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Greenville Science Center Greenville, South Carolina

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greenville
science
center

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GREENVILLE SCIENCE CENTER
GREENVILLE, SOUTH CAROLINA

A 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.

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Spring 1983

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DEDICATION

To Cynthia for all her love, labor, and support.

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Professor Frederick G. Roth
Professor Yuji Kishimoto, chairman

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problem statement

PROBLEM STATEMENT

The need exists in every community to provide a sense of the past, present, and future for the people of that area. Such a strong cultural foundation in a community helps it to grow and prosper by providing education, recreation, and the quality of life which attracts new businesses and jobs to the region.

Since the early 1970's the Greenville County School District has been trying to gain support for a science center that would provide educational and cultural benefits for it's citizens. Additional public interest has been more recently expressed in working toward this goal.

This terminal project will pursue that idea, developing programatic data, exploring alternative locations, and proposing an architectural solution.

introduction

INTRODUCTION

Traditionally, the priority of museums has been the collecting of rare and valuable objects with a view towards preserving man's cultural heritage and/or the natural environment. The science center is a museum which deals with increasing the public awareness and understanding of science and technology. The objects in a science center are nuts, bolts, springs, and buzzers. They are seldom unique or valuable, but are used to illustrate the principles and processes of science and nature. While traditional museums are object oriented, science centers are process oriented.

While museums had their beginnings as far back as the 3rd century B.C., the first example of a science center was the Deutches Museum in Munich in 1903. This museum was unique because of it's use of active, full sized working equipment and exhibits. For the first time, contemporary technology was used to present scientific laws of nature.

The Museum of Science and Industry in Chicago, founded in 1933 as part of the Columbian Exposition was the first museum in the United States to utilize active exhibits.

As this new type of museum evolved, each new institution added a further interpretation of what a science center should be.

Today more than 30 million people visit science centers annually in North America. They are among the most popular cultural institutions; One reason for this is the prevalency of "hands on" exhibits.

Hands on, or participatory exhibits are part of a new trend to provide direct experience; visually, aurally, and tactilely. These participatory exhibits attract more visitors, generally hold their attention longer and make greater impact on the visitors memory than do static exhibits.

Most science centers design and build their own exhibits. They also make some use of traveling exhibits. Many times an industry or corporation will sponsor an exhibit such as nuclear power or solar energy. While use of such exhibits is financially advantageous, the administrators of the science center must keep in mind their responsibility to show

all sides of an issue, which an exhibit sponsored by a special interest group may not do.

In addition to exhibits, science centers often show movies, hold workshops and conferences and explore various means of getting the public involved in their education process.

Approximately half of those attending science centers today are school children, the remainder being family groups. Not only does a science center teach established scientific principles to children but it plays a major role in updating the knowledge and awareness of family groups as well.

The actual role of a science center depends to a great extent on community needs. The major focus may be that of a health center, childrens museum, nature center, science and technology center, or possibly an environmental energy center. The center should endeavor to fill any existing voids in science education or culture within the community.

greenville

GREENVILLE - BACKGROUND

Greenville is located in the extreme northwest section of South Carolina and was once the hunting ground of the Cherokee Indians. In 1776 Richard Pearis, a white settler who trapped with the Indians, established a trading post and grist mill at Reedy River Falls, which soon developed into a village. In 1797, the village was designated as the county seat and called Pleasantburg. In 1831, the city's name was changed to Greenville.

From the initial establishment of a grist mill, the Reedy River was a very important asset to Greenville. In 1835, the river was dammed to run a water wheel for the Grover and Cox coach factory , which later became the largest coach factory in the South.

Following the Civil War, water power played a major role in establishing Greenville as a textile center. By 1930 Greenville became known as the "Textile Center of the South", and later as the "Textile Center of the World".

After World War II, industrial diversification brought electronics, chemicals, paper products, electrical machinery, and transportation equipment manufacturing to Greenville.

GREENVILLE - PRESENT

Since World War II, the declining importance of water power and railroads has diminished the city's hold on industry. More flexible forms of energy and transportation have freed industry to move out of the city in search of lower taxes, more abundant land for expansion , and nearness to the labor force. The vacumn left in the wake of industry's departure has created social and economic problems for the city.

Today, professional businesses are bringing white collar labor with them into the city center in an effort to revitalize the dying downtown area. The workers employed in these new multistory office complexes are beginning to move back to the nearby surrounding zones, creating pressures for new and revitalized housing, and recreational and cultural amenities.

GREENVILLE DATA

POPULATION

Greenville County- 291,200
Greenville Sprtg Metro Area- 575,400
11 county Piedmont region- over 1,000,000

Distance from site	Population
0-5 miles	126,217
5-10 miles	104,086
10-20 miles	139,619
20-35 miles	377,592
35-50 miles	214,893
	Total 962,407

Approximately 12.4 million visitors come to or through South Carolina annually who spend at least one night. An estimated 1.9 million of these stay over in Greenville, Spartanburg, Anderson, or Clemson. These tourists taken together with the 962,000 residents who live within 50 miles of downtown Greenville will provide the science center with a market of 2.8 million potential visitors. The challenge to the science center will be to offer programs of such appeal and to locate on such an accessible site as to reach the largest possible number of people in the Greenville area.

SCHOOLS

Greenville County
91 schools with 53,500 students within the county.
18 colleges or universities within a 50 mile radius of the site.

CLIMATE

Annual Precipitation	46.42 inches
Mean Annual Temperature	61.8 degrees
Mean January Temperature	44.0 degrees
Mean July Temperature	79.9 degrees
Sunshine Percentage	64.0
Wind- velocity	8.2 mph
Wind- direction	NE

current directions

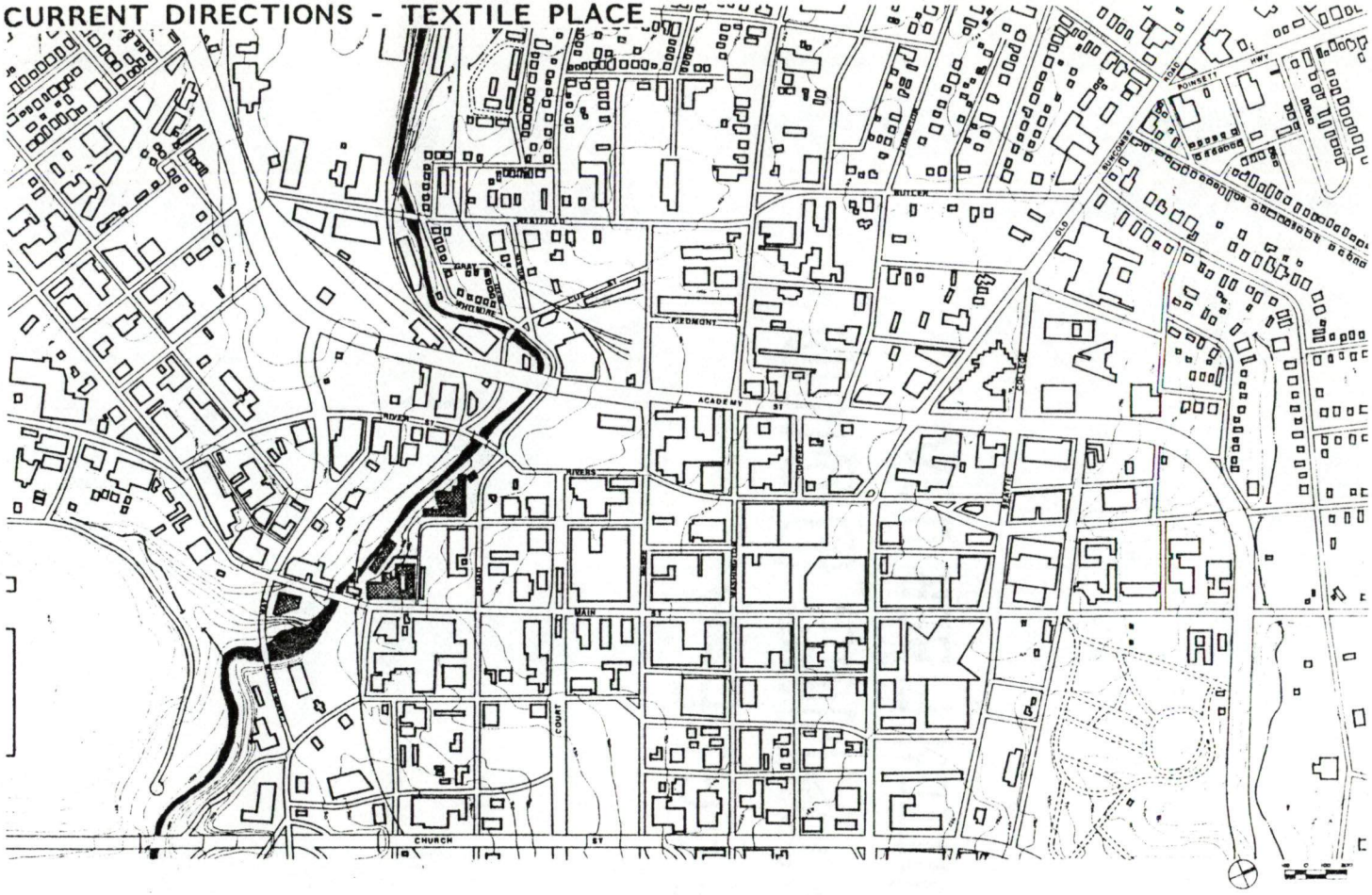
CURRENT DIRECTIONS - TEXTILE PLACE

In the past few years, several proposals have been made to revitalize the portion of the downtown area bounded by Main Street, Broad Street , and the Reedy River, the site of a number of old industrial buildings. The three studies that contribute the most to this project - A Feasibility Study For Textile Place, The Greenville Urban Design Charette, and The Greenville Central Area Action Plan - will be described in some detail below.

In 1979, A Feasibility Study for Textile Place, Greenville, South Carolina, was done by Anderson Notter Finegold, Inc., Economics Research Assoc., Inc., and Joseph A. Wentzel Assoc., Inc. The objective of this study was to renovate the area just south of downtown on the Reedy River. Several old mill buildings were to be developed into a complex which would include a textile museum, retail shops, restaurants , and leasable office space.

This proposal would take advantage of the aesthetic qualities of the river and the proximity to the city center, as well as the reuse of existing mill buildings to establish a major activity area on the fringe of the downtown business district.

CURRENT DIRECTIONS - TEXTILE PLACE



CURRENT DIRECTIONS - URBAN DESIGN CHARETTE

The 1980 Charette study was a study of the area west of the downtown core extending from Heritage Green to Bell Tower Mall. The purpose of this study was to show alternatives for designated areas of potential livability. Five areas were examined in detail:

1. HAMPTON COURT: Medium density housing was proposed for this block between Academy Street and the revitalized Hampton Pinkney neighborhood

2. TEXTILE GREEN: The area surrounding the old textile hall could be developed into a residential zone with the hall itself renovated as a cultural activity center.

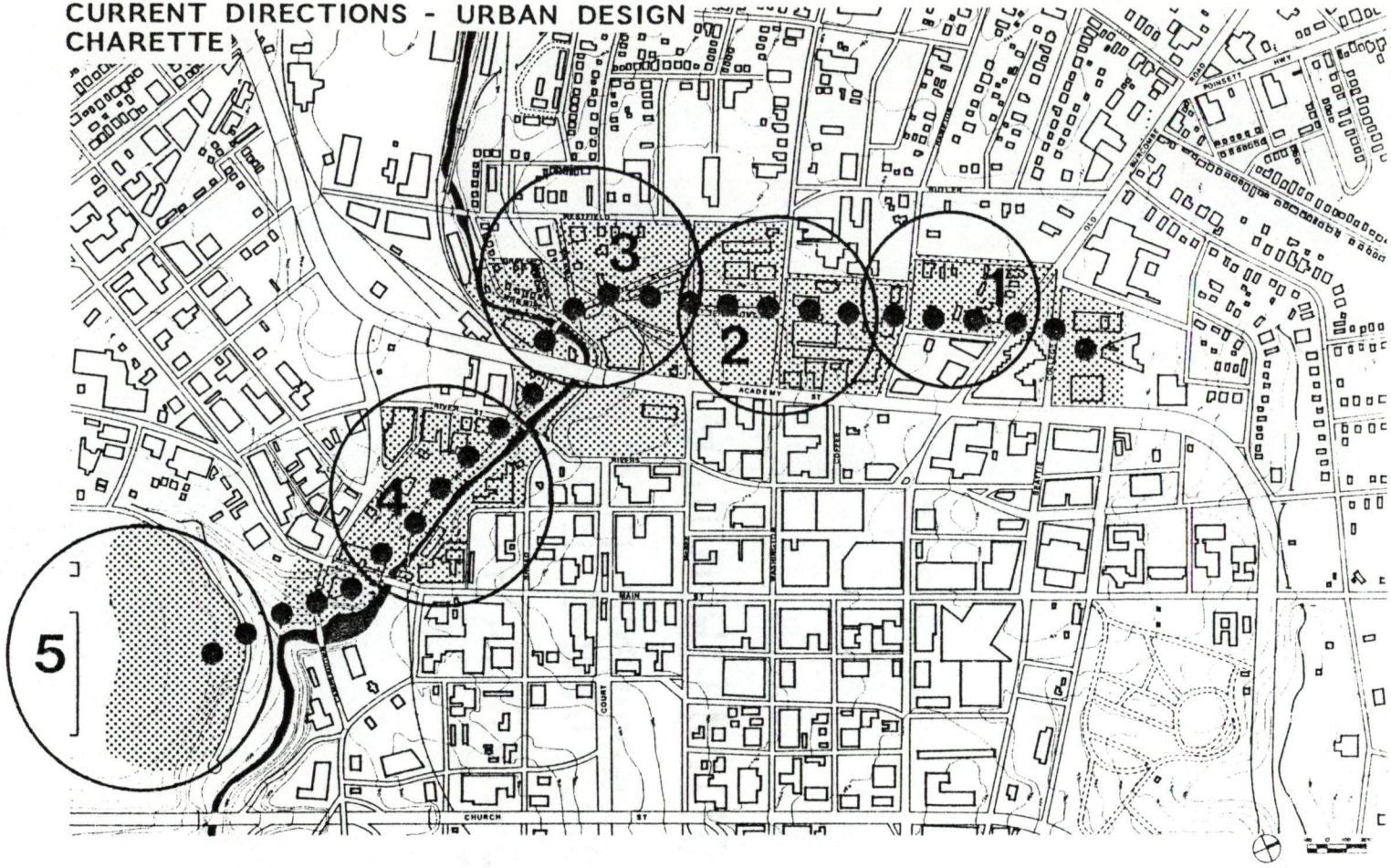
3. REEDY BEND TERRACE: The potential of the Reedy River could be exploited for an office complex with medium density housing to the north.

4. RIVER MILL SQUARE: This location could be developed into a complex of specialty shops, restaurants, apartments, condominiums, and offices on the river.

5. BELL TERRACE: The Bell Tower Shopping Center and the hillside below could be redeveloped into housing stepping down to the Reedy River.

It was proposed that these five nodes be linked by a pedestrian landscaped corridor. The museum complex at Heritage Green would constitute one terminous and Bell Terrace would create the other. The total development would strengthen the relationship of the central core area with it's fringes and would provide a better transition from residential to business districts.

CURRENT DIRECTIONS - URBAN DESIGN CHARETTE



1 Hampton Court

2 Textile Green

3 Reedy Bend Terrace

4 River Mill Square

5 Bell Terrace

Pedestrian Way

CURRENT DIRECTIONS - CENTRAL AREA ACTION PLAN

In 1981, a study called the "Greenville Central Area Action Plan: Final Report" was completed. This report outlines a plan of action for bringing about changes in the economic vitality, livability, and visual appearance of Greenville's central area. This plan utilizes several development themes:

1. The urban greenway proposed by the 1980 Charette Study has been expanded in its scope to completely encircle the central business area with parks and public facilities, large scale housing redevelopment sites, and a continuous pedestrian/landscape path.

2. Neighborhood reinforcement, especially adjacent to urban greenways, will consist of new infill housing to encourage living within close proximity to the city.

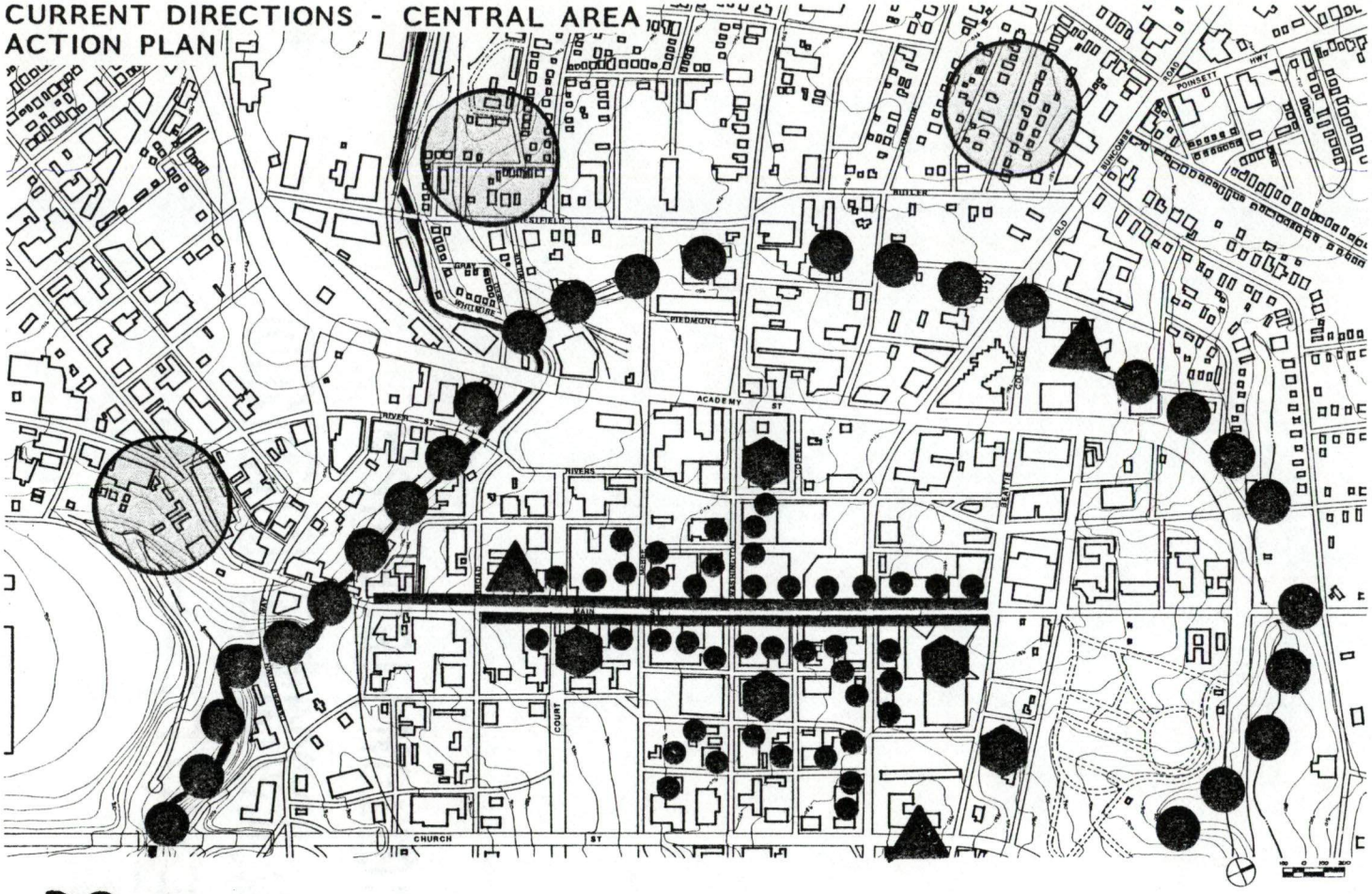
3. Urban villages of medium to high density housing developed alongside restaurants, shops, and small offices will utilize a pedestrian lifestyle.

4. Main Street will be rediscovered with the introduction of high quality retail establishments and entertainment activities which will not try to compete with suburban malls, but will encourage interaction by residents and business people in the central area.

5. The Civic Triangle consists of Heritage Green cultural complex, the Coliseum complex, and the Court Square civic complex.

6. Regional anchors consisting of offices, hotels, and similar activity - generating centers will be distributed about the central area adjacent to the greenway and convenient to major transportation routes and parking.

CURRENT DIRECTIONS - CENTRAL AREA ACTION PLAN



greenway

neighborhood reinf

urban village

main st rediscovered

civic triangle

regional anchor

location

LOCATION - CRITERIA

The following criteria have been established to determine the best location for a science center in the Greenville area:

1. It should be easily accessible to both the general public and to Greenville county schools.

2. It should be in close proximity to other cultural facilities in Greenville since a science center would tend to attract a similar audience.

3. It should be in an area where considerable activity already exists, although in itself it will generate new excitement.

4. It should be located so as to reinforce current development trends and directions being established in Greenville.

Using these criteria it was determined that the site chosen for the new science center should be an urban one. The present science center at Roper Mountain is removed from any urban context. This facility, owned by the Greenville County School District, consists of 62 acres of mostly tree covered land and contains a newly finished Horticultural Studies building, an amphitheatre, nature trails, picnic areas, and parking. Because of it's location, the naturalness of the site and the existing facilities, it is felt that this should be developed into a nature study center, as a counterpoint to the urban science center.

Three sites were chosen for further study to see if they would qualify as potential locations for the new science center. The sites are:

1. The block south of Heritage Green.
2. The Bell Terrace Shopping Center site.
3. The block bounded by Academy, McBee and River Streets.

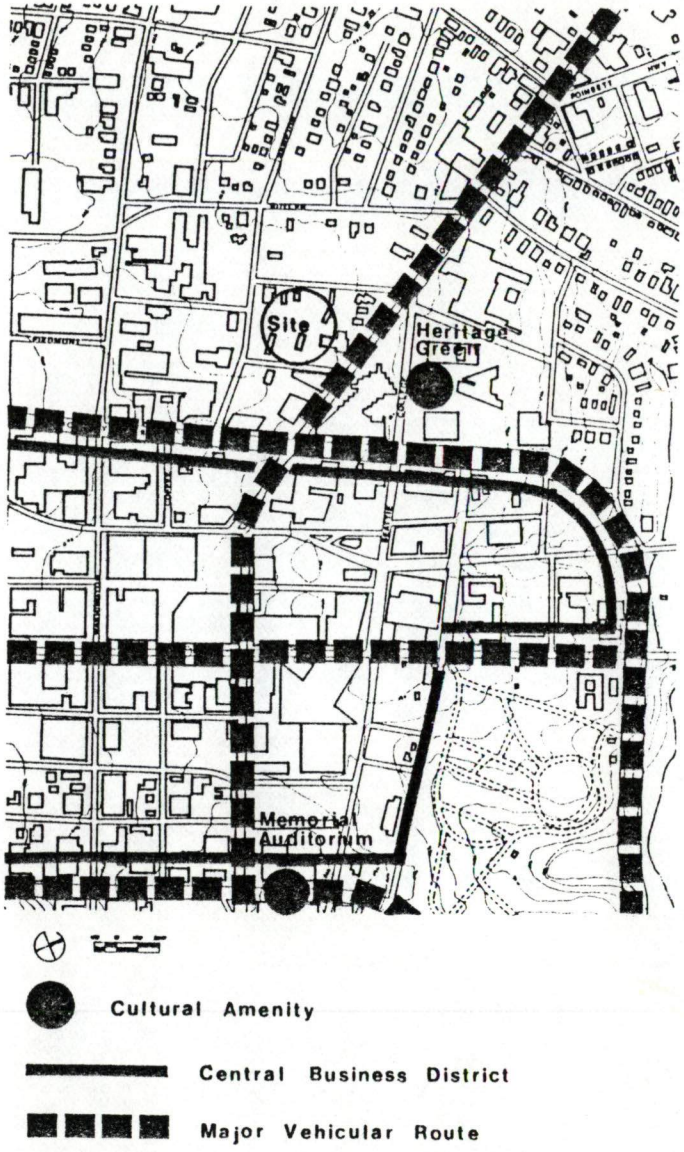
LOCATION - HERITAGE GREEN

1. The site is in a good central location relative to schools, being directly off major highways through the city; however the area around College Avenue is already busy and congested.

2. It is in close proximity to Heritage Green - the museum, library and Little Theatre complex.

3. It's location places it in a very active area.

4. It does not strongly reinforce any current development trends in Greenville.



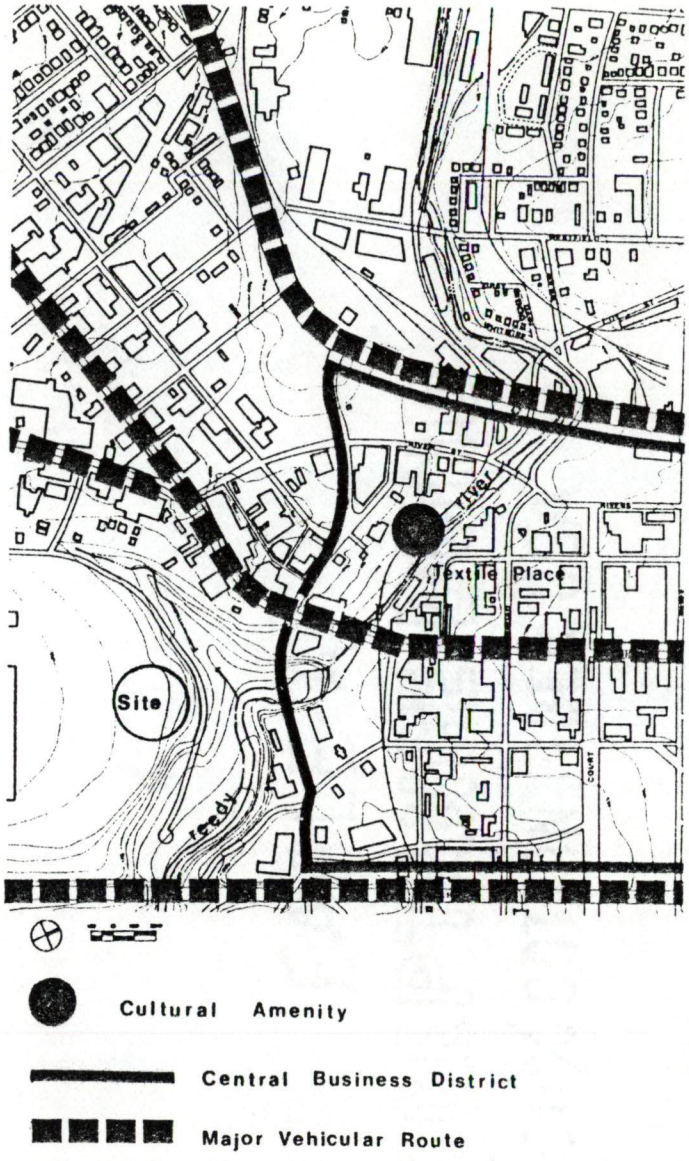
LOCATION - BELL TOWER

1. Access to the site is somewhat roundabout because of the steepness of the site.

2. The site is not in close proximity to other cultural amenities.

3. Even though the area surrounding the site supports a high degree of activity, the site itself is rather isolated.

4. This site was chosen because it directly reinforces the 1980 Charette study by developing that site as the southern activity node in the city.



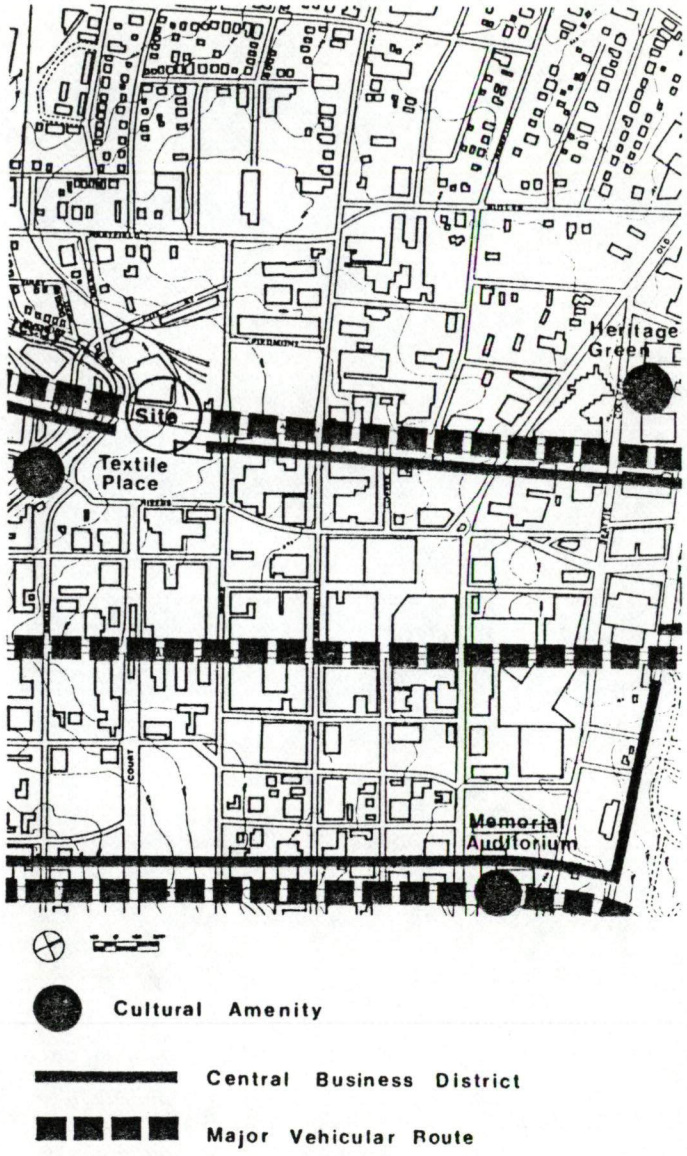
LOCATION - ACADEMY/McBEE

1. The site is located directly off Academy Street, which is a major thoroughfare through the city, so it is easily accessible.

2. It is in close proximity to the other cultural facilities in Greenville, being approximately a five to seven minute walk to the Heritage Green complex.

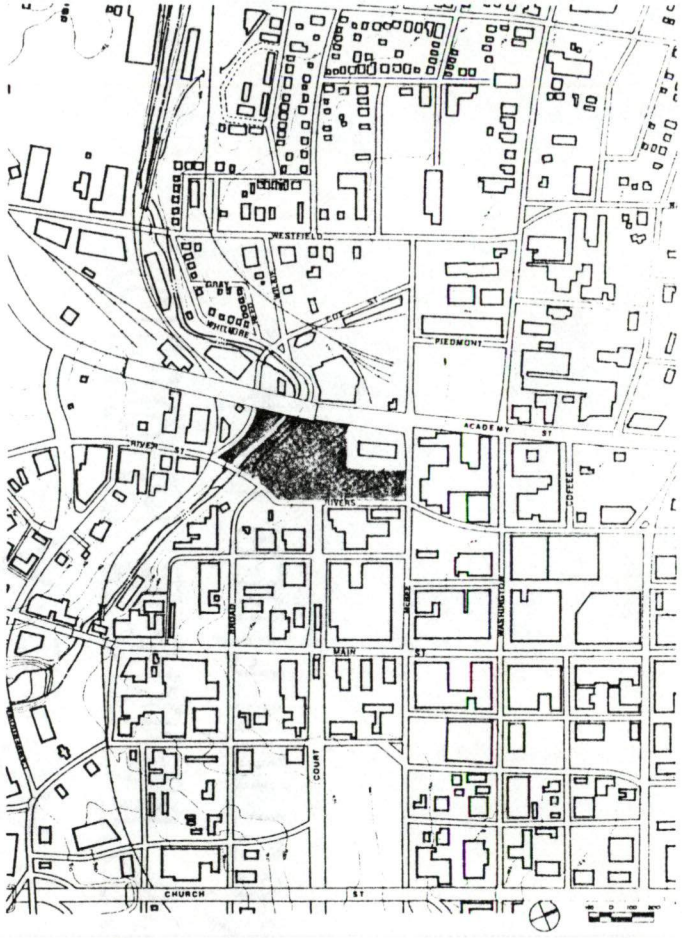
3. The site has high visibility from passersby on Academy Street and is only two blocks from Main Street, so an already high level of activity surrounds it.

4. This site strongly reinforces the 1980 Charette study and the 1981 Central Area Action Plan by developing the land immediately adjacent to the Reedy River.



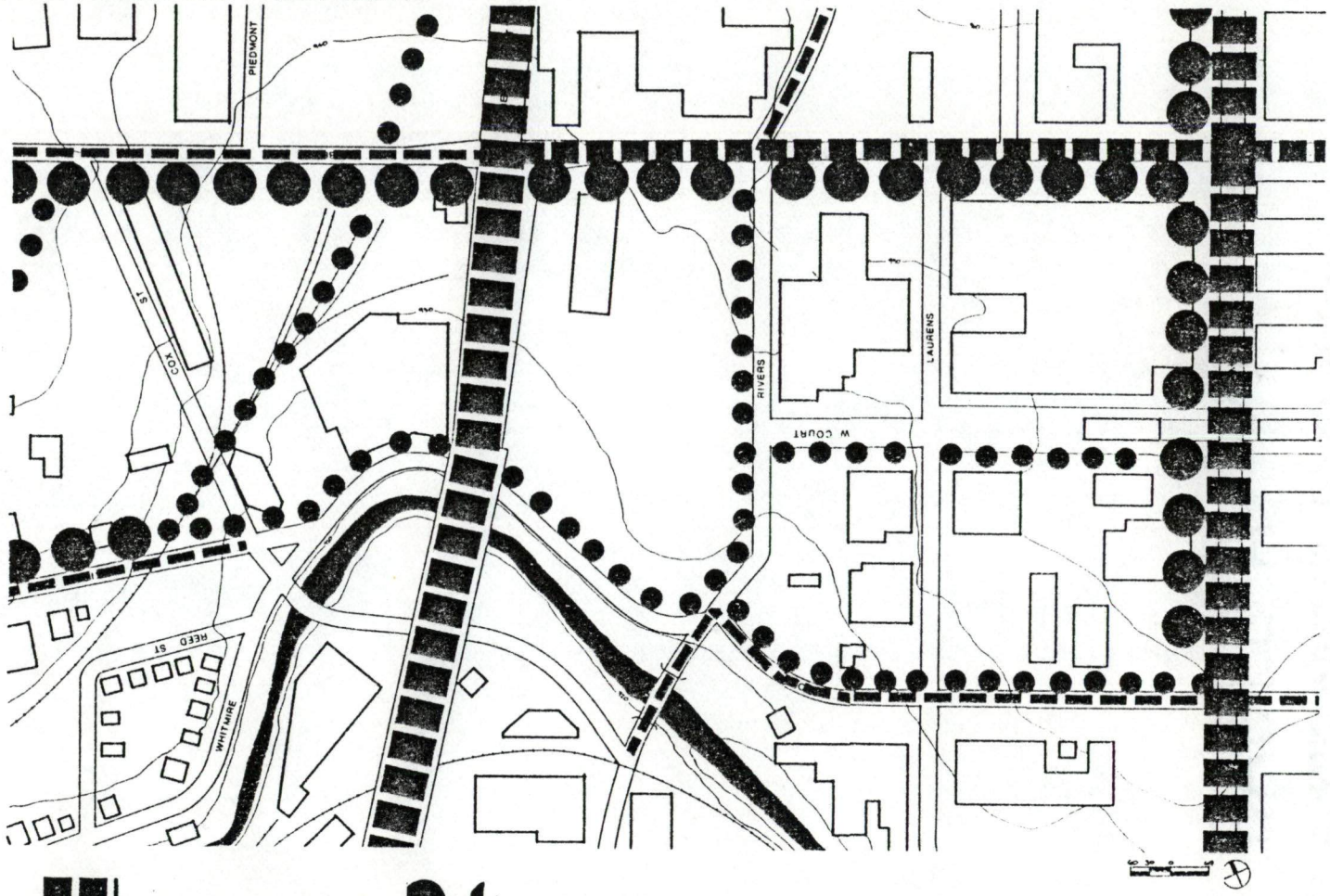
LOCATION - CONCLUSIONS

Of the sites selected for study, the Academy/McBee site was chosen for further investigation because it best met the criteria established: accessibility, proximity to other cultural centers, location adjacent to high activity areas, and the fact that it reinforces what the city of Greenville is trying to establish as a future goal.



site analysis

SITE ANALYSIS - MOVEMENT



Primary Vehicular

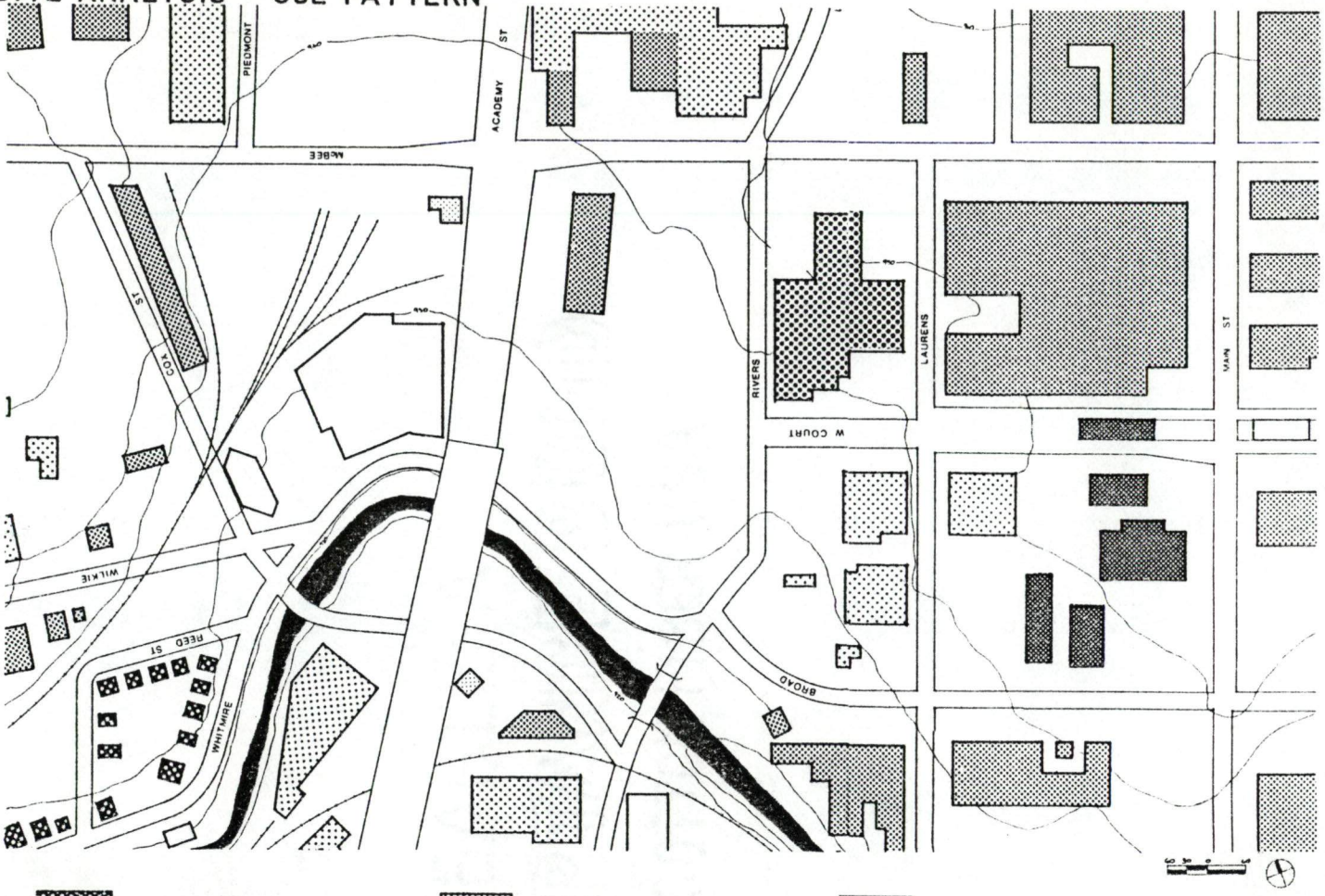
Secondary Vehicular

Tertiary Vehicular

Primary Pedestrian

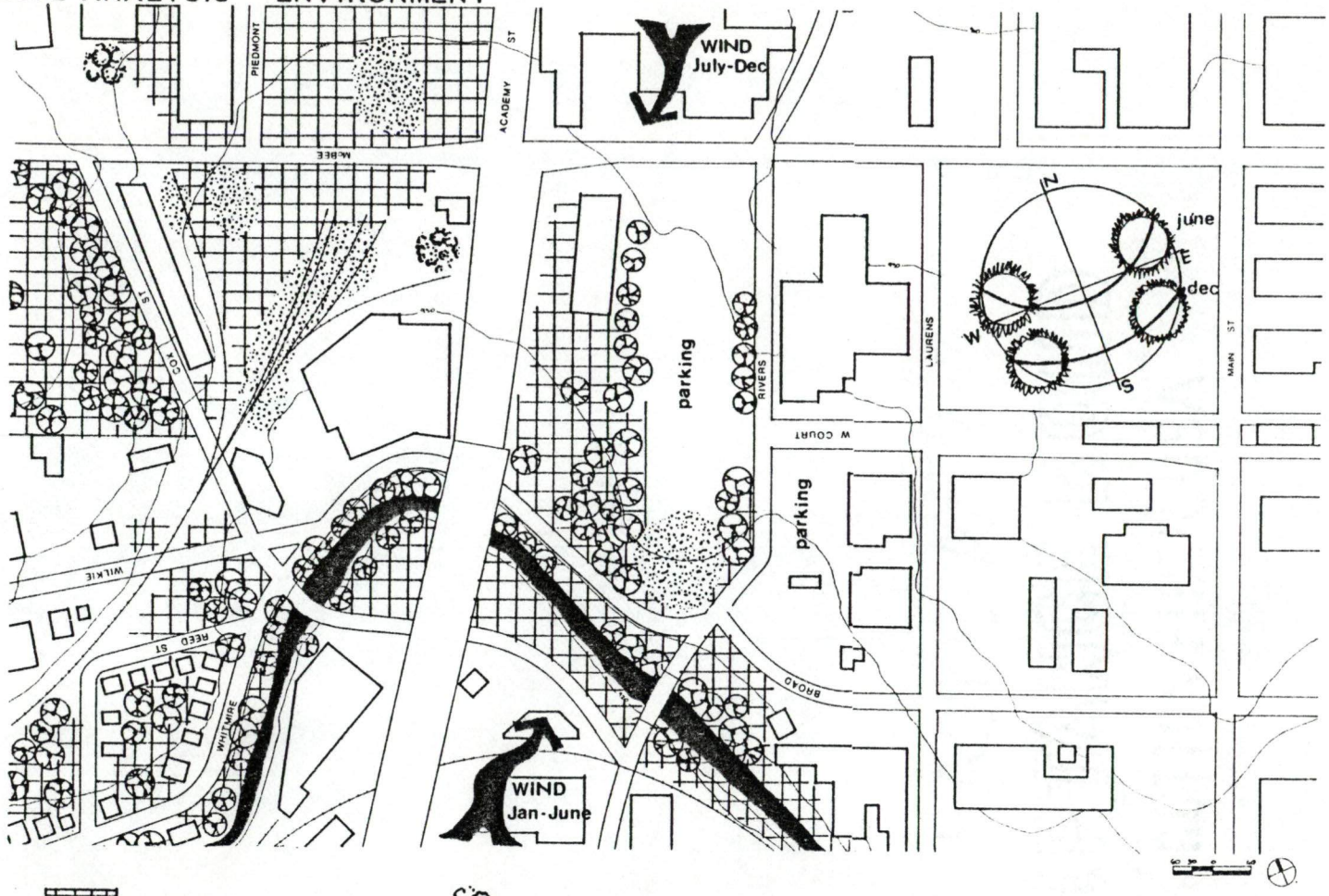
Secondary Pedestrian

SITE ANALYSIS - USE PATTERN

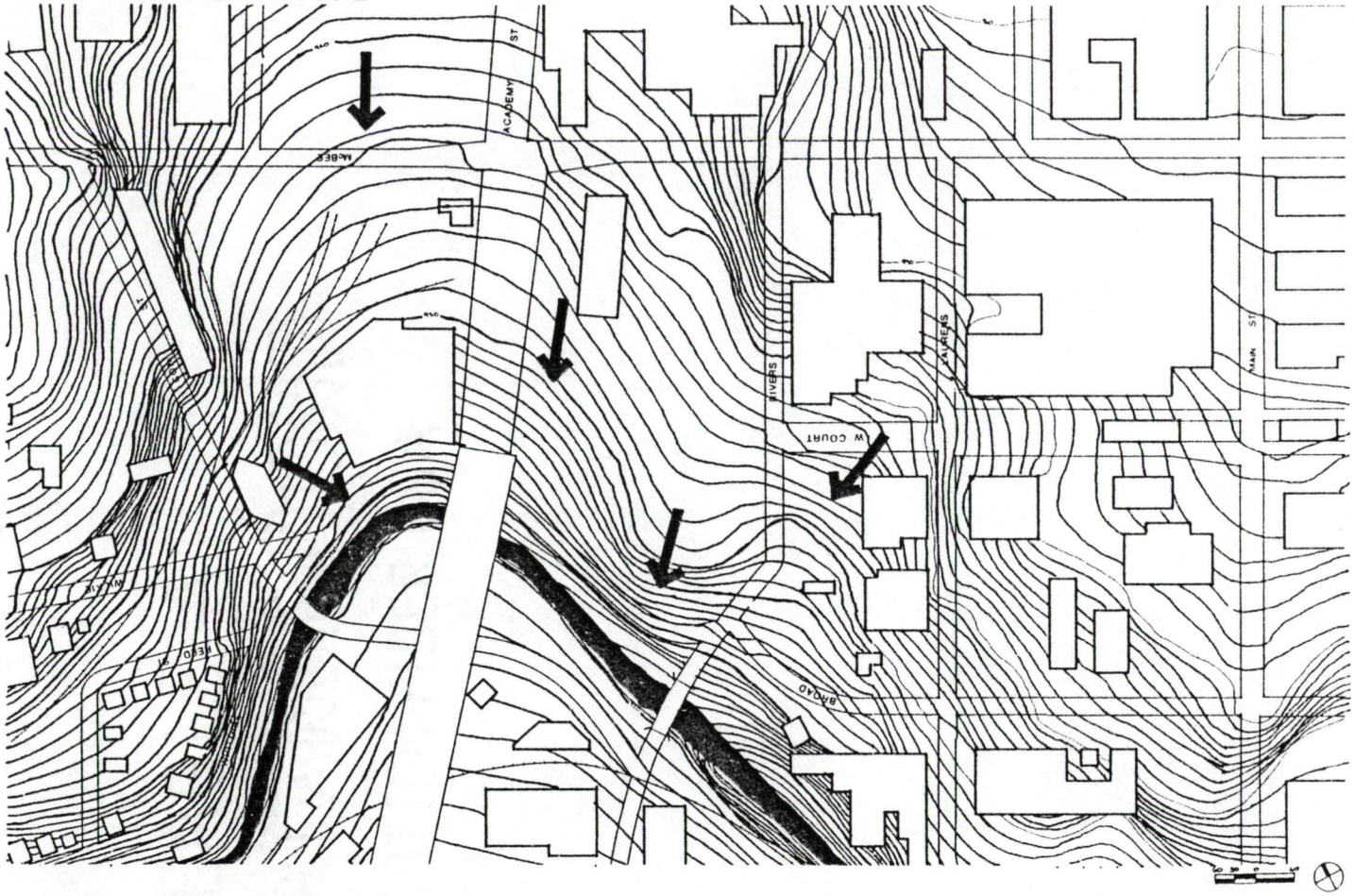


Residetial
Commercial
Vacant
Church
Industrial
Public
Railroad

SITE ANALYSIS - ENVIRONMENT



SITE ANALYSIS - SLOPE



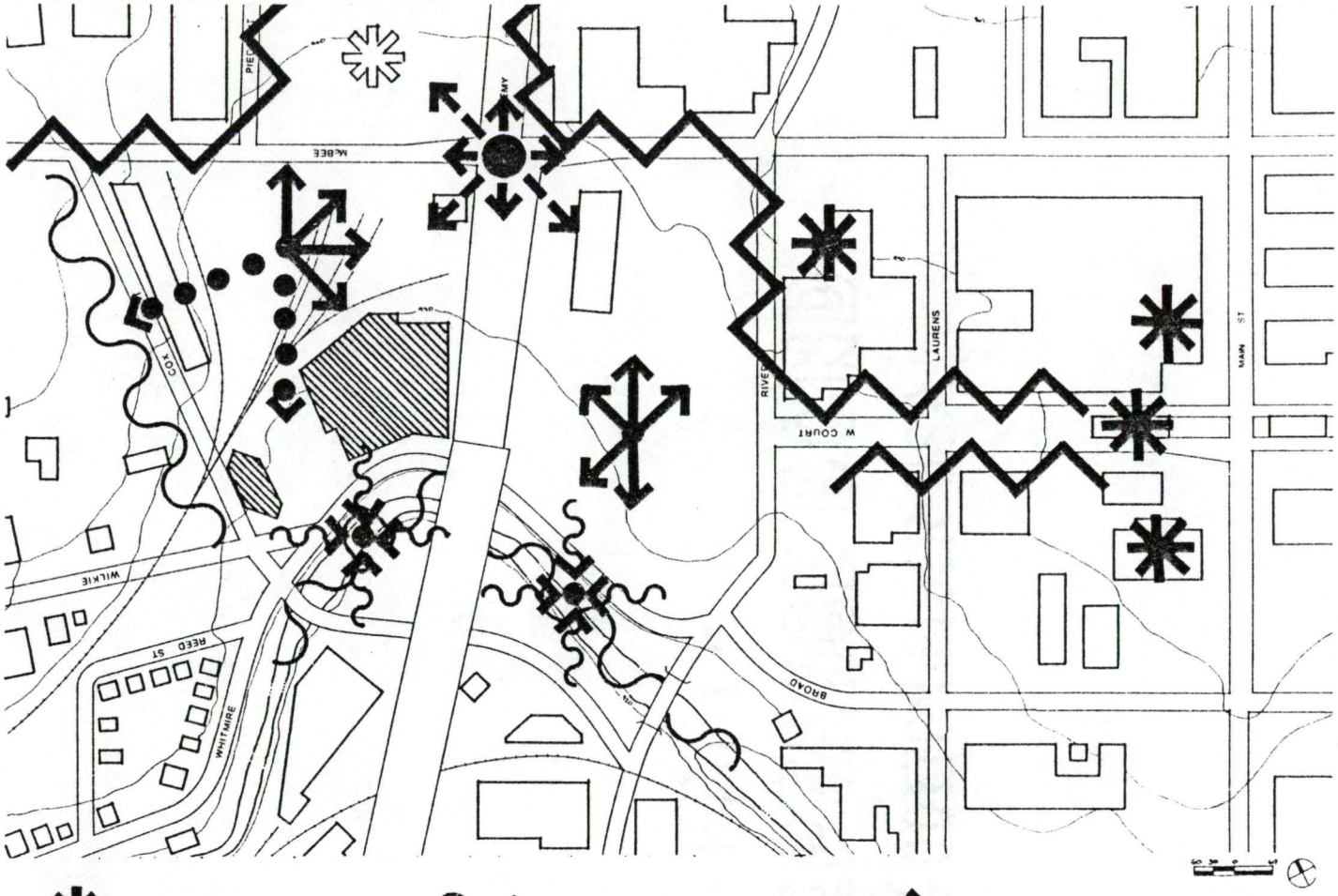
2%

5%

10%

20%

SITE ANALYSIS - PERCEPTION



Dominant Building

Dominant Space

Hard Edge

Soft Edge

Eyesore

Panoramic View

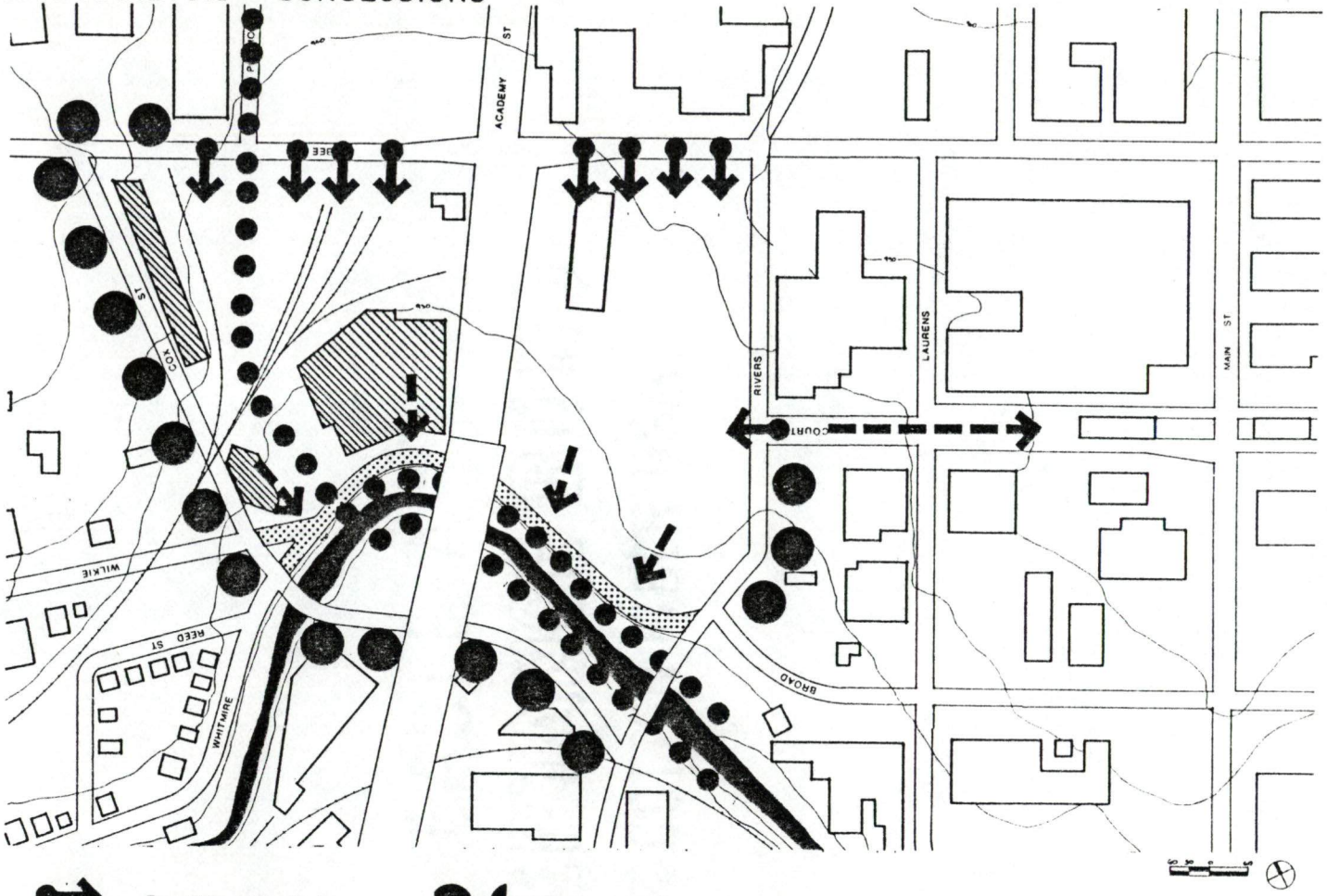
Filtered View

Noise

Appealing Sound

SITE ANALYSIS - CHARETTE PROPOSAL

SITE ANALYSIS - CONCLUSIONS



Possible Site Entry

Focus

Reinforce CHARRETTE Study

Buffer Zone

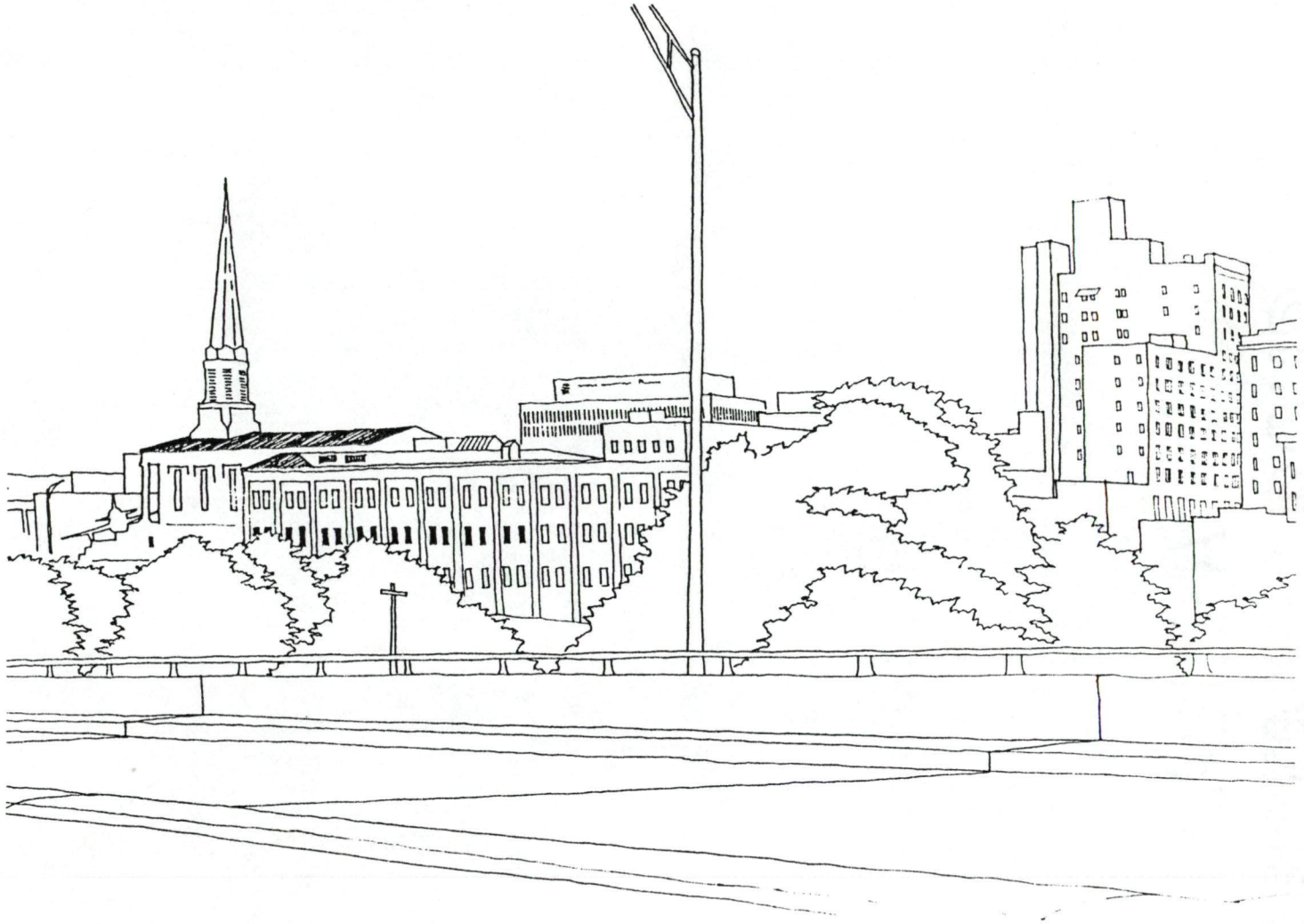
Buildings Removed

Road Closed

SITE ANALYSIS - CHARACTER

SITE ANALYSIS - CHARACTER

SITE ANALYSIS - CHARACTER



case studies

CASE STUDY
Discovery Place, Charlotte, North Carolina

Architect:
Clark, Tribble, Harris, and Li

Analysis:
For budgetary considerations, this 80,000 sqft museum was designed in a rectangular form, except for an S - curved wall on the north side. The serves as a symbol of nature, contrasting with the man-made, rectangular form of the remainder of the building. The exterior of the wall will eventually depict a cross section of the geologic strata of North Carolina in sculpted brick. The courtyard formed by the curved wall enriches the space between the museum and the historic church next to it.

The building has two levels, plus a mezzanine for offices. Extensive glass on the upper, Tryon Street level, was intended to give pedestrians a glimpse of some of the interior activities. In practice , however,the tinted glazing does not afford good visibility of inside activities from the street, while it allows too much light for most exhibits. The lower level entry on the Church Street side was planned for visitors arriving in vehicles. The existence of two entries, while convenient for public access, has posed logistical problems in terms of ticket sales, security, and restroom location.

The handicapped are accomodated with simple, yet effective, measures. The large freight elevator is in a convenient location, and large enough to accomodate several handicapped people at one time. The stepped auditorium is accessible to the handicapped by having a perimeter gallery at the entry level.

Space for the 150 hands-on exhibits is very flexible, with electrical power being delivered by drop cord from the ceiling. A staff of 35 full time employees man the aquarium, rain forest, collections gallery, life center, theater, energy center, and science circus, which are seen by an average of 800-1000 people per day. A snack area is located off the Tryon Street entry, but it is only large enough for vending machines and some seating and is inadequate for even serving lunches.

A related suburban nature center in Charlotte serves as a counterpart to this urban center and contains a planetarium, nature trails, and natural history exhibits.

CASE STUDY

Fernbank Science Center, Atlanta, Geogia

Architect:
1967 - Toombs, Amisano, and Wells

Fernbank forest was established in 1939 on 70 acres of virgin forest on the fringes of the Atlanta metropolitan area. The flora and fauna are approximately that typical of a climax hardwood forest of the upper Piedmont. The mere existence of a large pristine forest in an urban environment is a priceless resource for the 800,000 annual visitors.

The original concept of a forest as a living laboratory in proximity to a well equipped public science education facility was realized in 1967 when Fernbank Science Center was completed. Fernbank extends it's educational services equally to kindergardeners and graduate students, teachers and adults. Services include meteorological and electron microscopy laboratories, a planetarium , an observatory, a science reference library, greenhouses and gardens, and an exhibition hall.

Fernbank is primarily a traditional teaching museum devoted to natural science. In consequence, most of the 66 exhibits are of mounted taxidermy specimens surrounded by hand fabricated plants. The 9000 square foot exhibitioin space seems to be made up of left over space surrounding the planetarium; the somewhat low ceilings do nothing to visually enlarge the area. Even the exterior of the building with it's windowless stone veneer sloping walls and two seperate , ambiguous, sets of solid entry doors seems to reflect the somewhat narrow, exclusive and outdated means of presenting information.

CASE STUDY

Exploratorium, San Francisco, California

Architect:
1915 Bernard Maybeck

Analysis:

The Palace of Fine Arts was designed for the Panama - Pacific Exposition of 1915. The curved, neoclassical, pastel colored building is the only one remaining of the thirty two palaces that occupied the entire marina district. The Palace of Fine Arts was originally designed as a temporary structure, but when the exposition ended , the people of San Francisco urged that this building be preserved. Over the years it was used for a great miscellany of activities, but by the 1960's it became apparent that the building was dangerous and would either have to be demolished or reconstructed. The people of California managed to raise over 8 million dollars to save this landmark.

The open spaced vastness of the interior, punctuated by the original steel girders supporting the new roof and walls has lead to the comparisons with the proverbial whale's belly. Dr. Oppenheimer, the museums director, believes that it is vital to not fragment the space with walls that define subject matter boundaries, since his goal is for visitors to explore and invent in a way to which they are unaccustomed. The museum's theme is perception, which unites the eight loosely arranged sections: patterns, light, color, eye logic, the third dimension, sound and hearing, and the "tactile Gallery".

Dr. Oppenheimer is of the opinion that explaining science and technology without props resembles telling a person how to swim without ever letting them near the water. Altogether there are over 500 exhibits with which visitors can become involved, for learning or just for enjoyment. The exhibits in the Exploratorium illustrate natural phenomena by showing real effects. They do not simulate nature, there is never any attempt to decieve the visitor.

Most of the exhibits in the Exploratorium are built in- house with ideas that come primarily from the staff. The Exploratorium has very good carpentry, graphics, electronic, machine and welding shops , which are not closed off from visitor view.

A staff of 67 full time employees work in such areas as administration, teaching, exhibit fabrication and repair, building maintenance, graphics, and public relations. In addition to the full time staff, there are about 40 part time "explainers" for the general public and for school field trips. There are also about 30 part time people who work as artists- in- residence, on commissioned exhibits, on arranging concerts, as interns and apprentices, or on special exhibits.

CASE STUDY
San Antonio River Redevelopment, San Antonio, Texas

Architect:
1929 Robert H. Hugman
1962 Cyrus Wagner

Analysis:
San Antonio's major amenity is the San Antonio River, which over a ten mile length weaves it's way through the city's major open spaces, cultural facilities, and historical areas. The river is a linear pagent of color, texture and movement, water and people. Tall Cypress trees along the river create a sense of the oasis below and draw visitors to the activity there. Those shops and restaurants which recognize and incorporate the river into their activities are the most successful.

program

PROGRAM - OBJECTIVES

The Greenville County School District is trying to establish a science center in Greenville in order to satisfy two major goals:

1. Rapid advances in science and technology make it necessary for even the best educated adult to spend extra time in order to stay abreast of current trends which can affect such important aspects of his life as his health and his means of earning a living. For example, a science center might help an average South Carolinian understand some of the issues facing him , by having in- depth exhibits on such diverse subjects as nuclear power and waste disposal, and the growing supremacy of foreign nations in textile production and how South Carolina can become more competitive in the world market. In summary the science center would provide informal continuing education for adults and young people.

2. Of necessity, individual schools must present scientific subjects on a uniform, group basis with an emphasis on learning specific facts. In addition, many scientific devices are beyond the budget of most schools. The science center, being a county project, could better afford the latest in scientific equipment. Learning would occur by discovering general principles and their applications to modern technology, and could proceed in a pace and direction tailored to the individuals needs and interests. The second goal of the science center, then is to utilize equipment and to present subject matter in a manner not feasible for traditional schools.

THEME

The theme of"movement systems"is evident throughout the science center. This theme can be used as the thread that ties everything together,from tiny microscopic life shown through the electron microscope, to the circulatory system of man, to the Reedy River winding through the site, and to the motion of the planets around the sun in our universe. This theme is the common denominator that links the site, the river, the urban environment, the education system, and the future of science and technology.

PROGRAM - EXHIBIT TYPES

There will be eight broad categories of exhibit types. They are as follows:

Man
Plants and Animals
Energy Production
Transportation
Technology
Physics
Astronomy and Space
Perception

Each of these categories will then consist of exhibits following the overall theme of movement systems. Examples of exhibits within each major category are as follows:

Man; circulatory system, blood cells, heart beat, muscle structure , skeletal structure.

Plants and Animals; microscopes, growth and nutrition, relative speed of animals movement.

Energy Production; power generation with water from the Reedy River, bicycle power, wind power, solar power, nuclear power.

Transportation; simulated aircraft flight and landing, wind tunnel experiments, comparison of modes of transportation.

Technology; robot walking and talking, computers, laser, fiber optics, communications.

Physics; pulleys and gears, wave motion, resonator, motion detector, pendulum, momentum machine.

Astronomy and Space; mockup of space shuttle, relative position in space, movement in space, telescopes and binoculars.

Perception; op art, rotating discs, color reversal, mirrors, sound.

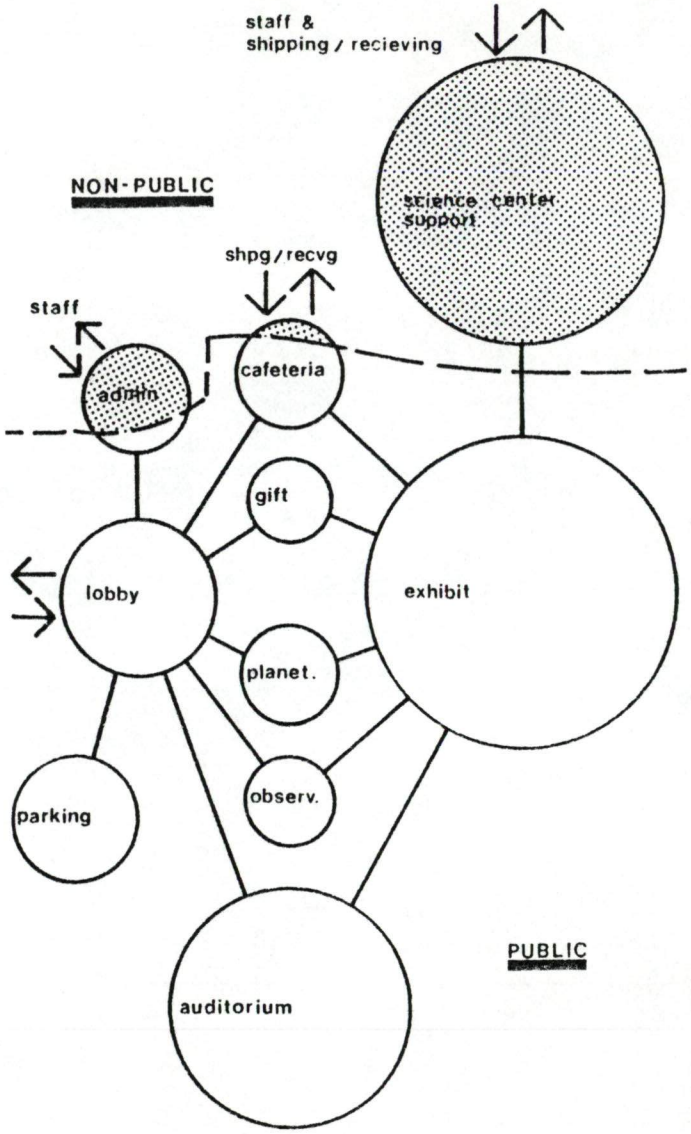
PROGRAM - OVERVIEW OF ACTIVITIES

Facilities:
The science center facilities would include an exhibit area, demonstration area, auditorium, planetarium, observatory, meeting rooms, gift shop, restaurant/ cafeteria, administration, and science center support area.

Staff:
full time - 44
part time - 14

Users:
student groups - Classes and clubs, generally classes would visit during school hours, clubs would visit after school hours.

family groups - Whether residents or visitors to Greenville, visitation to the science center would be at unpredictable times.



PROGRAM - SCENARIO OF USE BY FAMILY

After parking, the family may stop to look at an outdoor exhibit and then enter the lobby, where the father purchases the tickets and the mother inquires at the information desk as to which exhibits would most interest the children. Once inside the exhibit space, however, the children scatter, lured by blinking lights, odd sounds and a multitude of things with which to play, and manipulate. Even lunchtime is an educational experience, since the calorie content and nutritional value of each type of food is listed and added up with it's price. After lunch, the family has a choice of seeing a film in the auditorium or a star show in the planetarium, and decides on the latter. Before leaving, they browse through the gift shop, where the father and the seven year old , fascinated by the planetarium show, buy a small telescope. The four year old selects a magnet set and the mother chooses a crystal to remind her of their visit to the new science center.

PROGRAM - SCENARIO OF USE BY SCHOOL CLASS

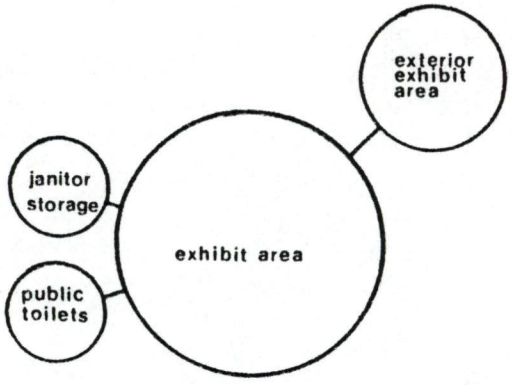
After parking in a bus or walking from the museum complex at Heritage Green, the group may eat lunch on the cafeteria's riverside terrace if it is a nice day. Then they will meet with a science center tour guide for a prearranged tour of the center and a lecture by an expert on the electron microscope or perhaps computer graphics. The group may then attend a planetarium show or a film or lecture in the auditorium, followed by a period of free time to see those exhibits which particularly interest each individual. Should any of the children get seperated from their group, they can go to a small meeting area in the lobby where eventually all of the group will assemble to go into dinner. After dinner they will have time to look for souvenirs in the gift shop before attending a group viewing in the the observatory. Then, their visit over, they will leave for home on the bus.

PROGRAM - EXHIBIT SPACE

Function:
To provide a space for the display of exhibits for both the observation and the interaction of visitors.

Size:
15,000 sqft interior space
5,000 sqft exterior space, minimum

Functional Diagram:



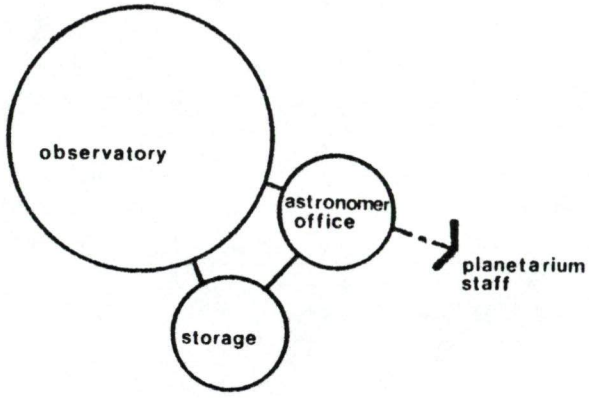
Spatial Characteristics:
Open plan, flexible space for wide variety of sizes and shapes of exhibits. Lively atmosphere. Architecture as backdrop to exhibits.

Special Considerations:
Outdoor space for large exhibits such as aircraft, locomotives, and trucks. Reedy River to be utilized to it's fullest extent.

PROGRAM - OBSERVATORY

Function:
To provide a place for the visitor to further understand his environment through the use of binoculars and telescpoes.

Functional Diagram:



Spatial Characteristics:
Stations for viewing with binoculars and small telescopes in an elevated position with views all around; station for viewing with large 23 inch diameter telescope with dome or roll-back ceiling above to allow unobstructed views of the night sky; 23 inch diameter telescope as an exhibit itself.

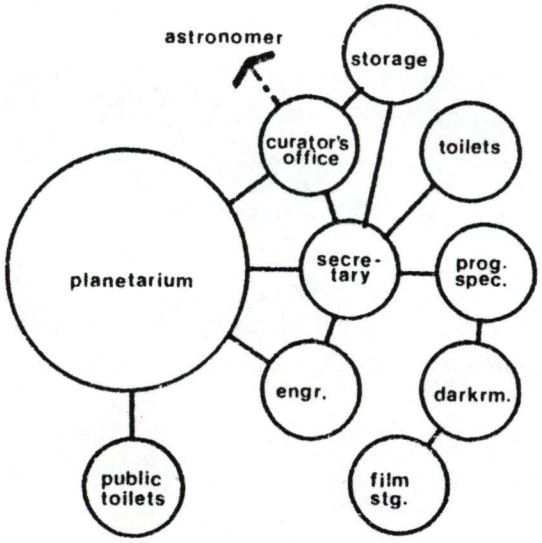
Special Considerations:
weight of equipment; delicate nature of equipment; exhibit potential of large telescope.

Size:
Astronomer's office 150 sqft
Storage 50 sqft
Observatory 3000 sqft
total 3200 sqft

PROGRAM - PLANETARIUM

Function:
To allow viewing of the night sky of any part of the world without problems such as ambient light, pollution, or time of day to affect the viewing, by using a projector to project the image upon the ceiling.

Functional Diagram:



Spatial Characteristics:
Domed ceiling to allow viewing from anywhere in the room. Seats arranged so that space can be used for lecture area also. Star projector at central location in room, can be lowered below the floor when not needed for shows.

Major Equipment:
Star projector, capable of being lowered hydraulically below the floor; control panel for lighting, projector, and music.

Special Considerations:
Domed ceiling made of perforated fiberglass or aluminum.

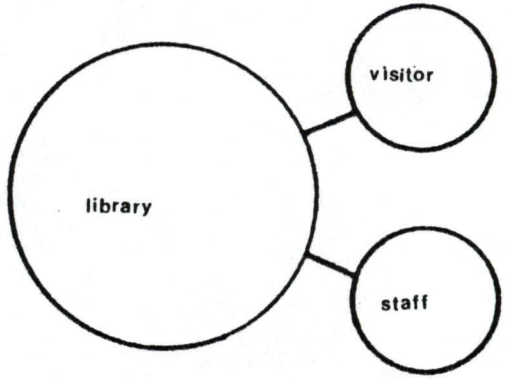
Size:

planetarium, 300 seats	3000 sqft
curator's office	150 sqft
programming specialist	200 sqft
& planetarium assistants	400 sqft
darkroom	75 sqft
darkroom storage	25 sqft
secretary	150 sqft
film storage	50 sqft
public toilets	250 sqft
Engineers Office	200 sqft
Total	4300 sqft

PROGRAM - LIBRARY

Function:
A place for visitors and staff to use books and research materials related to subjects covered in the science center.

Funtional Diagram:



Spatial Characteristics:
Stacks for books; space for seating and reading.

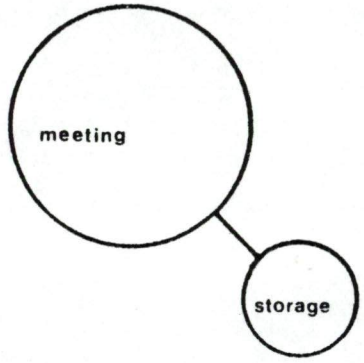
Special Considerations:
Convenient to visitor and staff; quiet location.

Size:
1200 sqft

PROGRAM - MEETING

Function:
A place for civic groups or clubs to hold regularly scheduled meetings; for use by guest lecturers to the science center; for staff meetings.

Functional Diagram:



Spatial Characteristics:
Space to accomodate either large or small groups; for greatest flexibility seating is not fixed to floor.

Size:
1200 sqft

PROGRAM - AUDITORIUM

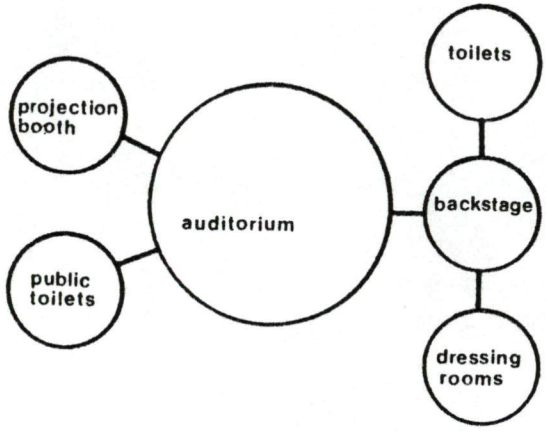
Function:
To allow for the assembly of large groups of people for purposes of showing films, slides, and presenting lectures ; some presentations put on by the science center but the space will also be available on a rental basis to community groups, clubs, school groups and other organizations.

Spatial Characteristics:
Fixed seating; stage area; sloped floor

Size:

auditorium (900 seats)	8000 sqft
toilets	150 sqft each
projection booth	150 sqft
storage	100 sqft
total	8400 sqft

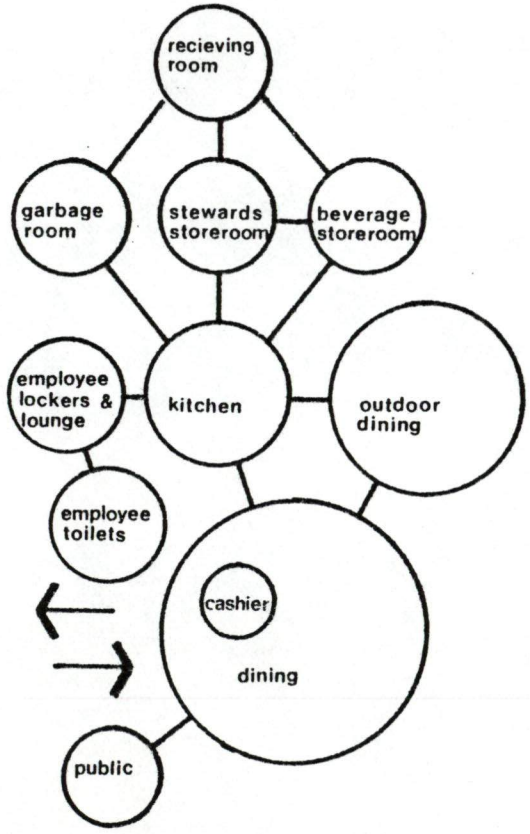
Functional Diagram:



PROGRAM - CAFETERIA

Function:
To provide a quick place for science center visitors and businesspeople to eat lunch or dinner.

Functional Diagram:



Spatial Considerations:
Indoor and outdoor dining; serving line; limited menu; lively atmosphere.

Special Considerations:
Views to river and downtown area; view into science center exhibit area.

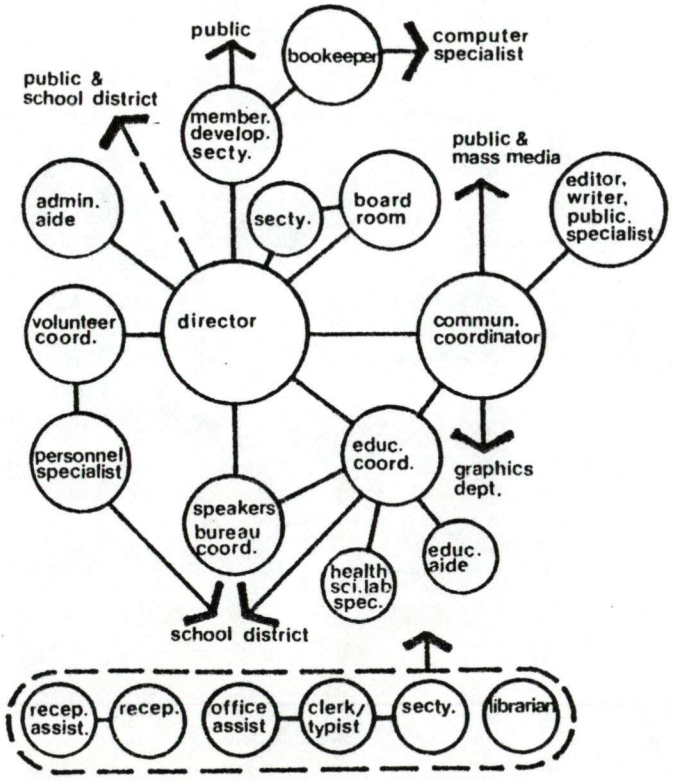
Size:

Dining	indoor- 150 seats	2400 sqft
	outdoor- 50 seats	800 sqft
Restrooms		400 sqft
Kitchen		1500 sqft
Stewards storeroom		500 sqft
Beverage storeroom		150 sqft
Employee lockers		200 sqft
Employee toilets		200 sqft
Recieving room		200 sqft
Garbage room		100 sqft
	total	6450 sqft

PROGRAM - ADMINISTRATION

Function:
To provide the offices and administration spaces necessary for the functioning of the science center.

Functional Diagram:



Spatial Characteristics:
Some private offices; other areas as open office planning.

Special Considerations:
Availability of the administrators to the public; area not associated with the exhibit area.

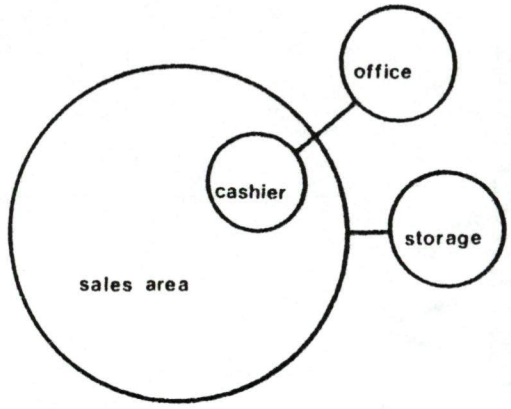
Size:

Directors office	300 sqft
Educational Coordinators office	200 sqft
Health Sc. Lab Spec. office	200 sqft
Volunteer Coord. office	100 sqft
Library	1200 sqft
Bookeepers office	300 sqft
Membership Development & Membership Secr. office	150 sqft
Editor, Writer &Speakers Bureau Comm. Coord., Public serv. & Public. Spec.	300 sqft
Office Assistants (2), Aide, Secretary, Secre. for Dir.,Clerk Recep., Admin. Aide, Per. Spec., Assistant, Internal Comm.	900 sqft
Restrooms	200 sqft
Storage	300 sqft
Board of directors	300 sqft
total	4450 sqft

PROGRAM - GIFT SHOP

Function:
Retail sales of items of interest to science center visitors.

Functional Diagram:



Spatial Characteristics:
Highly visible from exhibit area and from entrances and exits.

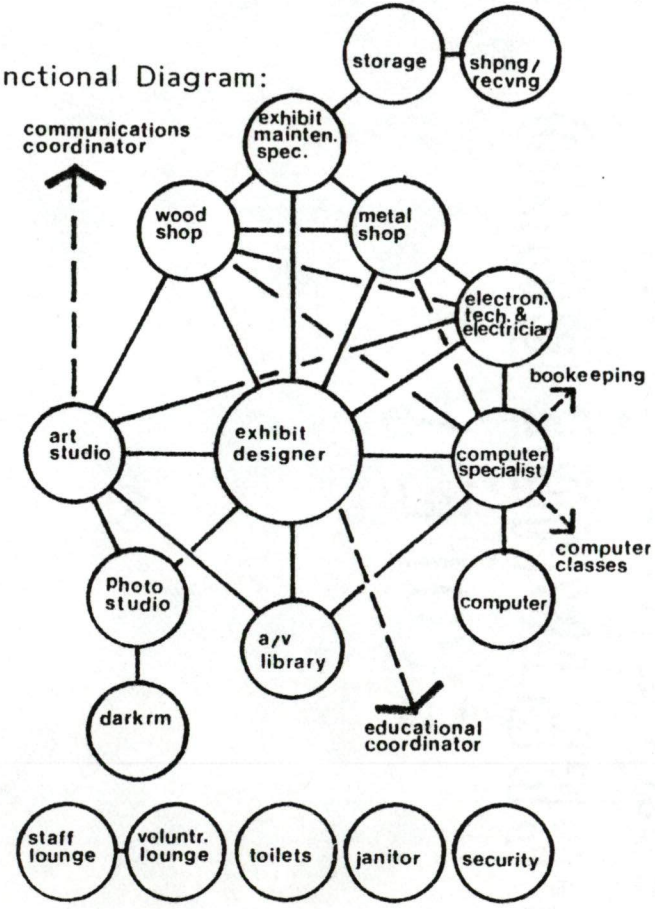
Size:

sales area	1800 sqft
storage	600 sqft
office	150 sqft
total	2550 sqft

PROGRAM - SUPPORT AREA

Function:
Space necessary for the design, maintenance, construction and storage of exhibits, as well as for maintenance in the science center facility.

Functional Diagram:



Spatial Characteristics:
Some private offices; open office planning area; area is not readily accessible to the public.

Special Considerations:
Close relationship to administrative and exhibit area.

Size:

A/V Library	200 sqft
Electronics Shop	400 sqft
Electrical Shop	300 sqft
Art Studio	250 sqft
Exhibit Designers office	400 sqft
Exhibits Maint. Spec. Shop	300 sqft
Computer Spec. office	150 sqft
Computer room	200 sqft
Photographers studio	150 sqft
Darkroom	150 sqft
Security Personnel office	200 sqft
Custodian closet	100 sqft
Staff toilets	200 sqft
Wood shop	2800 sqft
Metal shop	1400 sqft
Storage	6000 sqft
Staff Lounge	400 sqft
Volunteer Lounge	400 sqft
Shipping/ Recieving	800 sqft
total	14800 sqft

PROGRAM - STAFF FUNCTION

Staff/ Staff Functions:
Ticket seller/ Information;
Sells tickets and dispenses information to those wishing to attend the planetarium show, exhibit area or auditorium.

Tour guide(volunteer);
Guides school or club groups through the center. Works closely with the Educational Coordinator.

Demonstration Specialist (volunteer);
Answers visitors' questions about exhibits; demonstrates complex exhibits.

Astronomer;
Would lecture to visitor groups and clubs; would work closely with the planetarium coordinator and the educational coordinator. He would have an office for filing, lecture preparation, and research.

Observatory Assistant (volunteer);
Would help astronomer with lectures and maintenance of equipment.

Curator;
Deals directly with the public, giving 30-35 shows per week; works with audio/visual materials; works closely with Educational Coordinator to schedule lectures and classes; oversees the operation of the planetarium.

Engineer;
Works with the Programming Specialist to install and arrange new programs; also preventive maintenance of the planetarium.

Planetarium Programming Specialist;
Puts together new shows; assistant to the Planetarium Curator, and also works with the engineer; use of photography and motion picture equipment.

Planetarium Assistant (volunteer);
May present pre-recorded programs to the public; prepares scripts, artwork, slides, movies or models which may go into a program; works closely with planetarium personnel.

Secretary;
Services shared by observatory and planetarium personnel.

Audio/visual Projectionist (volunteer);
Would work with the A/V specialist and photographer; show films and slides in the auditorium, the planetarium, and other multi-use rooms.

Office Manager;
Deals with bookeeping and ordering.

Cashier;
Check out at sales counter.

Shipping/Storage;
Handles all incoming and outgoing packages; stocks shelves and maintains storage area.

Director;
Overseer of all science center activities; sets mood and trends in center; deals directly with the public.

Educational Coordinator;
Maintains liason with school district; establishes the educational programs of the science center for students and adults.

Health Science Lab Specialist;
Expert in health sciences; trains lecturers; doesn't deal directly with the public; works with Educational Coordinator.

Membership Development;
Fund raising activities and planning; membership drives; works with Membership Secretary; reports directly to Director.

Volunteer Coordinator;
Recruitment and training of volunteer staff; makes job assignments to volunteers; supervises their performance; reports directly to the Director.

Communications Coordinator;
Director of internal and external publications; deals directly with the public; works with editors, writers, and graphics departments.

Editor, member bulletin;
Works with Communications Coordinator, Membership Secretary, Speakers Bureau Coordinator, Educational Coordinator and Writer

Writer, member bulletin;
Writer of the monthly bulletin that goes to supporting members; works with the Editor, Communications Coordinator, Membership Secretary, Speakers Bureau Coordinator, and Educational Coordinator.

Office Assistants (2);
Run errands; answer phones; type; may be assigned to an administrator during heavy workloads.

Librarian;
Maintenance of a staff library.

Educational Aide;
Assistant to the Educational Coordinator; sets up laboratories and meeting rooms for groups and guest lecturers.

Secretary;
Secretary for the Director

Secretary;
General office secretary.

Receptionist;
Answers telephone; directs people.

Bookeeper;
Maintains books; works closely with computer personnel

Membership Secretary;
Works with membership developer and bookeeper; writes letters for fund raising and membership.

Personnel Specialist (volunteer);
Maintenance of the personnel records of the volunteer staff; maintains liason with school district personnel offices.

Receptionist Assistant (volunteer);
Assistant to the full time receptionist.

Administrative Aide (volunteer);
Aide to the director of the science center.

Internal Communications (volunteer);
Responsible for the dissemination of information to the staff; supplies information brochures to visitor racks; works with Communications Coordinator to produce the staff newsletter.

Public Service and Publications Specialist (volunteer);
Works with Communications Coordinator to prepare news releases, publicity campaigns, and contacts with the mass media.

Speakers Bureau Coordinator (volunteer);
Arranges guest lecturers and speakers; works with Educational Coordinator and Director.

Audio/Visual Specialist;
Librarian with A/V responsibilities; checks out and maintains equipment for use by other departments; familiar with A/V techniques and equipment.

Audio/Visual Projectionist (volunteer);
Works with A/V equipment to give shows in the various meeting rooms; works with A/V Specialist and Photographer.

Electronics Technician;
Hooks up new exhibits; maintenance of exhibits; works with exhibit designer, cabinet maker, A/V Specialist, and Computer Specialist.

Electrician:
Works with Exhibit Designer, A/V Specialist, Cabinet Maker, Computer Specialist, and Electronics Technician; works on new exhibits and maintenance.

Artist:
Works with Exhibit Designer, Commercial Artist, and Communications Coordinator.

Commercial Artist:
Works with Exhibit Designer and A/V Specialist; specializes in signage and labeling of exhibits.

Exhibits Designer:
An Architect or Industrial Designer; designs and often builds exhibits; close contact with carpenters, exhibit area, and specialists.

Exhibits Maintenance Specialist:
Repairs and maintains exhibits; works with Exhibit Designer, A/V Specialist, Computer Specialist, Electronics Technician, and others.

Computer Specialist:
Controls the computer for use with exhibits, bookeeping and accounting; teaches classes; works with Exhibit Designer.

Photographer (volunteer):
Takes photos for science center handouts, displays, and exhibits; works withArtists, Exhibit Designers, and A/V Specialist.

Safety/Security Personnel (4):
Control of traffic and crowds; give directions and information.

Custodians (4):
General cleanup; two stay during operating hours, two after hours.

Woodworker:
Builds and repairs exhibits; works with exhibit designer, A/V Specialist, Commercial Artist, and other specialists.

Machinist:
Makes parts for exhibits; maintenance.

Warehouseman:
Works in storage area.

Assistant Warehouseman (volunteer)

PROGRAM - SUMMARY

EXHIBIT	15,000 sqft
OBSERVATORY	3,200 sqft
PLANETARIUM	4,300 sqft
MEETING	1,200 sqft
AUDITORIUM	8,750 sqft
GIFT SHOP	2,550 sqft
CAFETERIA	6,450 sqft
ADMINISTRATION	5,310 sqft
SCIENCE CENTER SUPPORT	14,800 sqft
net	61,560 sqft
take 30% for circulation & mechanical	
gross	80,000 sqft

criteria

CRITERIA

CRITERIA - LAND USE

The Greenville County Zoning Commission has designated the area surrounding the site chosen as CBD (Central Business District). The zoning requirements are very simple, leaving lot coverage, building height, and parking to the discretion of the developer.

CRITERIA - PARKING

Since the Greenville County Zoning Commission does not have a parking requirement for buildings in the CBD, the following criteria were used to determine the number of spaces needed for the science center:

Administrative staff - 1 space / 200 sqft	20
Support staff - 1 space / 200 sqft	36
Exhibit area - 1 space / 300 sqft	50
Auditorium - 1 space / 4 seats	225
Planetarium - 1 space / 4 seats	75
Gift shop - 1 space / 300 sqft	8
Cafeteria - 1 space / 350 sqft	20
total	378 spaces

2% or 8 of these spaces should be 12 feet wide for use by the handicapped.

CRITERIA - FIRE SAFETY

The Southern Standard Building Code establishes the break between small and large assembly spaces at 1000 seats. Based on the 900 seat auditorium, TYPE II construction is indicated. TYPE II construction is that type in whichthe structural members, including exterior walls, interior bearing walls, columns, floors, and roofs are of noncombustible materials and are protected so as to have fire resistance not less than that specified in the table below:

STRUCTURAL ELEMENT	FIRE RATING
party and fire walls	4 hours
interior bearing walls and columns	3 hours
supporting more than one floor	2 hours
supporting one floor only	2 hours
supporting a roof only	2 hours
floor	1 hour
roof	3 hours
exterior bearing wall	

CRITERIA - PLUMBING

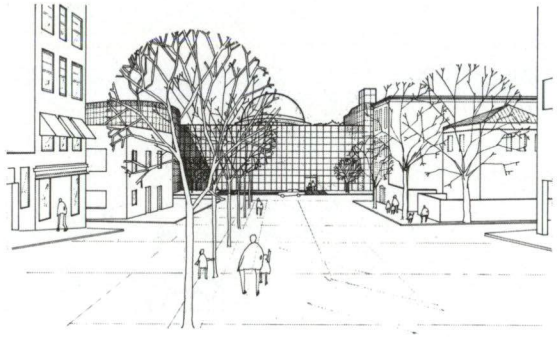
Using the 900 seat auditorium, the 300 seat planetarium, and the exhibit space to estimate the number of people in the science center, the following criteria were established for the toilet rooms:

Mens Toilet;
3 lavatories
5 urinals
5 toilets

Womens Toilet;
3 lavatories
9 toilets

To accomodate the handicapped, each toilet room shall have one stall three feet wide by five feet deep with handrails on each side and a 32" door that swings out. Also of the five water fountains required for the complex, at least one shall be accessible by the handicapped.

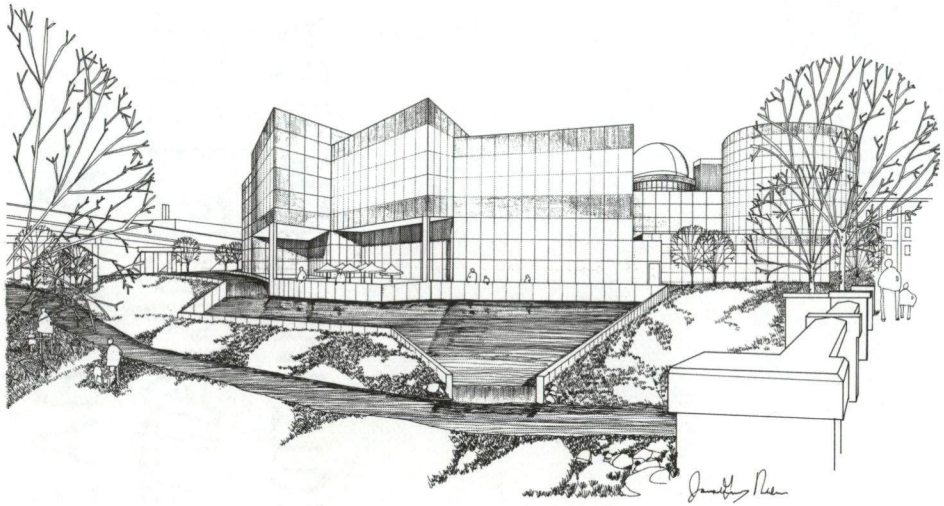
graphic solution

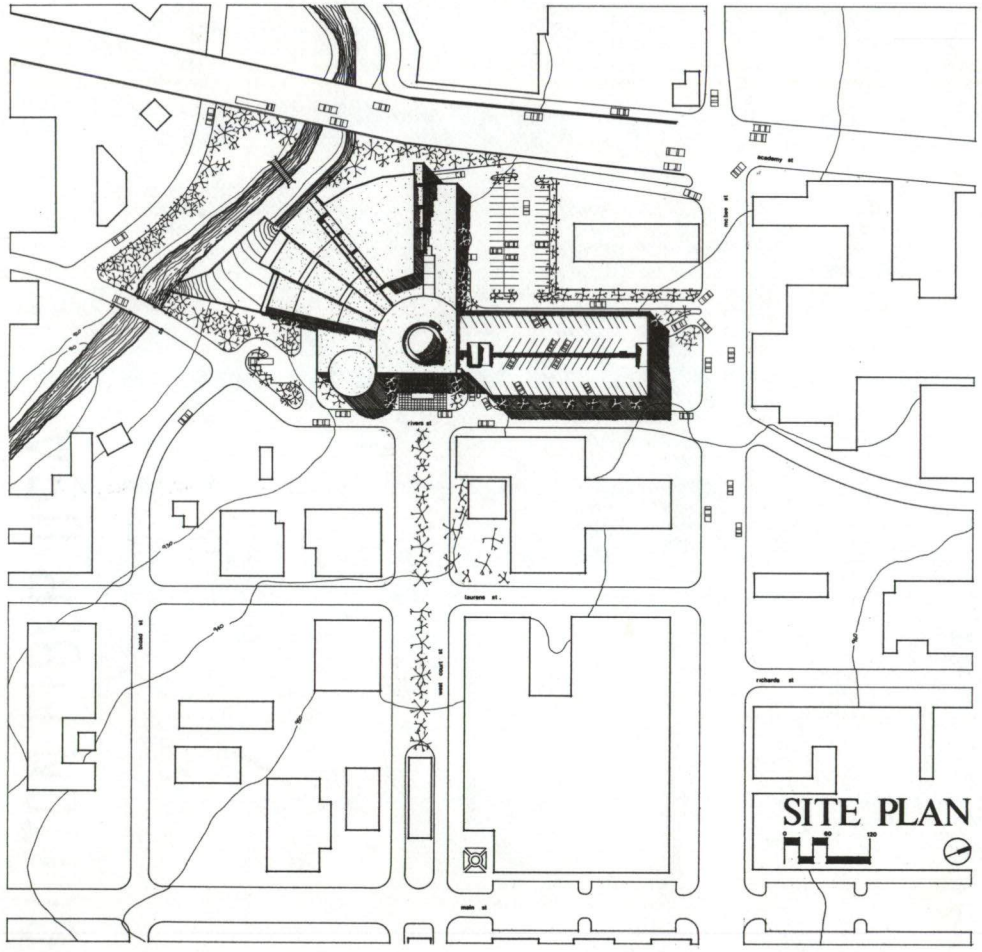


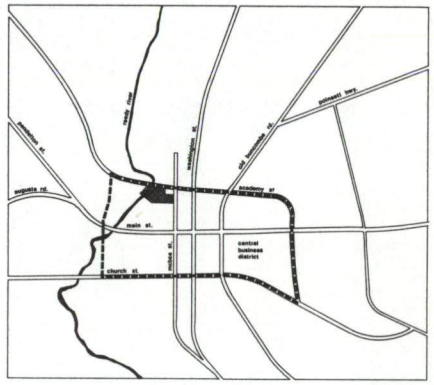
GREENVILLE SCIENCE CENTER

GREENVILLE, SOUTH CAROLINA

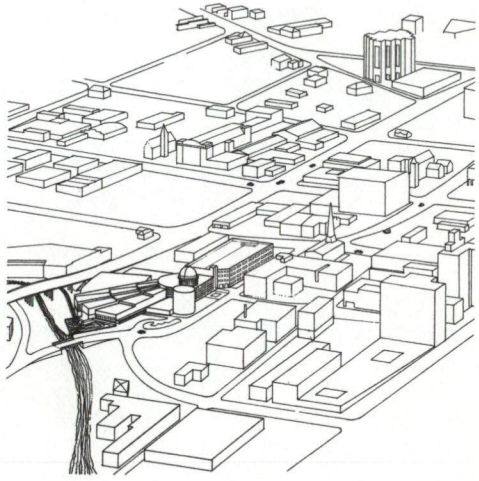
greg nielsen

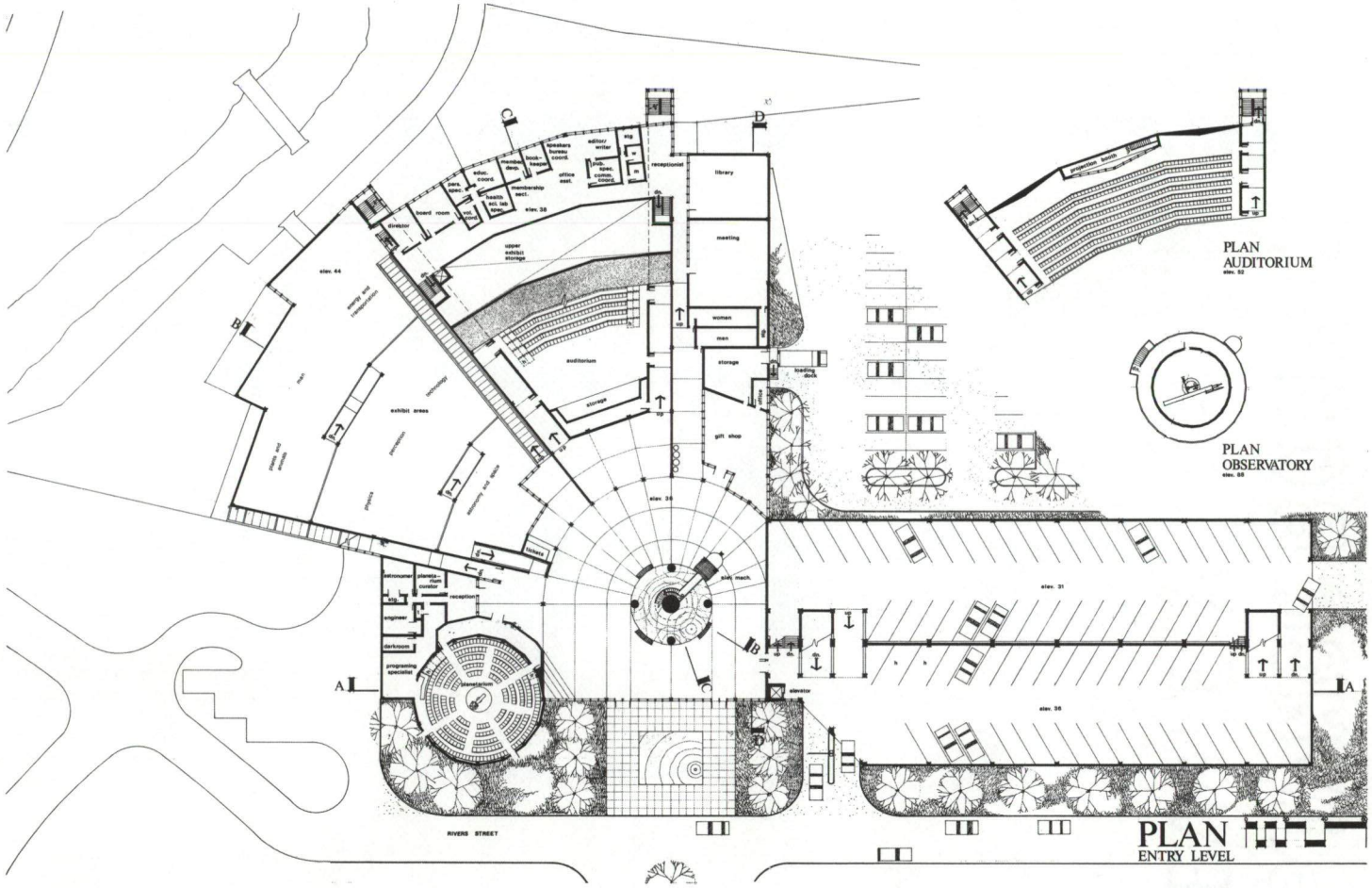


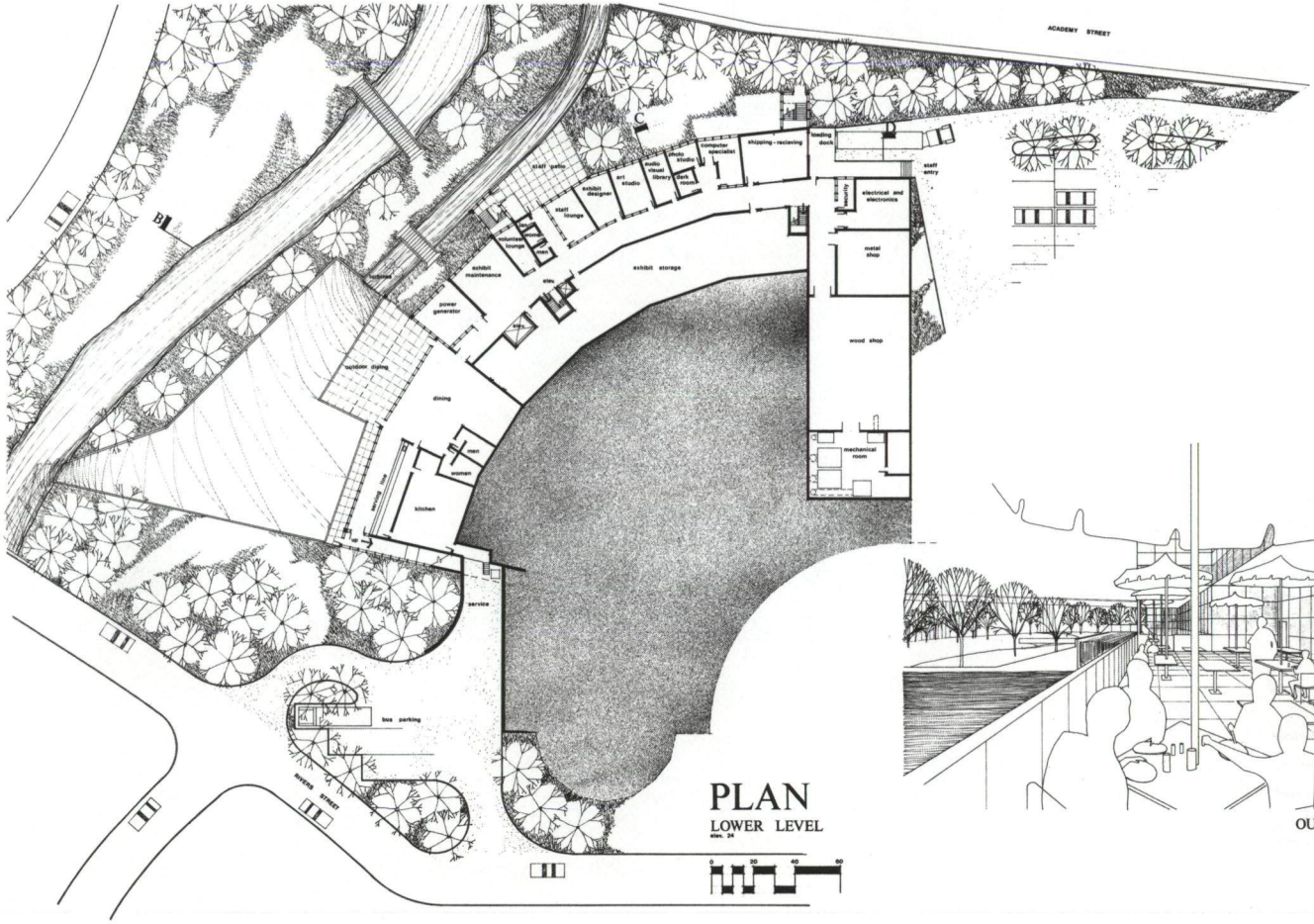

academy st
richards st
laurens st
main st
SITE PLAN
0
60
120


academy st
main st
church st
central business district

LOCATOR



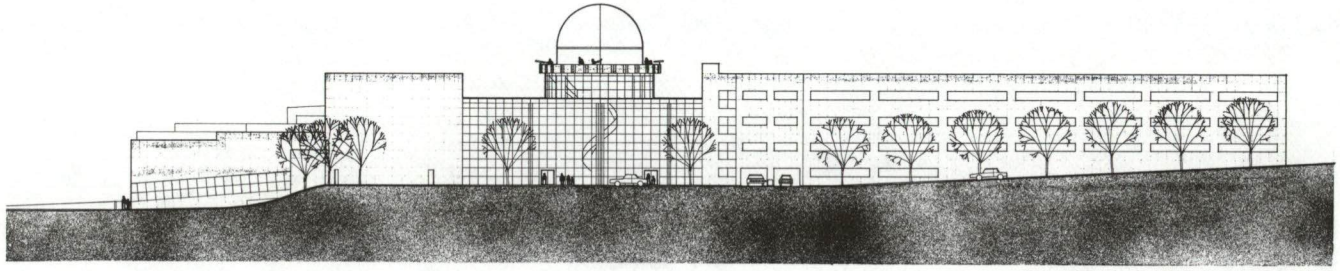

PLAN
AUDITORIUM
elev. 52
PLAN
OBSERVATORY
elev. 58
PLAN
ENTRY LEVEL
RIVERS STREET
elev. 44
elev. 38
elev. 34
elev. 31
elev. 26
director
board room
receptionist
library
meeting
women
men
storage
auditorium
exhibit areas
gift shop
loading dock
elevator
reception
planetarium
darkroom
engineer
programming specialist
projection booth



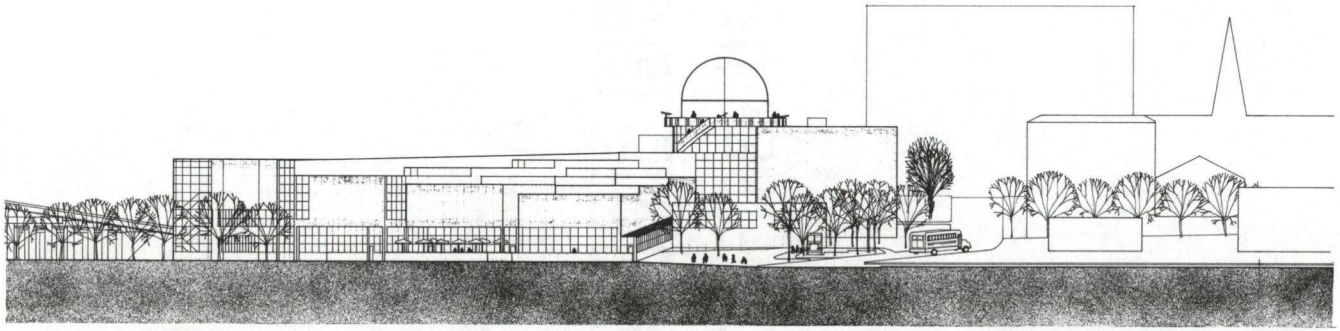
PLAN

LOWER LEVEL

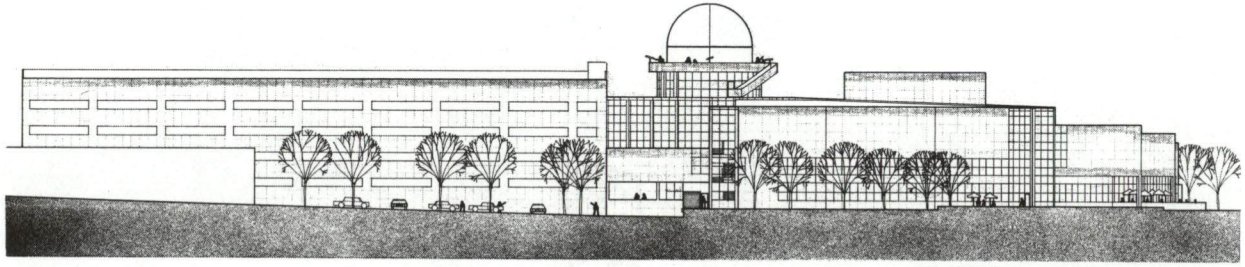
OUTDOOR DINING



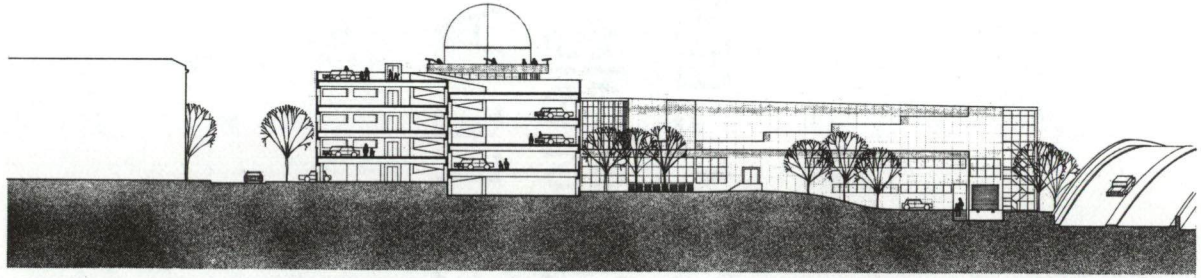
EAST ELEVATION



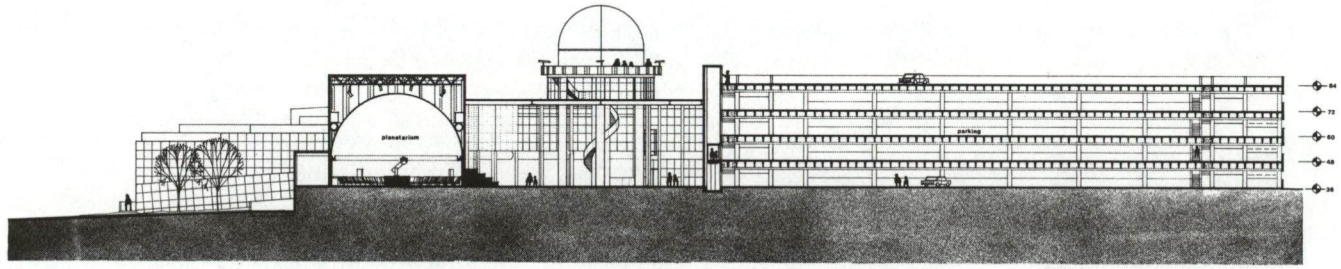
SOUTH ELEVATION



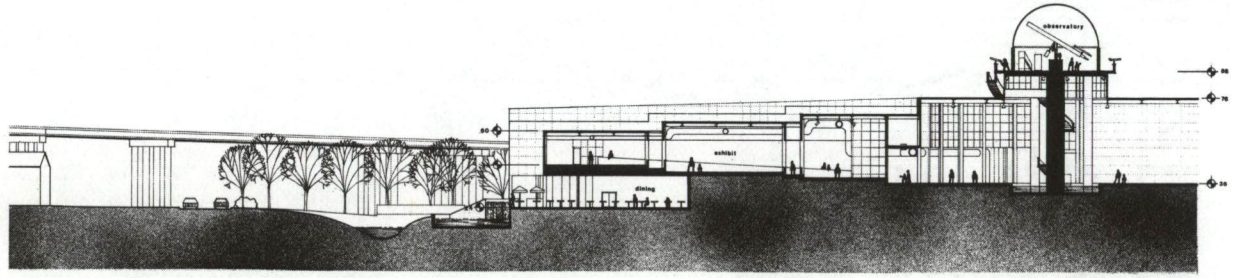
WEST ELEVATION



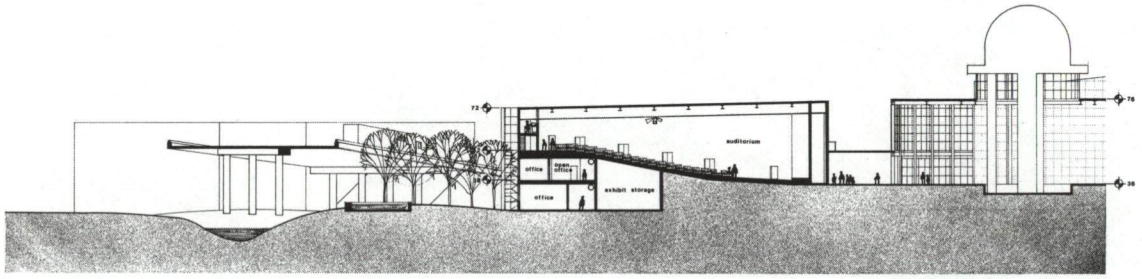
NORTH ELEVATION



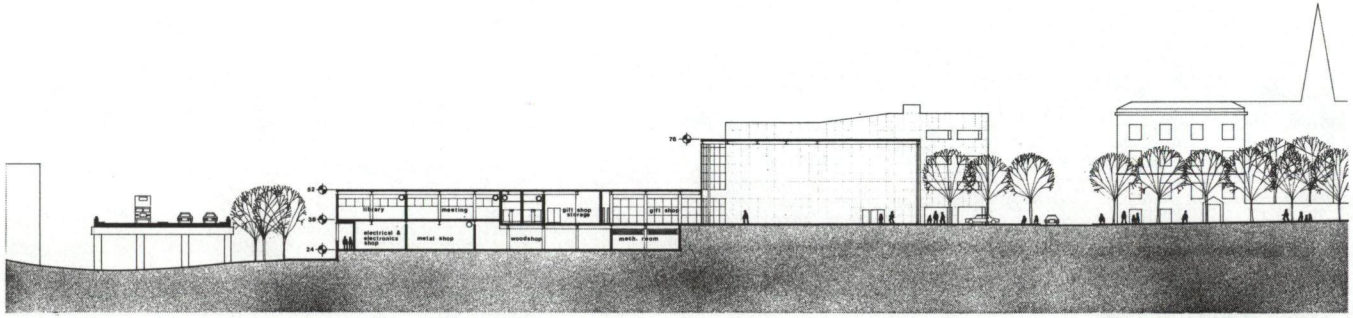
SECTION A-A



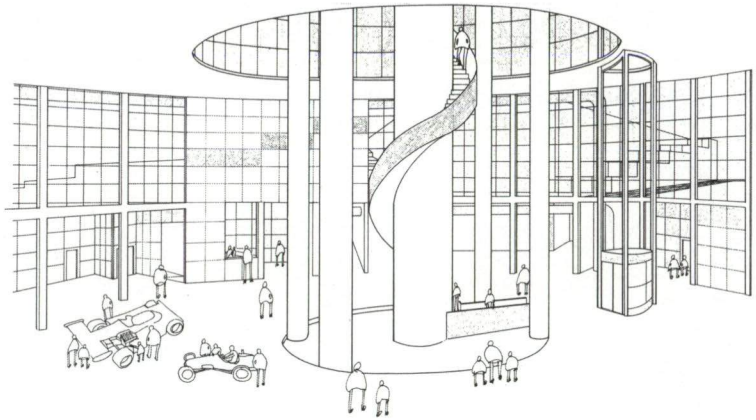
SECTION B-B



SECTION C-C



SECTION D-D



ATRIUM

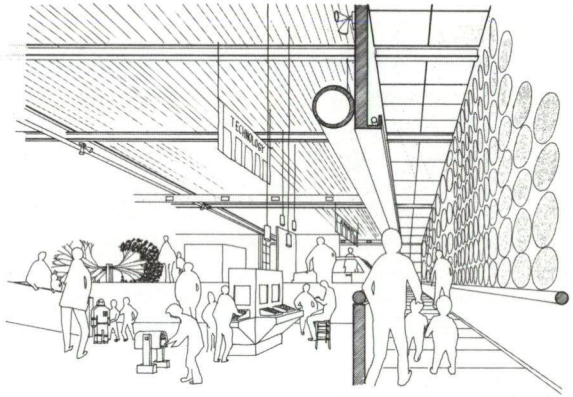
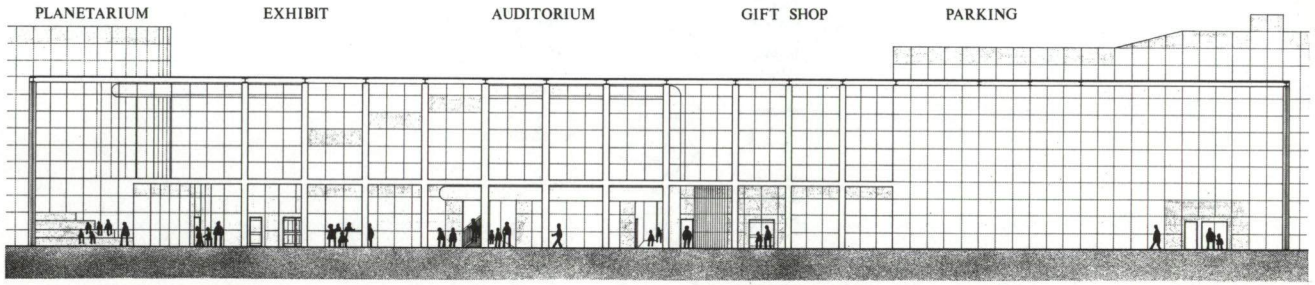
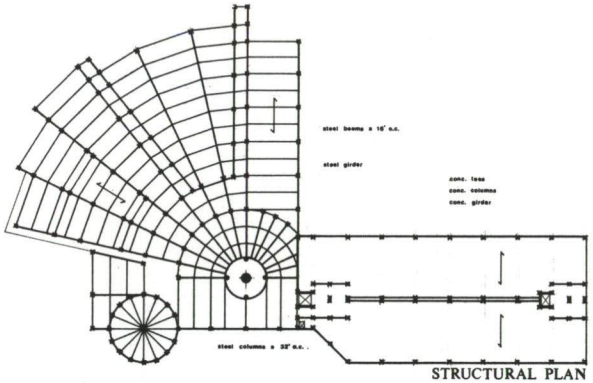


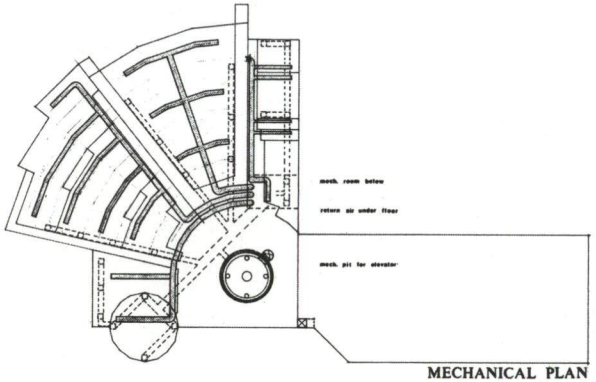
EXHIBIT AREA



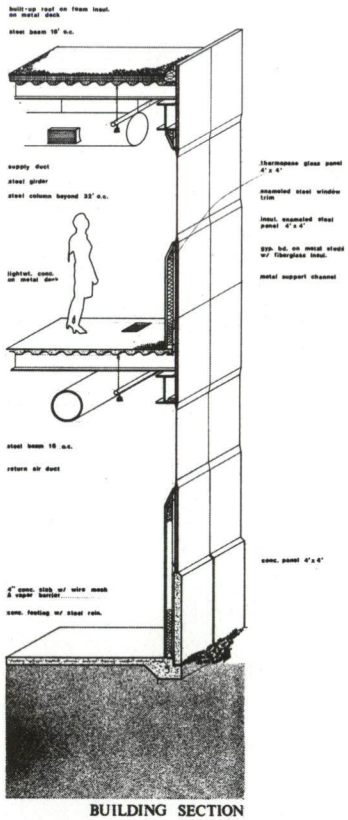
DEVELOPED ATRIUM ELEVATION



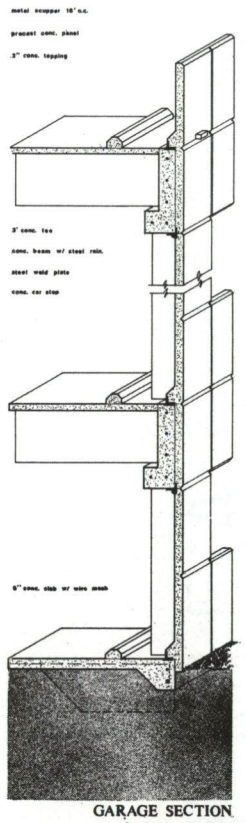
STRUCTURAL PLAN



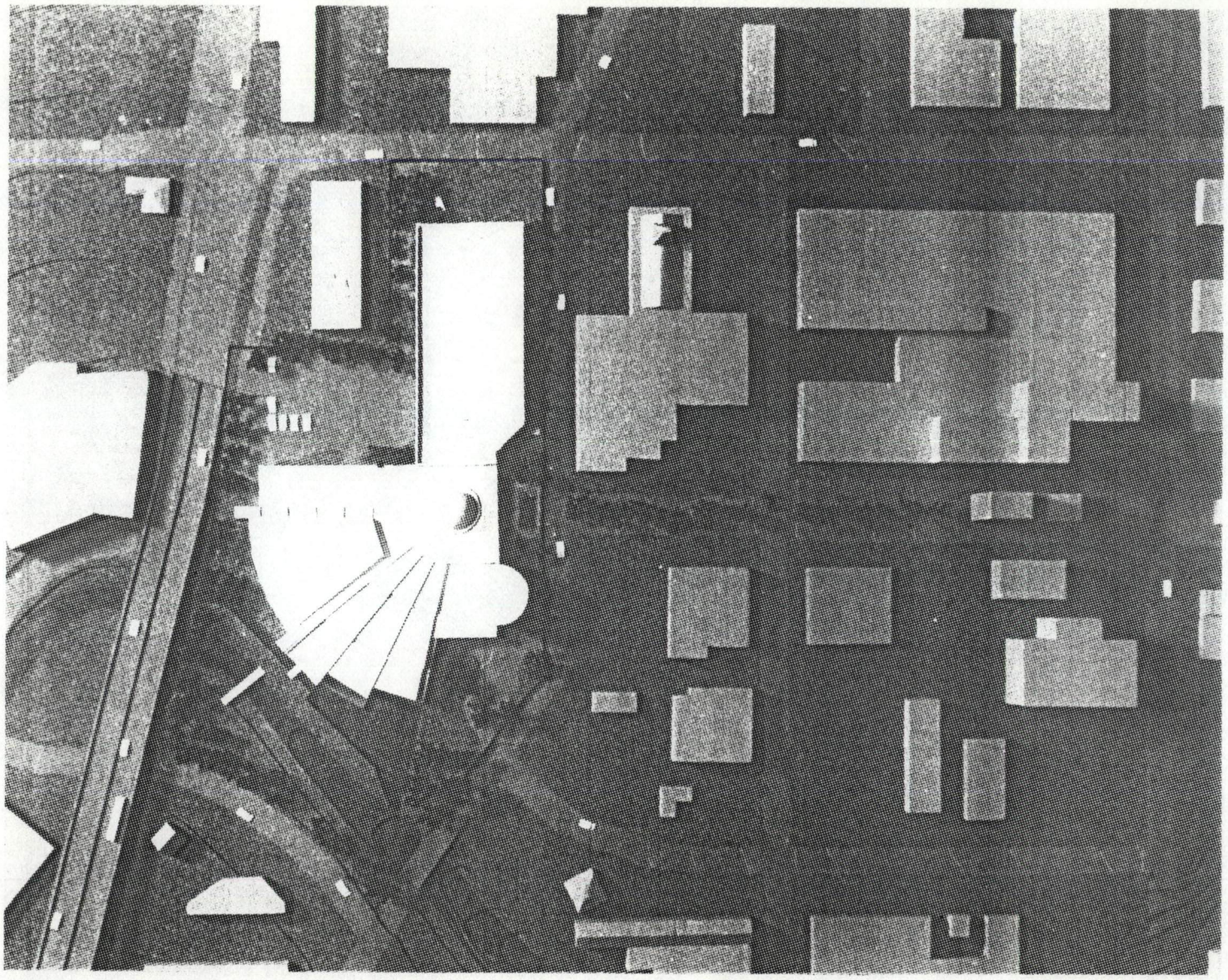
MECHANICAL PLAN

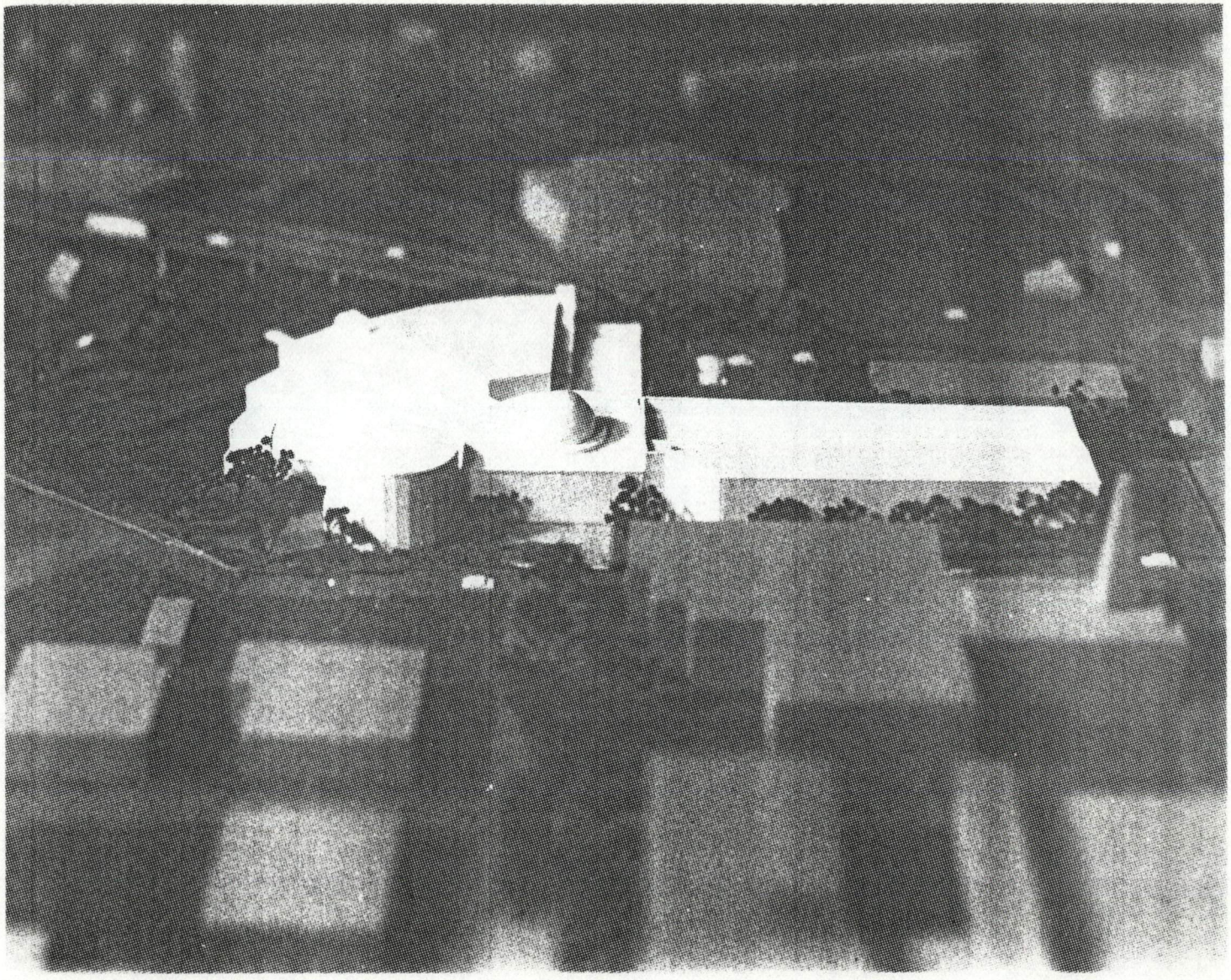


BUILDING SECTION



GARAGE SECTION





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