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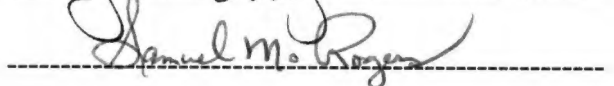
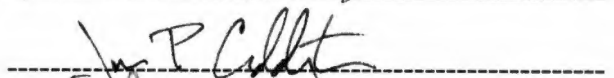
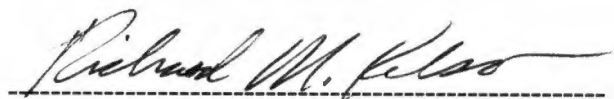
I am submitting herewith a thesis written by Yaomin Xue entitled "Harmony and Environment: Feng-Shui and Sustainability in Contemporary Architectural Design." I have examined the final copy of this dissertation for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Master of Architecture, with a major in Architecture.



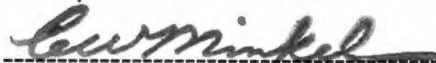
Tracy Mior-McClean, Major Professor

Mior-

We have read this dissertation
and recommend its acceptance:



Accepted for the Council:



Associate Vice Chancellor and
Dean of The Graduate School

HARMONY and ENVIRONMENT

Feng-Shui and Sustainability in Contemporary Architectural Design

A Thesis Presented for the
Master of Architecture Degree
The University of Tennessee, Knoxville

Yaomin Xue
August 1999

DEDICATION

This thesis is dedicated to Lu Jin (my wife) and YuJing Xue (my son) who have given me selfless support and countless inspiration. They make my dreams come true.

ACKNOWLEDGMENTS

I gratefully acknowledge the following people for their input and help on my endeavor of this thesis.

First I thank my thesis committee, Jon Coddington, Richard Kelso, Tracy Moir-McClean and Sam Rogers, for their contributions. They offered their knowledge and experience from thesis development to design solution, from technical adjustment to landscape integration.

Special thanks goes to Jon Coddington who has been my thesis committee member, my studio and seminar professor, my program director and advisor, my mentor and my friend. He has given me endless support to make my experience at the School of Architecture a successful one.

I would also like to thank William Rudd, Dwayne Pendley, and William Schriver for their help and support.

My wife and son deserve the credit for their support in enabling this thesis to become a reality.

ABSTRACT

This study explores the idea of *harmony* as a relevant one for contemporary design, in particular for sustainable design which concerns the relationship between building and environment. Chinese Feng-Shui directly engages the idea of *harmony* and offers potential for architectural design to reach the balance between man, man-made and nature.

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I. INTRODUCTION

A. QUESTION

Is it possible to reengage the idea and fact of *harmony* in contemporary architectural practice?

B. THESIS STATEMENT

In today's contemporary practice the issue of *harmony* as an architectural goal is rarely addressed, much less achieved. This is not surprising since contemporary architectural thought has not addressed *harmony* in a consistent or operative way. For instance, neither Venturi nor Tschumi mentioned the word in their treatises. Perhaps it is time to reinvestigate and reclaim this honored word in the architectural lexicon within the context of the increasing globalization of architecture. This thesis will turn to the Chinese tradition of Feng-Shui which directly engages the issue of *harmony* as it relates to the built environment and natural environment. At the same time, this study will also investigate how the principles of sustainability can make *harmony* a relevant idea once again in contemporary architectural practice. From these two points, a solution of harmonious relationships among man, the man-made, and nature will be explored.



Primitive Hut
Frontispiece by
Marc Antoine Langier

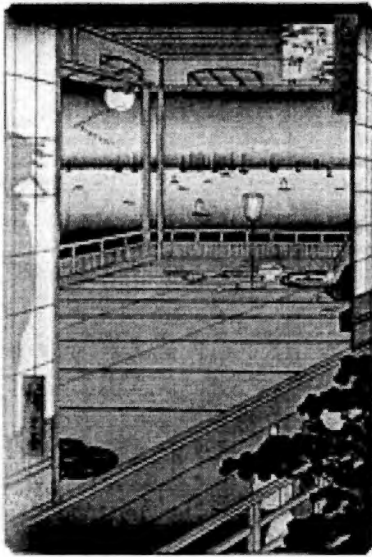
C. ISSUES

Main Issue:

Harmonious relationships of architecture/landscape, nature, and man.

Sub-Issues:

- 1) Harmonious relationship between the building and environmental forces,



Moon-Viewing Point
Oriental Print

- 2) Harmonious relationship between the building and the landscape,
- 3) Harmonious relationship between the building and other man-made structures,
- 4) Harmonious relationship within the building,
- 5) Harmonious relationship between the building and the users.

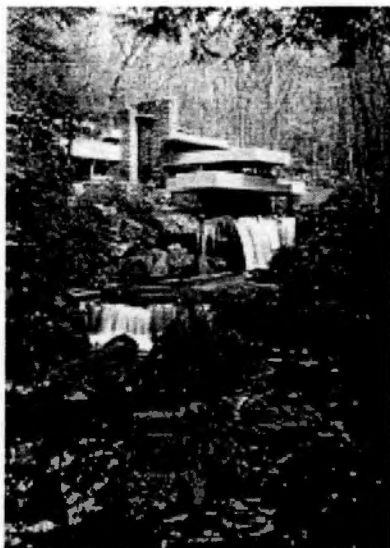
D. RATIONALE

In the contemporary architectural world, there are many dis-harmonic buildings, many of which can be described as "object buildings" or "sick buildings".

An object building only focuses on itself and ignores its context, with no coherence between the building and its environment. The "object building" breaks the balance and unity of the wholeness.

The term "sick-building syndrome" is no longer a new term. These buildings neglect the fundamental purpose of architecture as a safe and healthy shelter for the users, not to mention the higher level aesthetic feeling of the space. Technically they neglect the relationship between the building and natural environment, and overlook the opportunities of working with environmental forces, such as natural lighting and ventilation, to achieve the harmonious relationship between the building and nature, and therefore to achieve the harmonious and healthy relationship between the building and its users.

Making healthy and environmentally sensitive buildings to achieve harmonious relationships between man, the man-made, and nature is critical for us today and tomorrow. Feng-Shui linked to Sustainability offers the opportunities to achieve this goal.



Falling Water
by Frank Lloyd Wright

II. DEFINING THE THESIS INVESTIGATION

A. KEY TERMS

1. Harmony is fine balance between parts and whole, a coherent tension between variety and unity. Harmony is not necessarily achieved by uniformity; it can include counter-points which enhance the whole.

Architecturally, the harmony is achieved when the relationships between a building's elements are balanced and the relationship between building, built-environment, natural forces and users are reconciled and enhanced by each other as an integrated whole.

2. Environment is the surroundings, including the natural environment and the built environment, which affect the existence of a building. Whether the building is sustainable depends on if its relationship with the environment is harmonious,
3. Feng-Shui is the art of siting a building and the skill of designing with reference to climatic conditions and the physical landform so that the building is in harmony with nature and in balance with other man-made structures.
4. Sustainability is concerned with the wellbeing of humankind and of the planets, the harmony between built environment and natural environment, and with continued balanced growth and human development. Sustainable architecture and landscape are the realization of environmentally sensitive and re-

sponsive expression as a part of the evolving matrix of nature.

The definition of sustainability offered by the World Commission on Environment and Development is: "Meeting the needs of the present without compromising the ability of future generations to meet their own needs."

B. STRUCTURE

Harmony

Feng-Shui

- Qi (unity of site and natural forces)

- Yin & Yang (tension and balance)

- Five Elements (generative sequence and harmonious relationships)

Sustainability

- Working with the Climate

 - (harmony with the natural environment)

- Respecting for the Site

 - (harmony with the built environment)

- Spirit

 - (harmony with users)

C. METHOD AND PROCESS

Through a review of literature (refer to the bibliography), the basic principles of Feng-Shui and Sustainability will be introduced that are applicable to harmonious architectural design: these principles will establish relationships between the building, natural forces, the built environment, and the users.

Contemporary architectural language will be used to interpret these principles and explore the opportunities of applying them to the project. The project is an addition to a contemporary building, which will test the possibility of a harmonious design of structure with site.

III. DEVELOPMENT OF THESIS

A. FENG SHUI

1. BASIC PRINCIPLES OF FENG-SHUI

The basic principles of Feng-Shui include the theory of Qi, the Yin-Yang theory, and the Five Elements theory. These three theories are entwined with each other. This characteristic reflects ancient Chinese understanding of the environment: all things in the universe are related and attached to each other, and integrated into a united whole.

Qi Theory

Qi is a very important concept for understanding Feng-Shui. Qi can be translated as the "breath of nature", or as vital energy. Qi acts at every level of existence. On the human level, it is the energy which drives the body. Related to architecture, it is the energy carried by the wind and through the water, and comes from the sunlight which keeps the building alive.

Harmony will be achieved by locating or arranging a site and by sensitively designing the building to the landscape, so that the positive Qi will be formed.

Yin-Yang Theory

Yin and Yang are the essence of Feng-Shui. In general, Yin represents the female, the dark, and the still; while Yang represents the male, the light, and the moving. Yin and Yang together to form one unit as they complement and complete each other (Fig.3-1).

The Feng-Shui quality depends on the complementary relationship of Yin and Yang. A good Feng-Shui is where Yin and Yang meet and harmonize.

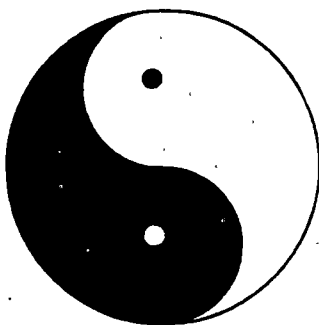


Fig.3-1: Yin-Yang

Five Elements Theory

Out of the interplay of *Yin & Yang* arise *Wu-Xing* or the *Five Elements* which are the five manifestations of *Qi*: metal, wood, water, fire and earth.

Metal is represented by the west, autumn, a circular form, and the color white; *wood* by the east, spring, a rectangular form, and the color green; *water* by the north, winter, a free form, and the color black; *fire* by the south, summer, a triangular form, and the color red; and *earth* by the central position, a square form, and the color yellow. Just like the seasonal changes, the Five Elements work in cyclical motions and succeed one another in a cycle of either generative or exhaustive interaction.

The generative cycle works by metal producing water, water cultivating wood, wood feeding fire, fire producing earth, earth creating metal, and so forth.

The exhaustive cycle works by earth obstructing water, water extinguishing fire, fire melting metal, metal chopping wood, and wood upheaving earth, and so forth (Fig.3-2).

The concept of the Five Elements is a tool that can be used to analyze, harmonize, and improve our *Qi*.

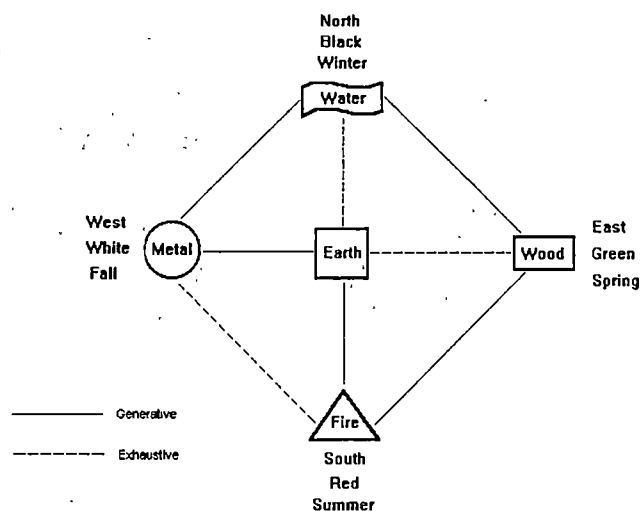


Fig.3-2: Five Elements

2. ARCHITECTURAL VOCABULARIES

Qi

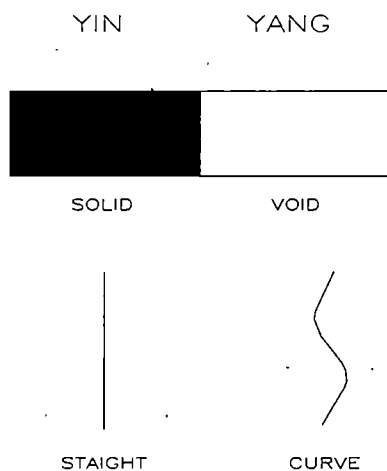
Landform

Sunlight

Wind

Water

Yin & Yang (Fig.3-3)



Space solid — void
 building — garden
 outside — inside

Form straight — curve
 vertical — horizontal
 high — low
 long — short

Feeling light — dark
 transparency — opaque
 hard — soft
 heavy — light
 tangible — intangible

Fig.3-3: Yin-Yang as
 Architectural Vocabularies

Five Elements

	<u>Form</u>	<u>Material</u>	<u>Color</u>
<u>Metal</u>	circle	steel	white
<u>Wood</u>	rectangle	wood	green
<u>Water</u>	curve	glass	black
<u>Fire</u>	triangle	plastic	red
<u>Earth</u>	square	concrete	yellow

B. SUSTAINABILITY

1. BASIC PRINCIPLES OF SUSTAINABILITY RELATED TO HARMONY

The focus of sustainability is the survival of the planet which calls for the harmonious relationships between man, the man-made, and nature both ecologically and aesthetically.

Working with Climate

When the climate condition is understood and blended into the design, the comfort for users and the harmonious relationship between building and natural environment will be achieved by using natural forces such as sunlight, wind and water.

Respect for Site

Sustainability encourages the design to "touch this earth lightly" which does not disturb the site, rather harmonize with it.

Balanced interaction with the topography, vegetation, and surrounding structures also plays a critical role.

Spirit

In William McDonough's *The Hannover Principles*, he proposed the fifth element – spirit in addition to the traditional four elements – earth, air, fire, and water.

Spirit embraces a commitment to conceive of the work of design as part of a wider context in time and place, and it leads to a design solution to present an aesthetic statement which sets up a conduit toward a fuller understanding of nature.

2. ARCHITECTURAL VOCABULARIES

Working with Climate

Sunlight	solar design
Wind	natural ventilation
Water	drainage and landform

Respect for Site

Harmonious relationship between building
and surrounding structures

Harmonious relationship between building
and landscape

Harmonious relationship between inside and
outside

Harmonious use of construction material and -
methods

Spirit

Harmonious relationship of time:
past – current – future

Harmonious relationship of space:
local – regional – global

IV. PROJECT PROGRAM

A. GENERAL

1. Background

The thesis of this study is *harmony* in an architectural design, specifically investigating *harmony* as it applies to the built and natural environment. The goal of this thesis project is to develop a harmonious design of a building with its landscape / environment. The design will utilize harmony-related principles of both Feng-Shui and Sustainability.

According to a survey by the Landscape Architecture Study Committee at the University of Tennessee, a program in Landscape Architecture at the university is needed. This program, together with the existing Architecture program, will be able to promote the sustainable and harmonious design.

2. Rationale

The academic program of the proposed School of Landscape Architecture needs close integration with the existing Architecture program. This relationship should be realized functionally and formally in the design. Consequently the harmonious relationship between the new building of School of Landscape Architecture and the existing building of School of Art & Architecture will be an issue.

Landscape is a living complex. The health and beauty of the built environment and natural environment are responsibilities of both Landscape Architecture and Architecture. Achieving harmony between the proposed building and existing buildings and natural forces surrounding them, and establishing consonance be-

tween the building and its landscape will find physical expression in the design.

B. ISSUES

The program of the project will focus on the issues of the thesis:

Harmonious relationships between the building's programmatic elements and their expression,

Harmonious relationships between the new building and the existing A&A building,

Harmonious relationships between the building and its landscape/context,

Harmonious relationships between the building and environment forces

The first three issues will be explored and expressed through *Yin-Yang* theory of Feng-Shui and *Respect for Site* principle of Sustainability, and the last one through *Qi* theory of Feng-Shui and *Working with Climate* principle of Sustainability (refer to earlier thesis discussion in chapter III).

1. LA Building's Elements

The major space is an open common space surrounded and engaged by studios and offices which have their own qualities and characteristics, but they are in balance and unity with one another.

The design will establish a hierarchy of studios, technical classrooms, and theory seminar rooms through sequence and position.

The relationship between studios and faculty offices expresses the collaborative nature between students and faculty members.

2. LA Building and A&A Building

The common space of Landscape Architecture

Building and the atrium of A&A Building should be related.

Shared spaces of two buildings will be architecturally connected: auditorium, library, gallery, shop, and common sitting area.

3. LA Building and its Landscape

Physical connections between the building and its landscape will be expressed by plants inside and outside, by green scheme on the roof and on the ground, by columns and trees, by water running through the building and landscape, and by form of building and landscape.

The building and its landscape will also be connected visually by strategic openings and glazings. In particular, the studios and the landscape will be transparently connected.

The Common spaces of the building will have inside landscape reflecting the landscape outside.

4. LA Building and Natural Environment

Natural lighting and ventilation will be a special part of design for the common spaces and studios.

Orientation of the building will be studied so that the design will take advantage of the sunlight and wind pattern.

C. SIZE

The School of Landscape Architecture will have a five-year undergraduate program with up to 200 students, and a two or three-year masters program with up to 45 students.

D. SPACE

Specifically, the building will include:

- Common Spaces
- Studios
- Lecture Rooms
- Seminar Rooms
- Auditorium
- Computer Labs
- Image Center
- Library / Reading Space
- Faculty Offices
- Special Projects Rooms
- Critique Spaces
- Display Areas
- Conference Rooms
- Restrooms

The following is the analysis of Academic Program and its interpretation to the functional space needs.

Program: List of Functional Spaces

Type of Space	# of Students	Footage of Space	# of Space	Total Footage
Common Space		3,000	1	3,000
Studio	40	1,800	7	12,600
Lecture Room	50	1,000	4	4,000
Seminar Room	20	500	2	1,000
Big Auditorium	500	6,000	1	6,000
Computer Lab	30	1,000	3	3,000
Image Center		1,000	1	1,000
Library		3,000	1	3,000
Faculty Office		150	8	1,200
Special Project		1,000	2	2,000
Critique Space		1,000	2	2,000
Display Area		2,000	2	4,000
Conference Room		300	2	600
Conference Room		400	8	3,200
				46,600

Classes Held in Landscape Architecture Building

YEAR	FALL			SPRING		
	Studio	Lecture	Seminar	Studio	Lecture	Seminar
1st						
2nd	Studio I	Land Survey I		Studio II	Land Survey II	
3rd	Studio III	History I Site Analysis		Studio IV	History II Env. Resources	
4th	Studio V		Sustainability I	Studio VI		Sustainability II
5th	Studio VII		Pro Practice	Studio VIII		Ethics
G1	Studio I	Plants & Env. I History I		Studio II	Plants & Env. II History II	
G2	Studio III	Theory Site Analysis	Sustainability I	Studio IV	Planted Form	Sustainability II
G3	Studio V		Pro Practice Thsis	Studio VI		Thesis Ethics
*	7	8	6	7	7	4

* number of sections

Classes Held in Art & Architecture Building

YEAR	FALL			SPRING		
	Studio	Lecture	Seminar	Studio	Lecture	Seminar
1st	Fund. I	Intruduction		Fund. II	Visual Design	
2nd						
3rd		Material/Const.				
4th						
5th						
G1						
G2						
G3						

PROGRAM

ISSUES	THEORY	ELEMENTS	RELATIONSHIP
Harmonious relationship between LA building's Elements	Yin & Yang	Common space Studios Faculty offices Others	Open common space is a central place engaged by major space: Studios. Studios and offices collaborate as students to professors. Hierarchy of studios, classrooms, and other spaces through sequence and position.
Harmonious relationship between LA building and A&A building	Yin & Yang Respecting for Site	LA building A&A building	Common space of LA building relates to Atrium of A&A building. Shared spaces of two buildings are "connected" *
Harmonious relationship between LA building and its Landscape	Yin & Yang Respecting for Site	LA building Landscape	Physical connection of Common space and Landscape. Visual connection of studios and Landscape.
Harmonious relationship between LA building/Landscape and Natural Environment	Qi Working with Climate	LA building Landscape Landform Sun Wind Water	Orientation Natural lighting Natural ventilation Topography and Landscape of the site unify as a whole.

* Spaces in A&A Building shared by LA Building:

Administration offices
Small Auditorium
Library (charrette, exhibit)
Shop

* Spaces in A&A Building shared by LA Building:

Computer Labs / Image Center
Big Auditorium
Library (journals)/Reading Space
Special Project Rooms



Fig.5-1: Aerial View of UT Campus

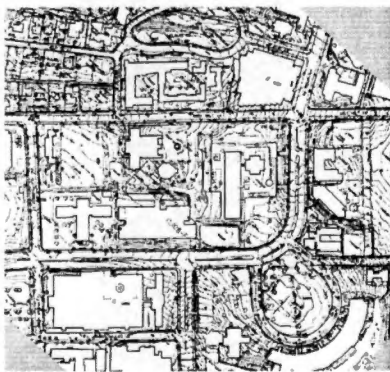


Fig.5-2: Site

V. SITE ANALYSIS

A. GENERAL

1. Location

The School of Landscape Architecture will be located at the University of Tennessee, Knoxville campus (Fig.5-1, 5-2), and be placed adjacent to the existing Art + Architecture Building as an extension (Fig.5-3).

2. Context

The site is in the area of arts and humanities. The surroundings of the site include Music Building, Carousel Theater, Clarence Brown Theater, Humanities & Social Science Building, Education Building, Nursing School, Circle Park, McClung Museum, Gibbs Hall, Stokely Athletic Center, and Volunteer Boulevard, Lake Loudoun Boulevard. The nearby high-rises are John Hodges Library and McClung Tower.

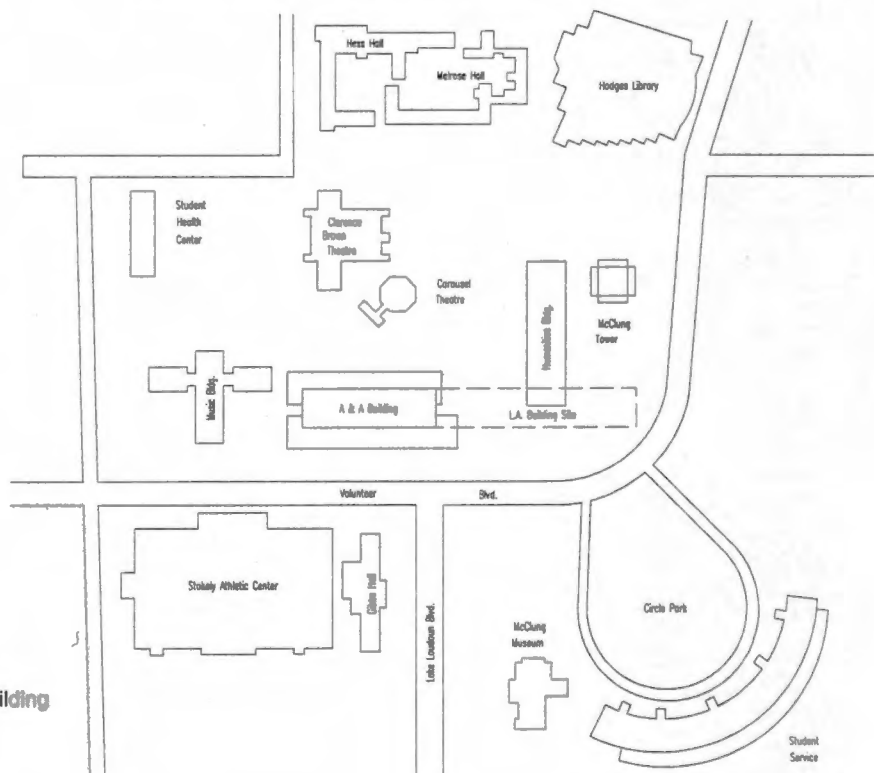


Fig.5-3: L.A. Building as an Extension of A&A Building

3. Rationale

The academic program of Landscape Architecture requires close relationship with the existing Architecture program. From a functional point of view, it is logical to place the School of Landscape Architecture next to the School of Architecture.

More importantly, the varieties of existing structures provide challenges and also opportunities to the project. The design will search the answers for not only the balanced relationship between the new building and the existing Art + Architecture building, the harmonious relationship between the new building and the natural forces, but also the integrated relationship between the new building and the surrounding area.

4. Goal

Through the design of the School of Landscape Architecture, a solution will be explored which attempts to connect, balance and integrate the site as a whole, to harmonize the built environment with the natural environment, and therefore to achieve a strong sense of a sustainable place.

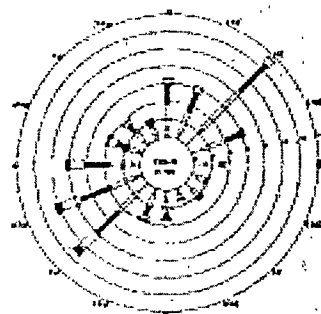
5. Issues

- Natural environment

- Built environment

- Approaches and Views

- Relationships



Windrose Annual

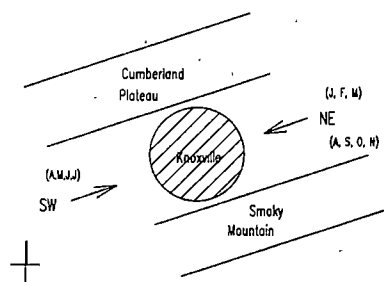


Fig.5-4: Wind Pattern

3. Precipitation (Water)

The annual average precipitation of Knoxville is 47.29 inches. The distribution of each month shown on the chart (Fig.5-5).

4. Temperature

The annual average temperature is 58.9 degree F. The chart indicates the pattern through the year.

When the temperature distribution chart is linked together year after year, we can see the obvious pattern: cycle (Fig.5-6).

B. NATURAL ENVIRONMENT

1. Landform

Knoxville is located in a broad valley between the Cumberland Plateau to northwest and the Great Smoky Mountains to southeast.

2. Wind (Fig.5-4)

The landform of the area determines the prevailing winds of Northeast during fall and winter (January, February, March, August, September, October, November, and December) and Southwest during spring and summer (April, May, June, and July).

Fig.5-5

PRECIPITATION

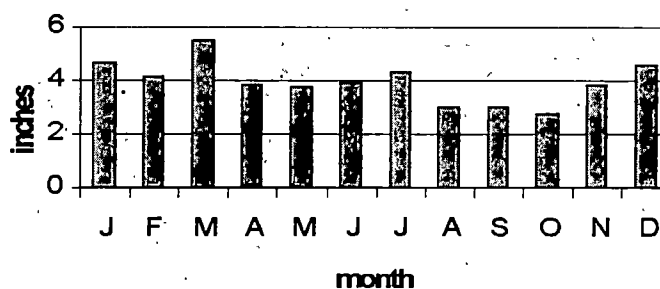
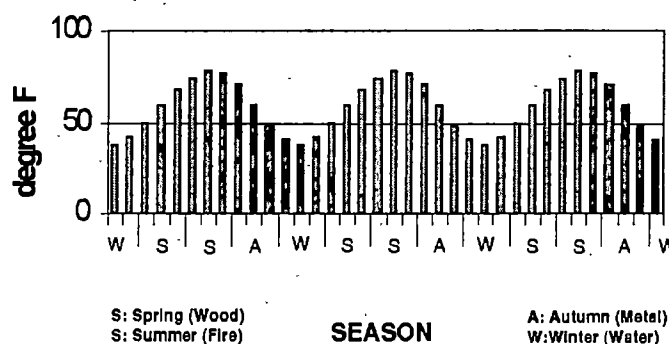
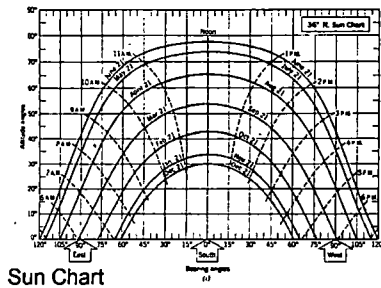


Fig.5-6

TEMPERATURE CYCLE





Sun Chart

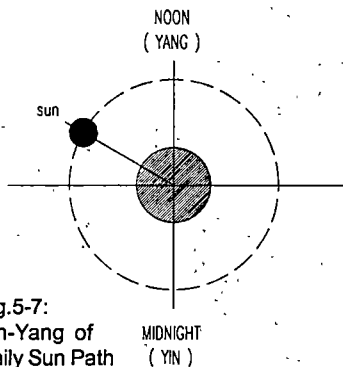


Fig.5-7:
Yin-Yang of
Daily Sun Path

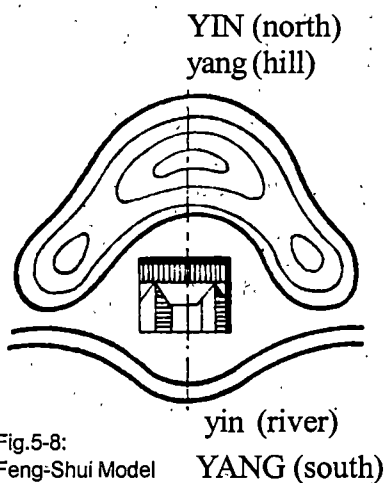


Fig.5-8:
Feng-Shui Model

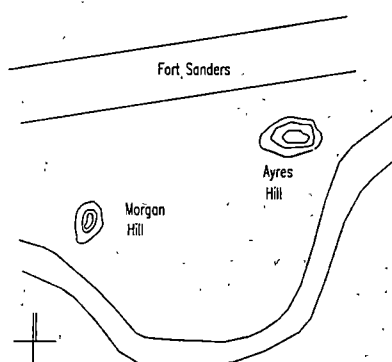


Fig.5-9:
Feng-Shui of UT Campus

5. Sunpath

Knoxville is located at Latitude 36 degree North and Longitude 84 degree West, 980 feet above sea level. The sun path chart shows the position of the sun at different time of a day and in different month of a year.

At noon, the sun's altitude angles reaches to the highest. According to Feng-Shui, it is at the extreme of Yang, and it turns to Yin. In the opposite, at midnight, it is at the extreme of Yin and turns to Yang. This way, it forms the daily Yin/Yang cycle of the sunpath (Fig.5-7).

When sun's altitude angles at noon of each month compiled and linked together year after year, we can see the cycle pattern which is clearly corresponding to the cycle pattern of temperature.

6. The Campus

The principal goal of Feng-Shui is to balance and harmonize the interaction between Yin & Yang. When Feng-Shui is applied to site selection, the ideal location is found behind Yin and in front of Yang; it is backed by mountain and facing water. In terms of environmental features, the mountain which is Yang locates in north which is Yin and the water which is Yin locates in south which is Yang. Together, Yang is in Yin and Yin is in Yang, and they form a closed, integrated, and harmonious space (Fig.5-8).

From the Feng-Shui point of view, the campus is embraced by the river (Fort Loudoun Lake) in the south, high ground (Fort Sanders) in the north, and two hills (Ayres hill, Morgan hill) in the east and west. This site is close to the basic ideal Feng-Shui location (Fig.5-9).

Also, if there is no proper hill to protect the site, it may be backed by trees or man-made structures.

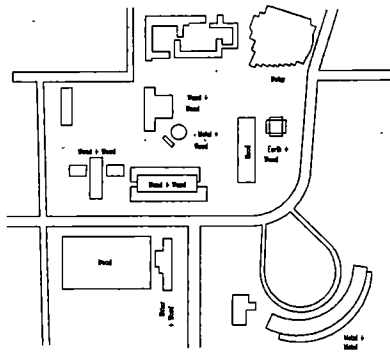


Fig.5-10: Five Elements of Solid

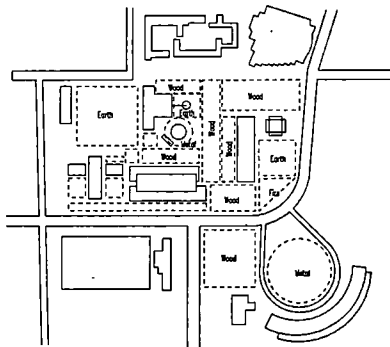
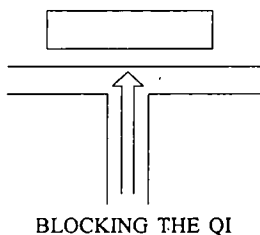
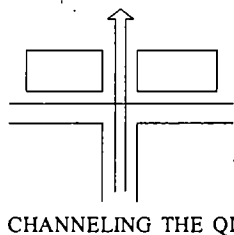


Fig.5-10: Five Elements of Void



BLOCKING THE QI



CHANNELING THE QI

Fig.5-12: Qi of the Gateway

C. BUILT ENVIRONMENT

1. Solid and Void:

A & A Building, Humanities Building and majority of surrounding buildings are *Wood* (rectangle) in form (Fig.5-10).

The open areas of the site are also mainly *Wood* forms (Fig.5-11).

The new design form could be *Wood* or *Water* to achieve harmony with the area.

Yet, the Carousel Theater is *Metal* (circle) which is not compatible with the site, according to Feng-Shui *Five Elements* theory. Through the new design (area master plan, new building and landscape) the incompatible forms could be neutralized and harmonized together.

2. Circulation:

The site is at the geographical center of the campus: between the Hodges Library, the Humanities Building, the Clarence Brown Theater, and the A&A Building.

The major vehicular circulation around the site is Volunteer Blvd., From the Feng-Shui perspective, a building should not located at the intersection of "T" shaped street, because the Qi coming from the vehicular street perpendicular to the building is too strong. In this case, the open "gateway" allows the Qi from Lake Loudoun Blvd. channel through the building, and the main door is located at the side. So, it is ok (Fig.5-12).

The main pedestrian circulation through the site is from the Gateway of A&A Building to Melrose.



Fig.5-13: Melrose Arch

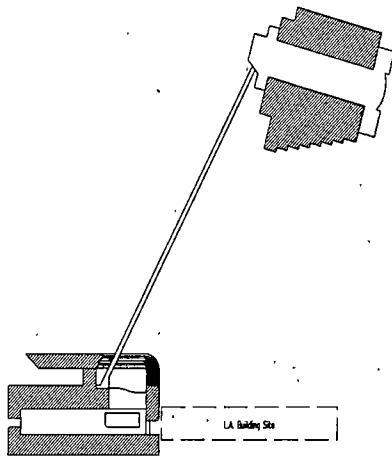


Fig.5-14: Connection

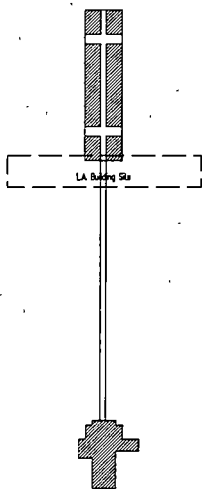


Fig.5-15: Relationship

From the research, it is discovered that the form of the Circle Park used to be a perfect circle (1947), but was altered later for the sake of automobile. To achieve the balance between the vehicular circulation and the pedestrian circulation, the Circle Park is redesigned into a perfect circle thus slowing the traffic around this corner on Volunteer Blvd.

3. View

The Melrose arch frames the view through the site, cross the river, to the Smoky mountain. This visual axis connects man-made to the nature (Fig.5-13).

4. Relationships

The walkway from the second level entrance of A&A Building leads to the entrance of Hodges Library (Fig.5-14).

The inside circulation axis of Humanities Building aligns with the outside glass window of McClung Museum (Fig.5-15).

The orientation of the Education Building is to the true south which reflects the sense of sustainability.

5. The Plaza (Fig.5-16)

The humanities plaza is exposed to sunshine, but generally it is not used.

According to Feng-Shui, this plaza is too Yang. Yin elements are needed to balance the place. There needs to be balance between openness and enclosure, and balance between individual and collective spaces.



Fig.5-16: Plaza Before/After

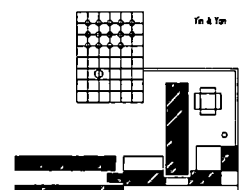




Fig.5-17: Atrium

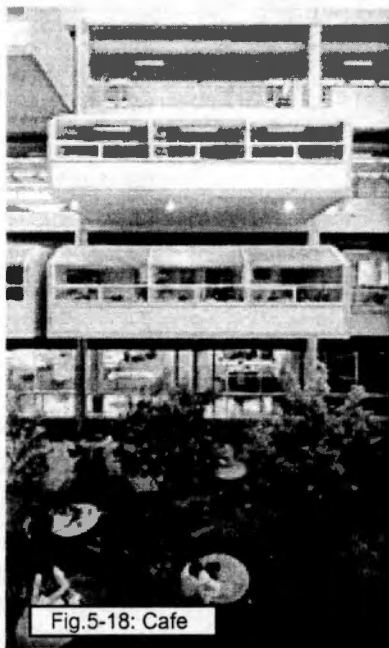
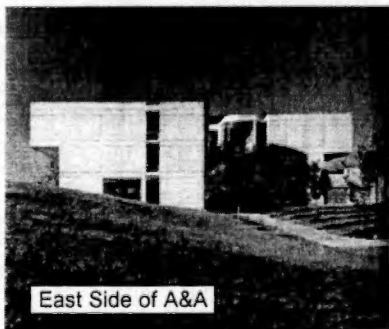


Fig.5-18: Cafe



East Side of A&A

D. ART & ARCHIECTURE BUILDING

1. Building Elements:

The building is organized into two long four-story structures fronting a central inside street along which studios and adjunct spaces are arranged.

The ground level street leads to upper levels and turns to corridors.

The cantilevered pods that contain faculty offices are placed seemingly at random which punctuate and lend human scale to the daunting stretch of a streetscape otherwise broken only by a dramatic staircase-bridge (Fig.5-17).

2. Building and Landscape:

The focal gathering space, the sidewalk cafe, communicates with the outdoors via unbroken views through the glass-walled two-story library to the reading court beyond, as well as through the glazed end wall. The trees arranged in the cafe also recalls the landscape outside (Fig.5-18).

The building sets up a "wall" along the street which defines the street edge. It also reinforces the space of the new campus center oriented to the humanities and arts area.

3. Building and Environment

The original idea of a skylight was proposed to light up the street on the ground level. Yet for economic reason it was changed to the clerestory which unfortunately does not supply sufficient natural light to the street.

The panoramic glazing of the studio spaces allows for generous northern light and wonderful views which connect the inside to the outside, connecting the studio to the landscape.

SITE ANALYSIS

ISSUES	THEORY	FACTORS	ANALYSIS
Natural Environment	Qi Working with Climate	Landform Wind Sun Water Temperature	Valley, facing river SW in summer, NE in winter Sunpath, shadow pattern Precipitation / site topography and drainage pattern Comfort effect
Built Environment	Yin & Yang Five elements Respecting for Site	Structures Landscape	Solid ~ void, horizontal ~ vertical, transparency ~ opaque Solid form and Void form Landscape ~ building
Approach & View	Qi	Entrance Circulation View	
Time & Place	Spirit	Topography Building	Past natural form ~ current detached fragments Evolution of filling on site Material

VI. DESIGN DEVELOPMENT

A. GENERAL

All design is goal-directed. We often ask "How does it look?" or "How does it work?" But now we are more interested in the answer to "How does it relate?" The intention of this design is to explore the possibilities of re-establishing harmonious relationships between building and environment, between building and surrounding structures, between building and landscape, and between the internal elements of building itself. These harmonious relationships will be achieved by applying the appropriate theories and architectural language of both Feng-Shui and Sustainability.

B. RELATIONSHIP WITH ENVIRONMENT

1. Feng-Shui of the Site

As discussed earlier in Site Analysis, the campus of University of Tennessee is located between a river to the south and high ground to the north. This site is close to the ideal Feng-Shui model which embodies the harmonious balance between Yin and Yang: Yin (river) in Yang (south) and Yang (hill or high ground) in Yin (north).

2. Orientation of the Building: sunlight and wind

The existing Art & Architecture building is oriented on a south-east axis. The new Landscape Architecture building will extend and continue the orientation, exposing more surface area to the south-east during the winter for the collection of solar radiation.

The flow of external wind produces regions of high and low pressure on the building surfaces, leading to influx and outflow of air through openings which will cause leakage. Larger building dimension should

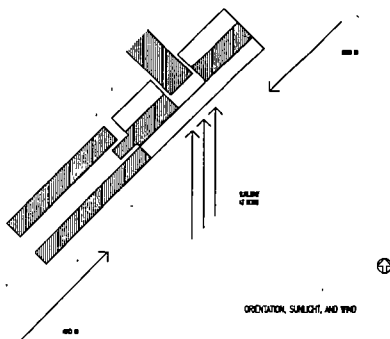


Fig.6-1: Orientation, Sunlight, and Wind

not face into the predominating wind direction. The major wind pattern of the site is north-east and south-west which is parallel to the long axis of the building, allowing for an ideal orientation regarding wind flow (Fig.6-1).

3. Solar Gain

To take advantage of sun, the curved-roof of the atrium is designed with photovoltaic power in mind. With a south-east orientation, solar collection can be achieved through the installation of solar panels in the future. Similarly, the angled linear panels are mounted on the deck (see the atrium cross section).

The first two level south-facing walls of library, computer labs, and classrooms will be 2-foot thermal mass which will provide thermal inertia and reduce temperature fluctuation inside the building (Fig.6-2).

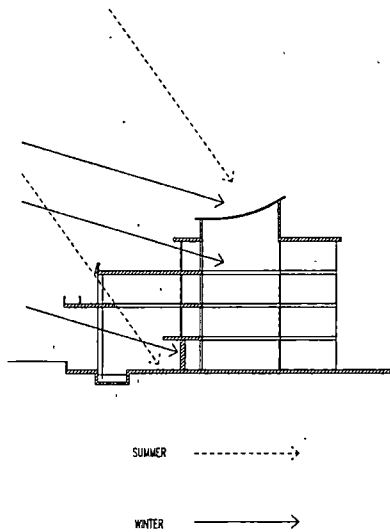


Fig.6-2: Solar Consideration

4. Natural Lighting

The natural lighting for open studios are enhanced by extensive glazing on the exterior walls and finished with high reflectance values throughout the interior.

5. Natural Ventilation

The ventilation and cooling effects is achieved through natural ventilation (stack effect) by the atrium. Warm air collecting in high spaces is vented through louvers. Cooler fresh air is channeled in through operable windows at each level (Fig.6-3).

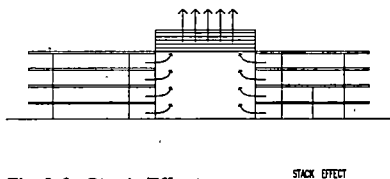


Fig.6-3: Stack Effect

6. Qi Flow: pedestrian circulation and visual axis

The new design utilizes the Qi flow to link the new building and existing buildings and unify the area as a harmonious place of a whole.

The interior street, atrium of A&A building, continues through the new Landscape building and beyond to Volunteer Boulevard to the north-east and connects



Gateway of A&A Building

with the existing outside walkway between the Education building and Nursing school, and then end at the new small park before it hits the Stadium. To the south-west, the atrium leads to the courtyard of the Music building.

The axis of Humanities Building continues through the new Landscape Architecture building past Volunteer Boulevard and terminates at the McClung Museum.

The visual axis through the Melrose arch will continue through the new Landscape Architecture building and extends towards the distant Smoky mountains (Fig.6-4).

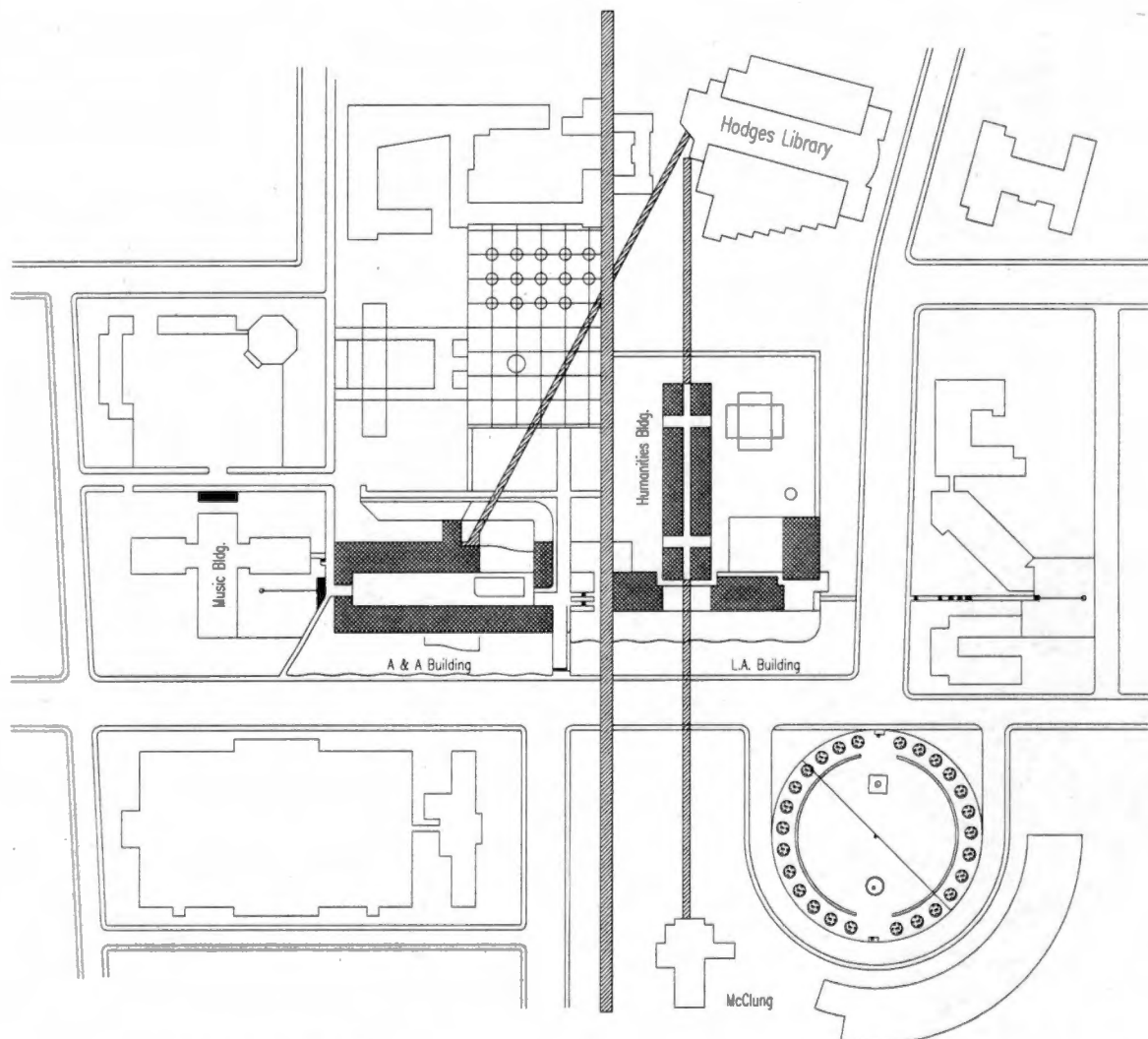


Fig.6-4: Qi of the Site

C. RELATIONSHIP WITH CONTEXT

1. Yin/Yang between A&A building, L.A. building, and Humanities Building

The form of the A&A building is solid-void-solid or yang-yin-yang, and the new L.A. building will be just opposite: void-solid-void or yin-yang-yin. So the L.A. building presents an intention to slide into the A&A building which harmonizes Yin and Yang. Similarly, the Humanity building is a single solid which slides into the atrium of L.A. building and the void continue to the solid of McClung Museum (Fig.6-5).

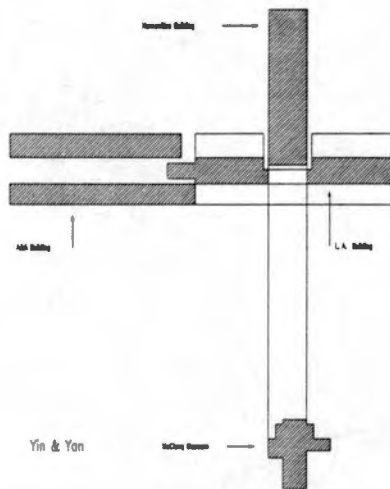


Fig.6-5: Yin-Yang Relationship

2. Engagement of A&A building, L.A. building, and Humanities Building

The street cafe of A&A building is a green area which extends into the L.A. building on the ground level. The top level of L.A. building slides back into the A&A building and the overlap serves as a common area for both buildings.

The gap between the L.A. building and the Humanity building is marked by a skylight which physically connects the two and by the overlook from the Humanities Building which establishes the visual connection to the L.A. building (Fig.6-6).

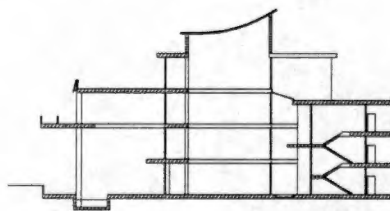
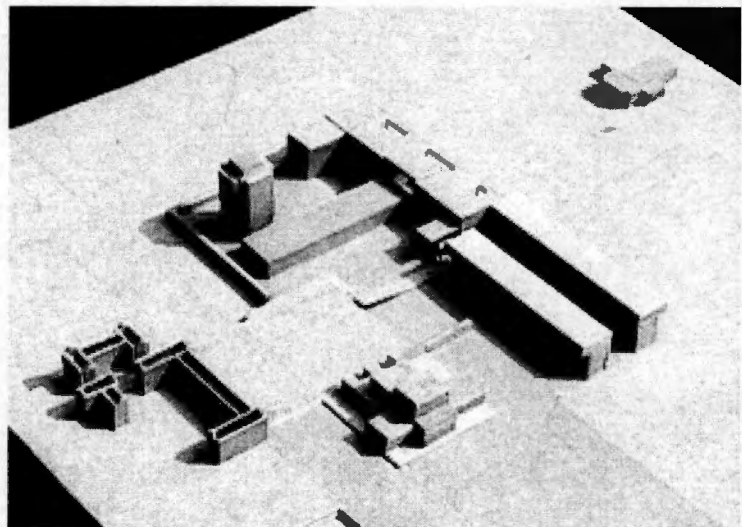


Fig.6-6: Engagement of H. Building and L.A. Building

Sketch Model of Design



3. Shared spaces for A&A building and L.A. building

The academic programs of Architecture and Landscape Architecture have a close relationship. They are functionally unified with many spaces shared by the two, such as small auditorium, library(charrette, exhibit) and shop in the A&A building and computer labs, image center, big auditorium, library(journals, internet) and special projects rooms in L.A. building.

D. RELATIONSHIP OF BUILDING ELEMENTS

1. Yin/Yang relationship of L.A. building: (Fig.6-7)

Over all the L.A. building is formed void-solid-void or yin-yang-yin linearly and solid-void-solid or yang-yin-yang longitudinally.

The engagement of Library and Auditorium to the main building reflects the slide-in language which have solid(yang) and void(yin) characteristics.

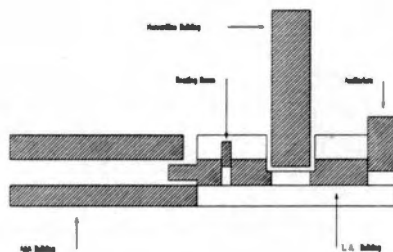


Fig.6-7: Yin-Yang of L.A. Building

2. Studios on 3rd floor and on 4th floor

The walkway on 3rd floor is open and visually connects to the 4th floor balcony walkway (Fig.6-8).

3. Studio and Faculty Office:

The office is engaged with the studio in the same language of slide-in which represent the close relationship between teacher and students and between teaching and learning.

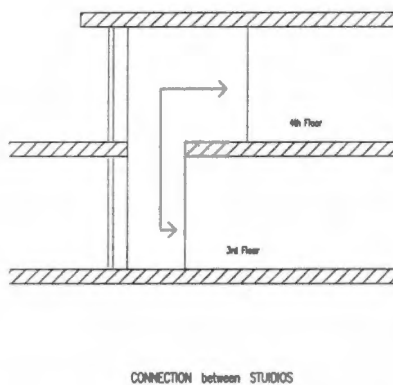


Fig.6-8: Connection between Studios

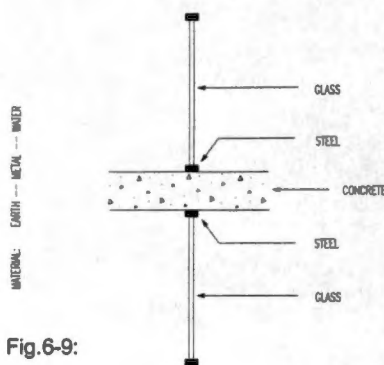


Fig.6-9:

4. Materials:

The structure of the building is site-cast concrete. The cladding is double-glazing with steel frame. According to the Five-Elements, concrete is Earth; glass is Water; and steel is Metal. Earth and Water are bridged by Metal and result in a generative harmonious relationship: Earth-Metal-Water (Fig.6-9).

E. RELATIONSHIP WITH LANDSCAPE

1. Inside and Outside: (Fig.6-10)

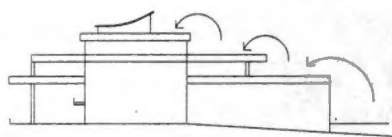
The atrium, the glazing walls, the glazed extended library reading room, and the open decks all physically and visually connect outside and inside.



Fig.6-10:

2. Ground and Roof:

From the plaza to the roof of the auditorium (two-story high), and then to the roof of the main building (three-story high at the east end and four-story high for the rest), this sequence leads a gradual connection from the ground to the roof (Fig.6-11). Also the zigzag green ramp engaged with the column in the front of the building dynamically connects the ground to the roof (Fig.6-12).



GROUND to ROOF Fig.6-11:



Fig.6-12: Green Ramp

3. Roof and Landscape:

The green roof embeds the building into the larger context of the landscape harmoniously.

4. Water: (Fig.6-13)

The water pool in the front of the building reflecting the river in front (south) of the site which gives the balance of Yin(water) and Yang(south).

The cascading water pool between the building and the new central plaza is balanced by itself:

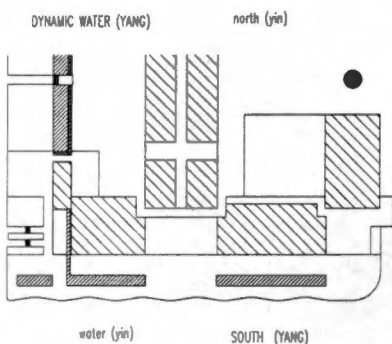


Fig.6-13: Yin-Yang of Water

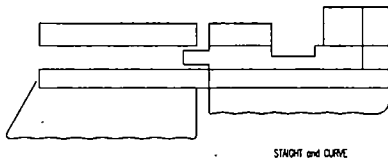


Fig.6-14: Straight – Curve

Yin(water) and Yang(dynamic motion). Also the cascading pool is a strategy for natural cooling.

5. Curve and Straight:

The curving retaining wall in the front of A&A building extends to the front courtyard of L.A. building which balanced the linear form of the buildings (Fig.6-14). Also the curved roof of the atrium enhanced this quality from a different angle (Fig.6-11).

6. Horizontal and Vertical:

The A&A building is a strong horizontal form; the extension of L.A. building is balanced by the outer exposed vertical columns.

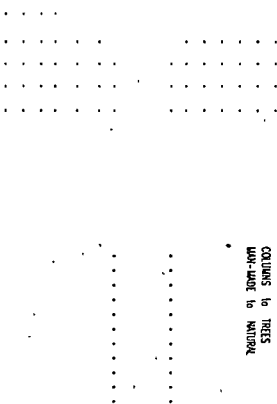


Fig.6-15: Columns – Trees

7. Column and Tree:

The tree lines form the void between the atrium of L.A. building and the McClung Museum and those trees are the extension of the columns of the building; or vice versa, the columns of the building are the extension of the trees which harmonize the man-made and the nature (Fig.6-15).

8. Plaza:

The humanities plaza is adding the Yin elements: green trellis to form the enclosure around the edge which balance the Yang: hard open space (Fig.5-16).

9. Circle park:

The design of circle park is the reflection of Yin/ Yang balance. Half concrete and half grass which are engaged by circular bench formed by half wood on the concrete ground and half concrete on the grass ground. The point of water fountain on the concrete area and the other point of statue on the grass area (Fig.6-16).

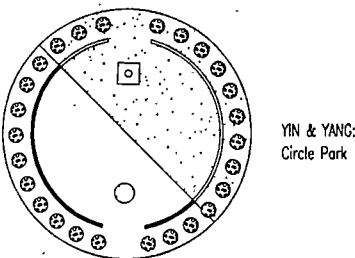


Fig.6-16: Circle Park

VII. CONCLUSION

The practice of Feng-Shui and Sustainable Architecture requires one to learn to live within the natural environment and to respect the forces in nature. The rudiments of Feng-Shui spring from the timeless wisdom of natural science and geography, and the principles of Sustainable Architecture are the modern interpretation of this wisdom. They can be used as a vehicle to achieve a deeper respect for culture and to design a building more conducive to the habitation of man.

This thesis shows the possibility and the opportunities to have a harmonious design in a contemporary context. Feng-Shui and Sustainability are two areas with wide scope, rich contents, and deep theories. Focusing on the idea of *harmony* to combine these two studies together is a new try. The thesis presented here touches the basic theories related to the issue of *harmony*, yet also with a wide scope. Each sub-issue, such as harmonious relationship between the building and environmental forces, harmonious relationship between the building and its landscape, harmonious relationship between the building and its context, harmonious relationship between the building and the users, and harmonious relationship within the building, can be a research topic itself. The author plans to continue the related research and study. More importantly, he intend to utilize them and reflect the idea of *harmony* in his future professional practice.

VIII. DRAWINGS

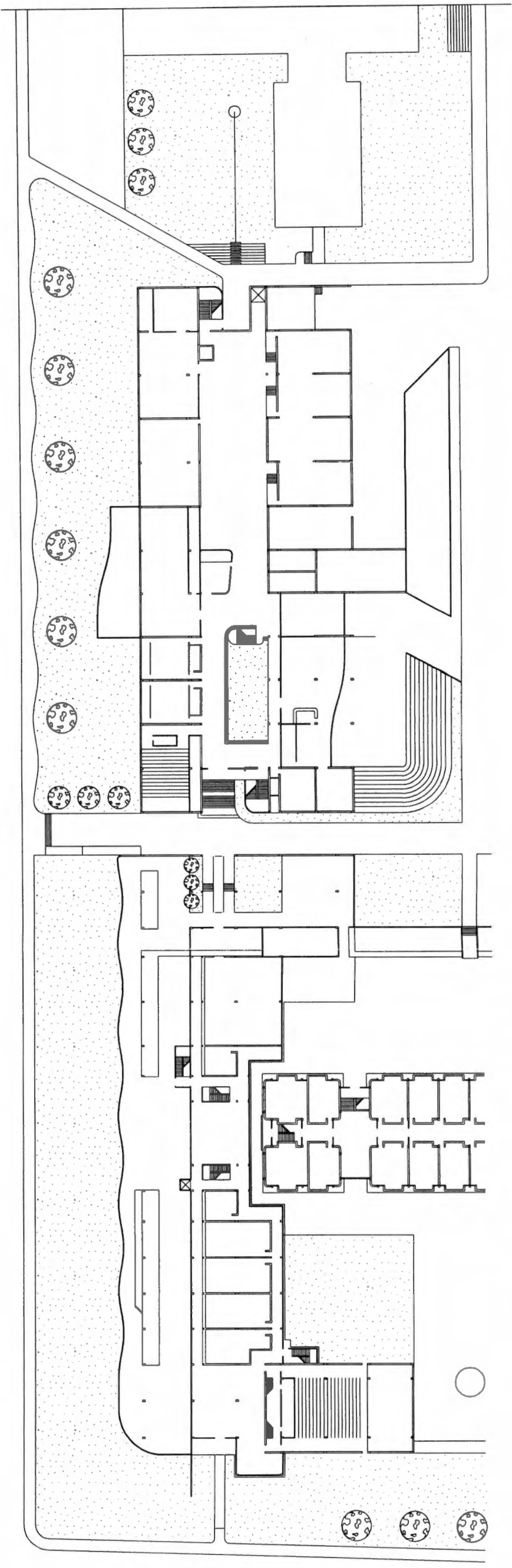
PLANS

ELEVATIONS

SECTIONS

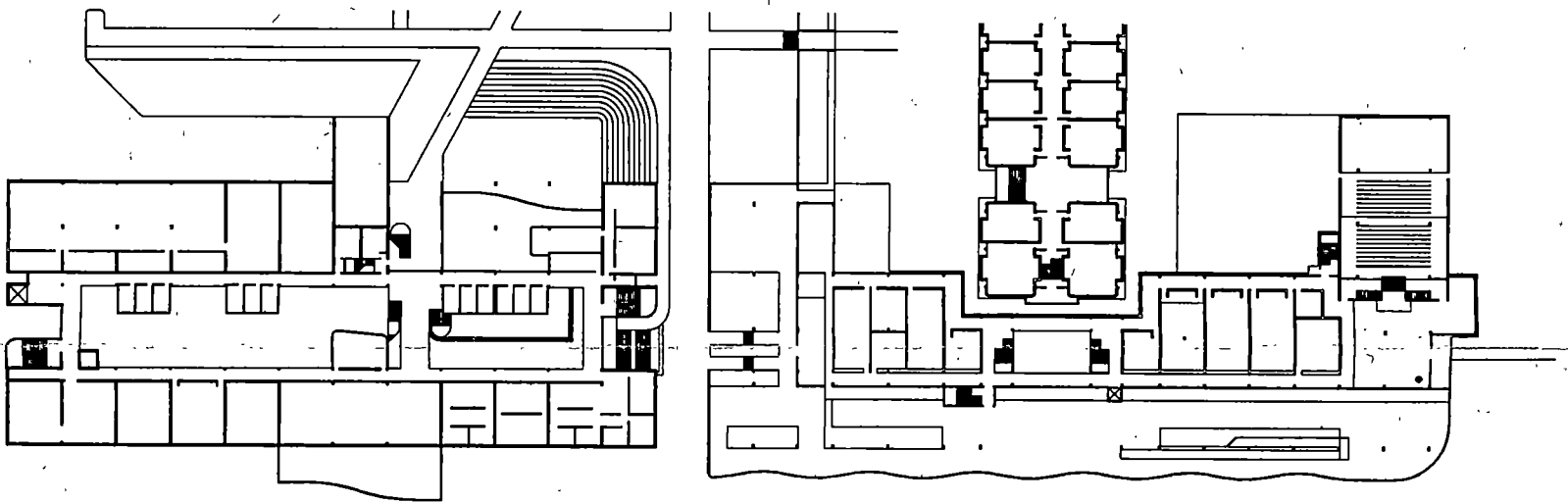
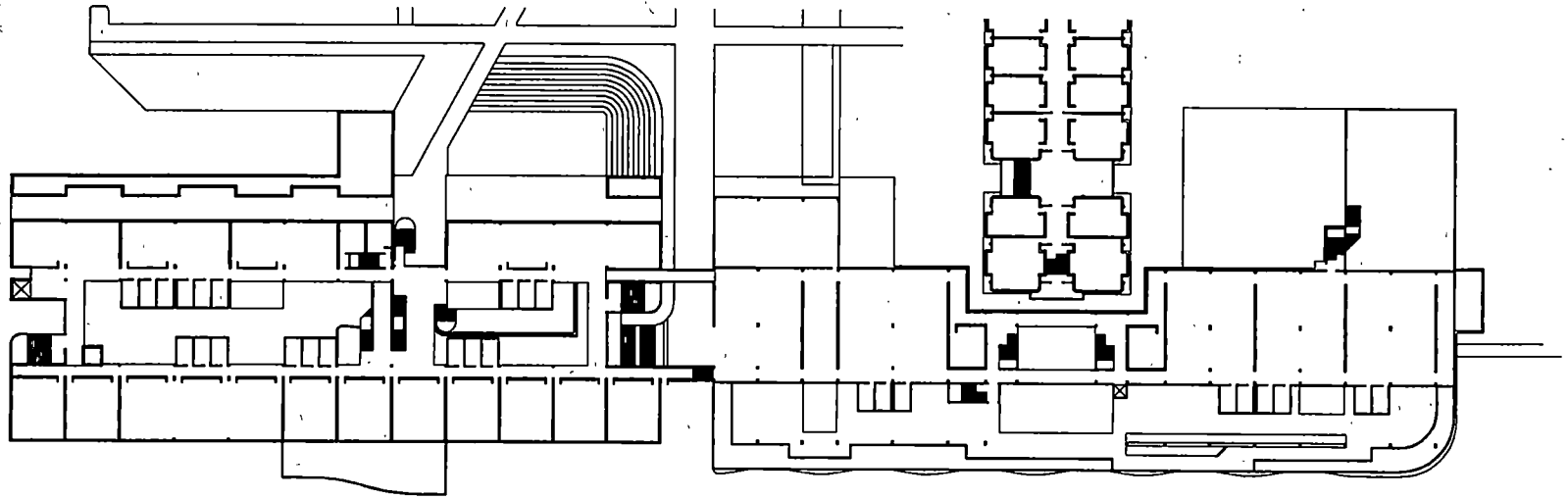
WALL DETAIL

AXON

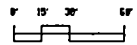


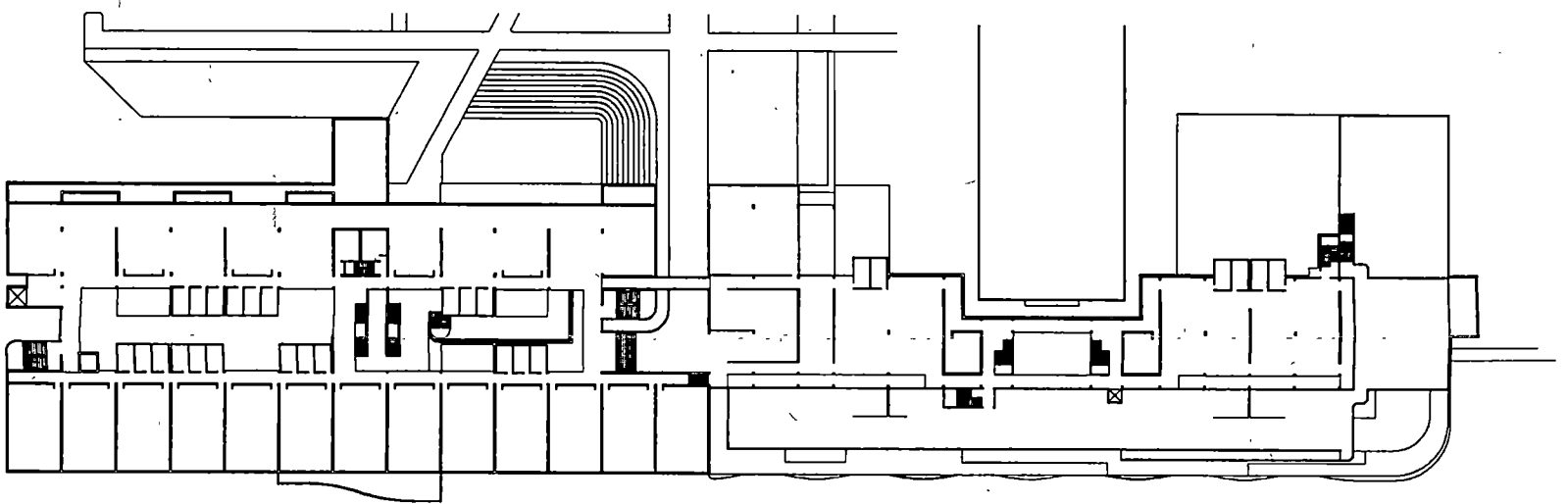
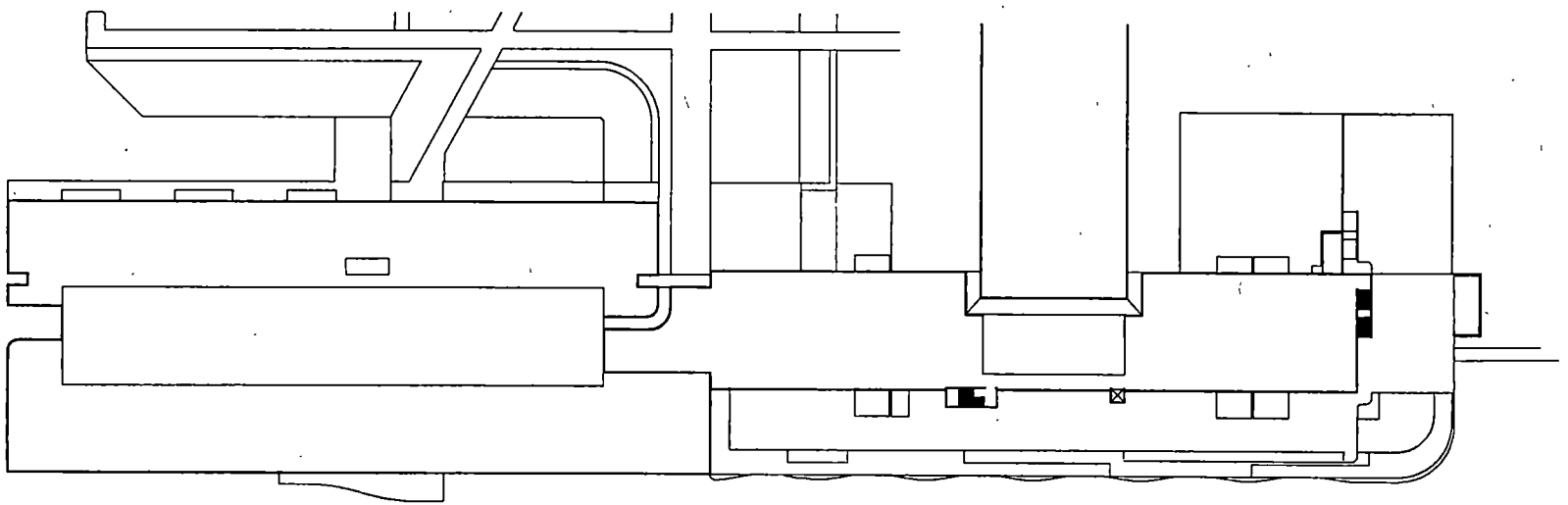
GROUND PLAN



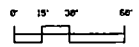


2ND and 3RD FLOOR PLAN

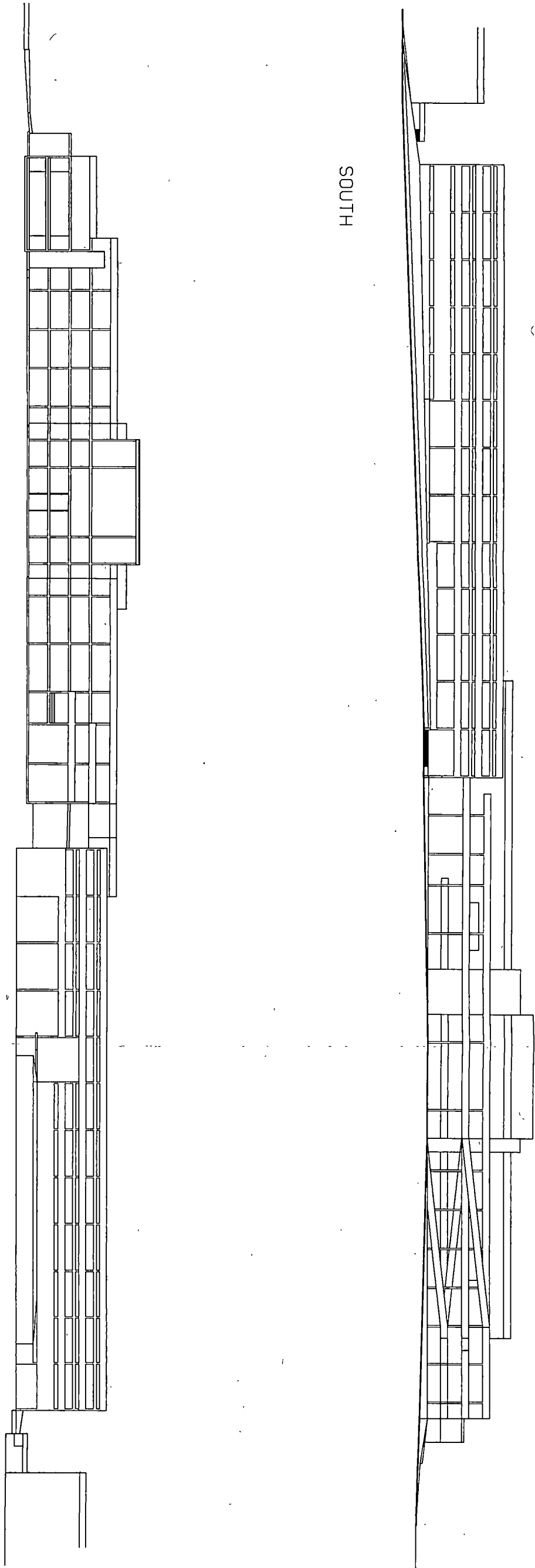




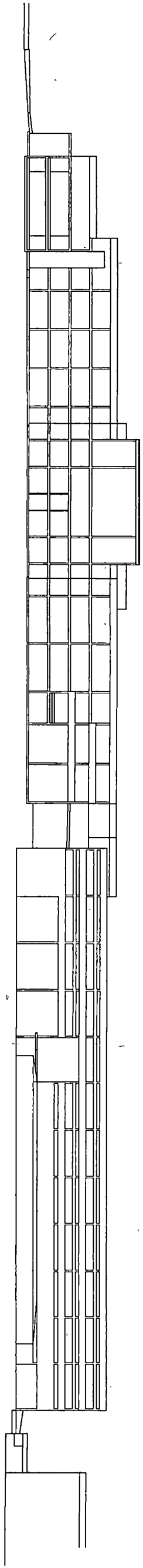
4TH FLOOR and ROOF PLAN



SOUTH



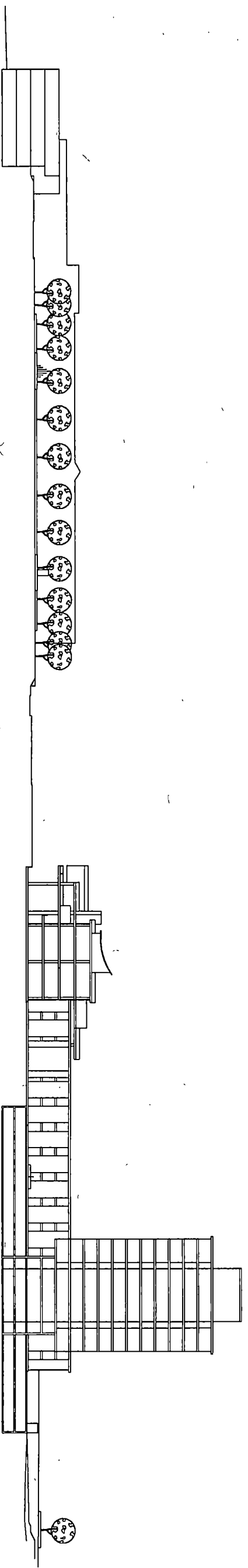
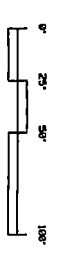
NORTH



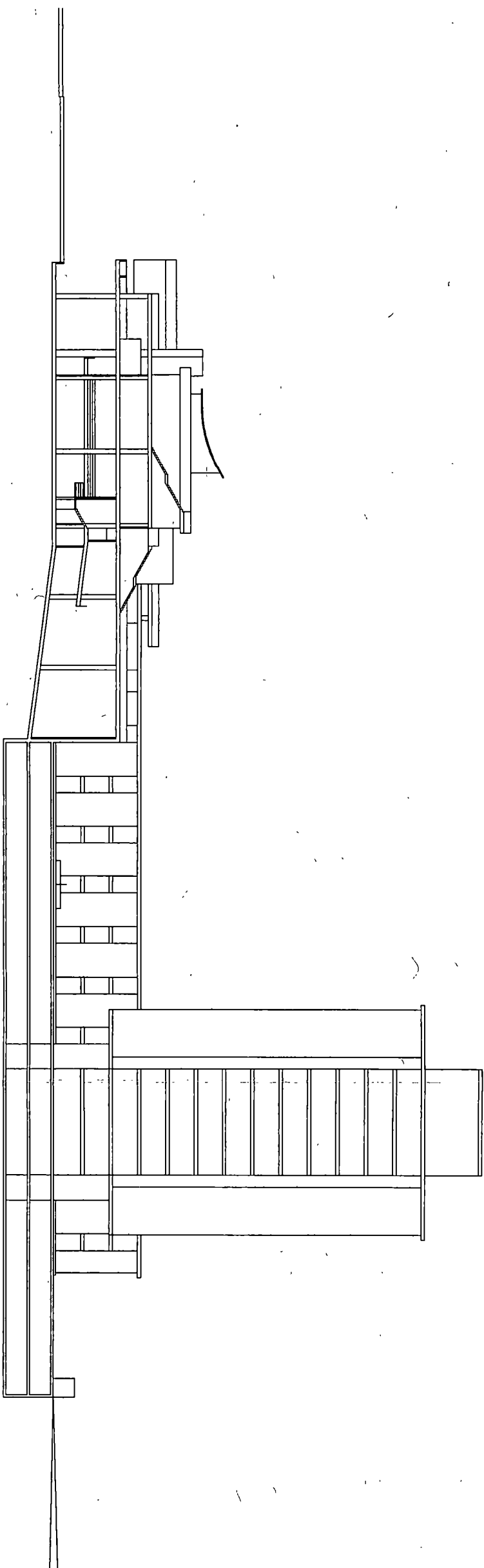
ELEVATIONS

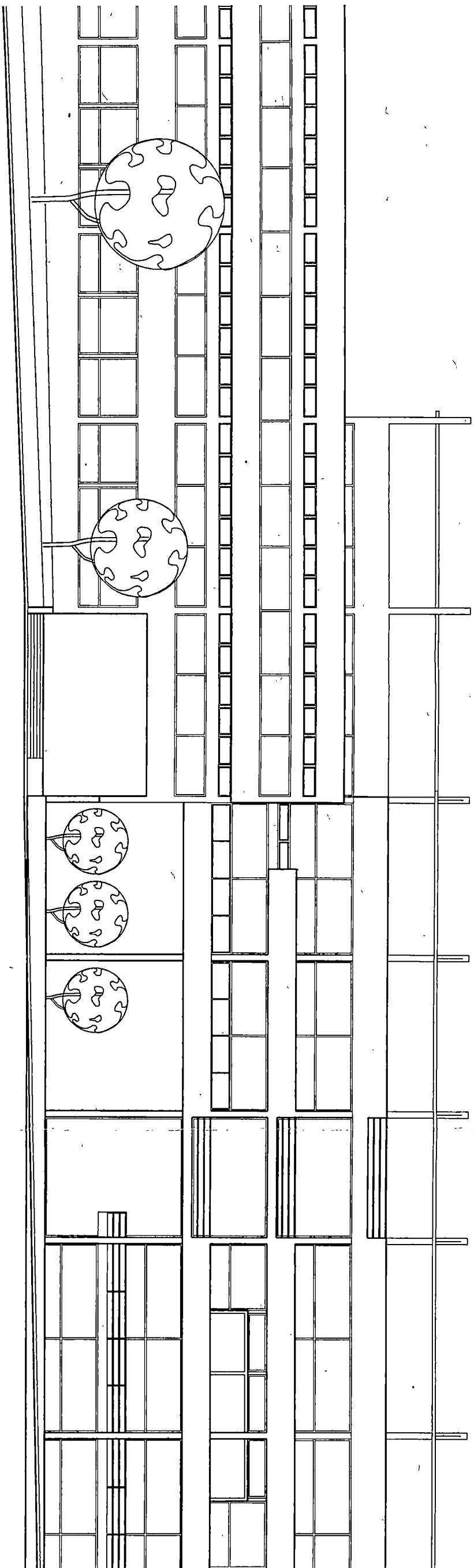


SITE SECTION through MCCLUNG TOWER



SECTION through AUDITORIUM

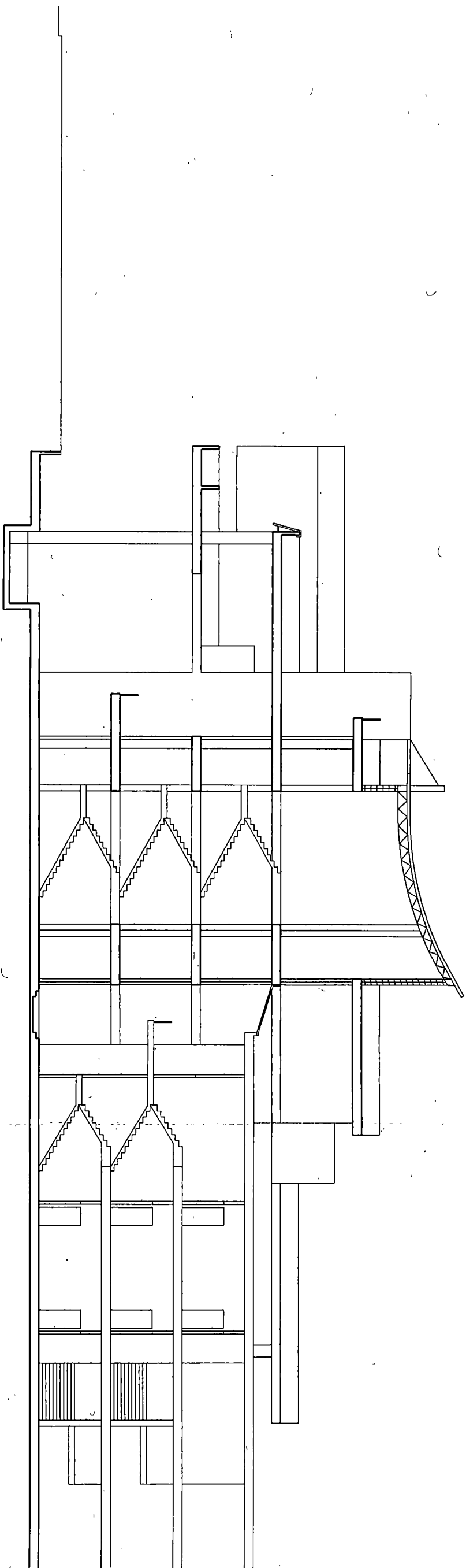


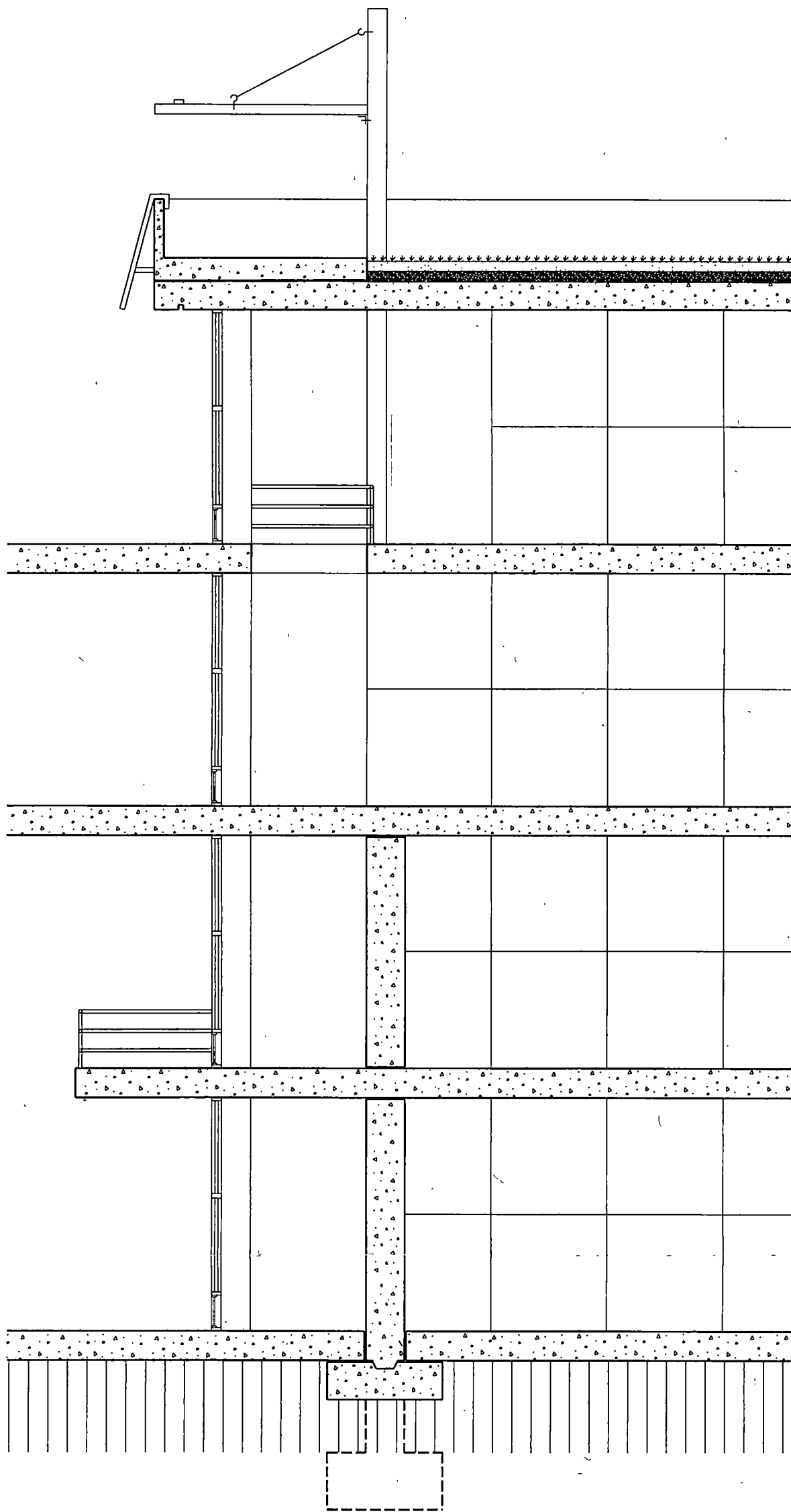


SOUTH ELEVATION

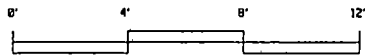


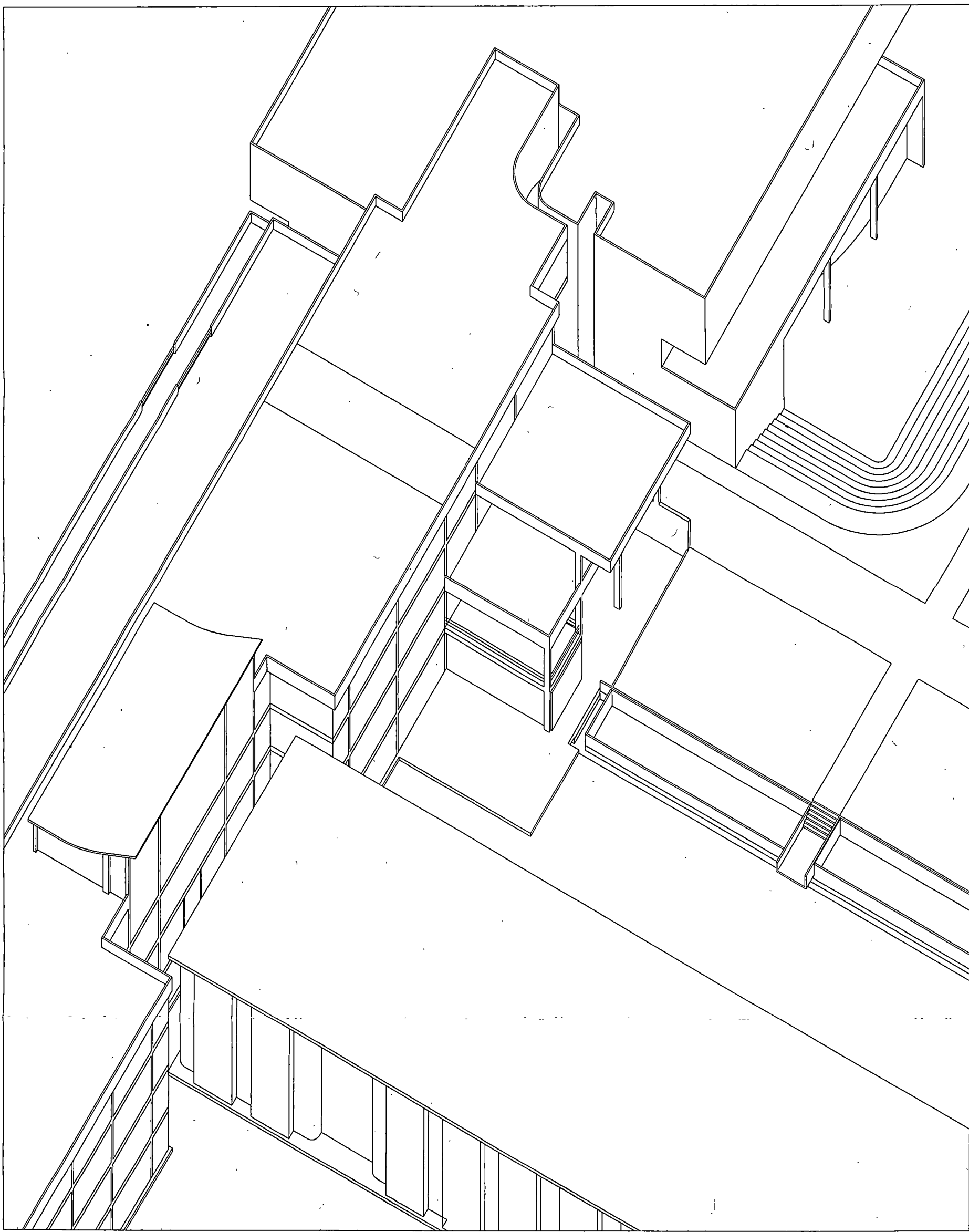
ATRIUM SECTION





WALL SECTION





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Jenny Tzu-Chun Liu (95)
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- Feng Shui: An Emerging Principle of Design*
Sui Seng Tan (96)
- Feng Shui: Its Context and Meaning*
Sang Hee Lee (86)
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VITA

Yaomin Xue studied Mechanical Engineering at Yancheng Institute of Technology in China and received his Bachelor of Science in 1982. He was selected to stay at YIT to teach in the Department of Mechanical Engineering. In 1988, he came to the States and studied Industrial Management at Clemson University and received his Master of Science in 1991. After that he worked at WestPoint Stevens as a management trainee and projects coordinator. In 1995 he worked with Computational Systems Incorporated as Asia-Pacific regional manager.

Reviewing his career path he realized that even though he had always been performing well, something was missing: enthusiasm and great satisfaction which are very important to his career and his life. Finally he made the decision to pursue his dream.

In the summer of 1996, he entered the Master's program of Architecture at the University of Tennessee. In June of 1999, he started his dream career with Thompson, Ventulett, Stainback & Associates in Atlanta.

He intends to continue his architectural education within the context of the professional world and become a registered architect. At the same time, he will keep in touch with the academic world. His special interest is human&nature-friendly design. Eventually he will like to share his knowledge and experience with young people in universities.