in the town is the parking lot at the base of the piers. Other than that, there is not a single real public plaza for people to gather, and for festivals to take place. In the summer, the entire Commercial St. is the public plaza. With people packed from wall to wall on Commercial St. there is no possibility for special events to take place. There is simply not enough capacity for any additional activity to take place. The town is reaching its saturation point, and it is suffocating itself.

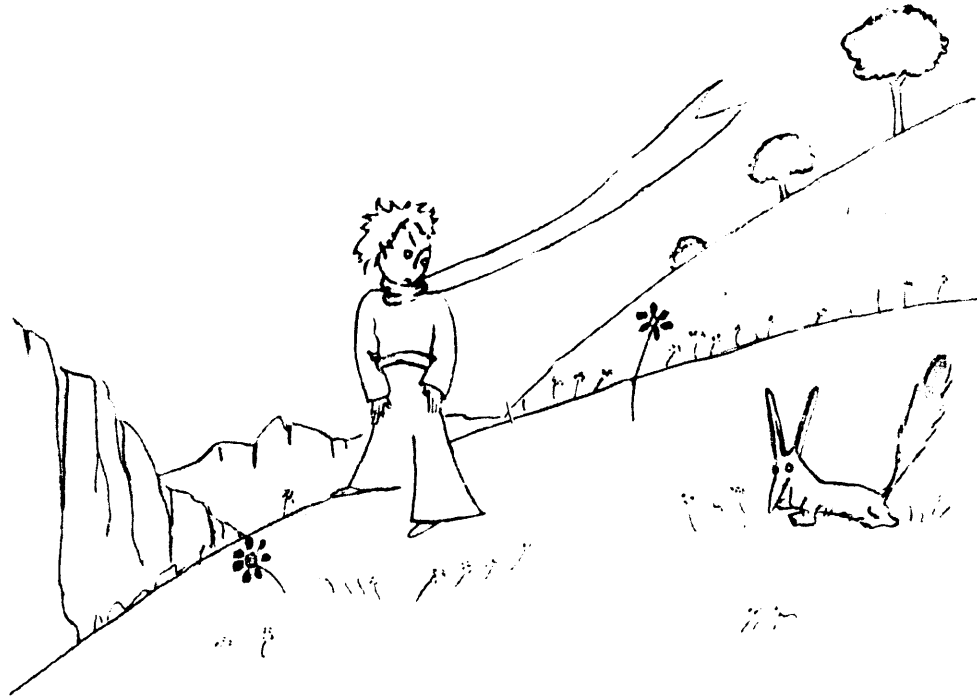


Commercial St.

Land

Provincetown has very limited land area since most of the land on the outer Cape belongs to the Cape Cod National Seashore authority. By law no new buildings can be built on this land even if privately owned. It is also the desire of the local residents to preserve some of the open landscape to prevent further deterioration of this fragile land. Without land for the town to expand, the waterfront and the harbor seem to be the logical alternative, assuming that the life of the town will continue, and will not become another museum town like Williamsburg in Virginia. Thus, for the town to grow into the next century as a community with its own identity and vitality, the waterfront is the only alternative for its expansion.



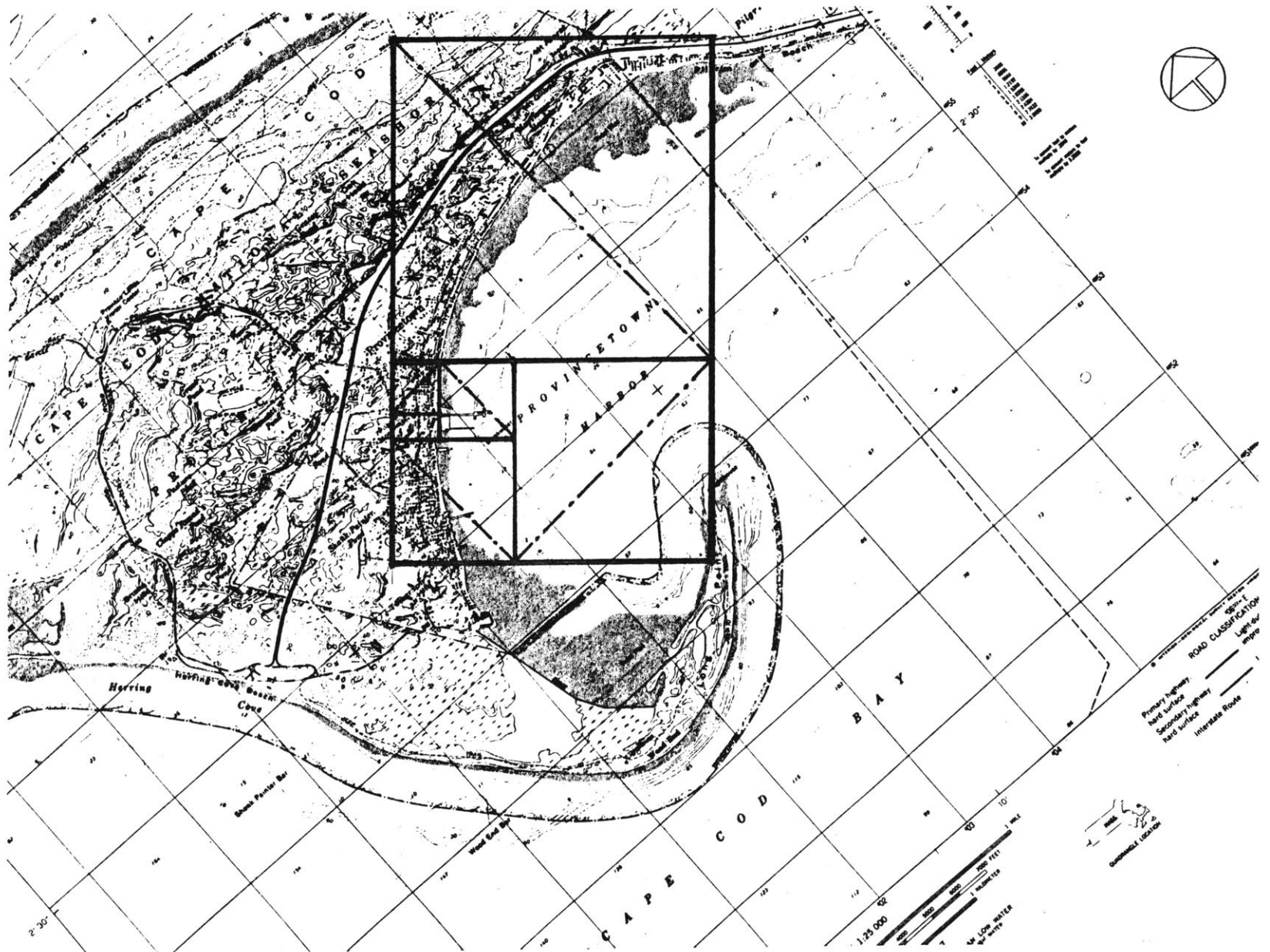


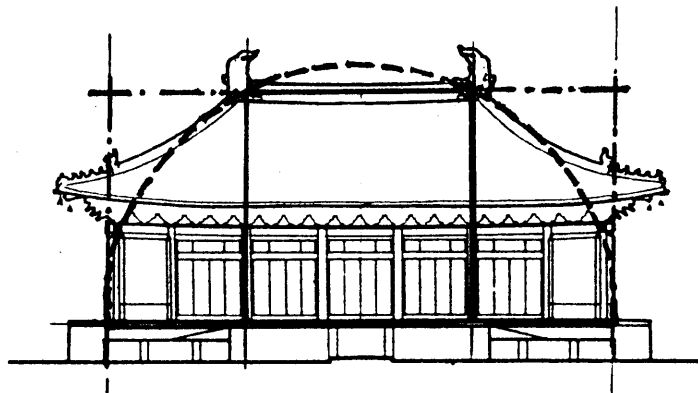
".....What does that mean--'tame'?" "It is an act often neglected," said the fox, "It means to establish ties."

" you see the grain-fields down yonder? I do not eat bread. Wheat is of no use to me. The wheat fields have nothing to say to me. And that is sad. But you have hair that is the color of gold. Think how wonderful that will be when you have tamed me! The grain, which is also golden, will bring me back the thought of you. And I shall love to listen to the wind in the wheat..."

"What is a rite?" asked the little prince....."They are what make one day different from other days, one hour from other hours."

*de Staint Exupery
The Little Prince*





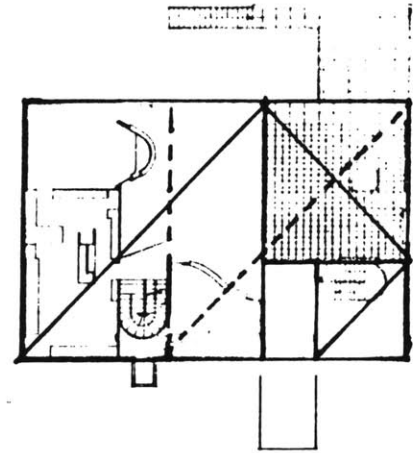
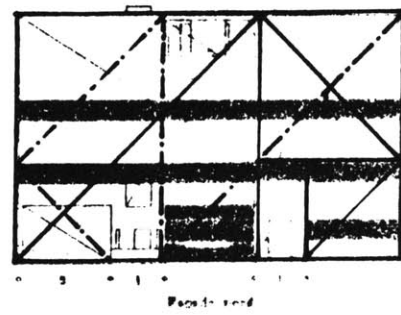
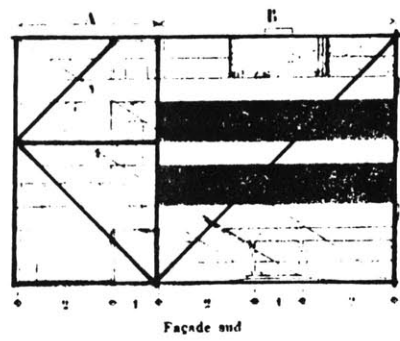
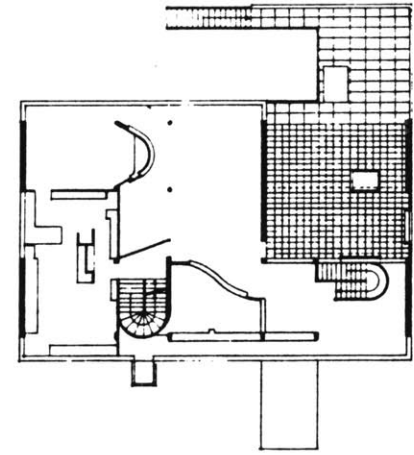
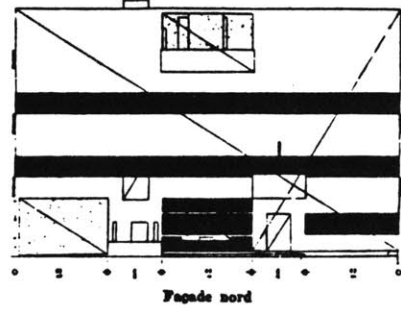
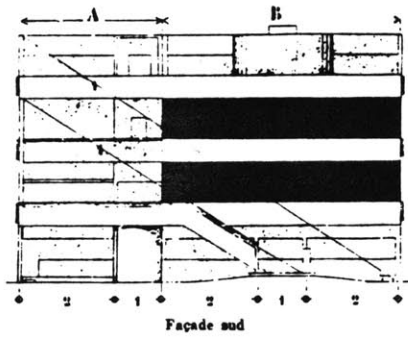
山西芮城永樂宮三清殿
temple San-Si, China

Design

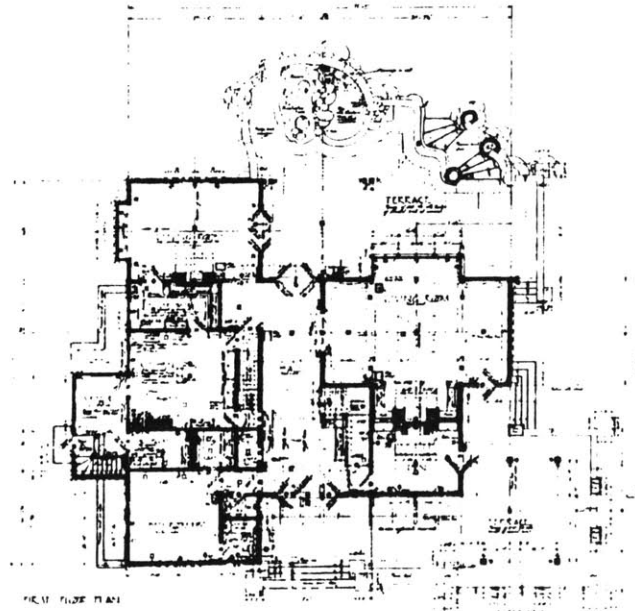
Geometry and Dimensions

The breakwater and the shoreline form a square. The town pier where the railroad used to terminate forms a golden rectangle within the square. A range of dimensions is set up with the square and golden rectangle as a guideline for the design. The diagram on page (28) shows the square of the breakwater and shoreline and how it relates to the larger dimension of the harbor, the town hall, and the hill on which the Pilgrim Monument stands.

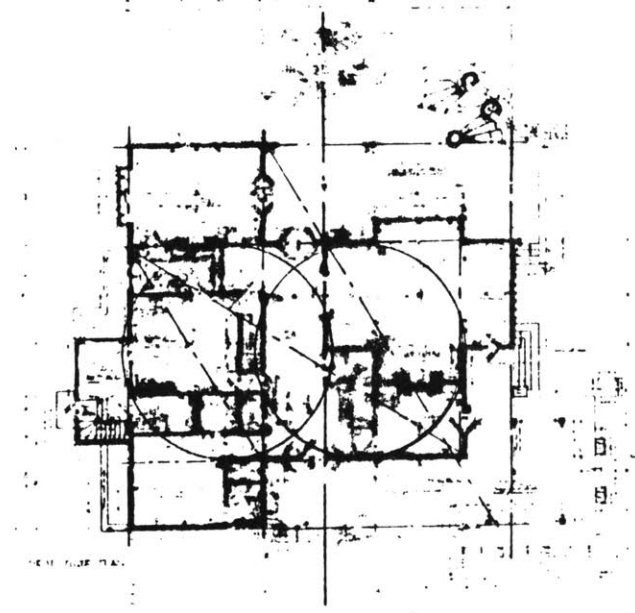
This geometrical and dimensional relationship has been used by architects and builders throughout history everywhere in the world. It is a relationship independent of the architectural style of the times. It is not my intention in this thesis to prove or disprove this case but to use these geometrical relationships as references for my own project.



Villa Stein de Monzie, LeCorbusier

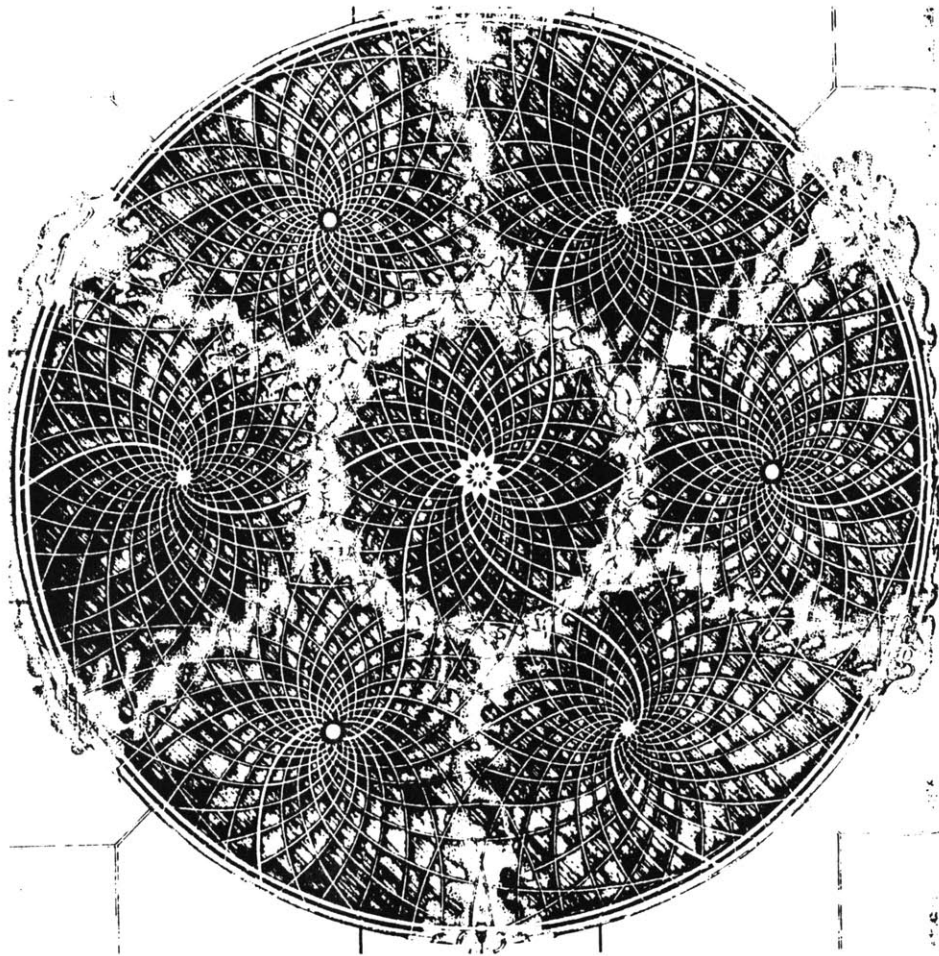


FIRST FLOOR PLAN



FIRST FLOOR PLAN

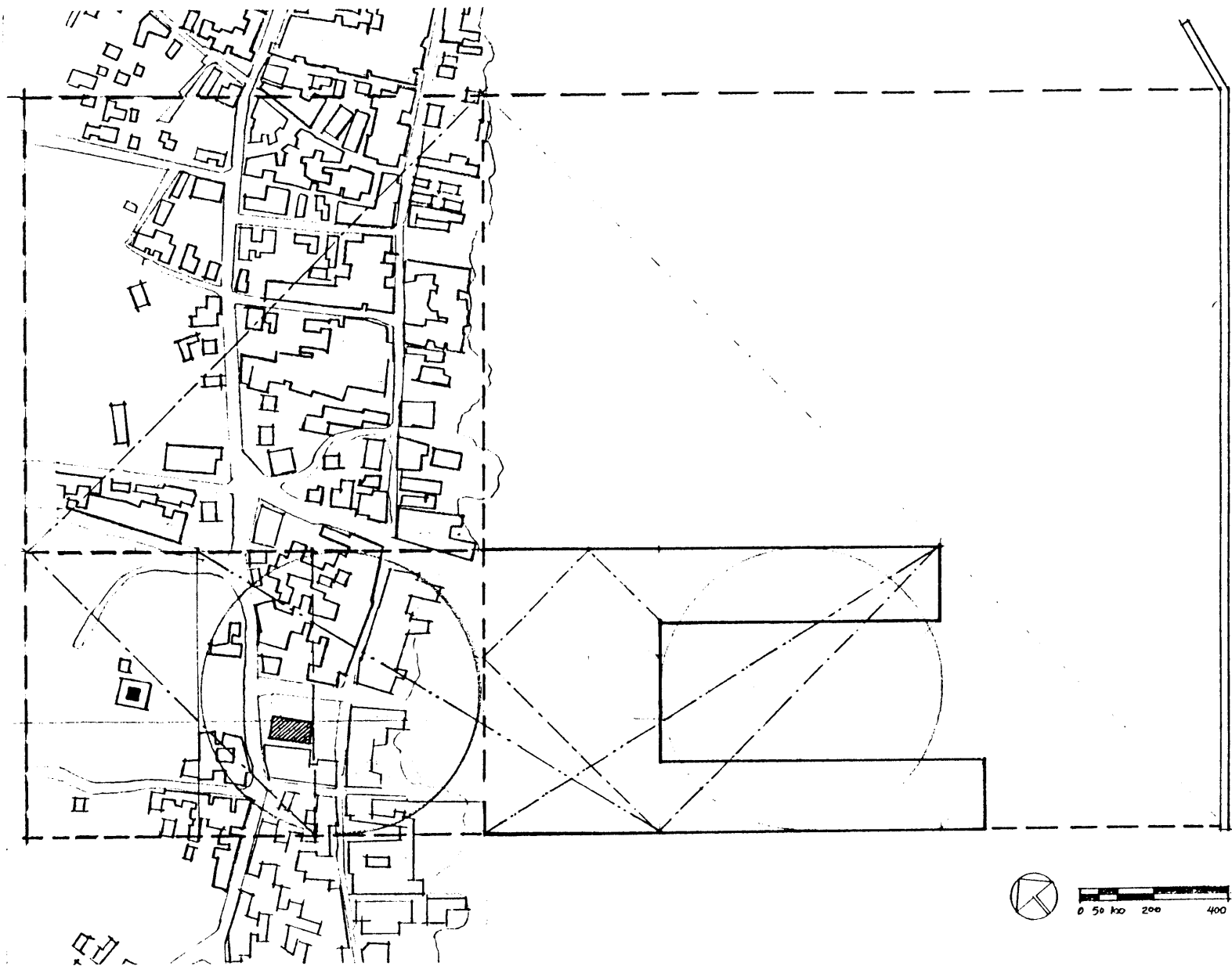
Gamble house,
Green and Green



Roger C. Ferri, design for a pedestrian city (project)

"...These patterns of events are always interlocked with certain geometric patterns in the space..... They are the atoms and the molecules from which a building or a town is made....."

*Christopher Alexander,
"The Timeless Way of Building"*



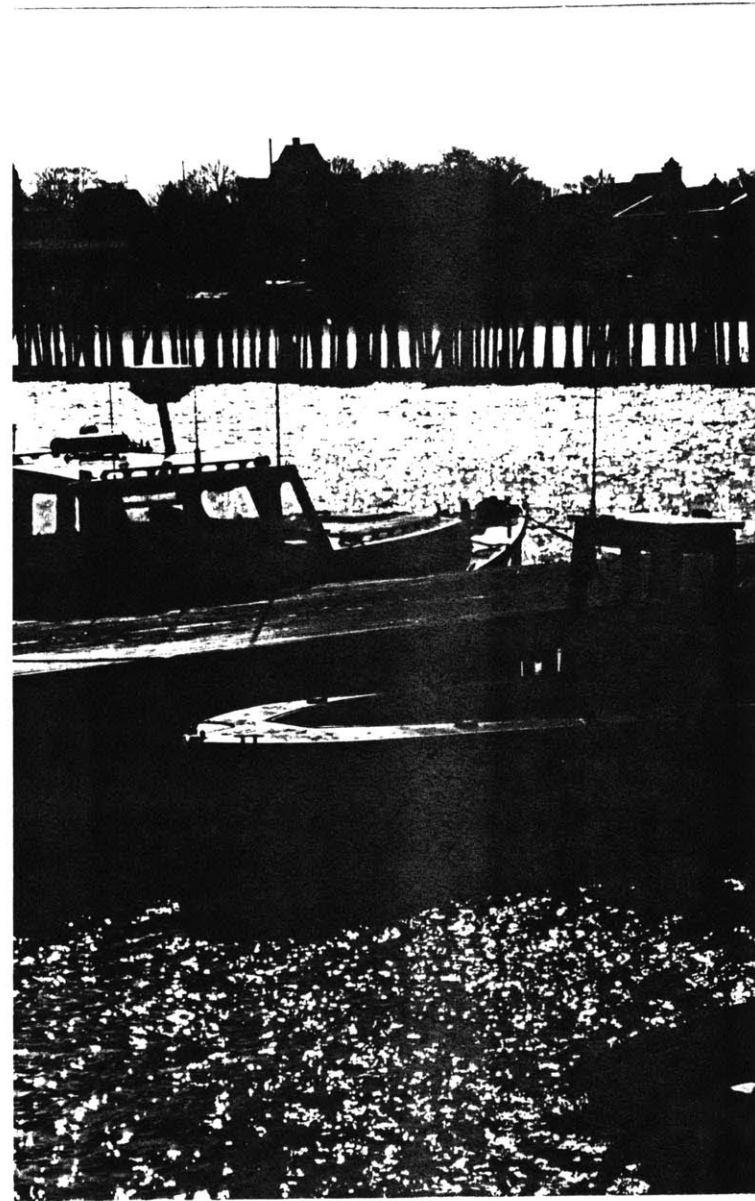
Landscape Move

The harbor is the largest collective space of this seaside town. But this small piece of water is only a part of the ocean. The Pilgrims landed here first before moving onto Plymouth. Later the harbor offered shelter for the cod fishing fleet. The town's fishing industry reached its peak during the late eighteenth century with its whaling fleet.

The first design decision was to extend the town into the water, and reciprocally allow the water to penetrate the town.

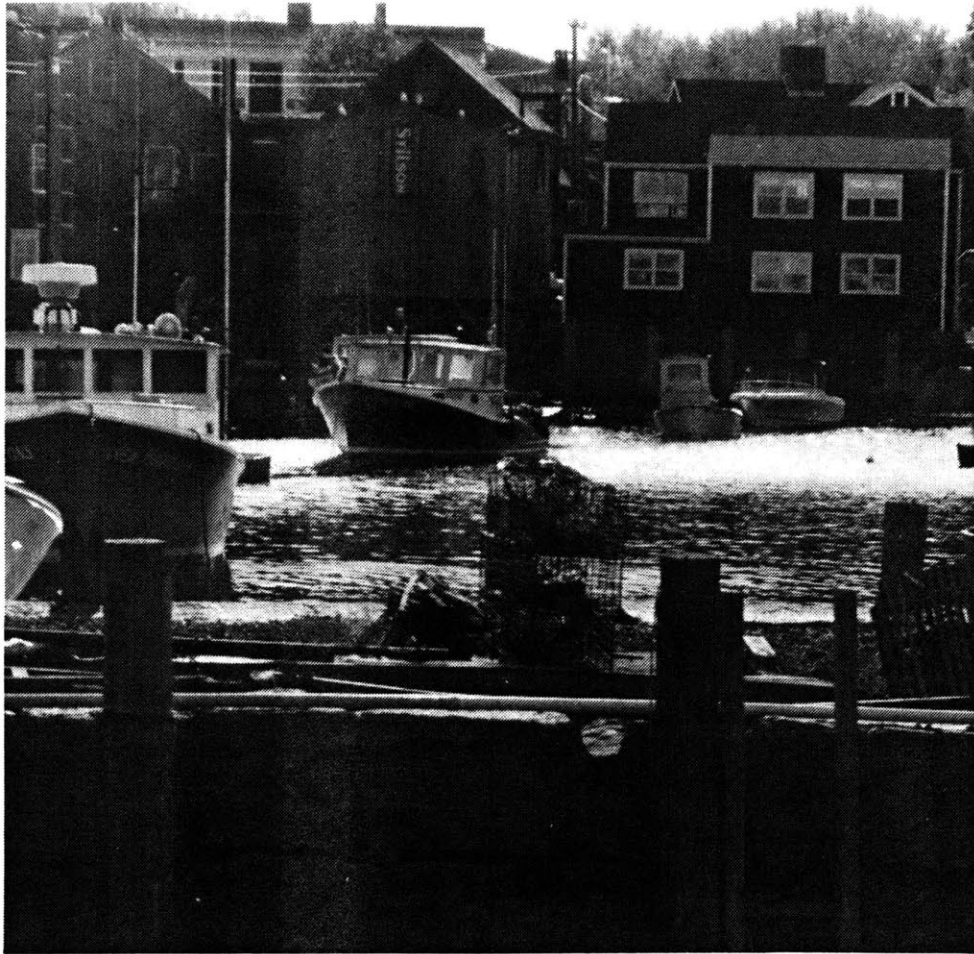
The width of the piers is about the same depth as a block in Provincetown. The piers extend into the harbor like arms of the town reaching out and embracing the water. Bounded on either side by two thousand feet long piers is a measurable part of the ocean. The two immense piers allows one to understand the largeness of the water between the piers, the size of the harbor, and consequently the immensity of the ocean itself.

As the waterfront and the harbor is the largest collective space in the town, one would only expect open public access and public space on the water for every citizen to experience and enjoy the water.

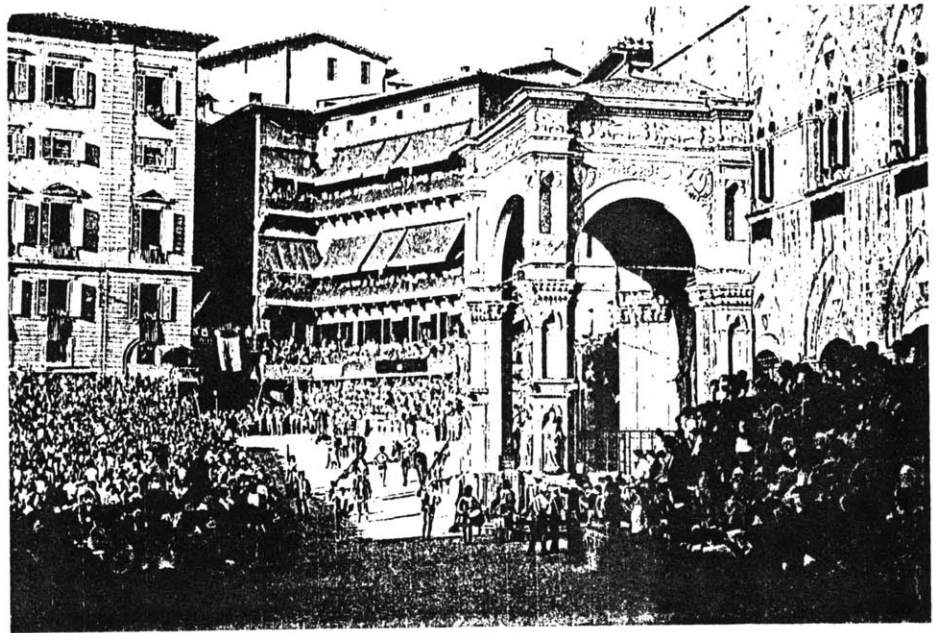
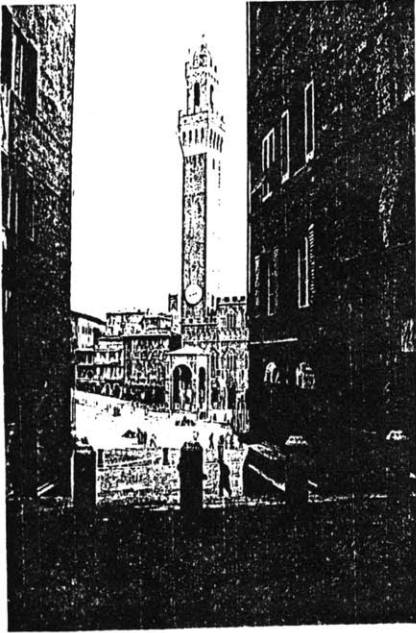


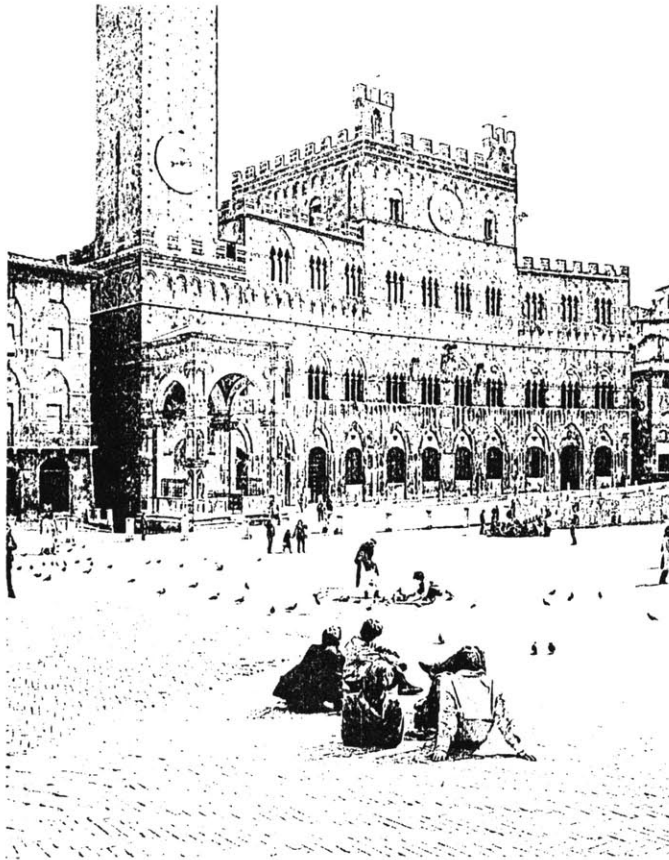






...There should be a place for the town to come to enjoy the fireworks on the Fourth of July; a place to gather for the blessing of the fleet at the beginning of the fishing season; a place for festivals to take place; and a place to watch a gray sea gull's six foot wingspan up close; a place to fly a kite; to feel the sea breeze rushing through your hair, and the salty air brushing against your skin; or just a place to sit and watch the fishing boats bring back the day's catch and wave to the crew onboard the last whale watching boat sailing into the sunset....

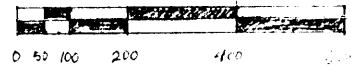
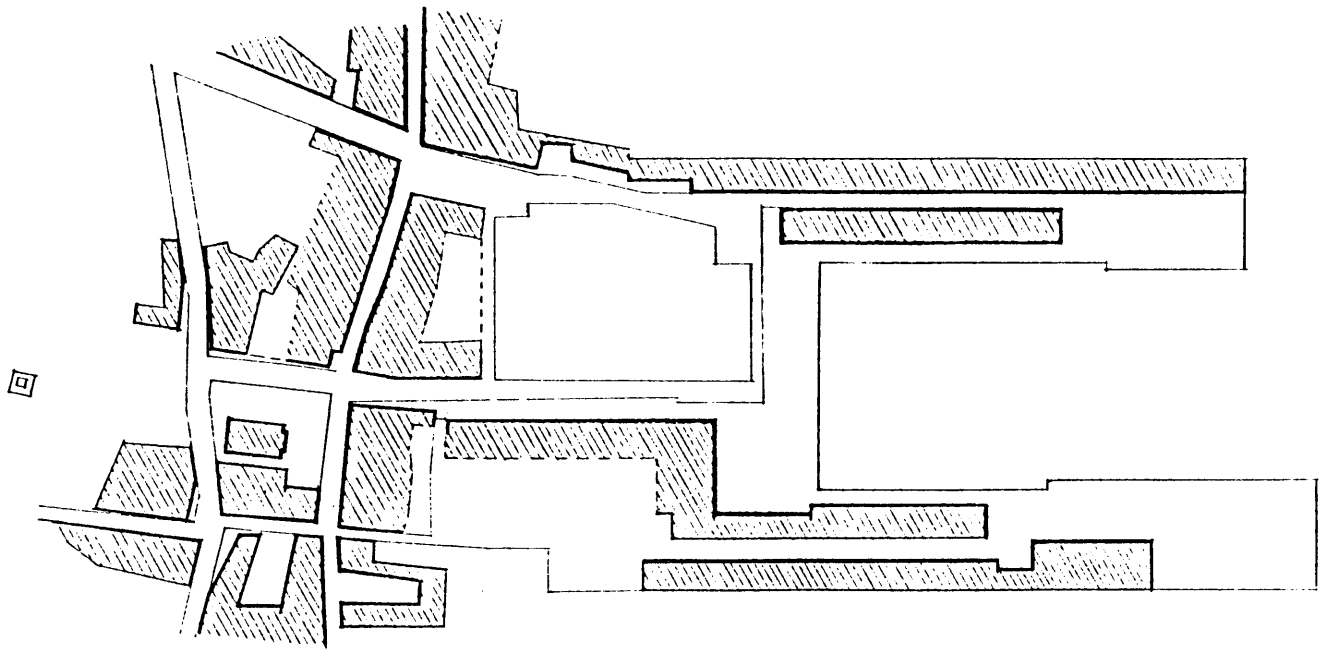


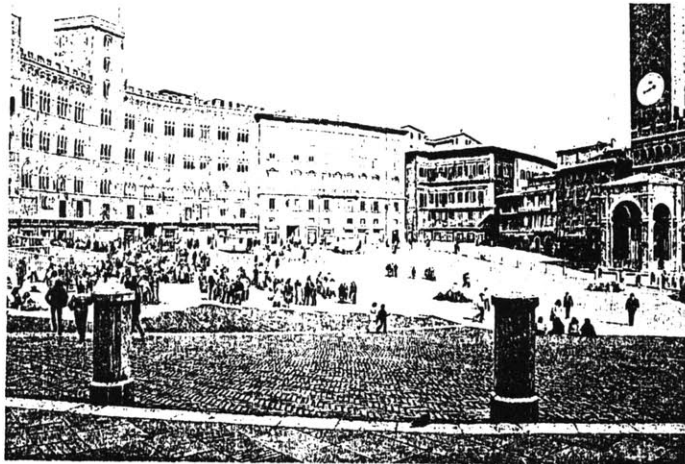
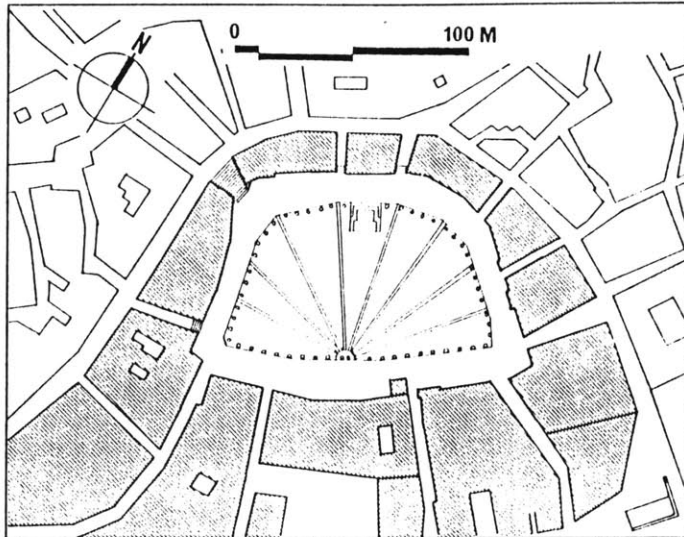


Collective Public Spaces

The basic outline of the piers is defined by this geometrical and dimensional relationship. The first order public space for the town is the harbor itself. The configuration of the piers encloses a body of water which serves as the second order collective space within the breakwater and the shoreline. At the base of the piers is the first public space on land. Currently at the base of the town's pier is a large parking lot. With limited land and narrow streets, there is never enough parking space for the visitors.

Often in a project like this, one can assume that there would be a ban or a limit on the number of vehicles allowed into this part of the town. However, this is not a reasonable presupposition for any realistic solution because we live in an automobile society with limited public transit systems. The design proposes an alternative treatment of the





parking lot. The parking lot is submerged three feet into the ground. Therefore, from the street, the parking lot is analogous to the water between the piers. One's vision is not obstructed by the cars parked in the lot and, moreover, one can experience the larger dimension of the entire parking lot.

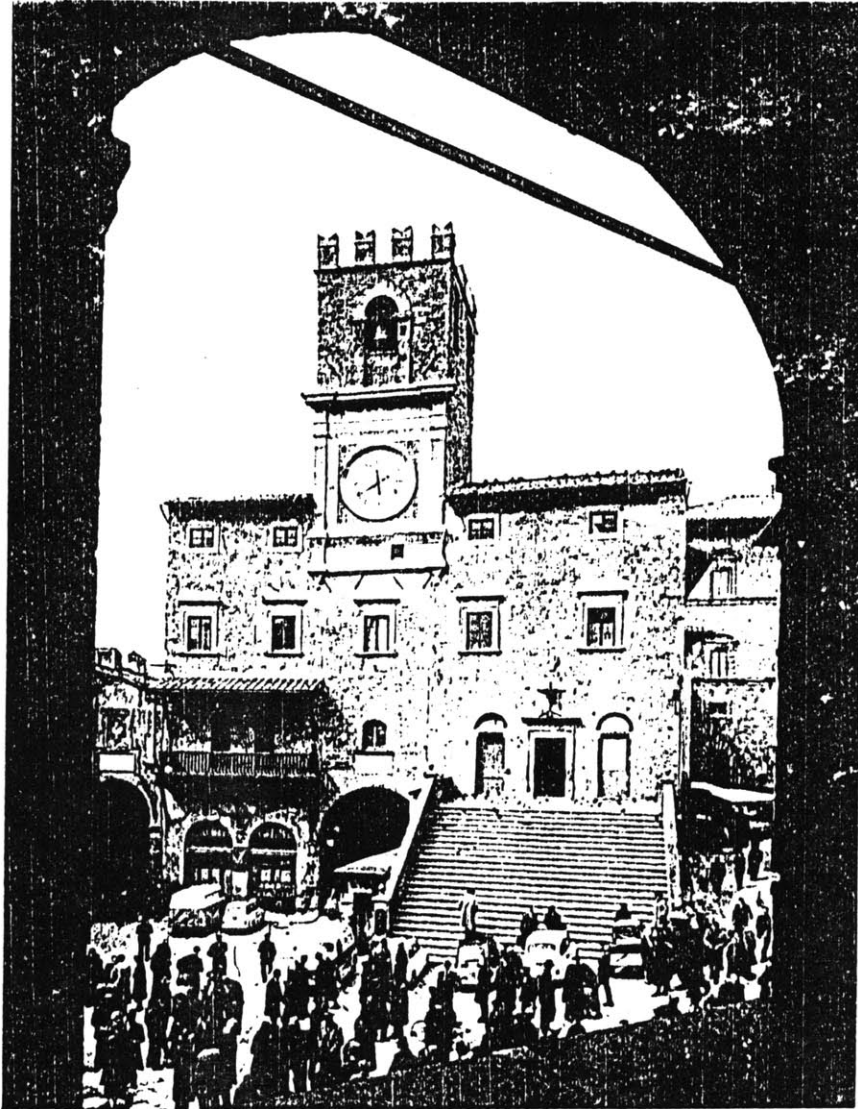
Arriving by boat from the sea, one first encounters the harbor, then the water between the piers, followed by the sunken parking lot which echoes the experience of the water between the piers. The parking lot is part of the zone of exchange between the town and the water. The submersion of the parking lot also gives one a sense of security as the cars are contained in this three feet deep "pond". In addition to being a place for parking, this "pond" can also serve as a stage for a variety of collective town activities. It can be used as a flea market or as a market place. On the Fourth of July, families can come and have tailgate picnics in the "pond" before the festival and fireworks begin. On these special occasions, the local high school

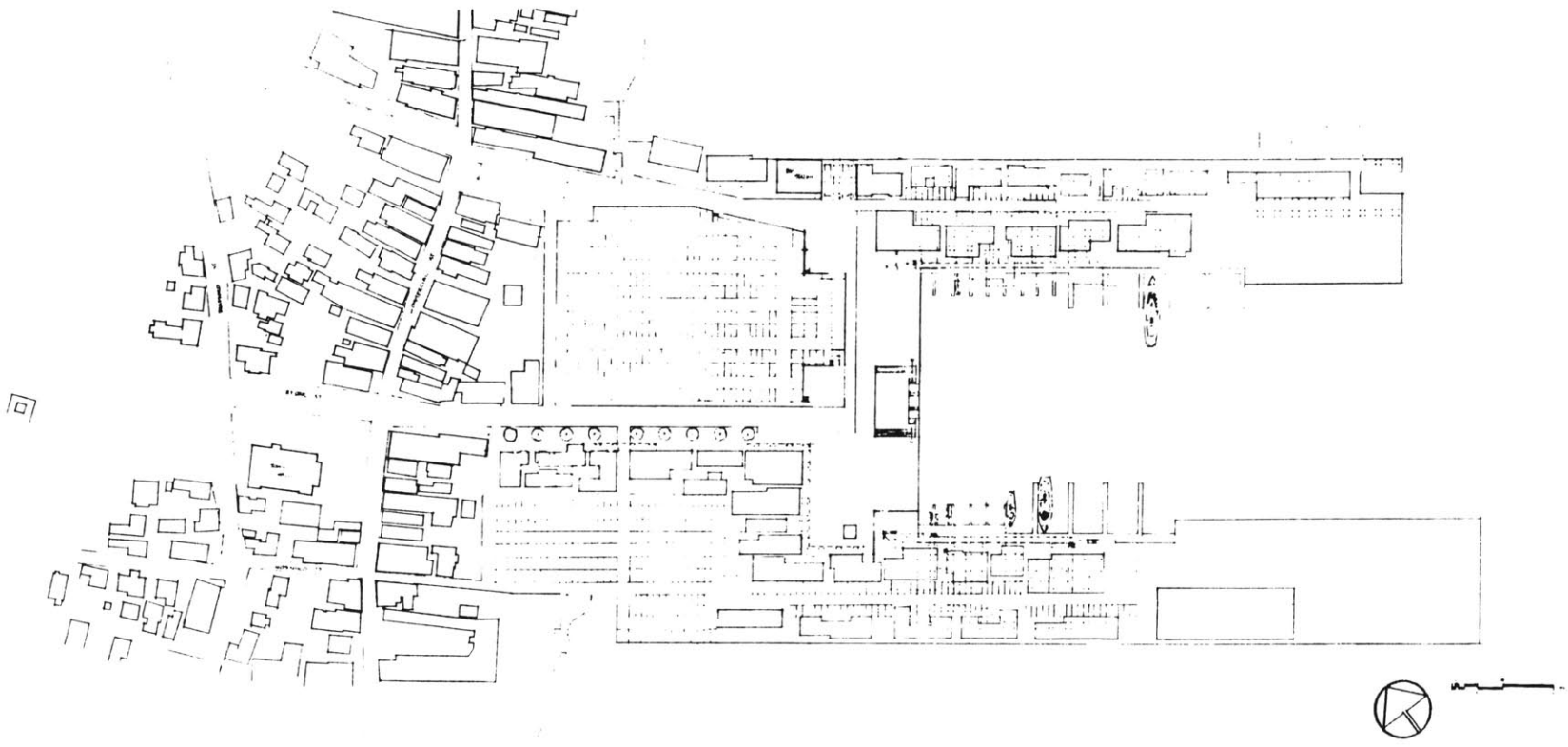
field can be used for parking and the "pond" can be the center stage for the festival.

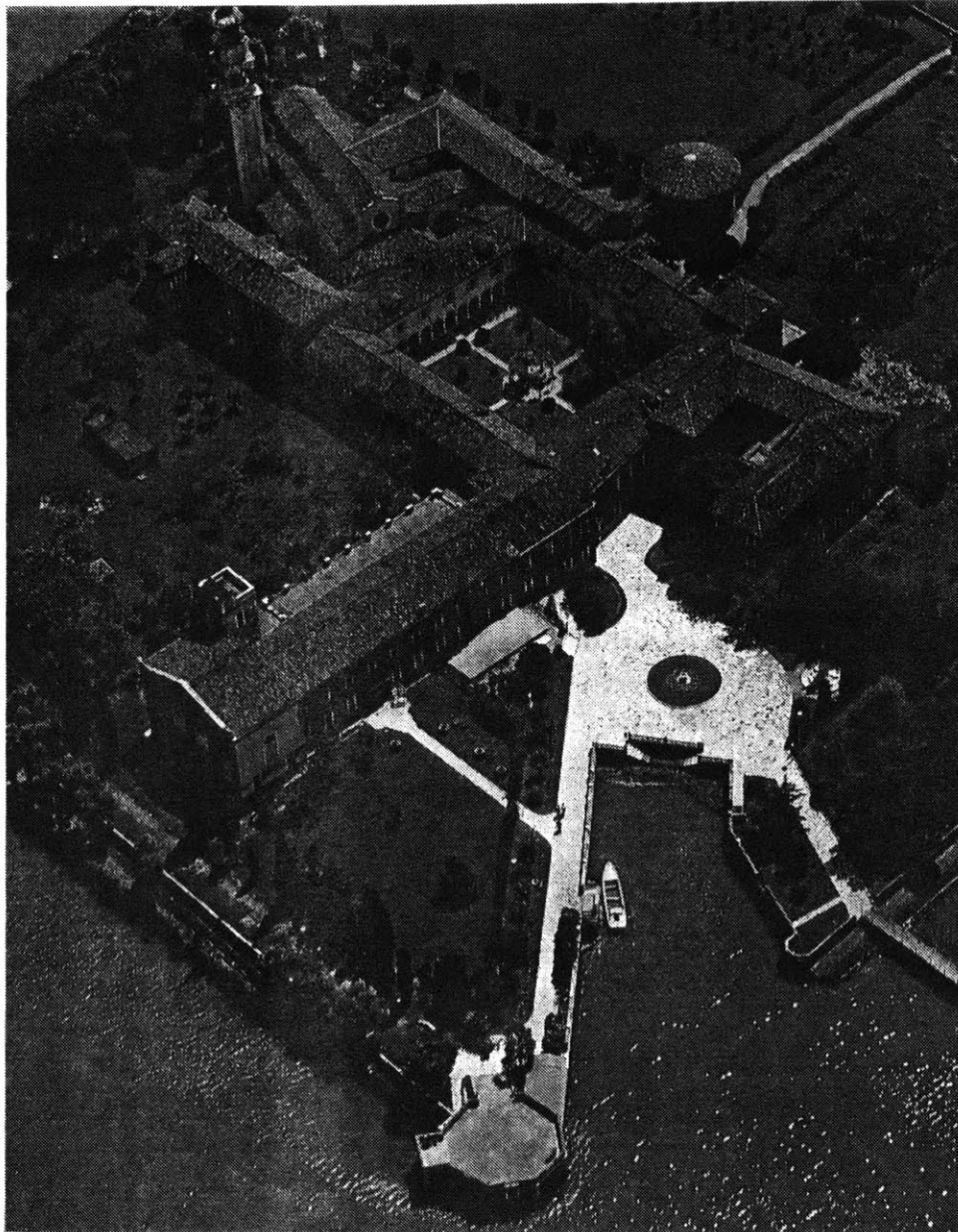
Because of its central location and suggestion of containment, the "pond" can take on a very different life once in a while, not unlike Piazza del Campo in Siena which turns into a race track once a year.

When the "pond" is normally used for parking, there are smaller public spaces open for everyday use. The next largest public space is the area around the harbor master tower. It is a point of arrival. The bus station is on the other side of the plaza, and the ferry terminal is at the tip of one of the piers and next to the parking lot. For the people arriving by car, this plaza is a place for large groups of people to gather.

There are other collective spaces between and among the buildings which open onto the larger public areas, such as the water between the piers, the parking lot, and the plaza. All of these spaces are hierarchically organized according to the same principle.



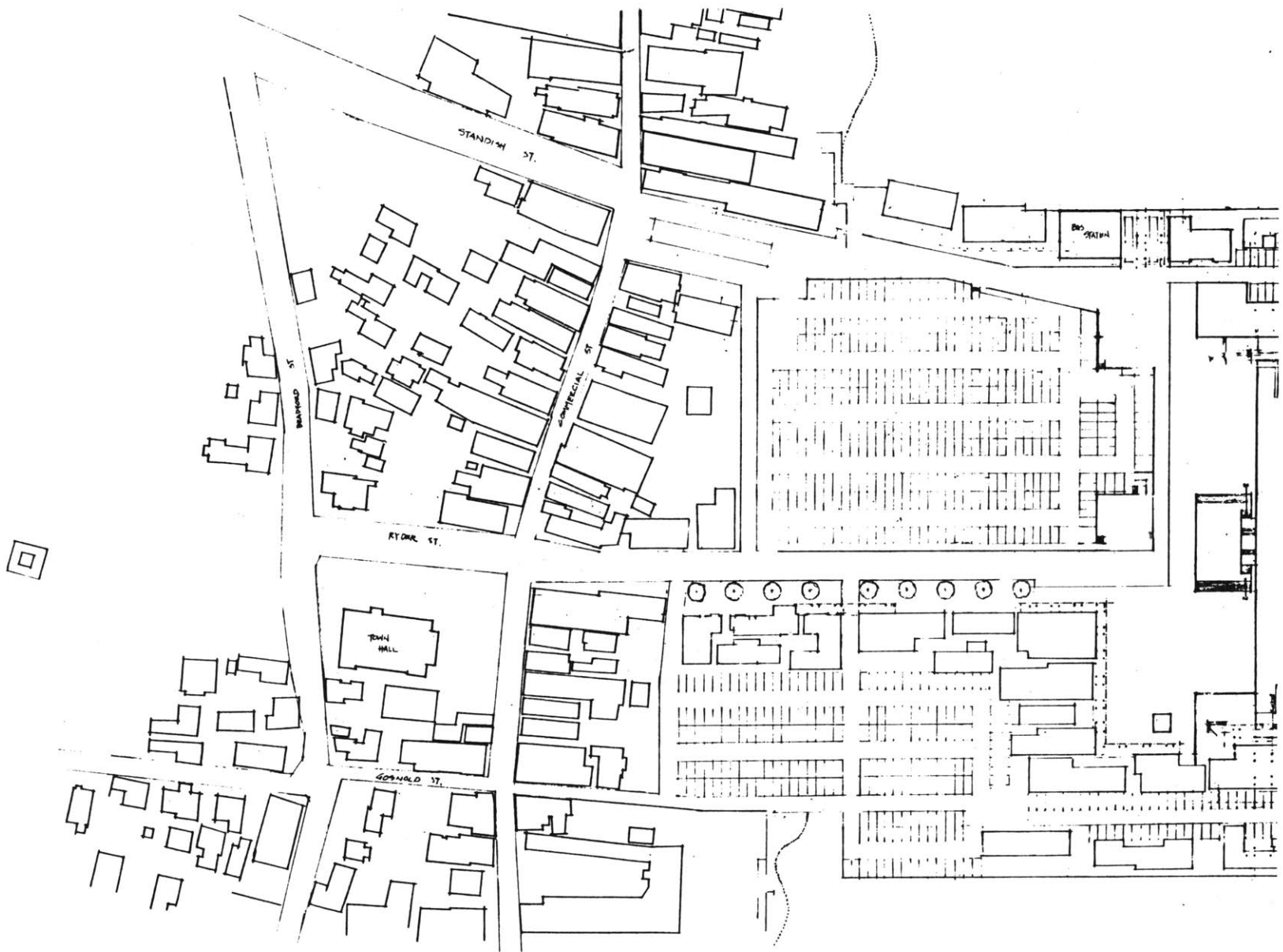


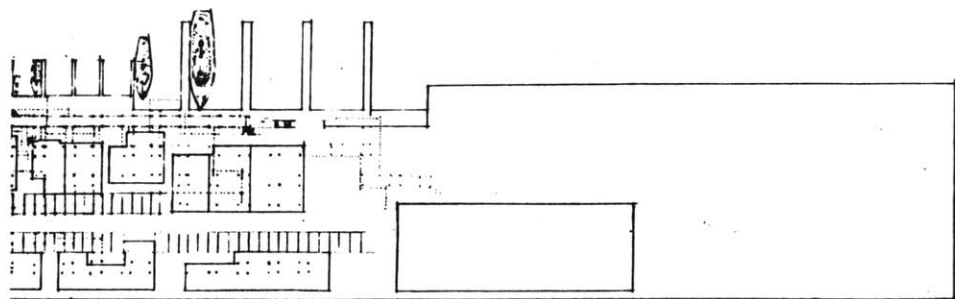
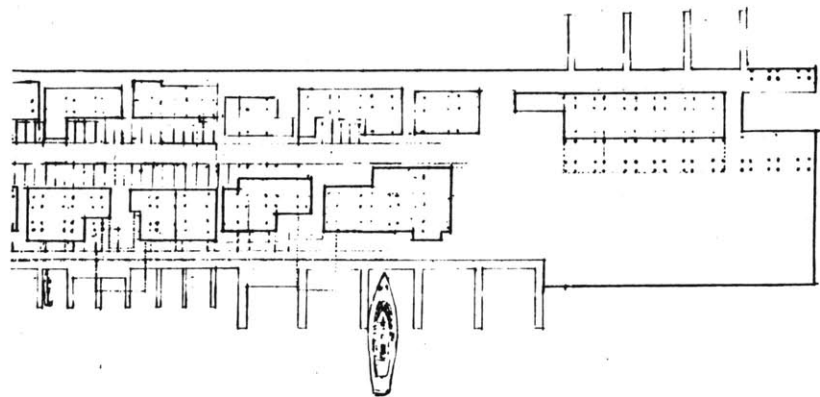


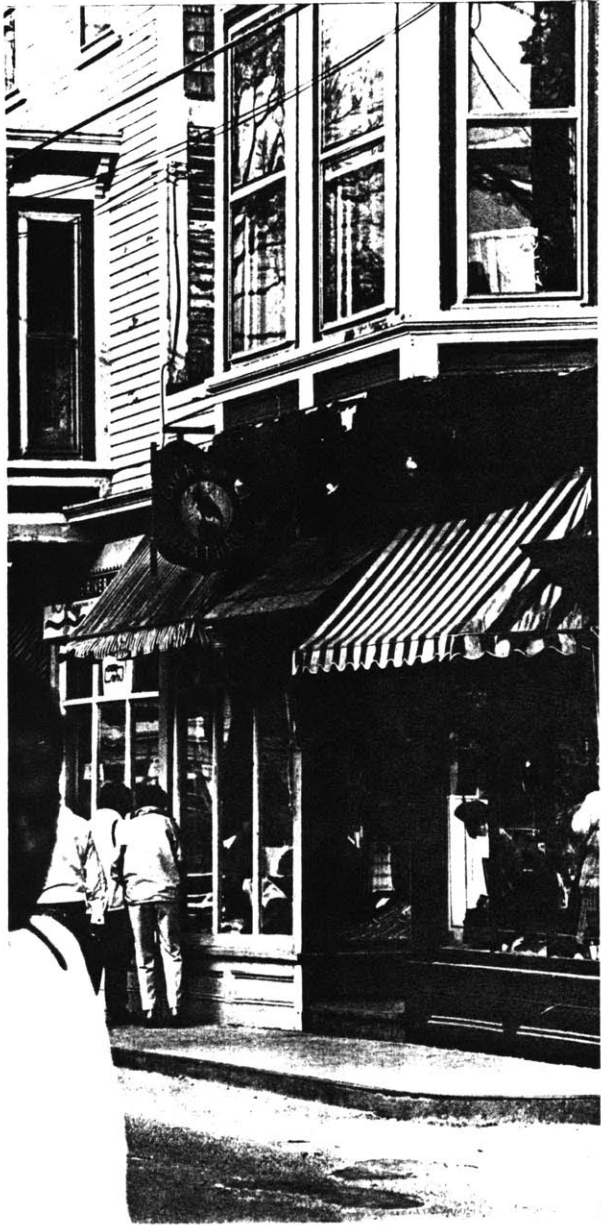
"The Plan

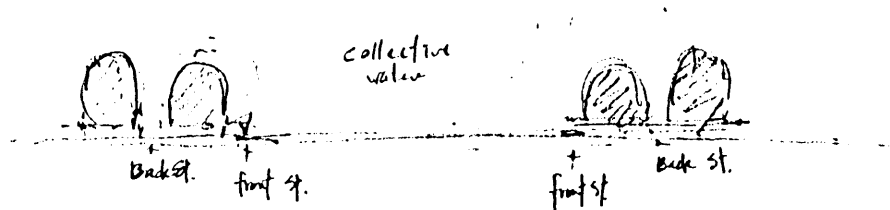
I think that a plan is a society of rooms. Areal plan is one in which rooms have spoken to each other. When you see a plan, you can say that it is the structure of the spaces in their light."

Louis I. Kahn
Between Silence and Light



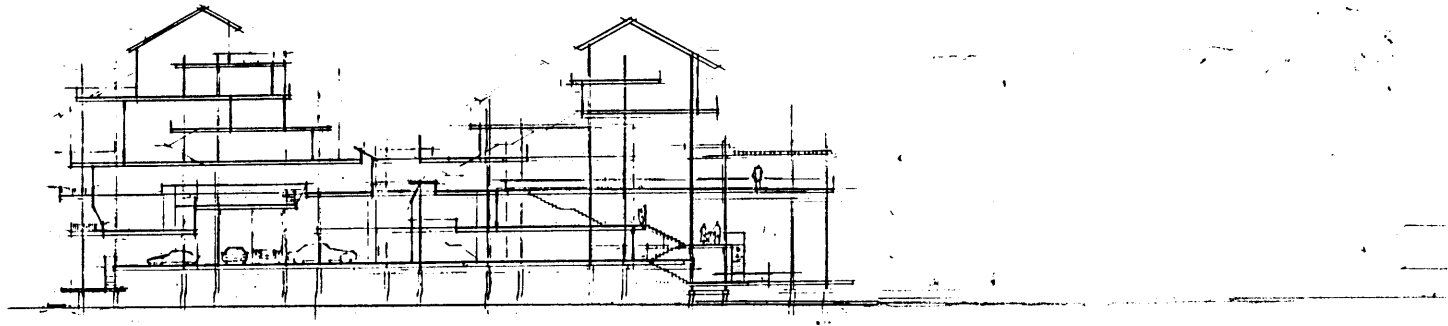


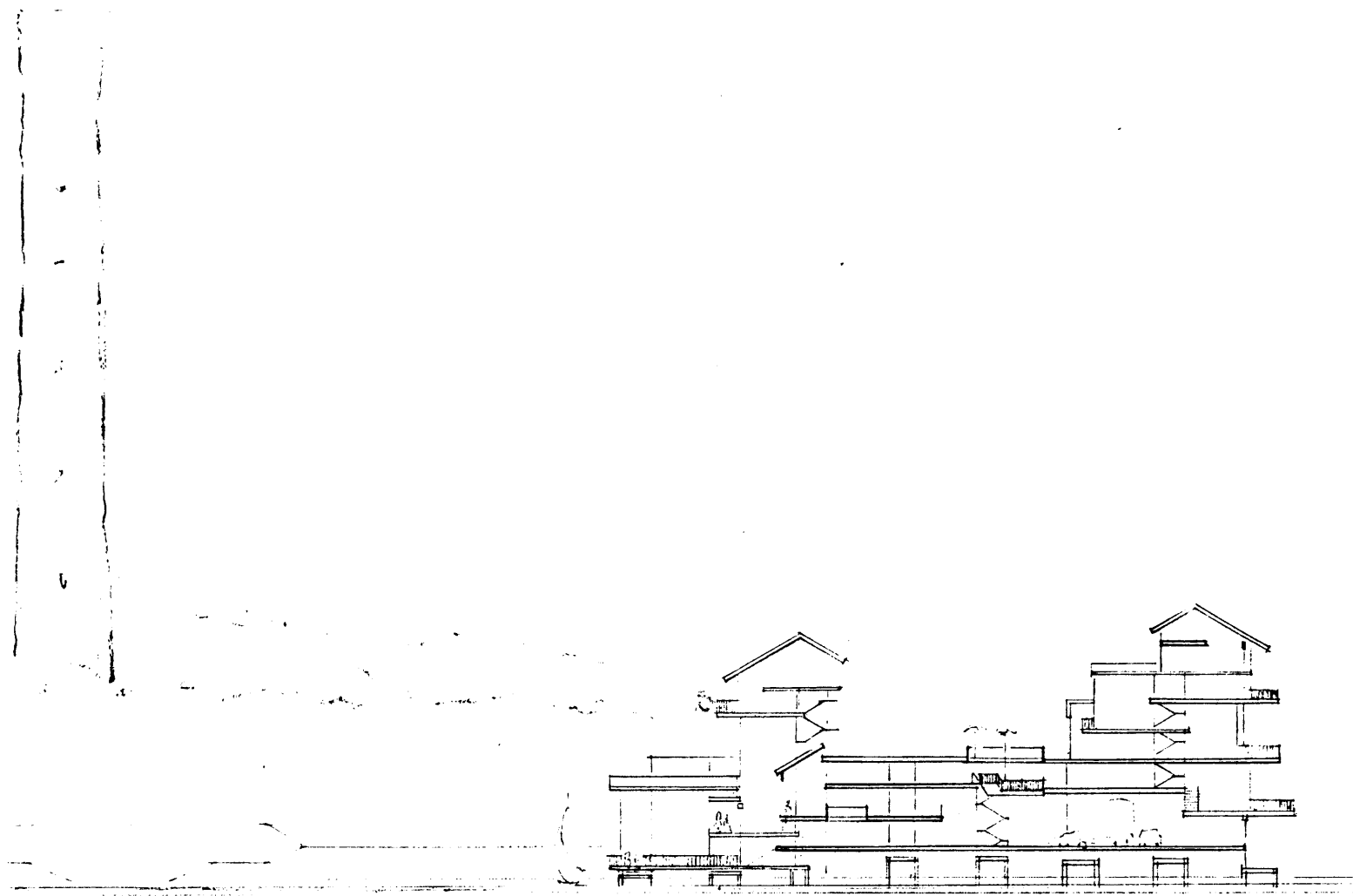


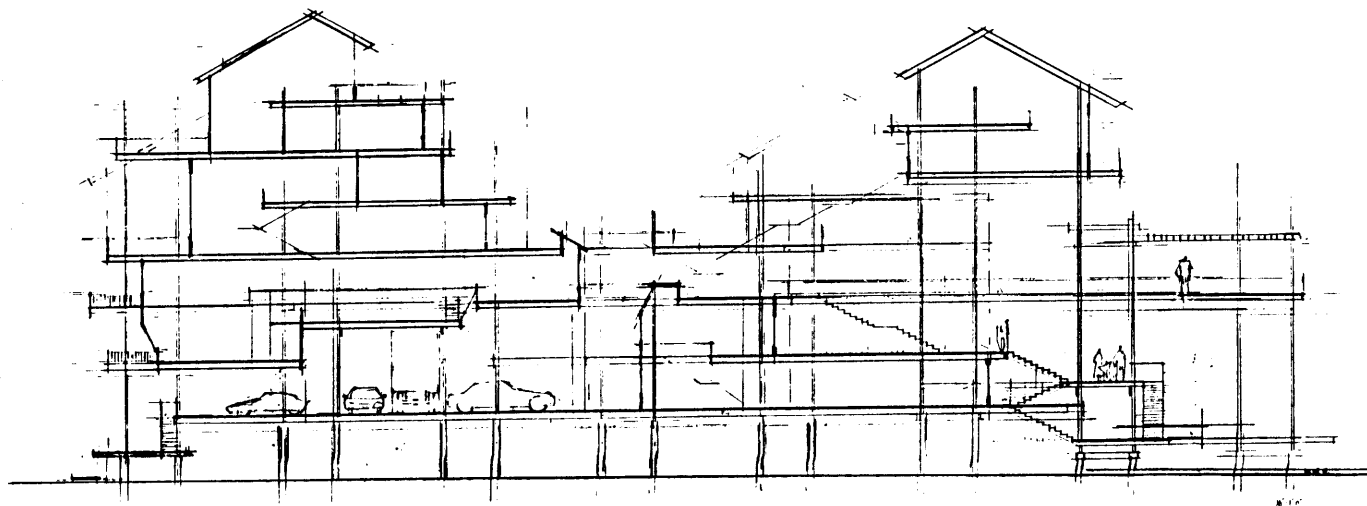


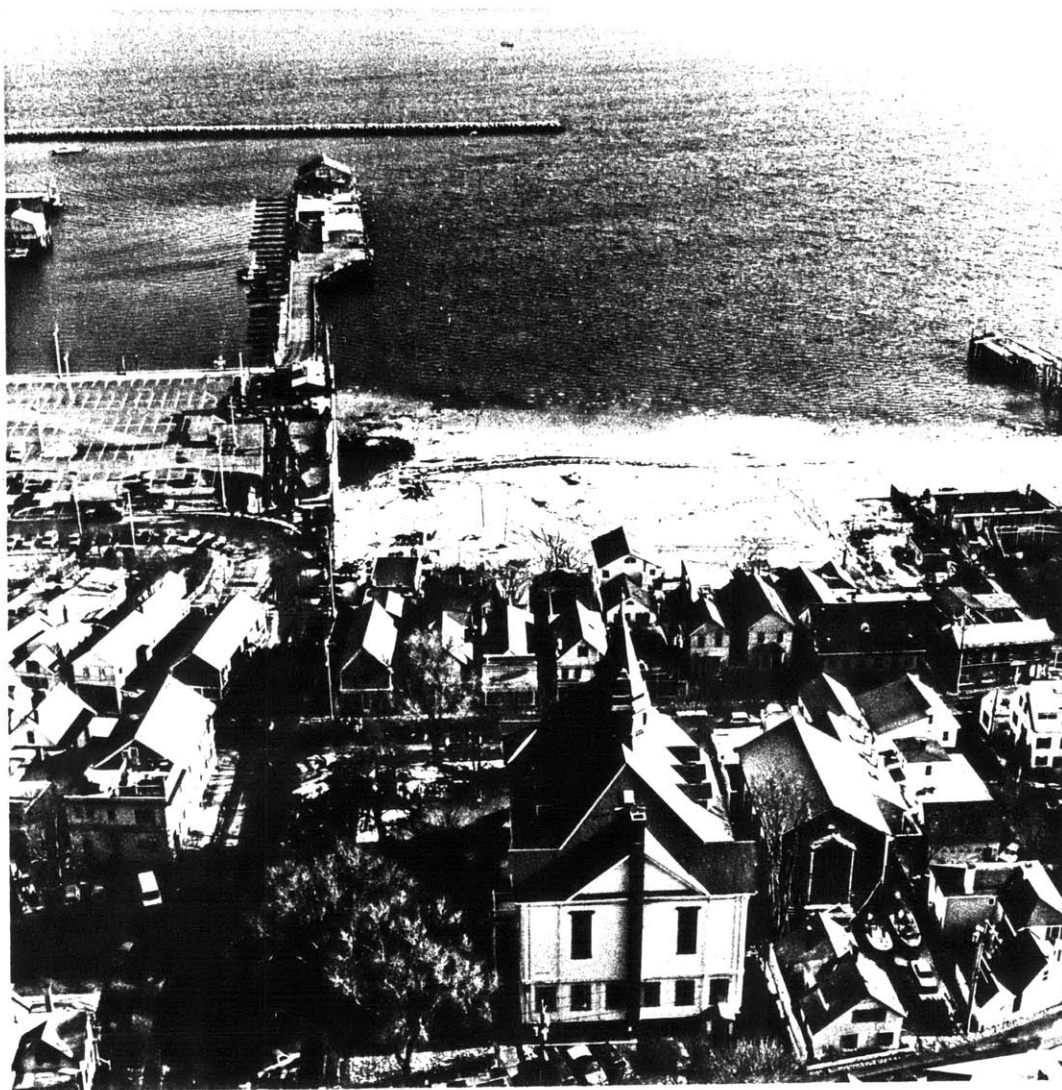
Urban Quality

The urban structure used for the pier is the front and back street model of Provincetown. Traditionally, Commercial St. is the front street, and Bradford Street is the back street. The front street is mainly for pedestrians and most of the commercial activities. Vehicles are limited to the back street because Commercial Street is too narrow to contain both people and cars. The piers follow this same structure, with the front street for commercial and pedestrian uses and the back street for vehicular and service access for both streets. Since the water between the piers serves as the collective space, it is only appropriate for the active commercial streets to be on the inner edges of the piers. The back street, on the other hand, accommodates the more private residential units on the outside of the piers.



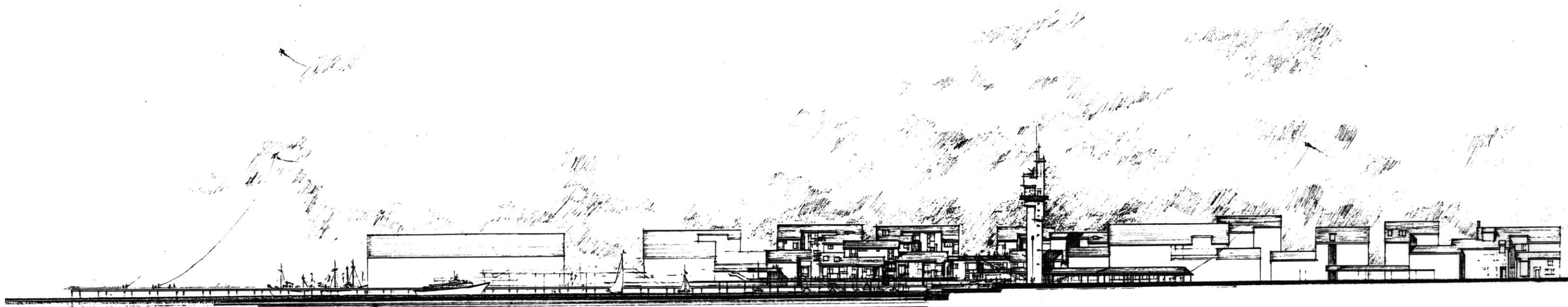


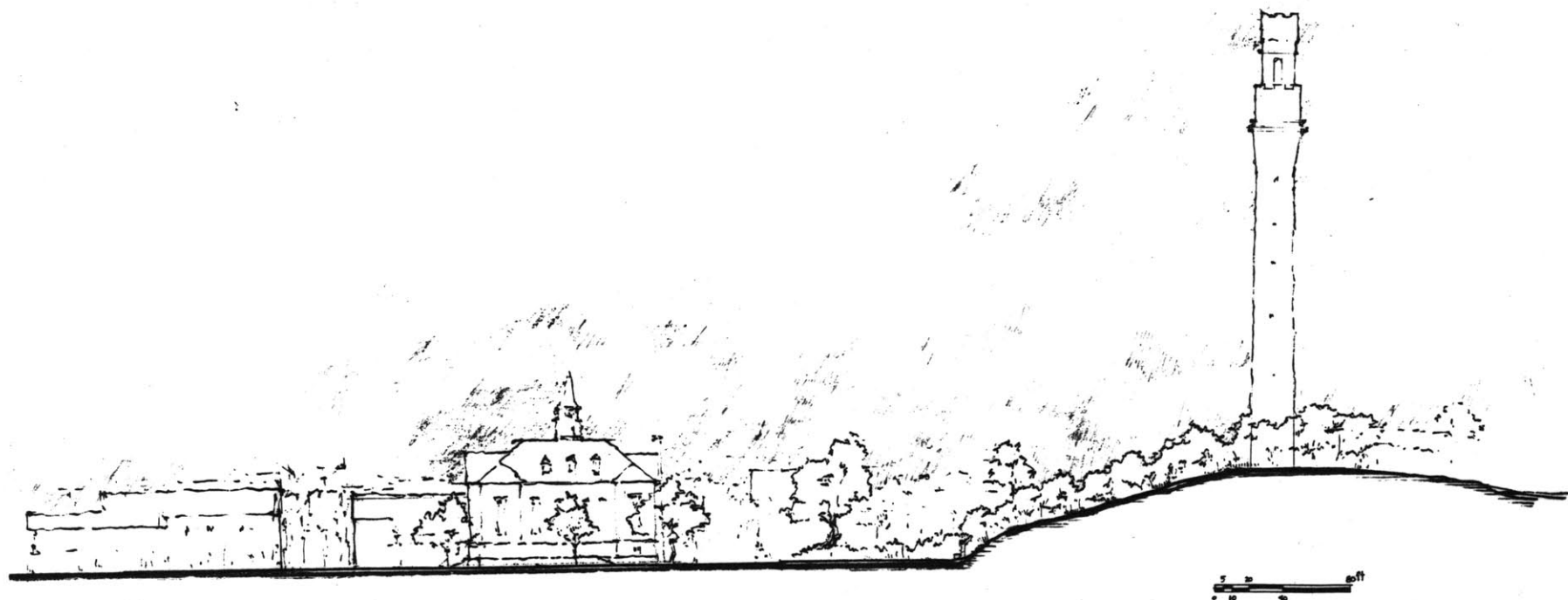


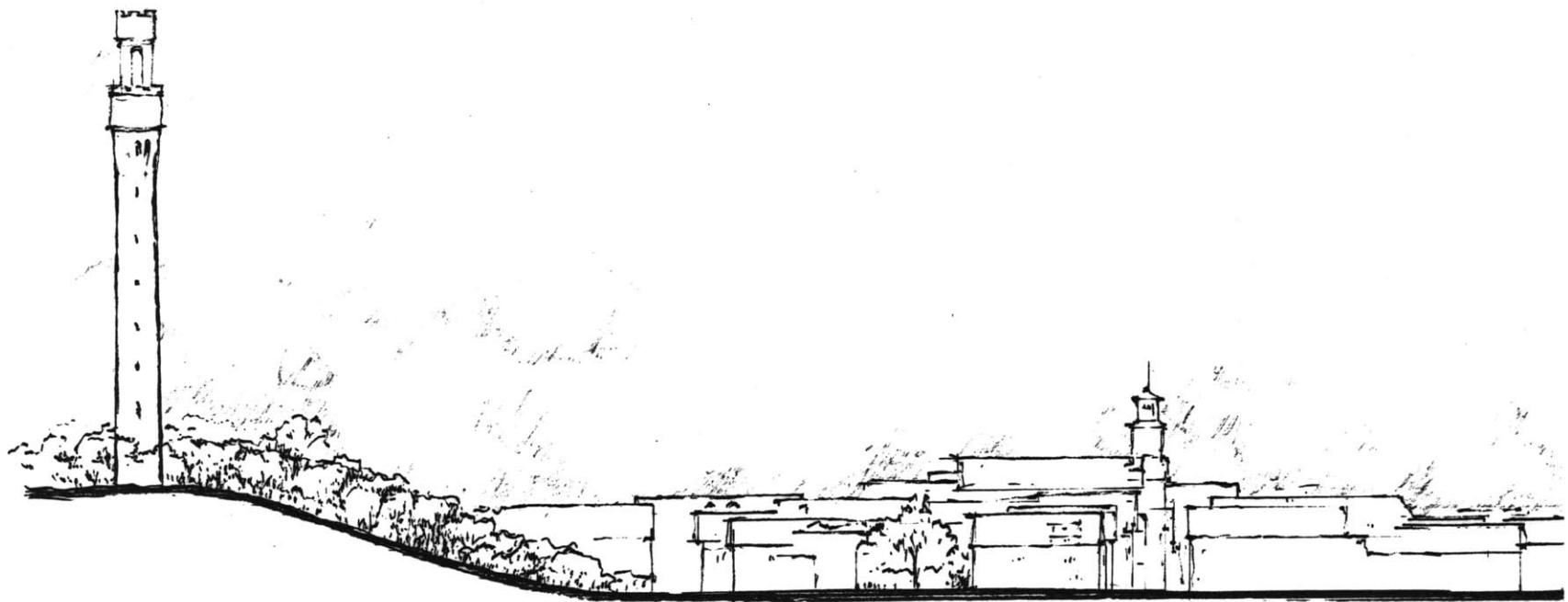


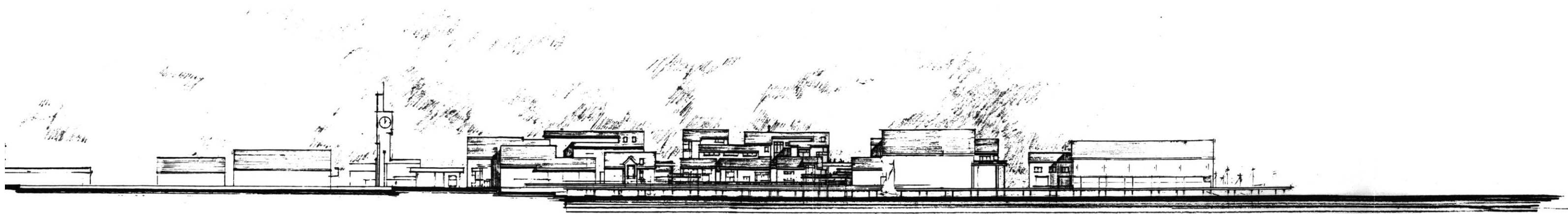
Sizes

In an urban condition where frontage is limited, the natural development is to maximize the depth of the building. Before the age of electrical lighting, the maximum depth of buildings were limited to seventy feet, since the amount of light thirty-five feet in from the window is insufficient. With the proliferation of electrical lighting, the depth of buildings dramatically increased. As a result, the interior association with the outside world has diminished to the point where it almost does not exist anymore. Inside these deep buildings, one can no longer tell whether it is day or night, or if it is sunny or raining. The connection with the rest of the world is minimized when one is buried inside these buildings. It is a crime to deny a person's right to knowledge, the knowledge of the world beyond the walls of the room. With this belief, I established a limit of thirty feet as the maximum distance away from an opening. Therefore the maximum building depth is limited to approximately sixty feet.









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Credits

cover, p15, p17, p21, Gillon, Edmund V. Provincetown Discovered.
i, p7, Rudofsky, Bernad. Architecture Without Architects.
inside cover, ii, p2-6, 8-9, p16, p19, p20, p23, p24, p36-39, p50, p55, author.
p11-13, Strahler, Arthur N. A Geologist's View of Cape Cod.
p14, p28, USGS map, Provincetown, MA.
p22, Provincetown Planning Dept. Zoning map.
p26, p30, Notional Oceanic Atmospheric Association, Provincetown harbor.
p29, Lee, Chang-Long. Beauties of China - Architecture.
p31, Risselada, Max, ed. Raumplan versus Plan Libre.
p32, Makinson, Randell. Green and Green .
p33, Ferri, Roger C
p40-43, Pocket Park Process Architecture, no.78.
p45, Tabarelli, Gian Maria. Palazzi Pubblici D'Italia.
p47, Rossi, Guido Alberto. Masiero, Franco. Venice from the Air.