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An Aquarium - Charleston, South Carolina

Marlene Walli Shade
Clemson University

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NEW YORK

AN AQUARIUM CHARLESTON, SOUTH CAROLINA

L. B. Gilbert & Bros

2018 COLLECTION

ERHARD & FULLER

FOX BIVIER

This manuscript is dedicated to Werner Erhard and Buckminster Fuller, who both enriched my life with responsibility. I also dedicate this to my friend Patrick Mays, who created the space of excitement that this project came out of.

AN AQUARIUM CHARLESTON, SOUTH CAROLINA

By Marlene Walli Shade

A sixth year terminal project submitted to the faculty of Clemson University College of Architecture as partial fulfillment of the requirements for the degree of

MASTER OF ARCHITECTURE
December 1984

FACULTY COMMITTEE

[REDACTED]

Peter Lee, Committee Chairman

[REDACTED]

Frederick Roth, Committee Member

[REDACTED]

Teoman Doruk, Committee Member

[REDACTED]

Dale Hutton, Committee Member

[REDACTED]

Kenneth Russo, Head
Department of Architecture

[REDACTED]

Paul David Pearson, Dean
College of Architecture

ACKNOWLEDGMENTS

I would like to thank Professor Peter Lee for his support through the many months of this undertaking. His high expectations produced results far beyond my expectations. His commitment to architecture was a force that aided me in discovering my place in this profession. For their enthusiasm, interest, and encouragement, I would like to thank Teoman Doruk, Frederick Roth, and my friend Norman Book. Special thanks go to Dale Hutton, whose criticism was especially valued.

Many persons involved in the marine sciences offered me advice and information. Aston Ramsey, Chief Engineer for the Baltimore Aquarium, was extremely generous of his time and expert knowledge. John Knightengale of BIOS in Seattle, Washington (the consultant later hired by the City of Charleston for its feasibility study), offered advice concerning program needs of the shark tanks, as did John Wourms of Clemson's zoology department. Margaret Davidson and Rick DeVoe of the Sea Grant Consortium in Charleston graciously met with me and discussed this project, as well as providing me with a list of resource persons.

Laurie Thompson, with the City of Charleston, provided me with initial plans and information concerning this project. He also served as my contact with the city. Frances Edmunds, director of the Historic Charleston Foundation, provided me with a collection of newspaper clippings regarding the aquarium project that proved to be quite valuable in setting the tone of the project.

To all of these persons I am deeply grateful for stopping their own work to aid in this academic venture.

Joel Newman, whose terminal project--Market Street Basin, A Proposal for Charleston, South Carolina--became the basis for my project and whose drawings and model became part of this project, is especially thanked.

I would also like to thank the many students who became a part of this project. Thanks to Mark Maresca, Louise Sheridan, and Richard Griffin, who were the foundation. Thanks also to Kelly Haas, who kept my head above the water. Many other students came to my aid and supported me throughout this project. I would especially like to thank Michael Barr and Mike Murphy.

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INTRODUCTION

If we are to be responsible, we must accept the fact that we owe a massive debt to our environment. It won't be settled in a matter of months and it won't be forgiven us.

--Russell E. Train

DESIGN OF AN AQUARIUM

At a time when our environment is neglected, abused, and often misunderstood, I, as a participant, feel responsible for using my profession to gain a greater understanding of our planet and how we affect it. There are many avenues by which to increase our environmental awareness. One of these is the museum that emphasizes the environment. An aquarium is such a place. I am honored to present this project--An Aquarium for the City of Charleston, South Carolina--as partial fulfillment of the Master's degree in Architecture.

GOALS & OBJECTIVES

Goals of this project are:

To explore the role of water in Charleston's built environment.

To design an aquarium that reflects the role of water in Charleston's built environment.

Objectives of the aquarium itself are:

To encourage participation in the preservation of South Carolina's environment.

To complement and provide a visual focus for the waterfront development.

To serve as a community resource.

THE PROBLEM

PPS COLUMN

EMAGNIFIED BOUND

FOXGIVER

People who understand their environment will not
destroy it ...

WHY CHARLESTON ?

An aquarium for Charleston, South Carolina, was first mentioned as the city prepared plans to develop an extensive waterfront park. The recent success of Baltimore's National Aquarium and waterfront development no doubt made such a project for Charleston very appealing.

Russell Blackburn, with the City of Charleston, prepared a preliminary report on the subject for Mayor Joseph P. Riley in July of 1983. This report stated that Charleston could support an aquarium of 25,000-30,000 square feet. The report identified the potential users as tourists, residents, and school groups, as well as the College of Charleston. The aquarium would be funded through admissions and, if necessary, community support, state revenues, and federal grants. Another possibility would be to sell it to a private entity and lease it back.

The proposed location for the aquarium is in an area of intensive development along the city's waterfront, an area that should serve as an impetus to increased tourism. Future developments in the area should consolidate existing structures.

The purpose of the aquarium will be to educate the public about South Carolina's marine environment. Users will have access to the aquarium both as an introduction to and as a continuing education in the coastal environment. The major exhibits will house native sea life and vegetation in a natural setting. Revolving exhibits will be concerned with topical issues related to the environment.

THE PROCESS

The initial planning for an aquarium begins with determining the level of community interest, the types of users, and the focus of the aquarium--i.e., is it an educational facility, a tourist attraction, etc. A feasibility study should be done to ascertain the community's ability to provide financial support for such a facility. Even a small aquarium such as the one in Seattle, Washington, with an area of 30,000 square feet, has a yearly operating budget of \$1.5 million.

Once interest and support have been established, the pre-design phase begins. At this point, consultants would be called in to determine the building requirements. They would include exhibit designers, aquarists, bio-engineers, mechanical and structural engineers, and, if possible, future staff members of the aquarium. These people would work with the architect as a team in establishing a building program.

About 60 percent of an aquarium consists of support space. Therefore, what may initially seem to be a building of adequate size may be undersized when the net exhibit space is finally established. Once the proper size is determined, the potential for expansion must also be considered. The aquarium in Baltimore, Maryland, built in 1981, is already expanding due to a much greater number of visitors than was expected.

In addition to developing a building program, the pre-design phase includes the identification and analysis of a selected site for the aquarium. This would involve determining its physical characteristics, its accessibility, and its relationship to other activities.

Once the pre-design work is completed, the architect begins to develop schematic designs for the building which are reviewed by the consultant team. After a design direction is established, the project proceeds toward greater detail and refinement until drawings and documents are ready for construction purposes. During the course of this design development, it may be necessary to make changes reflecting improved methods of operation. Marine science is an ever-changing field, and changes in aquarium technology are inevitable.

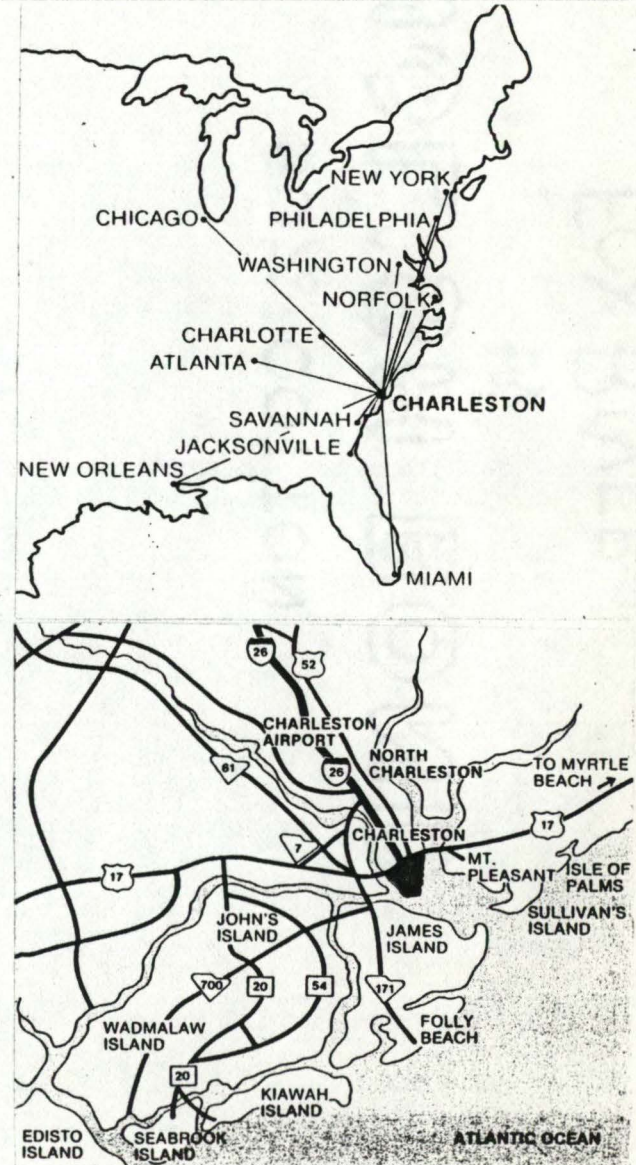
CHARLESTON

THE CITY

Charleston is a city on the coast of South Carolina with a population of 200,000 people. Of these, 50,000 live on a peninsula defined by two rivers--the Cooper to the east and the Ashley to the west. It is a city rich in history, dating from pre-Revolutionary times.

The Civil War left Charleston destitute, and during the final decades of the 19th century, at a time when other, more prosperous cities were tearing down and rebuilding, Charleston remained dormant. As a consequence, the city retained a large portion of what is now its historic area. Charleston's preservation movement began in the 1930s and has served as a model for other cities interested in enhancing the quality of their urban environment.

From its beginnings, Charleston was a cultural center for the surrounding plantation region. By the late 1800s, its outlying beaches had become a retreat for the city dweller. Water has always been a source of both livelihood and recreation for the city's inhabitants.



THE HISTORY

In 1663, Charles II of England gave the area we now call Charleston to a group of men known as Lords Proprietor, who encouraged settlement of the land. The first colonists to arrive in 1670 chose initially to settle on the west side of the Ashley River, but soon moved across the river to the peninsula. A city was laid out here in the form of large squares, which were later subdivided into smaller parcels. Some of this original grid is still evident in parts of the present city.

Because of the threat of attack from both Indians and Spaniards, Charleston began to create defenses. Creeks were dammed and fortifications built, creating a walled city behind which the population continued to grow (Map 1).

Even under these circumstances, Charlestonian homes responded well to the environment. The Charleston "single house," designed to catch the prevailing breeze in this city of high humidity, was adapted to all sectors of society and survived numerous stylistic changes throughout Charleston's history.

By the time of the American Revolution, Charleston had spread beyond its original fortifications and was enjoying great prosperity. This was interrupted by the Revolution and the subsequent War of 1812. Numerous fires, earthquakes, and hurricanes destroyed most of the city at one time or another during the first two centuries of its existence. In 1728 a great storm drove 23 ships up onto land, and in 1886 a series of 36 earthquakes occurred over a period of a month.

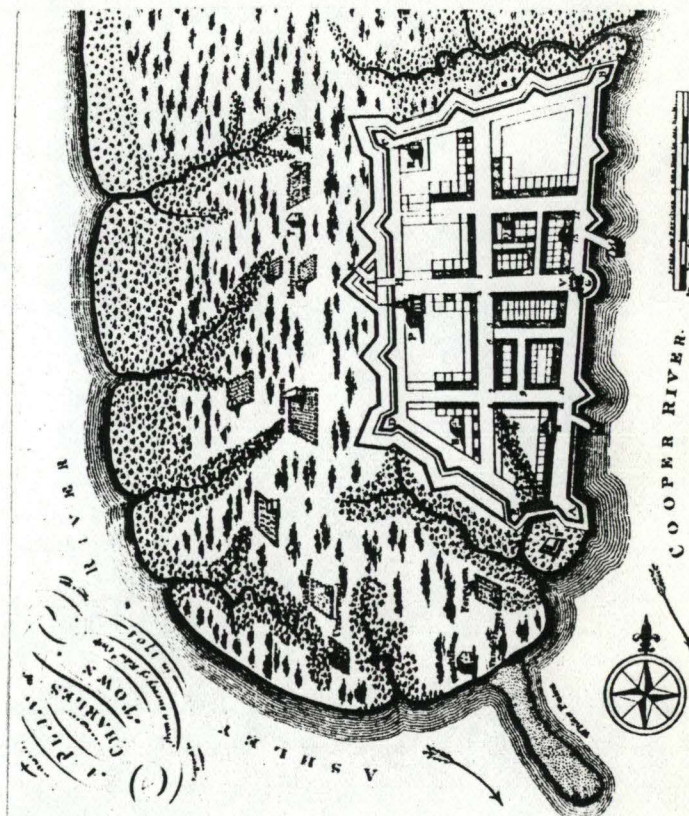
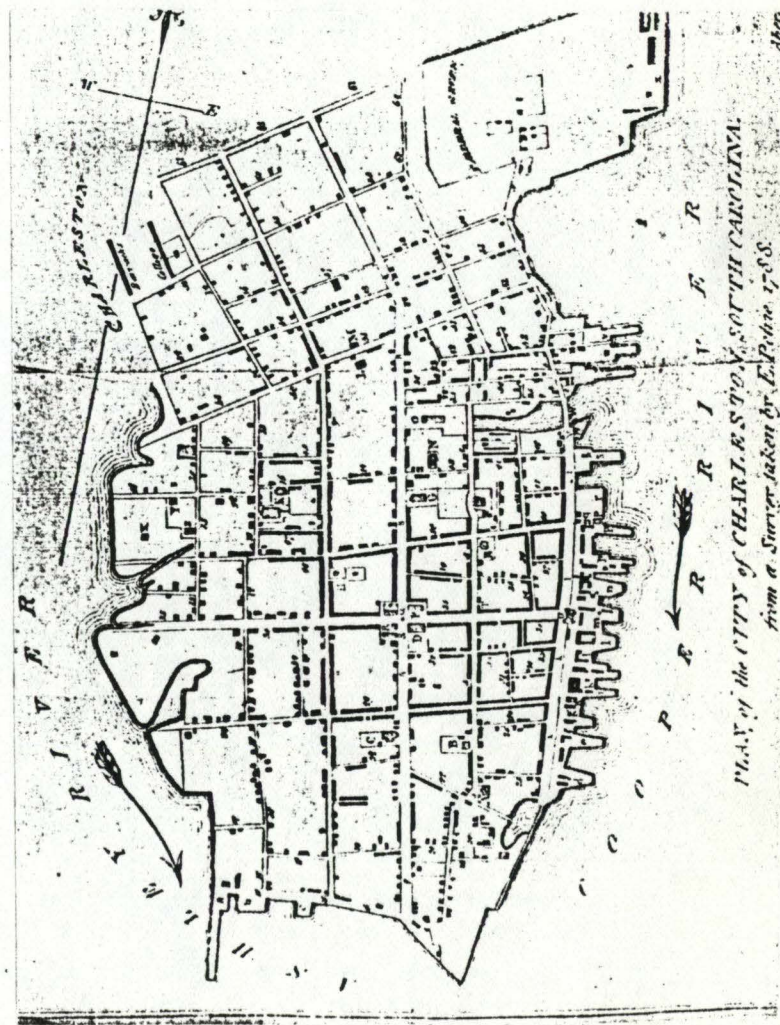


Figure I-3, Edward Crisp Survey, 1704

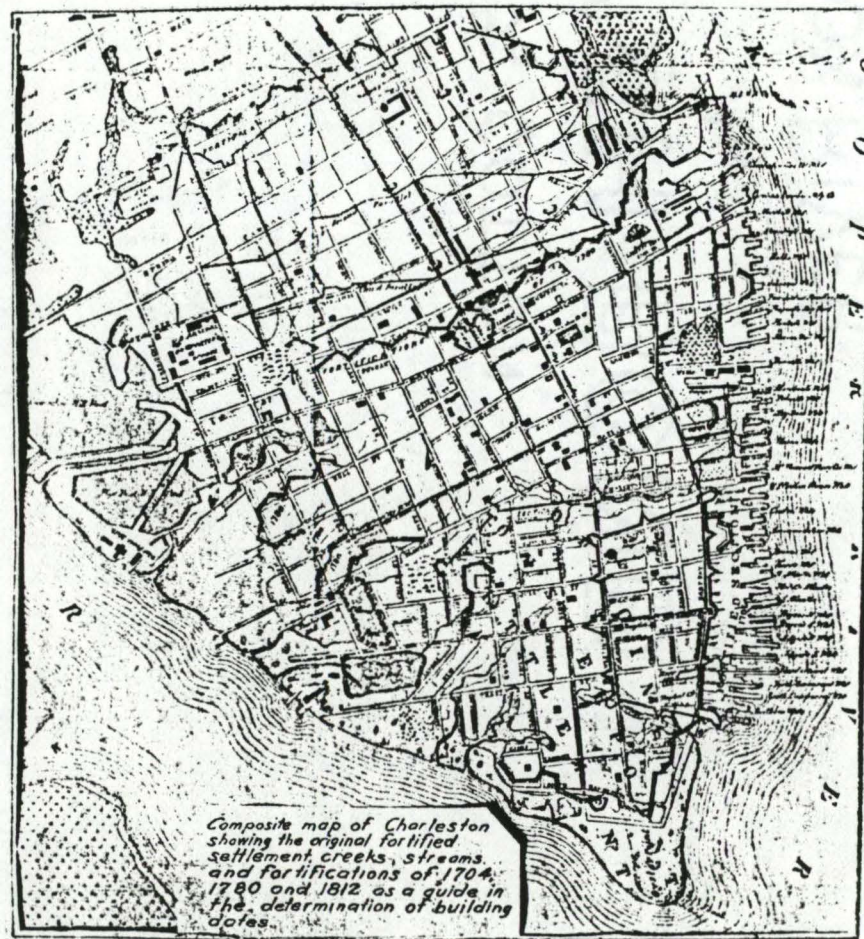
Despite these calamities, Charleston continued to grow. Much of the building during the mid-1800s was preserved due to the economic depression that occurred throughout the South after the Civil War. One critic wrote: "Much that must have been doomed by prosperity in the tasteless '70s and '80s survived the necessity to more sensible days."

It took the 20th century and the influx of tourists to bring about an economic upturn to the city of Charleston. As prosperity brought about change, preservation efforts began, but not before many noteworthy buildings gave way to new buildings or to the occasional rich tourist who would take a house with him.

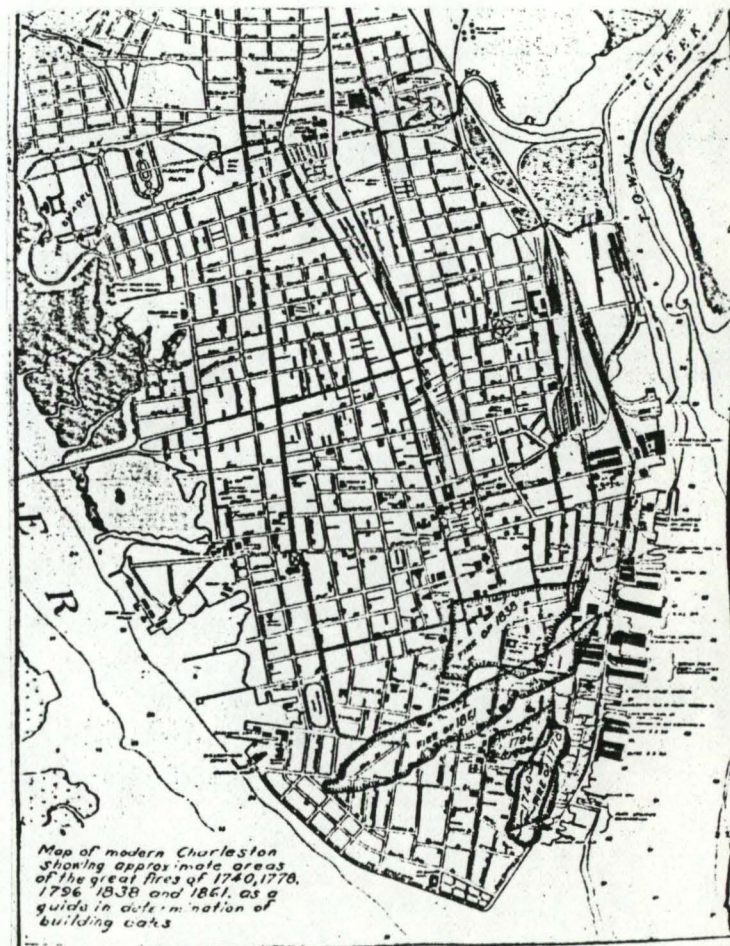
Today, the historic area of Charleston possesses a unique beauty, and its citizens take great pride in preserving this heritage. The restrictions placed on new development within Charleston reflect this sense of responsibility and an understanding of the fragileness of the built environment.



Note: All maps in this section taken from Charleston Yearbook



CHARLESTON—A COMPOSITE MAP, MADE IN 1883



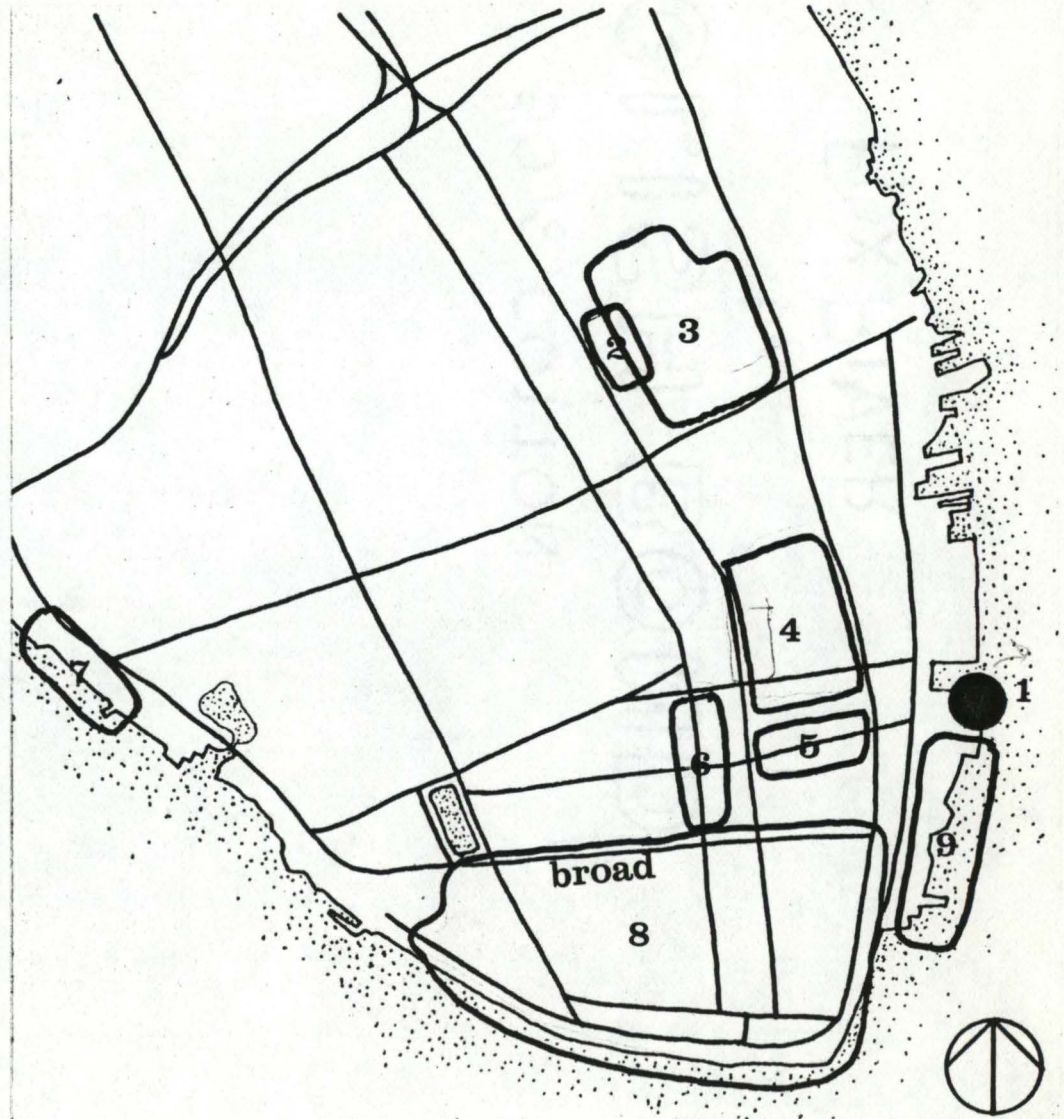
CHARLESTON THE FIRE AREAS, DRAWN IN 1925

TOURISM

Charleston has many tourist attractions. These include the Historic District, the Slave Market area, and the Battery Park. The most heavily populated tourist area is that portion of the peninsula south of Broad Street, which receives 12 to 15 thousand visitors a day in the spring and summer. The annual number of tourists visiting Charleston is now close to 2 million. As the Waterfront Park area and the Festival Marketplace are completed, these two developments will focus tourist activity on Charleston's historic waterfront and, presumably, will reduce the congestion in the adjacent residential areas.

The site for the aquarium will be at the juncture of these two areas, and consequently this facility will be expected to be a major tourist attraction.

1. Proposed aquarium site
2. Charleston Museum
3. Wraggsborough
4. Ansonborough
5. Market Area
6. Antique Row
7. Municipal Marina
8. South of Broad
9. Waterfront Park



CURRENT DIRECTIONS

Charleston's mayor, Joseph P. Riley, is the driving force behind recent changes in Charleston. He has been a supporter of the Spoleto Festival, which is one of the most comprehensive arts festivals in the world; a convention center currently under construction in the downtown area; the Waterfront Park in the formerly rundown and underused area of Charleston's waterfront; and, most recently, the Festival Marketplace.

Currently in the planning stage is a transportation and tourism center north of Calhoun Street. This facility would provide parking areas for tourists, who would transfer to public transportation, thereby reducing the number of vehicles entering the sensitive Historic District.

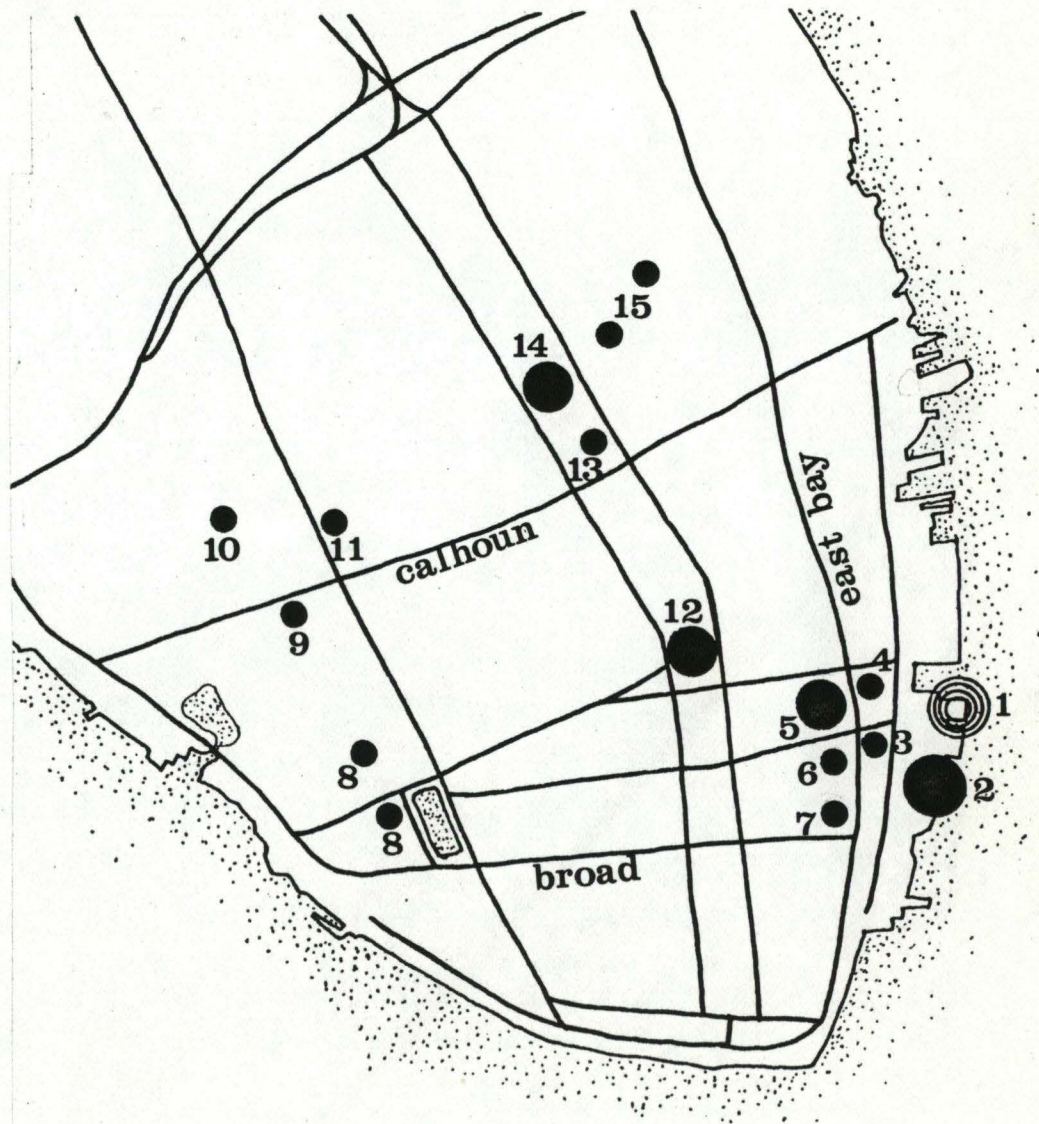
While these projects are certainly directed toward an improved Charleston with an increasing economy based on the tourist trade, this trend is not without its detractors, who are concerned that a way of life may soon be lost as a result of this growth.

CURRENT DEVELOPMENT

Currently, building development in Charleston is concentrated in a few unbuilt pockets left on the peninsula. Representative examples of this development are shown on the map to the right.

It may be noted that a good portion of this development is located near the waterfront area and adjacent to the marketplace. The location of the aquarium in this region will serve to intensify this portion of the peninsula as a major tourist center.

1. Proposed aquarium site
2. Waterfront Park
3. Office condos
4. New office renovations
5. Lodge Alley Inn
6. New restaurant
7. Bank addition
8. Residential condos
9. Ronald McDonald House
10. Children's Hospital
11. St. Francis parking
12. Convention Center
13. Parking garage
14. Transportation Center
15. Infill public housing



EMERSON
COTTON
BOX

WATERFRONT

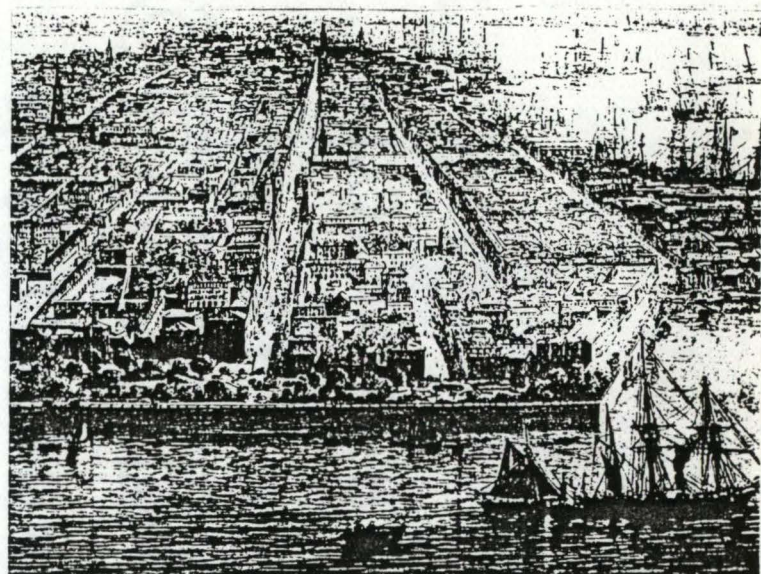
WATERFRONT HISTORY

Until this century, Charleston's waterfront had been a place of great activity, linked to battle, trade, and international influence that made Charleston a "European city," or perhaps English, by way of the West Indies.

Because of its vulnerability to attack from both land and sea, Charleston began its existence as a fortified city and remained so until the early 1700s, when the city walls were removed to allow for expansion. During the rest of the century, sea trade provided Charleston with an economic mainstay, as the city became part of the great "Atlantic highway."

Docks, wharves, markets, and warehouses lined the waterfront, supporting the shipbuilding, rope-making, artisan, and other trades. By the end of the 1700s, wharves covered the entire edge of the Cooper River from the Battery to Calhoun Street. It was an area that accepted gambling and prostitution as part of a vital economy in a city that also made church attendance mandatory.

In 1767, on the proposed site of the aquarium, Christopher Gadsden began his "Stupendous Work"-- a wharf that jugged 840 feet into the harbor and which would berth 12 ships. By the end of the 1700s, at a time when Charleston was the country's primary slave port, one could find nearly 100 ships in its harbor. Wharf-building and the prosperity associated with a vital trading activity continued into the 1800s, as steamships began to replace sailing vessels.

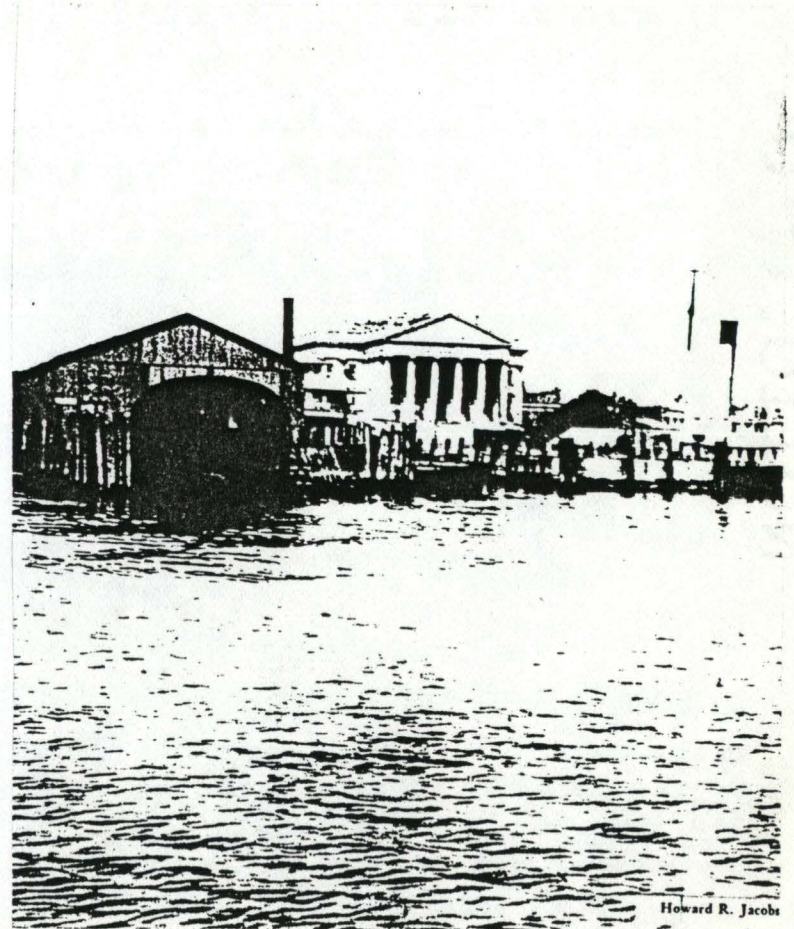


Courtesy: South Carolina Historical



Charleston suffered a great economic setback as a result of the Civil War. Although the cotton trade and other shipping commerce grew for a time after the war, the city never again regained its pre-war importance as a port, and the harbor area in particular began a period of decline.

By the early 1900s, most shipping activity had migrated to the area north of Market Street, and the docks fell into ruins due to neglect or fire. During World War II the boat shed for the Mount Pleasant Ferry, located adjacent to the historic Customs House, was replaced by the Fleet Landing Building, which was used to process servicemen returning from war. Today this building stands on the site of the proposed aquarium.



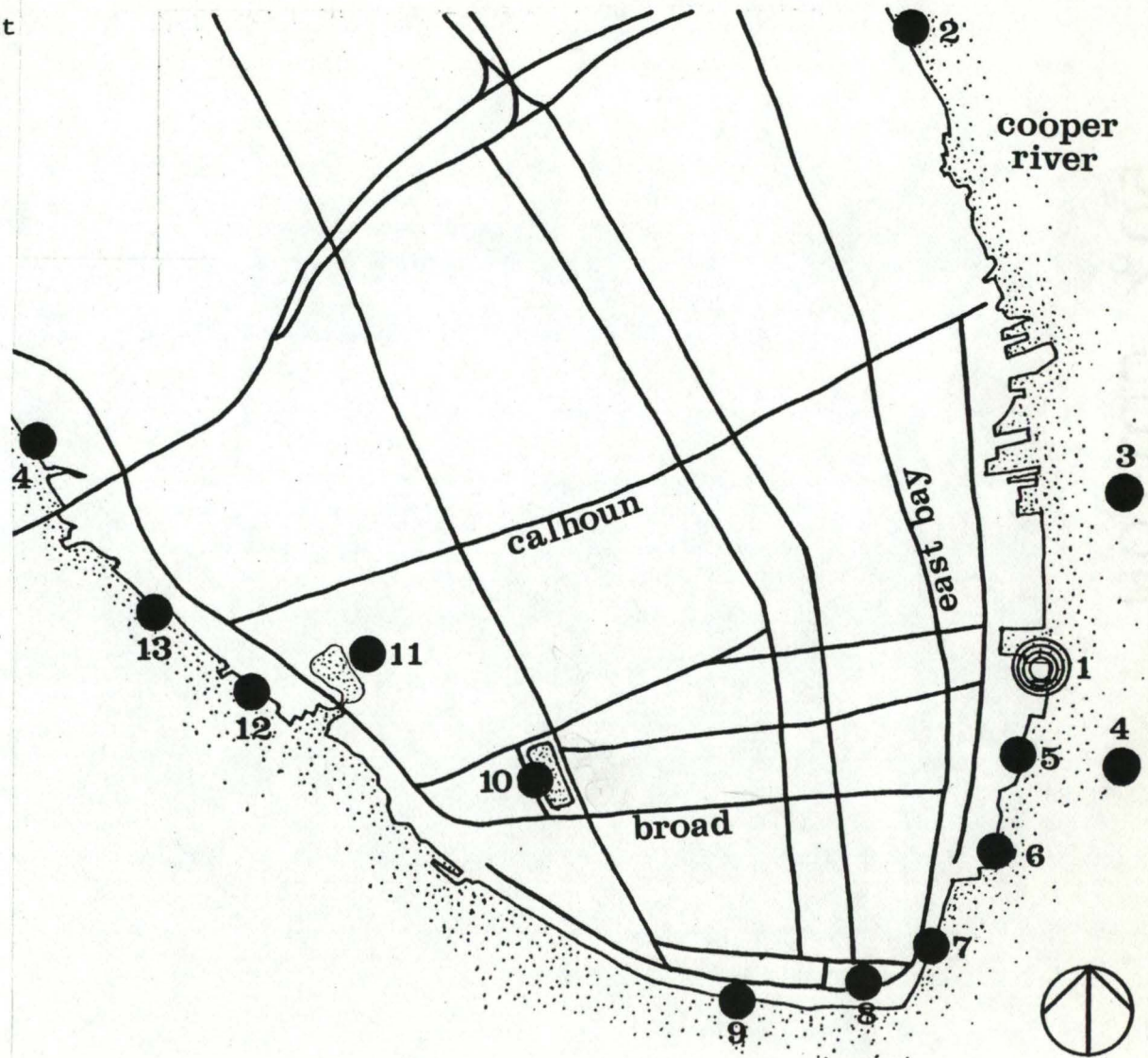
Howard R. Jacobs

Site: Early 1900's Mount Pleasant Ferry

CURRENT USES

The 20th century has seen a shift in waterfront uses from commercial to recreational in many American cities, and Charleston is no exception. However, waterfront activities have congregated more on the Ashley River side of the peninsula until well into this century because of the presence of the commercial docks on the Cooper River side. It was not until after World War II that public waterfront activities began to extend north of the Battery and across the river to Mount Pleasant. Completion of the Waterfront Park, along with the Festival Marketplace and aquarium, will greatly increase the recreational opportunities in this area.

1. Proposed aquarium site
2. Chiquita Boat Tours
3. The Yorktown
4. The beaches
5. The Waterfront Park
6. Adgers Wharf
7. Battery Promenade
8. White Point Gardens
9. Murray Boulevard Walk
10. Colonial Lake
11. "Fishing Hole"
12. Fort Sumter Tours
13. Municipal Marina
14. Rickenbacker Park

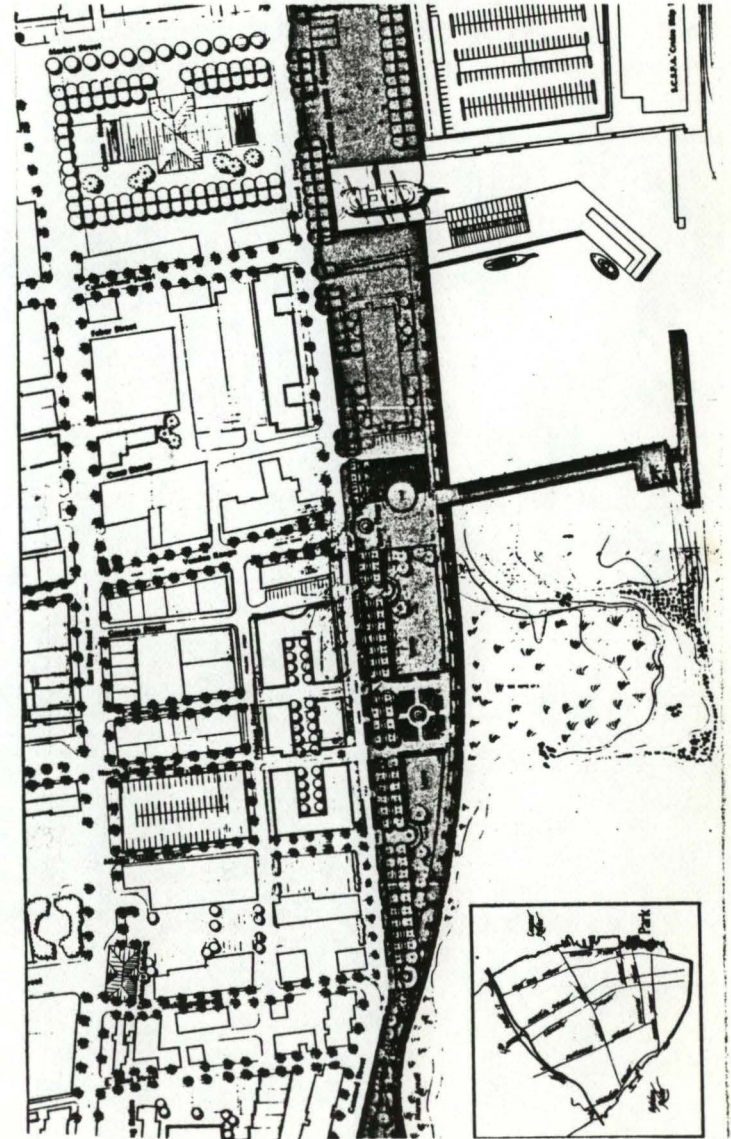


WATERFRONT PARK

Charleston's Waterfront Park, now under construction, will provide the city with 12 acres of lawns, along with a promenade, covered wharf, water walk, and fishing pier. The park will stretch 1,280 feet between the South Carolina State Ports Authority Building and the Adgers Wharf Park, and effectively link the Battery and the market area.

The Waterfront Park was designed by Sasaki and Associates, Inc., of Watertown, Mass., with Edward Pinckney Associates, Ltd., of Hilton Head, and Jacqueline T. Robertson.

Along with plans for the park, Sasaki and Associates have developed some broader urban studies for the entire waterfront area, including the area that encompasses the site for this project.

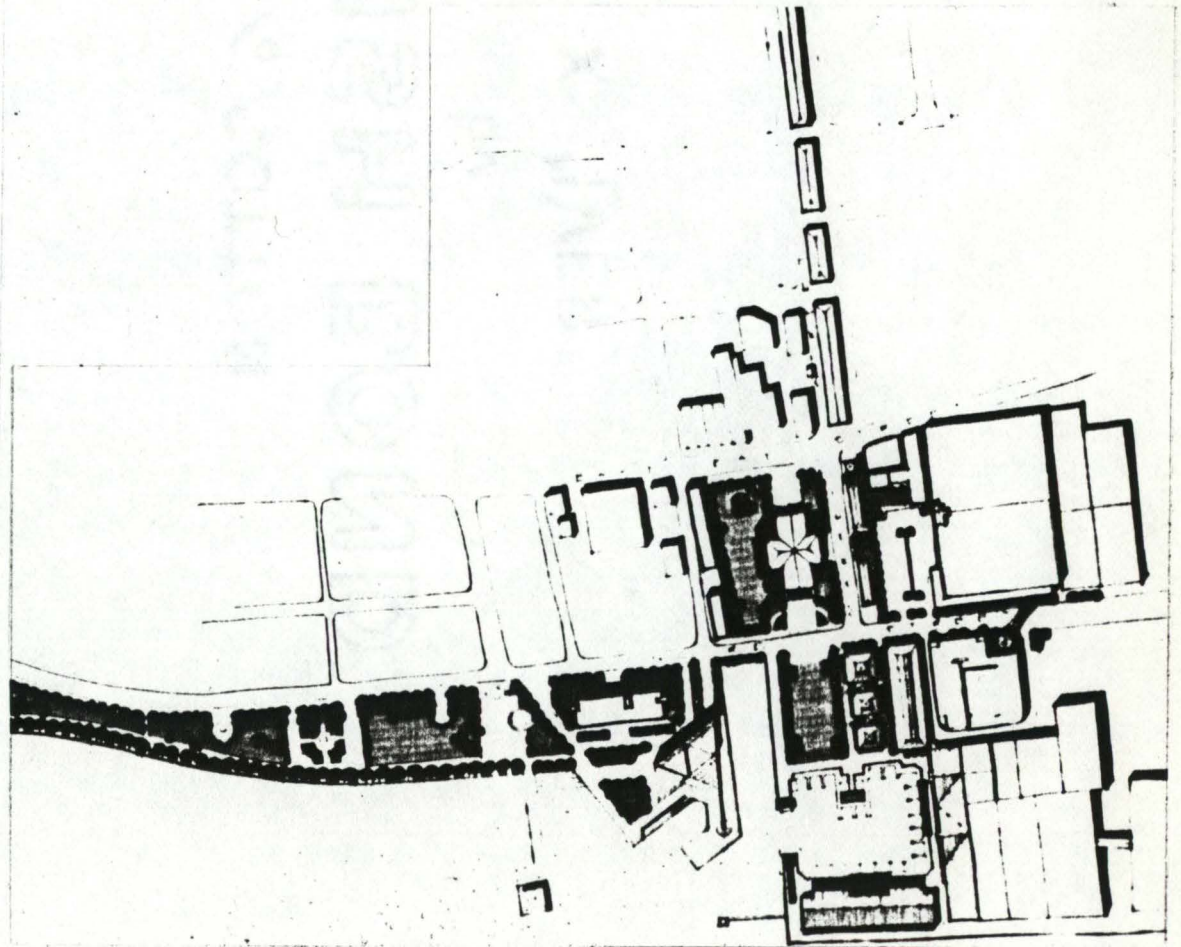


FESTIVAL MARKETPLACE

* Private developers are considering the development of a "Festival Marketplace" at the terminus of Market Street on the Cooper River, just north of the Waterfront Park and the proposed aquarium site.

The Marketplace would adapt the present Ports Authority passenger terminal for the use of shops and restaurants. The project would also include a plaza in front of the Customs House and a marina which would berth approximately 45 boats on a short-term basis.

A Tall Ship is being considered for the existing terminal inlet. Parking would be provided by an adjacent 400-car garage.



NEWMAN PROJECT

Joel Newman, March 1982, developed a proposal for Charleston's Market Basin, the site of the current proposal for the Festival Marketplace, as his terminal project. Elements in this proposal included a hotel, marina, parking structure, and plaza. Portions of Mr. Newman's project have been included in the aquarium study.

BRIGFIEDH BOMAB

FOR JOLLOM

FOR CIVIL

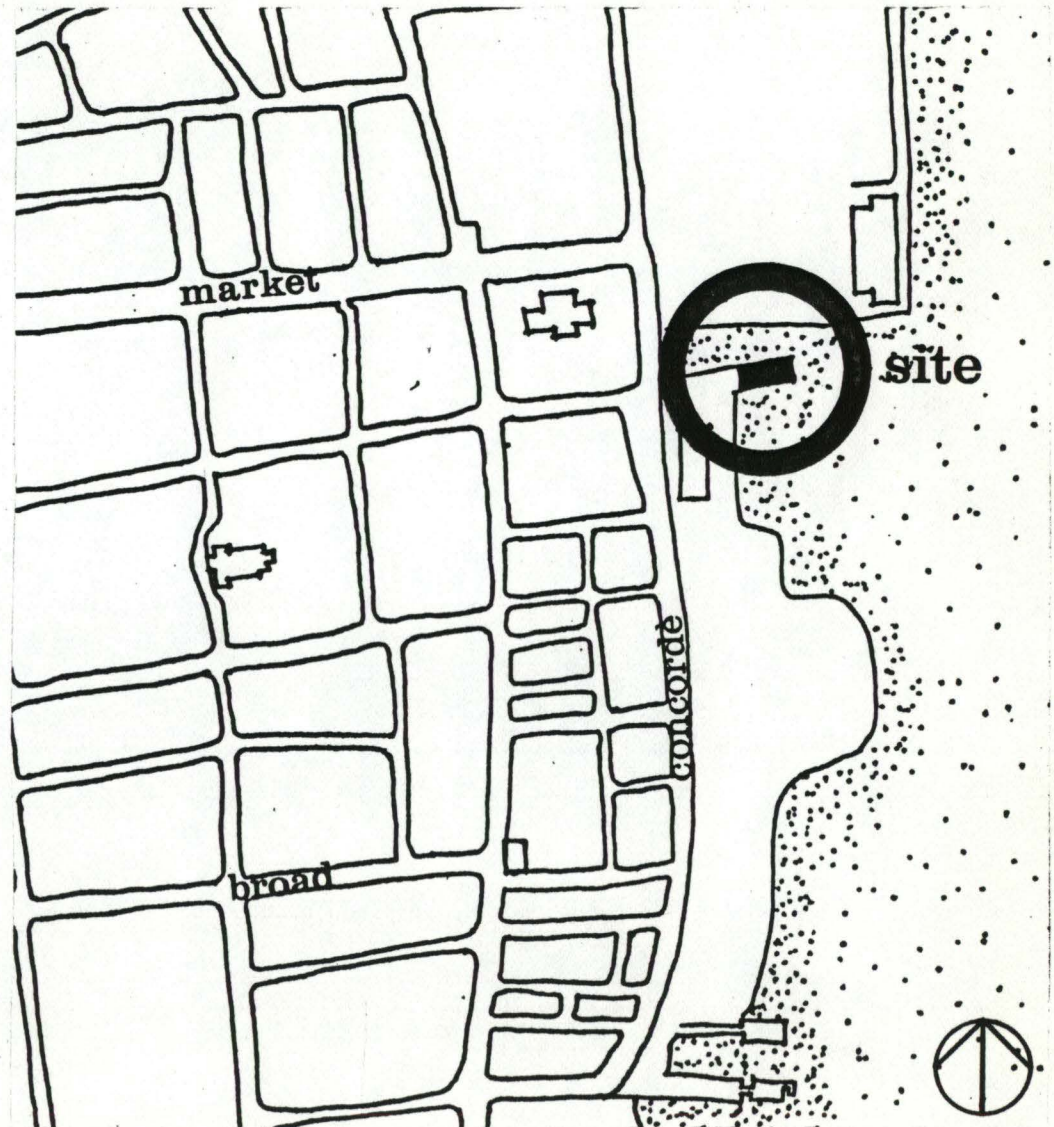
SITE ANALYSIS

THE SITE

The proposed aquarium site is located in the southeast section of Charleston's Historic District. It lies along the Cooper River between the Ports Authority cruise terminal and office building.

The site is a pier that juts out into the harbor and which currently is occupied by the Fleet Landing Building, a structure which dates from the time of World War II.

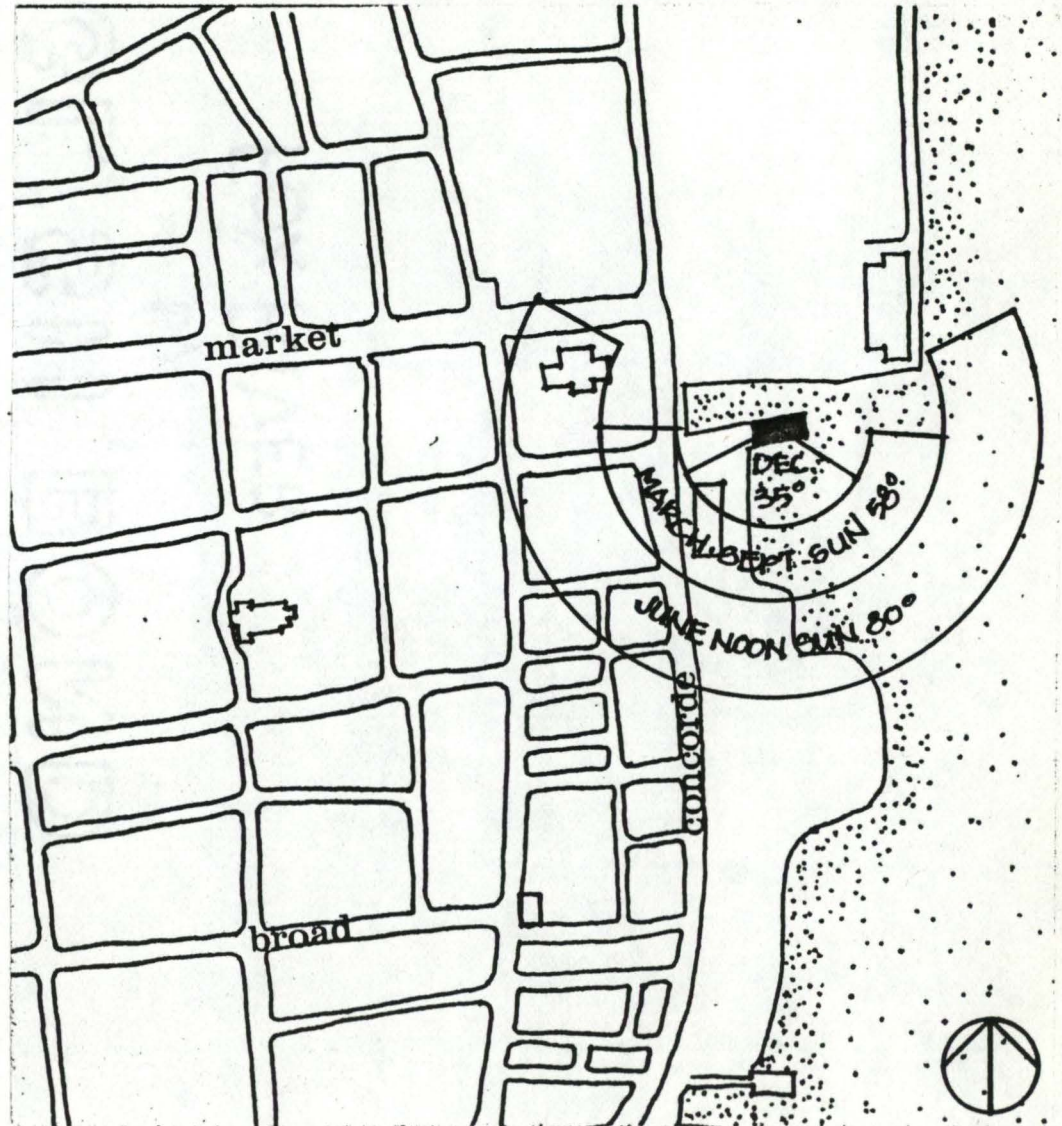
The following maps further analyze and describe the proposed site.



CLIMATE

Charleston lies in a subtropical climate that experiences a great deal of heat and humidity during the summer months. Since the site receives full solar exposure, protecting the pedestrian from the sun will become a design factor.

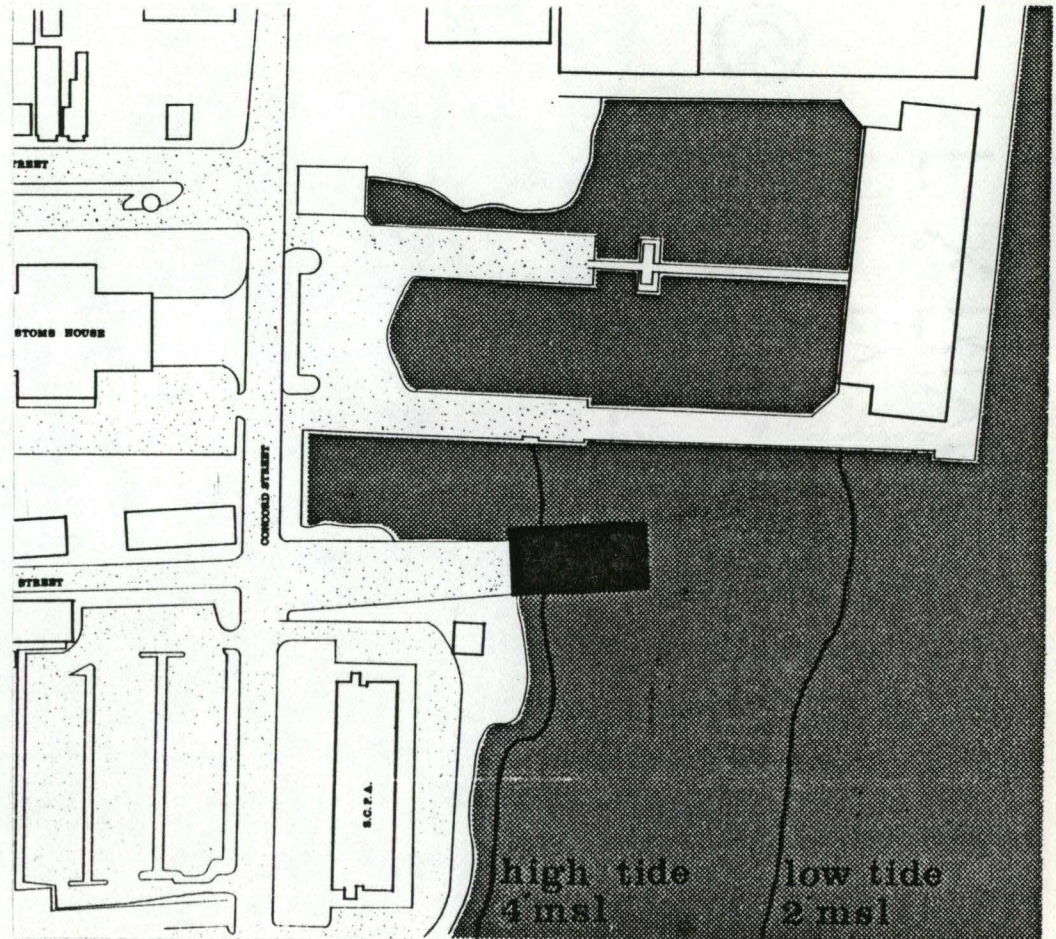
Since the average temperature is 65 degrees with 330 frost-free days a year, reducing the cooling load will be far more important than heating.



WATER

Perhaps the most significant environmental aspect of this site is its relationship to the surrounding water. The site, as well as all of peninsular Charleston, lies in a riverine flood plain with an average of six feet rise in the water level during the course of the day.

The water quality is polluted, precluding its use in any of the life-support systems that occur within the aquarium.

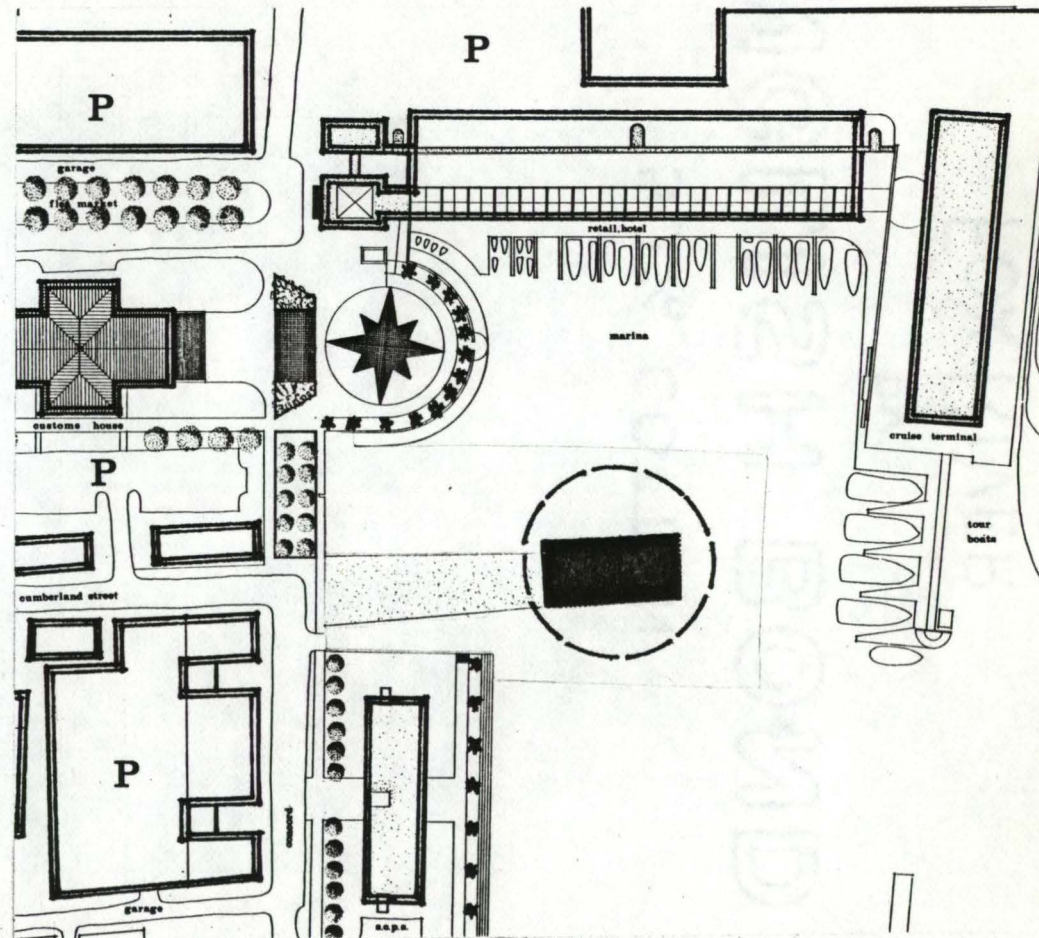


LAND USE

This area of peninsular Charleston is currently undergoing a great deal of development and growth. Various new projects are either in the process of construction or on the drawing board.

This map outlines the projected growth for this area as well as incorporating Mr. Newman's proposal and parts of the Festival Marketplace plans. These plans become the background for the Charleston Aquarium.

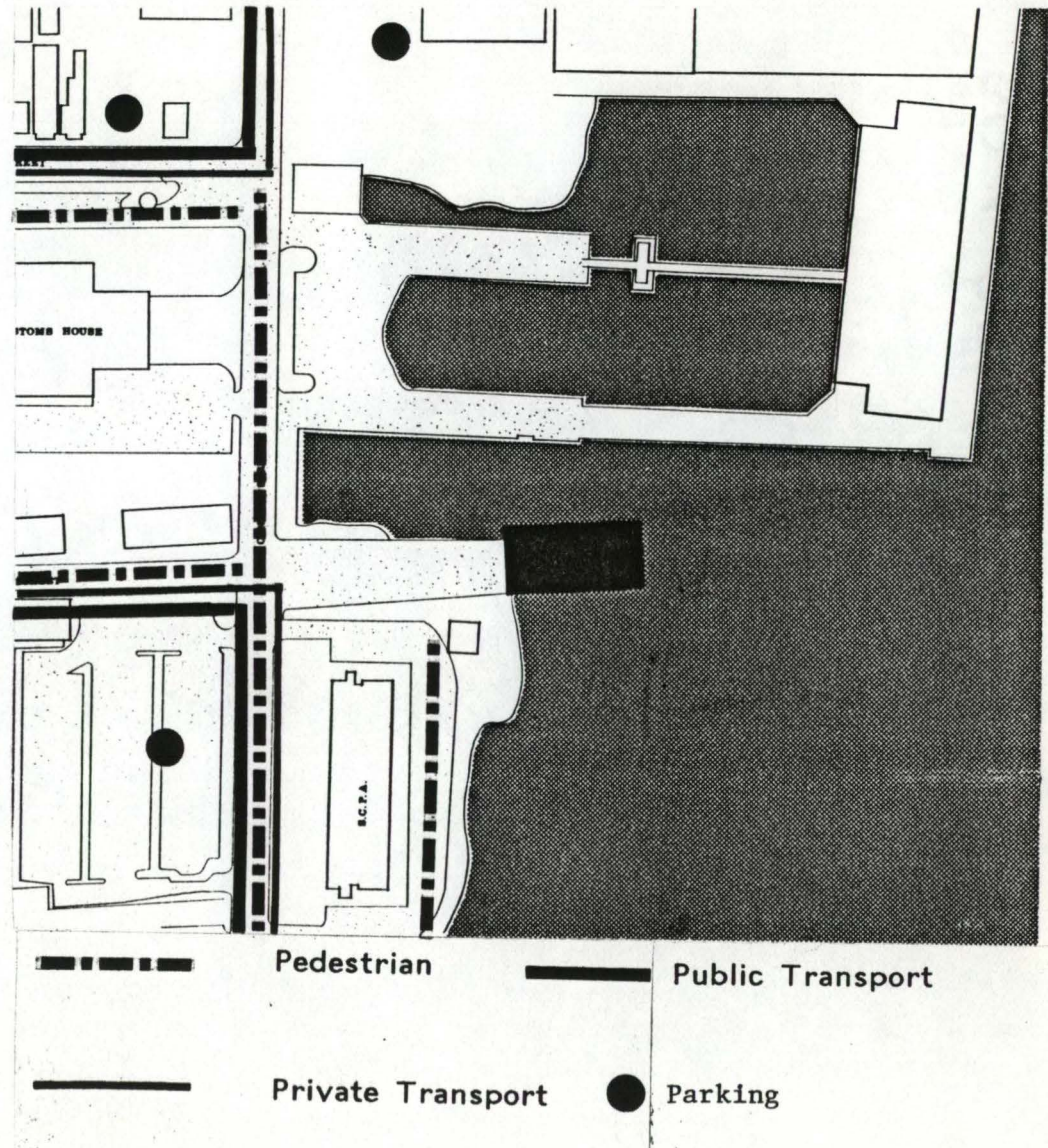
1. Parking-existing
2. Parking-under construction
3. Parking-proposed by Newman
4. Hotel & Retail-proposed by Newman
5. Cruise Terminal-existing
6. Tour Boats-proposed by Newman
7. Plaza-proposed by Newman
8. Two-story Offices-existing
9. Office Building-existing
10. Waterfront Park extension-proposed by Shade



MOVEMENT

At present there is little vehicular or pedestrian traffic in the area of this site. However, with the Waterfront Park construction and the introduction of a Festival Marketplace, a strong north-south circulation axis will be established. The site is at the juncture of this axis and a potentially well-traveled street.

Parking for the aquarium will be handled off-site in the two parking garages shown at right. The future completion of a visitor/transportation center north of Calhoun Street will serve to emphasize the use of public transport to this and other tourist sites.

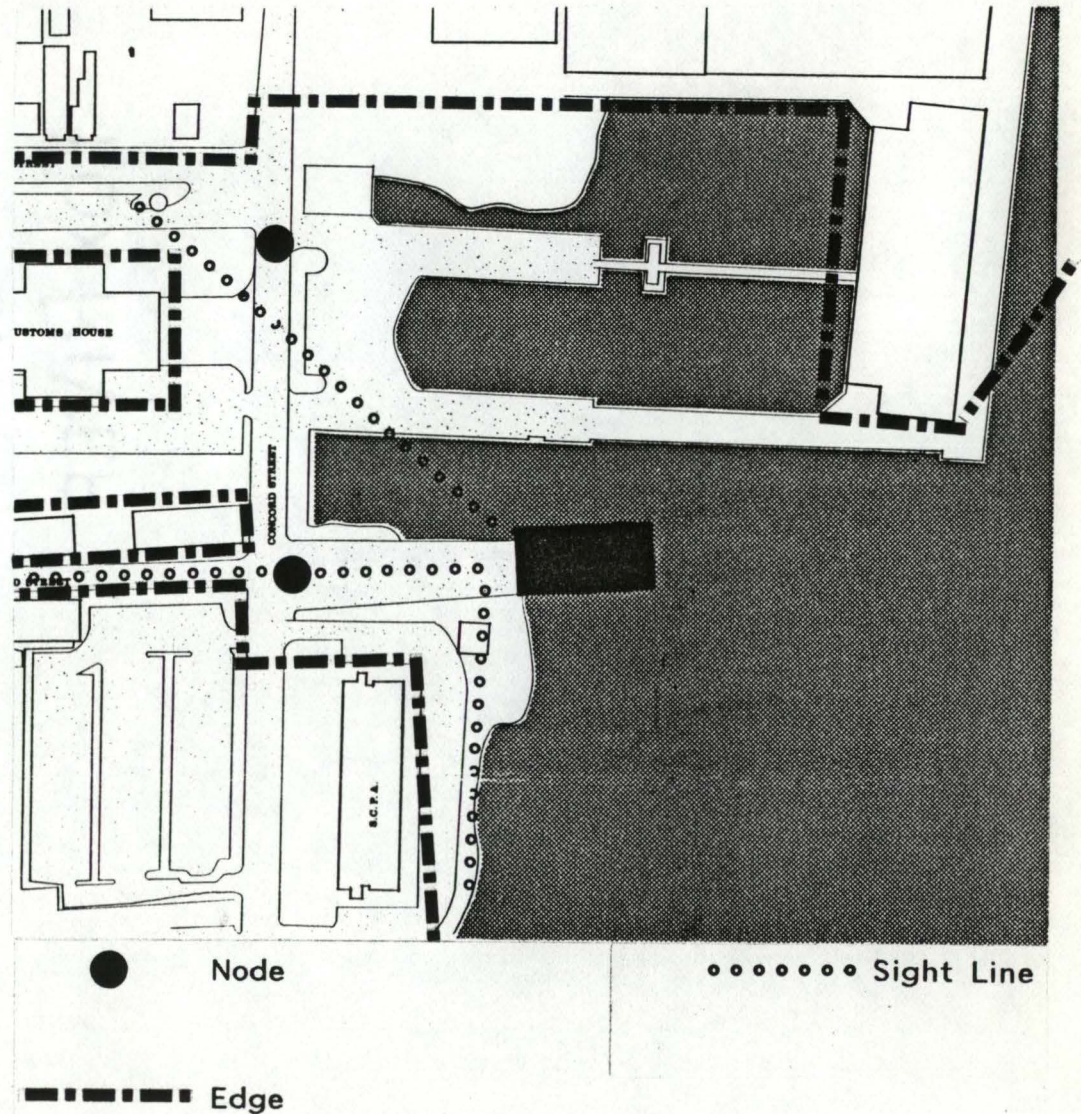


ACTIVITIES · NODES · EDGES

The site is especially important to the overall fabric of the waterfront area. It is one of the last few open spaces in a city with an intricate pattern of density that has left few open vistas. The site marks a gateway into a tranquil dialogue with the water, beginning with the Waterfront Park and ending with the White Point Gardens and the Battery.

Existing buildings and those planned for this area already create an edge that surrounds a proposed marina. Any structure placed on the proposed site will begin to form a fourth edge to this "outdoor room," enclosing the existing vista to the Atlantic and providing a backdrop to any development coming into this area. From the Slave Market, one's eye is drawn out to the Atlantic and the aquarium site.

Two areas begin to form activity nodes or areas where activities/movement will congest—one at the base of Market Street and one in front of the aquarium site. These provide opportunities to develop plazas/congregation areas for visitors.

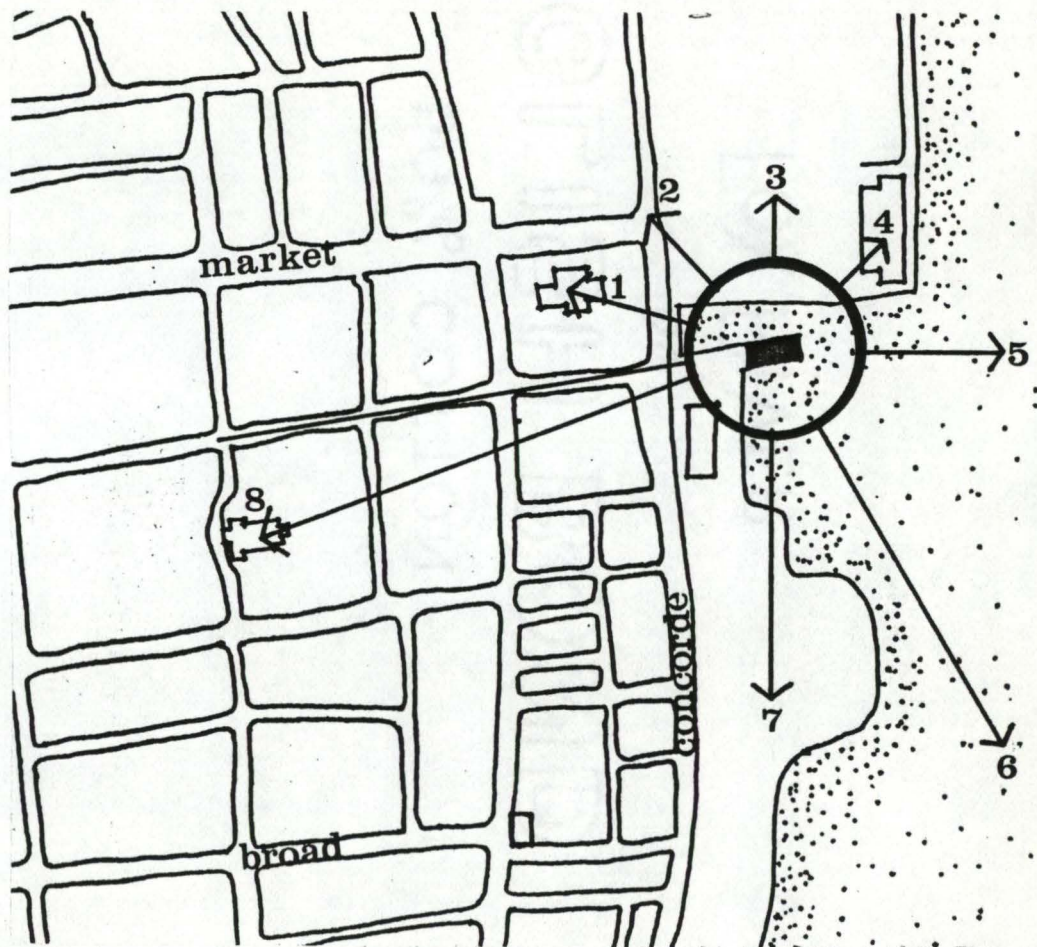


VIEWS · LANDMARKS

The construction of the Festival Marketplace will provide a visitor to the aquarium with a short-range view of urban waterfront pageantry, while long-range views of greater tranquility will extend down the Waterfront Park and out to Mount Pleasant and the ocean.

A nearby landmark is the Customs House, while three blocks away the spire of St. Philip's rises out of the Charleston roofscape.

1. Customs House
2. Market area
3. Proposed marina and Festival Marketplace
4. Ports Authority cruise terminal
5. Proposed tourboats and Yorktown aircraft carrier
6. Atlantic Ocean and Fort Sumter
7. Waterfront Park (under construction)
8. St. Philip's Church



FOX BIVIER
PA
THE MICHIGAN BIRD BANDING
BOB COLLIER

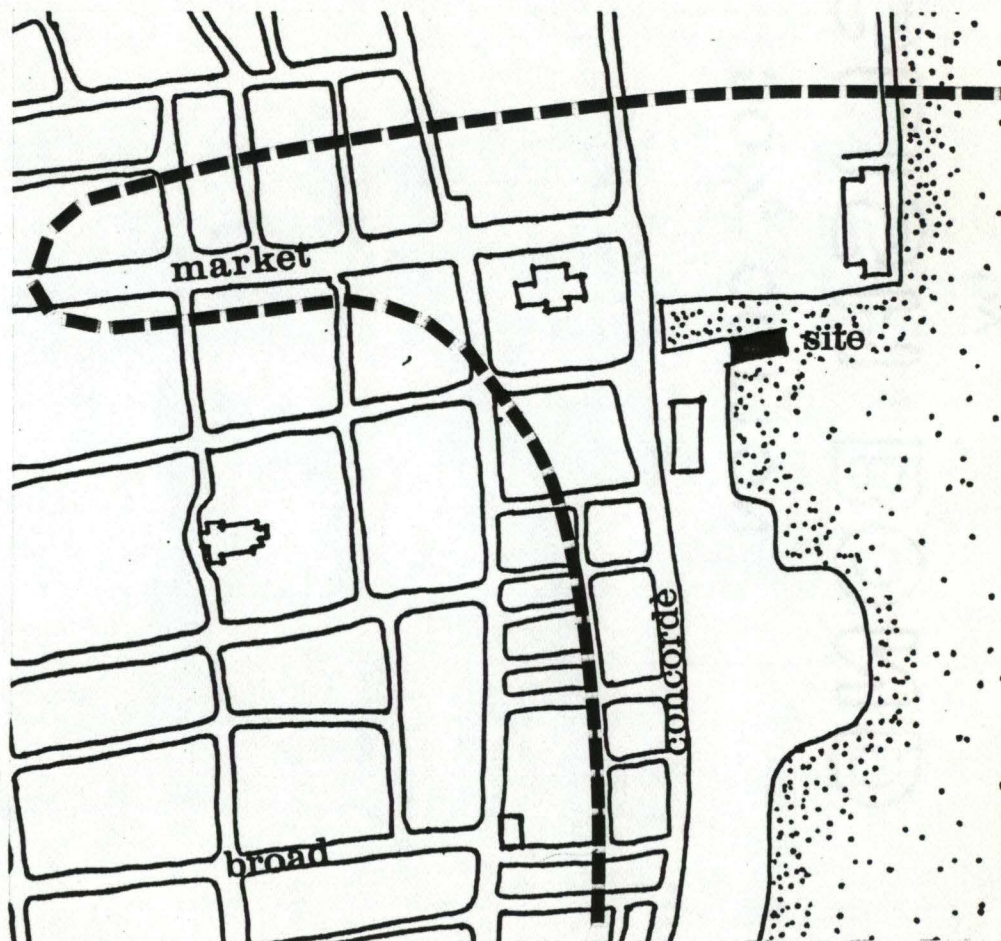
CONTEXT

LIMIT OF CONTEXT

The area of Charleston which will have a direct influence on the character of the aquarium is generally defined by the limit of context line shown on the map to the right. The previously described Waterfront Park and Festival Marketplace relate directly to the building site, while a lesser but still important influence is cast by the Market Street region.

The aquarium will necessarily mark the transition between water and land, and it will need to reflect the character of the park as well as the adjacent buildings on Concord Street.

While the aquarium will be prominent in its location jutting out from the park area, it may easily be dwarfed by the rather ponderous Greek Revival Customs House immediately behind it.



NOTES OF

EMILIO B. BROWN

4

1917

NOTES OF

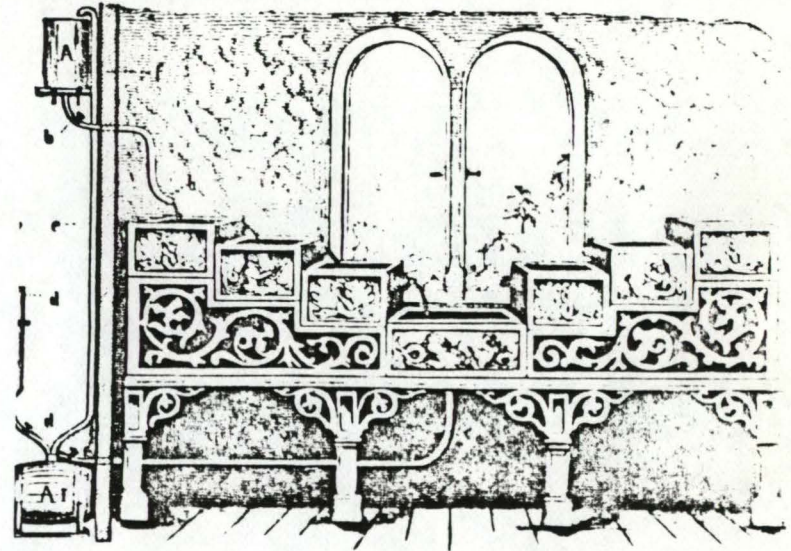
CASE STUDIES

HISTORY OF BUILDING TYPE

Although the Chinese kept domestic goldfish as exotic pets over 1,000 years ago, it was not until the Industrial Revolution that the types of life-support systems needed for an aquarium were developed. These systems provided just the right amount of oxygen, light, and heat to sustain aquatic life. By the mid-1800s, experimentation was being done with both fresh- and salt-water aquaria.

The first public aquarium opened in the Zoological Society of London in 1853, and soon this type of facility appeared in numerous countries. New York and Boston were the first two cities to have aquariums in the United States. These early buildings usually contained rows and rows of small tanks, such as children might have today. It would be some time before systems for adding oxygen were sophisticated enough to support the large tanks needed to simulate a natural environment. Once this technology was available, it became very popular to create grotto-like settings for the display of fish and to exploit the potential of glass. During the 1867 Exposition in Paris, the ceiling of a public space in an aquarium was the transparent bottom of a large fish tank.

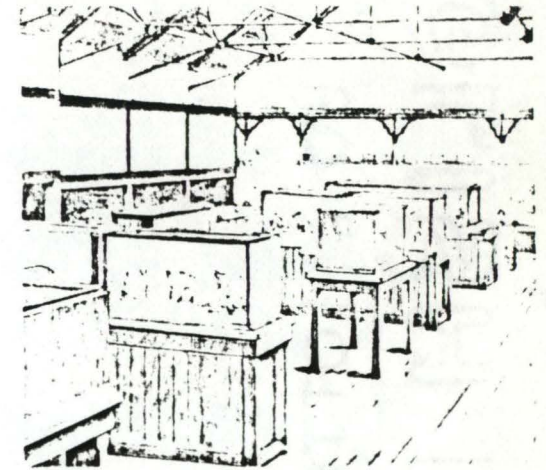
The architecture of aquariums on the continent of Europe at this time reflected a taste for ornamentation and classic forms, a trend not followed in Britain. According to a contemporary quote by Ruskin, "buildings for scientific purposes should be plain and useful in all things, in appearance as in fact." The British did indeed design plain buildings to house their aquariums; both the aquarium at Brighton and the London Royal Aquarium are examples of this aesthetic.



By the turn of the century it was generally an established idea that aquariums were primarily for research. This opinion continues today and, with an increasingly more sophisticated visitor, it should prevail in the future.

While the architecture of Continental museums continued along traditional lines, and the English pursued a utilitarian approach, Scandinavia sought to interpret this building type in terms of modern architecture. This was evidenced in both Danish and Norwegian aquariums constructed in the 1930s.

The aquaria of today take on a variety of architectural forms, with an emphasis on creative internal environments that describe the entire context of marine life and its relation to man. An example of this is the Baltimore Aquarium. Many facilities attempt to relate closely to regional environments, as in the case of the Seattle Aquarium.



London Zoo has pioneered a wealth of innovations, including the first public marine aquarium in the world, opened at its gardens in 1853.

OVERVIEW

Numerous aquariums were studied in the course of this project. In most cases there seemed to be little connection between the size of the aquarium and the size of the city it served. While many older aquariums were built out of civic pride or to educate their citizens, the issue is primarily one of an economic nature. Today they must support themselves and contribute to the economy of their community. Many recent aquariums have been included in the plans for a major waterfront revitalization, as is the case with Charleston.

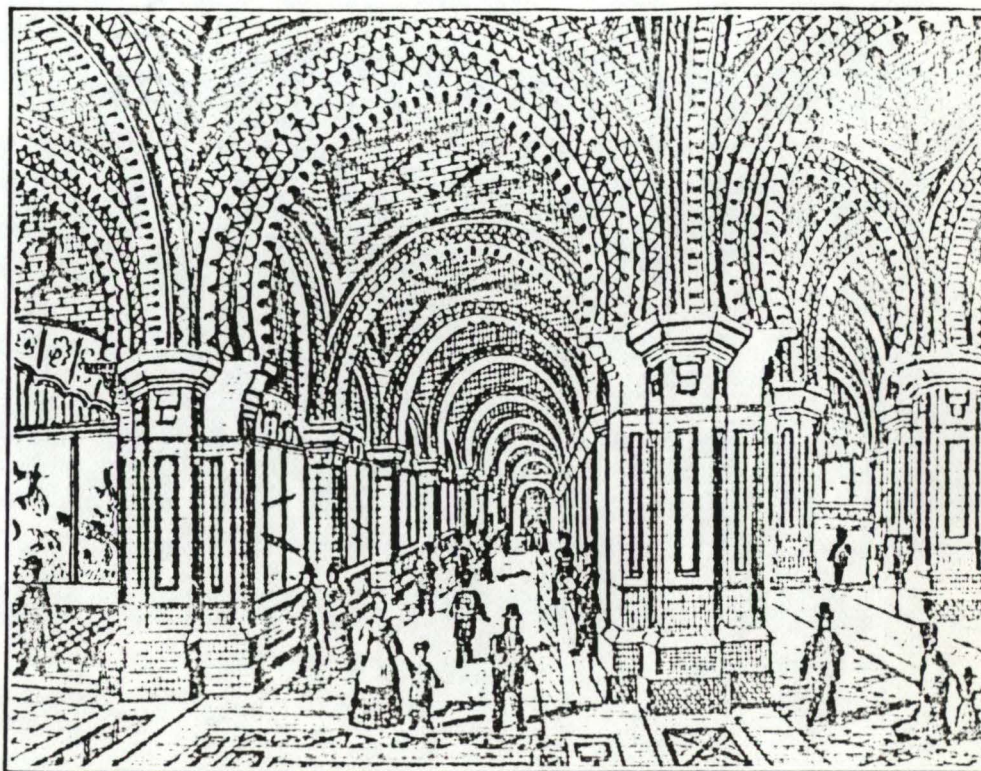
The following is a brief overview of the size characteristics of several aquariums, followed by critical examination of certain facilities.

	Exhibit Space (sq. ft.)	Support Space (sq. ft.)	Total Space (sq. ft.)	Stories
Baltimore Aquarium	52,005	63,872	115,877	6
Boston Aquarium			63,800±	4
New York Aquarium	59,950	55,000	105,950	Indoor/outdoor
Cleveland Aquarium	11,000±	7,160±	18,160	1
Seattle Aquarium	24,799	24,000±	49,000	2
Basel Aquarium			35,400±	2
Washington Aquarium			187,930	2+
Oceanarium (San Pablo)			52,375±	
Nagasaki Aquarium			45,500±	

In those cases where plus-or-minus figures are shown, the statistics were taken by measuring drawings that accompanied articles about these aquariums. Where a breakdown of exhibit and support space is not shown, these figures run fairly equal but could not be scaled from the reduced drawings.

BRIGHTON

In 1877, at a cost of 111,000 pounds, the aquarium at Brighton was completed. It covered $2\frac{1}{4}$ acres and was lit by 16,000 gas jets. One of the tanks was the largest in the world--36 feet square and 9 feet deep. Its fame, however, was of brief duration, and the aquarium closed after only four years. The building was later adapted for several other uses, including a swimming bath, theater, skating rink, and zoo. The building was eventually abandoned at the beginning of this century.



BALTIMORE

The Baltimore Aquarium is the primary case study for this project. Designed by the architectural firm of Cambridge Seven, of Boston, it is located within the waterfront development of Baltimore's inner harbor. The building has attracted large numbers of people since its opening and has been so successful that it had to be refurbished after only five months of use. It has also proved to be economically sound, returning over \$1 million in profits in its first year of operation. Information obtained from a tour of this facility with the Chief Engineer has played an important role in the development of this project.

Features of the Baltimore Aquarium:

USE OF WATER

- pools
- moving
- sculpture

USE OF SOUND

- animal
- water

USE OF NEON

USE OF SKELETONS

LIGHT AND COLOR

- as people movers

CIRCULATION

- as a form determinant

NAUTICAL IMAGES

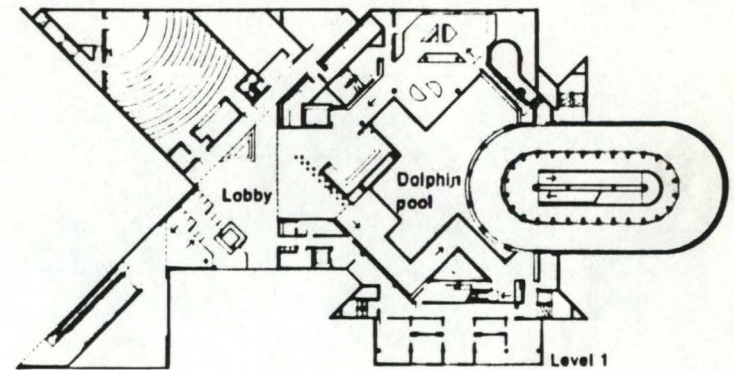
WHARF LOCATION

HINTS

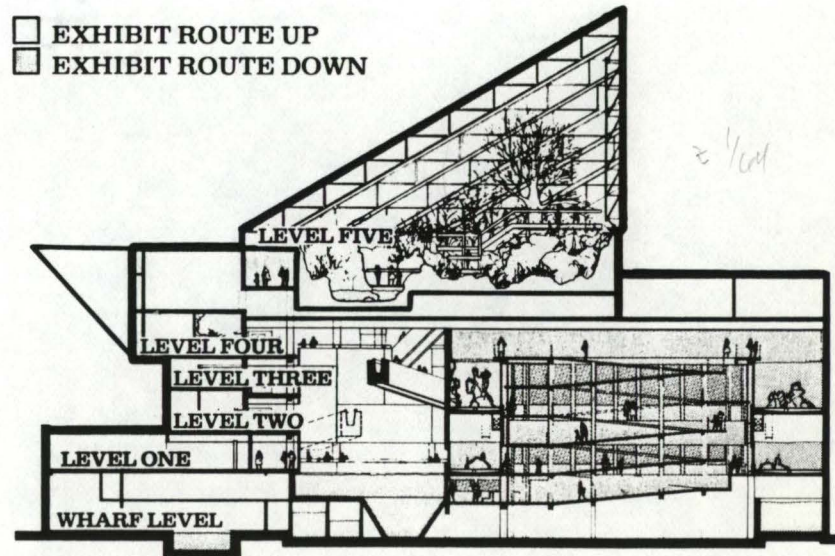
- of things to come

INTERIOR ORIENTATION

- cut off from outside
- central orientation point



- EXHIBIT ROUTE UP
- EXHIBIT ROUTE DOWN

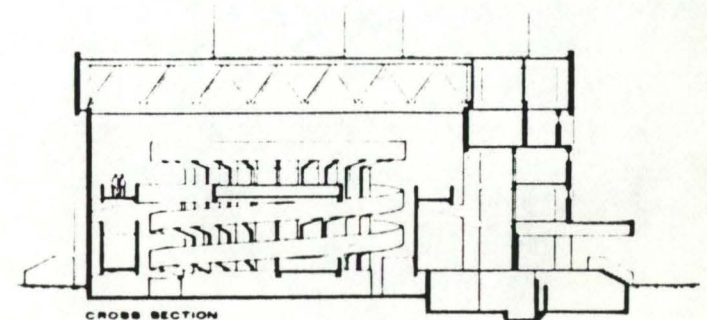
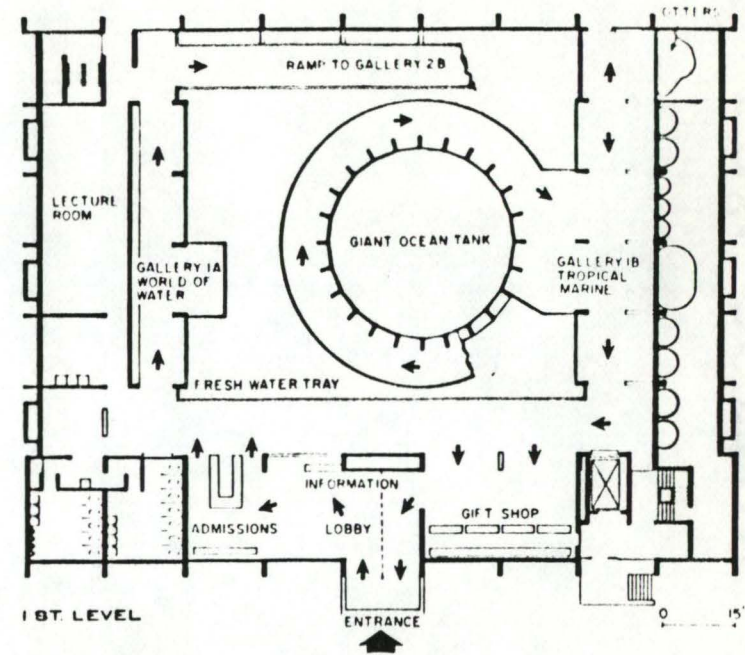


BOSTON

The Boston Aquarium also was designed by the Cambridge Seven firm. It preceded the Baltimore facility by several years and is a simpler and smaller facility. It was a highly innovative building for its time, influential in its impact on subsequent aquarium planning. The building has a major central space that serves to orient the visitor. Ramps circulate around the perimeter of the exhibits and gradually lead to the fourth floor, where one descends a spiral ramp around the major central tank. The exterior expression is one of a neutral concrete container.

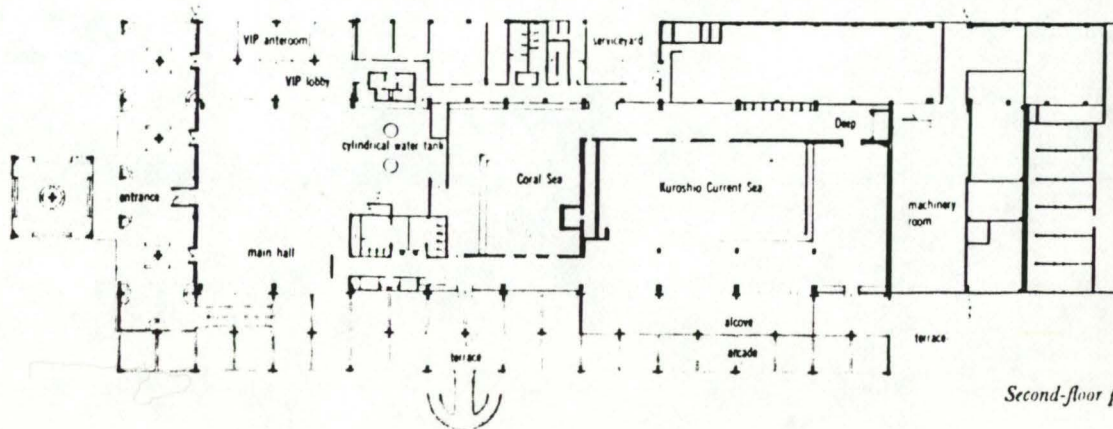
Features of this aquarium include:

- LARGE CENTRAL SPACE
 - orientation space
 - relates to vastness of sea
- SPIRAL PATH
- CENTRAL MAIN TANK
- RECTILINEAR
- MURALS
- REFLECTIVE CEILING
 - for underwater effect
- CONCRETE
 - corrosion resistant



OKINAWA

The Okinawa Aquarium is of a more formal aesthetic nature than most American aquariums. A double row of high arches lines one side of the building and acts as both a sun and wind protector. The pattern of these arches seems to recall the image of waves approaching a shore. In the interior, alcoves are provided in which to pause and contemplate the particular marine life while one is soothed by background music. The building is on a rectilinear grid, recalling traditional Japanese architecture. From the large tank that houses 8,000 fish to the smaller, more specific exhibits on the perimeter, there is a constant re-emphasis of the vastness of the sea and its interrelationships.



Second-floor plan.

SEATTLE

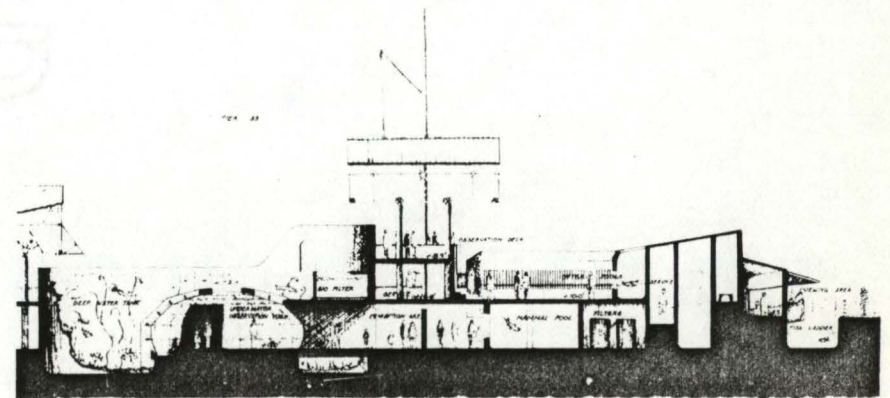
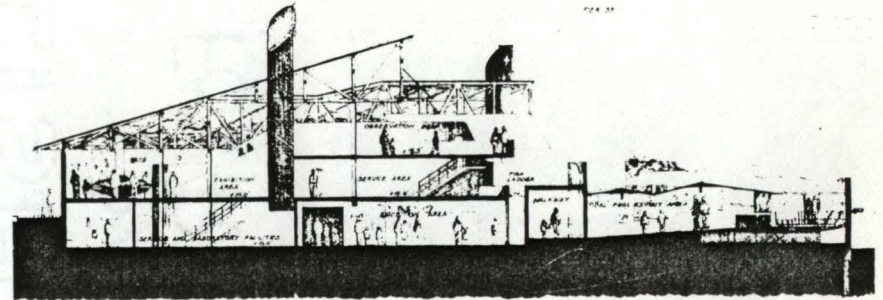
The Seattle Aquarium was designed by Kramer, Chin & Mayo, with Fred Bassetti & Co. as project architect.

Of the aquariums studied, Seattle's most closely parallels the size and scope of one which might be built in Charleston. Situated on the waterfront, it is a restoration of and addition to an existing structure. Its architecture--a vernacular one--follows the general waterfront theme, which harkens of ships and their close relationship with Seattle. The aquarium is accessible via a well-known waterfront market, Pike's Place, and is a vital part of the downtown economy.

One of its most unusual features is an underwater room, entirely of glass, which provides the visitor with a 360° view of the fish. Another is a salmon ladder that is accessible during the season when the salmon are running.

The theme of the building itself follows the storyline concept, emphasizing regional marine life. It provides a large public education facility as well as a bookstore to enhance understanding of the marine environment. Throughout the aquarium, themes are introduced and fully developed in order to provide a firm understanding of the environment, not just to titillate or entertain. Emphasis also is placed on the interrelationships and the common threads, such as water support, that run through all aspects of marine life.

The storyline for the Seattle Aquarium served as a basis for the storyline which was used in the design of this project, and which is explained in greater detail elsewhere in this manuscript.



SUMMARY OF CASE STUDIES

In summary, there are many lessons to be learned from these case studies.

First, in the choice of theme and in the scope of the project itself (something that goes beyond mere square footages), it becomes evident that in a small aquarium one could easily try to cover too broad an area of marine science in choosing the general scope of the project. For this reason I have chosen, as many case studies did, to emphasize regional marine life, native to South Carolina and adjoining areas.

Case studies also laid the groundwork for determining the relationship between the space requirements of the exhibits and of the support functions--the goal, of course, being the maximum amount of exhibit space. This is further elaborated in the next section of this manuscript.

As to design itself, there are several lessons to be learned from these case studies. Simplicity and order appeared in many of the aquariums, providing ease of circulation as well as enhancing one's sense of space. The design also served as a neutral backdrop to the real ornamentation--the specimens themselves. In many cases, open central spaces provided orientation and also gave a small aquarium the sense of being much larger.]

All of these design elements could enhance an aquarium in Charleston.

AN AQUARIUM

DRAP COLLON

PROFITABLE BOMB

PA

FOX FIVER

The miracle of life defies the universal law of
degradation ...

--Jacques Cousteau

THE STORYLINE

This aquarium will emphasize the marine environment of South Carolina with special emphasis on that in the Charleston area. It should both educate and entertain, and have the potential for future expansion in the area of research.

The building will be organized along the storyline concept. This method is not unlike the organization of a book. It has a beginning, a middle, an end, and is defined by an overall order. As visitors move through the aquarium, they are aware of a purpose, a path through the aquarium that provides information in a logical and organized manner.

In addition to permanent displays of the local environment and the marine species that inhabit it, there will also be the opportunity for temporary exhibits dealing with topical aspects of sea life.

The storyline of the Charleston Aquarium is as follows:

BEGINNING MARINE ENVIRONMENTS

DEVELOPMENT TANKED FISH/DEEPSEA FISH

CLIMAX SHARK TANK

RELEASE SWAMP AREA

CONCLUSION MAN AND THE SEA

Exhibits will alternate between those that are active, with participation (hands-on, questions and answers) and those more passive, such as resting spots in which to sit and watch fish.

ACTIVE . . . PASSIVE . . . ACTIVE . . . PASSIVE . . . ACTIVE

ACTIVITIES

Activities in this aquarium can be broken down into two main categories:

- Exhibit - Public
- Support - Private

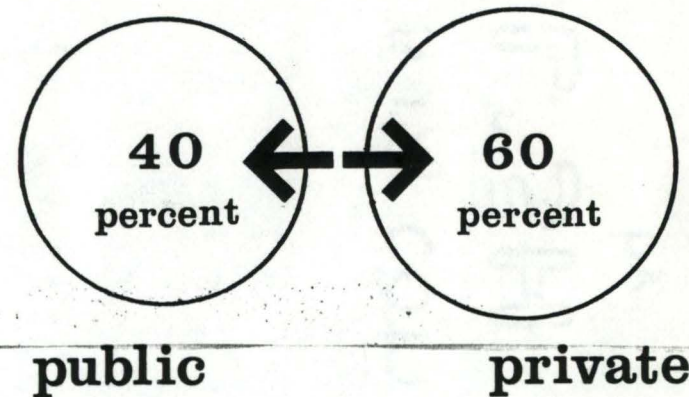
Based on case studies and other research, the ratio of public to private spaces will be approximately 40% vs. 60%.

Public spaces:

- exhibit spaces
- auditorium
- lobby
- gift shop
- public restrooms

Private spaces:

- administration
- mechanical
- holding
- backup
- maintenance
- shop and design studio
- quarantine
- specimen shipping and receiving
- food preparation
- staff offices
- crew room and lockers



SPACES • PUBLIC

PLAZA - A community plaza in front of the aquarium will act as an introduction to the building and to the Waterfront Park. It will contain a history of the Charleston waterfront and orientation to points of interest along the water.

LOBBY - This will be the major control point for visitors. Private spaces would be accessible from here. It will include a ticket booth, an introductory exhibit, and ample space for crowds.

PUBLIC RESTROOMS - Will be adjacent to the lobby.

AUDITORIUM - This will be an informal space, adjacent to the lobby, that can be used as a classroom. It will have facilities for audiovisual presentations.

EXHIBITS - Begin immediately upon leaving the lobby.

1. Introduction will feature the reef tank, which will display graphics that introduce the visitor to the chemical and physical factors of the environment. These include water, oxygen, circulation, currents, and waves.
2. Marine environments native to South Carolina will occur next. These include estuaries, swamps, marshes, dunes, barrier islands, open sea, deep sea, and reef.
3. Relationships between species will be explored in the third exhibit area. This will display the food chain and will also look at adaptation and evolution.

4. Shark tank. This will be the climax of the storyline and should be an exciting but not frightening experience for the visitor.

5. Swamp area. This will contain vegetation and wildlife, including alligators, found in the many swamps of this state. It will be a calming exhibit and one that needs to be studied in detail to reveal itself to the visitor.

6. Edges will describe the space where the land meets the sea. It will include sea turtles and be arranged to enable the visitor to touch several species.

7. Man and the sea will be concerned with sea exploration and both current and future environmental issues. Traveling exhibits of an environmental nature will be displayed here.

8. Reef tank. This is again seen from below, giving a sense of the power of the sea and man's responsibility to it.

SPACES·PRIVATE

These spaces can be broken down into two main categories:

BACK-UP

Fish support
Water treatment
Biologist/Aquarist
Mechanical
Maintenance

ADMINISTRATION

Director
Secretary
Research
Education
Accounting

FISH SUPPORT. This is the work space behind the public exhibits. Its floor should be three feet above the exhibit space to allow for access into tanks, and it must be wide enough to safely work on exhibits and move and transport specimens.

There should be a holding area where smaller 50-gallon tanks are located, along with equipment related directly to the exhibit.

A food preparation area should allow for preparation of small batches of a great variety of foods for the animals. A cooler and freezer are necessary, as well as two or three small temperature-controlled rooms in which certain foods can be grown.

Adjacent to this area should be a specimen shipping and receiving area. All incoming fish are kept here in quarantine for a specific length of time. This area will be equipped with tanks and a water supply.

The loading dock will receive fish foods, specimens, exhibit materials and equipment, and should be located centrally to the fish support area.

The shop is an area that needs to be separated from the fish, as many exhibits are made of fiberglass and give off toxic fumes during construction. The shop also will be used to repair equipment.

WATER TREATMENT is an extremely important function in the aquarium and acts much like a water treatment plant. It will produce salt and fresh water, temperate and cool water. Contamination of water in an aquarium is a major concern. The following techniques are used to assure its purity:

- Biological filters
- Mechanical filters
- Chemical filters
- Nitrification (to remove ammonia)
- Ozone addition (at night)
- Ultraviolet addition

There are also skimmers on all tanks that remove surface waste. In the bottom of each tank there is a gravity-activated system of filters, including dobermite, which corrects the ph level of the water.

MECHANICAL SPACE. In addition to the water treatment facility, the building will require space for heating and cooling equipment, and a security system which includes safety devices for anyone entering the large tanks.

MAINTENANCE SPACE. Storage space for the aquarium engineer. Major maintenance problems are corrosion due to salinity, waterproofing areas, the effect of vibration on species, and clogging filters.

BIOLOGIST/AQUARIST. Work space will be provided for these staff members, as well as a crew room which will contain a lounge, lockers, showers, and toilets.

ADMINISTRATION. Staff offices, storage, and a private library.

AREA REQUIREMENTS

SPACE	USER (S-Staff) (V-Visitor)	ACCESSIBILITY	ACTIVITIES	SUPPORT NEEDED
<u>Lobby</u>				
Ticket booth	2-S	Admin./gift shop	Greet/map/information	Light/telephone/ first aid
Queuing space	330-V	WC/auditorium	Chat/orient/sit	
Gift shop	1-S	Storage/ship/receive	Buy/reinforce concepts	
Bathrooms (WC)				
Introductory exhibit	-V	Backup	Intro/transition (temp., sound, light)	Sound/light/ water/air
<u>Administration</u>				
Director	1-S	Public/city	P.R./management	Light/view to exhibits
Secretary	2-S	Storage	Clerical/support	Light/HVAC/ telephone
Research	2-S	Lab/backup/auditorium	Research/community service	Water/storage/ library
Educational	2-S	Auditorium/public/ exhibits	Teach/program/P.R.	Lab/kitchen/ classroom
Accounting	1-S	Director	Clerical	Light
Accounting	1-S	Director/secretary		
Storage		Education/secretary		
<u>Auditorium</u>				
Theater	-V	Audiovisual/exhibit/ lobby/bathrooms	Slides/films/video/ receptions/experiments	Audio/visual
Audio/visual	1-S	Auditorium/mechanical	Slides/films/videos	Mechanical
Kitchen/lab	2-S	Auditorium/holding	Food service/ experiments	Water/ ventilation

SPACE	USER (S-Staff) (V-Visitor)	ACCESSIBILITY	ACTIVITIES	SUPPORT NEEDED
<u>Exhibits</u>				
Shark		Biologist/feeder/ all mechanical	Viewing	Salt water/HVAC/ light/air/ resting point
Reef		Biologist/feeder/ all mechanical	Viewing	Salt water/light/ air/art
Others		Biologist/feeder/ all mechanical	Viewing	Salt water/light/ air/art
Associated circulation		Maintenance/exits	Movement: hori- zontal, vertical	Low level light/ audiovisual/HVAC
<u>Circulation</u>				
Elevators		All areas per code	Movement: vertical	Electric light/HVAC
Escalators or stairs		All areas per code	Movement: vertical	Backup generator
Ducts		All spaces and back to mechanical	Vertical movement	HVAC
<u>Support</u>				
Backup		All exhibit spaces	Holding/feeding fish/ life support/ experimentation	Tanks/sinks, 6 ft. wide minimum, 3 ft. higher than exhibit, 70°-72° F.
Kitchen			Food preparation	Freezer/refrigerator/ HVAC/light/water
Holding/ quarantine		Shipping/receiving/ vertical circula- tion/major exhibits		Prepared water/air/ HVAC

SPACE	USER (S-Staff) (V-Visitor)	ACCESSIBILITY	ACTIVITIES	SUPPORT NEEDED
<u>Staff</u>				
Laboratory	1-S	Holding/quarantine/ biologist/research	Experimentation/ hospital	Water/air/light/ dark
Biologist	1-S	Holding/research/ all exhibits	Work with fish/ monitor diet	Office space/ light
Crew room		Staff	Lunch/meeting/breaks	Electricity/ sinks/light
WC/shower		Staff	Toilet/shower/etc.	Water
Special shipping, receiving		Water/loading/ holding	Receive fish	Ship
Shop & studio	2-S	Loading	Repair/mechanical/ exhibit preparation	Electricity/light
<u>Mechanical</u>				
Pump room HVAC	1,2-S	All spaces	(1) Maintain life sup- port for specimens; (2) maintain comfort & safety of visitors, staff	Water seal, corro- sion resistant
Water treatment				Reserve water (size of largest tank)
<u>Engineering/Control/Maintenance</u>				
Engineer	1-S	All mechanical/ backup/exhibits		Light/view/HVAC
Control center	1-S	All mechanical/ exhibits		Controlled environment
Storage Loading dock		Service entry		Light/security

SQUARE FOOTAGES

There are currently few standards for aquarium design. Square footage figures were derived from case studies and documents from the Department of the Interior.

Without the aid of the programming team mentioned at the outset of this manuscript, the figures are at best an estimate.

Minor changes occurred during the final design phase to assure that the building mass was kept within an appropriate scale.

Well into the design, final area requirements were determined as shown on the following pages.

First Floor Sq. Ft.

Swamp	3500
Exhibit (including immediate circulation)	4906
Exhibit (including immediate circulation)	6741
Administration	1200
Service/bathrooms/stairwells	800
Backup	900
Holding	1800
Shipping & receiving	260
Quarantine	260
Shop & studio	400
Mechanical	800
Water treatment	2400
Service circulation (200 & 600)	800

Second Floor

Exhibit (including immediate circulation)	
Exhibit (including immediate circulation)	
Auditorium	1200
Service/water closets	400
Staff space (crew, lockers, circulation)	
Biologist	200
Engineer	200
Laboratory	260
Kitchen	320
Holding & backup	
Water treatment	1200
Mechanical	800

Third Floor

FOX BIAFER

EMERGENCY BROWN

100% COTTON

CONSTRAINTS

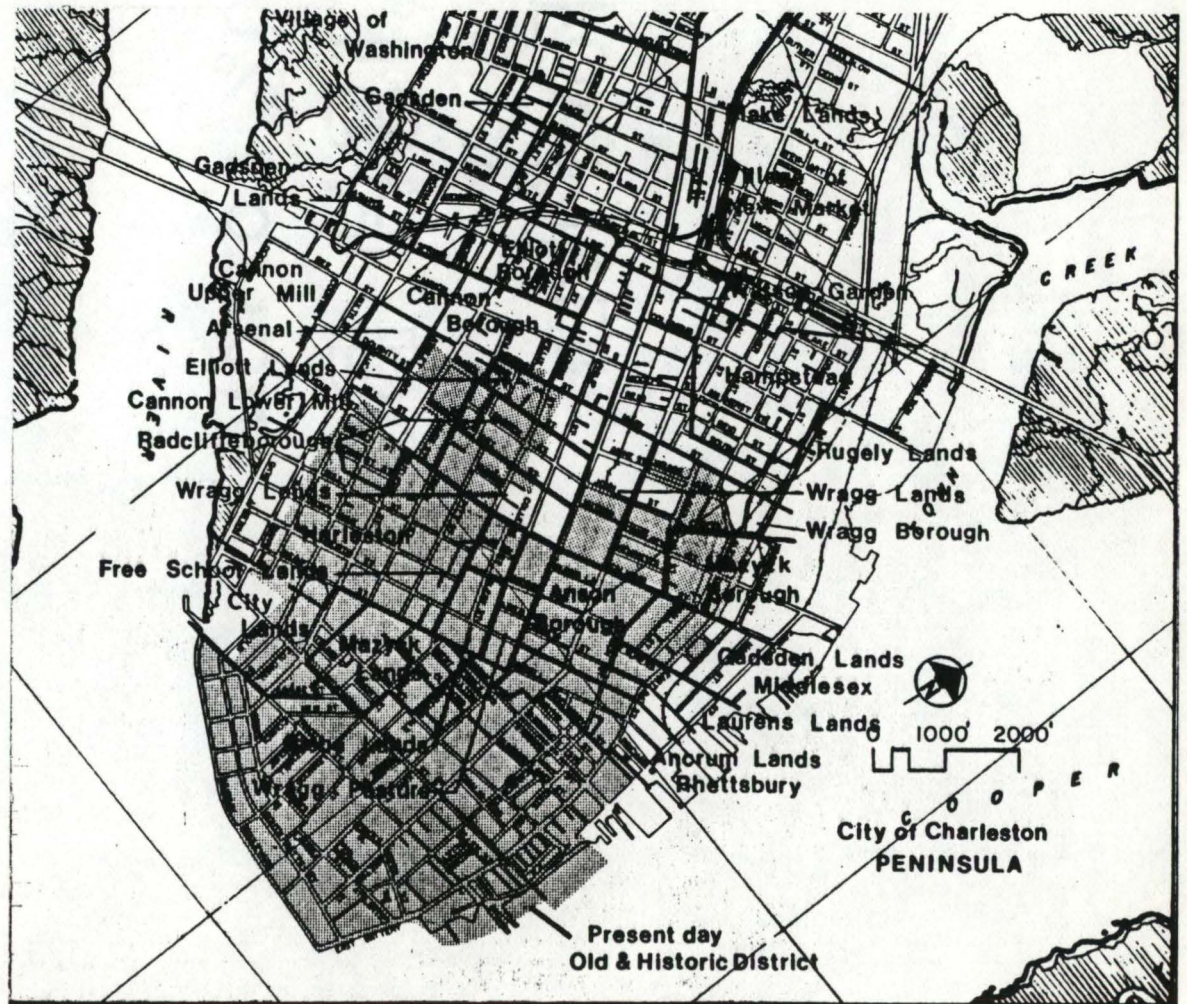
HISTORICAL

(taken from Charleston Codes governing historic districts)

1. New development must be carefully planned to harmonize with the old, while reflecting and representing contemporary times and designs. Contemporary architecture is needed to provide an element of contrast in the city.

2. The importance of vistas and sightlines should be recognized in planning for new development.

3. Careful attention should be given to the streetscape and the street furniture of the Old and Historic District to present a unified environment and accentuate the human scale.



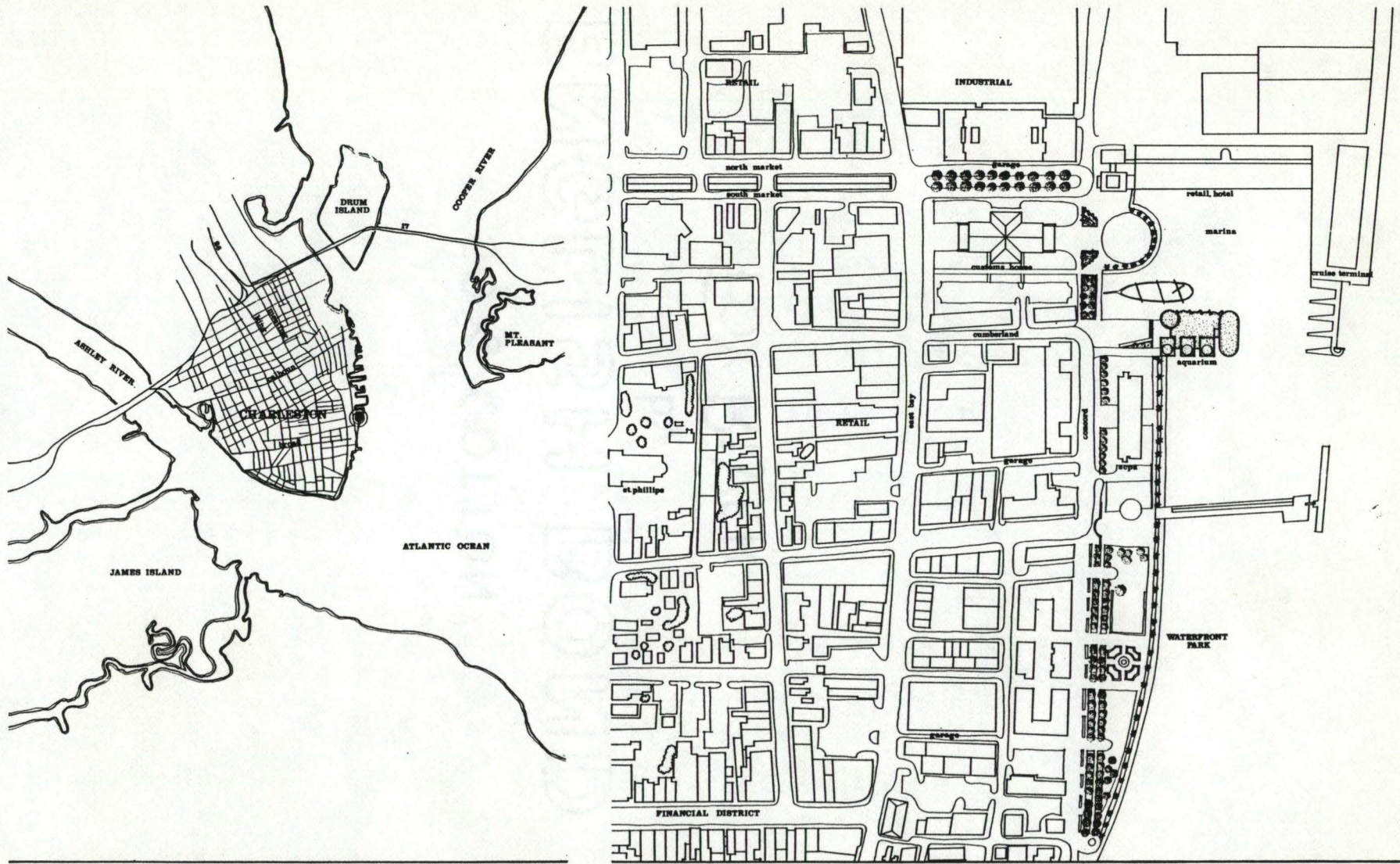
MATERIALS

The choice of building materials in an aquarium is quite critical. Corrosion, caused by the high salt content in the atmosphere both inside and outside the building, is a major concern and precludes the use of any exposed steel. Reinforced concrete, for both structural and architectural purposes, has been used with good success in several recent aquariums and is proposed for this project. }
Wherever it will come into direct contact with salt water, it will receive an epoxy coating.

All pipes will be of polyvinyl chloride, and the smaller aquarium tanks will be constructed of fiberglass. Painted surfaces should be kept to a minimum, as they do not hold up well to salinity.

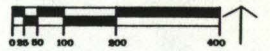
All pumps and motors should be isolated from the structure to avoid any vibrations which can adversely affect certain forms of marine life.

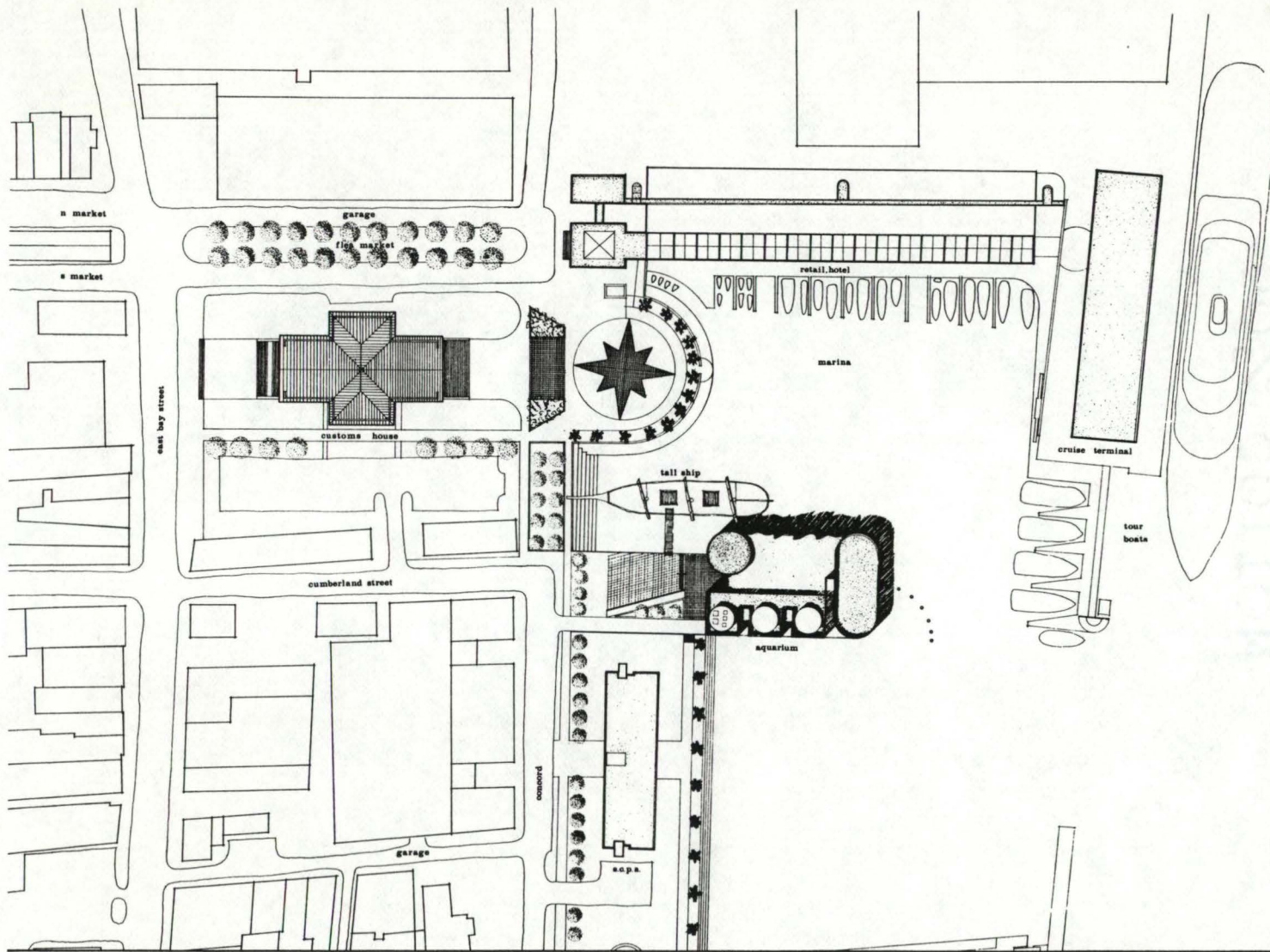
DESIGN



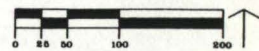
AN AQUARIUM CHARLESTON, SOUTH CAROLINA

Marion Walli Shook

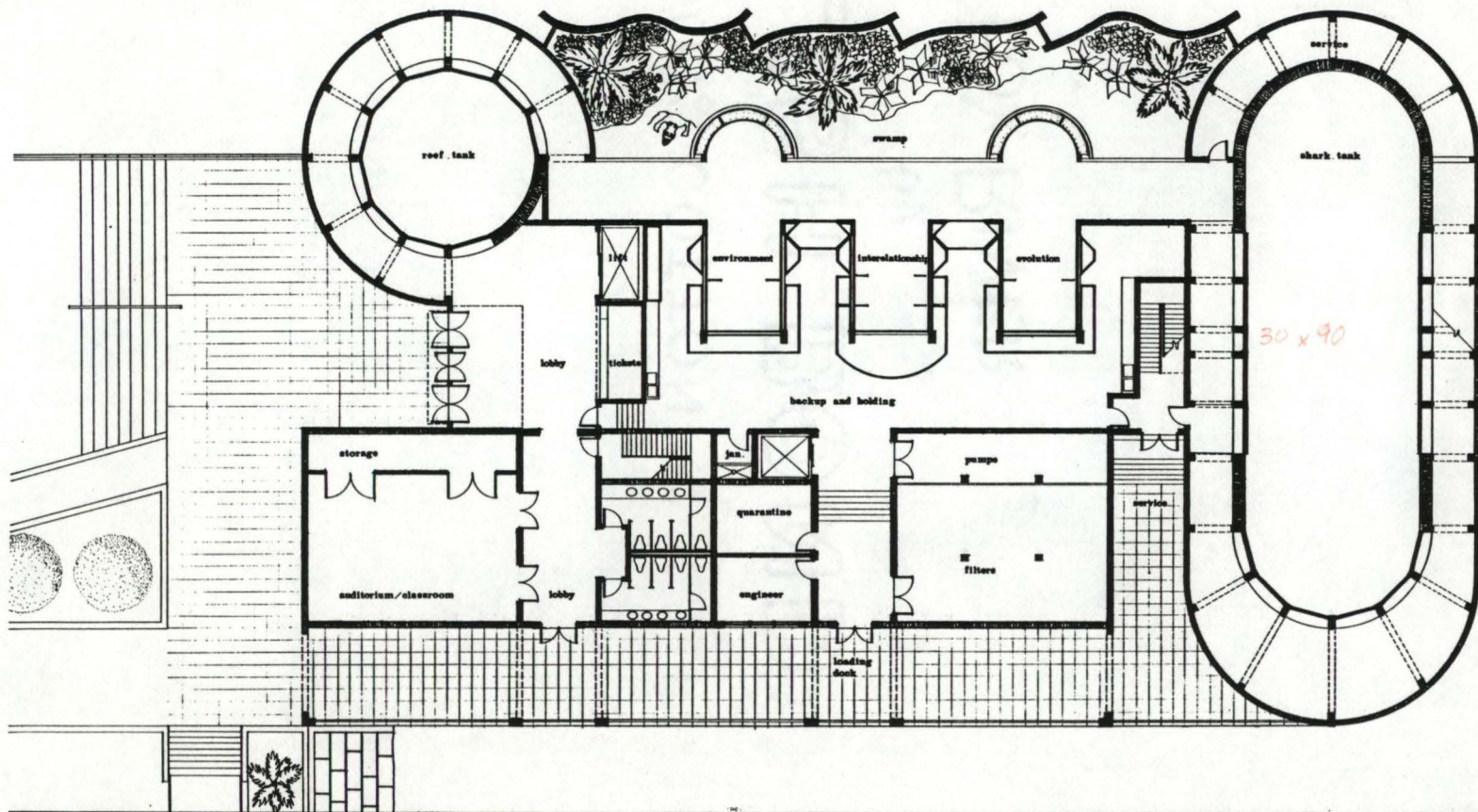




SITE PLAN

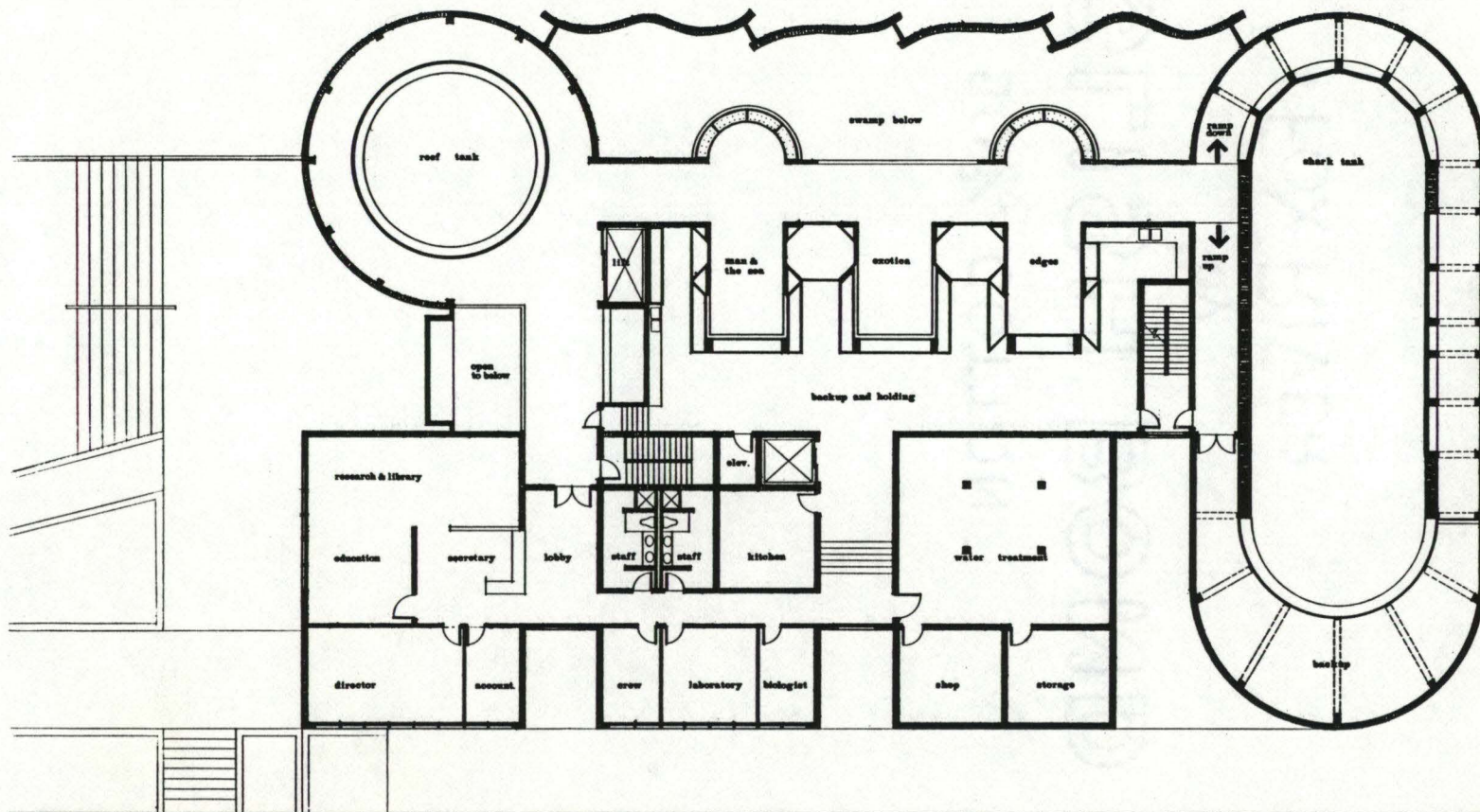


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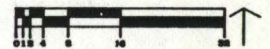


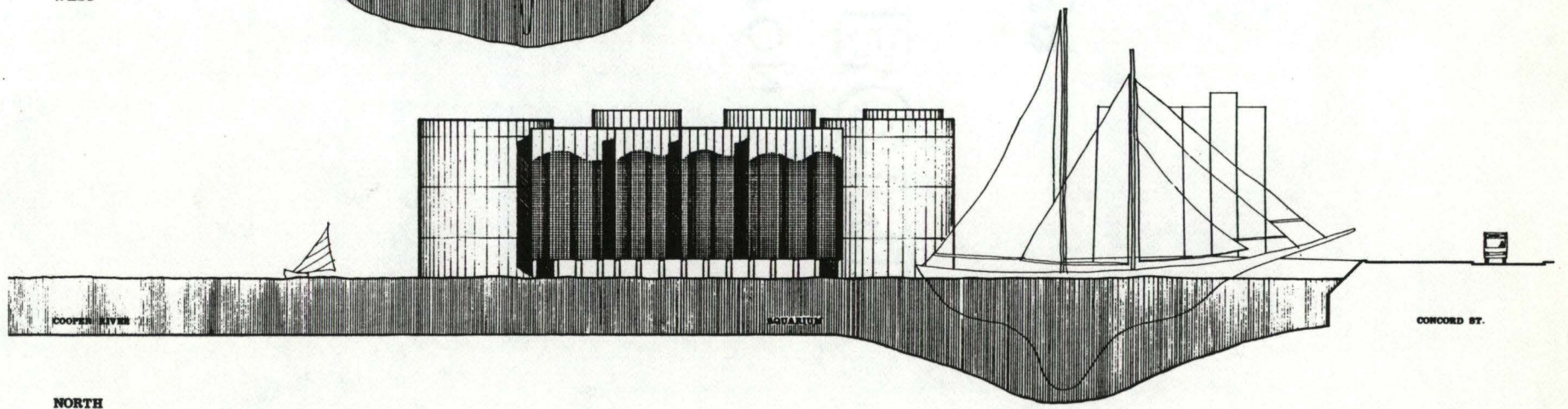
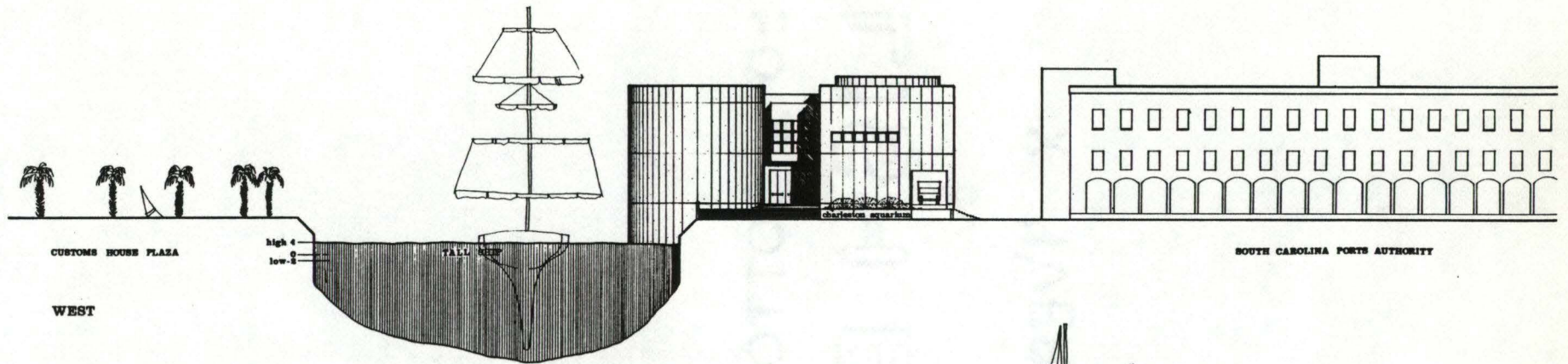
FIRST FLOOR PLAN



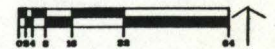


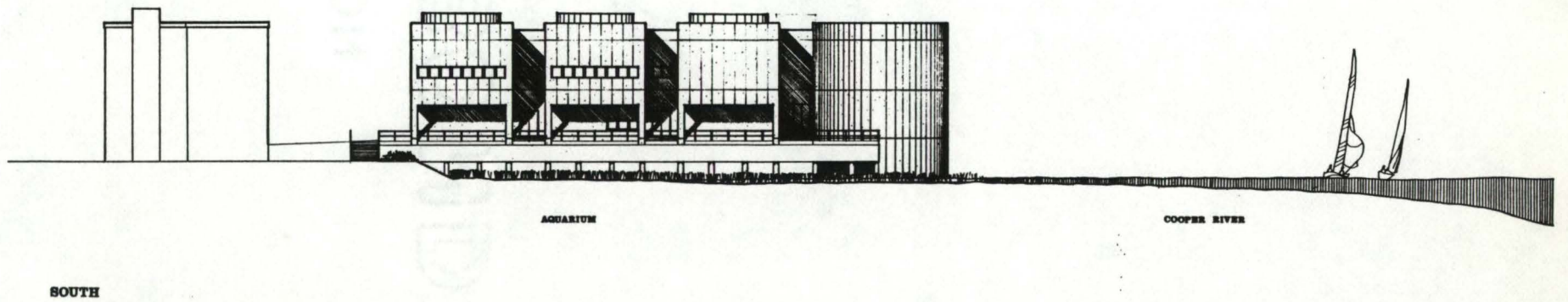
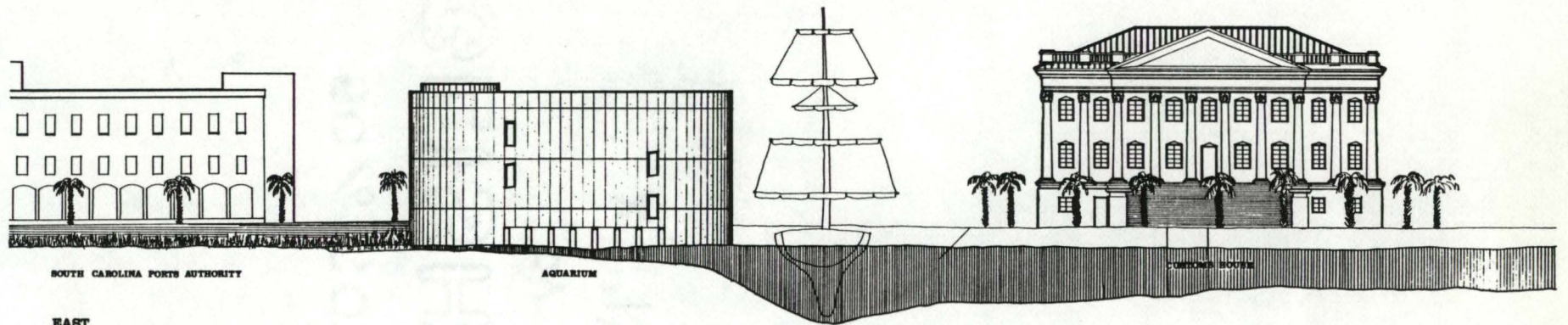
SECOND FLOOR PLAN





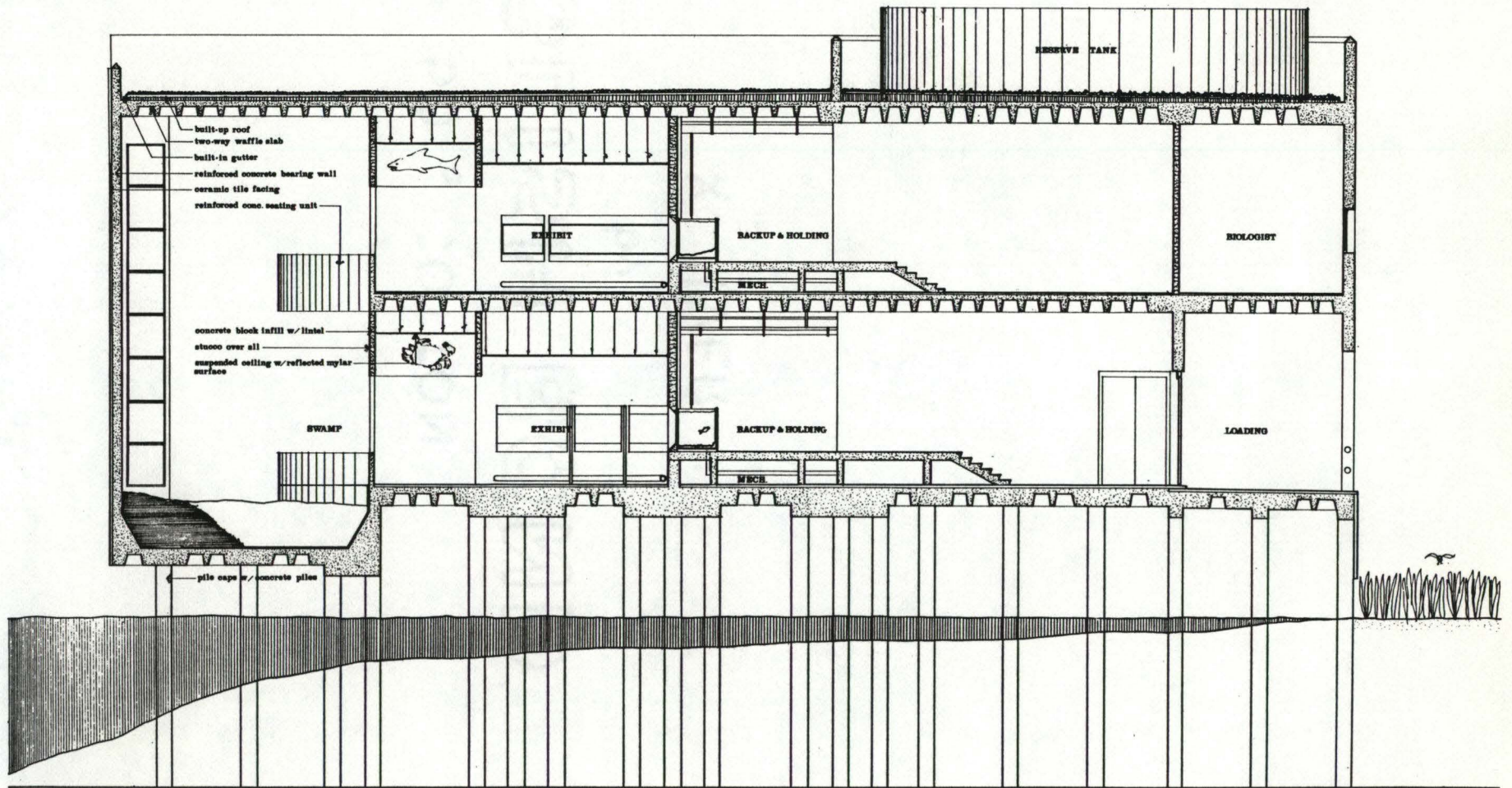
ELEVATIONS





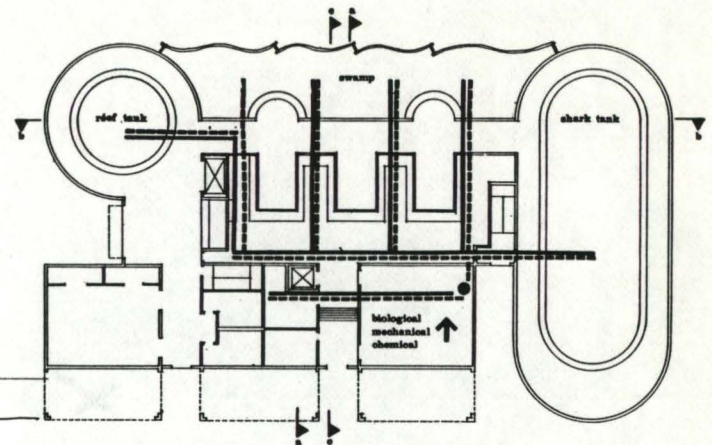
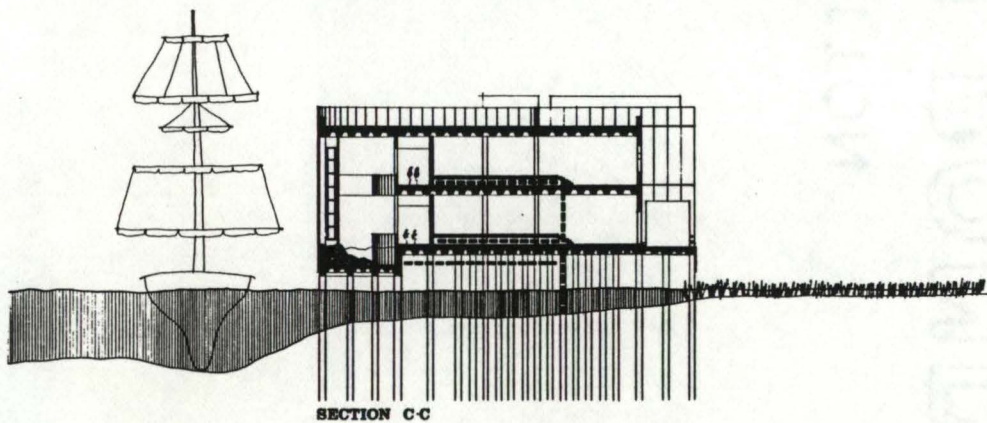
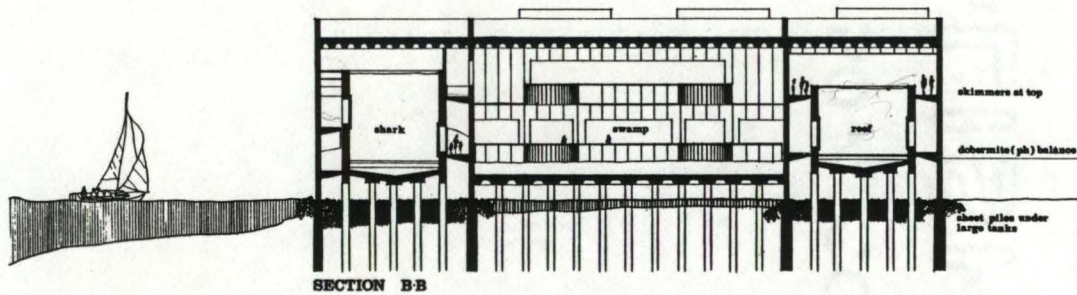
ELEVATIONS



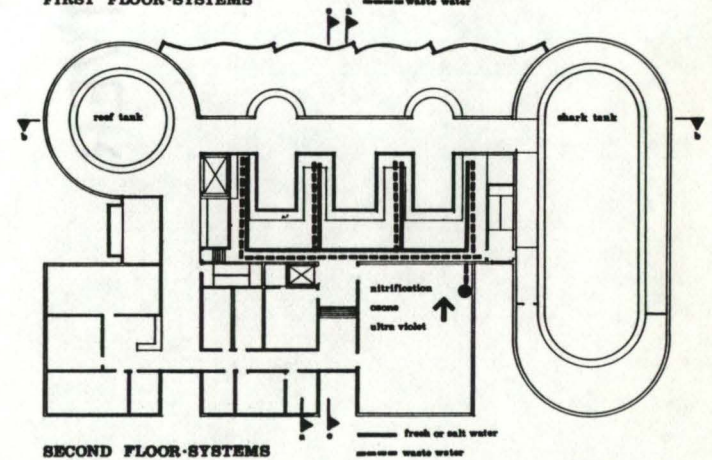


SECTION A-A



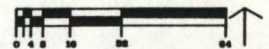


FIRST FLOOR-SYSTEMS



SECOND FLOOR-SYSTEMS

SYSTEMS



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RESOURCE PERSONS

Margaret Davidson and Rick DeVoe
South Carolina Sea Grant Consortium
James Island, Charleston, S. C.

Frances R. Edmunds
Director, Historic Charleston Foundation
51 Meeting Street, Charleston, S. C.

Frederick J. Lighter
Director of Marketing, Seattle Aquarium
Seattle, Washington

John Nightingale, BIOS
206-3rd Ave. S., Seattle, Washington 28104

RESOURCE PERSONS (cont'd)

Edward Pinckney Associates Ltd.
Landscape Architect
Charleston, S. C.

Aston Ramsey
Chief Engineer, National Aquarium in Baltimore
Pier 3, 501 E. Pratt St., Baltimore, Md. 21202

John Sadler, Jr., P.E.
Major Projects Engineer
South Carolina Ports Authority
P.O. Box 817, Charleston, S. C.

Laurie Thompson
Downtown Revitalization, The City of Charleston
Charleston, S. C.

John Wourms
Professor of Zoology, Clemson University
Clemson, S. C.

Paul Zielinski
Director, Water Resources
Professor of Civil Engineering, Clemson University
Clemson, S. C.