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Causton Bluff

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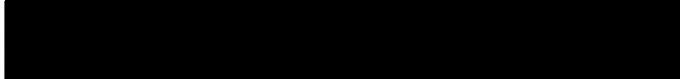
Submitted by Patrick Owen Shay


Terminal project submitted to the faculty of
the College of Architecture, Clemson University,
in partial fulfillment of the requirements for
the degree of Master of Architecture.


Approved: *1/10*



Committee Chairman


Dean, College of Architecture


Head, Department of Architecture


Committee Member


Committee Member


Committee Member

CAUSTON BLUFF

To my parents for their encouragement and support
throughout my undergraduate and graduate studies.



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Acknowledgements

I would like to give special thanks to the following people for their help in the realization of this project:

The members of my Thesis Committee, Prof. Peter Lee, Prof. Fritz Roth and Prof. Robert Eflin, for their timely and valuable criticism, and my Committee Chairman, Prof. Yuji Kishimoto, for his guidance and encouragement.

Mr. John Thomas and Mr. Mike Wysocki for introducing me to the project site and helping to procure information and materials.

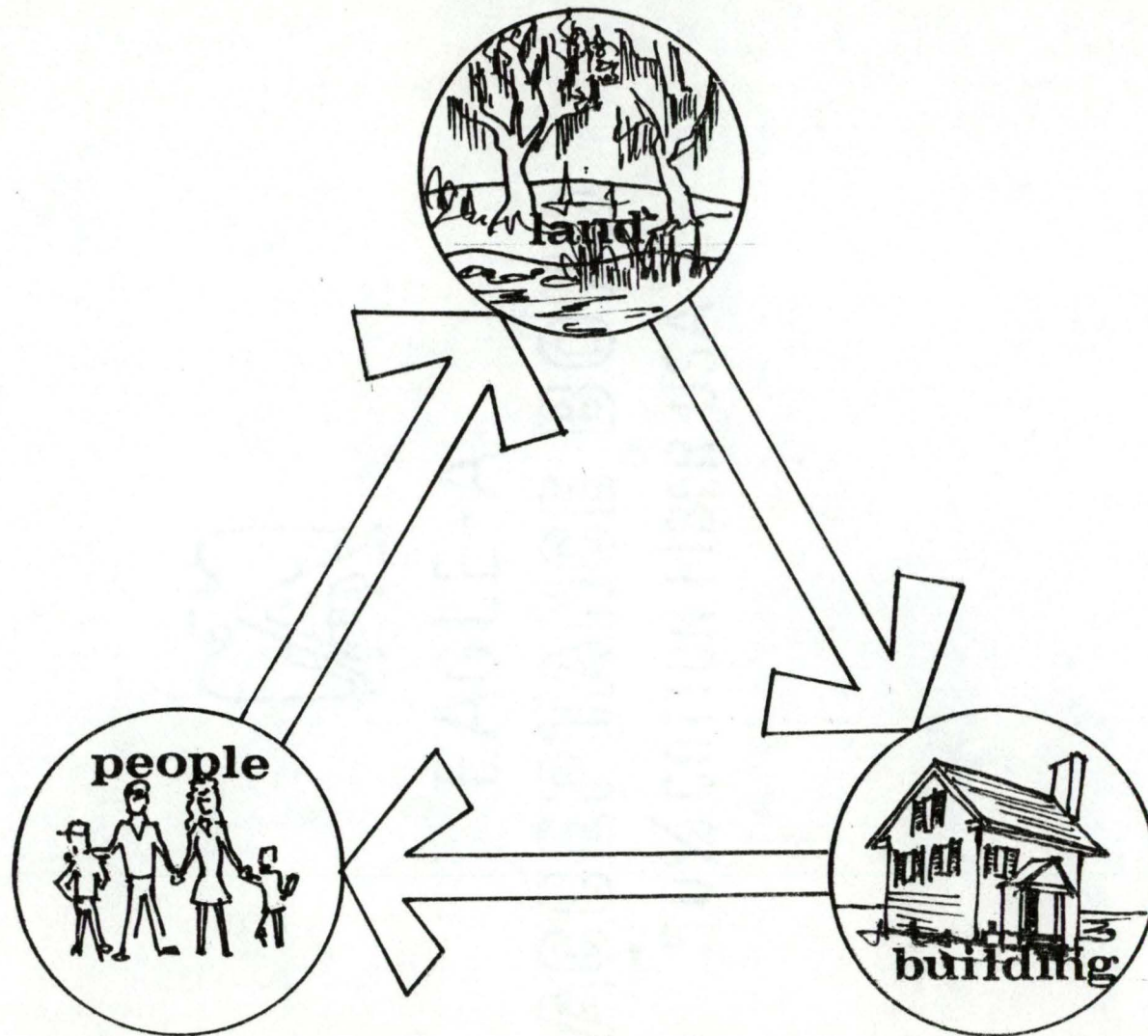
Ms. Lou Jurkowski, Mr. Richard Griffin, Mr. Fletcher MacNeill, and especially Mr. Chris McCarthy and Ms. Mary Bercek for their help in assembling the final presentation of this project.

And finally to Ms. Carol Hough for her continued support and understanding during these past months of this ordeal.

An 80 acre island in the middle of a broad marshland is located along the Intercoastal Waterway within three minutes of the Savannah, Georgia urban area. It is valued at \$1.5 million and is soon to be developed for residential use. The problem is to develop this unique piece of land in a way which will take best advantage of the many favorable qualities that the land possesses. Furthermore, as the use of this land is to be residential, it will be necessary to find the user groups which best fit the special qualities of the site and to determine how to design an environment which best suits the social and personal needs of these groups. Finally, to ensure the financial feasibility of the project, a workable proforma based on the realistic financial constraints of the current economic situation and the marketplace will be developed.

PROBLEM STATEMENT

The basic elements of the project are **LAND**, **BUILDING**
and **PEOPLE**.



How can the **LAND** be developed in a way that the
BUILDINGS may better serve the **PEOPLE**?

INTRODUCTION

The primary determinant of this project must be the site itself. The site is of such a special nature that it demands consideration in the entire spectrum of design decisions. The user group must carefully fit with the advantages and limitations which the site possesses. The infrastructure which links these users must likewise respond to the larger network of physical and social links which surround the site. At the same time this infrastructure must not detract from the intrinsic value of the site as a natural environment.

The topography, vegetation and exciting visual qualities of the land will help determine the placement of the different functions essential to community development. Thus the master planning of the project must be responsive to a detailed physical analysis of the site. The relationship of the dwellings to the land which they occupy must be closely tailored to the physical characteristics of the site. In this way the use of these built areas will be maximized and the character which distinguishes the entire site will be preserved.

The design of the individual dwelling units must respond to the needs of the users while

complimenting the environment. These needs are of both a social and physical nature. In some cases needs will vary with the background of the users, while in others the needs will be universal. Decisions about densities and organization must reflect these needs as well as the natural beauty of the site in order to arrive at a mutually beneficial development.

An equally important ingredient in a successful development is that of financial feasibility. The users must be capable of affording the dwellings provided. A careful analysis of the existing market conditions must be made in order to determine the proper users. Also, a favorable rate of return must be ensured in order to attract investors to the project.

Aside from those previously mentioned, there are several external influences on the form of the architecture. The image of a dwelling is equally important as its function. The materials chosen must reflect this desire for image as well as local availability. The method of construction must enhance the visual environment while providing an economical solution.

Finally, there are many regulations which govern

residential development. Zoning regulations must be considered. Building codes provide standards for life and fire safety. Also, as this site is located in the ecologically important wetlands, environmental regulations must be adhered to.

In order to attain these diverse goals, the following manuscript has been divided into seven major divisions: Setting; Users; Financing; Influences; Constraints; Case Studies and Program Conclusions. Each of these divisions has in turn been broken down into sub-divisions which deal with the topic in greater detail. In the areas where topics overlap, references to the appropriate division have been provided in the left hand margin.

SETTING

The purpose of this division is to examine the many physical factors which will influence the design of the project. The many amenities offered by the Savannah urban area and their proximity to the project site will be studied first. This will be followed by a narrative description of the site and its history. The next section provides a detailed analysis of the many many physical characteristics of the site. The final portion of this division is an analysis of the climate of the site and surrounding region.

The impacts of these analyses will be seen throughout the project. The user group will be chosen, in part, by their ability to take advantage of the many advantages of the land. The economic value of the site is in large part due to the physical beauty and location of the land. This in turn has had an impact on the feasibility of the project. This island in a marshland is an ecologically sensitive area and the design of the project must also respond to this constraint. Finally, the architecture of the individual dwellings themselves must respond to the climate, context and topography of the site.

See Users, Types Analysis, Densities, and Community Needs.

See Financing.

See Constraints, Environmental Impact

Context
History

The city of Savannah was settled in 1732 by James Oglethorpe. It is the oldest planned city in the northern hemisphere, based on a rectangular grid system periodically broken up by a series of city squares placed at the center of main intersections. Today it is the site of the largest urban Historic District in the United States.

Population

In 1980 the estimated population of Savannah is 148,000 while that of surrounding Chatham County is estimated at 204,000. Within the trade area of Savannah (50 mile radius) the population is approximately 350,000. The Savannah metropolitan area is currently experiencing a period of expansion due to the influx of industrial and shipping businesses along the Savannah River.

See Financing, Market Analysis.

Transportation

The City's economic lifeline is Georgia's gateway to world trade and the Southeast's leading foreign trade port between Baltimore and New Orleans. This, the tenth largest port in the United States is served by 97 steamship lines and 36 deep water terminals. Net vessel tonnage in 1979 was 17,230,839. Savannah International Airport is served by Delta, Eastern and National Air Lines with regular flights throughout the southeast as well as New York and Washington.

Savannah is also served by four railroads: Seaboard Coastline, Southern, Central of Georgia and Savannah-Atlanta with passenger service to Atlanta, Miami, Boston and points in between. There are 70 motor carriers offering regular, non-scheduled and contract services and four bus lines.

Communications

Currently there are four newspapers. The Savannah News Press, offering morning, evening and Sunday editions, and three weekly papers: Georgia Gazette-Journal Record, The Herald and The Tribune. Savannah has 13 radio stations, eight AM and five FM. Also there are four television stations, representing all three major networks and the Public Broadcasting System. Cable television is also available.

Commercial

Chatham County's taxable sales for 1980 was \$1,335,497,000. Savannah's industries include more than 200 manufacturers and processors in the metropolitan area. There are seven commercial banks, 42 branches and four savings and loan associations with eleven branches in Savannah. Tourism accounted for more than \$80,000,000. in 1980, making it the cities largest industry. Aside from the new Hyatt Regency Hotel on the riverfront, there are

three hotels with 545 rooms and 36 motels with approximately 3,000 rooms.

Institutional

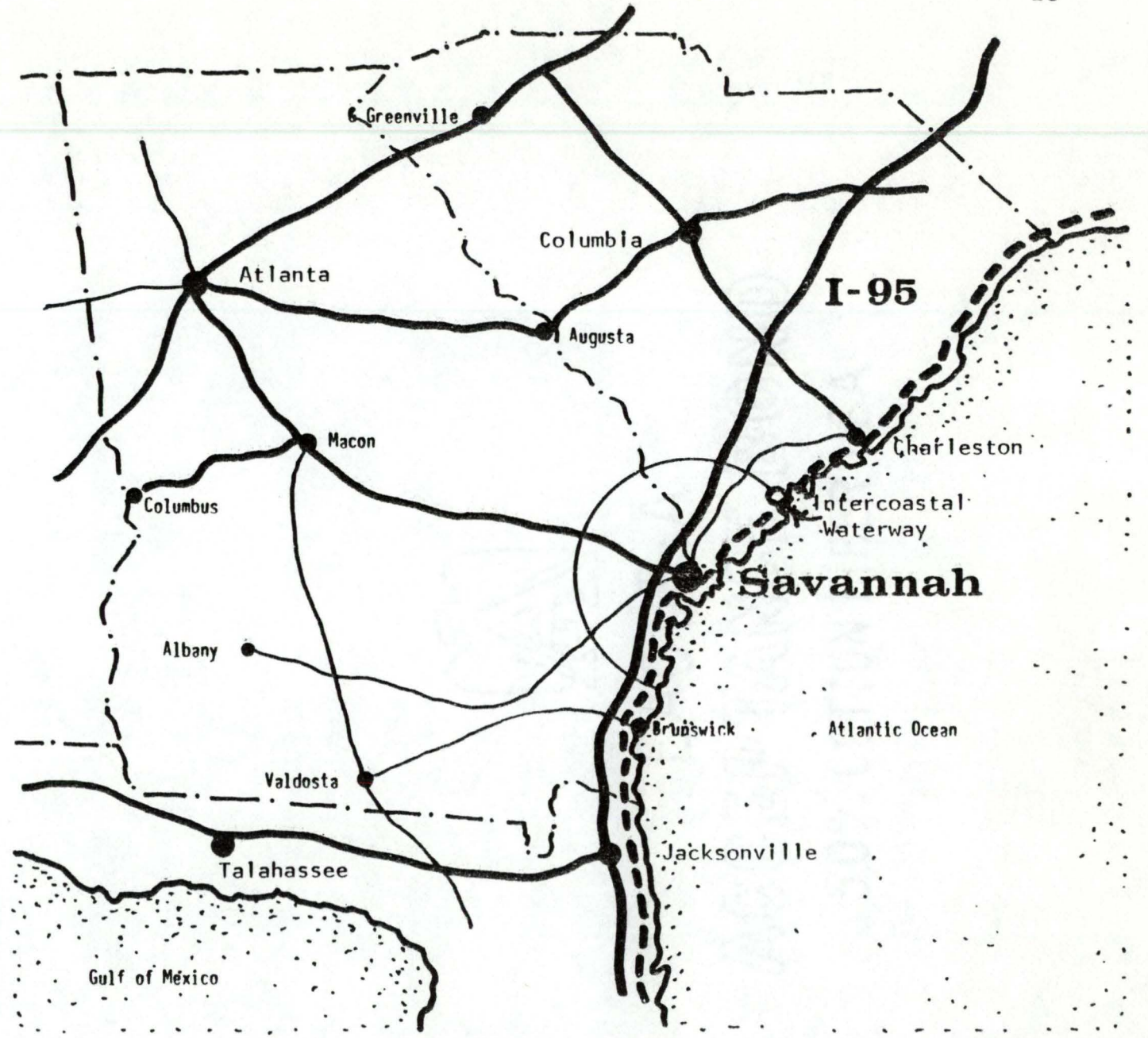
Savannah's educational facilities include Armstrong State College and Savannah State College, 59 public schools, three vocational-technical schools, 18 parochial schools, ten private schools and one business college. With more than 300,000 volumes and a total circulation of over 1,000,000 Savannah's library system consists of the Main Public Library, 13 branches and eight bookmobiles. The Telfair Academy of Arts and Sciences is the oldest public art museum in the South. Also the Owens-Thomas House, the finest Regency mansion in America is open to the public. Savannah's churches include over 200, representing all major denominations. There are seven hospitals in the area providing 1,489 beds and over 250 medical doctors and dentists.

Recreational

There are 17 theatres, seven golf courses, 32 public squares, parks and playgrounds as well as three sports fields, two recreation centers and two stadiums in the area. The Savannah Civic Center is a modern downtown complex with arena seating 7,500, theatre seating 2,500, and 26,000 square feet of exhibit space.

Seacoast

In addition to the recreational amenities of Savannah, there are a wealth of opportunities along the coast. History can be experienced at Fort Jackson and Fort Pulaski, both important in coastal defense of Savannah during the War of 1812 and the Civil War. Tybee Island offers a wide sandy beach and many resort hotels, as does Hilton Head Island. Both are within short driving distance of Savannah. Also there are many opportunities for sport fishing and sailing in Wassau Sound and off the coast of Isle of Hope.



REGION



AREA CONTEXT

Site Description

See later discussion of Fort Bartow.

Perhaps the most unique quality of the site is its limited accessibility, without the usual companion problems associated with remoteness. The site is entirely bounded by three distinct and powerful edges. One long edge is sharply defined by the line of bluffs which give the land its name and which face the Intercoastal Waterway. Another longer edge is also defined by water, but in this case it is a salt marsh. As it is extremely difficult to build on marshland, it is likely that this edge will remain intact. The third and shortest edge is generated by the Islands Expressway which slices across the island and separates the site from an identifiable region of large single family dwellings. This edge is emphasized by the earth works which face the highway and which once protected the eastern approach to Savannah.

The limited access to the site is sharply contrasted by the vitality of the paths which pass adjacent to the site. The Islands Expressway passing to the west links the site directly to the city of Savannah and the resort community of Tybee Island. The central business district of Savannah is about ten minutes away by car. In the other direction, also about ten minutes away is a private airstrip. Farther in

this direction, about 30 minutes from the site, is resort area associated with the beaches of Tybee Island.

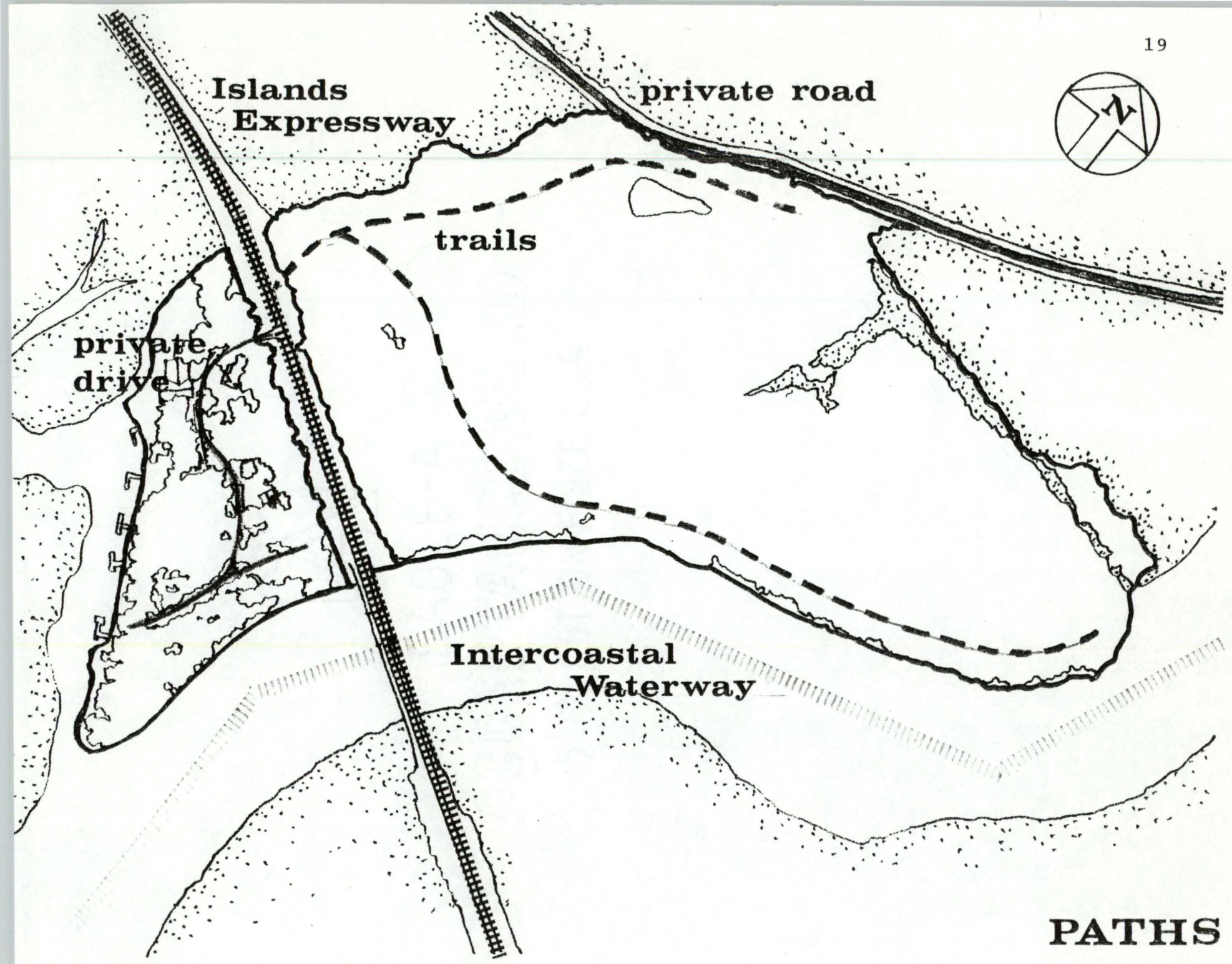
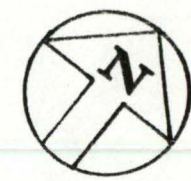
Equally as important a pathway is the Intercoastal Waterway, which runs along the south edge of the site. This river system handles extensive commercial traffic as well as pleasure craft in transit up and down the eastern coast of the United States. On a local scale it allows access to the fishing and recreational areas of the Wassau Sound and the resort areas of Savannah Beach and Hilton Head Island.

These combined advantages of strong territorial definition and immediate access to two major transportation arteries (in two different media) are further fortified by an amazing variety of visual amenities. Virtually untouched since it played a passive role in the defense of Savannah during the Civil War, the site is a forest of fully mature live oaks. Also, as it is bounded on two long sides by water and open marshland, the perimeter commands expansive and distant views. Internally, the site possesses a tidal estuary, which could be developed into a marina, an inland pool fed from groundwater and runoff from the site, and a system of earthwork

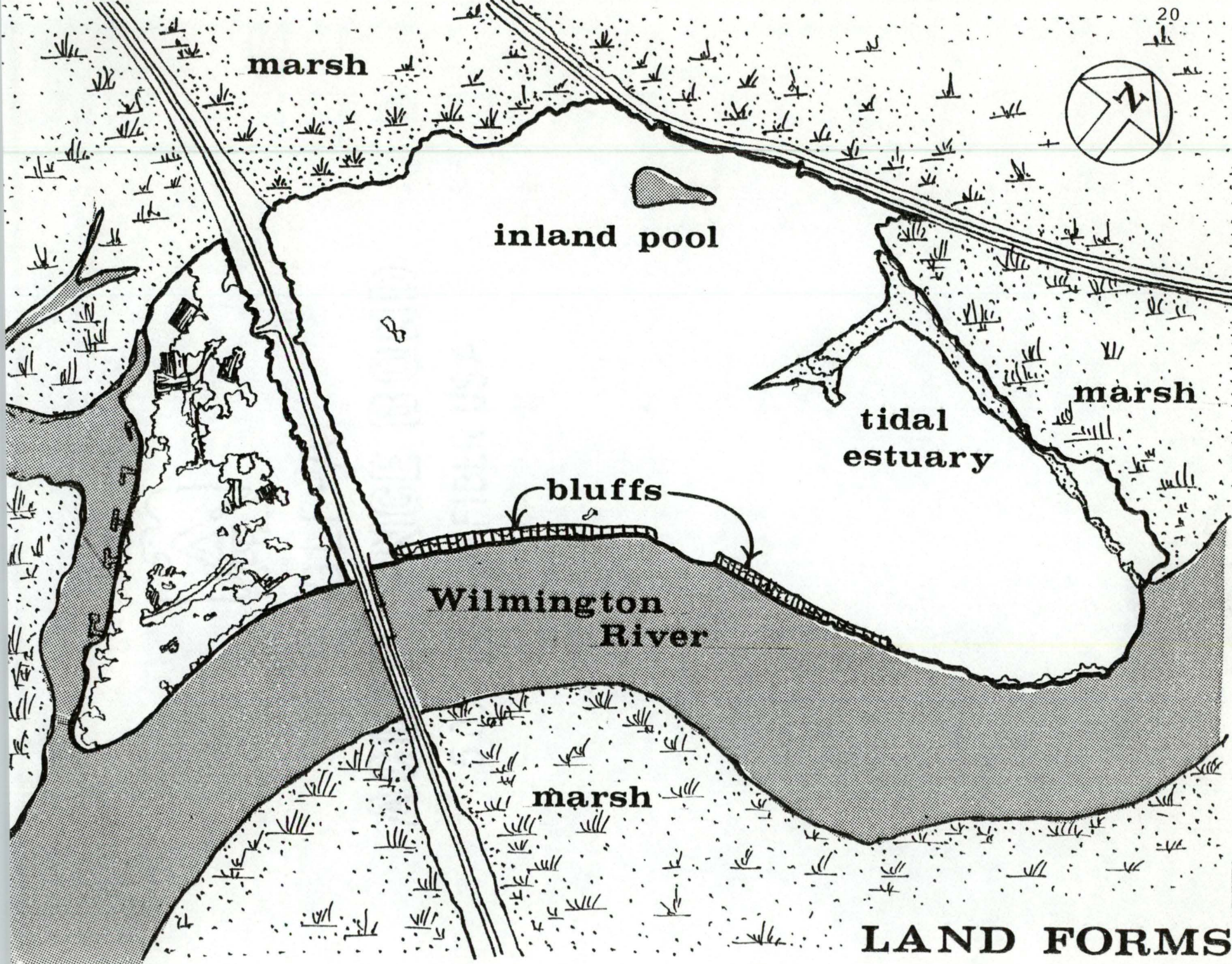
fortifications, which provide interesting contour. Each of these could be improved visually to provide highlights in this gem of land.

The following Site Analysis is a graphic analysis of each of the physical characteristics of the site. For clarity, only one aspect of the land has been studied at a time. Each of these aspects will have an impact on the design of the project and it is hoped that by isolating them the reader will be able to understand the complexity of the problem. At the conclusion of the analysis there is a composite map and discussion of the conclusions which have been drawn from this part of the study.

SITE ANALYSIS



PATHS



marsh

inland pool

tidal estuary

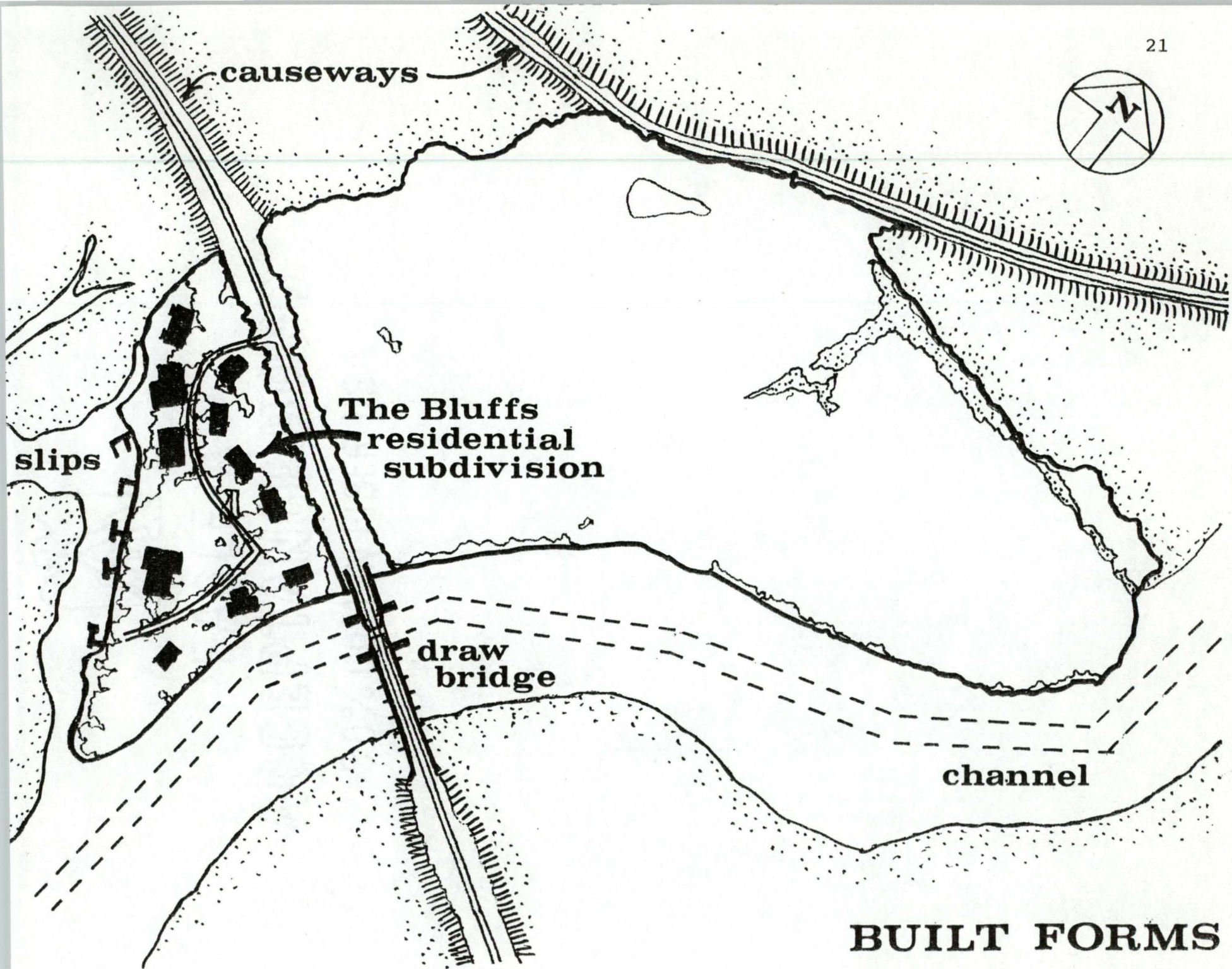
bluffs

Wilmington River

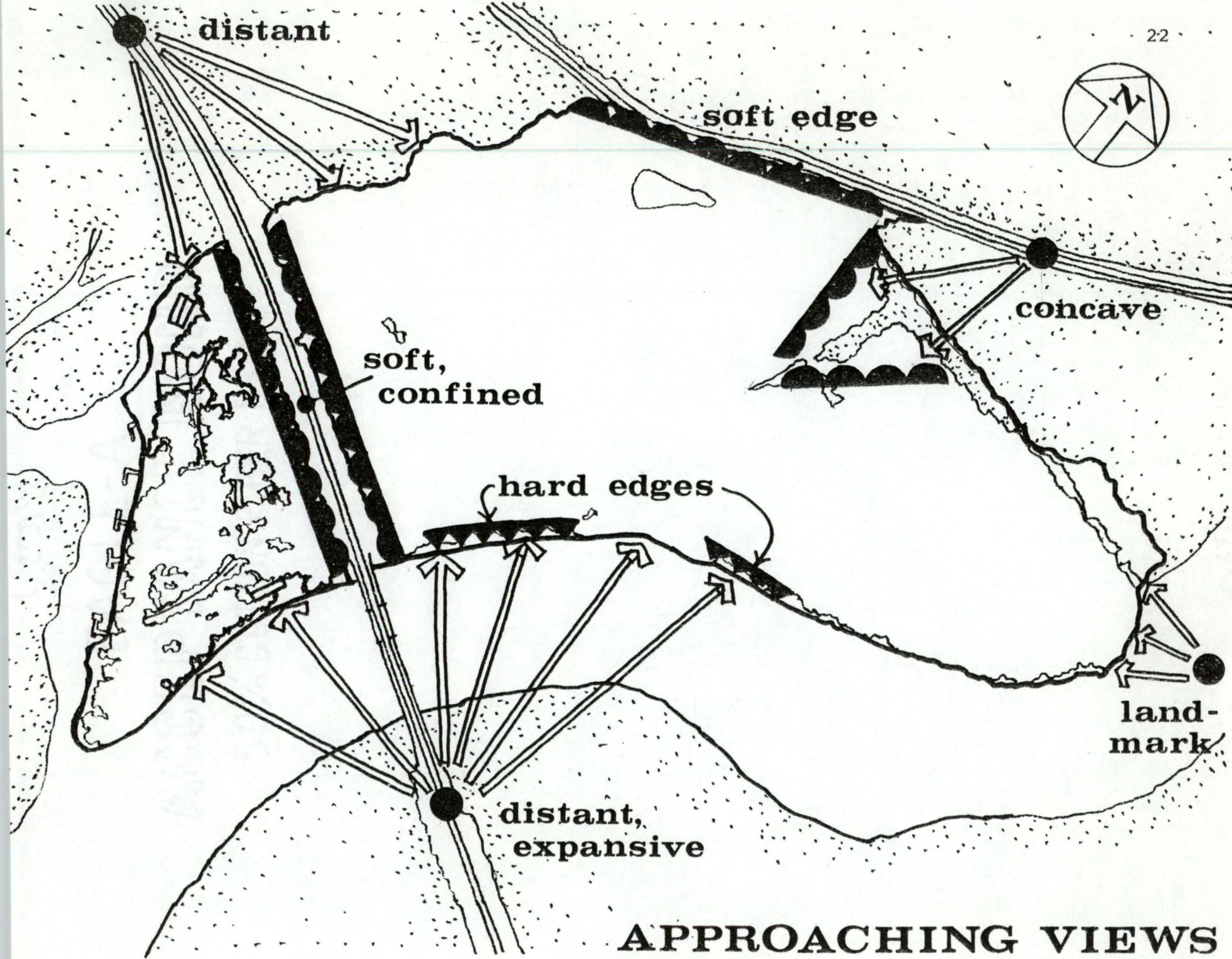
marsh

marsh

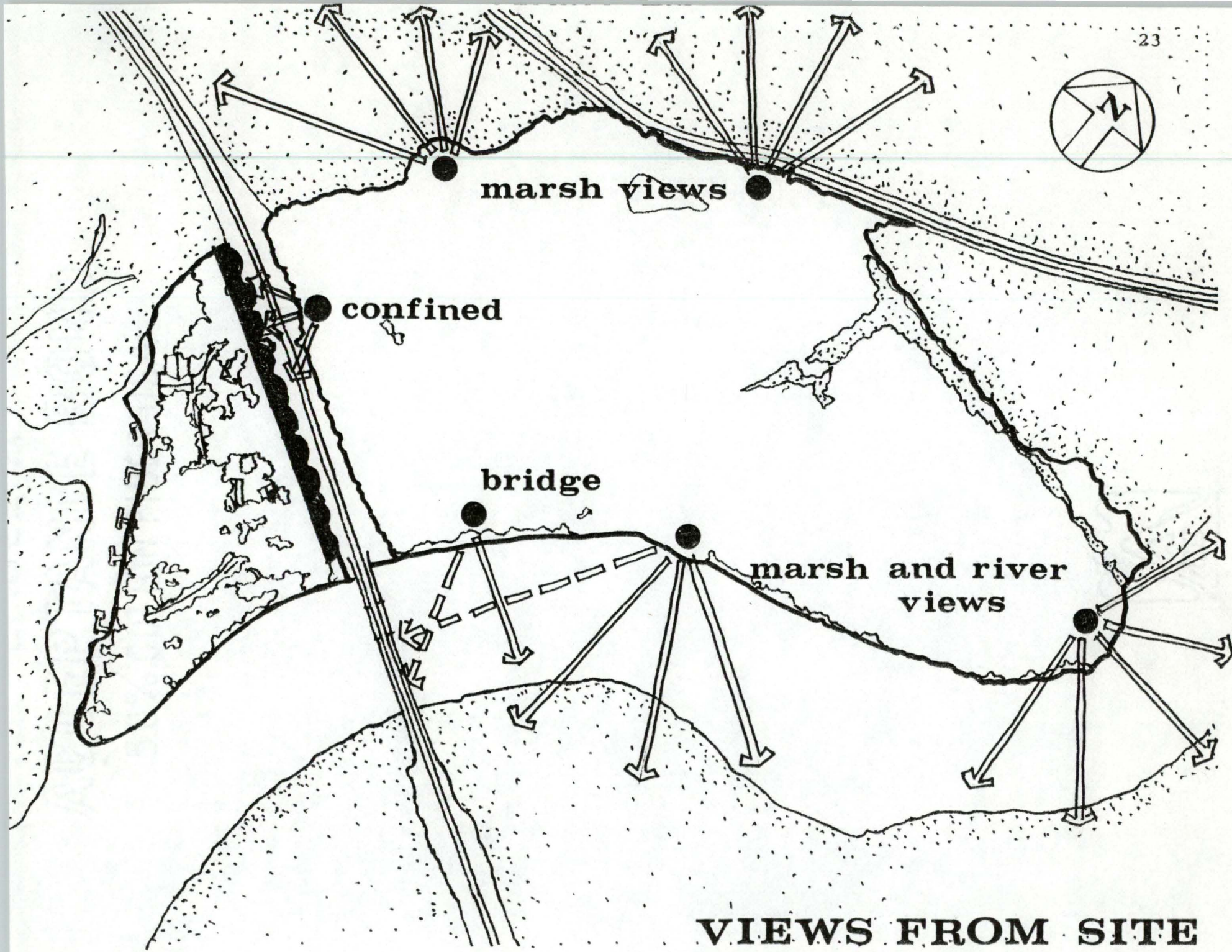
LAND FORMS



BUILT FORMS



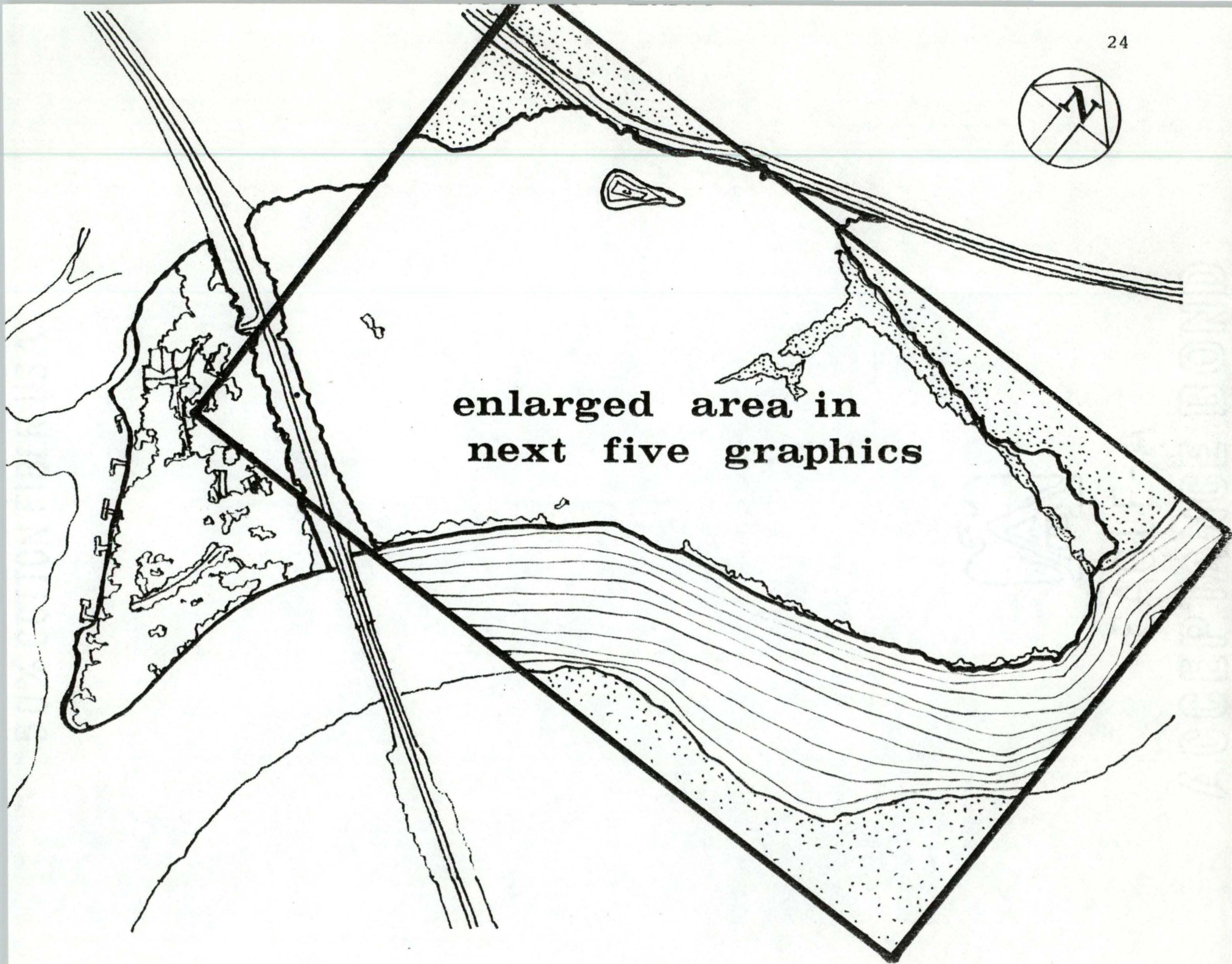
APPROACHING VIEWS



VIEWS FROM SITE

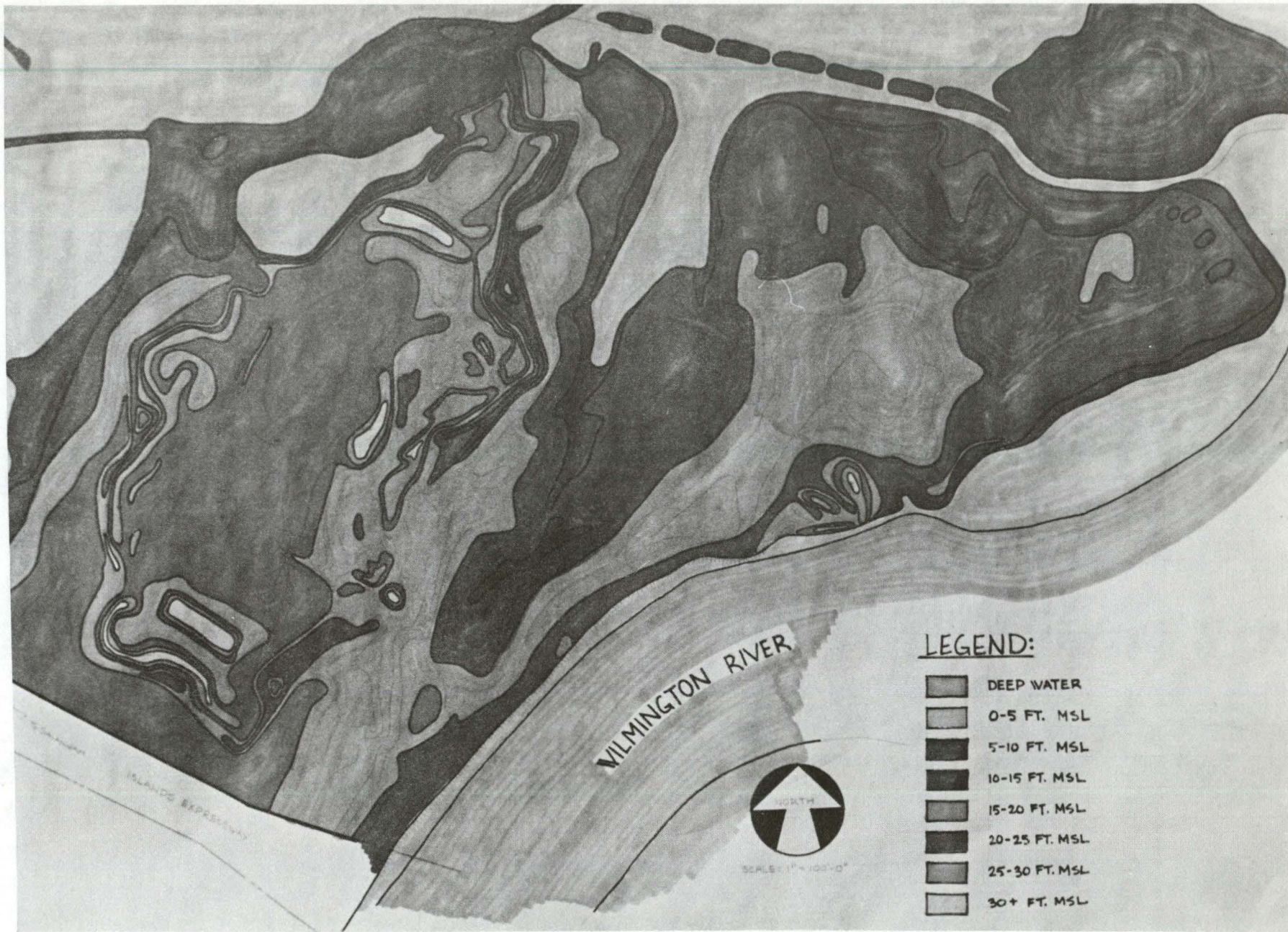


**enlarged area in
next five graphics**











The outstanding majority of the site is above an elevation of 10 feet MSL (mean sea level). Tidal fluctuations vary from +3.5 feet to -3.5 feet MSL. Spring tides flood the tidal estuary at the northern edge of the site. The eastern half of the site averages an elevation of about 15 feet with a high point of 31 feet MSL which occurs at a small hill at the edge of the Wilmington River. The western half of the site averages about 25 feet MSL and is characterized by the earthworks and trenches which surround the center of this region. These earthworks are crowned by several hills with elevations of over 30 feet MSL. These are the highest points on the site.

SITE: ELEVATION

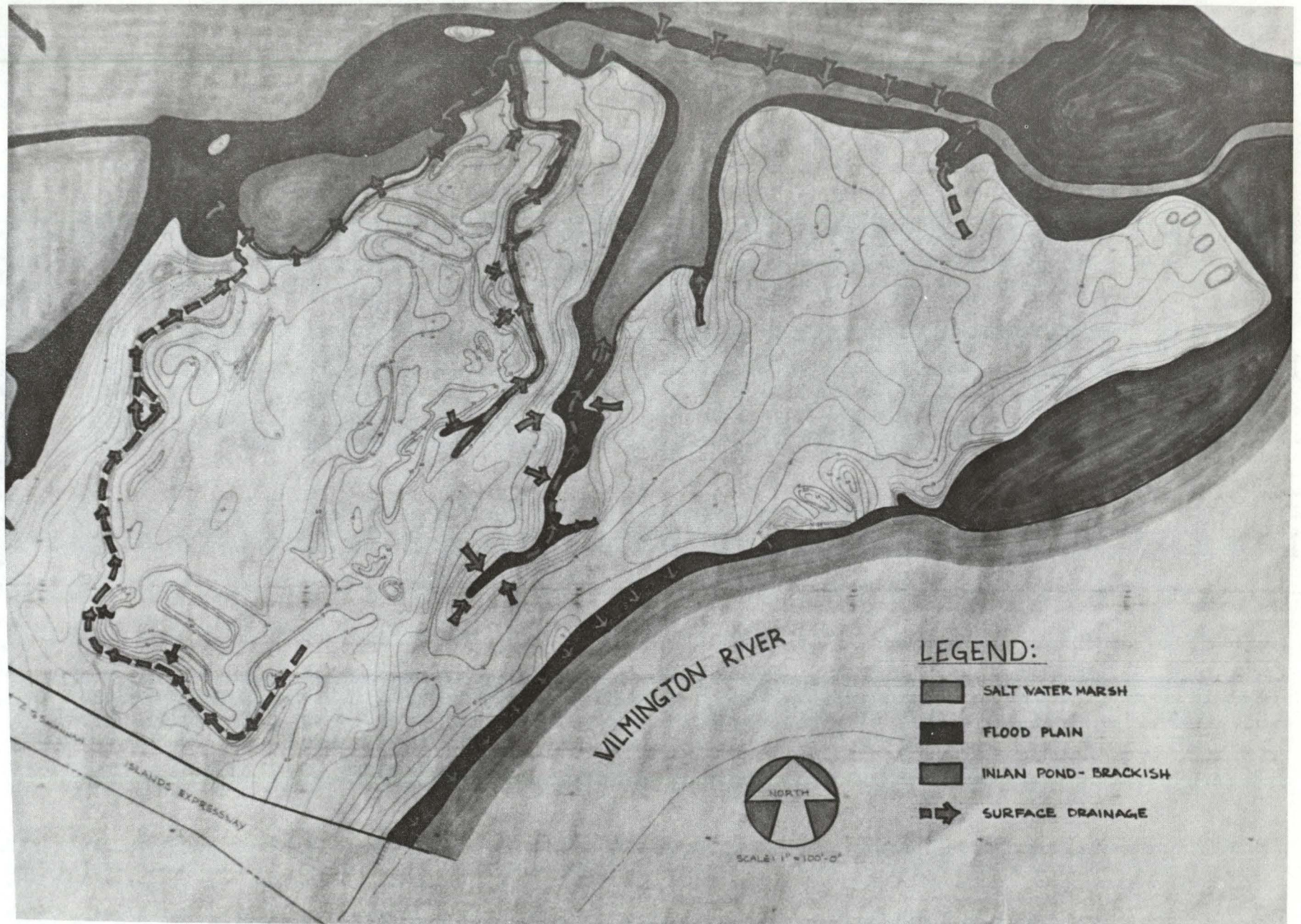


LEGEND:





-  DEEP WATER
-  0-5 FT. MSL
-  5-10 FT. MSL
-  10-15 FT. MSL
-  15-20 FT. MSL
-  20-25 FT. MSL
-  25-30 FT. MSL
-  30+ FT. MSL

The site is almost entirely surrounded by salt marsh. At the northwestern, northern and eastern edges of the site lie large areas of dry land which are within the flood plain. In the northwestern part of the site there is a large inland pool. This pond is fed by spring tides, groundwater and runoff and the water is brackish year round. This pond is a haven for small fish and crabs. Surface drainage on the eastern portion is outward toward the perimeter, while the western portion of the site is drained by a series of trenches which lead runoff to the pond and tidal estuary.

SITE: HYDROLOGY



LEGEND:

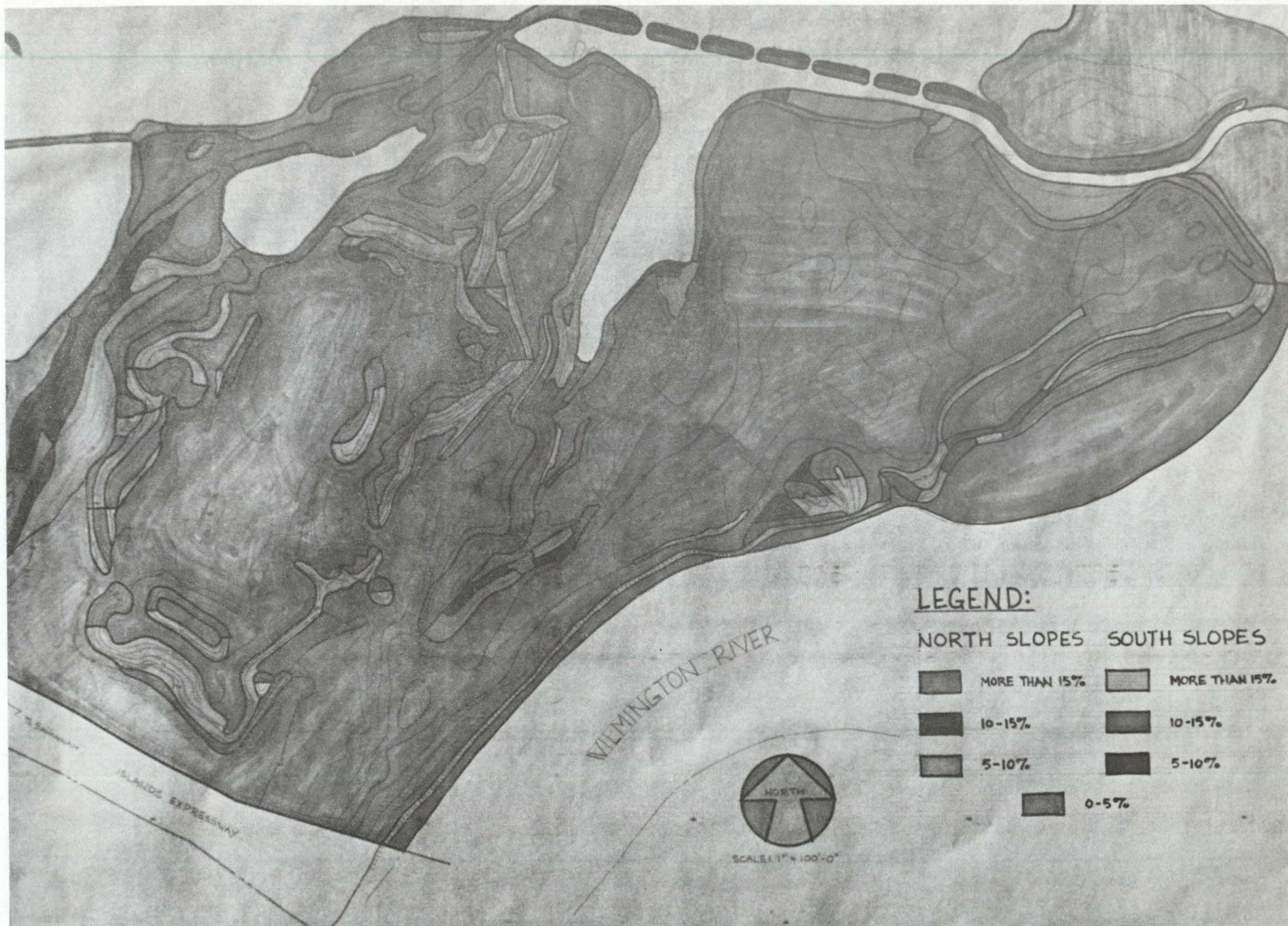
-  SALT WATER MARSH
-  FLOOD PLAIN
-  INLAN POND- BRACKISH
-  SURFACE DRAINAGE



SCALE: 1" = 100'-0"

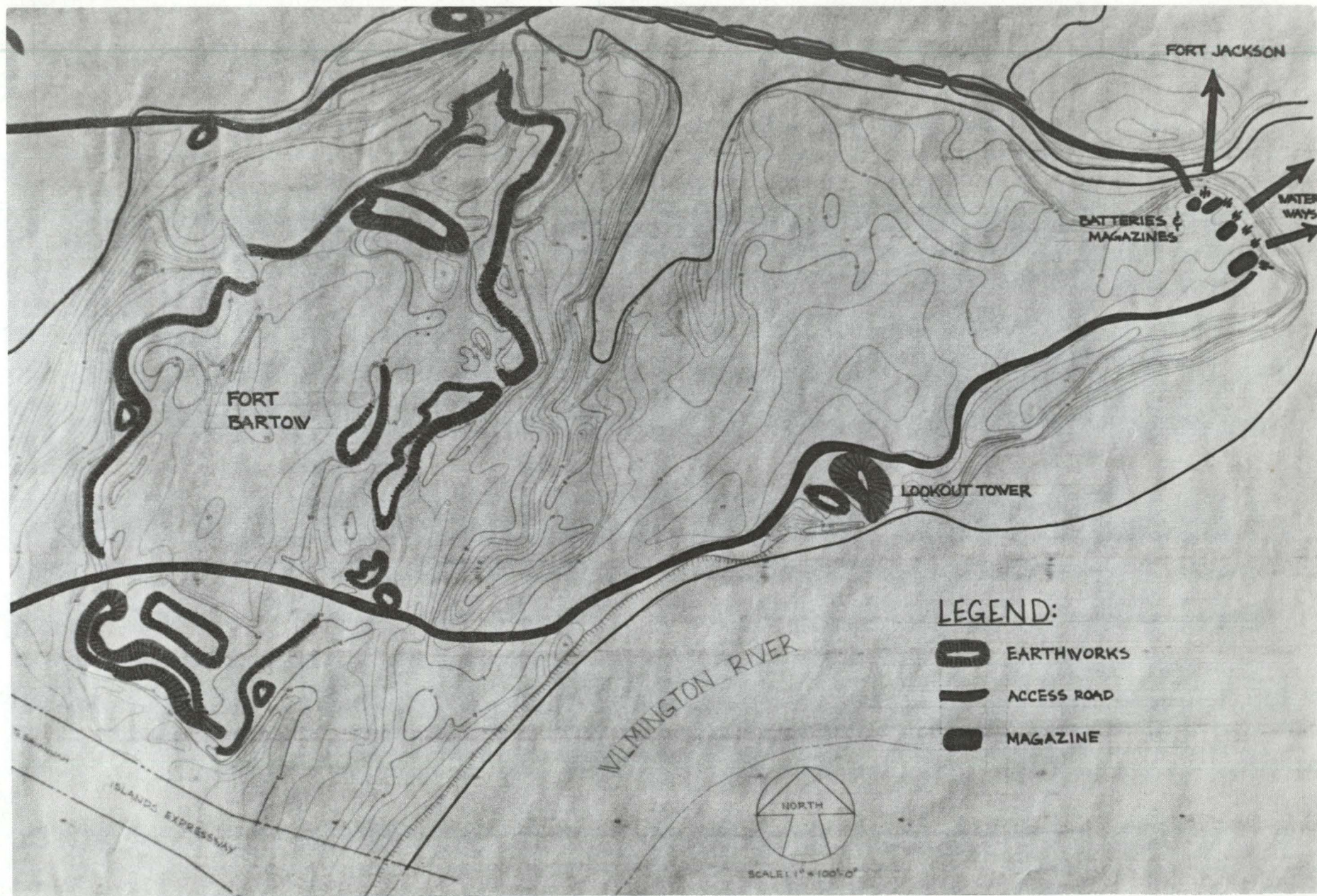
The majority of the site is relatively flat, with an average slope of between 0 and 5%. Exceptions are the steep bluffs along the Wilmington River and those areas around the earthworks. Slopes are evenly divided between northern and southern exposures with the majority of area favoring neither.

SITE: SOLAR SLOPES



The Confederate Fort Bartow was constructed early in the year 1862 at the request of General Robert E. Lee, who was then Commissioner of Coastal Defenses for South Carolina, Georgia and Florida. The purpose of the fort was twofold: first, it was to defend the eastern approach to Savannah from the vulnerable Tybee Island, and second, it was to protect the rear of Fort Jackson and the Wilmington River. To meet these tasks an earthwork fort was constructed on the high ground on Causton Bluff and an open battery of six guns (two 8-inch columbiads and four 32 pound cannon) was placed at the point. The fort was garrisoned with 13 companies of light infantry. Fort Bartow never saw action though, as Savannah was captured by land late in 1864. For this reason the earthworks were never placed on the National Register of Historic Places and has since fallen into disrepair.

FORT BARTOW



LEGEND:

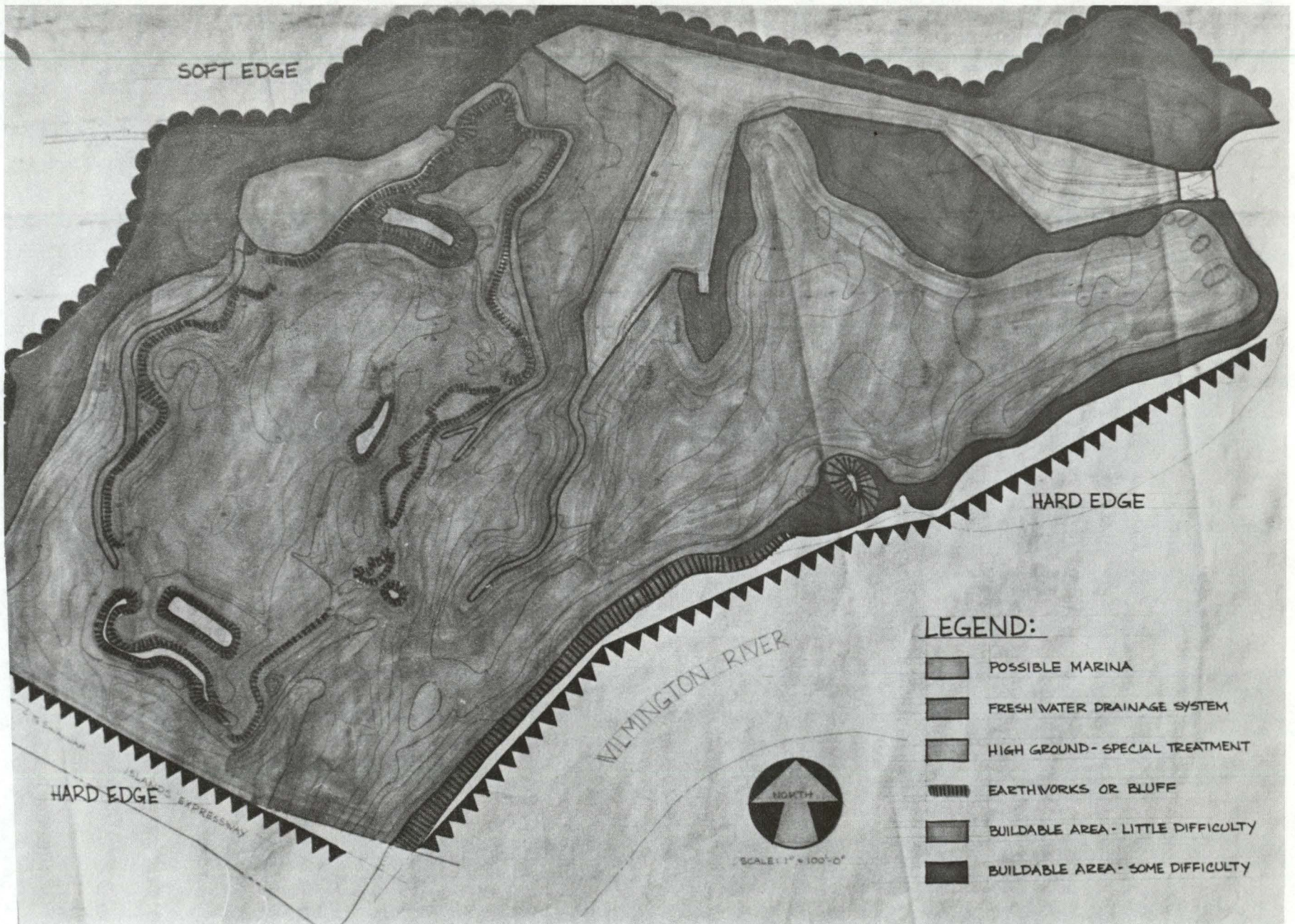
-  **EARTHWORKS**
-  **ACCESS ROAD**
-  **MAGAZINE**



SCALE 1" = 100'-0"

The following graphic is a composite of the previous four graphics. The hard edge provided by the bluffs along the Wilmington River should be reinforced, perhaps by the addition of a sea wall along the eastern portion of this frontage. Likewise, the edge along the Islands Expressway should be hardened with some type of built form. The long edge which faces the marsh should remain soft. The tidal estuary could be dredged to form a marina, with the resulting fill employed to strengthen the bank along the northern edge of the site. The existing system of trenches at the interior of the site could be used to form a fresh water drainage system with the inland pond to hold storm water. The areas of elevation over 30 feet MSL should be given special treatment. The bluffs and earthworks should be left as they are. The majority of remaining area is suitable for building with little difficulty. Those areas along the edges of the site and proposed marina are also buildable, but some filling or special type of construction would be required.

SITE: COMPOSITE



SOFT EDGE







HARD EDGE

WILMINGTON RIVER

HARD EDGE

ISLAND EXPRESSWAY

LEGEND:

-  POSSIBLE MARINA
-  FRESH WATER DRAINAGE SYSTEM
-  HIGH GROUND - SPECIAL TREATMENT
-  EARTHWORKS OR BLUFF
-  BUILDABLE AREA - LITTLE DIFFICULTY
-  BUILDABLE AREA - SOME DIFFICULTY



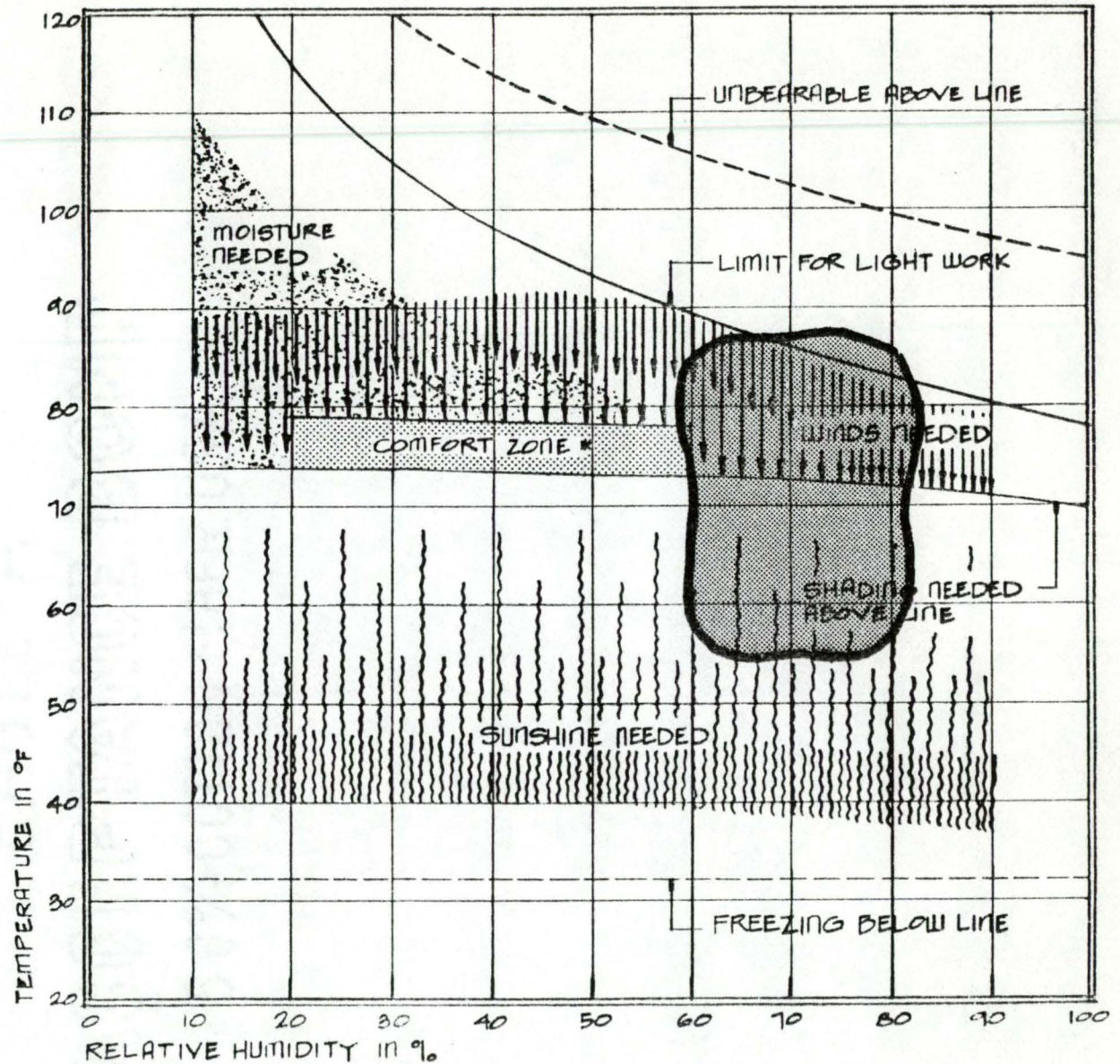
SCALE: 1" = 100'-0"

The climate of Savannah is characterized by warm sunny Springs, hot humid Summers, warm moist Autumns and cool wet Winters. Humidity averages 70% year round. Weather patterns are generated by the ocean and the area is prone to hurricanes from June through October. Summer storms with gale force winds and downpours of rain are common. These are often seperated by periods of drought. Temperatures are usually mild, except in summer when extended periods of stifling hot weather are not uncommon.

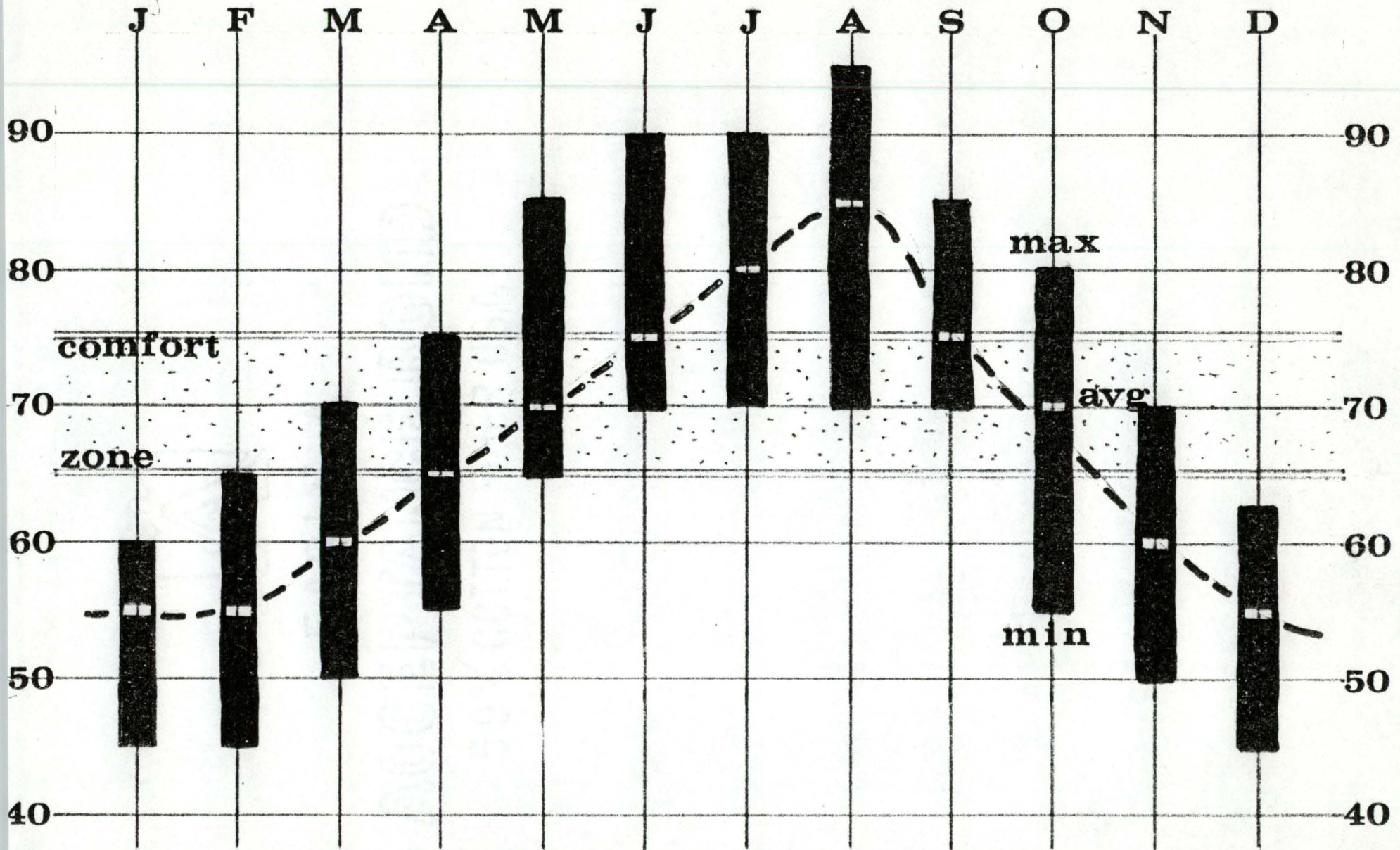
The following four graphics analyze four aspects of Savannah's climate: Outdoor temperature and humidity, Average daily temperatures, Extreme temperature days, and Sun angles. Following these is a series of conclusions and recommendations as to the proper architectural response.

CLIMATE ANALYSIS

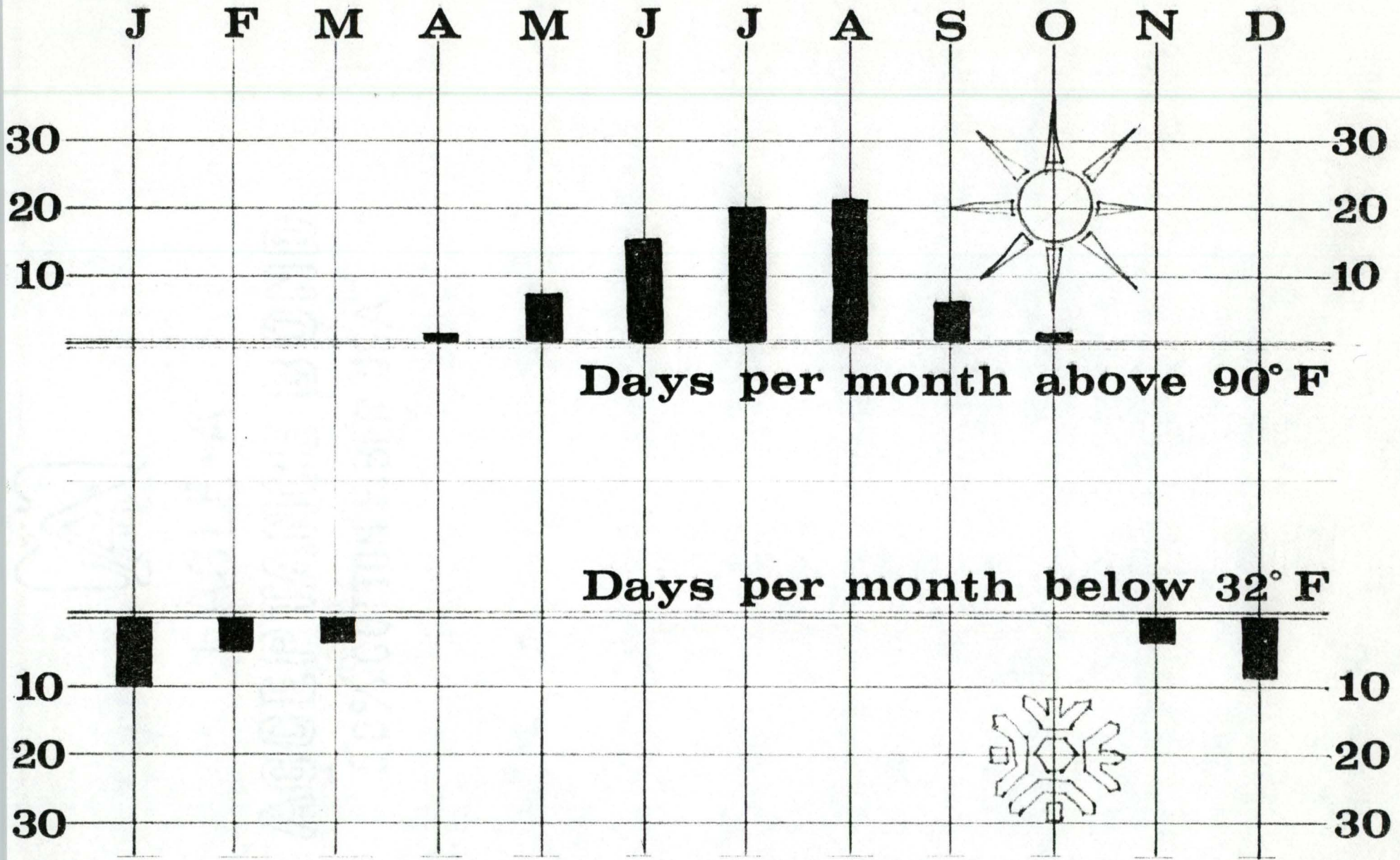
This is a graph developed by Victor Olgyay for analyzing outdoor temperature and humidity. The shaded region indicates the year round conditions for Savannah. From the graph it is seen that conditions are seldom within the outdoor "comfort zone". Sunshine is needed about half of the time, while shading and breezes are needed most other times. The part of the shaded area above the "limit for light work" indicates that mechanical conditioning will be necessary.



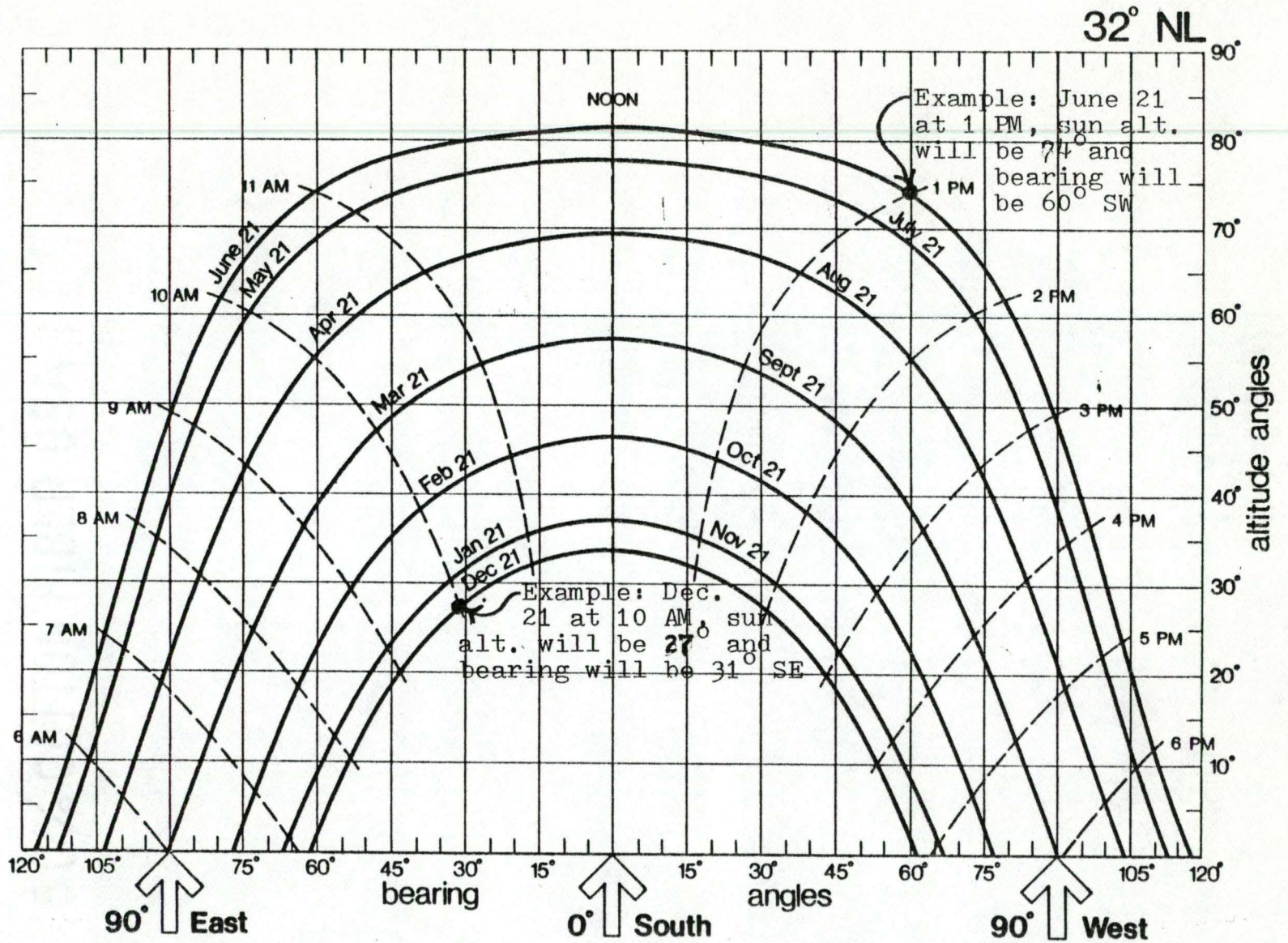
OUTDOOR CLIMATE



DAILY TEMPERATURES



EXTREME TEMPERATURE DAYS



SUN ANGLES

The climate of the Savannah area requires an architecture which is primarily responsive to heat and humidity. Buildings should be slightly elongated along the east-west axis to reduce low angle sun rays. Where buildings are attached they should be joined at the eastern and western edges for the same reason. Shading devices should be provided on southern exposures to limit summer sun penetration. Because of the difference between the zenith of summer sun (June 21) and the height of summer temperatures (mid August) operable shading devices should also be provided. In order to promote cross ventilation, at least two operable windows (preferably on opposite sides) should be provided for each habitable space. Deep eaves and overhangs not only provide shading, but also help to keep torrential rains from damaging the sides of buildings. Winter sun should be allowed to penetrate deeply into interior spaces so as to temper colder weather. Despite all of these measures there will still be days too hot or nights too cold for these measures to be effective. Therefore mechanical systems will have to be relied upon. Full insulation and weatherstripping will help to increase efficiency of these systems.

CLIMATE CONCLUSIONS

USERS

Introduction

The purpose of this division is to examine the many social, functional and spatial factors which will determine the form of the buildings of this project. Essentially it is an analysis of the people who will live on Causon Bluff, their ideals, their habits and their needs.

The first section is about the background of the American ideal home, its history and the developments of the recent past which may change its form. The next section is an analysis of all the potential user groups and a selection of the appropriate ones. This is followed by a density study which determines the land coverage, building height and a discussion of the appropriate building types for the site. Individual dwelling needs are the next topic of discussion. Here the space requirements for the chosen groups are listed. Finally, there is a discussion of the needs of the community and a pattern developed for the dwellings within the community. Facilities which are prescribed for the use of the community are detailed and quantified in the later division entitled Program Conclusions.

Background

Since America was first settled the dream of owning private property has been one of her most powerful lures. The English, Dutch, French and Spanish people who colonized this land were usually the least well off of their countrymen. Persecuted for their religious beliefs or prosecuted for their poverty, these people arrived with a hope of owning a piece of land and the right to build a home upon it. When she declared her independence this experimental nation proclaimed freedoms of "life, liberty and the pursuit of happiness." Later the newly created Supreme Court held that implied in this freedom for "pursuit of happiness" was the freedom to own private property. In 1845 the Manifest Destiny committed the United States to an aggressive policy of expansionism and reaffirmed the biblical belief that man's destiny was to "multiply and conquer the Earth." The endless frontier has always been an integral part of American culture, even though it no longer exists.

The truth is that America is now a completely owned and managed piece of property, and has been for more than fifty years. The "pioneer spirit" and Manifest Destiny are still a part of the American dream though. The suburban movement of the fifties and sixties is a

House Form and Culture,
Amos Rappaport

contemporary example of this phenomenon- except that the "frontier" has been replaced by the farmland which once surrounded our cities and the prairie schooner has given way to the automobile. Increasingly the American dream has become a creature of privacy. This in turn has become equated to social status- the more private a home is, the more privileged the inhabitants are presumed to be. Amos Rappaport wrote that "the (American) dream home is surrounded by trees and grass in either country or suburb, and must be owned, yet Americans seldom stay in it for more than five years. It is not a real need, but a symbol."

Unfortunately, this mythology of the American dream has been dependent, first on the boundlessness of her territory, and later on the boundlessness of her resources. In the seventies we discovered that neither was the case, and that we could no longer depend on either to continue our penchant for conspicuous consumption. This has been described as "the crisis of rising expectations." Our great-grandparents arrived penniless and uneducated and proceeded to carve an existence out of the natural wealth of the land. Our grandparents were better educated and provided the labor to realize the American

industrial revolution, in the process acquiring homes in the urban centers of our nation. Our parents, by now high school or college educated, fostered the technological revolution, moved to the suburbs and commuted to work in the symbol of their technology- the automobile. Each generation had higher aspirations and achieved higher goals than their ancestors. More important each generation raised their children with higher expectations for their future. All of this resulted in a crisis of rising expectations in the seventies.

The problem is that the American dream of more and bigger automobiles and bigger and more private homes is no longer attainable. There is not enough land and oil left to support these inflated dreams. And now, with an unprecedented number of young people entering the housing market, there is a tremendous gap between what these people, indeed our whole culture, have come to expect and what they can afford.

The crisis of rising expectations has resulted in many social and economic upheavals. The trend toward both parents working to support the family is a direct result of the increasing education and employment aspirations of this generation.

See Financing, Market Analysis

The role of the woman in society has grown with the decrease in personal buying power in relation to the cost of the "standard of living". Social patterns have also changed. Where the country club and the church used to be the centers of social activity, the night club and the health spa now abound. The rapid increase in the number of divorces has resulted in many more single parent families than in the past. Fewer and fewer children have the luxury of a full time parent to oversee their needs and the demand has greatly increased for day care facilities. In short, the social and economic needs of society are changing in response to the realization that our wealth is limited.

As it is the responsibility of the architect to design environments which best suit the needs and aspirations of men and women, then the architect must respond to these changes. Once the functional requirements have been met, then the thornier issue of symbolism may be addressed. For if the American dream "is not a real need, but a symbol", then perhaps symbolism can be developed to narrow the gap between the two. This project is an attempt to see if a housing development can be at once meaningful, economical and in concert with the land it occupies.

Types Selection

In order to arrive at the proper fit between the users and the land, it is necessary to evaluate those qualities of the site which will influence the choice of users. By finding the proper subset of all the people who are in the market for housing and whose needs are best served by the advantages of the land, then both land and user will be equally served.

Economics

Clearly one limiting factor is the cost of the land. This alone eliminates any possibility of considering low income or subsidized housing. People of such limited means would not be able to afford the luxuries that this land can provide. Another group that must be disqualified from consideration is that of the rental market. This is for two reasons: first, the land cost makes it impossible for the developer to recoup the original investment at competitive rents, and second, this user group tends to be transient in nature. This transience results in less respect for the buildings and surrounding land. Private property owners have much more of a stake in the preservation of quality in both their personal holdings and those of the community.

Mobility

Mobility would also be a requirement. Although

the site is within minutes of the center of Savannah, the appropriate user would need to have a private automobile in order to take maximum advantage of the city's many amenities. Also the appropriate user would need to have access to a boat of some kind in order to take advantage of the waterways adjacent to the site. Finally, as there is a private airstrip a few minutes away, a user with access to a small airplane would also be appropriate.

Defensability

The unique advantages of a site with great potential for controlled access, defensability and a strong feeling of territory suggests a clientele with a strong desire to protect their personal property, safety and privacy. Thus the appropriate user should be capable of affording the cost of these advantages and equally capable of appreciating them.

Vacation homes

One of the largest groups of people in the area's housing market are those seeking second homes or condominiums. These are usually vacation homes. Although there is a great demand for these types of dwellings, they are usually associated directly with the coastline. With large amounts of property available on the barrier islands of the coast, the Causton Bluff property would not

be as well suited for this user group.

Having eliminated the above groups from consideration, what remains is the great number of people searching for private housing to be used as a primary place of dwelling. These people can generally be divided into three groups: the first time buyers, seeking their first privately owned home; those in the "buy-up" housing market, who already own a home, but are seeking a new one; and the people who are seeking a retirement home.

First Time Buyers

In recent months a great deal of literature has been devoted to trends in the housing market. One factor that everyone agrees upon is that construction costs and mortgage interest rates have far outstripped the increases in personal and family income. This pattern is exactly the reverse of the situation in the early sixties when housing starts were at their peak. Coincidentally during this period America experienced the "baby boom". Now, twenty years later, the ranks of people in the market for their first house have swelled with these same children of the baby boom.

Buy-Up Housing

At the same time demand for buy-up housing has remained steady. This group is usually operating from a much stronger financial position than the

first time buyers. Ordinarily the people in this buy-up category have accrued some equity in their present homes and also have a proven track record for meeting mortgage loan obligations.

Retirement Homes

Another important part of the market is the retirement household. This group of homeowners is perhaps the most stable financially as they ordinarily own their present homes outright. Furthermore, tax laws favor immediate reinvestment of capital gained from the sale of these homes, particularly if the money is reinvested in housing.

FIRST TIME BUYERS

primarily age 25-34

young children

both parents may work

income of \$30 to \$40k

active socially

active recreationally

weak financial base

The first time buyers are the youngest of the groups targeted for the project. In the area of mobility these people usually own an automobile, but are less likely to own a boat or airplane. Recreationally, favorite activities are swimming, tennis and jogging, with less emphasis on boating, fishing and gardening. In regards to defensability, this group is very interested in safety, as they are likely to have small children. Privacy and security are less of an issue with this group than with those in the buy-up and retired groups. Financially, this group is least able to bear the principal cost of property, though better able to make payments and keep up with maintenance costs due to their steady income and physical hardiness.

Exceptions to the patterns listed are the likelihood of single people seeking housing, as well as couples without children. In both cases the primary differences are in the need for bedroom space.

BUY-UP GROUP

primarily age 35-54

teenage children

one parent working

income of \$30 to \$50k

less active socially

active recreationally

stable financial base

Those in the buy-up group tend to be older than the first time buyers. They usually own at least one automobile and perhaps some type of boat. Some of this group will also have access to a private airplane. Recreationally, favorite activities include boating, tennis, swimming and golf, with less emphasis on fishing, jogging and gardening. In regards to defensability, privacy is the most important issue along with security against crime and to a lesser extent safety. In the area of financial ability, this group is better able to afford the principal costs than the first time buyers, and the strongest group in terms of making interest payments and maintaining their property.

Exceptions to the patterns listed are single parent families. In these cases, however, there is little difference in these people's personal space needs.

RETIRED GROUP

primarily over age 55

no children at home

seldom employed

limited income

active socially

active recreationally

strong financial base

The retired group is least likely of the three studied to own a private automobile, although most of these people will continue to have at least one car. They are the most likely to own a boat and some will have access to a private airplane. Recreationally, this group favors boating, fishing, golf and gardening over swimming, tennis and jogging. In the area of defensability, security from crime is of primary importance, though privacy and safety are also important concerns. Financially this group is best prepared to deal with the principal costs of home ownership, as they usually own their previous home outright and can sell it to buy their retirement home. However, with a limited income, they are less able to make interest payments or pay for expensive maintenance.

Exceptions to the listed patterns are generally that of having a young adult at home or the ability to have part time work.

DENSITY STUDY

Building Heights:	High (over 6 stories)	Moderate (3-6 stories)	Low (1-2 stories)
Ground Coverage: High (over 50%)	--	dense walkups	courtyard housing
Moderate (10-50%)	high slabs	ground access walkups	attached houses
Low (under 10%)	towers in the green	--	freestanding houses

Density Study

Kevin Lynch,
A Theory of Good City Form

Having defined the user groups for the project, now the issue of density must be addressed. Here again, the land itself must be the primary consideration. The character of the site will be influenced by the project density in two ways: the coverage or "footprint", and the scale of the buildings or "image". On the preceding page is a matrix developed by Kevin Lynch which correlates these two factors.

If the character of the site is to be preserved, then clearly the highest category of ground coverage must be eliminated. A footprint of over 50% would result in an almost total loss of vegetation, destroying the exceptional quality of the site. Also, the category of high building height must be eliminated. There are few residential buildings of this type in the urban area of Savannah, where the surrounding density and height of office and commercial structures provide better context. The urban image of this building type would stand in sharp contrast to the isolated and rural nature of the site.

This leaves three basic types of dwellings available: freestanding houses, attached houses and ground access walkups. Each of these types would be suitable for the site. The following

is an analysis of each of these types and their inherent properties.

Freestanding Houses

Kevin Lynch

Freestanding houses "remain the ideal of most American families, and make up two-thirds of our urban housing stock". Given an unlimited amount of land and sufficient buying power this would be the overwhelming favorite among those seeking housing today. An example of this type of development is directly across the Islands Expressway from the project site. "The Bluffs" consists of about twelve single family dwellings on approximately 20 acres of land. Each house has a large private front and back yard and each has been landscaped by removing all of the understory vegetation and the planting of grass. About half of these houses have a view of the Intercoastal Waterway or marshland. Aside from paved areas there is no common space. Recently one of these houses sold for \$450 thousand.

Clearly there are financial advantages to developing the property in this manner. For a minimum of investment the land could be subdivided, utilities and roads laid out and profit taken from the sale of lots. This would result in about 75 to 80 prime homesites for those people who could afford to invest

\$50 to \$150 thousand in them.

However, there are some basic flaws in this approach. First, there is not an unlimited amount of land available for this type of project. In fact, this is the last area of land along the Intercoastal Waterway and within close proximity to Savannah which would be suitable for residential development. Second, the many amenities which might be developed on the site, such as the inland pool, the potential marina and the earthworks would not be able to be enhanced or maintained through this arrangement. Third, the high cost of each parcel would limit buyers to those of the highest income bracket. There is little guarantee that there are a sufficient number of buyers in this category to fill the site with this type of housing. So, although this might be the most profitable approach to the development, it is not the highest and best use of the land.

Attached Houses

Kevin Lynch

Attached houses "along with the freestanding house...are the work horses of the North American city. Compact and inexpensive relative to other types, they still provide the desired qualities of direct access and parking, unit identity, and private open space". With attached houses, the streetscapes can be coherently

fashioned, rather than consisting of a series of boxes scattered across the landscape. Also common spaces can be dedicated to groupings of attached houses, providing a more efficient use of open space.

Ground Access Walkups

Ground access walkups have many of the same advantages as attached houses with the added advantage of a higher density, hence less footprint per unit. However, there is less opportunity for private open space and unit identity, suggesting better fitness for a user with less demand for privacy and less ability to maintain private open space. Also, in areas with extensive and distant views, this type of unit could take much better advantage of this amenity than sparsely placed single family dwellings.

Conclusions

In the final analysis, each of these dwelling types should play a part in the development of this parcel of land. However a close and careful fit between the dwelling type and local site conditions must be found. Total coverage of the land by built forms should not exceed 20 percent. This will result in a total project density of about four units per acre, but local densities may be as much as ten units per acre or as little as one dwelling per acre.

Dwelling Needs

The primary user group targeted for this project are those people who already own homes, but are seeking newer, better ones. Some of the enticements that might attract these people to the project are as follows:

location- homestead close to downtown Savannah, the amenities and employment opportunities of the city

recreation- an opportunity to have a wide variety of recreational alternatives within the community which can be reached on foot

privacy- a residence which provides not only for personal privacy, but also for communal activities which can be enjoyed in a secure environment

maintenance- a dwelling which offers many of the same spatial and territorial advantages of their current residence, but with less time and investment required to maintain the property

In order to analyze the functional requirements of this group, it will be necessary to generalize about the composition, social habits and needs of the group. However, the conclusions should provide a framework which is flexible enough to fit the specific needs of individuals within the group.

In general, the social and functional attributes of the buy-up group are those of the traditional American family:

- nuclear family with father employed full time and mother employed either part time or in the home; an average of two children living with the family, usually of school age
- at least one and probably two automobiles
- social patterns formed from acquaintances found in the workplace or through friends of the children
- spatial arrangement of the house a strict segregation of public and private functions
- outside space devoted to ornamental landscaping and territorial definition

These characteristics have determined the form of the traditional American home. Freestanding as a symbol of the sanctity of the nuclear family unit, the traditional home is a careful layering of private and public spaces: public front yard, private back yard; front door as symbol of transition between public and private space; large entry hall for guiding the movement of guests (intruders into the private realm) into the semi-private interior spaces; segregated interior spaces by function and degree of privacy--kitchen, dining room, living (entertaining) room

and the remoter bedrooms and servant spaces. This desire for a hierarchical layering of more and more private spaces explains the resistance of Americans to the open plan arrangement espoused by the Modern movement in architecture. Thus, any attempt to attract this group to the project must carefully consider these desires for identity, hierarchical composition and spatial segregation.

However, the American dream home is not ideal. Aside from the previously discussed economic and ecological flaws to the traditional American house, recreational amenities are severely limited by the constraints of land cost. Swimming, tennis, ball games and most other forms of strenuous activity require too much space to be economically justifiable on private property. These types of facilities are left to be provided and maintained by public agencies. This usually means they are spread out over large suburban areas and require automotive transportation to be reached. Clearly this is not an ideal situation. Also the freestanding house is inefficient to maintain. It is inherently less energy conserving than the attached house because of its greater surface area. The abundant outdoor space also requires a great deal of time and expense to maintain.

Architecturally this group can best be served by a community organized of neighborhoods which are spatially and mentally recognizable. These neighborhoods should contain recreational amenities which are commensurate with the size of the neighborhood and these facilities should be communally supervised. The individual dwellings need to be tailored to the family's desires for identity and privacy. Physically these units must be more efficient to own and maintain. Symbolically, the forms which have traditional meanings must be employed to reinforce these objectives.

BUY-UP GROUPSpace Requirements for Typical Dwelling:

Master Bedroom (including dressing area)	300 sq. ft.
Master Bath	50 sq. ft.
Bedroom #2 (including dressing area)	200 sq. ft.
Bedroom #3 (including dressing area)	200 sq. ft.
Bath #2	40 sq. ft.
Kitchen	120 sq. ft.
Dining	140 sq. ft.
Living Room	250 sq. ft.
<hr/>	
Subtotal	1,300 sq. ft.
Storage (5%)	65 sq. ft.
Walls, Circulation and Mechanical (20%)	270 sq. ft.
<hr/>	
Total Conditioned Space	1,635 sq. ft.
<u>Enclosed Outdoor Space:</u>	
Garage (2 cars)	400 sq. ft.
Service Yard	65 sq. ft.
<u>Private Outdoor Space:</u>	
Front Yard (including drive)	2,000 sq. ft.
Back Yard	4,000 sq. ft.

The second user group targeted for this project is retired people, who, having raised their families, are now seeking smaller more easily maintained housing. Many of the issues dealt with in the previous discussion of the primary user group are also common to this group. However the differences will be examined and manifested in the architectural conclusions. Some of the enticements to the project for this group are as follows:

social accessibility- an opportunity to establish new contacts and establish new friendships

security- an environment which is free from fear of theft and physical harassment

maintenance- a dwelling which is easy and inexpensive to heat, cool and care for

recreation- a variety of leisure time activities within short walking distance

This group of people are generally characterized by the following:

--people of the mid-fifties or older without children living at home; usually married couples, although sometimes single, or pairs of relatives

--usually one private automobile

--social patterns formed by establishing new acquaintances in the community

- less need for strict segregation of public and private space, though some spaces still reserved for ceremonial functions
- less need for private outdoor space, though some should be provided for gardening

Architecturally these people can be served best by a neighborhood organization which is visually and physically secure, yet allows for free interaction between neighbors. Recreational amenities should be organized so that they promote social visibility and are close to home. Individual units can be more more modest in size and have less outdoor space. Traditional symbolic forms are of great importance to these people and must play an important part in the form of their environment.

RETIRED GROUPSpace Requirements for a Typical Dwelling:

Master Bedroom (including dressing area)	300 sq. ft.
Master Bath	50 sq. ft.
Spare Bedroom (including dressing area)	200 sq. ft.
Bath #2	40 sq. ft.
Kitchen	120 sq. ft.
Dining	140 sq. ft.
Living Room	250 sq. ft.
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Subtotal	1,100 sq. ft.
Storage (5%)	55 sq. ft.
Walls, Circulation and Mechanical (20%)	220 sq. ft.
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Total Conditioned Space	1,375 sq. ft.
 <u>Enclosed Outdoor Space:</u>	
Garage (1 car)	200 sq. ft.
Service Yard	65 sq. ft.
 <u>Private Outdoor Space:</u>	
Garden Area	1,000 sq. ft.

The third user group for this project are the first time buyers. The ranks of this group have been swollen in the past ten years and will continue to grow over the next decade. These are generally people seeking to start a family of their own, although accommodations should also be made for singles and single parent families. In all of these cases provisions must be made for the special needs of this group of young adults and young children. Some of the enticements which might attract this group to the project are as follows:

location- close to the employment centers of Savannah

safety- a community which offers an opportunity for young children to grow and learn without the dangers inherent in an urban setting

recreation- a wide variety of recreational amenities for strenuous activity, relaxation and social contact

maintenance- a dwelling which could be kept up by working parents

This group is generally characterized by the following:

- usually adult couples or singles with young children
- usually one, perhaps two private automobiles

- social patterns formed through friends from the workplace and the community
- entertaining done both in the home and at outside locations
- less need for strict segregation of public and private space, more adaptable to flexible functions for shared spaces
- less need for private outdoor space, more need for public outdoor space

Architecturally, these people can be served best by a neighborhood organization which is visually secure and physically safe, yet allows free interaction between neighbors. Recreational amenities should be widely varied and organized so that some may be supervised from the dwellings. Individual houses may be modest in size and have less private outdoor space, but should be available to larger public spaces. Traditional symbolic forms would be of less importance to this group, although the form of their environment should be equally meaningful.

FIRST TIME BUYERSSpace Requirements for Typical Dwelling:

Master bedroom (including dressing area)	300 sq. ft.
Master Bath	50 sq. ft.
Bedroom #2 (including dressing area)	200 sq. ft.
Bedroom #3 (including dressing area)	200 sq. ft.
Bath #2	40 sq. ft.
Kitchen	120 sq. ft.
Dining and Living Room	300 sq. ft.
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Subtotal	1,210 sq. ft.
Storage (5%)	60 sq. ft.
Walls, Circulation and Mechanical (20%)	240 sq. ft.
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Total Conditioned Space	1,510 sq. ft.
 <u>Enclosed Outdoor Space:</u>	
Garage (1 car)	200 sq. ft.
Service Yard	65 sq. ft.
 <u>Private Outdoor Space:</u>	
Front Yard (including drive)	1,000 sq. ft.
Back Yard	3,000 sq. ft.

FIRST TIME BUYERSSpace Requirements for Efficiency Dwelling:

Master Bedroom (including dressing area)	250 sq. ft.
Master Bath	50 sq. ft.
Bedroom #2 (including dressing area)	200 sq. ft.
Bath #2	40 sq. ft.
Kitchen and Dining	160 sq. ft.
Living Room	250 sq. ft.
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Subtotal	950 sq. ft.
Storage (5%)	45 sq. ft.
Walls, Circulation and Mechanical (20%)	180 sq. ft.
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Total Conditioned Space	1,175 sq. ft.
<u>Enclosed Outdoor Space:</u>	
Service Yard	65 sq. ft.
<u>Private Outdoor Space:</u>	
Front Yard (including parking)	1,000 sq. ft.
Back Yard	1,000 sq. ft.

Community Needs

With the individual unit needs established, now the the needs of the community must be addressed. Probably the greatest single failure of land developers in America today is their neglect of the issues of community space. How should the individual dwellings be organized in order to provide a satisfying and coherent whole? What are the physical needs of this organization? These are the questions which this section will endeavor to answer.

Robert Sommer, a behavioral sociologist and architect, argues that there are distinctly different types of territory in human settlements:

Personal Space, The Behavioral
Basis for Design, Robert Sommer

"(There are) four types of territories in human societies: public territories, home territories, interactional territories and body territories. Public territories such as courtyards and parks provide the citizen with freedom of access but not necessarily of action. Home territories are public areas taken over by groups or individuals. Examples would include childrens' makeshift clubhouses, homosexual bars, and coffeehouses that cater to habitues. In each case the regular patrons have a sense of intimacy and control over the area. Interactional territories are areas where social gatherings

gatherings may occur; they have clearly marked boundaries and rules of access and egress. Lastly there are territories encompassing the body, which we have called personal space." Thus a well rounded community will provide each of these types of territory. In this way it can be socially self sufficient.

But this provides no clue as to how these territories should be organized. For an insight into the solution of this problem, the following excerpt from the writings of Serge Chermayeff, a professor at the Joint Center for Urban Studies of M.I.T. and Harvard, is provided:

Community and Privacy,
Serge Chermayeff

"...an urban anatomy must provide special domains for all degrees of privacy and all degrees of community living, ranging from the most intimately private to the most intensely communal. To separate these domains, yet allow their interaction, entirely new physical elements must be inserted between them. It is because these new elements of separation emerge as vital and independent units in their own right that a new urban order may develop from the hierarchy of domains."

A hierarchical composition of domains or territories, then is the key to a mentally and physically perceived order.

Centuries ago Copernicus discovered that the earth, and hence man, was not the center of the Universe, in the process destroying the notion that the cosmos was hierarchically composed. This is not the case for society. The individual is the basis for society, and for each individual the human environment is an outwardly expanding series of groupings: the family, the neighborhood, the community, the state and finally, the world. At each level the amount of interaction and responsibility decreases, but it continues to be present at all levels.

Spatially, the hierarchical composition which begins with the individual dwelling must be carried through at the community level. Christopher Alexander sets explicit guidelines for the next level above that of the individual dwelling:

"People will not feel comfortable in their houses unless a group of houses forms a cluster, with the public land between them jointly owned by all the householders."

Furthermore:

"Arrange houses to form very rough, but identifiable clusters of 8 to 12 households around some common land and paths. Arrange the clusters so that anyone can walk through

A Pattern Language,
Christopher Alexander

See Case Studies

them, without feeling like a trespasser."

Not surprisingly, Alexander also prescribes the proper mix of individuals within the community:

"Encourage growth toward a mix of household types in every neighborhood, and every cluster, so that one-person households, couples, families with children and group households are side by side."

In this way each neighborhood and cluster will become a microcosm of society. Young children be able to learn about all different ages of people, retired people will have an opportunity to look back on each phase of their life, and adults will have an opportunity to interact with different types of life style and livelihood.

Having established the space requirements for individual dwellings and the organization of those dwellings within the community, the next task is to define public space requirements.

At the house cluster level there is a need for open space which can be used for the following purposes:

extra parking- individual dwellings generally provide parking for owners vehicles only, therefore this extra parking is for guest and service vehicles

maintenance- garbage collection, mail pick-up
and utility distribution

recreation- play areas for young children,
recreation court for ball games and a
pavillion for outdoor gatherings

open space- landscaped areas to preserve
large trees and maintain the natural
character of the site

Individual clusters will be arranged in cluster groups of three or more housing clusters. At the scale of the cluster group, one or more of the following facilities will be provided: semi-public swimming pool, tennis courts, garden plots and small playing fields for activities such as soft ball, touch football and frisbee. In addition to these amenities, the circulation network between clusters and facilities provided at the community level should be designed in a way which allows for their use for cycling, jogging and strolling for exercise. This would best be achieved by segregation from automobile circulation routes for safety reasons. Also these pedestrian networks should be routed along visual amenities such as the bluffs, earthworks, inland pool and marina. This would allow for further recreational uses such as fishing and bird watching.

See Program Conclusions

At the level of the entire community facilities will be provided for the maintenance of the public land and roads, security, and the upkeep of the marina. Also at the marina will be a small hotel, a tavern, a restaurant, a fueling station and other support facilities. Also an area of commercial establishments, including a convenience store, a pharmacy, a sundries store, a delicatessen, and offices for professional services as well as a sales and management office for the development will be provided. A community day care center, with provision for continuing education classes at night will be located on the site. Finally, a clubhouse, with meeting rooms, a private bar and a health spa will also be provided. These services will be detailed later.

Thus the Causton Bluff Residential Community will be a comprehensive and self contained entity. The full range of territories described by Robert Sommer will be included. The organization will allow a complete range of domains from most private to most public. The hierarchical composition of this community will support a physically secure and mentally recognizable layering of these domains. All of these will provide a vital and meaningful environment that is in concert with the land.

FINANCING

The purpose of this section is to demonstrate the financial feasibility of this project. This will be done in three ways: first, a market analysis will survey the population, income and construction trends in the Savannah area; second, a project pro forma will be developed to determine the return on invested capital for the developer; and third, the cost of the units, based upon the pro forma will be compared against costs of other projects nationwide, in the coastal region and in Savannah. This will demonstrate that the project is both affordable to the buyer and profitable to the developer. Based upon this information conclusions will be drawn which effect the design solution.

Market Analysis

Metropolitan Planning Commission

Savannah Battlefield Park
Feasibility Study

See Graphic on following page
Chatham Urban Transit Study

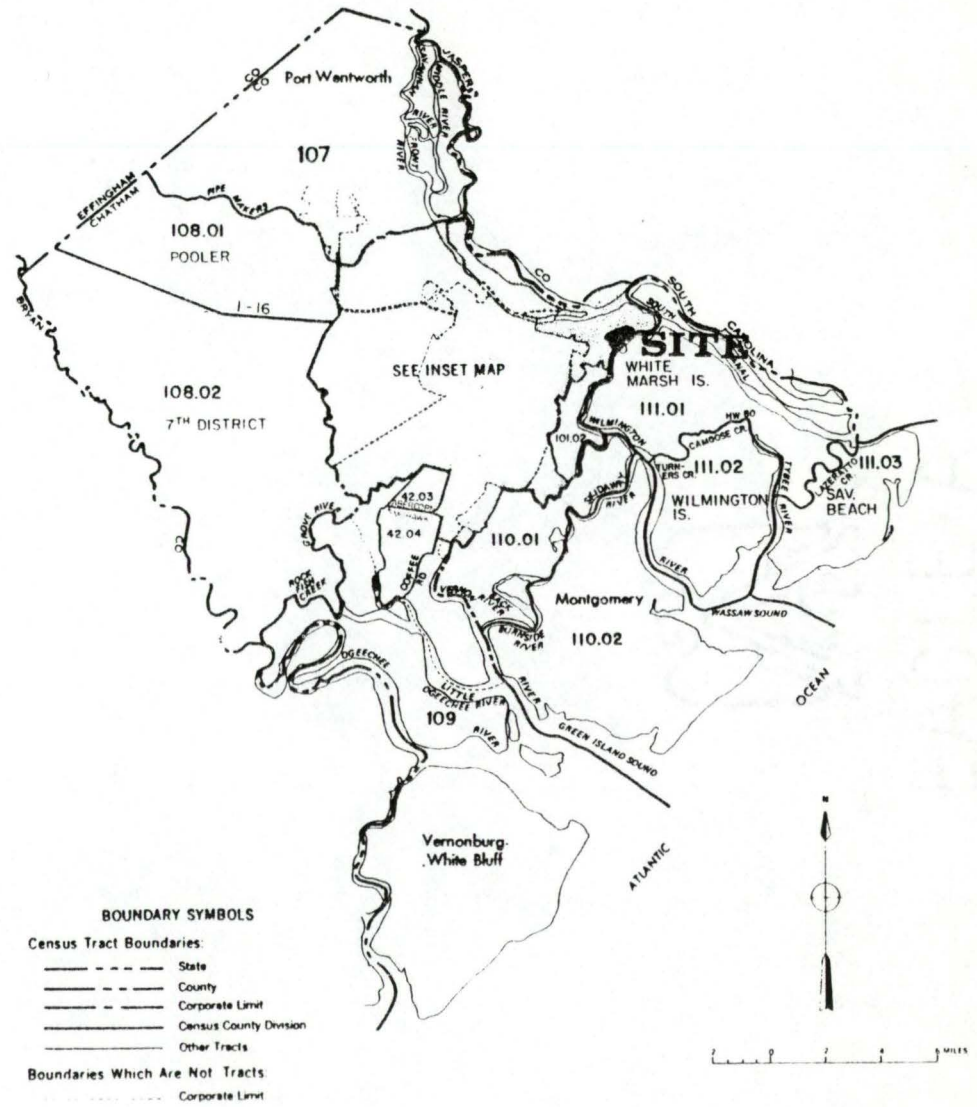
Chatham County Housing Market Survey

See Graphics

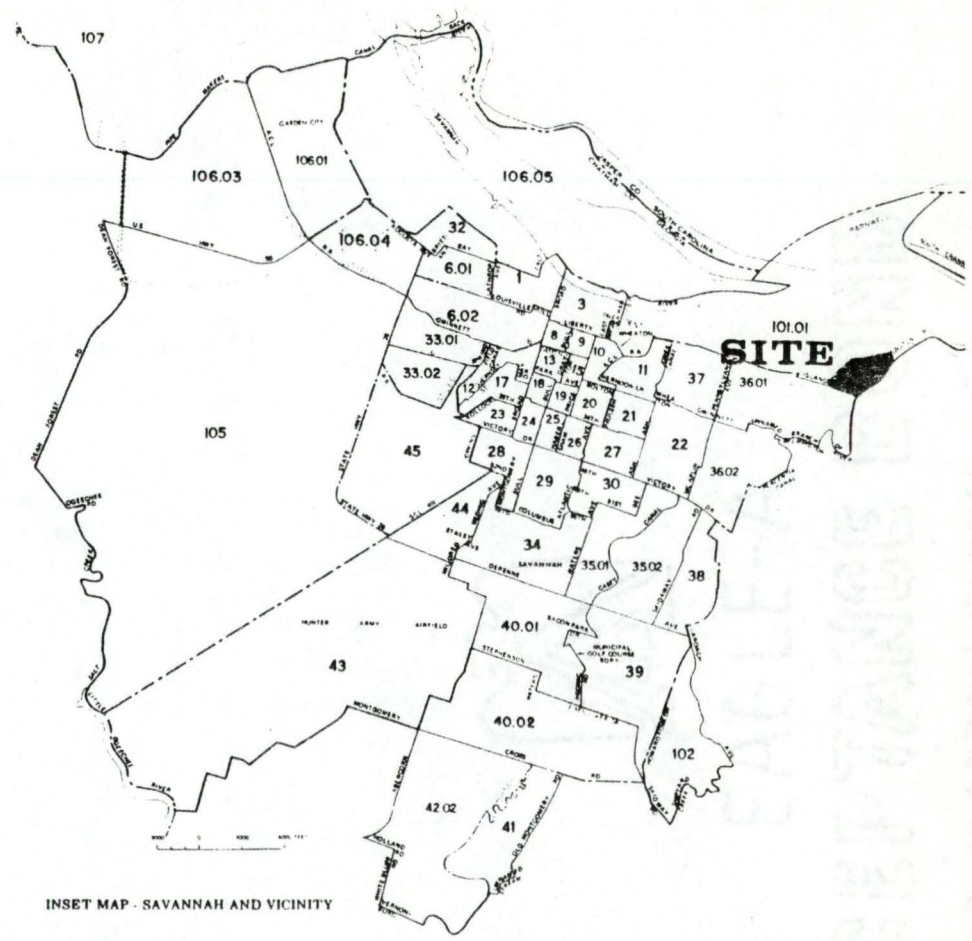
Causton Bluff lies at the center of a rapidly expanding residential area. Fueled by the rapid influx of people seeking employment in the recently opened or expanded industrial and manufacturing plants along the Savannah River, the continuing success of the many resorts in the barrier islands of Wassaw Sound, and the increasing popularity of Savannah as a tourist attraction, this area has been forecast to increase in population by 46%, or about 6,500 people by the year 2000. Per capita income in the Savannah market area has increased from \$2,753.00 in 1970 to \$5,432.00 in 1977, or about 20.1% when adjusted for inflation. This, coupled with the per capita income of the surrounding Whitmarsh, Wilmington and Montgomery districts of \$10,633.00 or \$33,569.00 per occupied dwelling, suggests that the site could be developed as a private residential community for upper middle class families.

Construction has been steady in the past five years despite the sluggishness of the national economy. Residential sales during this period have averaged about 2,800 per year and in 1979 50 building permits were issued for the site's census tract and 127 for the neighboring tract.

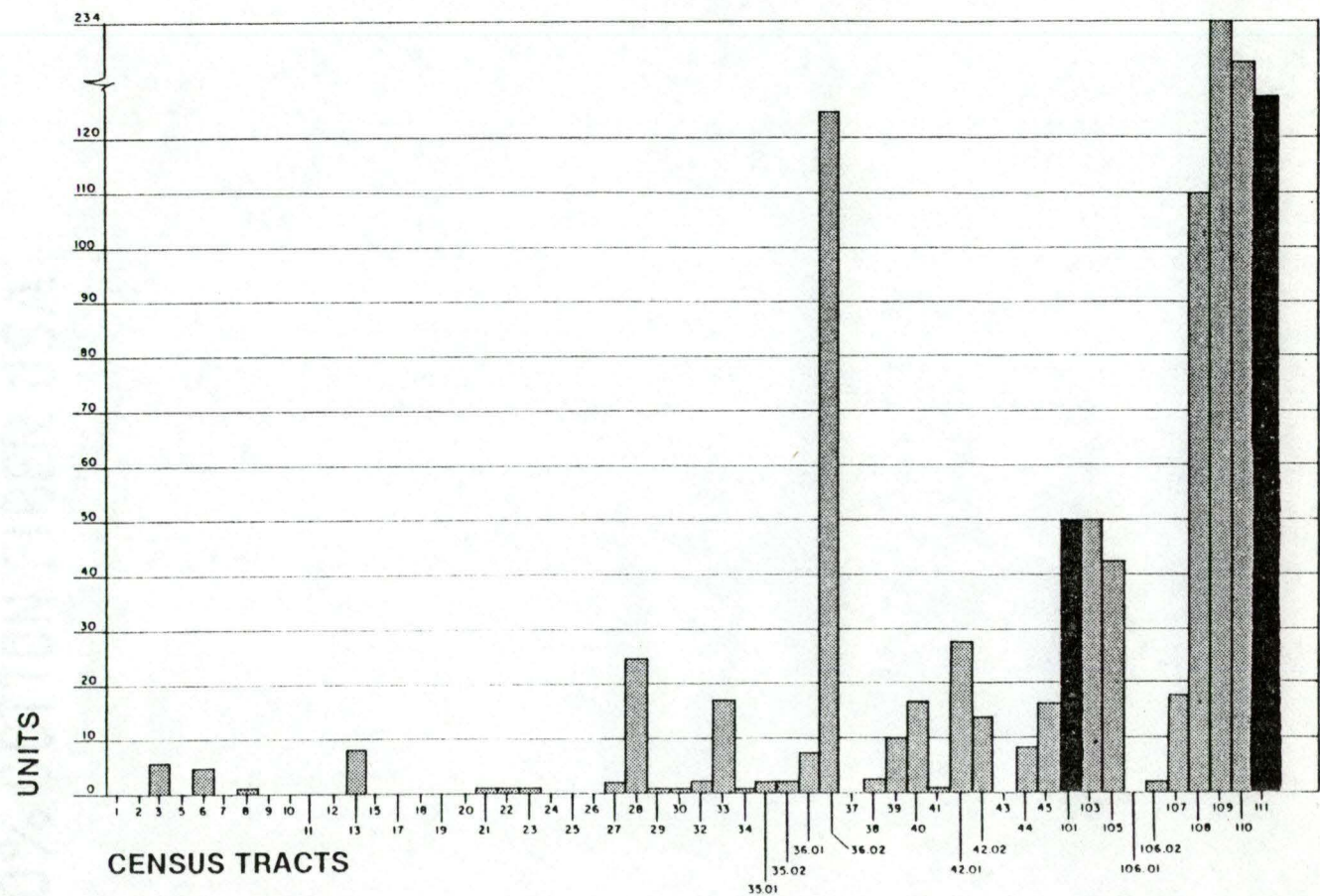
Chatham County Census Tracts



Savannah Census Tracts



**BUILDING PERMITS ISSUED FOR SINGLE-FAMILY
AND DUPLEX UNITS JAN. 1, 1979 - TO - JAN. 1, 1980**



Pro Forma

The following is a preliminary analysis of the financial feasibility of this project. It has been prepared based upon the design solution which is presented in a later section of this manuscript. Construction cost estimates have been forecast based upon similar projects in the Savannah area and an earlier project for this site. Within the limited framework of this study these estimates are reasonably accurate. However, as this is an architectural thesis and not an accountant's statement, complicated issues such as legal fees, property taxes, construction loans and income taxes for individual investors have been neglected. Some of these costs would be incurred by the developer while others would be passed on to buyers. Thus the ultimate goal of establishing a return on invested capital is presented in a simplified format.

The project is based upon the establishment of a limited partnership between a group of investors and a managing partner, or developer. Investors often attracted to this type of project include insurance companies, oil companies, pension funds and other parties with large amounts of capital to invest in order to reduce capital gains in the short term, yet producing favorable returns over a longer term.

CAUSTON BLUFF PRO FORMA STATEMENT

Marina Complex:

Residences

<u>No.</u>	<u>Description</u>	<u>Square Feet</u>	<u>Unit Cost</u>	<u>Cost of Sale</u>	<u>Sales Price</u>	<u>Total Sales</u>
62	2 Bedroom	1,920	\$40.00	\$76,800.00	\$150,000.00	\$9,300,000.
9	3 Bed, loft	2,520	"	100,800.00	\$200,000.00	\$1,800,000.
28	Garages	220	\$15.00	\$ 3,300.00	\$ 10,000.00	\$ 280,000.
	Parking Level	31,500	\$20.00			

Commercial

	Leasable area	30,000	\$25.00			\$1,050,000.
18	Garages	220	\$15.00			

Marina

75	Docks				\$ 10,000.00	\$ 750,000.
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Walkups:

48	3 Bedroom	1,980	\$35.00	\$64,300.00	\$120,000.00	\$5,760,000.
24	2 Bedroom	1,210	\$35.00	\$42,350.00	\$ 85,000.00	\$2,040,000.

Edge:

60	3 Bedroom	1,650	\$35.00	\$57,750.00	\$110,000.00	\$6,600,000.
34	3 Bedroom	1,800	"	\$63,000.00	\$120,000.00	\$4,080,000.
34	2 Bedroom	1,500	"	\$52,500.00	\$100,000.00	\$3,400,000.

CAUSTON BLUFF PRO FORMA STATEMENT

Interior:

<u>No.</u>	<u>Description</u>	<u>Square Feet</u>	<u>Unit Cost</u>	<u>Cost of Sale</u>	<u>Sales Price</u>	<u>Total Sales</u>
33	4 Bedroom	2,020	\$35.00	\$70,700.00	\$125,000.00	\$4,125,000.
50	2 Bedroom	1,360	\$35.00	\$47,600.00	\$ 85,000.00	\$4,250,000.
11	3 Bedroom	1,560	\$35.00	\$54,600.00	\$ 95,000.00	\$1,045,000.
94	Garages					

CAUSTON BLUFF PRO FORMA STATEMENT

All figures in thousands

<u>Sales:</u>	<u>Year 1</u>	<u>Year 2</u>	<u>Year 3</u>	<u>Year 4</u>	<u>Totals</u>
Marina					
Residences	11,380.0	-	-	-	11,380.0
Walkups	-	7,800.0	-	-	7,800.0
Edge	-	-	14,080.0	-	14,080.0
Interior	-	-	-	9,420.0	9,420.0
Docks	750.0	-	-	-	750.0
Commercial	-	-	-	1,050.0*	1,050.0
Sales Income	12,130.0	7,800.0	14,080.0	10,470.0	44,480.0
Rental Income*		210.0	210.0	210.0	630.0
	12,130.0	8,010.0	14,290.0	10,680.0	45,110.0

Notes:

Rental Income based on \$7.00 per square foot of leasable space.

Commercial Sales based upon a capitalization rate of 20%.

CAUSTON BLUFF PRO FORMA STATEMENT

All figures in thousands

<u>Cost of Sales:</u>	<u>Year 1</u>	<u>Year 2</u>	<u>Year 3</u>	<u>Year 4</u>	<u>Totals</u>
Marina Residences	6,318.0	-	-	-	6,318.0
Walkups	-	4,536.0	-	-	4,536.0
Edge	-	-	7,392.0	-	7,392.0
Interior	-	-	-	5,593.0	5,593.0
Land	750.0	750.0	-	-	1,500.0
Landscaping	200.0	200.0	200.0	200.0	800.0
A/E Fees (4%)	450.0	225.0	300.0	235.0	1,210.0
Sewer, Water hookup	150.0	-	-	-	150.0
Roads and Utilities	250.0	150.0	150.0	100.0	650.0
Marina	2,800.0	-	-	-	2,800.0
Gate, Pool, Spa					
Tennis	65.0	100.0	100.0	50.0	315.0
Commercial	900.0	-	-	-	900.0
Gross Costs	11,833.0	5,965.0	8,142.0	6,178.0	32,168.0
Gross Income	12,130.0	8,010.0	14,290.0	10,680.0	45,110.0
Net Income	297.0	2,045.0	6,148.0	4,484.0	12,974.0

Net Return on investment: $\frac{12,974}{32,168} = 0.406$; by present worth method this is approx. 25%.

Buyer's Cost Comparison

The dwellings proposed for this development will range in cost from \$85,000.00 to \$200,000.00, with the majority at or near \$100,000.00. These costs are substantially less than those of properties on nearby Skidaway and Hilton Head Islands, while providing more amenities than similar projects in these locations. In 1979 the average price for all residential sales in the unincorporated areas of Chatham County was \$53,740.00. When this figure is adjusted for inflation, the average cost of these same dwellings in 1982 would be \$81,733.00. Also, it should be noted that these figures are for all types of residential sales, including apartment conversions, condominiums and previously owned homes.

Chatham County Housing Market Survey

"The Bluffs" subdivision adjacent to the project site offers larger, single family residences, but no comparable amenities, yet one residence recently sold for \$400,000.00. Similarly, restored townhouses in Savannah's historic district start at \$125,000.00 and one recently sold for \$650,000.00. Nationally, the price of new homes peaked in November of 1981 at \$98,100.00.

Wall Street Journal, Nov. 30, 1981

Based upon these statistics, the prices set for residences on Causton Bluff are very competitive.

RESIDENTIAL SALES IN CHATHAM COUNTY FROM 1975 through 1979

Municipality	1975		1976		1977		1978		1979	
	Total Sales	Average Price	Total Sales	Average Price	Total Sales	Average Price	Total Sales	Average Price	Total Sales	Average Price
UNINC. CHATHAM	351	\$ 32,120	653	\$ 34,106	900	\$ 36,996	1,091	\$ 43,434	1,124	\$ 53,740
SAVANNAH	882	\$ 24,313	1,202	\$ 26,083	1,578	\$ 29,701	1,800	\$ 33,754	1,575	\$ 37,635
THUNDERBOLT	8	\$ 19,910	8	\$ 17,437	18	\$ 16,347	20	\$ 25,340	12	\$ 20,275
SAVANNAH BEACH	45	\$ 22,130	57	\$ 21,907	49	\$ 37,324	72	\$ 34,330	49	\$ 52,400
POOLER	24	\$ 21,614	58	\$ 23,832	53	\$ 27,955	55	\$ 34,427	63	\$ 39,353
GARDEN CITY	28	\$ 22,757	44	\$ 23,279	53	\$ 25,998	18	\$ 26,206	39	\$ 31,340
PORT WENTWORTH	22	\$ 16,452	28	\$ 21,637	33	\$ 21,360	25	\$ 23,310	33	\$ 29,534
BLOOMINGDALE	7	\$ 16,943	20	\$ 17,930	25	\$ 23,359	18	\$ 31,034	18	\$ 25,419
VERNONBURG	0	\$ 0	0	\$ 0	1	\$ 60,500	2	\$ 83,950	1	\$ 117,500
SUMMARY TOTALS	1,367	\$ 19,582	2,070	\$ 20,690	2,710	\$ 31,060	3,101	\$ 37,309	2,914	\$ 45,249

Conclusions

The most important impact of the pro forma study is upon the construction period. Studies were made of longer periods of up to ten years, but the rate of return was never satisfactory. Given the current and projected demand for housing in the area, the conclusion was that a period of four years was the optimum practical period. This in turn had a great effect upon the choice of method of construction. Where a conventional system of concrete block party walls and wood framed construction required less initial capital, this system of construction allows erection of only 35 to 40 units per year and thus a construction period of ten years. Thus a building system which allowed construction of up to 100 units per year was chosen.

See Case Studies

CONSTRAINTS

This section is a study of the various regulatory constraints applicable to the project. First, the zoning regulations will be examined and the most important sections listed. Second, environmental constraints will be reviewed and the process of obtaining the proper permits outlined. Third, the building codes will be analyzed and pertinent sections repeated. Also considered here are insurance requirements and protection from natural hazards. Design conclusions will be drawn from this information and listed for application in the design solution.

Zoning Regulations

The Causton Bluff site is currently zoned PUD-R by the Savannah Metropolitan Planning Commission. This is a Planned United Development Residential and is defined as a residential project of 25 acres or more and consisting of single family detached, single family attached, multi-family and/or condominium dwellings as well as limited commercial uses. The following is a list of some of the requirements of this classification.

Open Space

Common open space is not to be less than 20 per cent excluding streets, drives and parking areas.

Density

Net densities shall not exceed eight dwellings per acre.

Lot Sizes

Where lots are provided the minimum width is eighteen feet and the minimum area is 1,200 square feet.

Except for condominiums and multi-family dwellings each dwelling shall be located on a separate parcel of land.

Attached Dwellings

For single family attached dwellings the maximum number of dwellings per building is eight. No dwelling shall be situated to face the rear of another dwelling.

Parking

There shall be a minimum of two parking spaces per dwelling. Parking may be provided in a common lot within a maximum walking distance of 200 feet from the nearest parking space to the entrance of the building.

Commercial Uses

Allowable businesses are defined as those providing daily needs for residents of the development and may include food stores, drug stores, barber and beauty shops, restaurants, gift shops, floral shops, professional offices or similar uses.

Conclusions

The entire project will be designed within these constraints and no variances need to be sought. In regard to the commercial portion of the development, the entire project is to be designed for the residents only, so that all business occupancies would serve only resident's needs.

Environmental Impact

The U. S. Army Corps of Engineers has jurisdiction over all projects in wetlands areas which require discharge of dredged or fill material into any waters of the United States under Section 404 of the Federal Water Pollution Control Act (PL 92-500). Before a permit can be issued for work in wetlands areas, the Corps provides a public notice of the intended project to solicit public opinion on the probable impact of the project. In addition opinions are obtained from the U. S. Fish and Wildlife Service, the Environmental Protection Agency and other federal and state agencies. The Corps then evaluates the application based upon conservation, environmental concerns, economics, aesthetics, historic values, flood damage prevention, land use, navigation, recreation, water supply, water quality, energy needs, safety, food production, and, in general, the needs and welfare of the people. Permits are issued at the discretion of the District Engineer.

Criteria

Other Agencies

In conjunction with the Corps of Engineers the State of Georgia requires a Marshland Protection Permit for any activity which will alter marshlands. Water Quality Certification may be required for commercial piers, public marinas and any backfill associated with seawalls. These permits are handled in conjunction with the Corps.

Conclusions

These permits would be required in order to create a marina on the project site in the area of the existing tidal estuary. This area is flooded during spring high tide and is therefore classified as wetlands. Also, construction of a marina, dredging of its access channel and the backfilling of seawalls would entail some discharge into the navigable waters of the Wilmington River. Precautions would have to be taken to minimize the negative effects of this process.

Although there is no guarantee that this portion of the project would be approved, similar projects in the region have recently been granted permits. In order to minimize the effects of this project upon surrounding wetlands, every attempt has been made to avoid disruption of surrounding marshland by fill material. All dredged materials will be used either for production of construction materials such as concrete, filling of low spots on the site not classified as wetlands, or as mulch for landscaped areas. Earlier schemes which attempted to build upon the hammocks along the northeastern edge of the site were rejected for environmental and aesthetic reasons.

In the opinion of the author, wetlands should be preserved as much as possible to protect the coastal environment. The development of Causton Bluff in a sympathetic manner would be for the public welfare in that it provides much needed housing in the Savannah area while not adversely effecting public safety. The development of this particular site would in fact help to preserve land in the barrier island of the coast by reducing demand for housing in these more sensitive areas.

Building Codes

The code chosen for application to this project is the Uniform Building Code. At this time it is the most stringent in regard to single family attached dwellings. This code contains detailed requirements for light, ventilation, sanitation, room dimensions, shaft enclosures and fire warning systems, all of which have been adhered to in the project design but need not be listed here individually. The most important requirements of this code are in regards to building heights and fire seperation.

Building Heights

Building heights are limited to three stories for the intended residential occupancies, except where Class I, fire resistive type construction is employed, in which case building height is unlimited. This type of construction has been chosen for all types of dwellings in the project.

Fire Seperation

Seperation between dwellings is required to be a minimum of four hour fire resistive construction. Fire resistive construction must extend from the foundation to a point 30 inches above the roof and project to the outer edge of vertical seperating elements. Exceptions to these requirements at the roof and balcony projections are acceptable where these constructions are non-combustible.

Insurance

Flood insurance is available on this site only for buildings which have no habitable areas below an elevation of 12 feet mean sea level. As the Savannah area is prone to hurricanes, additional consideration should be given to life and property safety during these periods of 100 mph winds and wave heights over 8 to 10 feet above the flood plain.

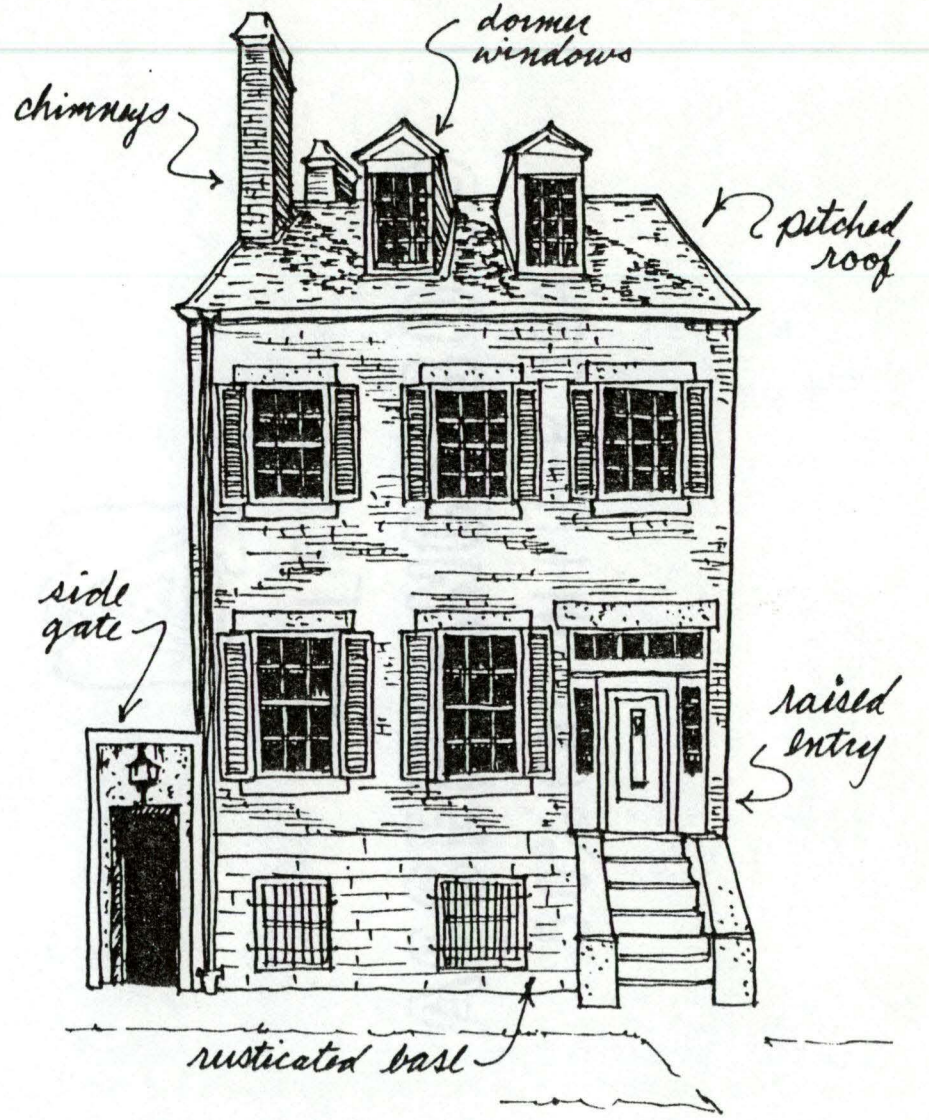
Conclusions

These building code and insurance requirements provide a minimum standard for construction. In the opinion of the author, these requirements should be met or exceeded in most cases. In the case of fire safety, there is great danger of fire spreading between dwellings in a project of this density. For this reason a system of construction has been chosen which provides a six hour separation between dwellings and in most cases within floors of residences themselves. This compartmentalization will greatly enhance fire and property safety and significantly reduce insurance premiums. More than adequate access for emergency vehicles has been provided in all cases. Fire detection devices and fire protection equipment connections are to be provided throughout. All commercial and public use areas are to be protected by sprinkler systems.

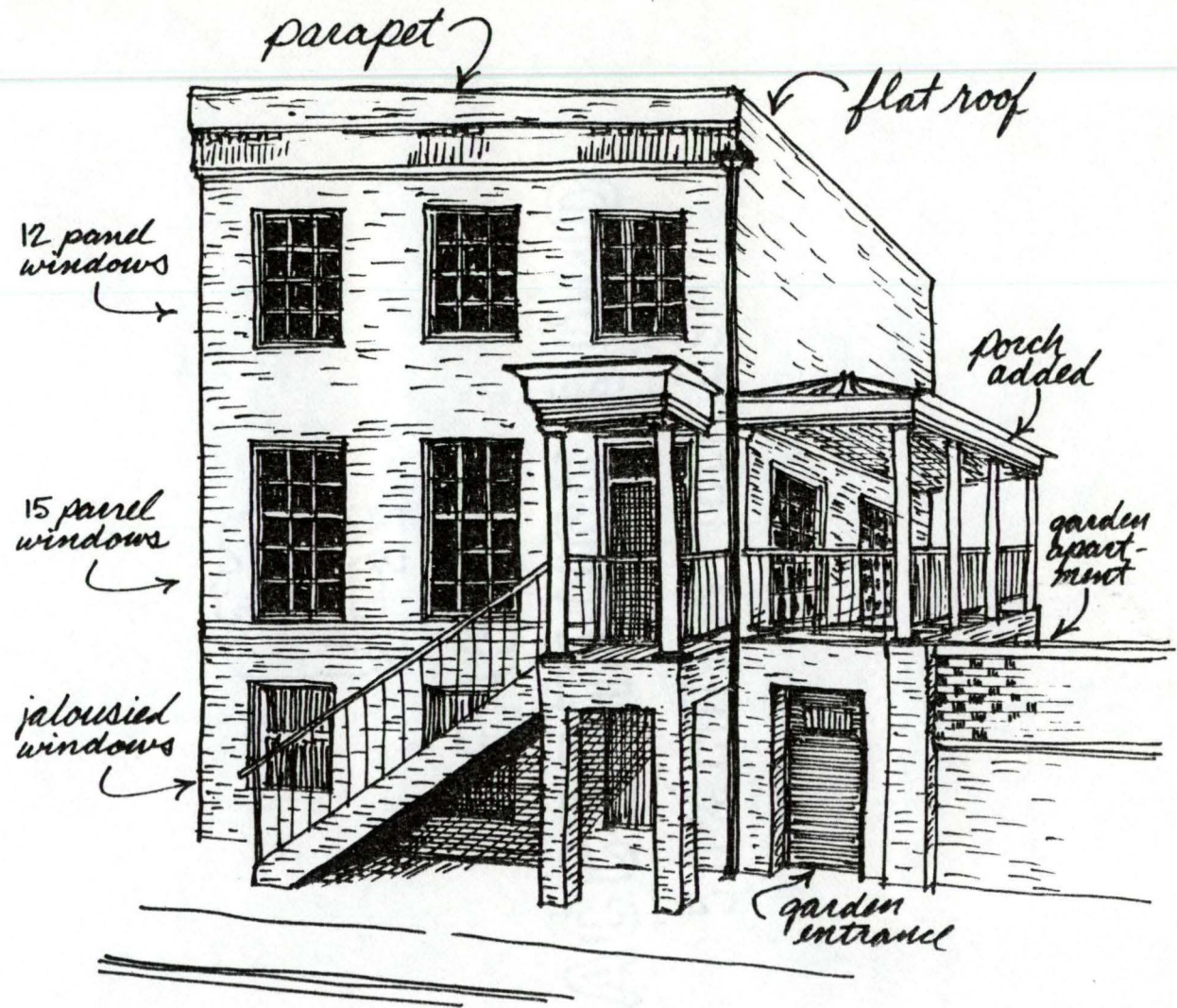
In regards to flood and hurricane damage protection, no habitable dwelling areas are designed below an elevation of 20 feet mean sea level. The building system chosen is highly resistive to lateral forces developed during periods of high winds.

INFLUENCES

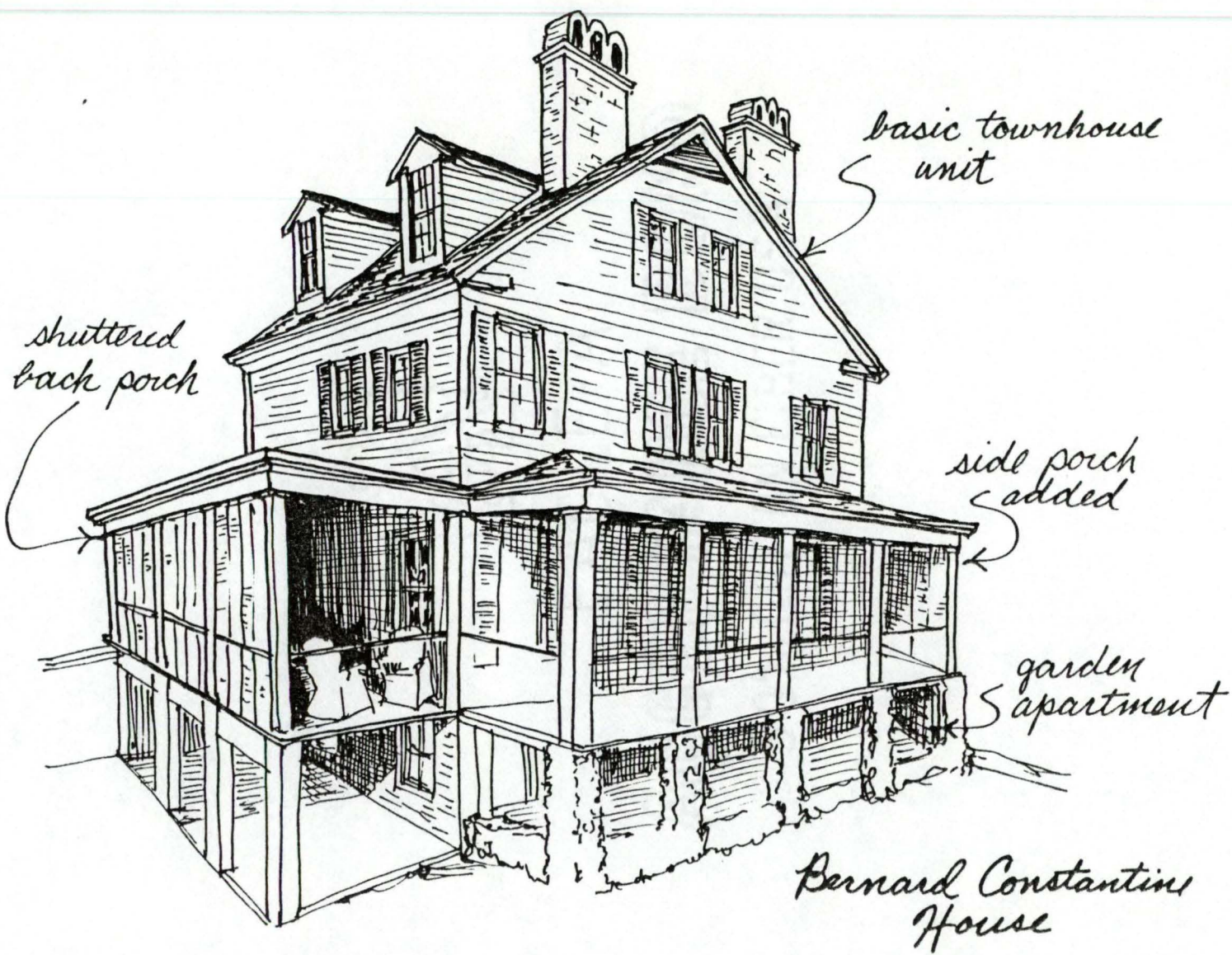
The purpose of this section is to identify some of the major influences in the Savannah area on residential community design. The first to be studied is Savannah itself. The largest urban historic district in the United States provides a wealth of examples of domestic architecture. Though the examples shown hereafter are primarily from the antebellum era, there are also many examples of Victorian (or carpenter) Gothic dwellings which deserve to have an influence on the project. Next, Hilton Head Island is examined for influences. This is followed by a discussion on materials to be employed in the project.

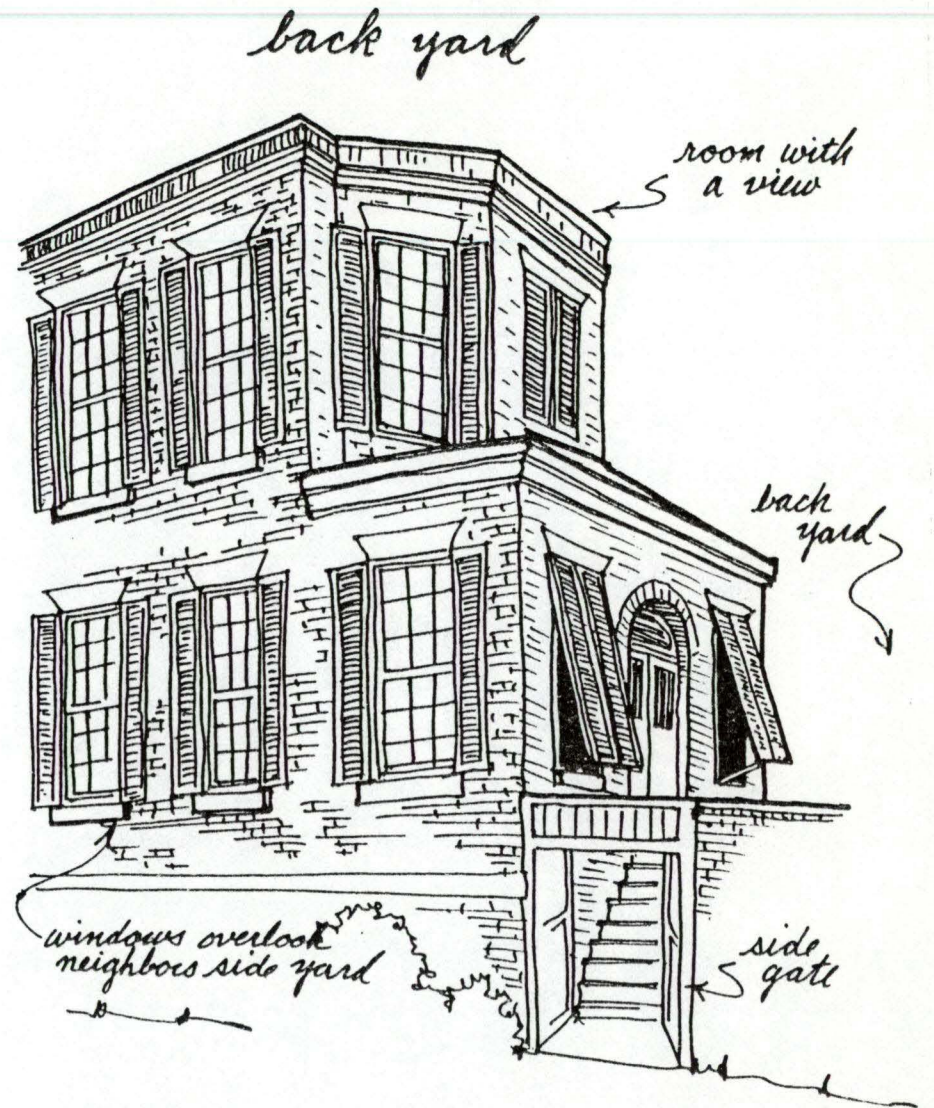


John Scudder House 1851

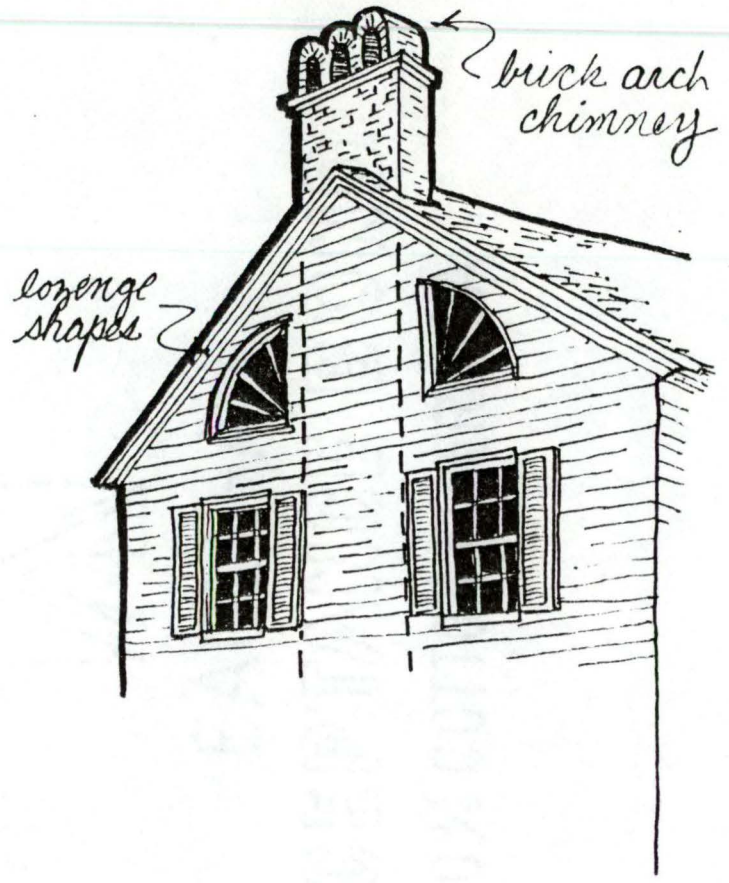


Margaret Pendergast House, 1868





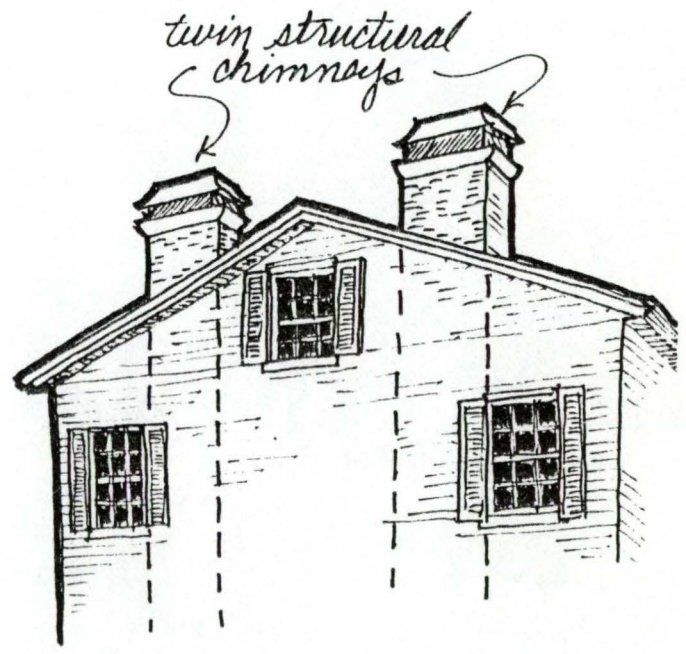
Oliver Stungas House 1835



brick arch chimney

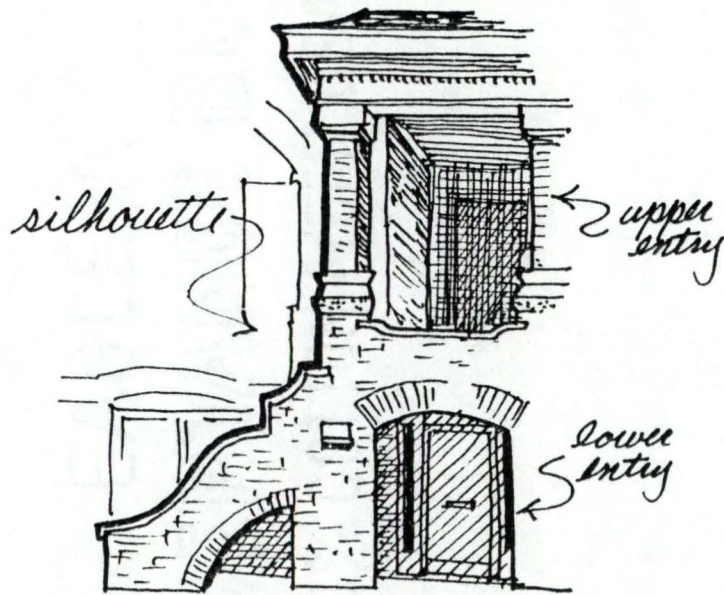
lozenge shapes

gable ends

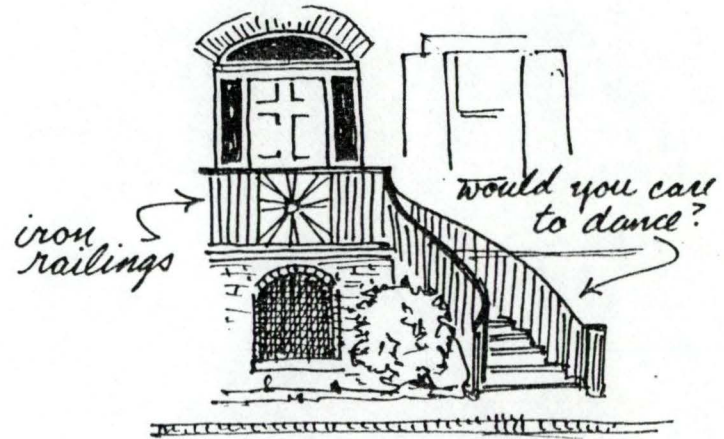


twin structural chimneys

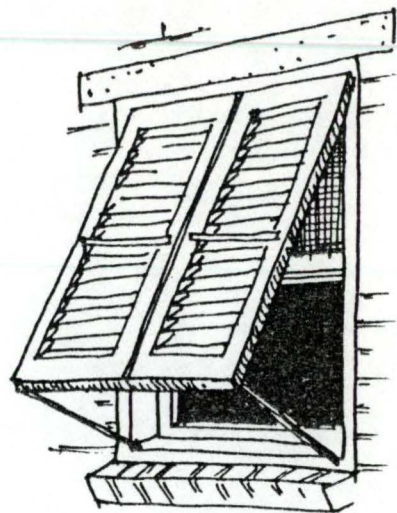
entries



Steinberg House 1891

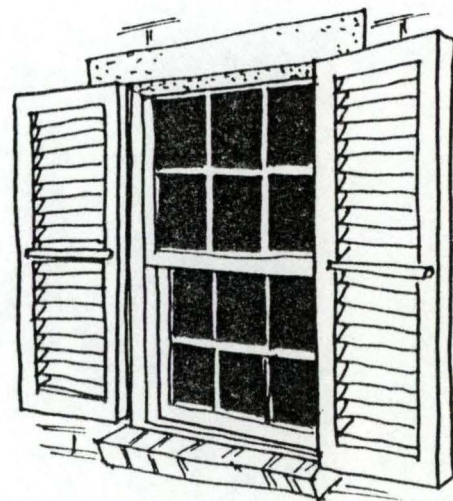


Davenport House 1821



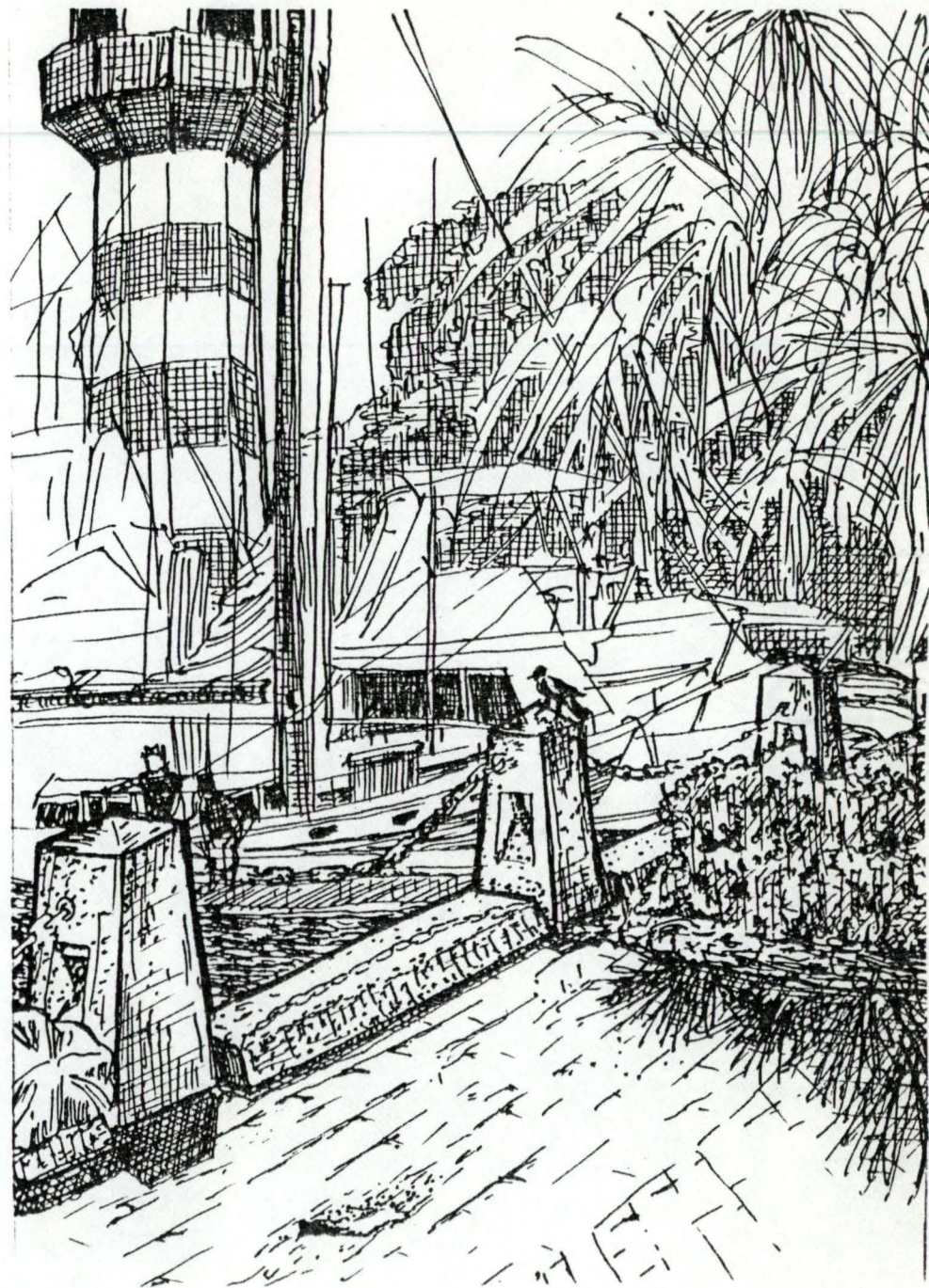
window
shutters

shading
position



open
position

Harbor Town, Sea Pines Plantation,
Hilton Head Island, S.C.



Materials

The most prevalent materials in Savannah are brick, tabby concrete, stucco, wood and ornamental iron. Although it is impossible to recreate much of the detail from the historic era, employment of these materials should help to recreate the character of old Savannah. Hilton Head's vernacular style is one of rough sawn cypress, pine trim and asphalt shingled roofs. The colors are always subdued. Though Hilton Head has much less of an influence on the architecture of the dwellings, the image presented at Harbor Town is a pattern for the marina portion of the community.

CASE STUDIES

This section studies three projects of differing size which have provided insights into the design solution. The pertinent information gained from each case is documented along with graphics which help to explain the various systems and methods of each design. The first case is on the scale of an entire community and has influenced all suburban planning since its inception. The second is of a smaller scale and begins to deal with the individual dwelling and its meaning to the inhabitants. The third is a study of a system of construction which provides sturdy and speedy results.

Radburn, New Jersey

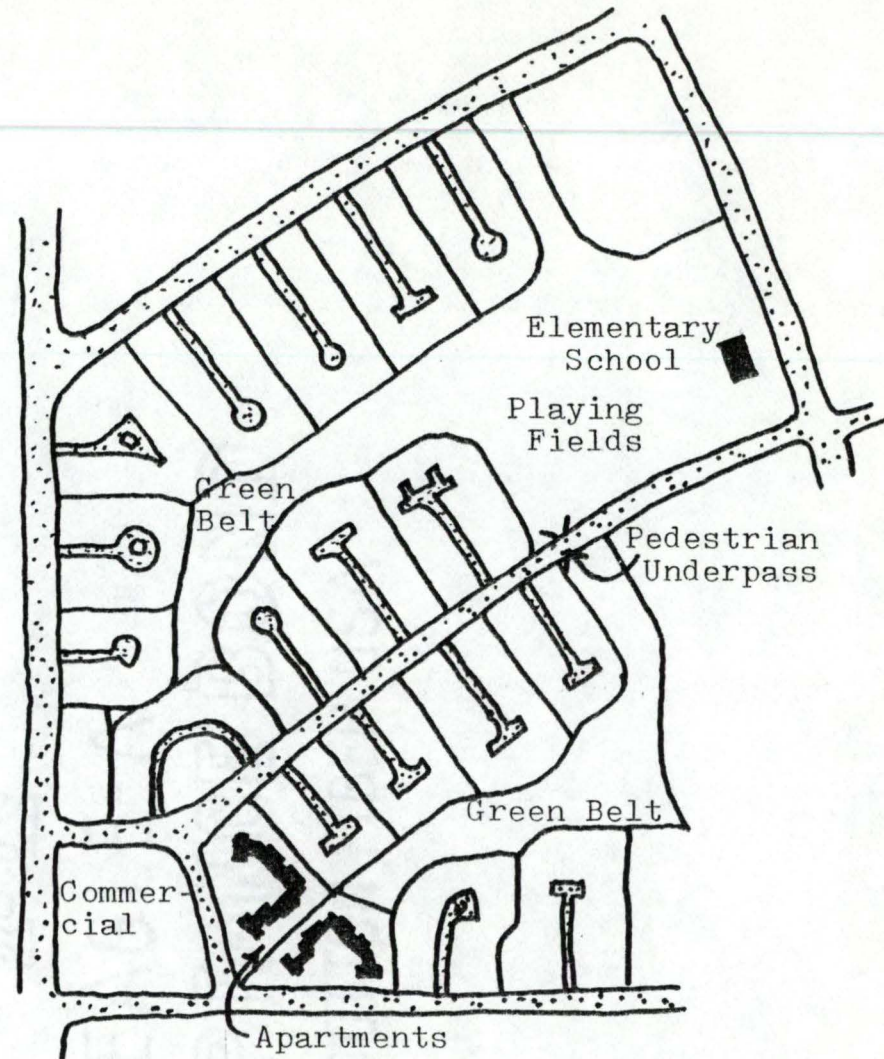
Architects:

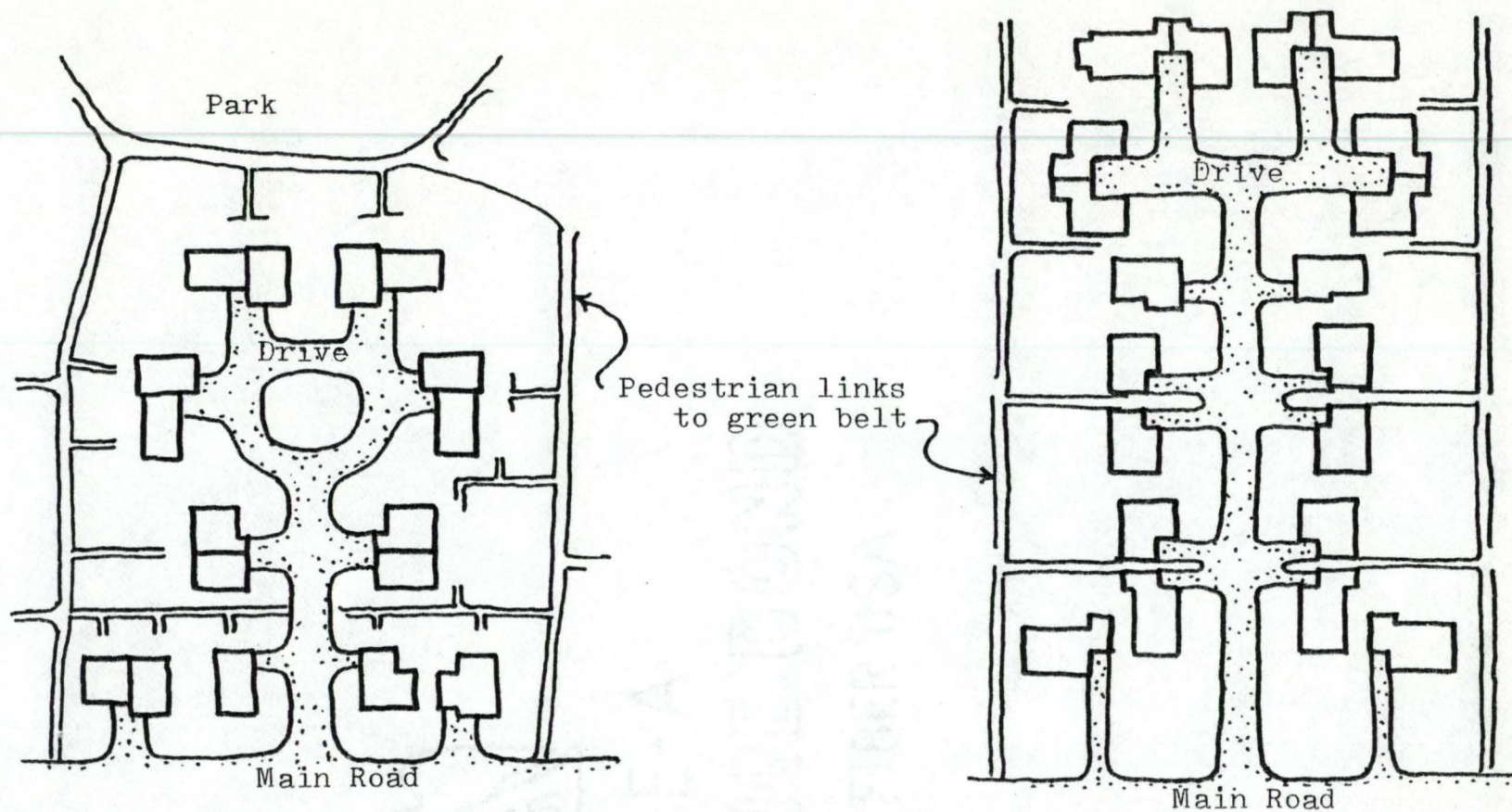
Clarence Stein

Richard Wright

The Radburn community plan is undoubtedly the most influential residential development of the modern era. Its concept of segregated pedestrian and automotive traffic is consistent at all scales of design. All commercial, residential, educational and recreational areas may be reached on foot without crossing a street. Small neighborhoods are organized around cul-de-sacs which serve automotive access. Individual units have private back yards which are linked to large green belts by walkways. These green belts in turn open onto playing fields, schools and commercial areas.

Hierarchical composition of small neighborhoods of fifteen to twenty dwellings provide a comprehensible organization and definition of territory. Amenities are provided at a scale appropriate to the density of use.





Later Radburn scheme corrected problems of turning around in drives and long driveways. Small neighborhoods consisted of seventeen units with a higher proportion of duplexes. Pedestrian circulation was still segregated from cars and linked to green belt with walkways which bordered private back yards.

Original Radburn small neighborhood plan called for twenty units grouped around semi-private drive. Pedestrian traffic was completely segregated from automotive and linked to green belt with walkways which bordered private back yards. Most dwellings were detached, though some were joined at garages.

Project Description:

Kingsmill Housing

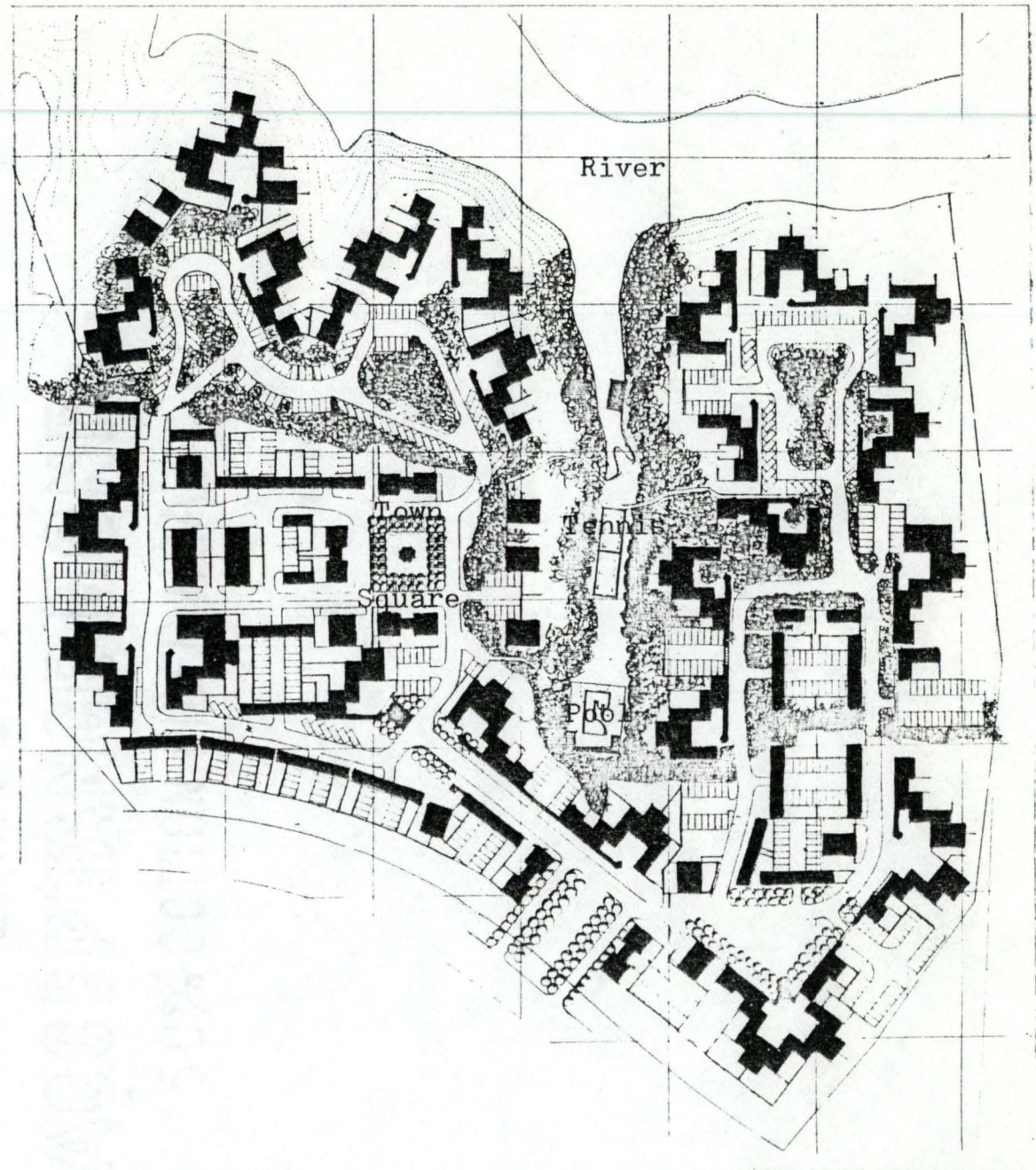
210 dwellings on 25 acres
near Williamsburg, Virginia

Architect:

Charles W. Moore

Site Concept:

Tight clusters of six dwellings encircling semi-private courtyards. Clusters in turn grouped into small neighborhoods of 12 to 24 dwellings with parking and open space at center. Automotive circulation in cul-de-sacs or loops. Pedestrian circulation segregated. Recreation facilities central. "Town Square" with pavillion near center. Buildings sometimes relate to contours, sometimes to grid system.



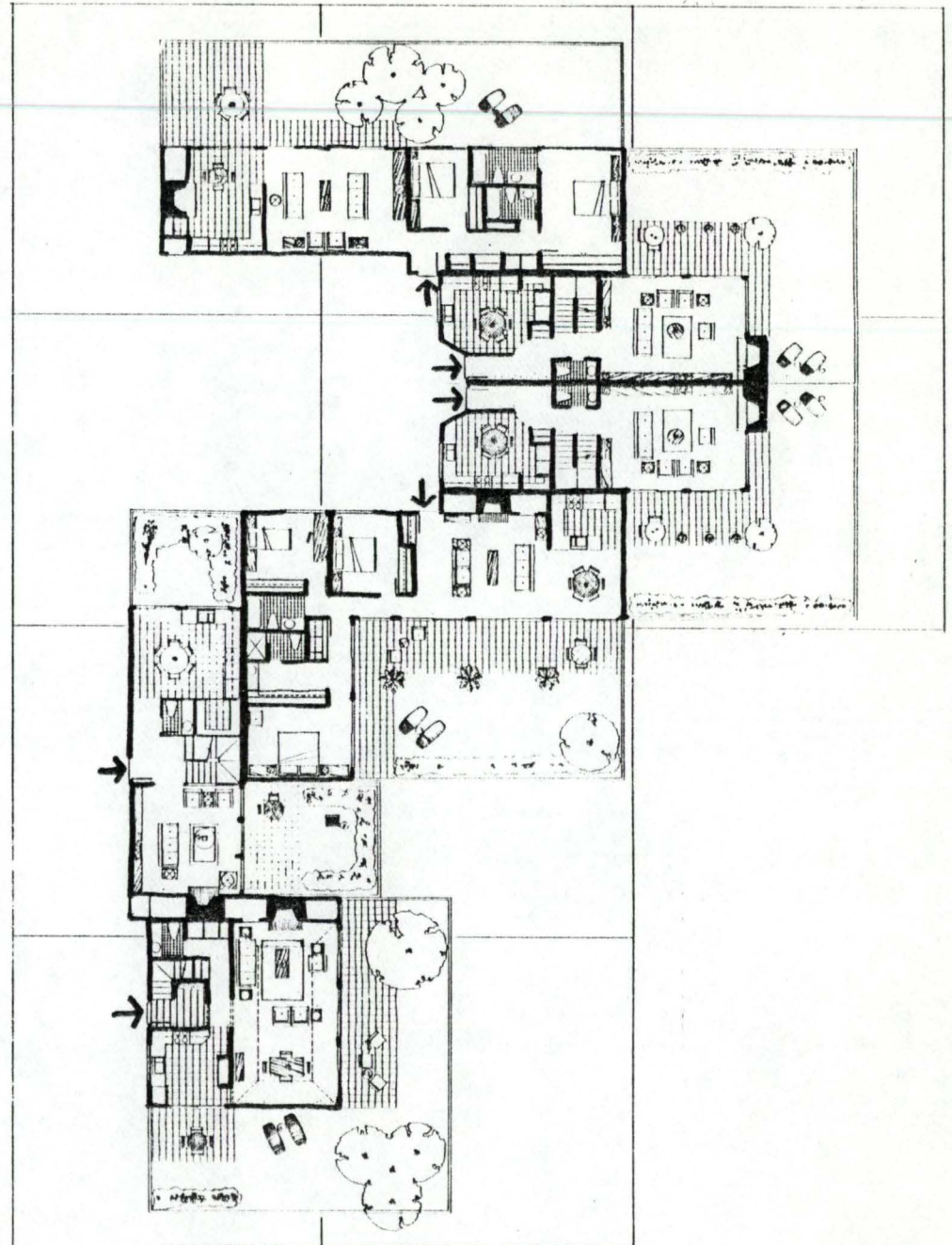
Kingsmill Housing
Charles W. Moore

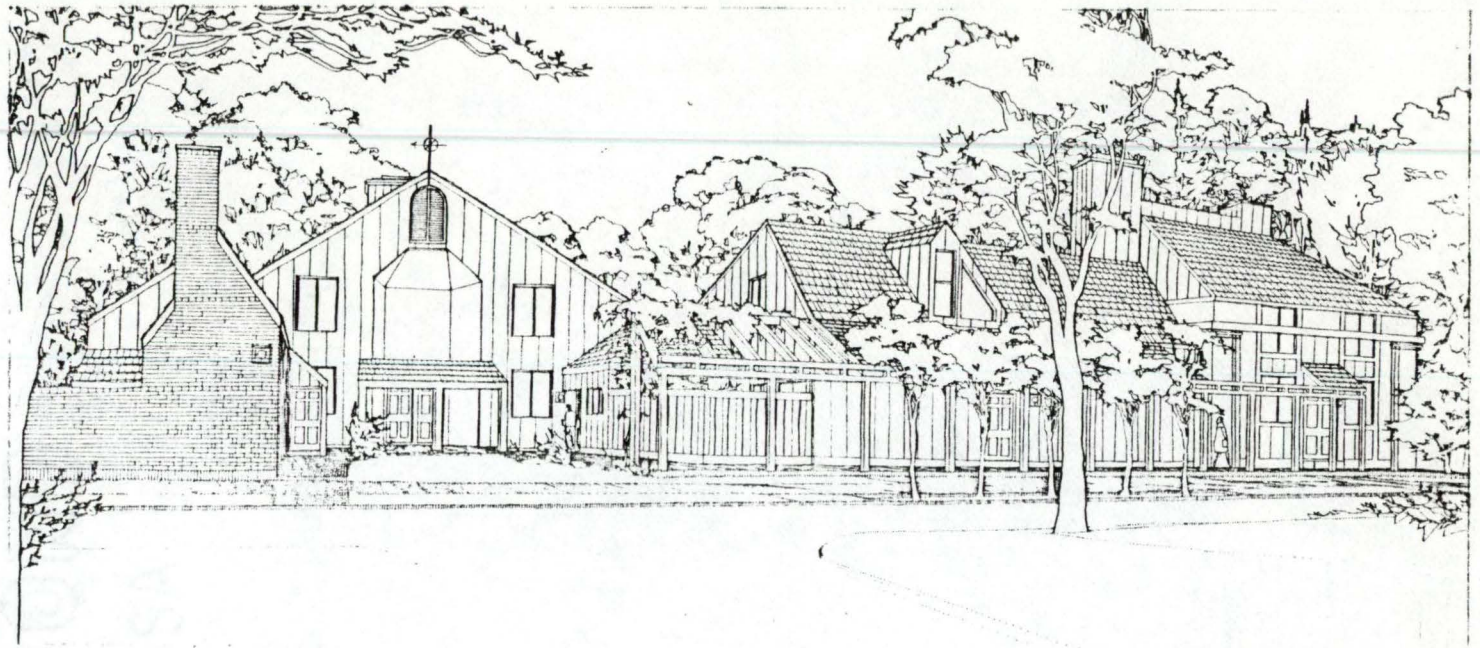
Unit Descriptions:

Two, three and four bedroom attached dwellings of one or two storey height.

Unit Concept:

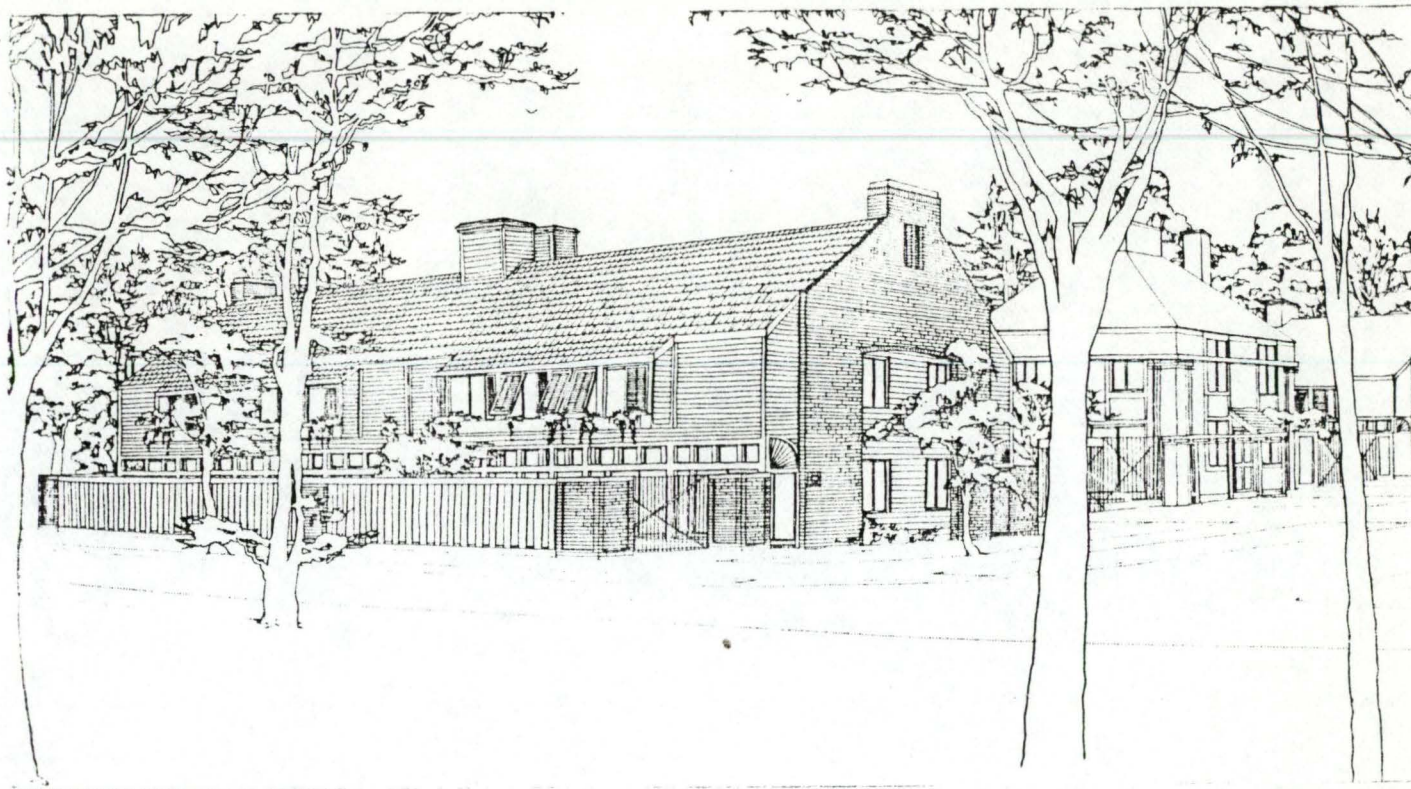
Each unit has a semi-private entry and a private side or back yard. Majority of glazing faces views or private areas. Plans segregate "machine" spaces from "people" spaces. Living, dining spaces of open plan variety while bedrooms are secluded. Fireplaces in all units.





Kingsmill Housing
Charles W. Moore

The architect's approach to the image of this community was one of creating a townscape. This was achieved by varying the style of each unit within the clusters and recombining units into varying cluster arrangements. Visual allusions to barns, churches, cottages and carriage houses create the illusion of varying functions within this townscape despite the the homogeneous residential purpose. Historical allusion to the past architectural styles of the region also contribute to the image of townscape, though these references are by no means explicit. The overall image is a fantasy of an 18th century village.



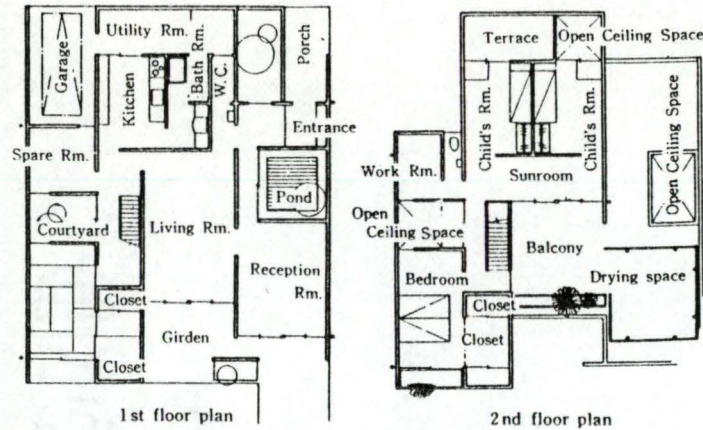
Kingsmill Housing
Charles W. Moore

This scheme is architecturally successful primarily for two reasons: the variations in each unit's appearance gives each dwelling an identity of its own, thus increasing the feeling of privacy; the employment of historical allusion adds social status and gives the community an enduring quality which is pure fantasy.

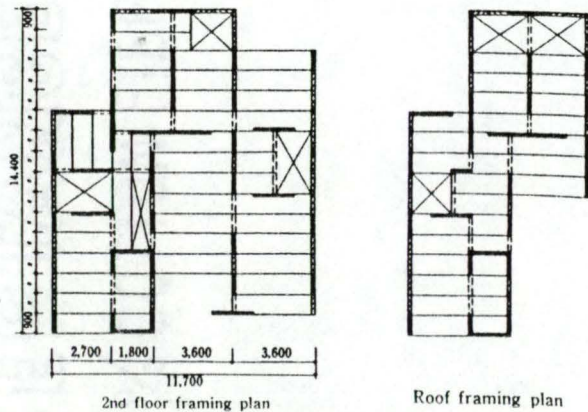
Project Description:
Silkaltsiit Model House

Architect:

RIA General Research Institute of Architecture



Plans, Silkaltsiit Model House

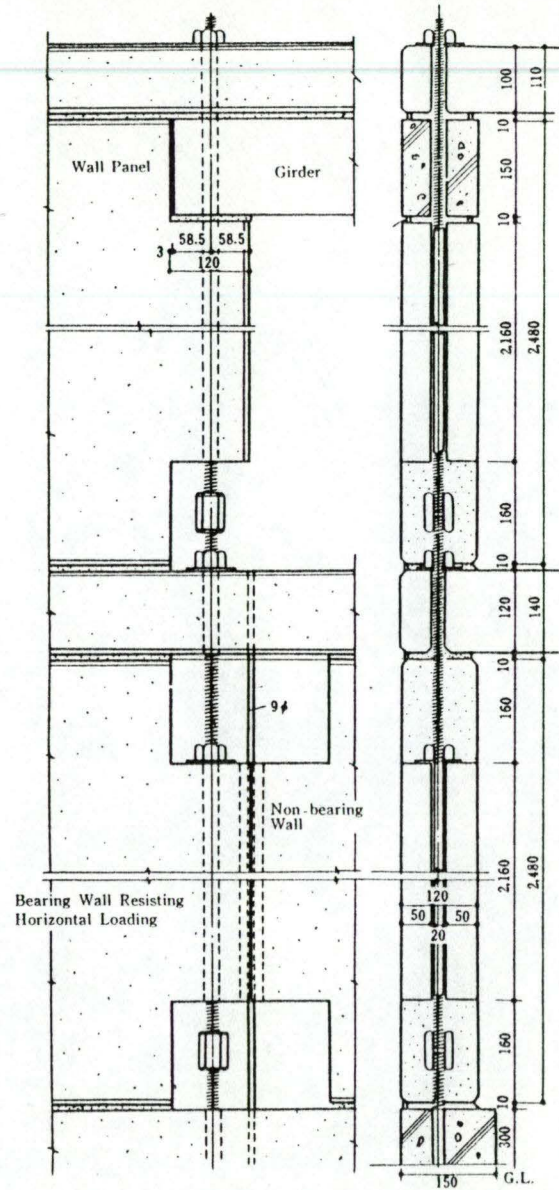


— Wall to resist horizontal load
- - - Wall to resist vertical load
... Girder

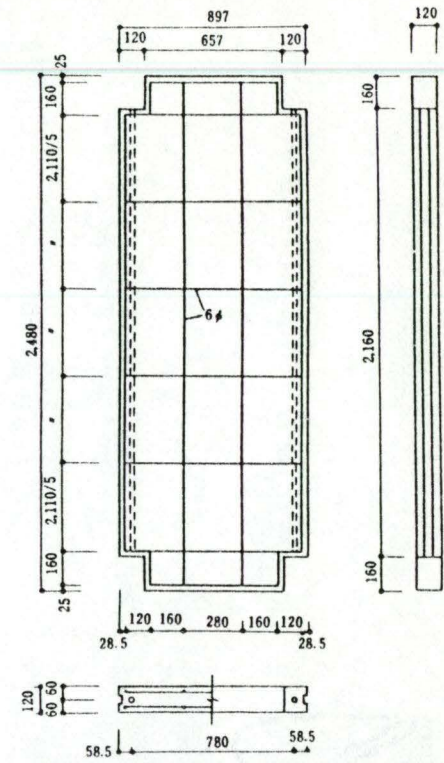
Framing plans

The structural system for this project is a system of precast prestressed plates which are assembled like a house of cards and then post-tensioned to create a monolithic structure. These prefabricated panels can be mass produced either on site or nearby and then erected in a matter of hours. The continuous foundation is the only cast in place portion of the structure. Horizontal forces are resisted by the post-tensioning which effectively makes the bearing walls and floors a vertical cantilever from the foundation. On the following page are structural details which illustrate how the system is put together. After post-tensioning is applied, the cutouts for tightening of rods are dry packed with concrete to lock the post-tensioning force.

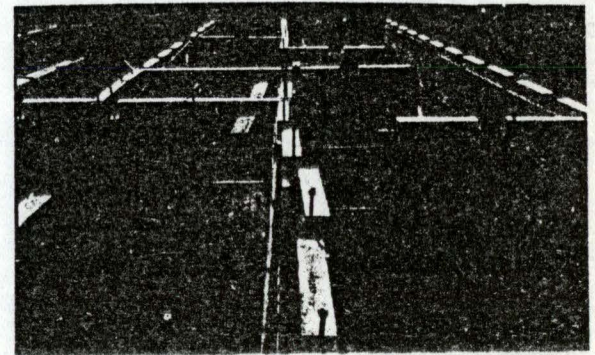
The advantages of this system are its speed of erection and resistance to lateral forces. The concrete floors and walls also provide excellent resistance to the spread of fire.



Details of joints of panel



Bar arrangement for wall to resist horizontal load



Silkaltsiit Model House (under construction)

PROGRAM CONCLUSIONS

The purpose of this section is to detail the program requirements for community spaces. These include those associated with the marina, commercial, recreation and security areas. The program for the dwellings has been set forth in two previous sections. Users detailed the types and organization of individual dwellings, and provided preliminary space requirements for the different groups. In the pro forma which was included in Financing, types, numbers and descriptions of each dwelling were included. These relate directly to the Design Solution which follows.

Space Requirements

Marina Complex:

Boat Racks

60 storage racks
storage area

Boat Launch Area

Workshop and Feuling Stations 4,200 sq. ft.

Marina Retail 1,000 "

storage area 500 "

Marina Hostel 4,200 "

8 guest rooms

lobby

showers and lockers

4 car ports

Commercial:

7 Leasable Retail Stores 10,500 sq. ft.

1 Leasable Retail Store 2,200 "

Sales Offices (to be converted
to private club) 6,300 "

reception

6 offices

conference room

A/V and banquet

Restaurant 3,100 sq. ft.

Kitchen 1,200 sq. ft.

Delicatessen 600 "

Convenience Store 3,100 "

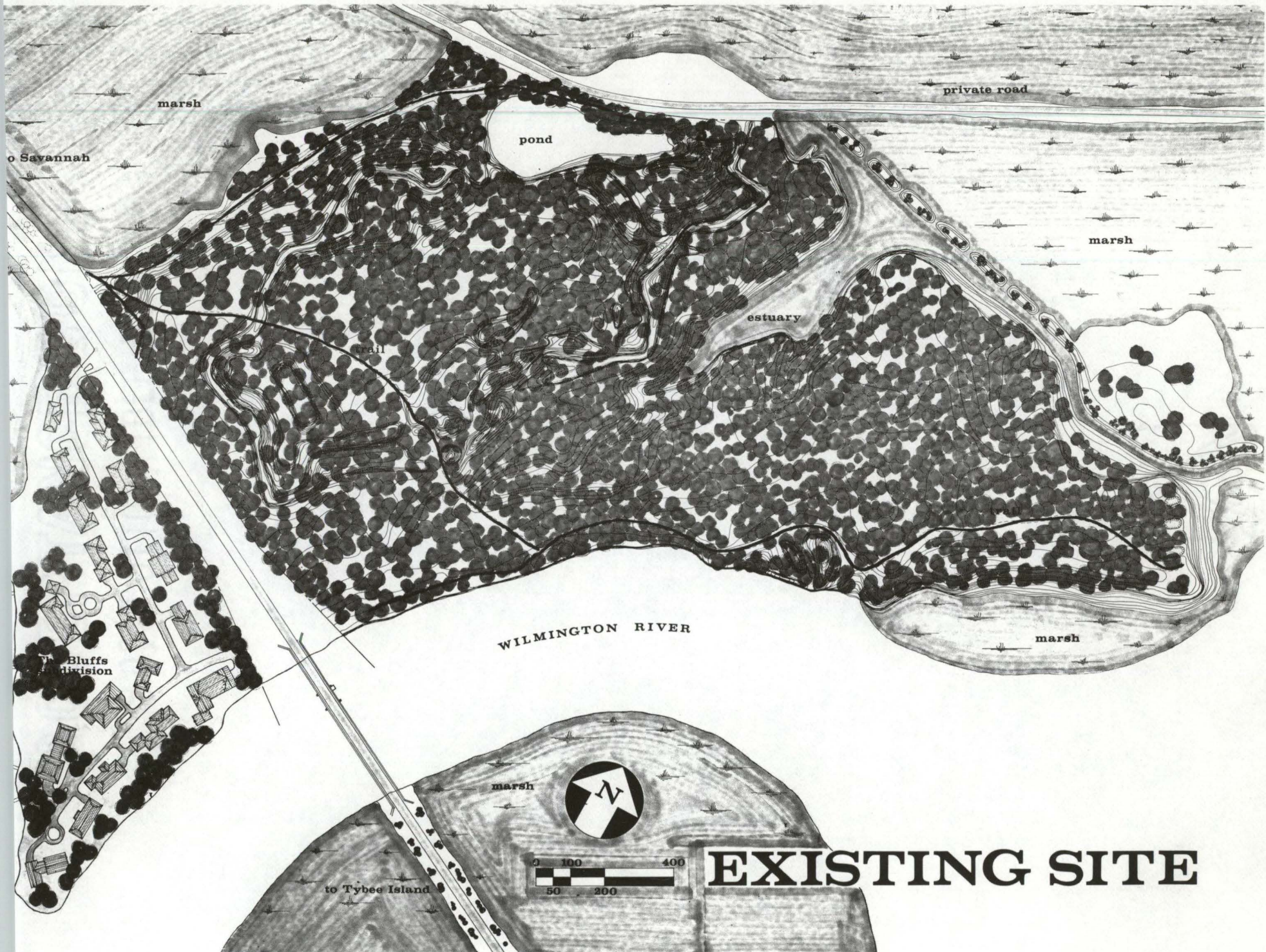
Commercial (cont.)

Pub	1,800 sq. ft.
Community Center, Child Care	4,200 "

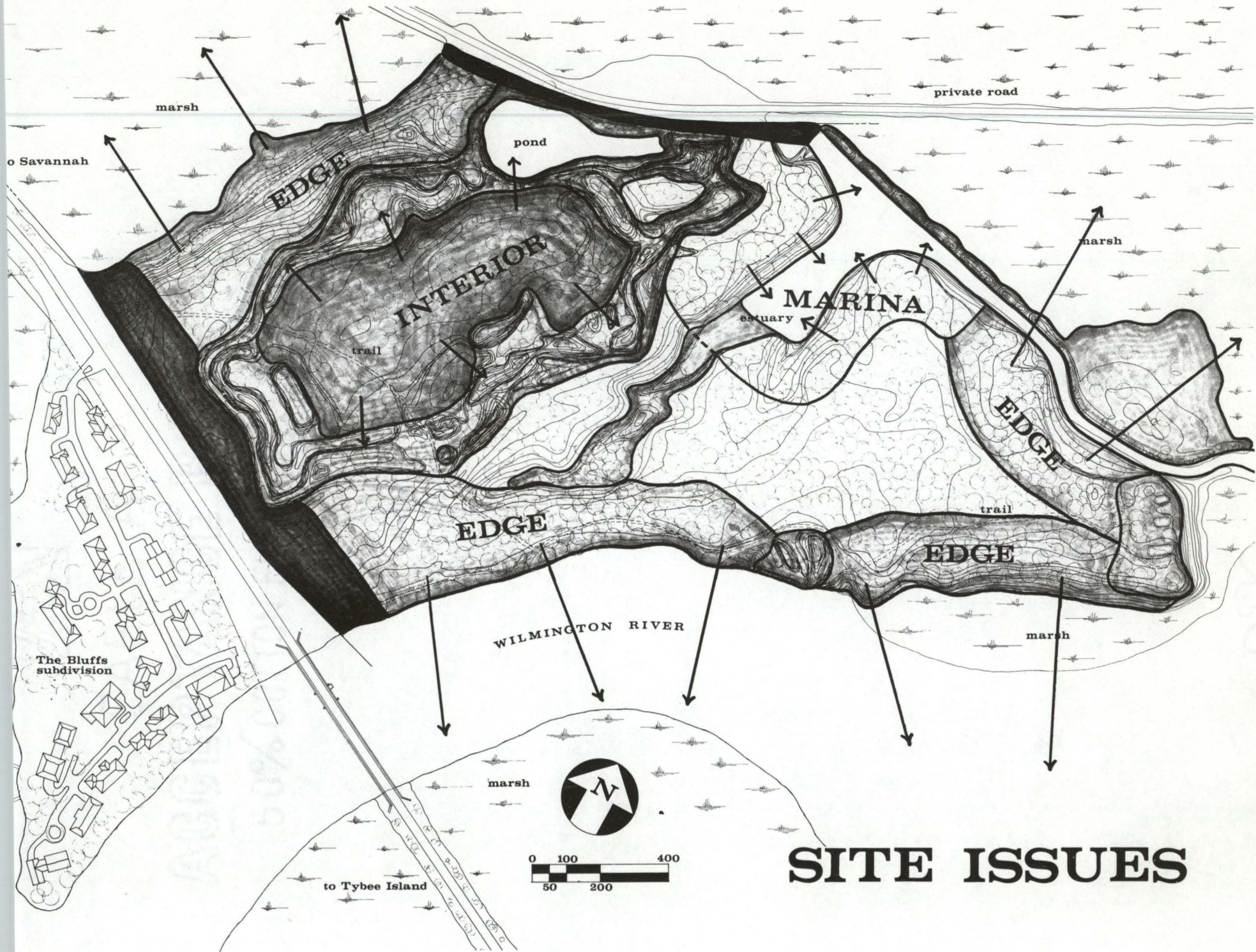
Recreation:

Men's Spa	2,500 sq. ft.
Women's Spa	2,500 sq. ft.
Pool	5,000 "
Pool House	1,000 "
dressing area	
rest rooms	
basket area	
4 Tennis Courts	
3 Fishing Piers	
6 Playing Fields	
2 Garden Areas	
Battery Park	
Security Gate	200 sq. ft.

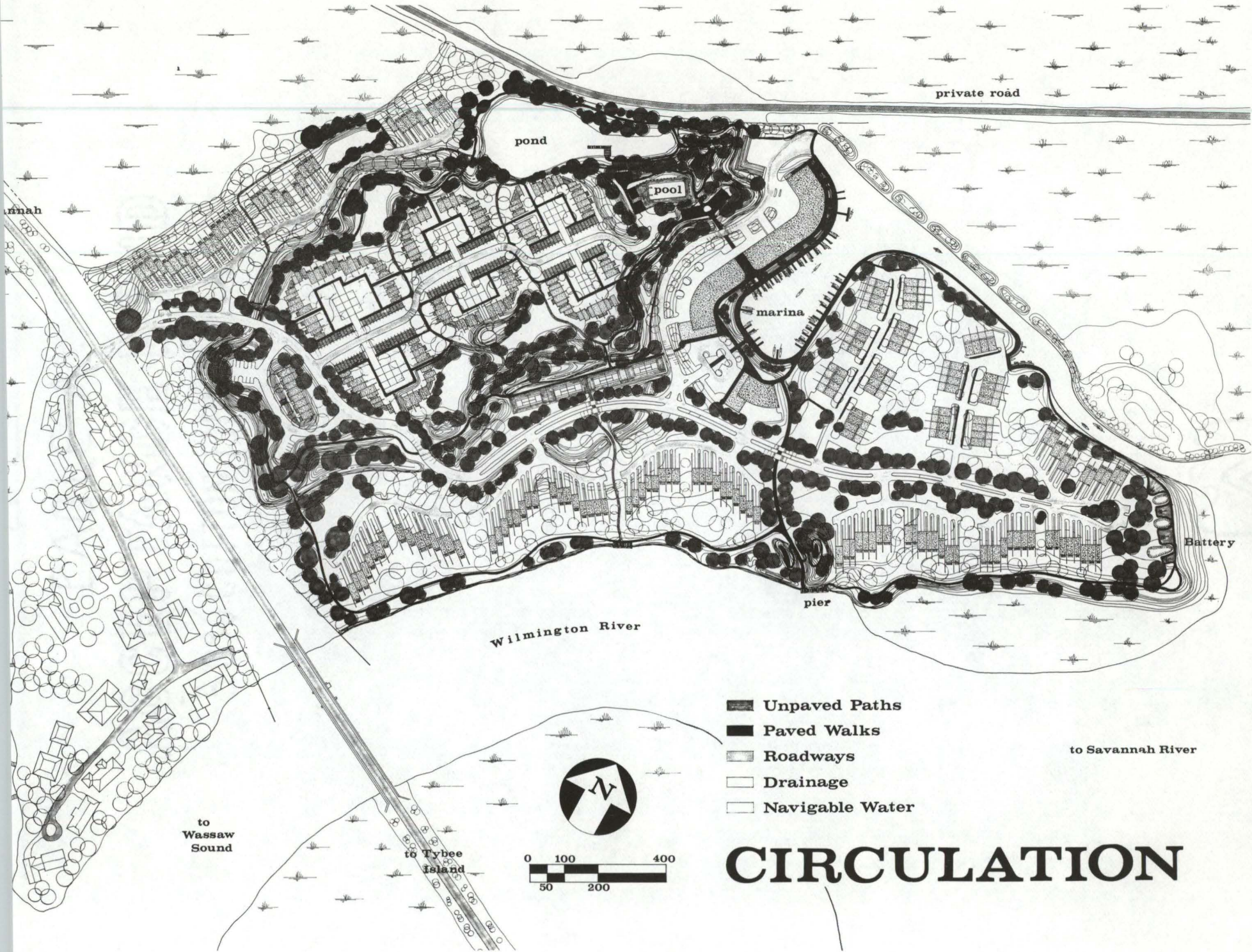
DESIGN SOLUTION



EXISTING SITE



SITE ISSUES



CIRCULATION



private road

pond

pool

marina

Battery

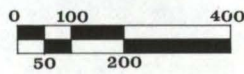
pier

Wilmington River

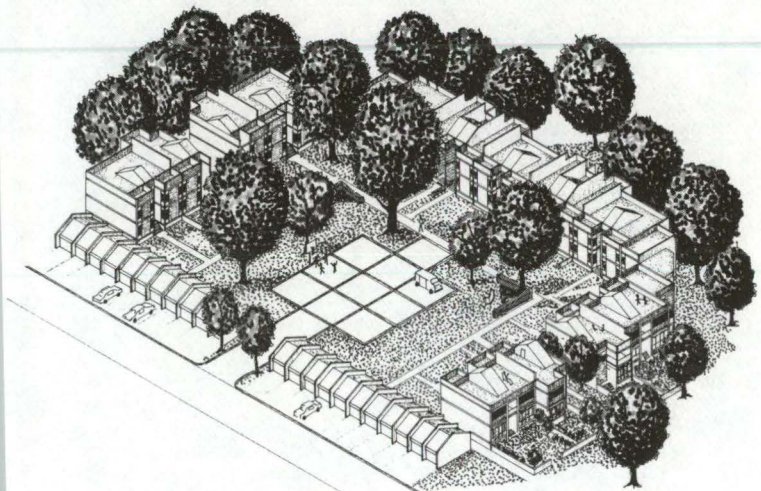
to Savannah River

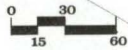
to Wassaw Sound

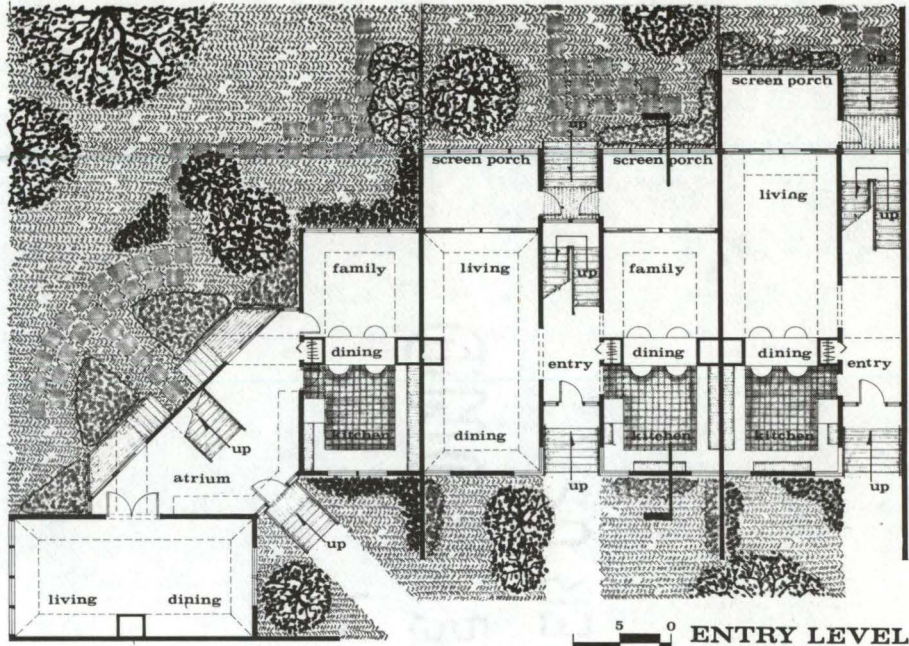
to Tybee Island




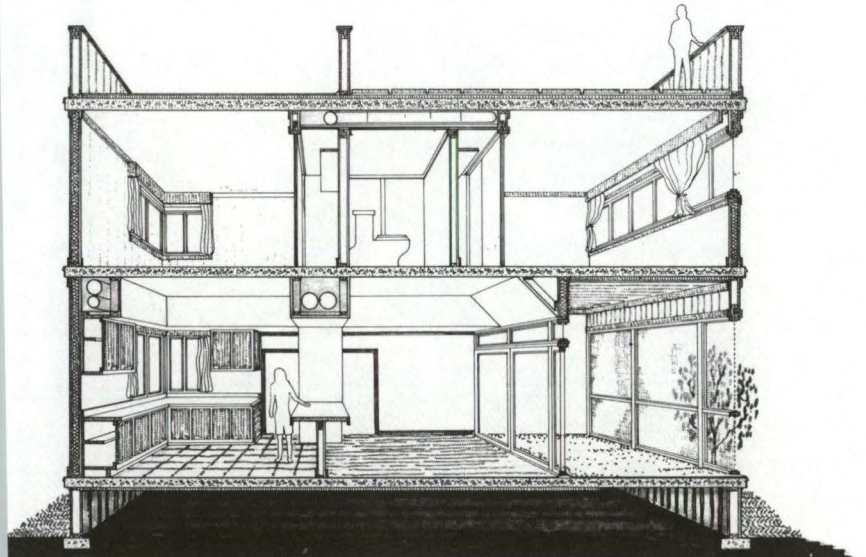
MASTER PLAN

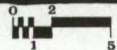


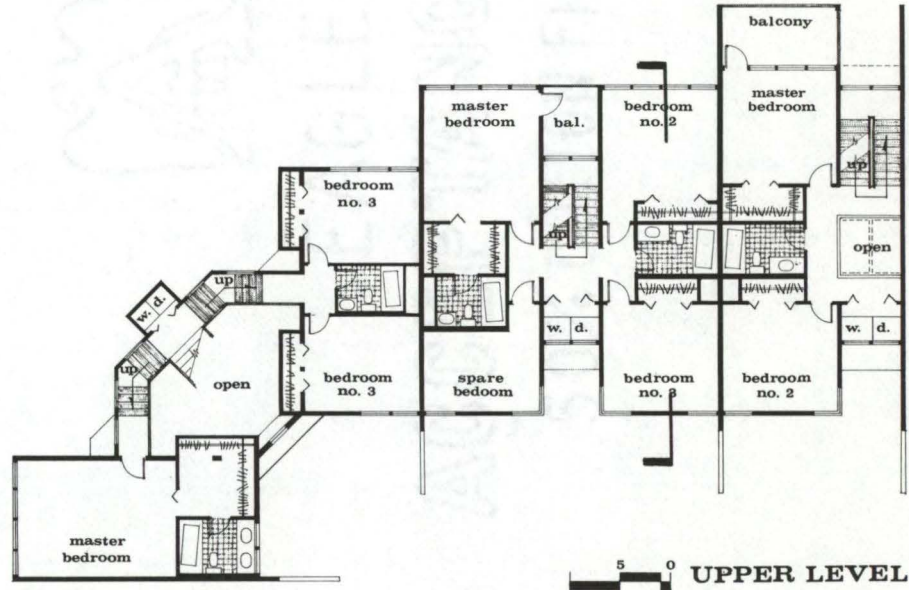
MODEL CLUSTER 

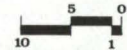


 ENTRY LEVEL

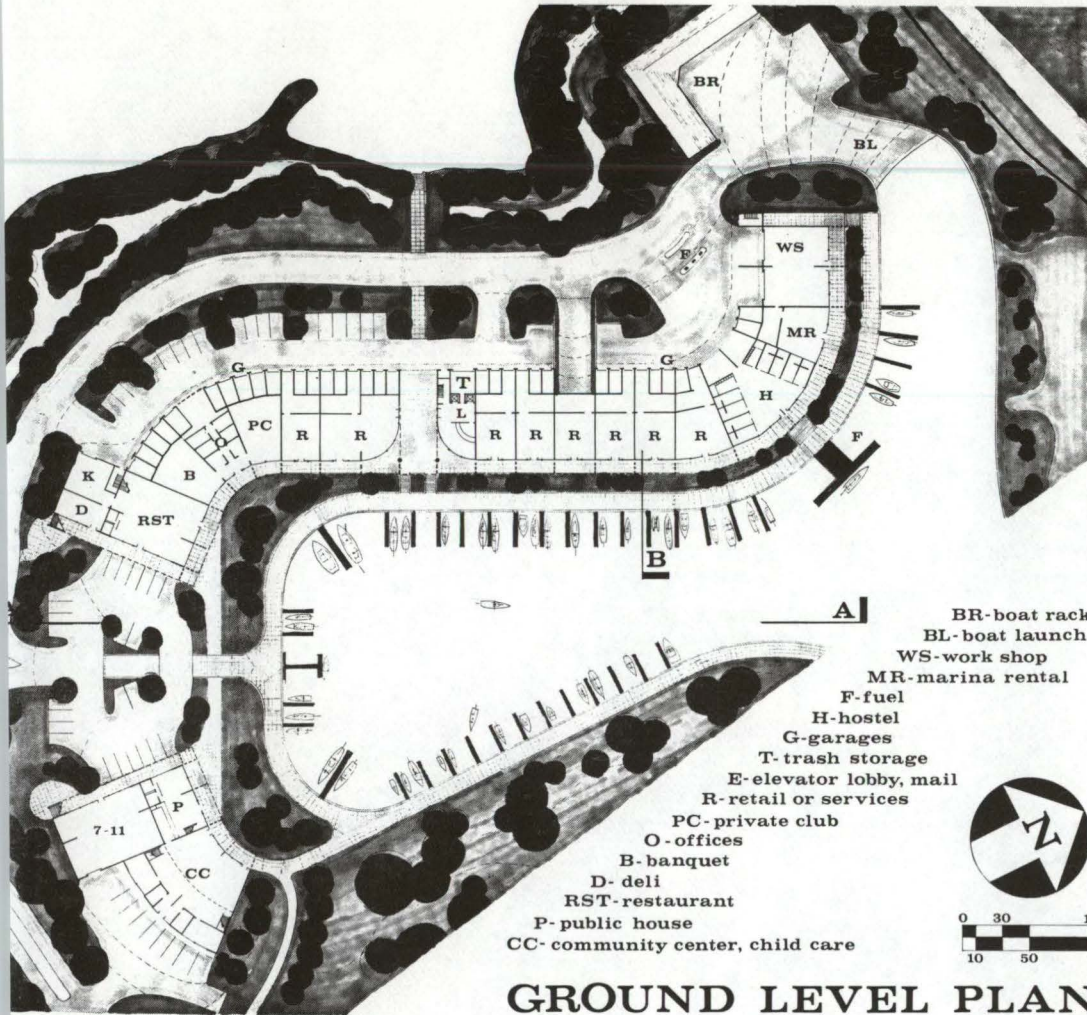


BUILDING SECTION 

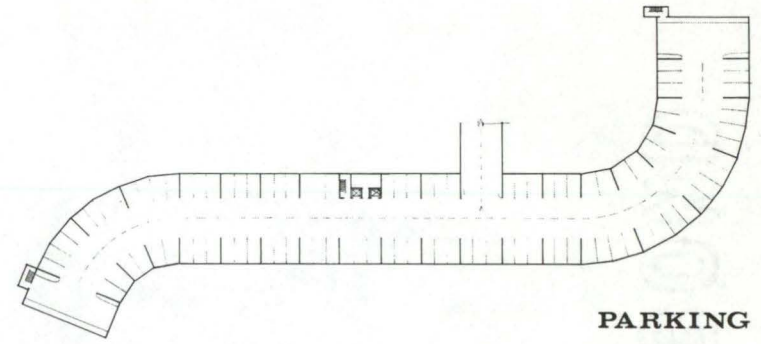
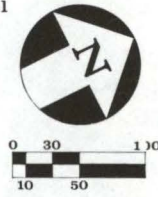


 UPPER LEVEL

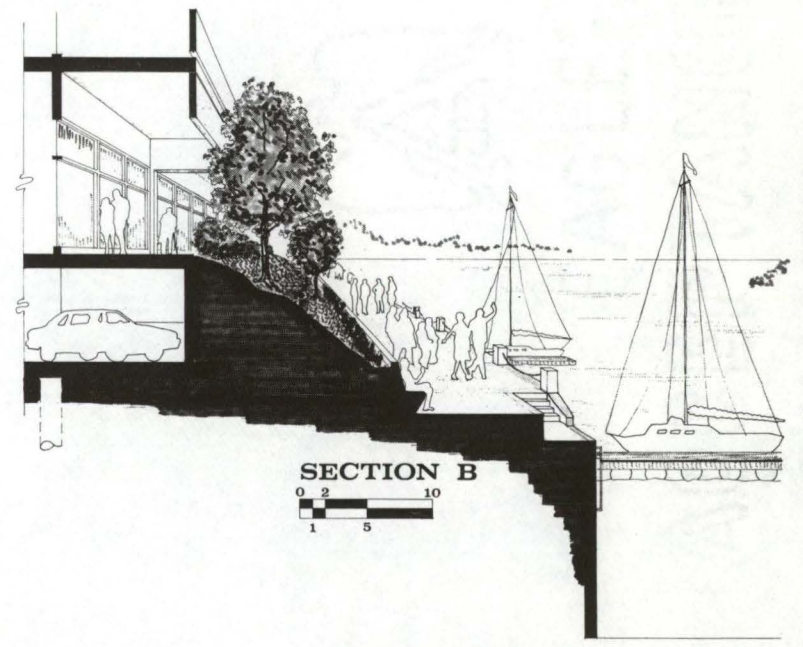
INTERIOR



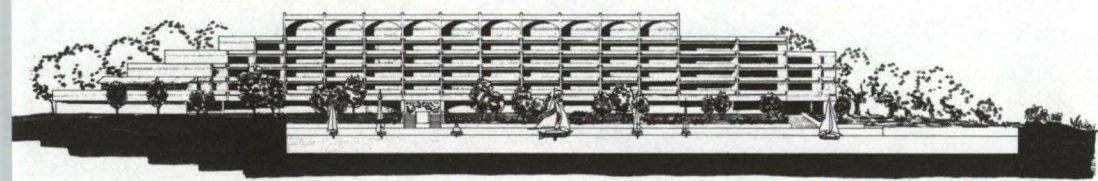
- BR-boat rack
- BL-boat launch
- WS-work shop
- MR-marina rental
- F-fuel
- H-hostel
- G-garages
- T-trash storage
- E-elevator lobby, mail
- R-retail or services
- PC-private club
- O-offices
- B-banquet
- D-deli
- RST-restaurant
- P-public house
- CC-community center, child care



PARKING

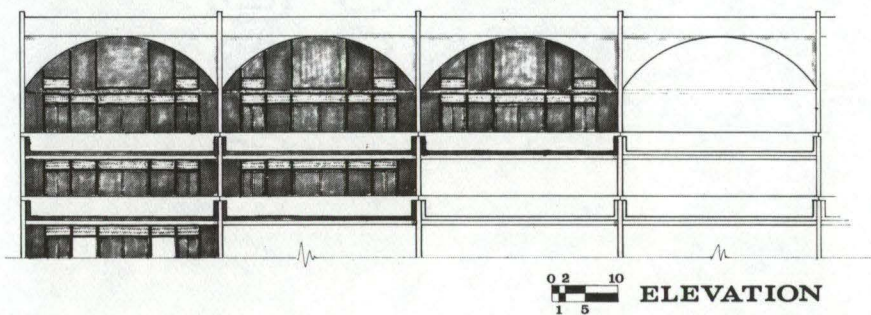
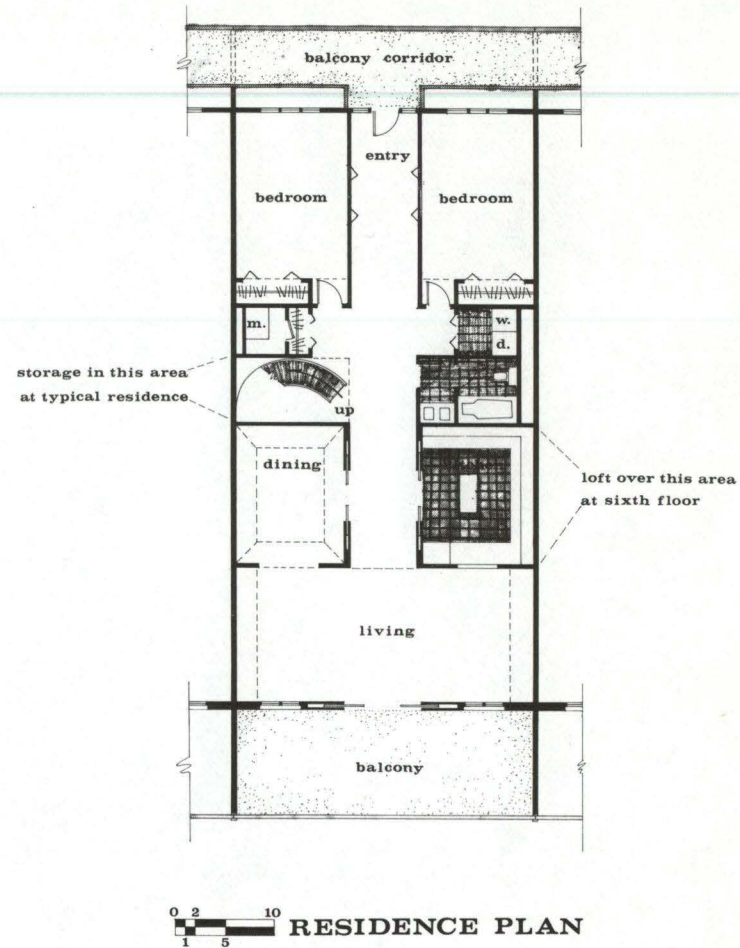
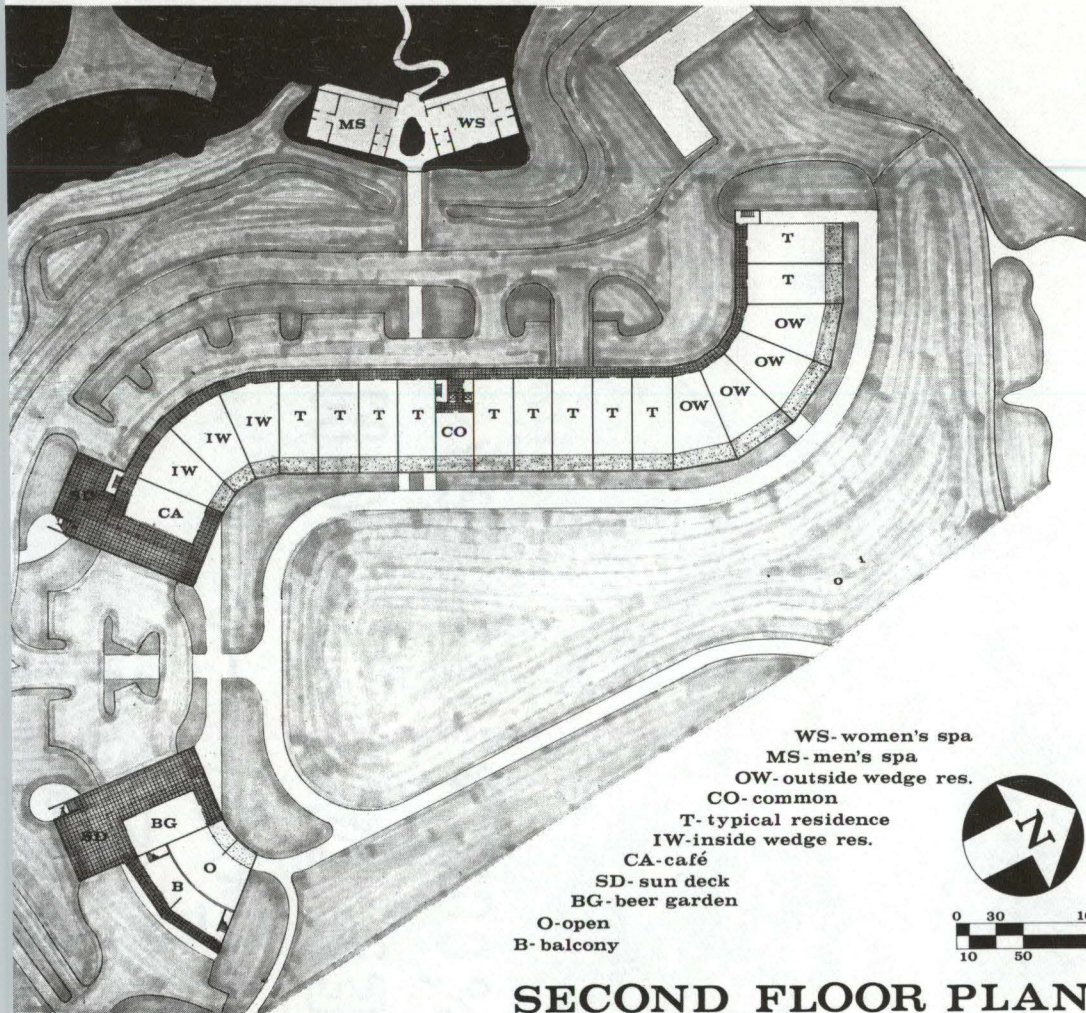


SECTION B

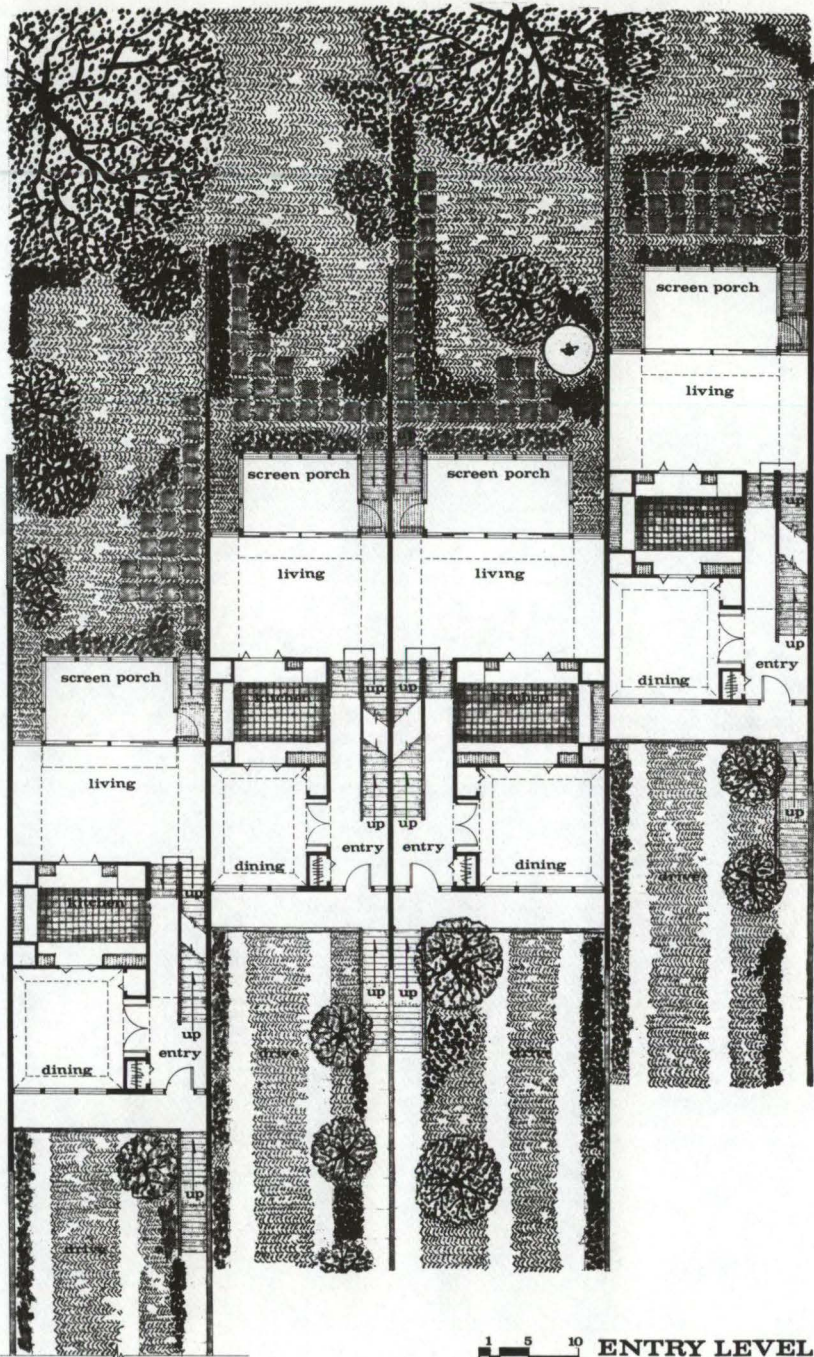


SECTION A

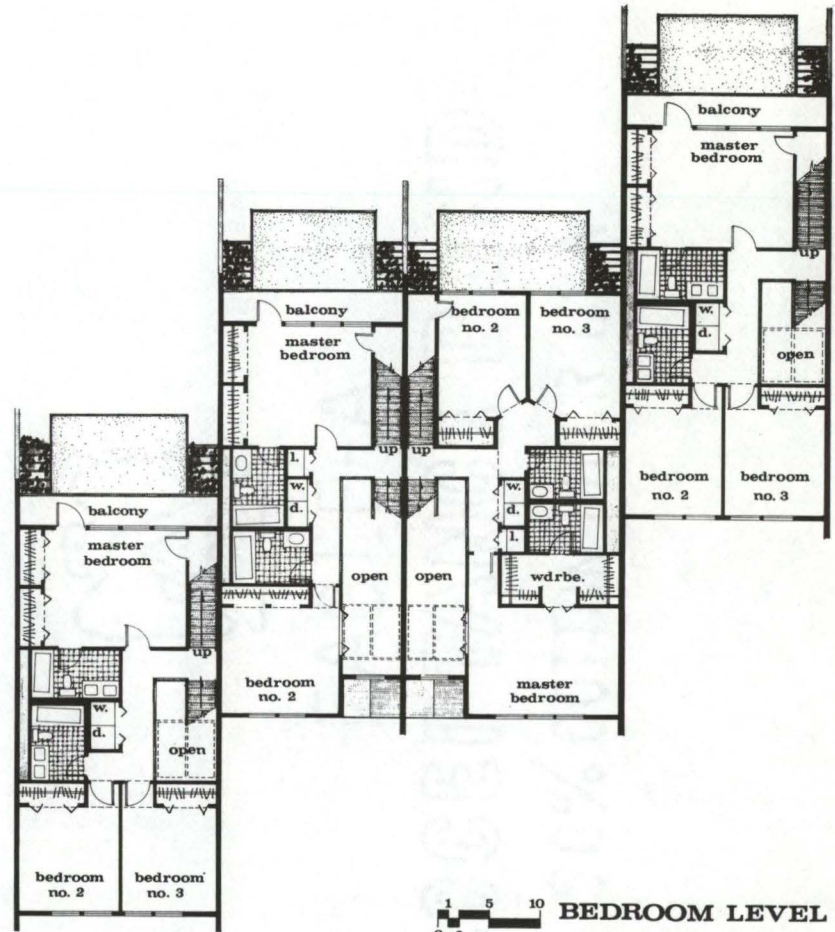
MARINA



MARINA

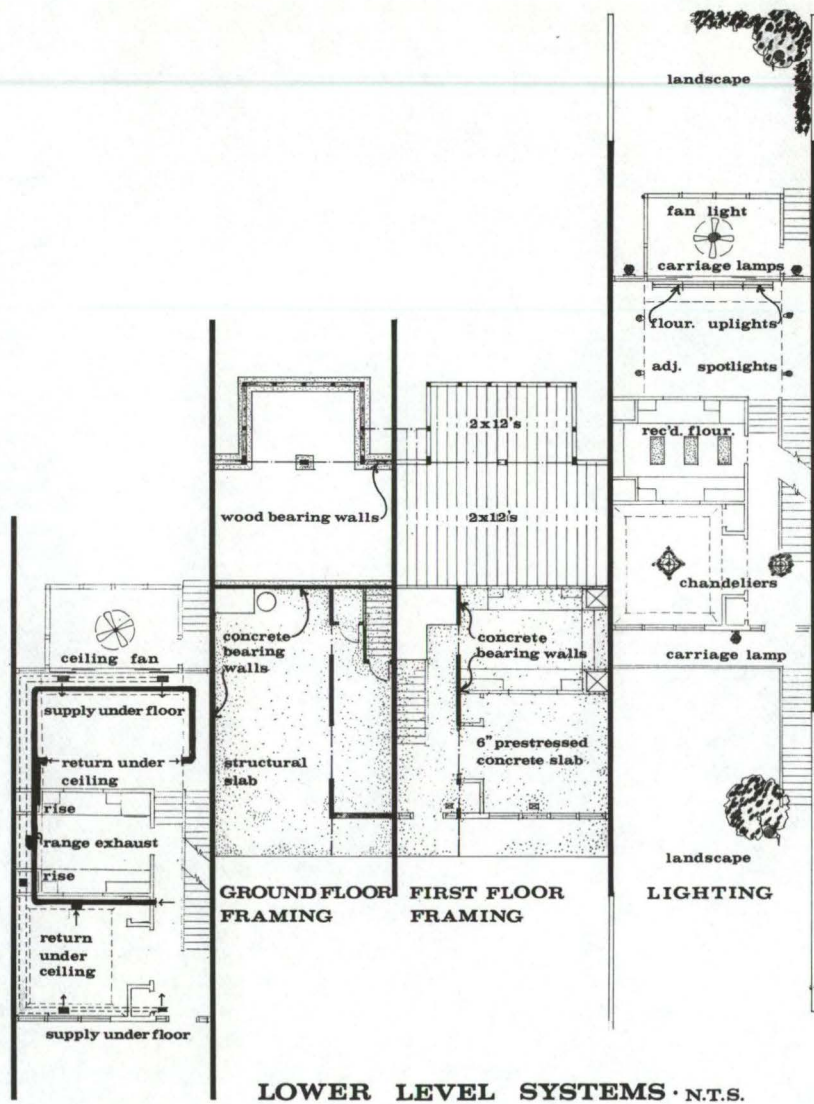


1 5 10 ENTRY LEVEL
0 2

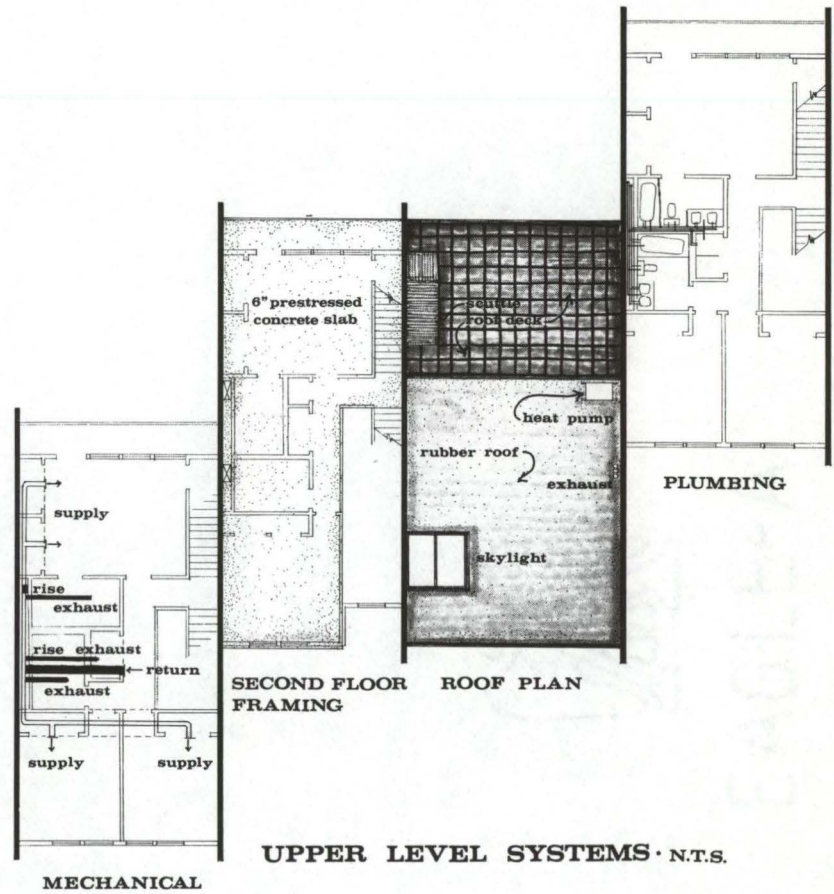


1 5 10 BEDROOM LEVEL
0 2

EDGE



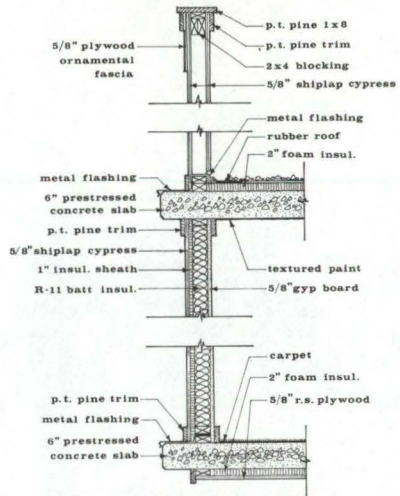
MECHANICAL



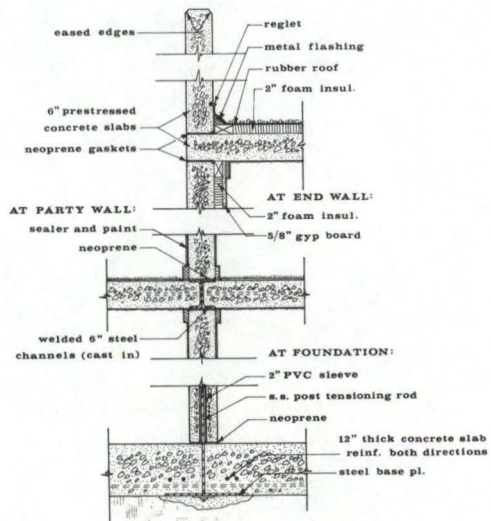
MECHANICAL

EDGE

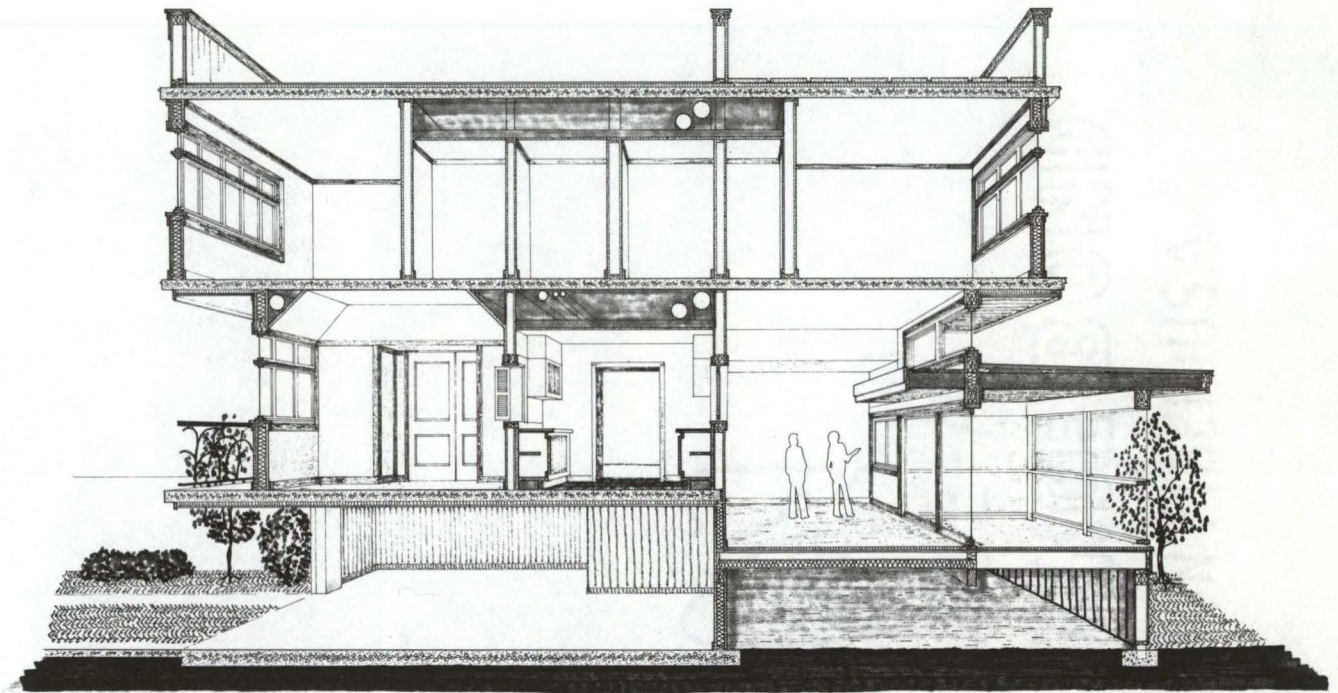
NON-BEARING WALL:



BEARING WALL:

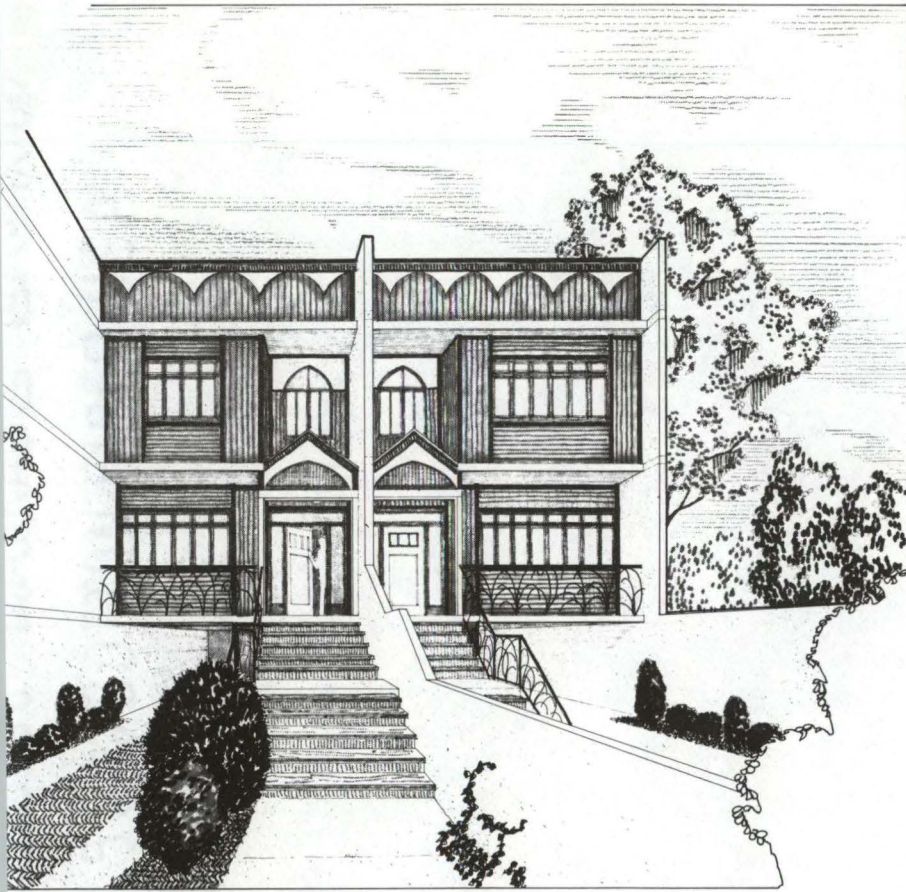


WALL SECTIONS 0 1/2 1 2

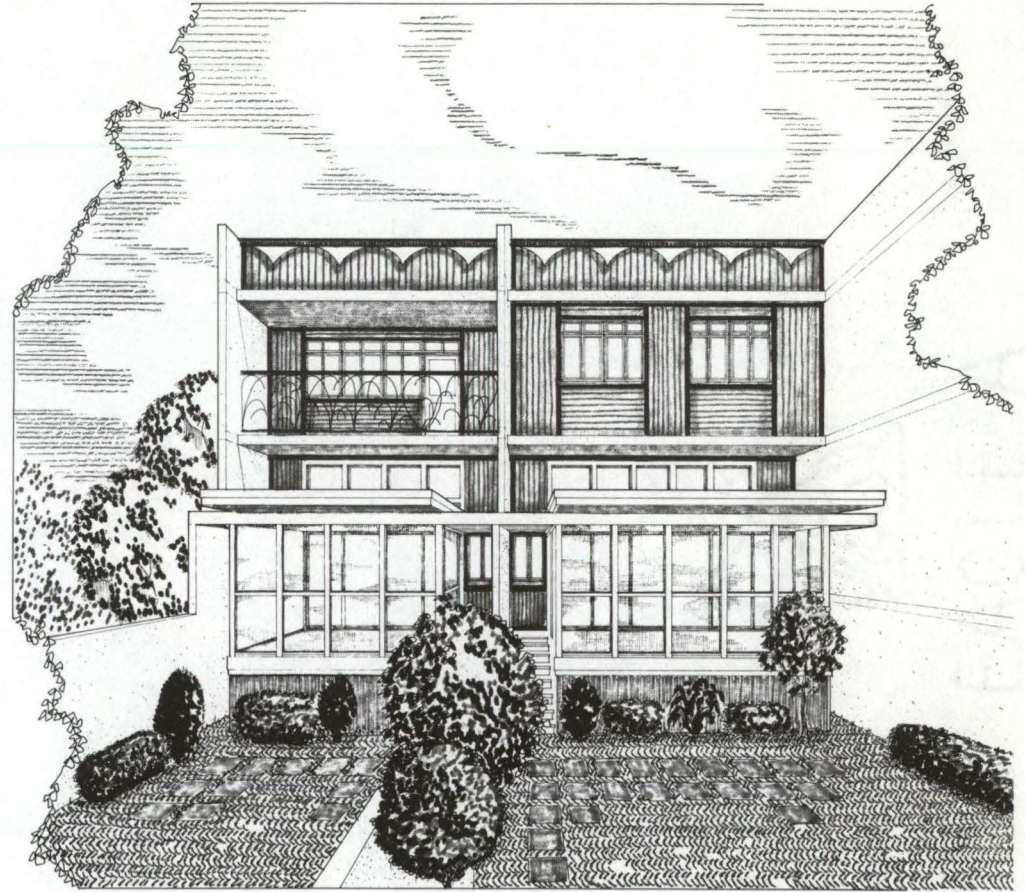


BUILDING SECTION 0 1 2 5

EDGE

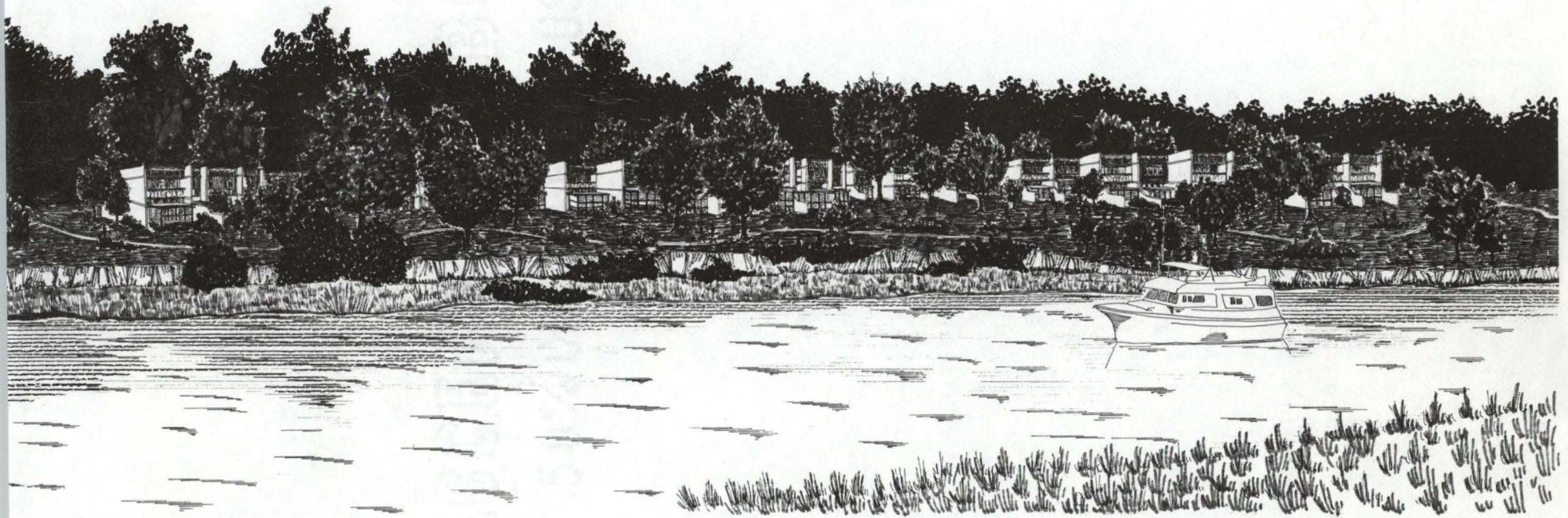


FRONT YARD



BACK YARD

EDGE



CAUSTON BLUFF

The implementation of this project would require the services of a variety of design professionals. Hydrologic and soils engineers would be required to design the marina, with an environmental engineer as consultant. A structural engineer would be needed to detail the structural concrete system. A landscape architect would design the open areas such as the Battery Park, the pedestrian walkways and other landscaped areas. A series of architects would design individual dwelling clusters within the framework outlined in the Design Solution. All of these professionals would be coordinated by a project architect, who would report directly to the managing partner.

DESIGN TEAM

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