



Boat Show • Annapolis, MD

# SUSPENDED COMPLEX

By

JAMES SCOTT ROBERTS

Thesis submitted to the faculty  
of the Virginia Polytechnic  
Institute and State University  
in partial fulfillment of the  
requirements for the degree of

## Master of Architecture

William W. Brown, Chairman

Gregory K. Hunt, FAIA

James W. Ritter, FAIA

Teach us all to have aspiring minds  
(to) comprehend the wondrous  
architecture of the world.

Christopher Marlow, c. 1587



Ford Plant • Alexandria, VA

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### ABSTRACT

In simple terms, you could say that building order is the unity that arises in a building when the parts taken together determine the whole and, conversely, when the separate parts derive from the whole in an equally logical way. The unity resulting from design that consistently employs this reciprocity may in a sense be regarded as a structure.

Herman Hertzberger



Potomac River • Alexandria, VA

## ACKNOWLEDGEMENTS

I would like to extend my appreciation to Bill Brown, Greg Hunt and Jim Ritter for opening my eyes and teaching me how to see. My journey through this thesis project was a difficult yet extremely beneficial process in my development not only as an Architect, but also as a person.

## CREDITS

All images are reproductions of original drawings, renderings or photographs by the author.

Every child is an artist.  
The problem is how to remain  
an artist once he grows up.

Pablo Picasso



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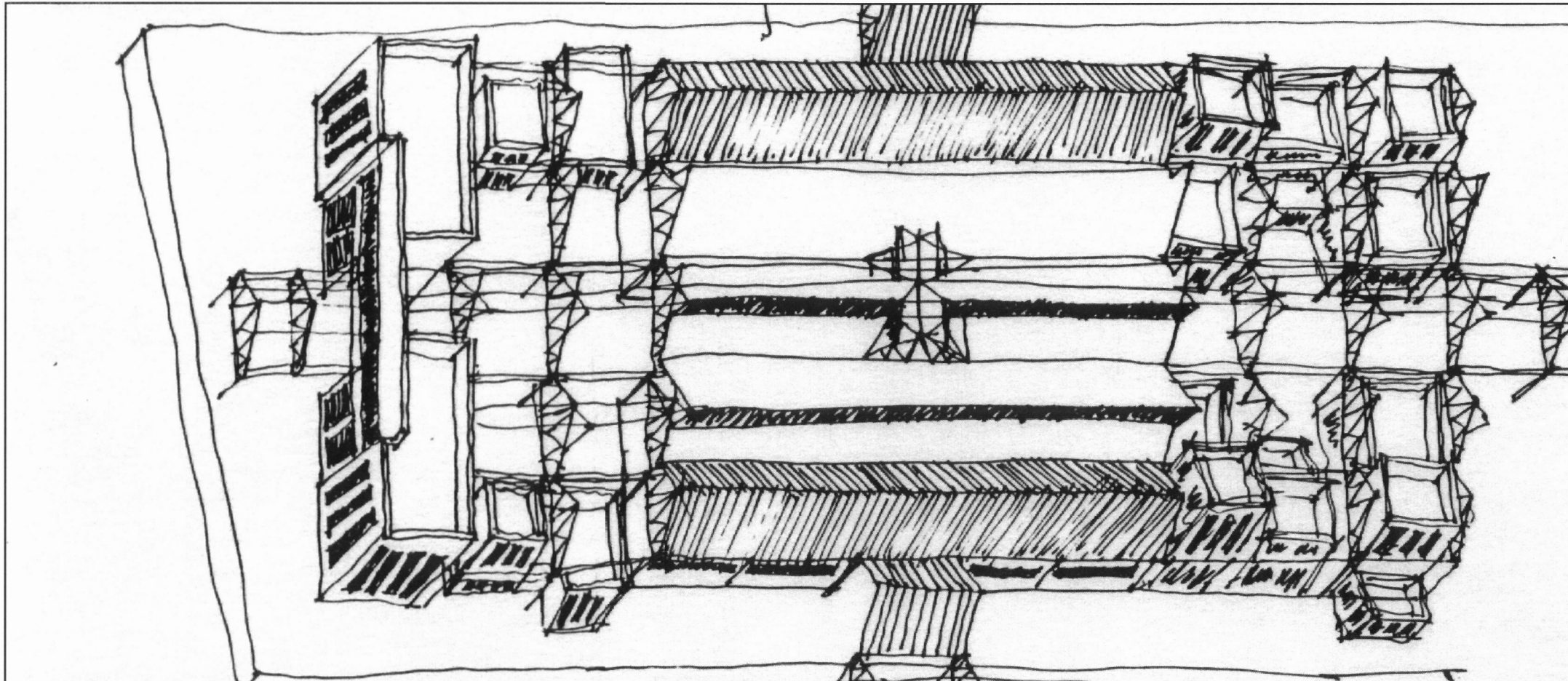
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*A great design has nothing more  
than it needs to do the job.*

Davin Stowell



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## INTRODUCTION

Successful architecture or a successful journey through the design process must address several issues. The project should be properly sited, sensitive to the environment and surrounding area, and functionally and aesthetically pleasing. It is on these ideas that this thesis is based.

The project selected was to design a multi-use building. The initial project idea was that of an adaptive re-use of the old Ford Plant (shown on the preceding page and pages 1 & 2) located on the Potomac River in Alexandria, Virginia. The Ford Plant was designed by Albert Kahn and built in the 1930's. The building is approximately 200' x 400' of open warehouse space interrupted only by the column grid. A series of skylights and clerestory windows that run the entire length of the building illuminate the cavernous space.

You employ stone, wood, and concrete, and with these materials you build houses and palaces.... But suddenly you touch my heart.... That is Architecture.

Le Corbusier



Ford Plant • Alexandria, VA

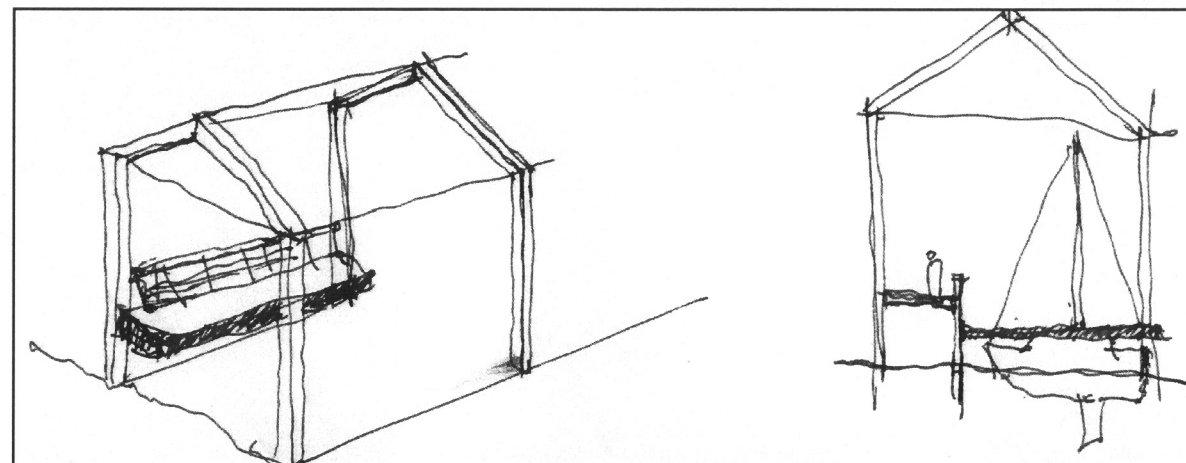
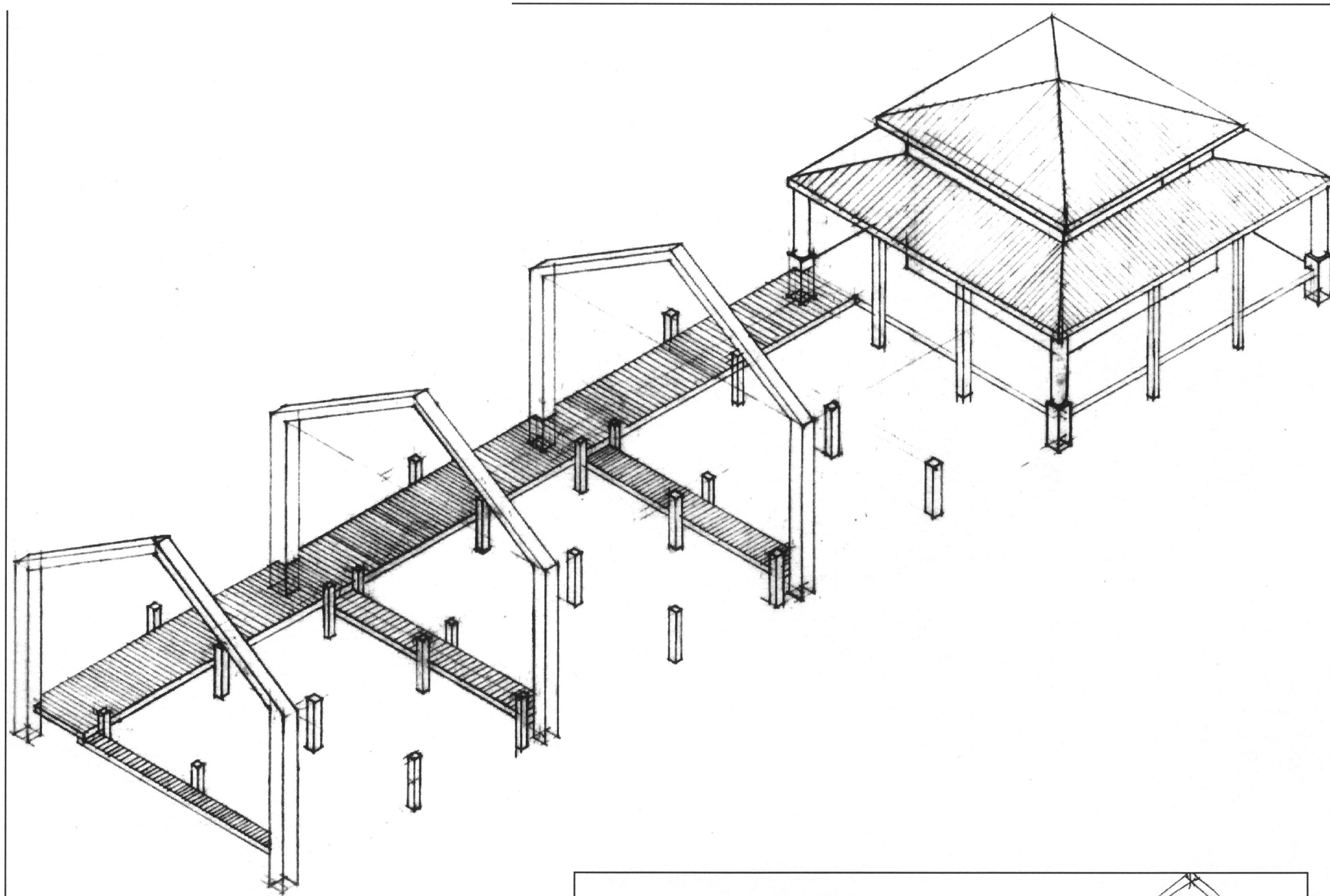
Adaptive re-use, along with the complexities of a multi-use building, created some interesting problems. As the design progressed, it became a constant struggle to successfully incorporate new functions while maintaining the integrity of the existing building.

The decision was made to pull the commercial functions out of the Ford Plant and site these functions in a new building to be located on the "land" side of the old plant. This created three distinct zones:

1. The residential zone located inside the Ford Plant.
2. The commercial zone in front of the Ford Plant.
3. The marina to be located on the waterside of the Ford Plant.

I don't think of form as a kind of architecture. The architecture is the result of forming. It is the kinesthetic and visual sense of position and wholeness that puts the thing into the realm of art.

Roy Lichtenstein

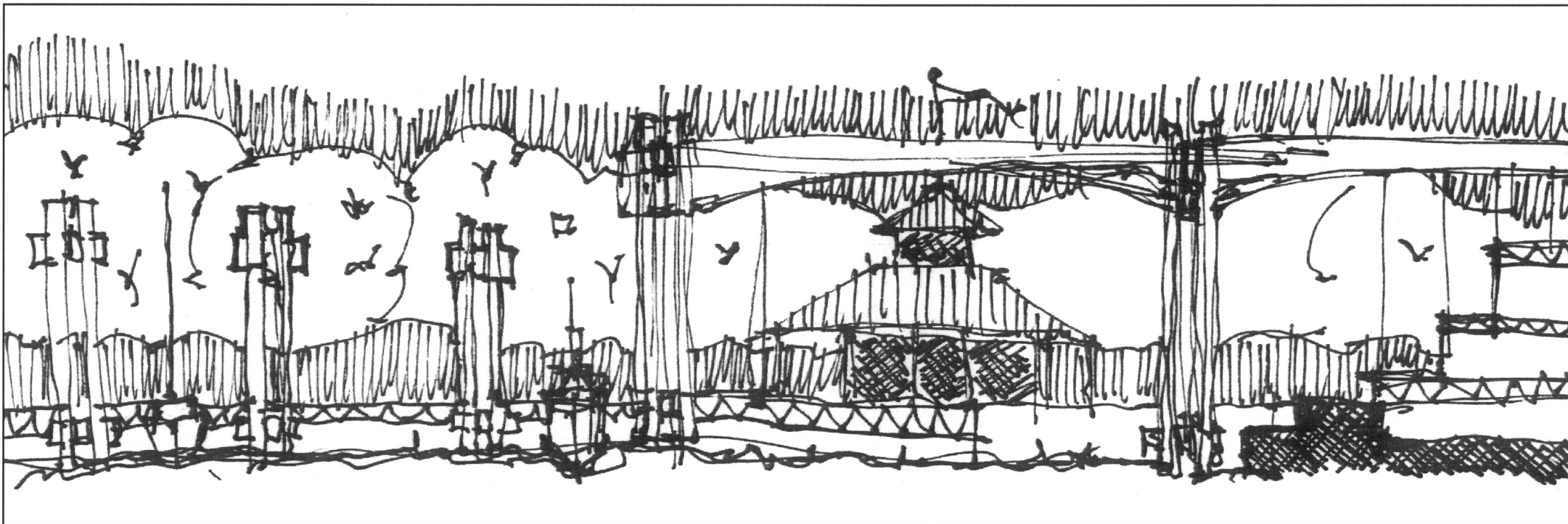
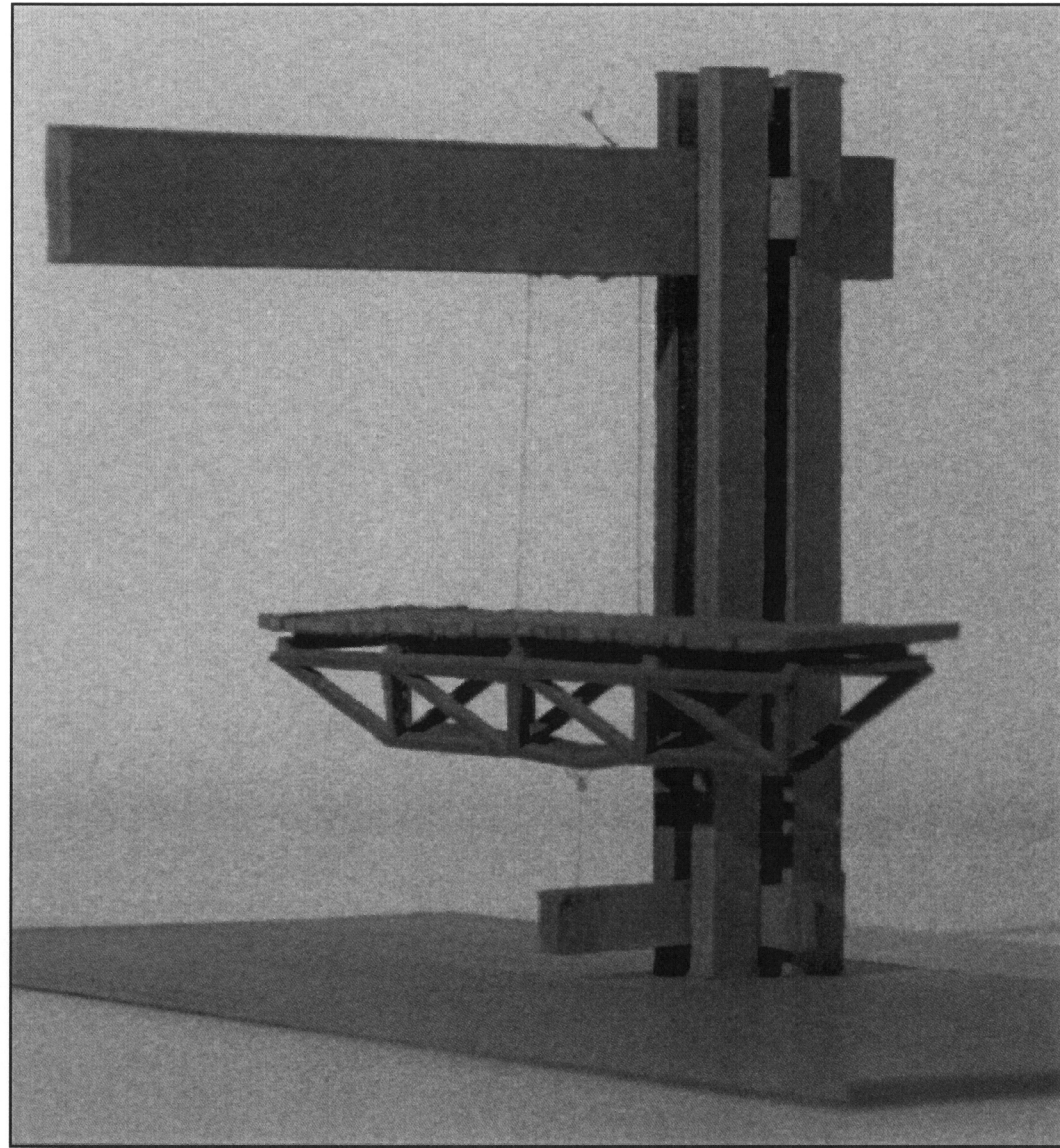
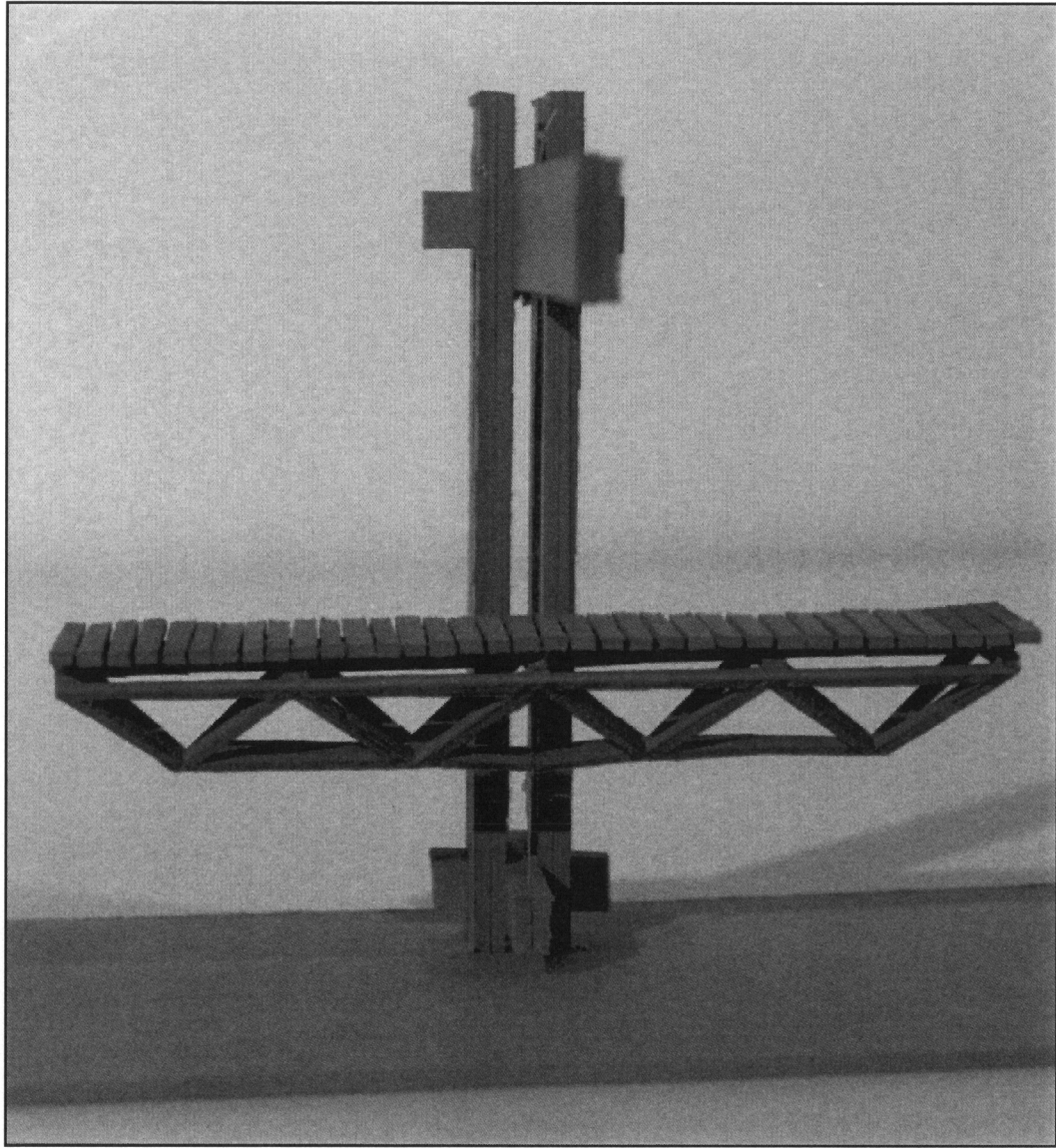


## SUSPENDED DOCK

The schematic design phase of the Ford Plant multi-use project included a marina and dock. As use of the Ford Plant became increasingly difficult, the dock and marina portion began to take shape as the multiuse building project. The dock would not be a typical dock in that it would not be supported from below by piles, but would be suspended over the water by a series of columns and beams. This would diminish the number of piles driven into the riverbed. Concrete would be utilized for the piers because of its durability in water.

Most of us spend most of our time in, near or influenced by built surroundings. We spend our lives in what were once the thoughts of architects.

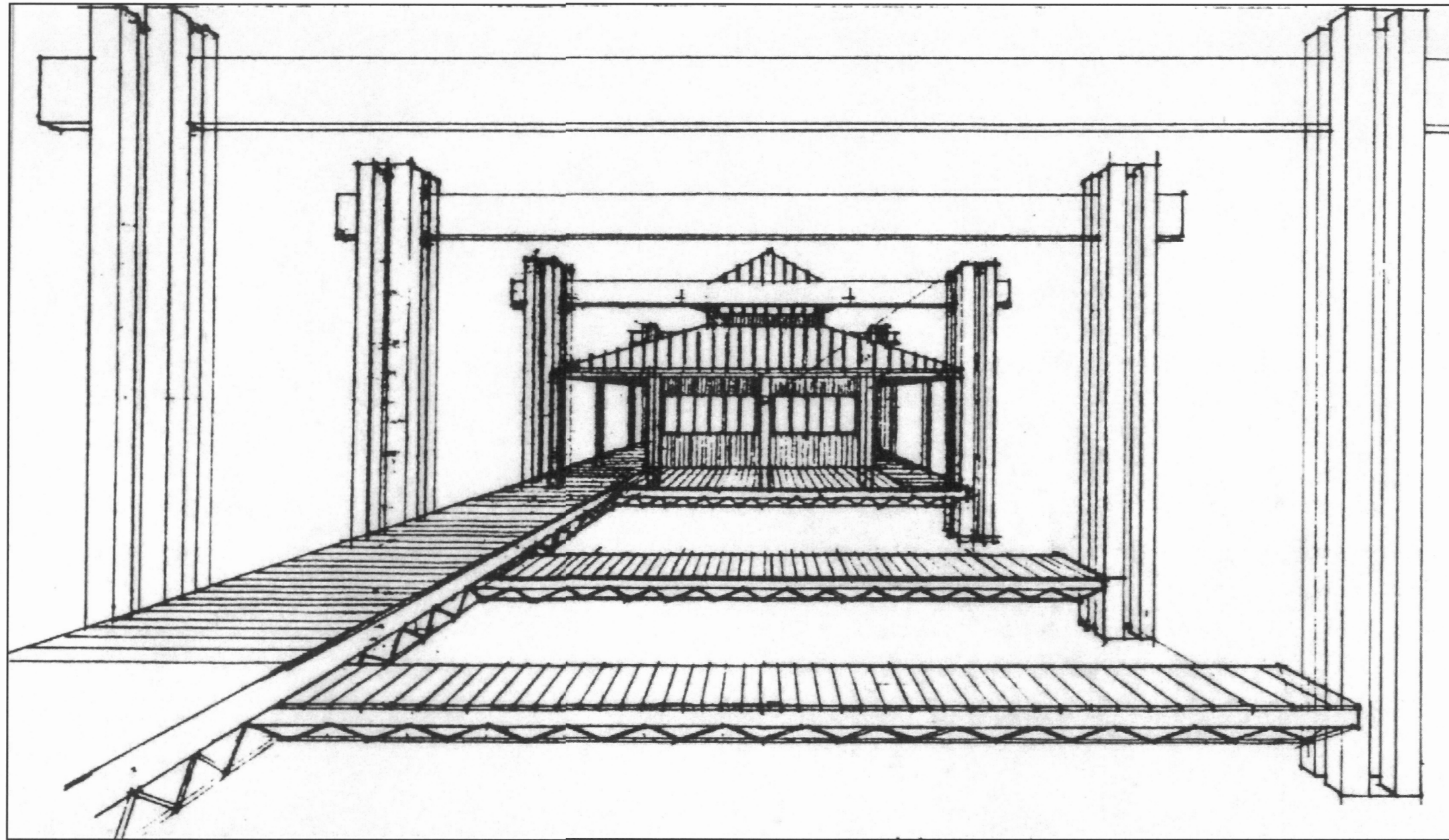
Christopher Day



The columns/piers would be connected with concrete beams at approximately 20' above the water surface forming an arch that rises from the river. The main dock and appropriate finger piers could be suspended from a series of these beam column configurations. The docks and finger piers would be constructed from a steel truss system that could form a rigid structure. Wood planking would be attached to form the dock surface, and the entire dock system was suspended from the structural system using stainless steel wire rope cables. This structural system could take on many different configurations depending on the layout of the concrete structural system.

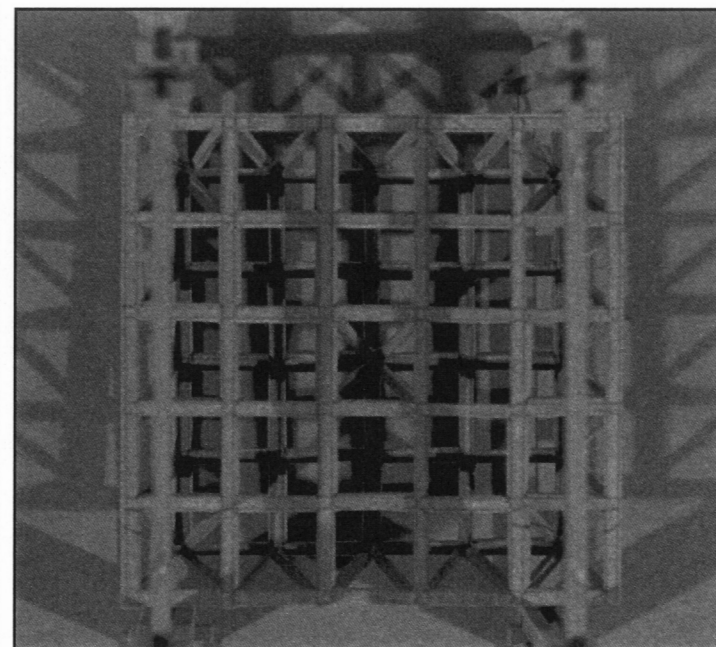
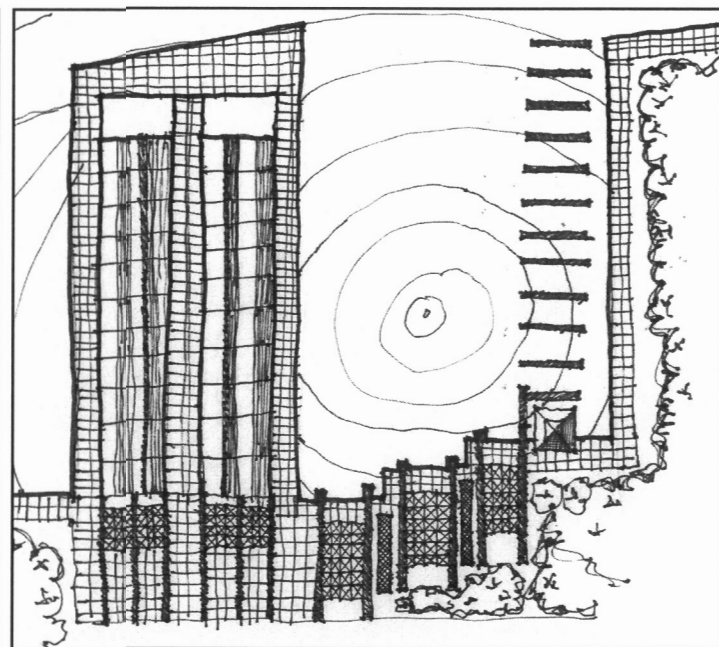
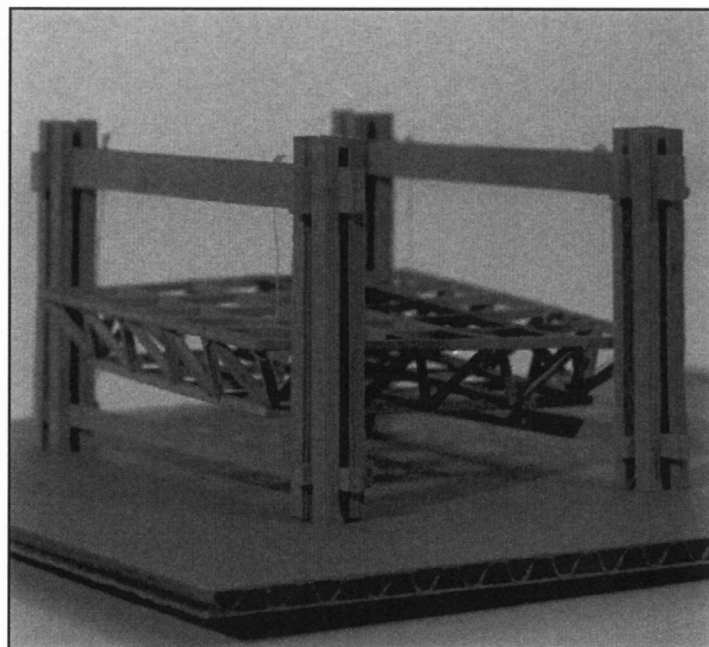
Our task has evolved beyond creating spaces that are aesthetically wonderful. Design is a science - the science of enhancing human interaction, connection, emotion and motion.

Gary E. Wheeler



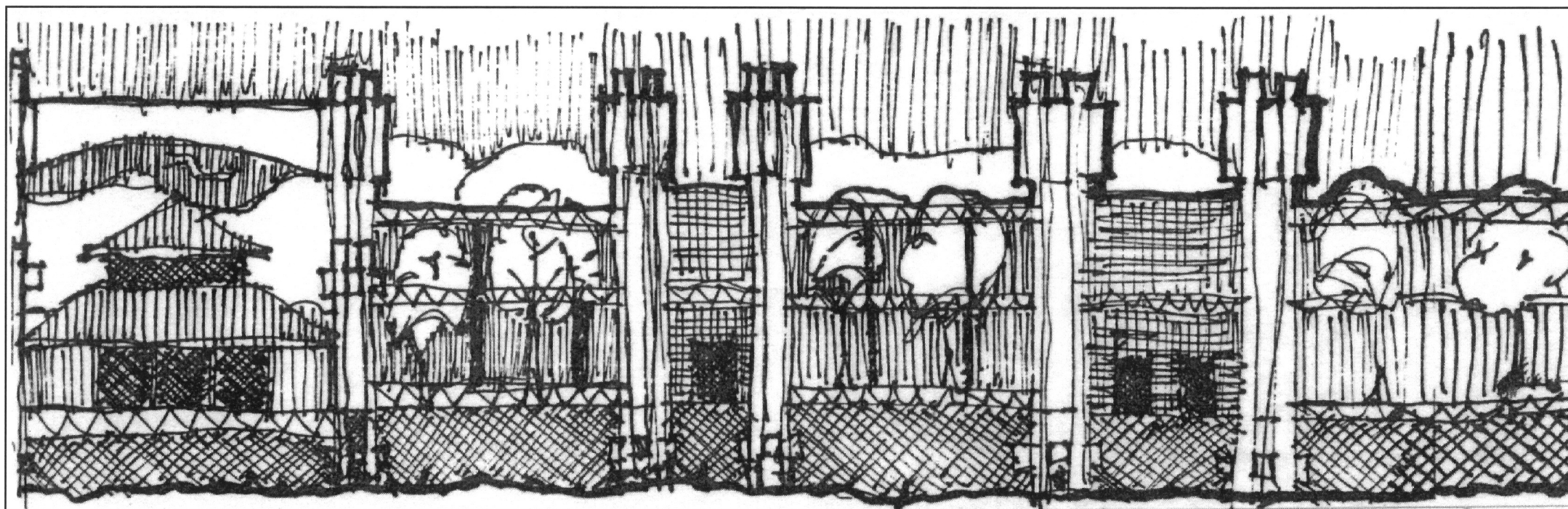
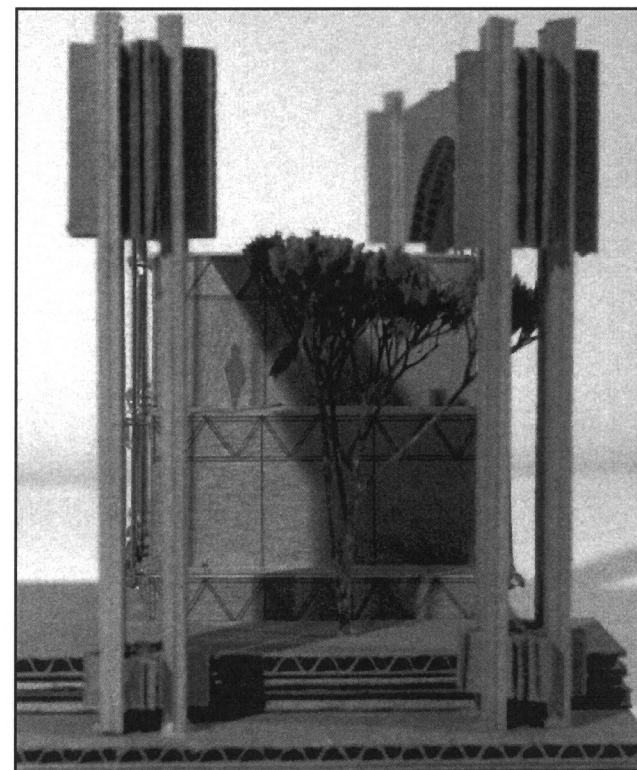
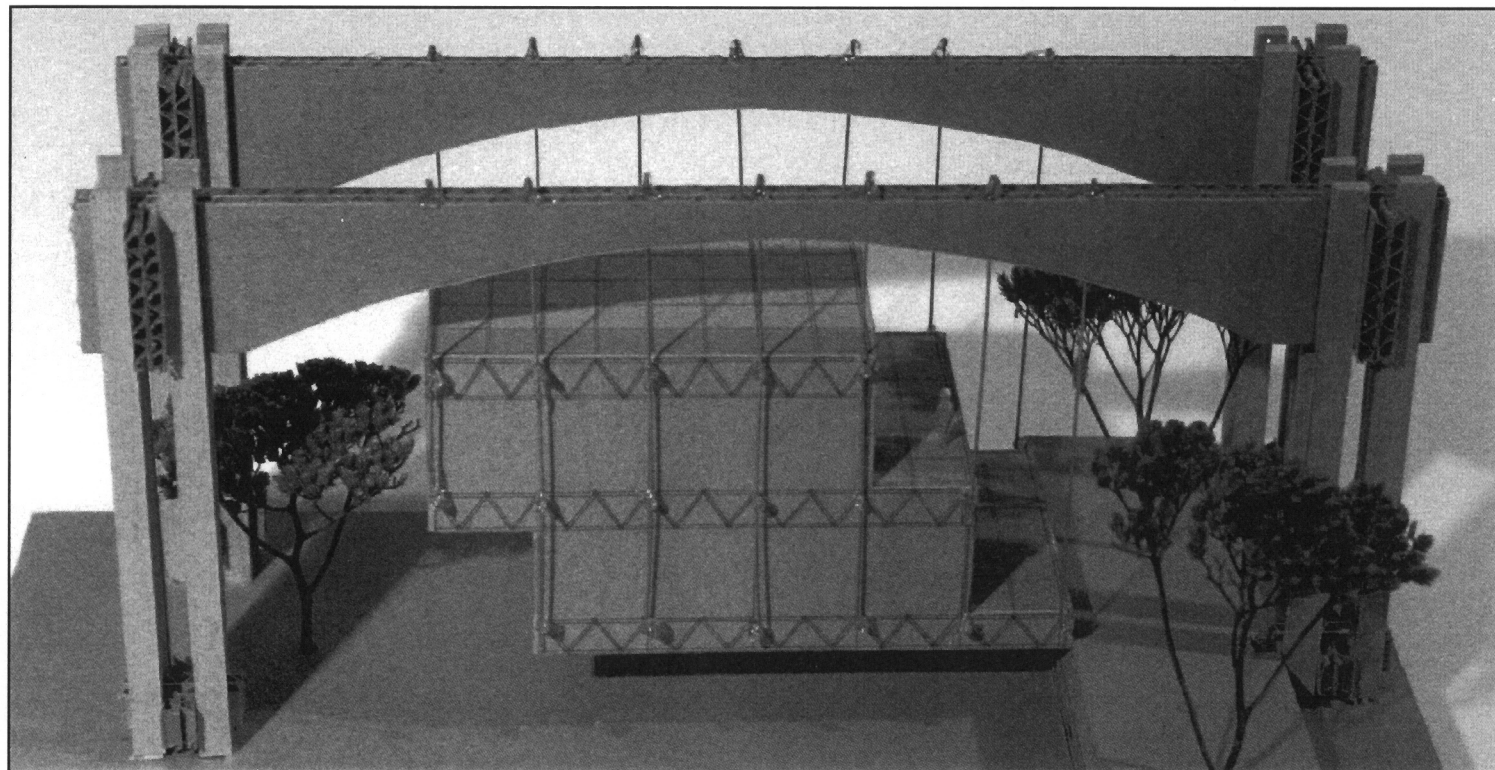
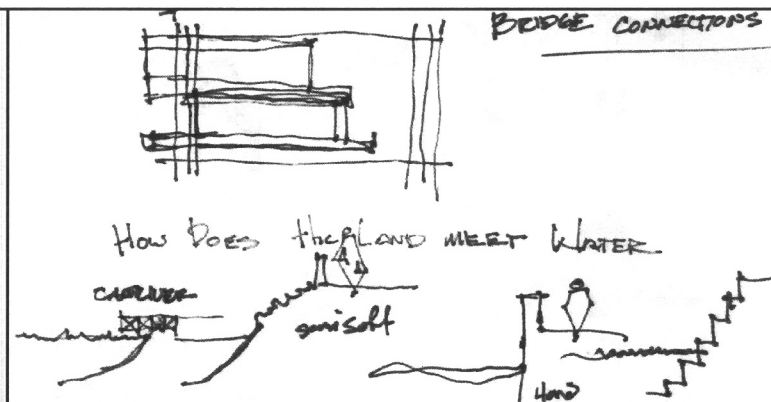
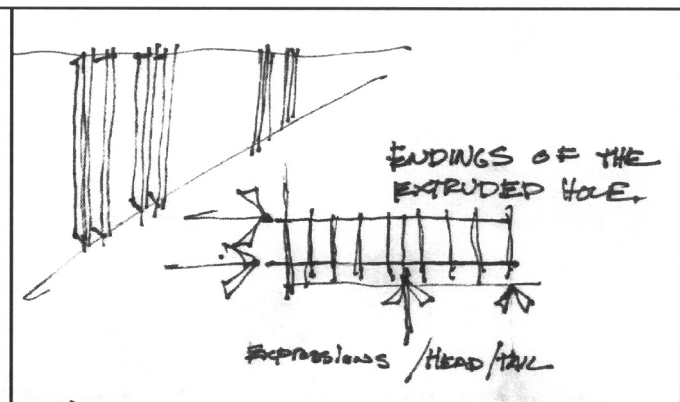
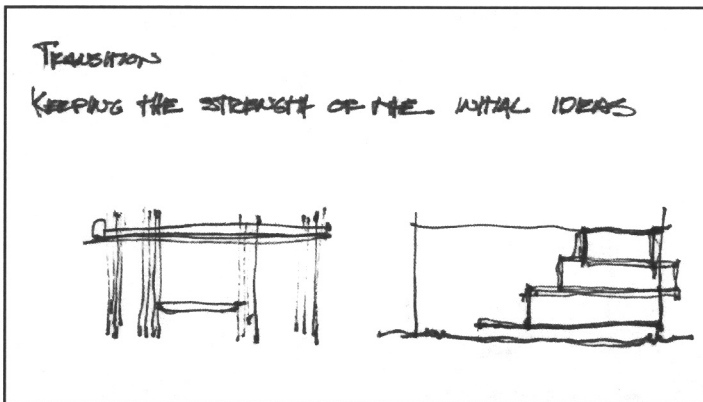
## SUSPENDED MARINA

As the suspended dock was developed, a separate structure was needed to house the functions of the marina. Locker rooms, rest-rooms, a marina office and a restaurant/snack bar would be housed within this structure. Following the idea of the suspended dock, the natural progression was to suspend the marina building. The structural system would require further development. The concrete columns evolved into a grouping of four columns that support a precast concrete beam. The steel truss work developed for the suspended dock evolved into a steel space frame. This would support a large rigid platform covered with wood decking and suspended over the water.



Architecture is both a matter of utility and a matter of art, its complexities exceeding our expectations for the merely useful or merely artistic.

Dora P. Crouch

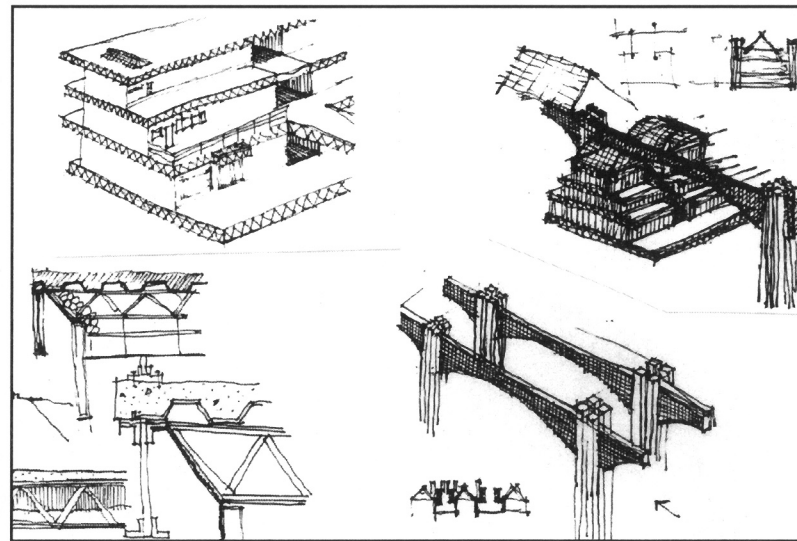
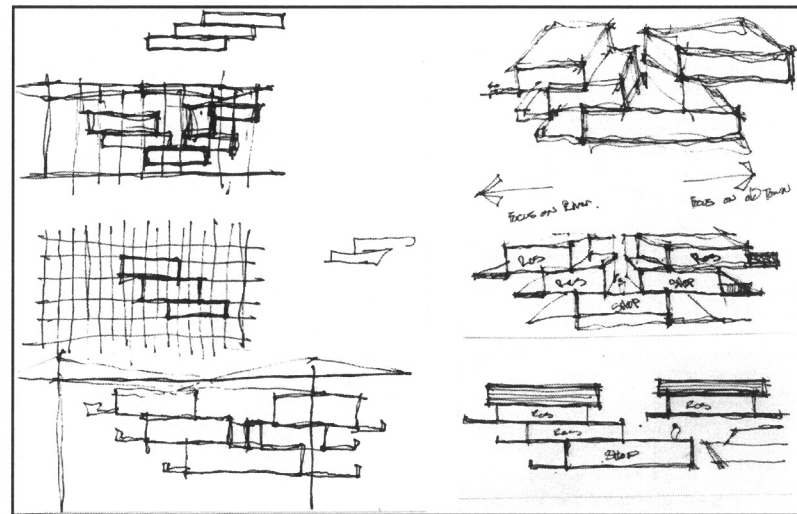
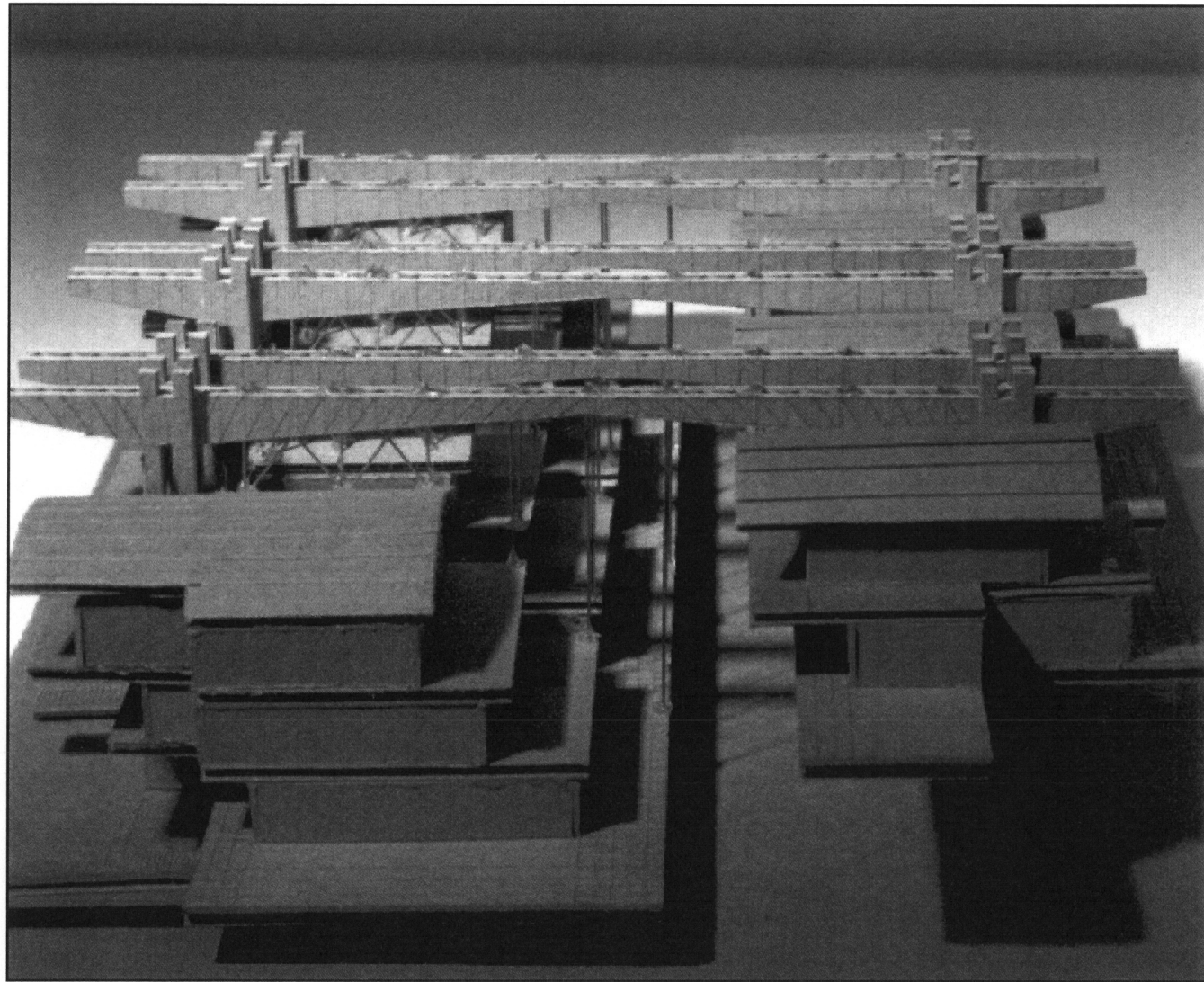


## SUSPENDED BUILDING

As the project continued to evolve, the suspended marina grew into a larger suspended building to house commercial and residential space. The residential units would be located on the second level and staggered off the front to allow for a garden terrace and a sense of privacy. Initially, this building was to be suspended over the ground. After some cost considerations, the building would be suspended over the water. The increased size of the building initiated further development of the structural system. The columns grew to a height of 90 feet with the beam spanning the columns being 200 feet in length. The space frame increased in size and supported the roof and floor of each level.

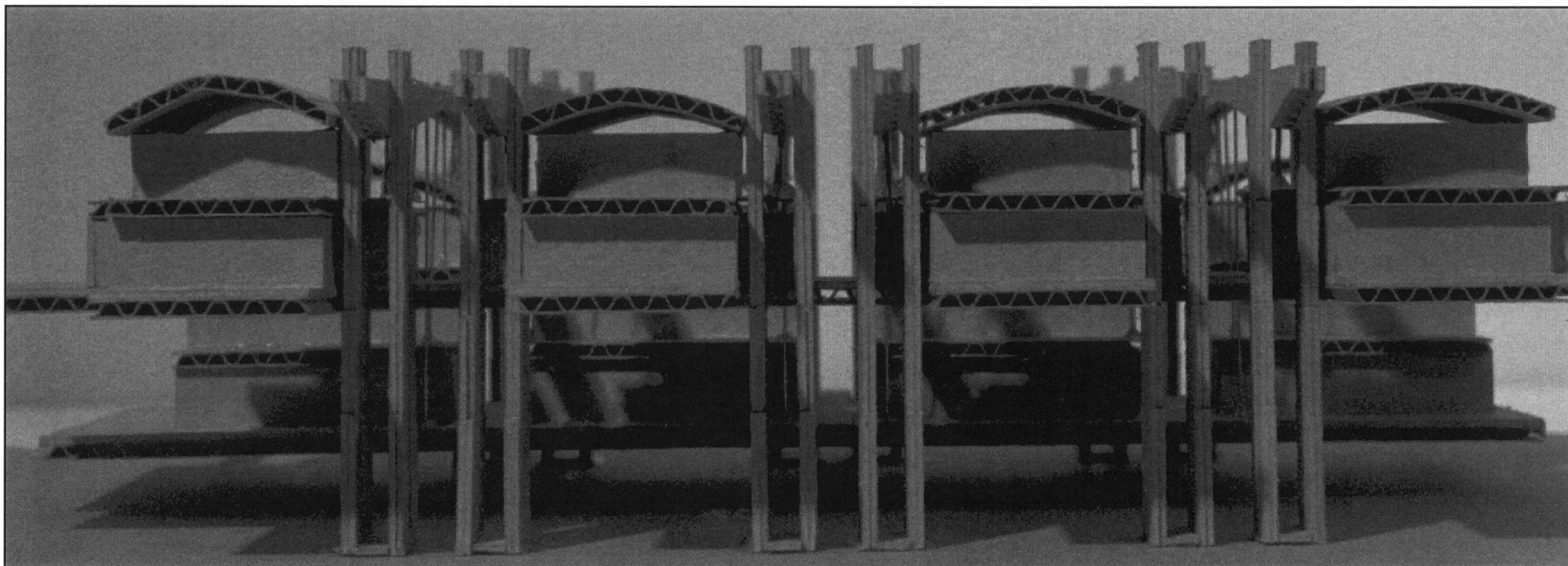
Ah, to build, to build! That is the noblest art of all the arts. Painting and sculpture are but images, are merely shadows cast by outward things on stone or canvas, having in themselves no separate existence. Architecture, existing in itself, and not in seeming a something it is not, surpasses them as substance shadow.

Henry Wadsworth Longfellow



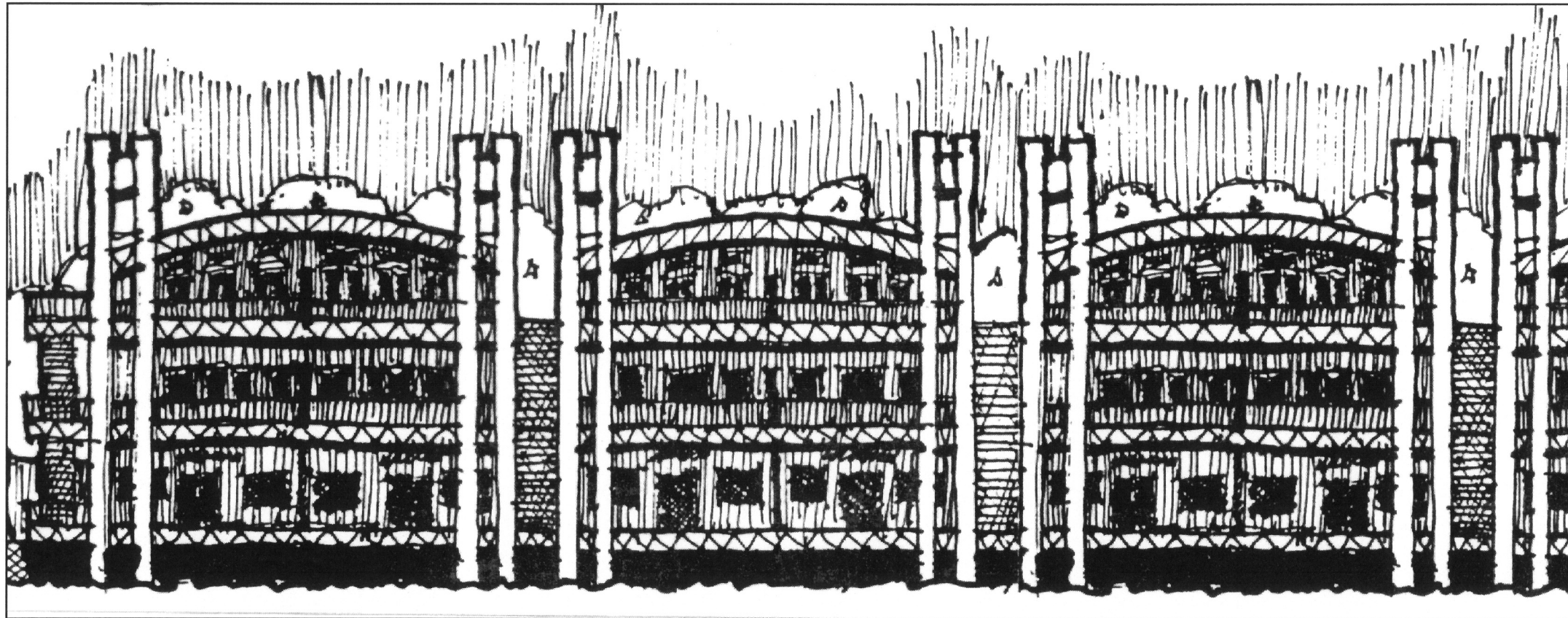
## SUSPENDED COMPLEX

As the idea of the suspended building continued to develop, the marina functions were removed to allow for additional residential and commercial space. These new spaces took on new configurations to take advantage of being suspended over water and to allow boats to dock underneath. One of the structural towers evolved into a residential tower unit that further increased the diversity of the complex.

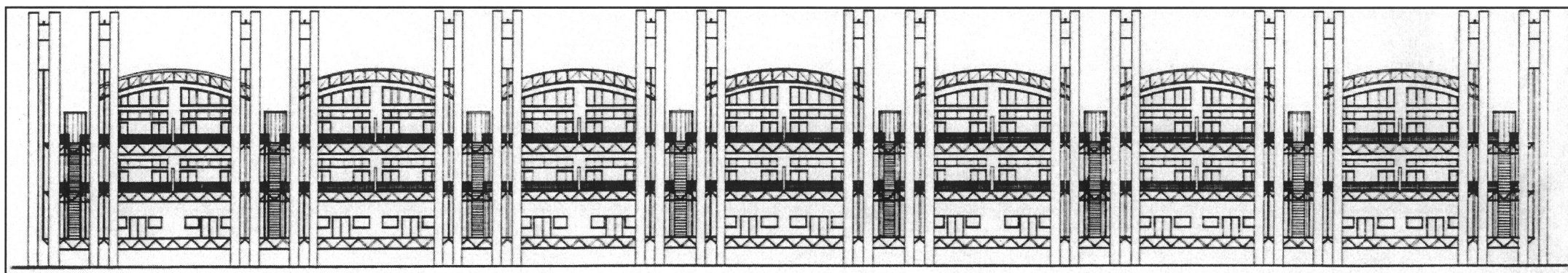
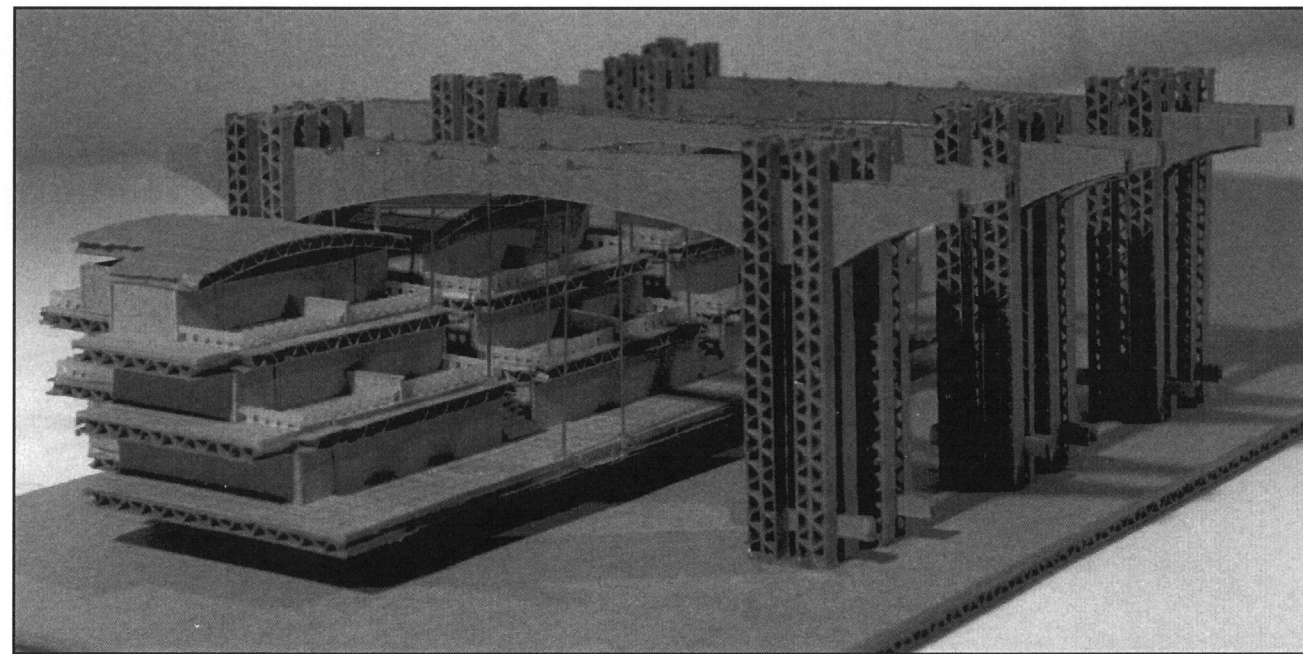
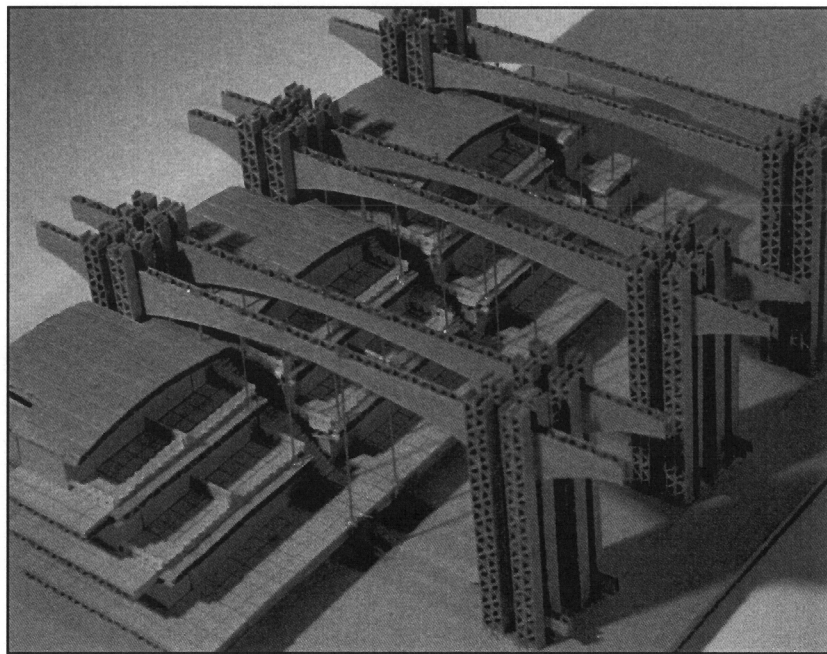


When I am working on a problem, I never think about beauty. I think only how to solve the problem. But when I have finished, if the solution is not beautiful, I know it is wrong.

Buckminster Fuller



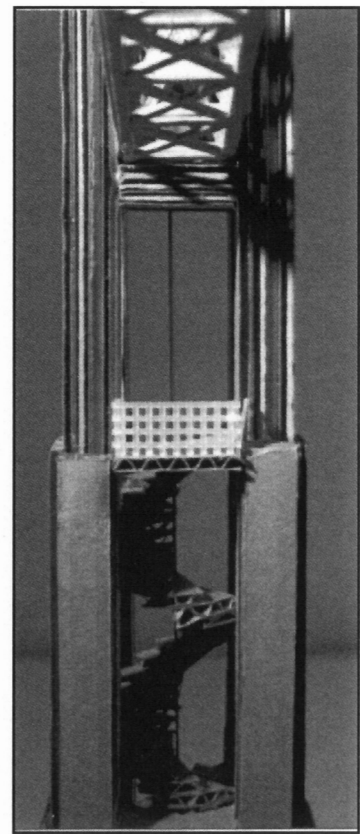
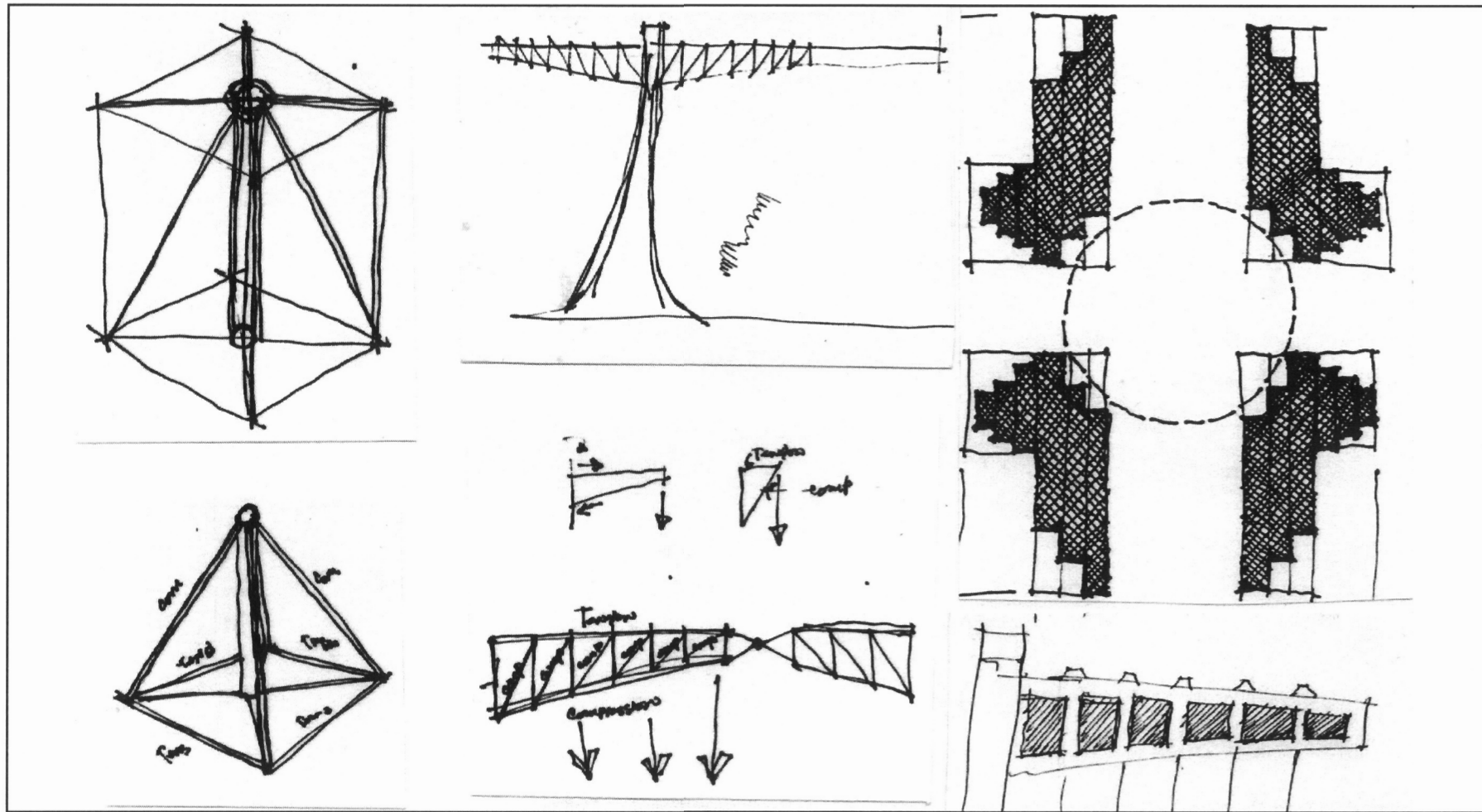
The possibility of building structures over the water creates interesting opportunities for future waterfront development. A great deal of land previously considered unbuildable could be developed using a suspended structure.



Design is not beautification. It's a thought process - a non-linear, spatial way of thinking in which connections are made between seemingly unrelated things.

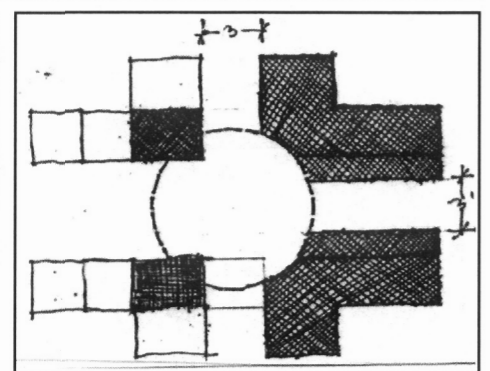
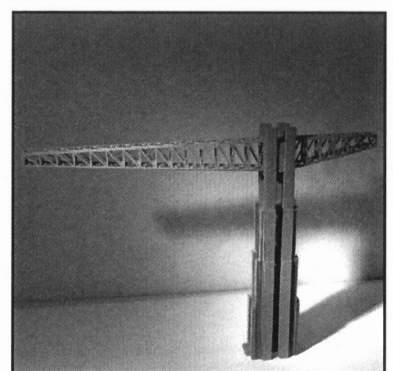
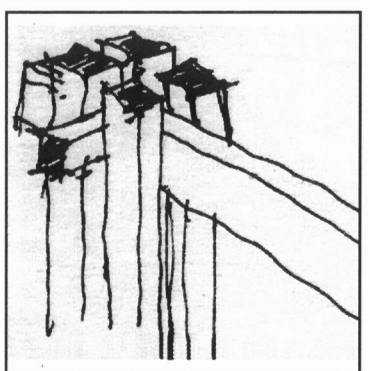
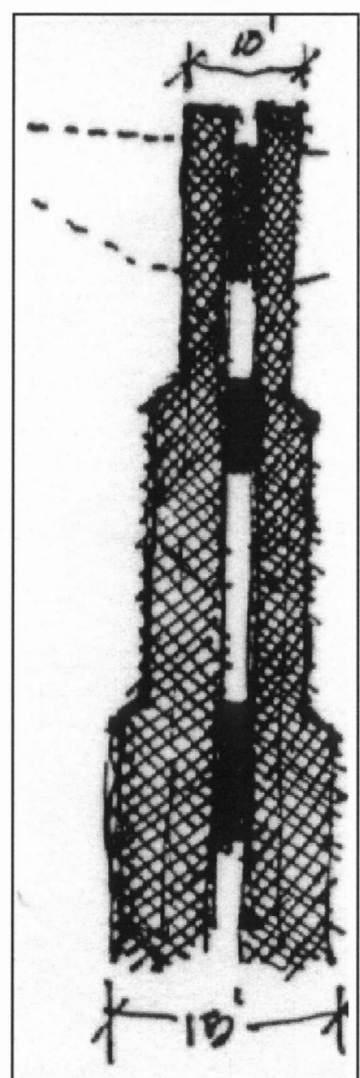
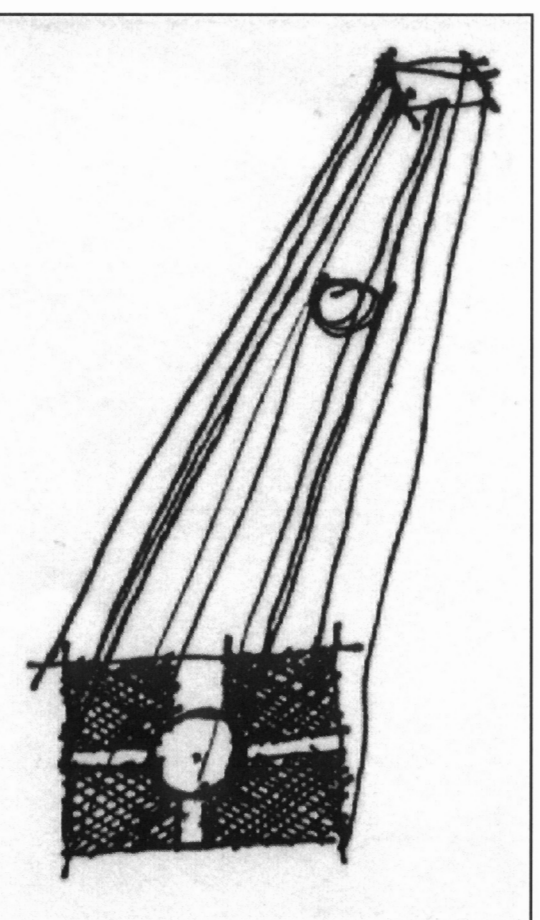
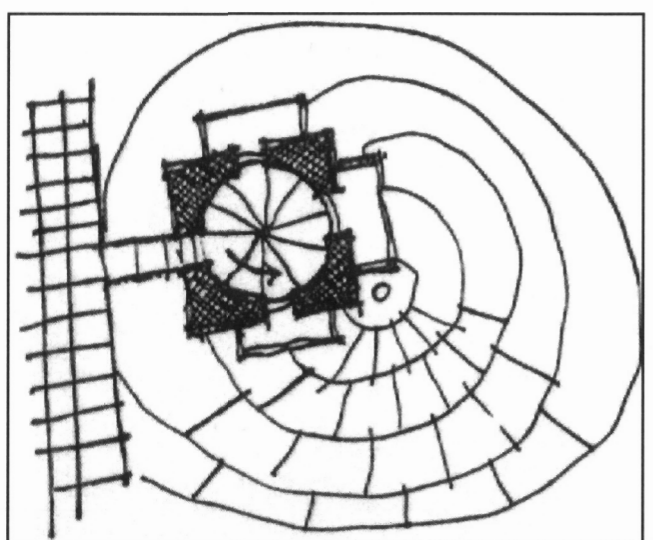
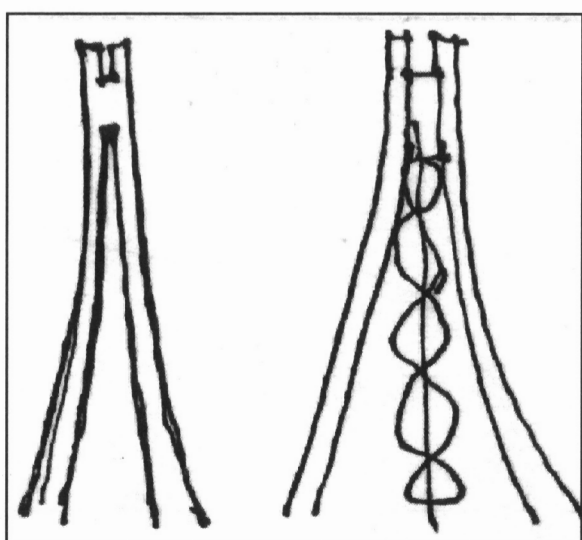
Sohrab Yossoughi

# SUSPENDED COMPLEX



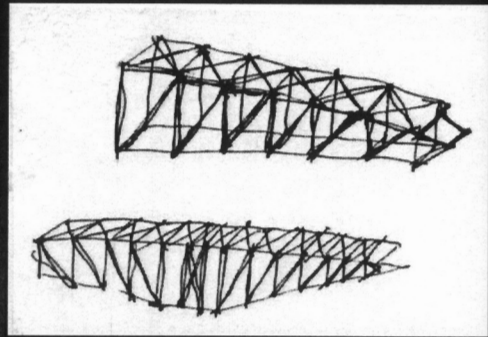
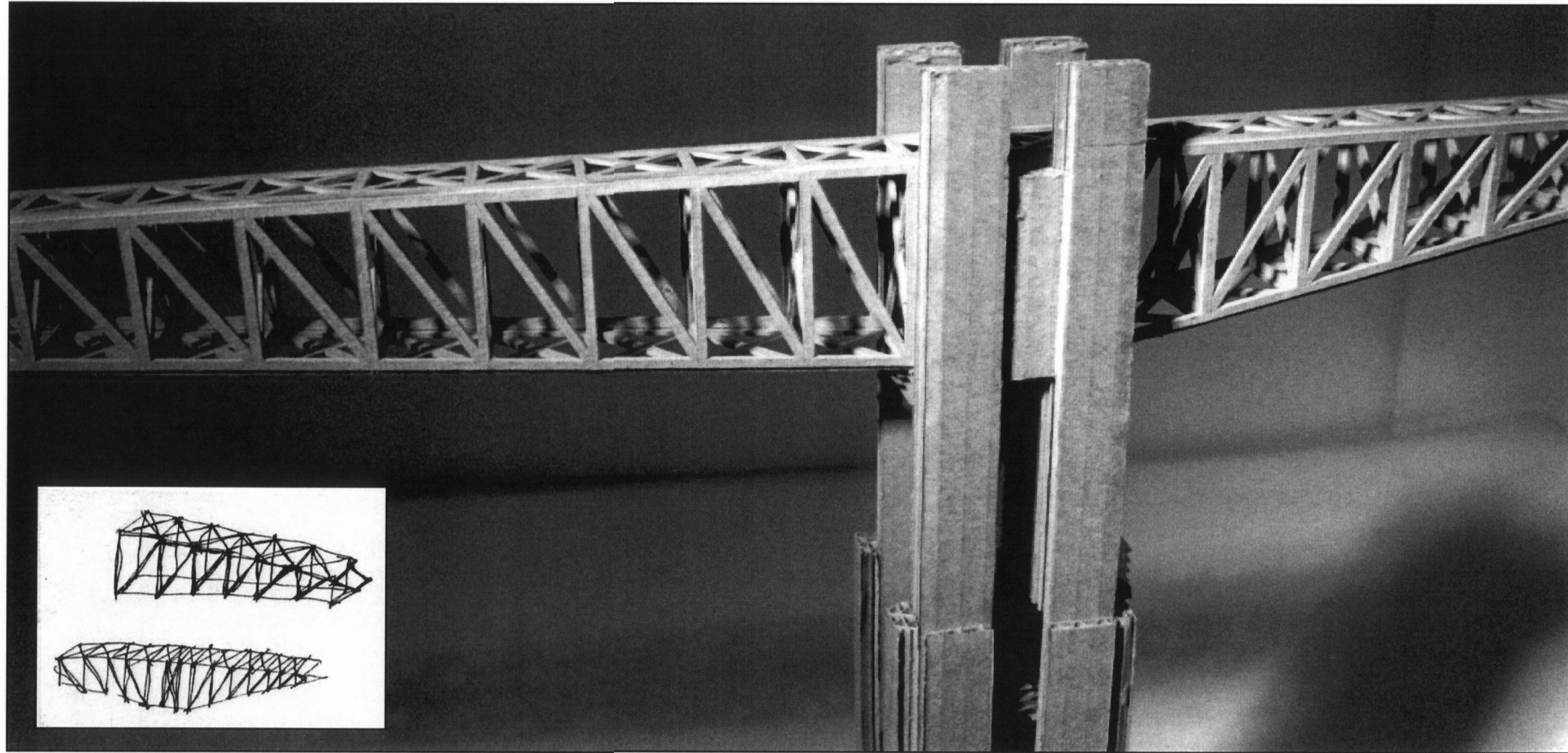
## CONCRETE STRUCTURE

One of the most important developments of this project was the structural system made up of concrete columns and beams. The original idea of four separate columns supporting each end of the beam was extremely heavy as well as impractical. The columns then evolved into hollow structures that housed the vertical circulation. Large openings in each side of the tower conveyed the original idea of four separate columns. Small terraces were incorporated into each tower creating viewing platforms that overlook the river and Old Town.



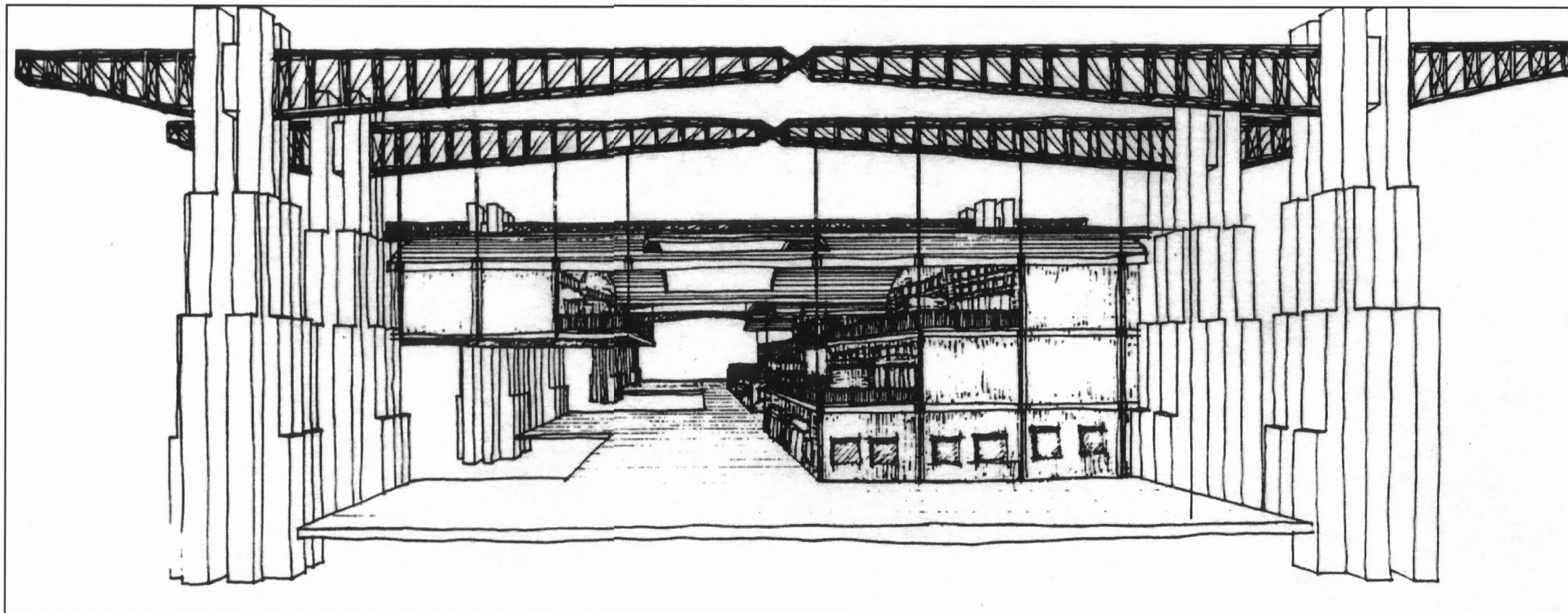
Architecture is the art which so disposes and adorns the edifices raised by man, that the sight of them may contribute to his mental health, power, and pleasure.

John Ruskin



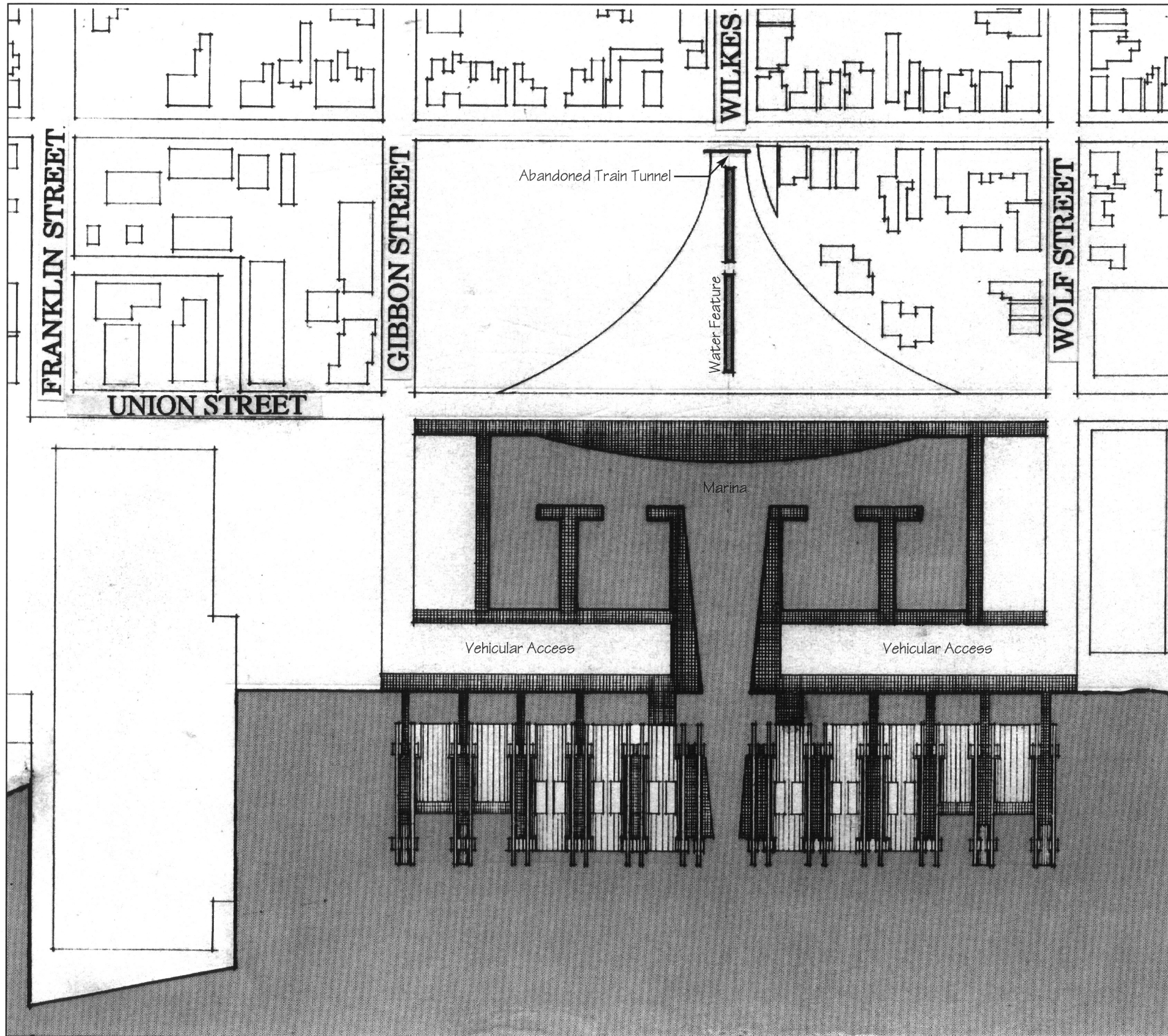
## STEEL TRUSS

The beam that spanned between the towers was originally constructed of concrete. As the span became larger the weight and size of the beam became inappropriate. In order to scale down the size of the beams, the idea of the steel box truss was investigated. The box truss then evolved into two double-cantilevered trusses each spanning half the distance meeting at a hinge connection. As the buildings extended around the structural columns the cantilevers helped balance the load. The steel trusses provide ample support for the buildings while relieving the tremendous load from the concrete towers.



There are three basic principles behind any well-designed product: truth, humanity, and simplicity.

Sohrab Vossoughi



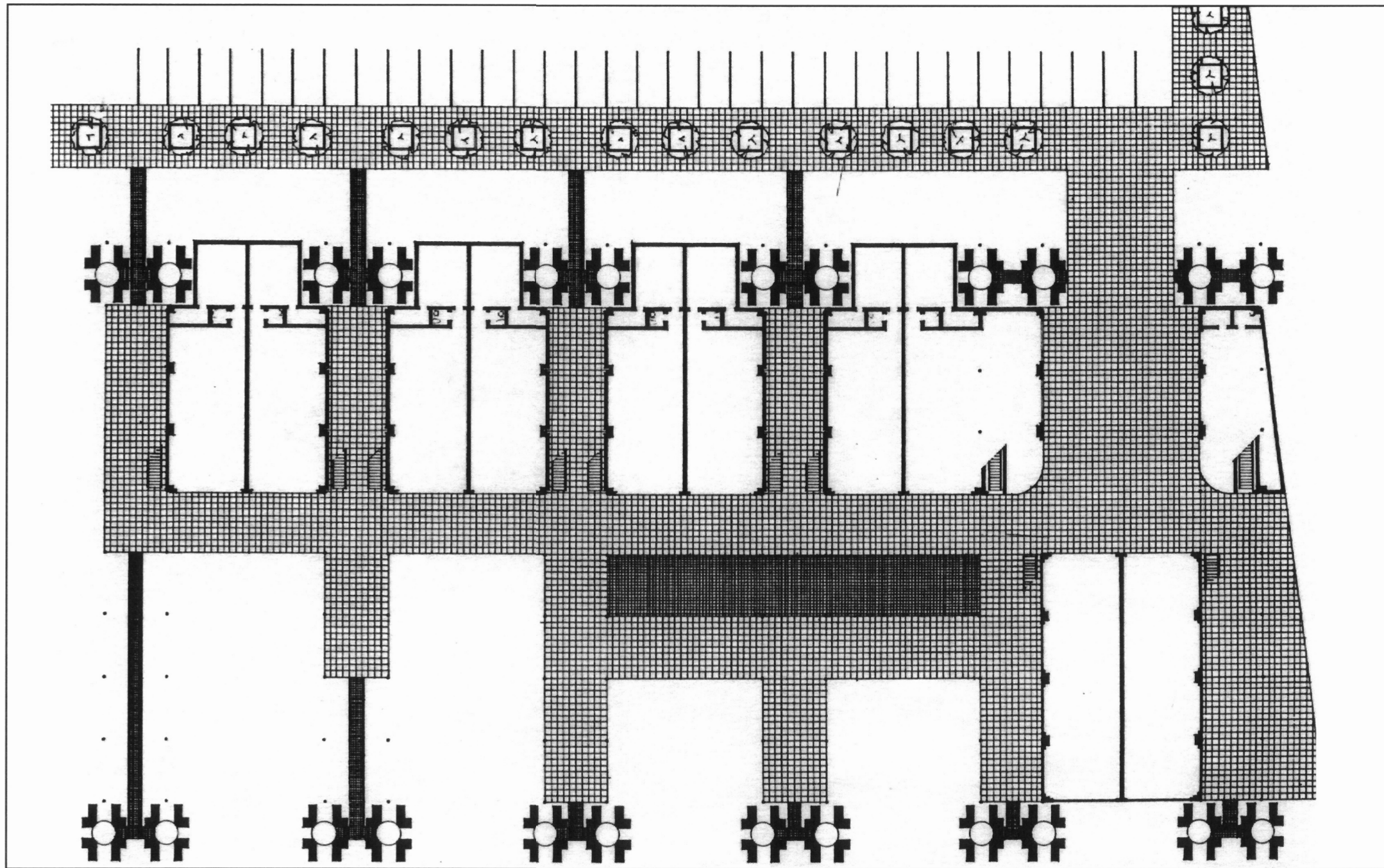
## SITE PLAN

The development of the site was a very important aspect of the project. By suspending this structure over the water, the land is then free for other purposes. This area then becomes a transitional space between the city and the new structure, and is utilized as a marina, public park and parking. The marina would bring the river into the city while providing a sheltered boating area. The park area would be a continuation of the existing park located across Union Street. The existing train tunnel would be the axis for the entrance to the marina and the complex. The pedestrian street area of the complex would include a drawbridge to allow boats to access the marina.

This site located between the Old Ford Plant and the Robinson Terminal would draw the public to the river and act as a gateway through the industrial barrier that separates the river from Old Town.

Ten acres of inner-city land is equivalent to one acre on the water.

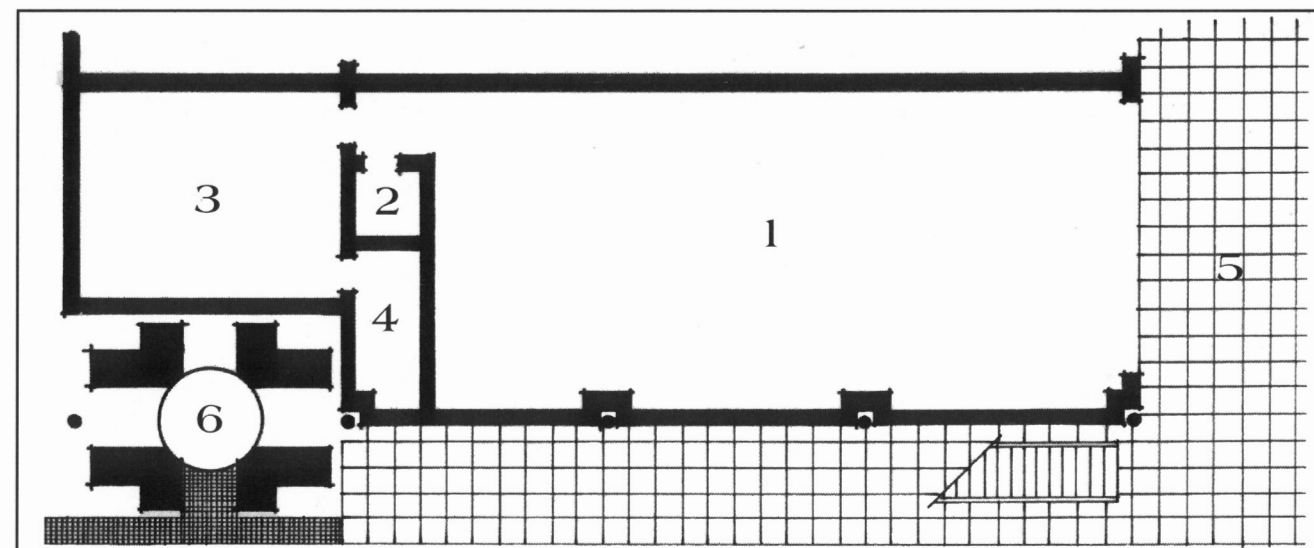
F.L. Olmsted



## FIRST LEVEL

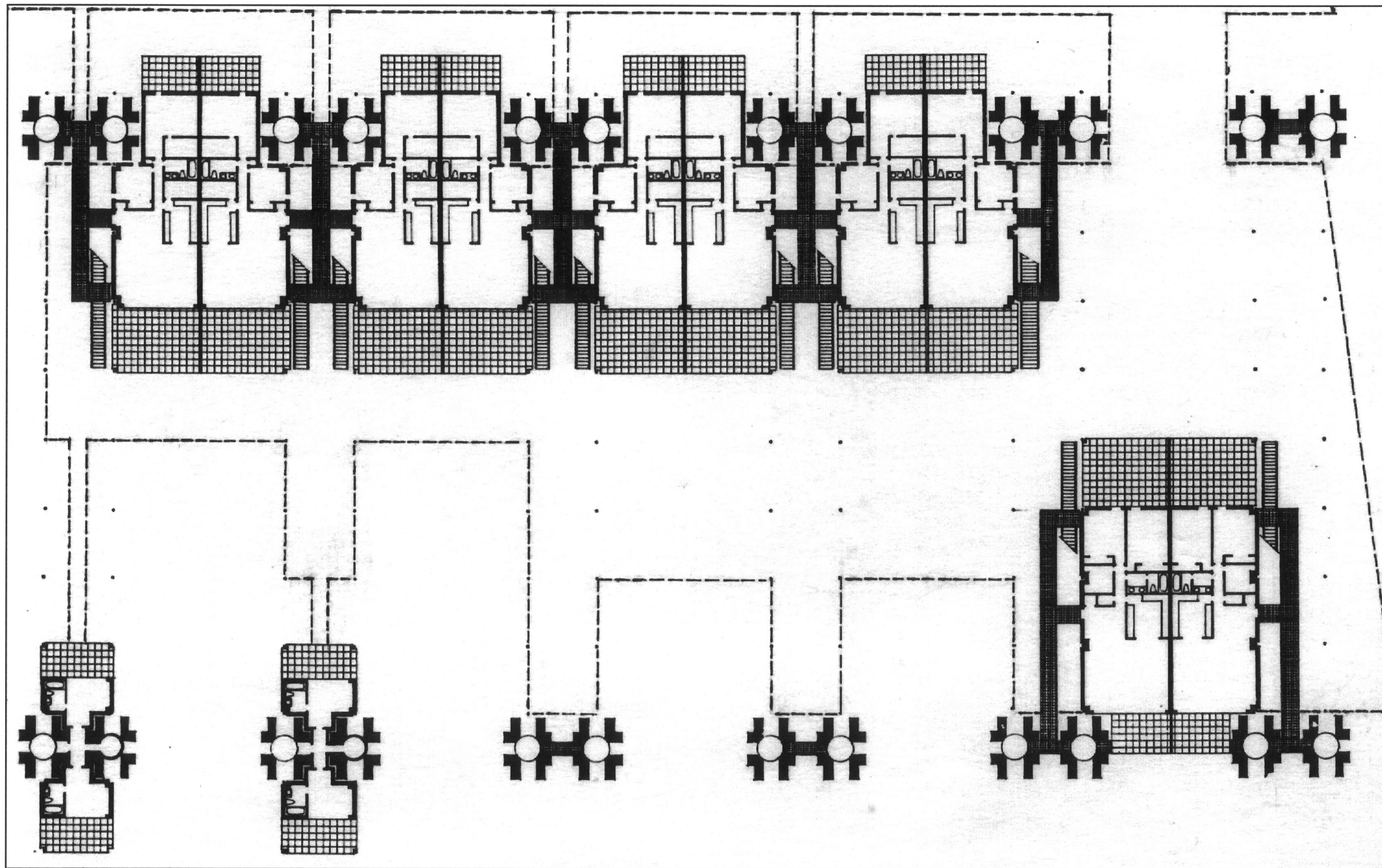
1. Commercial space
2. Restrooms
3. Storage
4. Mechanical space
5. Pedestrian street
6. Elevator

The first level of the complex is commercial space consisting of restaurants, shops and offices that all open onto the pedestrian street. The street area would be large enough to accommodate outdoor dining and entertainment. The public would access the pedestrian street via a series of bridges connecting the complex to the site.



Architecture presents man,  
 literature tells you about him,  
 painting will picture him to you.  
 You can listen and hear him, but if  
 you want to realize him and experience  
 him go into his buildings, and that's  
 where you'll find him as he is. He can't  
 hide there from you and he can't hide  
 from himself.

Frank Lloyd Wright

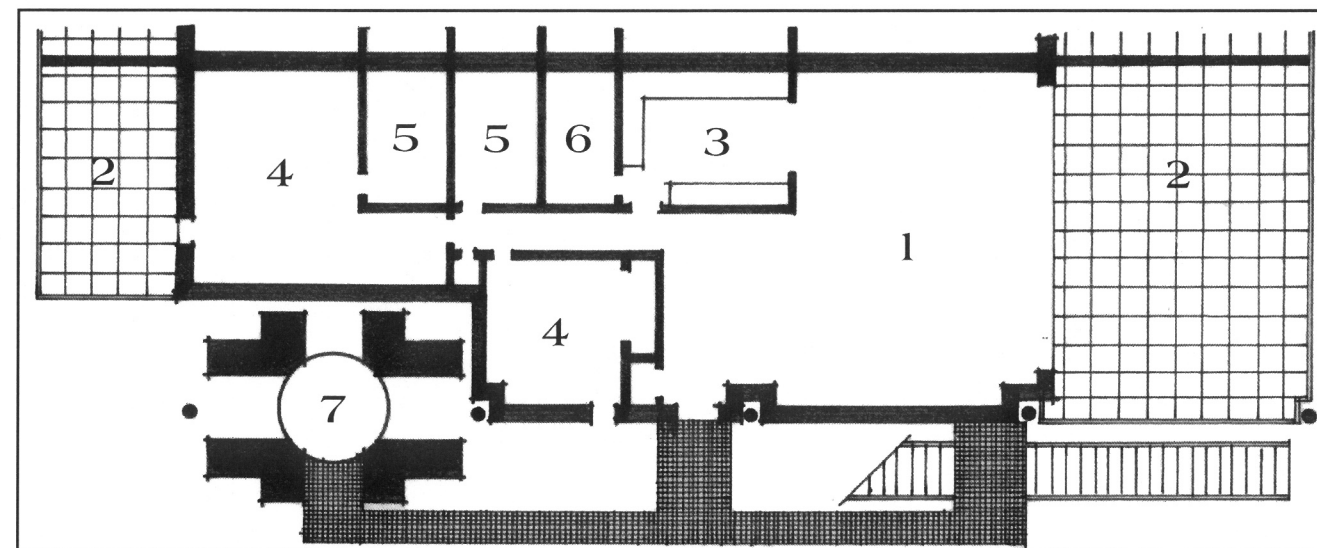


## SECOND LEVEL

1. Living area
2. Terrace area
3. Kitchen
4. Bedroom
5. Bathroom
6. Mechanical
7. Elevator

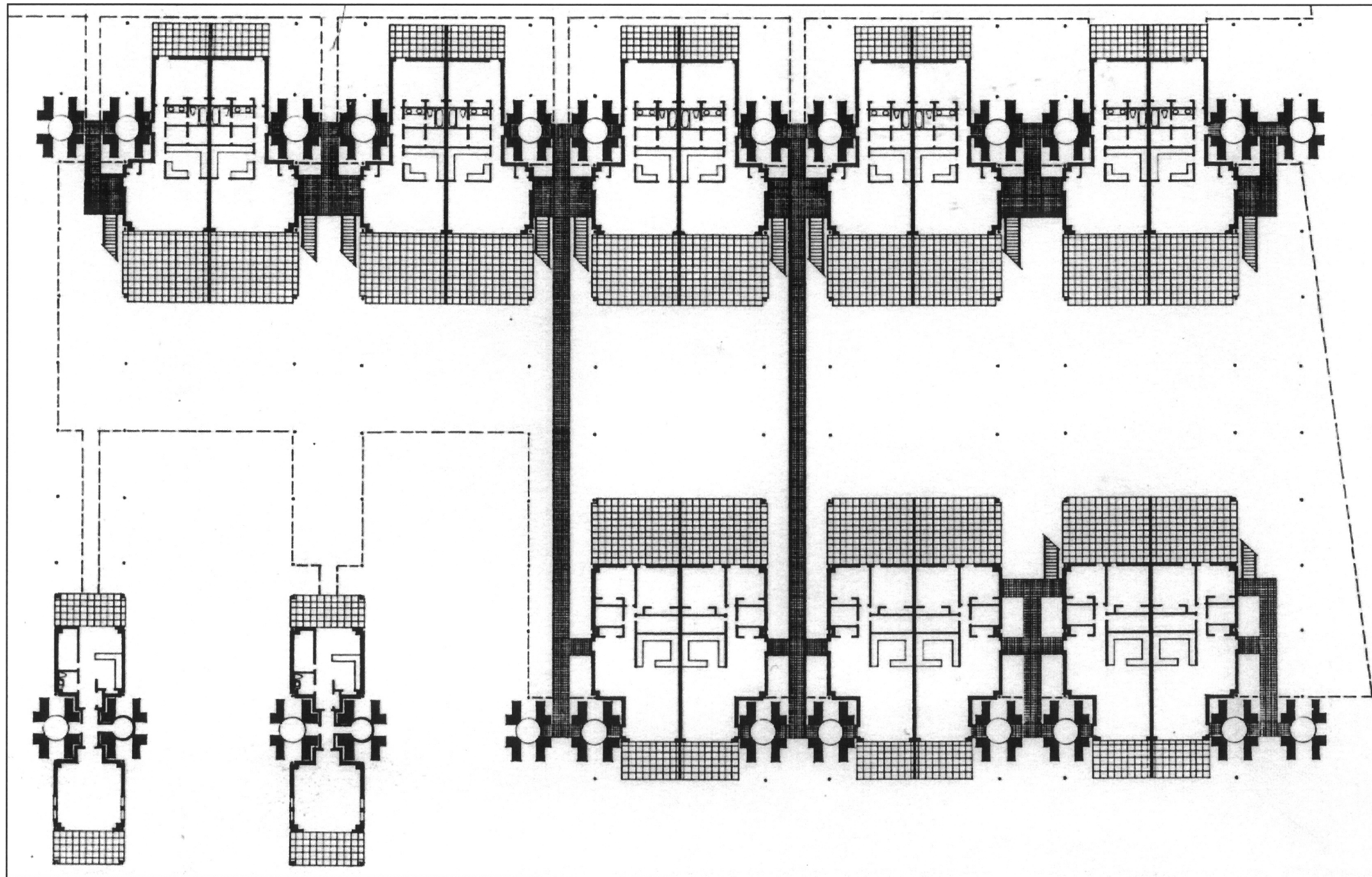
The residential units are located on the second level of the complex. These are accessible by either the elevator or stair towers.

The typical unit is designed with river views in mind. Each unit has a large terrace off the living area that overlooks the river. This terrace also serves as a private exterior space away from the public space below. The floor plan is open with the kitchen, dining and living areas flowing together. The bedrooms are located away from the public areas for increased privacy.



Our task has evolved beyond creating spaces that are aesthetically wonderful. Design is a science - the science of enhancing human interaction, connection, emotion and motion.

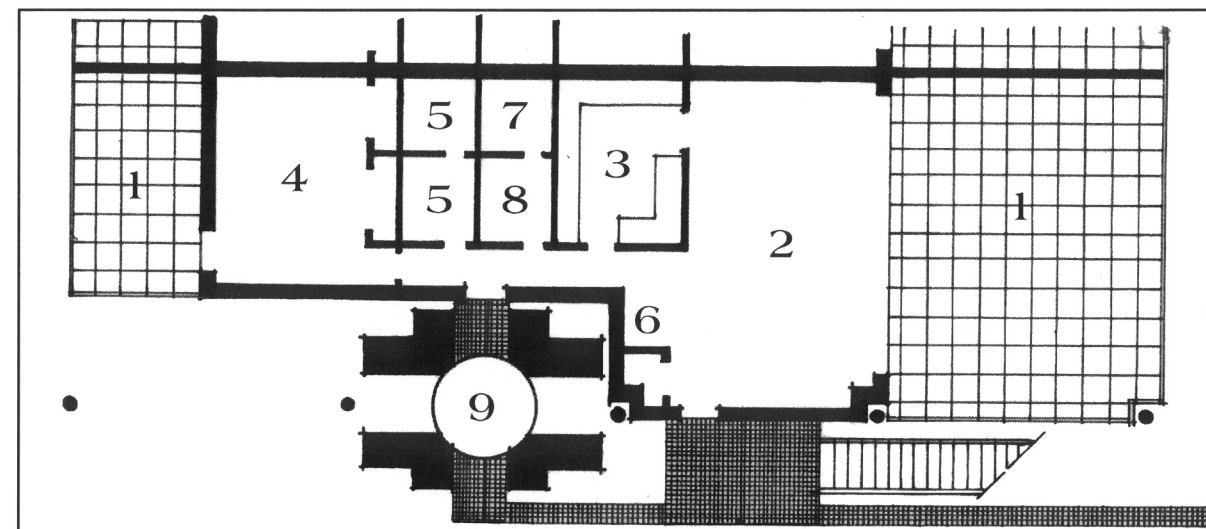
Gary E. Wheeler



### THIRD LEVEL

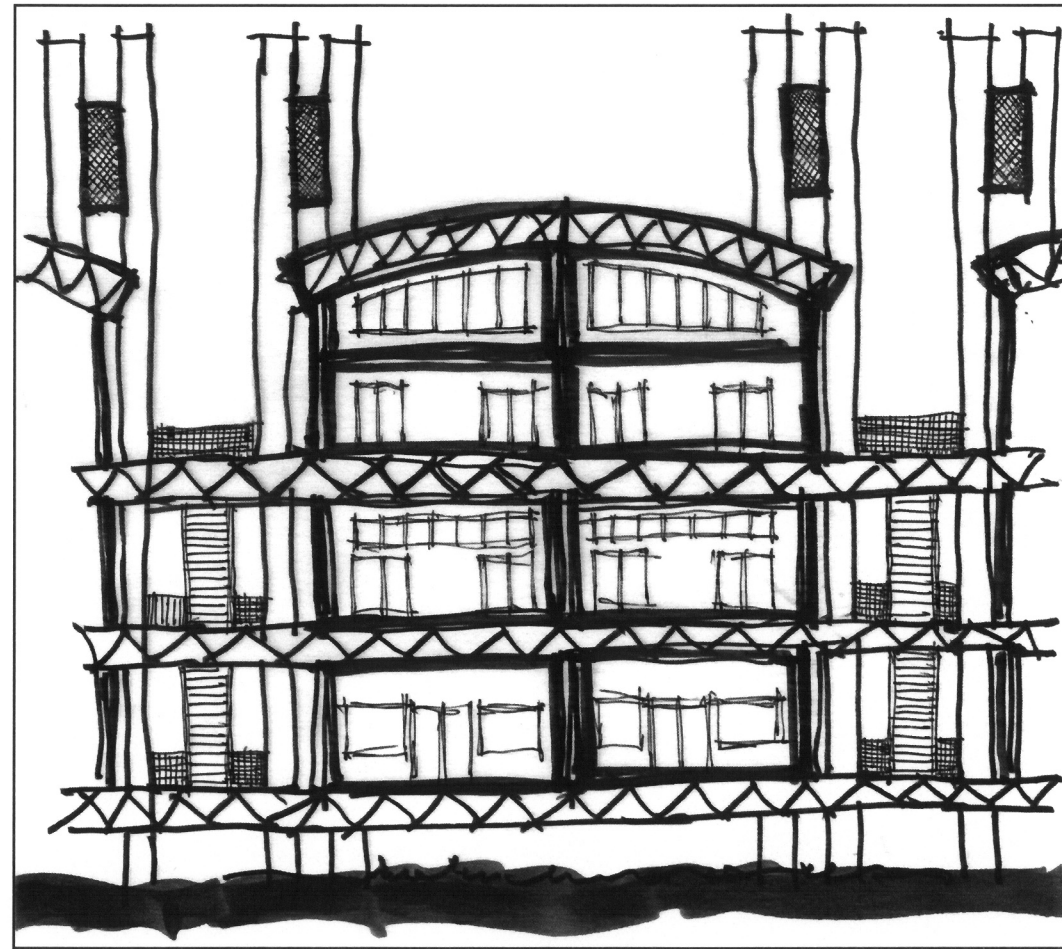
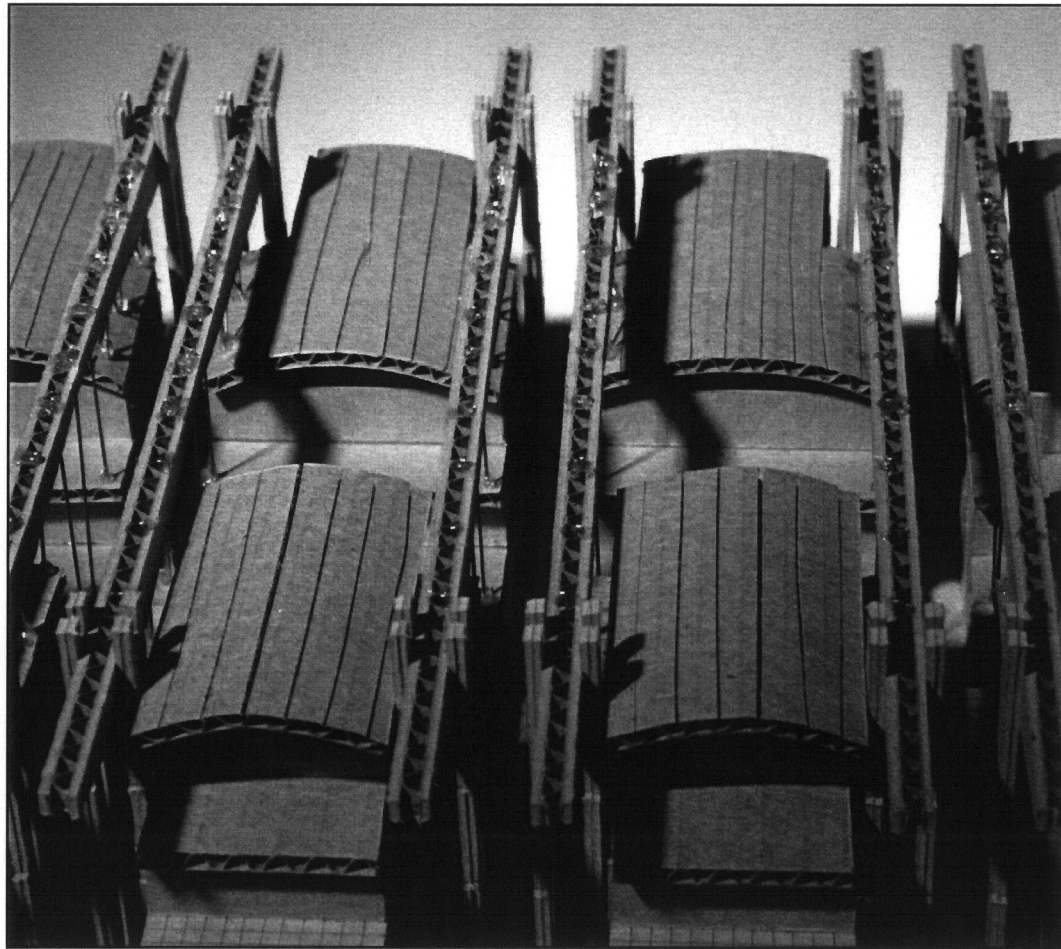
1. Terrace
2. Living
3. Kitchen
4. Bedroom
5. Bath
6. Loft
7. Mechanical space
8. Storage
9. Elevator

The third level is also comprised of residential units. These units are slightly smaller with a loft space that is created by the barrel vault roof.



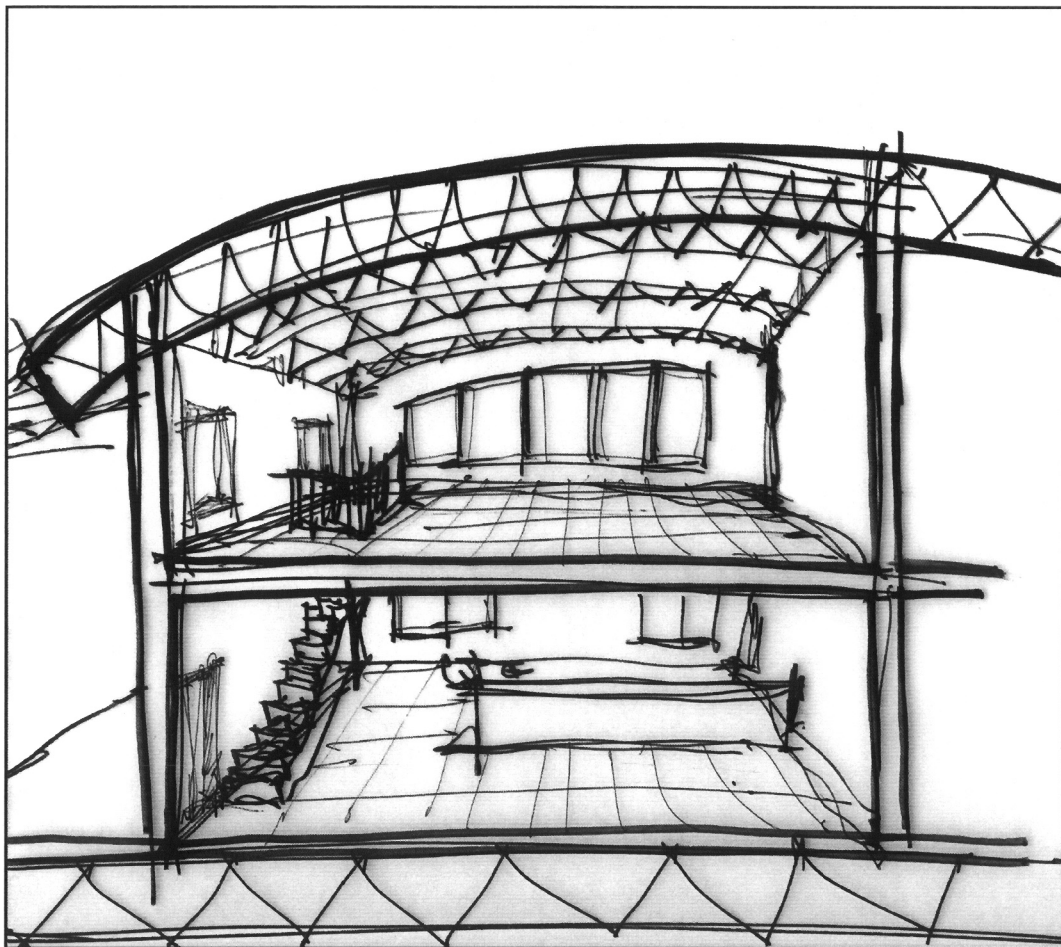
Architecture is to make us know  
and remember who we are.

Sir Geoffrey Jellicoe



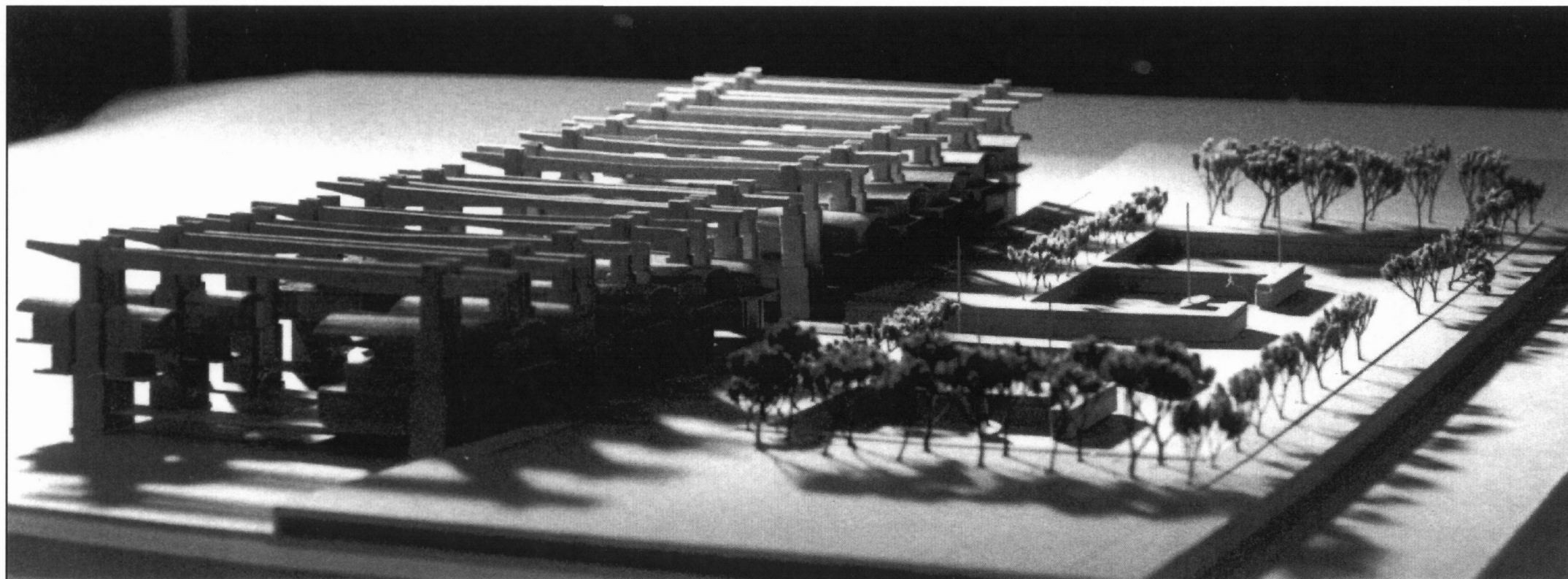
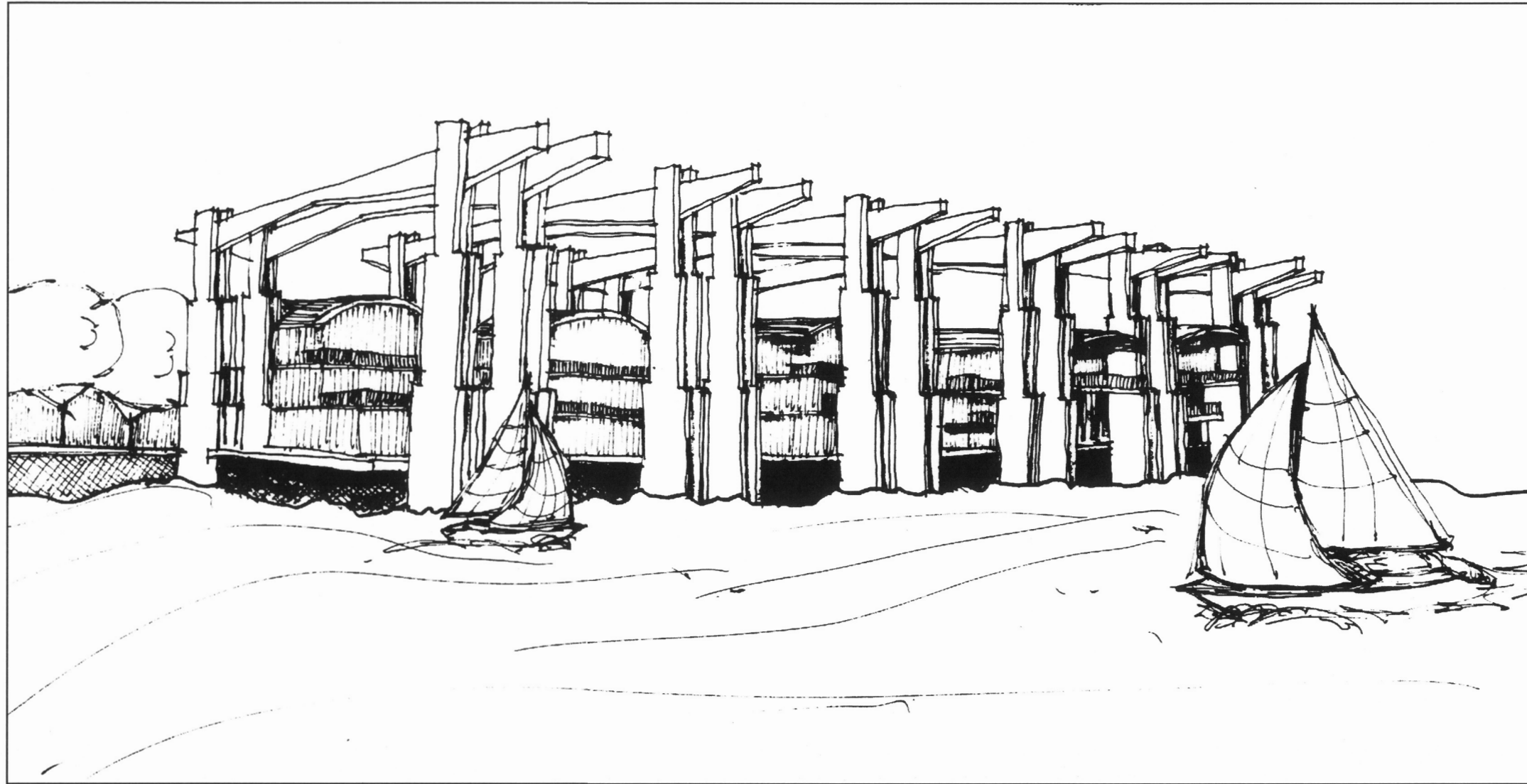
## SUMMARY

The possibility of building structures over the water creates interesting opportunities for future development. Many areas that are considered unbuildable or environmentally sensitive could possibly be utilized in the future as land continues to become more expensive and scarce.



The sun never knew how great it was until it struck the side of a building.

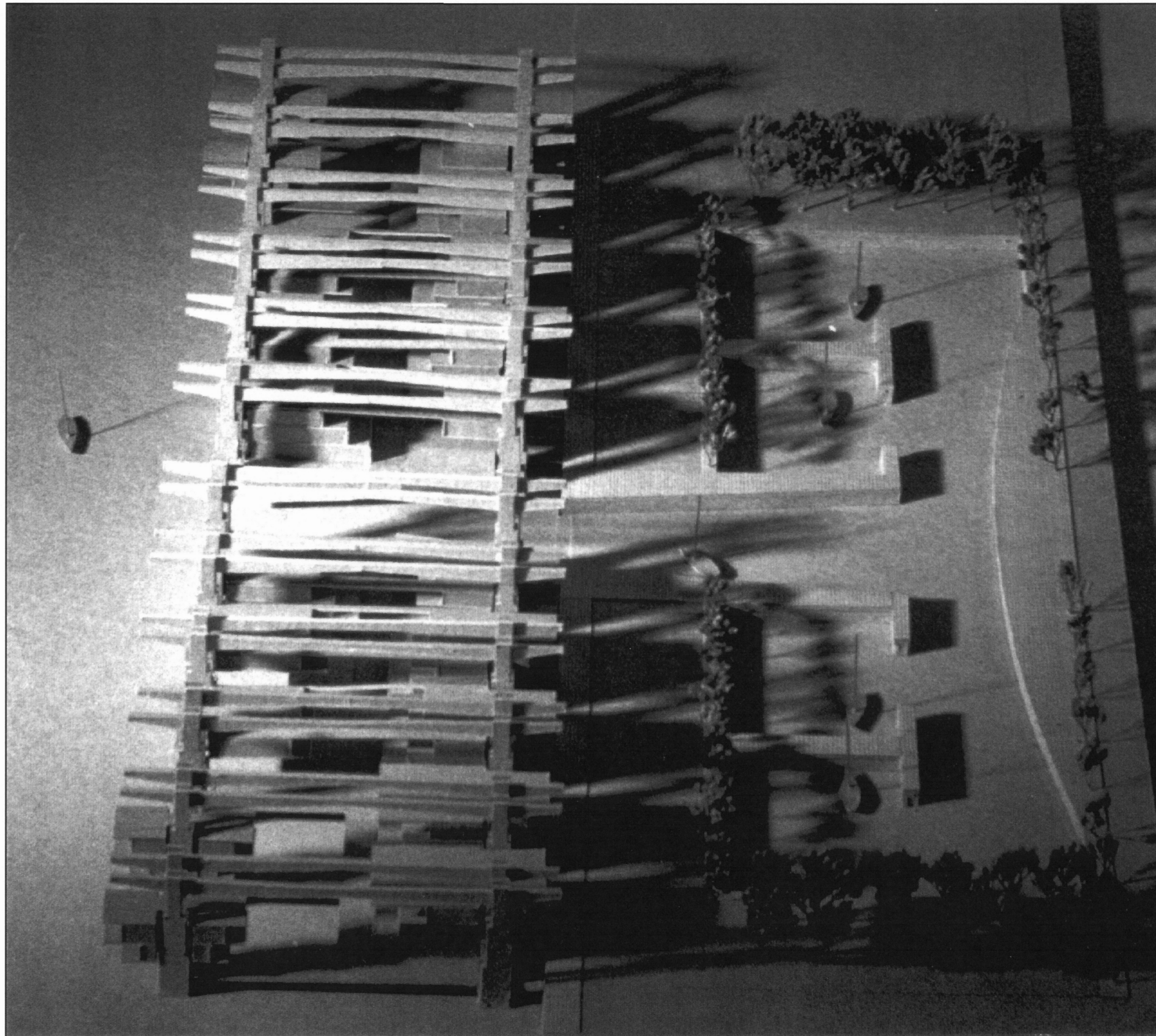
Louis Kahn



This project represents the results of my own internal struggles to clarify my position in Architecture. Through the continual process of asking questions and searching for answers, my position has been further developed. This project and its processes have opened my eyes to new ideas and possibilities, and have allowed me to further educate myself in the process of thinking. While this project represents the culmination of my academic experience, it is only the beginning of an educational process that will last a lifetime.

Architecture is the handwriting  
of man...When you enter his domain  
you know...  
his dream.

Bernard Maybeck



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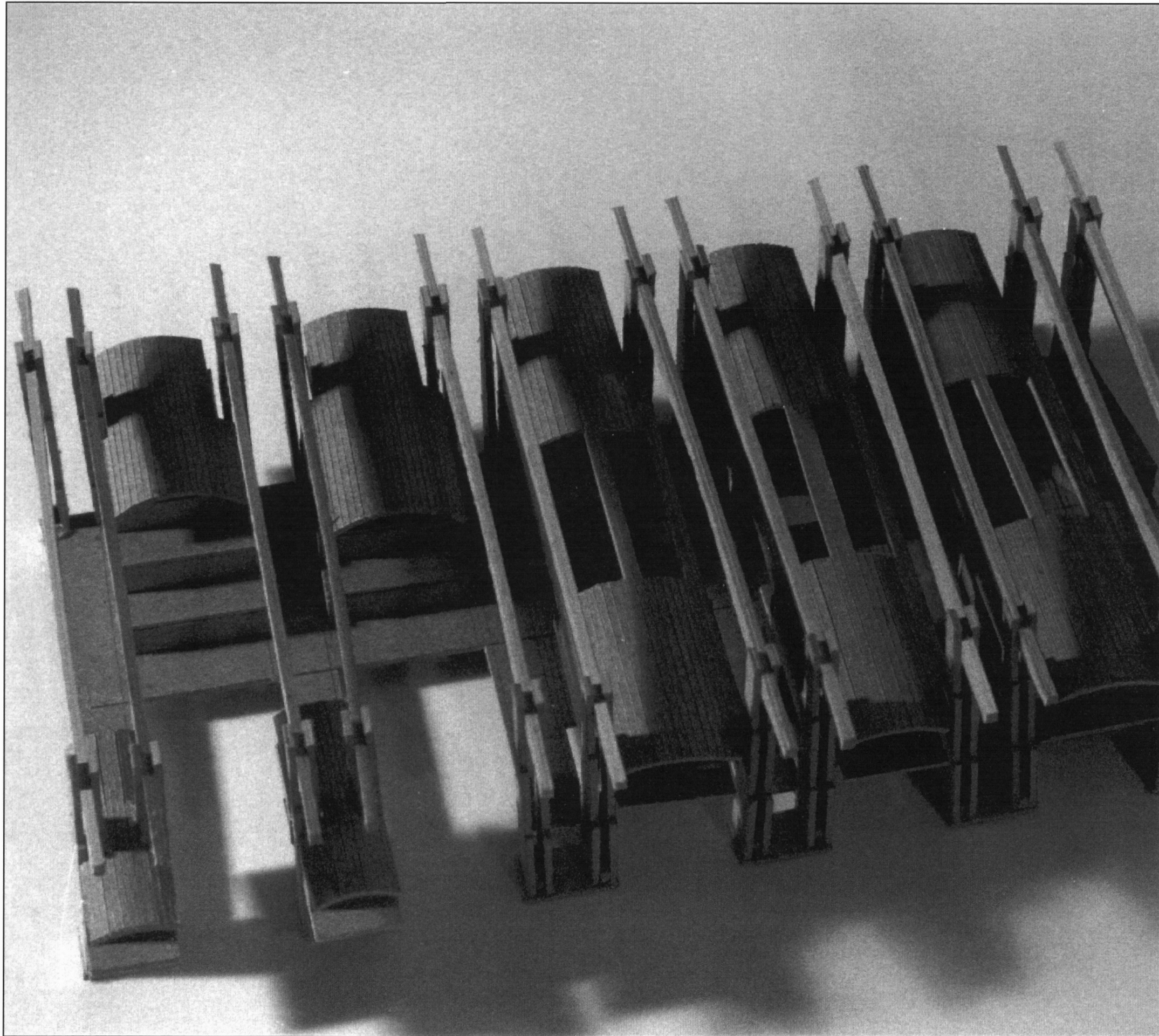
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