

James River Nature Center:
a Study of
Context and Concept

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This thesis submitted to the faculty
of the Virginia Polytechnic Institute & State
University in partial fulfillment of the
requirement for the degree

Master of Architecture

July, 1999
Blacksburg, Virginia

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To my Grandparents:

Alvin and Rhoda Eichholz

&

George and Grace Richards

I would like to extend my deepest gratitude to everyone who has aided in the completion of this project, especially my parents, for giving me this opportunity.

I would also like to thank my thesis committee:
Mike O'Brien, William Brown, and Jack Davis
for their helpful insight, criticism, and support.

Finally, I would like to thank
Terry Corean
for her patience, love and support.

ABSTRACT

Contextually, each program has a set of inherent issues, stemming from physical, social and historical conditions. This CONTEXT can be helpful, if not essential, in developing the architectural questions that lead to a CONCEPT. To establish and cultivate a concept in architecture is to give an otherwise dangling set of elements an autonomous existence as an architectural place. The James River Nature Center provided a complex program that allowed for the exploration of context and concept as a thesis.



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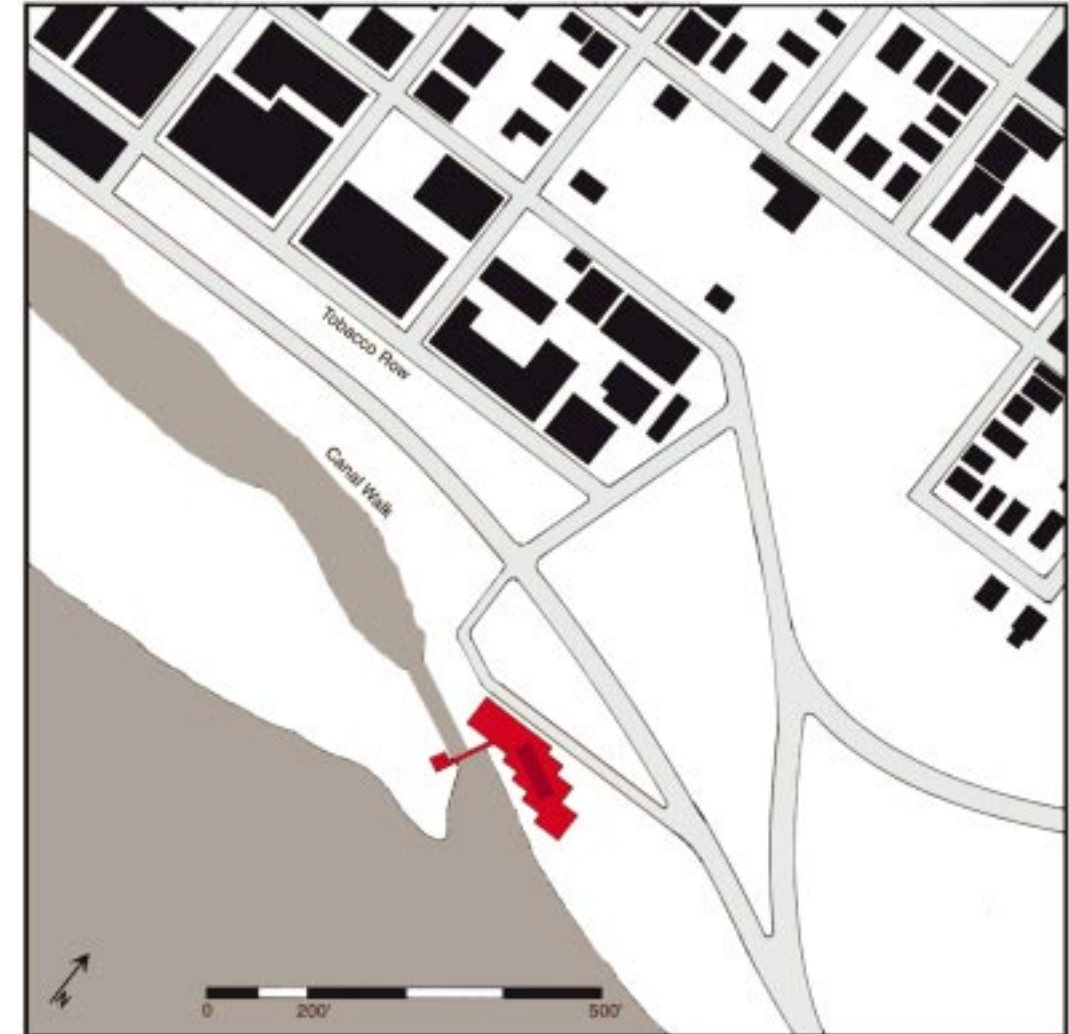
I. CONTEXT

The city of Richmond was once one of the foremost cities in the country, primarily due to its location on the fall line of the James River. The fall line is the point where ships can no longer make their way upstream. The city's prominence was also due to the ambition of men like George Washington, who designed and implemented the country's first canal system there. The docks in Richmond where the canals meet the James River were once responsible for 70 % of U.S. trade.

Due to advances in shipbuilding and the burning of Richmond in 1865, the city has become only a second tier American city. Recently the city has begun to grow again with its inhabitants longing for what the city should have become. They realize that to grow Richmond must move into the future, but also preserve the character given to it by its historic past and its roots in the James River. The movement has begun downtown to reconnect the city to the river by rebuilding the historic canal works and encouraging growth along the river front. The project is a nature center that will be devoted to increasing the public awareness of the life and history of the James River. Exhibits will include species of flora and fauna from all realms of the James River ecosystem. Secondary exhibits will introduce visitors to area geology, man's impact on the river, flooding, and the river's history.

The site is located at the edge of the city of Richmond, in the floodplain, between the city and river. It lies between an abandon industrial area and the James river, adjacent to the Kanawha canal and historic docks of Richmond. The development of this site is crucial to the city's successful redevelopment.

The project is complex. The James River Nature Center will acquaint the people with the river and its importance to the city, revitalize the abandoned Tobacco Row industrial area, and anchor the end of the Richmond canal walk. It will also serve as the link between past and future, city and river, and man and nature.

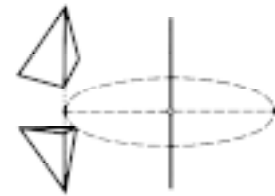


II. CONCEPT

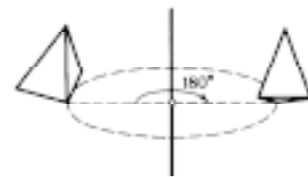
Crystallography and symmetry

I have introduced a geological concept into the project based on previous knowledge gained from the study of crystallography. Crystallography is the study of crystals and how they are ordered based on the principles of symmetry. Each crystal can be defined into one of 32 classes based on three types of symmetric operations.¹

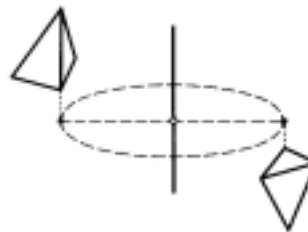
1. Symmetry with respect to a mirror-reflection plane.



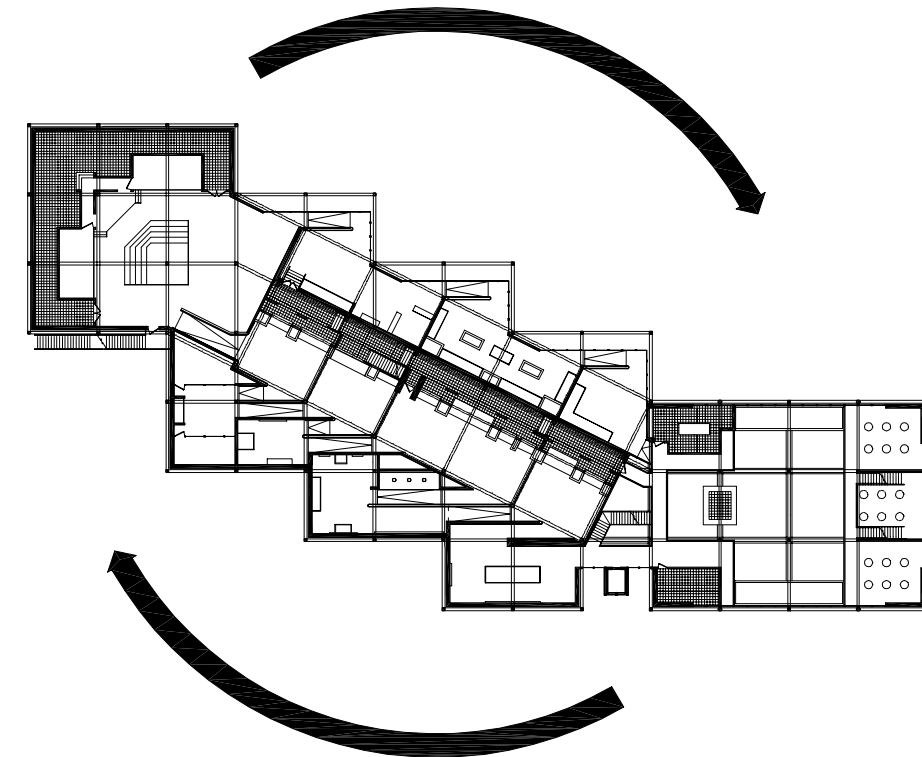
2. Symmetry with respect to a rotation axis.



4. Rotary Inversion. This occurs when a crystal repeats its appearance every so often when it is rotated and then inverted.



The nature center does not represent any one of these 32 classes of crystal. The symmetric operations were used, when possible, to govern ordering decisions, especially in 2-D. However, because of the complexity of the project none of these symmetric operations were used in their truest sense.



II. CONCEPT

Crystal Systems

As stated before there are 32 classes of crystals, each based on their symmetric properties. These 32 classes fit into one of 6 crystal systems. These 6 crystal systems are based on the length and angular relationship of a crystal's axes. The 6 crystal systems are:²

1. Isometric.
3 equal axes,
all perpendicular.



4. Hexagonal.
1 major axis,
3 minor axes
perpendicular to
the major axes.



2. Tetragonal.
2 equal axes,
all perpendicular.



5. Monoclinic.
2 unequal axes
oblique to each
other and
perpendicular to
another axis.



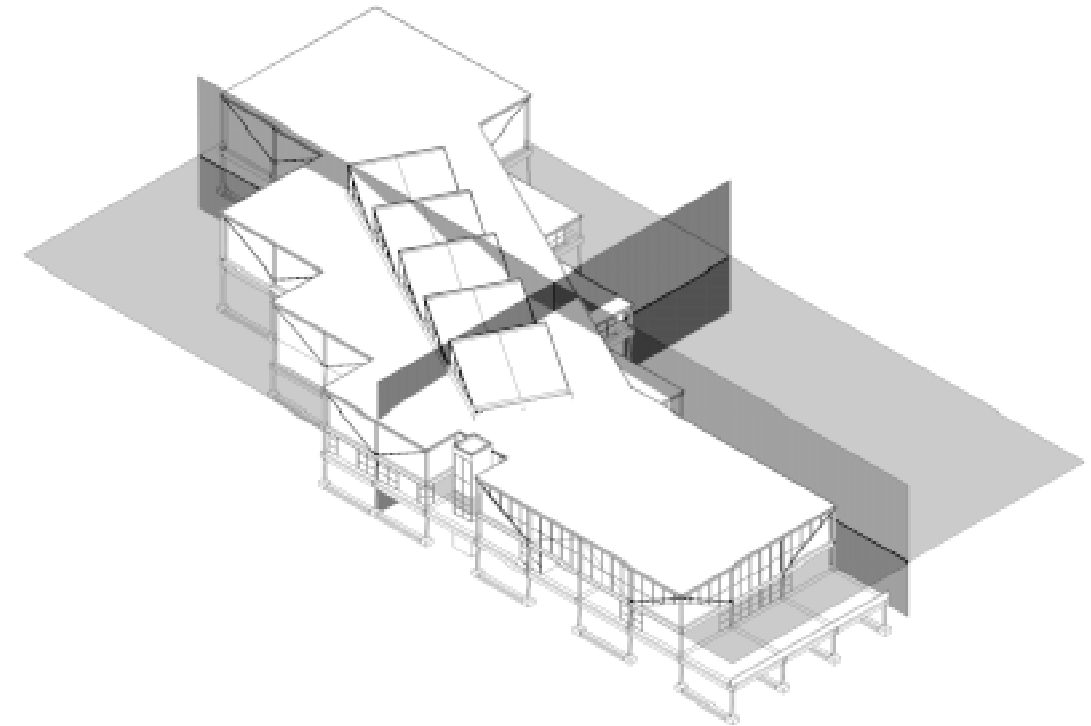
3. Orthorhombic.
3 unequal axes,
all perpendicular.



6. Triclinic
3 unequal axes,
all oblique to each
other.



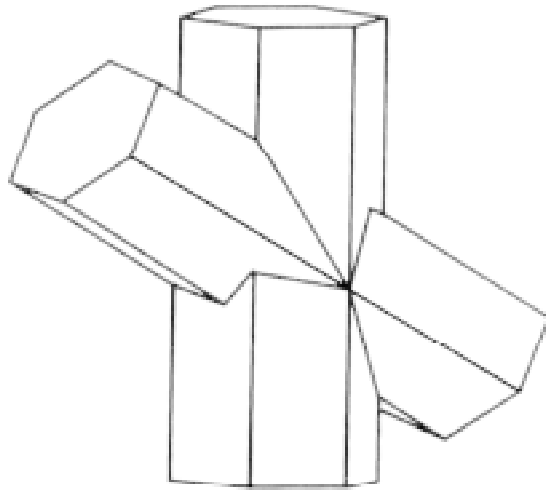
The nature center could be classified into the orthorhombic crystal system. In other words, it has 3 perpendicular axes, all of differing lengths.



II. CONCEPT

Twinning

A concept that was used in this project and not introduced earlier is the concept of twinning. Twinning occurs in crystallography when a crystal has another “crystal” form within it or is attached to it. There actually is only one crystal. The twinning occurs from a defect in formation. These defects are usually caused by changes in temperature or pressure during the growth process. . . .



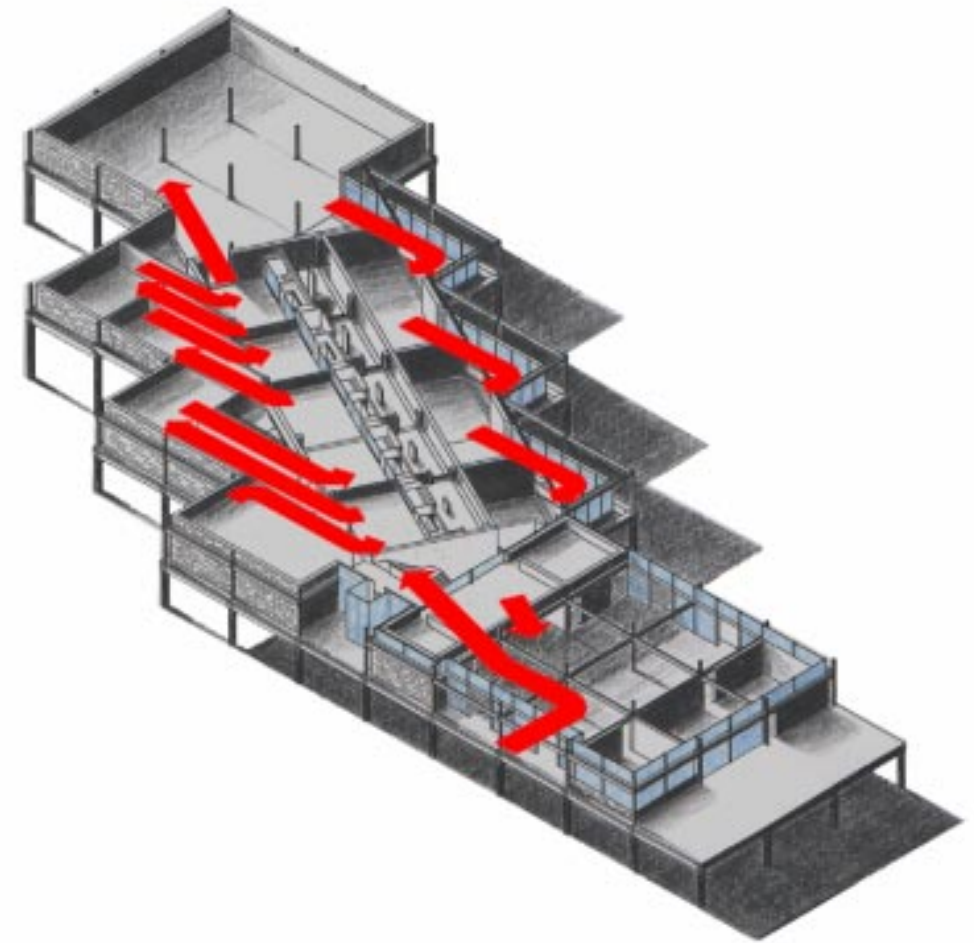
. . . The structure of the Nature Center is laid out on a grid that is orthogonal to that of the Richmond city grid, but shifts to become orthogonal to the James River in the main exhibit. The bend in the river at this site causes the city grid to lose its perpendicularity to the river's edge, likewise the Nature Center responds to this “defect.”



II. CONCEPT

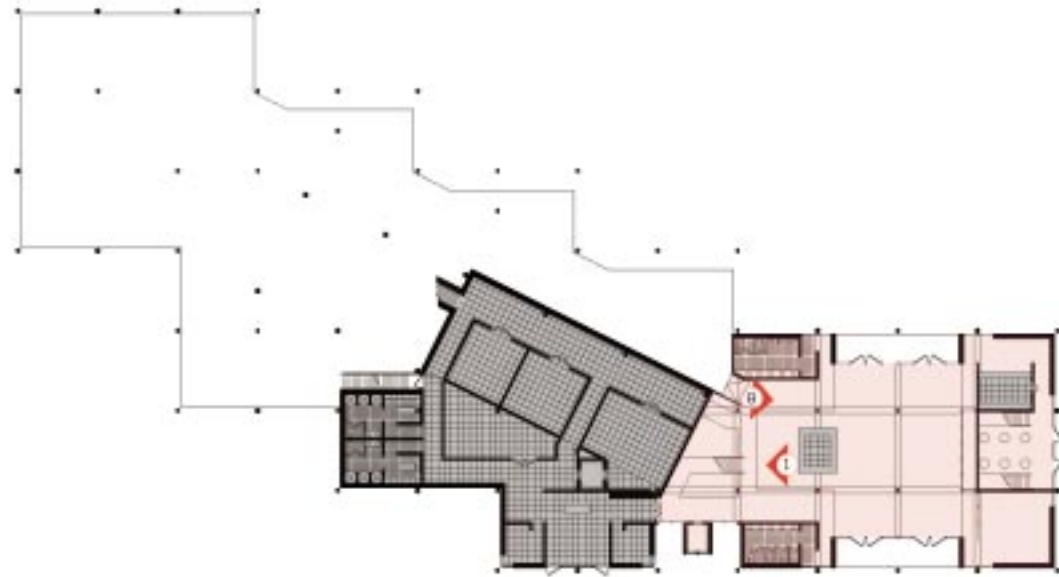
Movement

The visitors experience the nature center by making an ascension to the first exhibit and then winding their way down, through and around the other exhibits. The experience will be similar to taking a ride down the James River, sometimes moving quickly and sometimes just letting the current take you where it may.

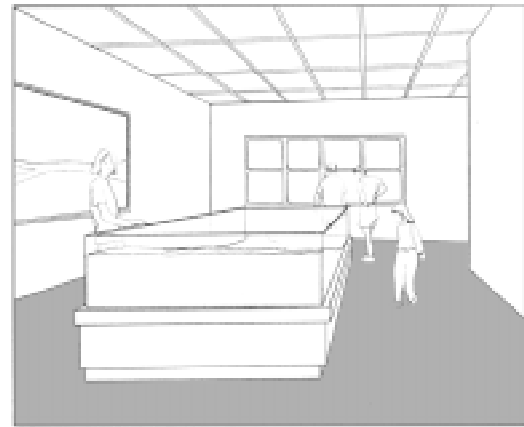


II. CONCEPT

Movement



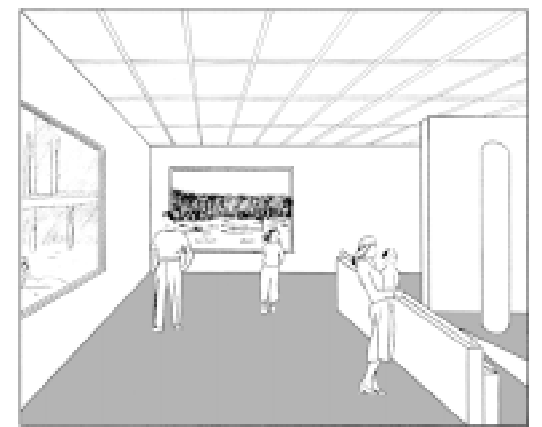
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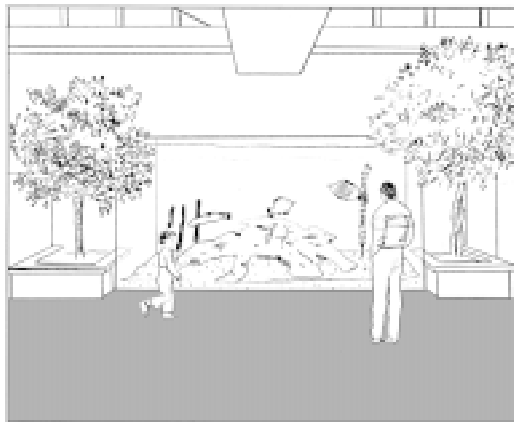
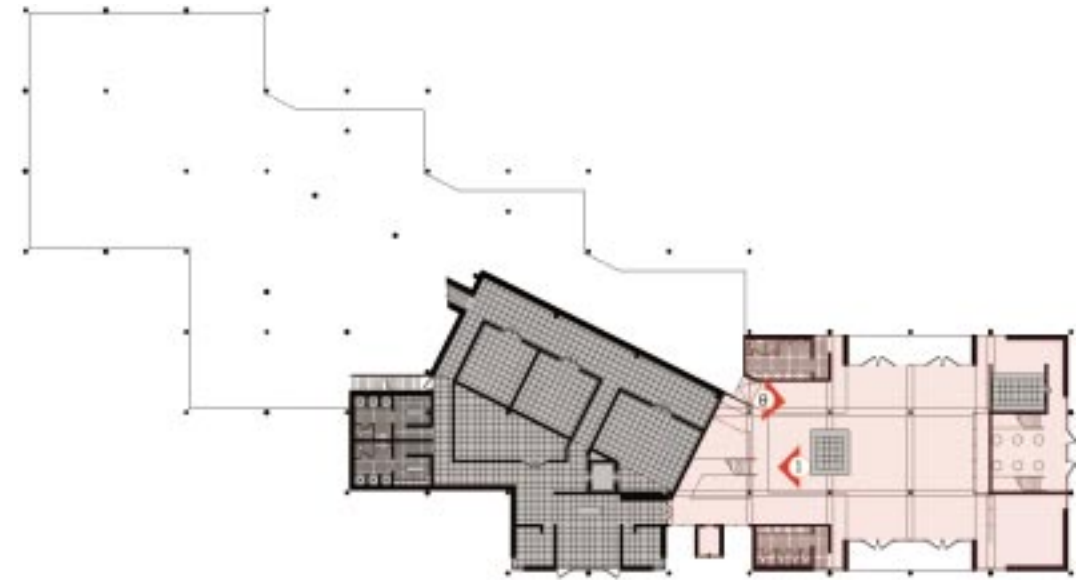
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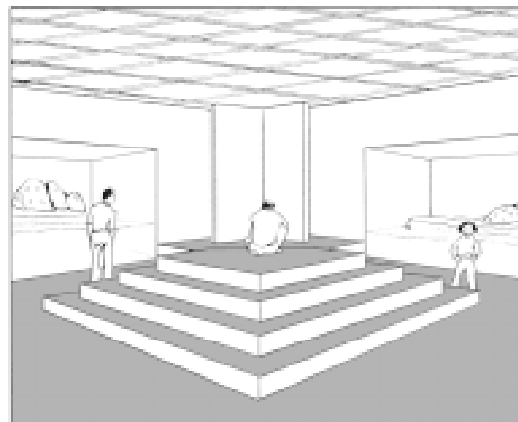
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II. CONCEPT

Movement



5



6



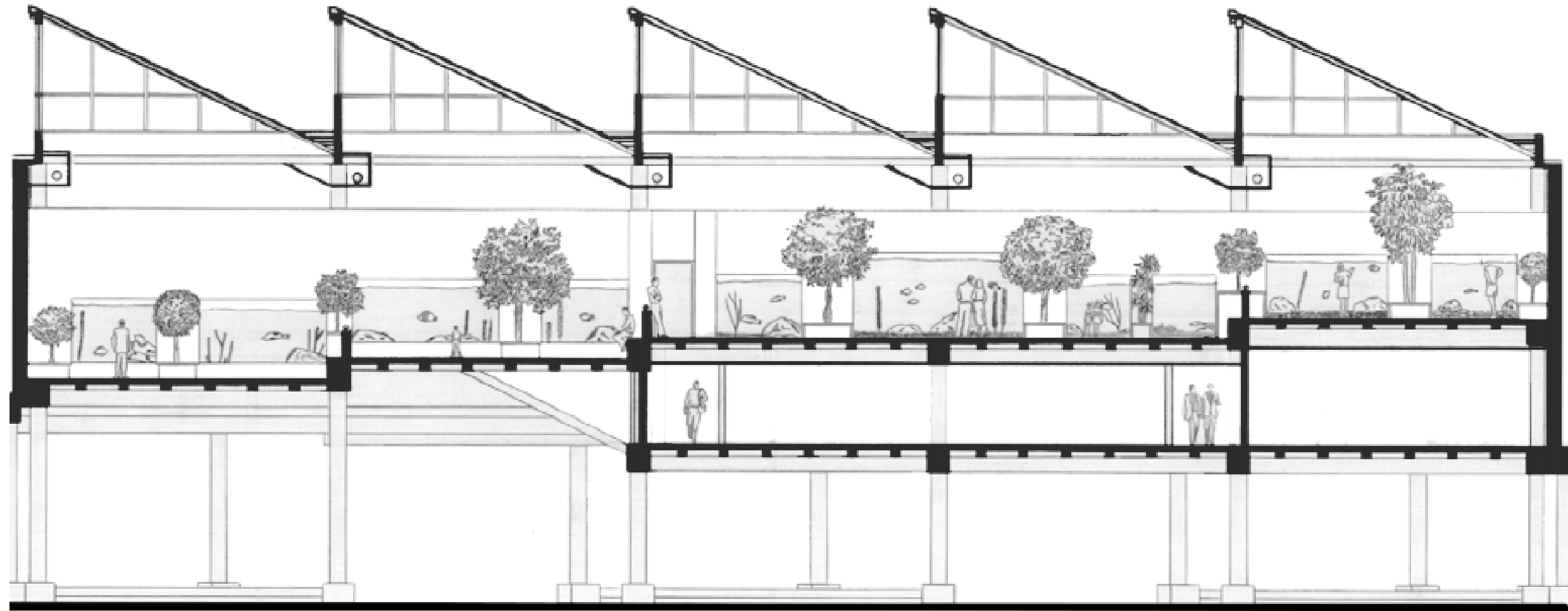
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8

II. CONCEPT

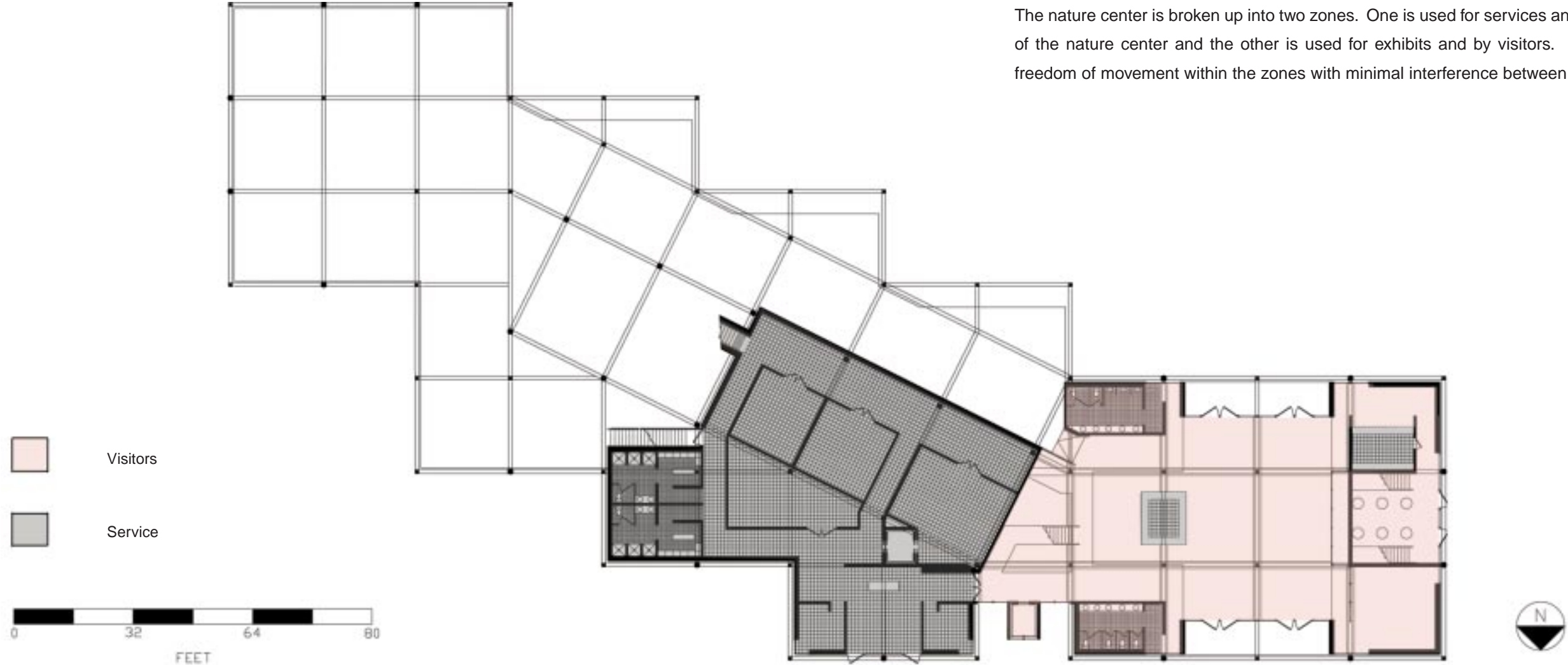
Movement



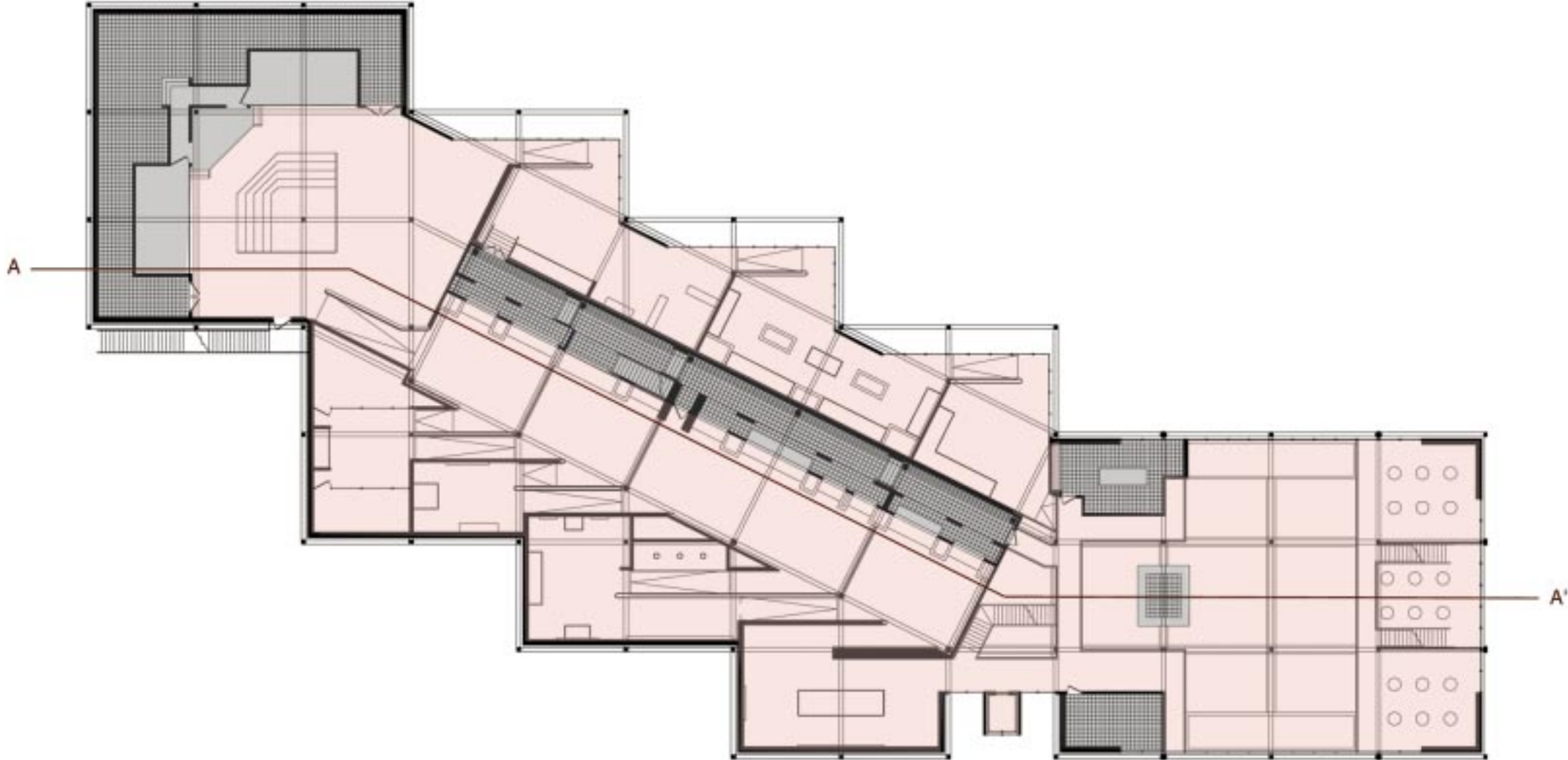
II. CONCEPT

Movement/Function

The nature center is broken up into two zones. One is used for services and by employees of the nature center and the other is used for exhibits and by visitors. Each allows for freedom of movement within the zones with minimal interference between the two.



Movement/Function



II. CONCEPT

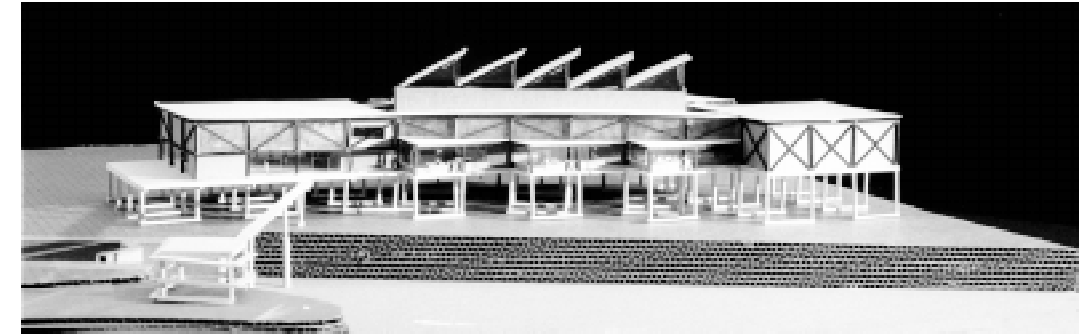
Movement/Function



III. CONSTRUCTION

Flooding

The James River offers the city a natural and beautiful retreat, but can also become a powerful and devastating force in times of flood. Most of the city's structures are protected by a floodwall; however, in this section of the city no flood wall exists. Structures here are either protected by natural barriers or they are raised above flood level heights. The nature center is protected from minor floods by the Kanawha canal. It is also raised up on concrete columns to protect it during times of major flooding.



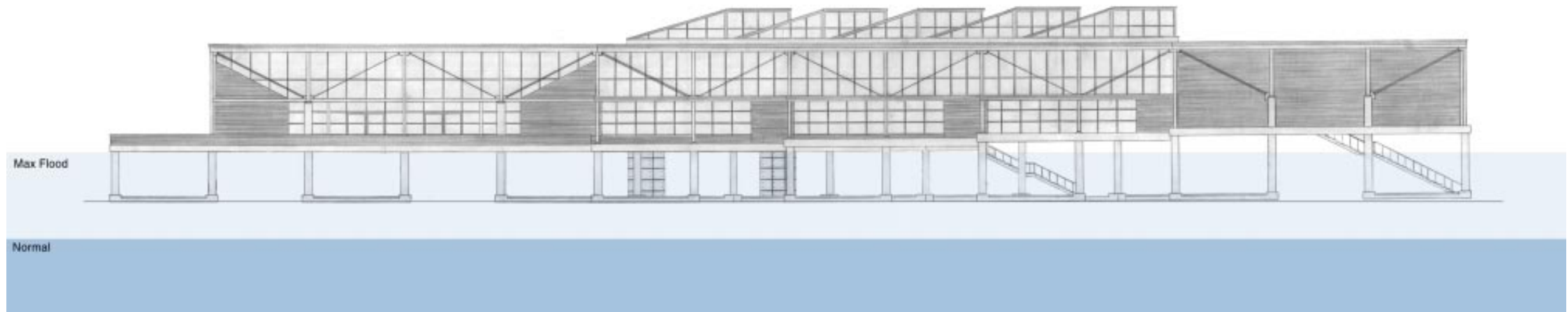
III. CONSTRUCTION

Flooding



III. CONSTRUCTION

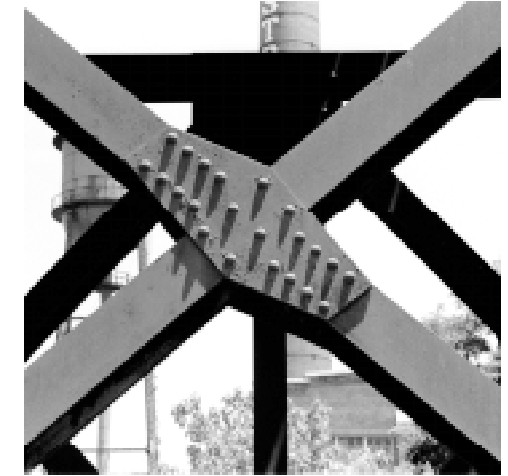
Flooding



III. CONSTRUCTION

Materials

The prevalent materials in the area include concrete, steel, and red brick. These materials are abundant in this microcosm of industrial structures. Concrete is used mostly in foundations and for raising structures above flood levels. Steel exists in the area as the major component of a train trestle that runs along the river's edge near the nature center. The red brick is used widely in the area, especially in the tobacco row warehouses, as red clay is abundant in the area. These materials are reused and reinterpreted in the skeleton and skin of the nature center allowing it to exist in the language of the existing industrial structures. Together, with its neighbors, the James River Nature Center creates a unique urban condition, where the man-made meets the serenity of nature.



III. CONSTRUCTION

Materials



Entrance



Lobby

III. CONSTRUCTION

Materials



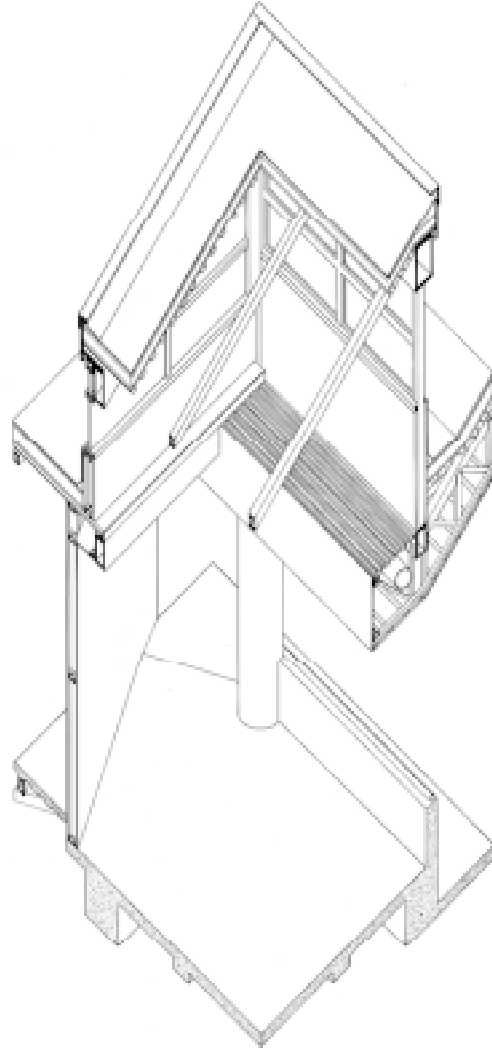
Main Exhibit



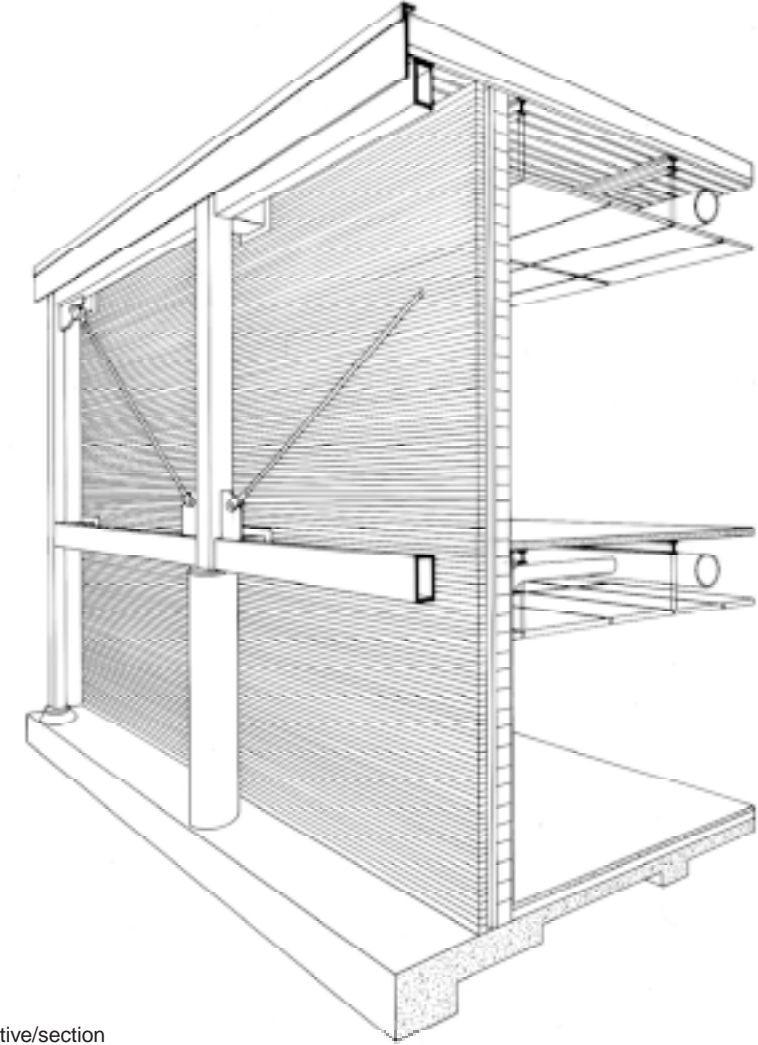
Main Exhibit

III. CONSTRUCTION

Materials



axon/section



perspective/section

IV. ENDNOTES

¹ Vainshtein, Boris, *Fundamentals of Crystals*, Springer, New York, 1994, p. 67.

² Wade, Franklin, *Elements of Crystallography and Mineralogy*, Harper & Brothers, New York, 1960, p. 40, 56, 67, 83, 91, 97.

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