

**PROPORTIONS: THE CREATION OF  
ORDER**

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**ARCHITECTURAL THESIS**

MAY 16, 1988

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This document is submitted in partial fulfillment of the course requirements for Architectural Thesis Arch 406 and the requirements for the degree: Bachelor of Architecture.

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Building Type - "School for the Design Arts"  
Location of Project - "Fort Wayne, Indiana."

Thesis Committee Chair- Paul Laseau.  
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Published by the College of Architecture and Planning  
Ball State University  
Muncie, Indiana 47303

## Acknowledgements:

MOM

DAD

SEAN

TONY

THESIS ABSTRACT:

**PROPORTIONS: THE CREATION OF ORDER ?**

Proportions, as an instrument of design, can introduce order and harmony into architecture. Proportions establish a consistent set of visual relationships between the parts of a building as well as between the parts and their whole. Proportions open up a way of seeing, feeling and thinking about spaces shapes and their contents.

Perhaps, these relationships may not be immediately perceived by the casual observer, however, the visual order they create can be sensed or even recognized through a series of repetitive experiences. It is therefore possible to define the objective of architectural proportions as the creation of visual order by the rhythm and repetition of similar shapes.

As with any instrument or principle, the user has to understand its potential, he must be free to exercise his own choices and input his own ideas, which in the end are the arbiters of his success. For these there is no substitute. The tool or architectural project that I will be using to test my research is a school for

environmental design. I felt it was important to choose a project in which the users can understand and appreciate the beauty and complexity created from the implementation of a proportioning system.

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## INTRODUCTION:

At the center of any successful theory of architecture throughout history is a theory of proportions. Correct proportions are in fact essential to any successful work of architecture, whether the proportional relationship is a purely arithmetic one or a proportional relationship which is based on visual similarities.

I found it interesting that relationships that are known to please the eye could be approached analytically, and that the process of creating desired relationships did not have to be purely intuitive. Through my research and experimentation, I hoped to learn to employ these relationships in my own design, and that I could eliminate the haphazard trial and error method of creating pieces of architecture which are complimentary to each other and to the whole.

# CHAPTER ONE: RESEARCH.

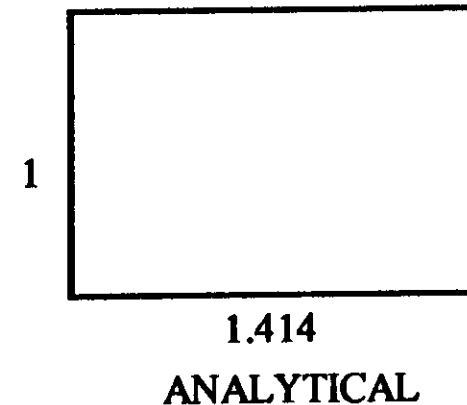
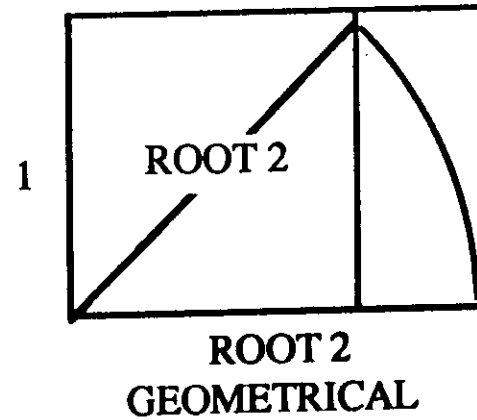
- PROPORTIONS.
- VISUAL PROPORTIONS.
- RHYTHM.

Chapter One is a brief summary of my research conducted fall quarter. It is in no way, however, an inclusive documentation of my research. It does, however, describe the direction from which I approached the idea of proportions and rhythm in architecture and is the basis for my experimentation winter and spring quarter.

## PROPORTIONS.

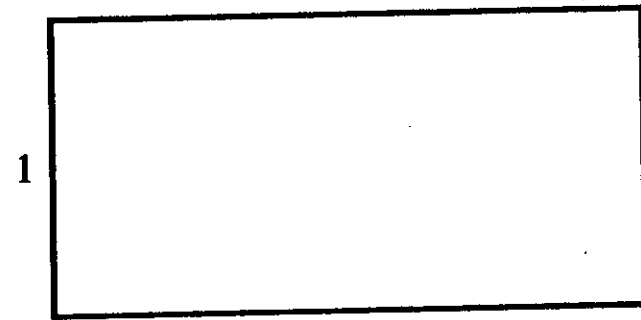
Proportion is defined as the relationship of one part to another and to the whole, especially in respect to size and position. In mathematical terms, it is when two ratios are equal. It does not necessarily have to be two ratios; it can consist of a number of different terms or magnitudes all having the same ratio and thus are proportional.<sup>1</sup> In architecture, the ratios correspond to the dimensions height, width and depth. These elements can be anything from individual members or parts to complete masses or volumes. According to the strict mathematical concept, we say that good proportion exists when the same ratios are found in all the major dimensions of a building and of its parts.<sup>2</sup>

Proportional systems can be classified in two ways, either by the methods used to put them into effect or by their mathematical characteristics. The methods used to put them into effect are termed either geometrical or analytical. For example, if a designer constructs a root two rectangle by tracing the diagonal of a square and striking an arc from the longer side, he is using a geometrical method. He is more concerned with the shape

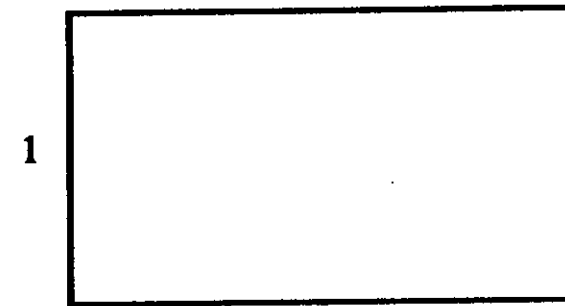


itself than with its actual dimensions. If however, the designer scales each side of the rectangle so that it has the correct ratio, he is using an analytical method. The designer is more concerned with the shape of the rectangle, but the importance is placed on the linear dimension.<sup>3</sup>

The second way proportional systems are classified is by the mathematical ratios they employ, either commensurable or incommensurable. Commensurable systems are based on whole numbers. That means, the shapes are formed by whole number ratios such as 1:2, 2:3, 3:4 etc.. Systems which are based on irrational numbers such as the golden section are considered to be incommensurable systems. Geometrical systems are usually incommensurable in that they deal with irrational numbers and therefore are easier to use in a geometrical fashion. The geometrical incommensurable system is said to be what the Greeks used in their architecture. Analytical systems are however, found to be for the most part commensurable. This method is based on whole numbers and can easily be dealt with mathematically, and it is this system which the architects used during the renaissance.<sup>4</sup>



2  
**COMMENSURABLE**



1.618  
**INCOMMENSURABLE**

The difference in characteristics of certain shapes lies in their practicality as a tool for design and in their flexibility. For architectural purposes, an analytical system is more advantageous than a geometrical system, in that the designer is more concerned with actual linear dimensions, the scale being used as the tool. With regards to flexibility, an incommensurable system, which is based on forms composed of irrational numbers have much greater degree of flexibility, greater than those shapes which are based on commensurable ratios. The ideal condition, therefore is to combine practicality and flexibility, or more directly an analytical incommensurable system. This topic has been talked about extensively by Jay Hambidge in his book titled "Elements of Dynamic Symmetry."

Dynamic symmetry is the combination of the main advantages of the systems of the past. It combines the practicality of the Renaissance along with the flexibility of the Greeks.

The Greeks were the masters of dynamic symmetry, however they approached it in a geometrical manner because the powers of arithmetic were not readily available to them. The Greeks used string, points and levels when

composing buildings parts. It was this idealistic method which allowed them to proportion each part with relationship to each other part and to the whole. The powers of arithmetic are available to us however, and it is this idea that leads me to believe that modern day designers could apply these same geometrical principles with a more practical approach.<sup>5</sup>

The square is the form which serves as the basis for constructing the elements of dynamic symmetry, of which the root rectangles are the most important. The root five rectangle is of special interest within the elements of dynamic symmetry. It is the most versatile of all the root rectangles, the reason for this is because the golden section rectangle is contained within its boundaries.

As it is already known, the art of proportioning can be approached in two ways, either intuitively or by the conscious application of a system. I believe a purely intuitive approach is not valid, when it is known that there does exist concrete relationships that delight the eye and serve as a means to an aesthetic end. Taking this one step farther, perhaps these systems should be viewed as a means of training the eye in correct proportion but that ultimately it should

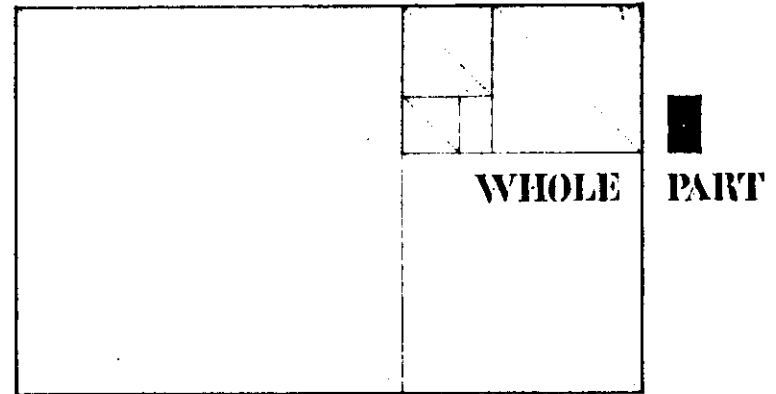
become unnecessary to obtain these relationships through measurement and calculations.

## VISUAL PROPORTIONS.

Proportioning systems establish a consistent set of visual relationships between the parts and their whole. At the heart of these visual relationships are common ratios apparent in all the parts and the whole.

Proportioning systems go beyond the functional and technical determinates of architectural form and space to provide an aesthetic rationale for their dimensions.

However, it has indeed, often been denied that purely formal relationships of proportions give any satisfaction to the eye in themselves. For instance, the requirements of economical construction decides within certain limits the shape and size of many parts of a building. It has been argued from time to time that the whole problem of proportions could be reduced to structural mechanics, and that engineering skills could produce a unique perfect and automatically pleasing solution to every problem of design. But the application of this theory in practice very quickly shows that the problem of making a building stand up is different from that of making it pleasing to the eye. The most that can be said is that any apparent defect in the construction of the building is likely to inhibit our enjoyment of



**RATIO**.....  $\frac{a}{b}$

**PROPORTION:**  $\frac{a}{b} = \frac{c}{d}$  or  $\frac{a}{b} = \frac{b}{c} = \frac{c}{d} = \frac{d}{e}$

its proportions.<sup>6</sup>

Along with the structural requirements of a building, a similar factor in determining the proportions of a building is commodity or how the spaces will be used. The purpose of a room, for instance, may determine its shape within certain limits. But it is very rarely the case that it determines it exactly, and normally it can be varied within fairly wide limits to take into account other requirements. In this case, our enjoyment of the proportions of the room is only inhibited if its shape is very obviously unsuitable for its purpose.

These two factors of structure and commodity together constitute the fitness which played an important part in debates on aesthetics and the theory of proportions in the eighteenth century.<sup>7</sup>

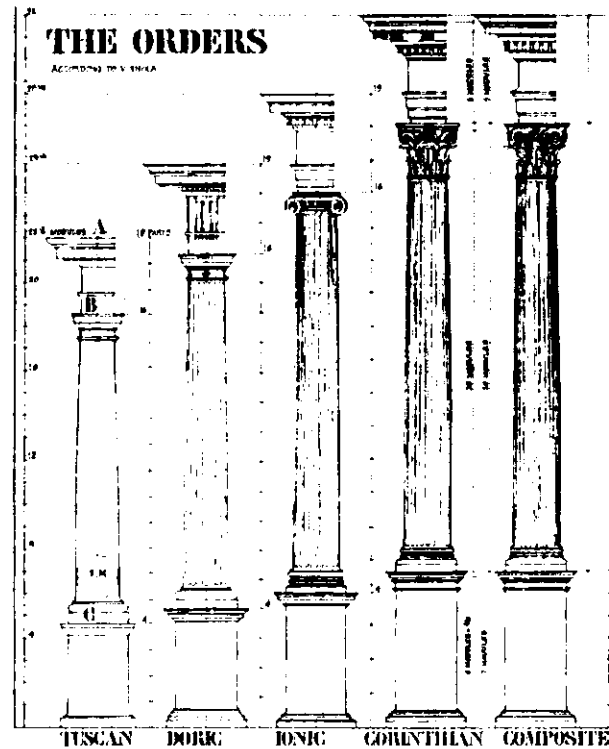
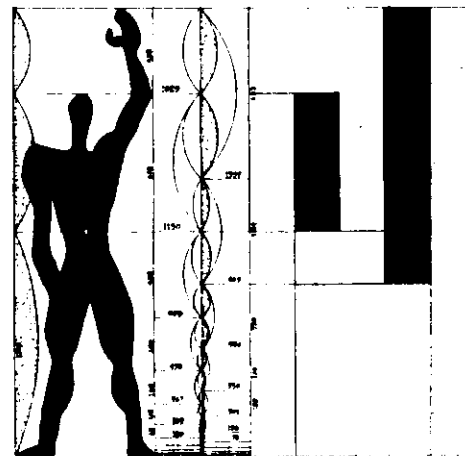
The attempt was often made by philosophers and critics to reduce the theory of proportions entirely to a theory of fitness. In fact, however, it is the common experience of designers in practice that when all the requirements of fitness have been met, a good deal of choice usually remains between proportions which appear pleasant and those which appear unpleasant.<sup>8</sup>

Another factor which can be confused

with visual proportion must be mentioned, especially as it seems to concern the eye very much more directly than fitness. This is the factor of custom or convention. It is obviously no use drawing a human figure in accordance with some canon of proportion if the result is not recognizable as a human being of the type we are use to seeing. In the same way, when strong conventions are established in architecture, such as those controlling the proportions of the orders, any variation from what the eye is use to seeing may destroy the pleasing effect of the design. An attempt has sometimes been made to reduce the theory of proportions entirely to a theory of custom or convention. This attempt would more likely be successful in the renaissance when so much of architecture was controlled by custom than it is today.<sup>9</sup>

Indeed, the urgency of the need for an adequate theory of visual proportion today is partly due to the collapse of traditions in the face of new methods of construction and new uses for buildings. While it must be agreed that both fitness and custom may play an important part in determining proportions, it is very seldom in architecture that no latitude remains for the operation of visual

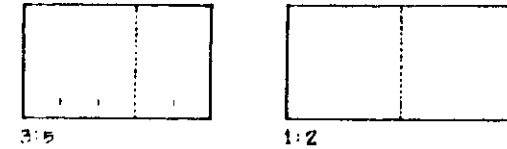
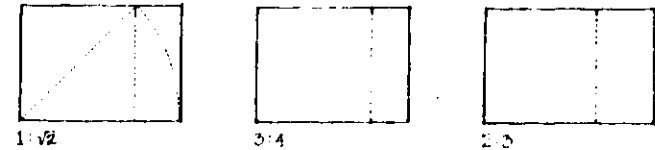
Lecorbusier's Modular.



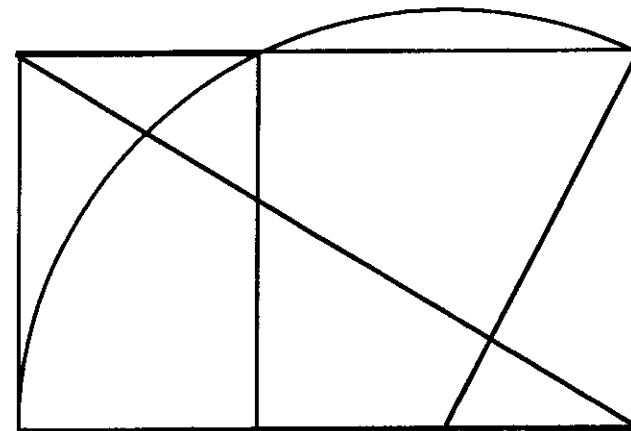
proportions, that is proportional relationships which please the eye in themselves, independently of external considerations such as fitness for purpose or agreement with convention.

One way of explaining the pleasing effect of proportions in architecture is to assume that certain shapes are more pleasing to the eye in themselves. Once the admired shapes have been selected, - and this is where the trouble lies - architectural proportions becomes a straightforward matter of using them as often as possible.<sup>10</sup>

We shall find that in the renaissance it was commonly believed that the most beautiful rectangles were those whose sides had the simple numerical relationships of musical consonance. More recently, the most popular rectangle has been one whose sides are in the ratio of the Golden Section. Experiments to decide between the two have had rather inconclusive results, though they seem to have given a preference to the Golden Section. It is clear, however that no individual rectangles are in themselves either outstandingly beautiful or ugly. The secret of proportions seems to lie not in the shapes themselves, but in the relationships between them. It would



Renaissance proportions

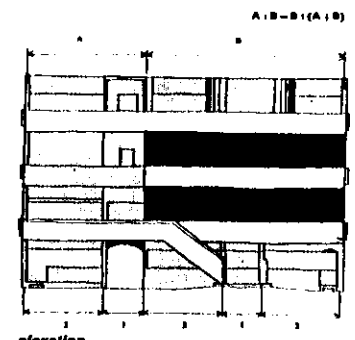
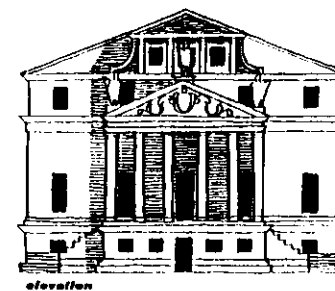
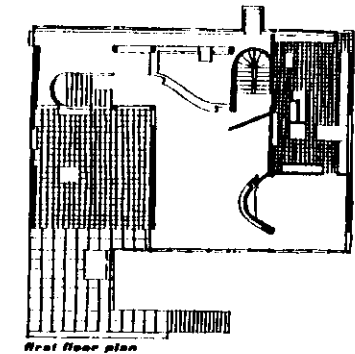
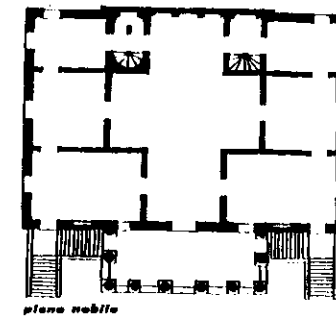
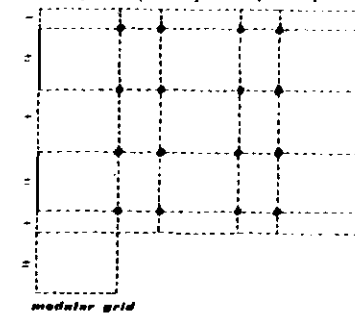
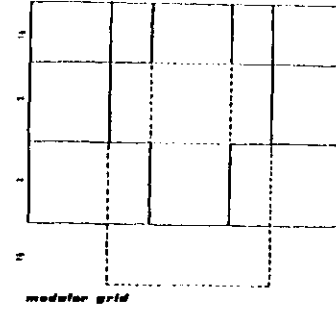


GOLDEN SECTION RECTANGLE

otherwise be difficult to explain how for instance, the buildings of Palladio and those of Corbusier can both be well proportioned when they embody different systems of shapes.<sup>11</sup>

The supposed beauty of certain individual shapes is not only a very doubtful assumption on which to base a theory of proportions, but it is also quite unnecessary. The use of these shapes in practice can be explained as a means to an end, and it is of no consequence whether the shapes themselves are regarded as beautiful or not. But before this is explained, I should first consider those proportional relationships which are, without any doubt significant to the eye.

If we include size as well as shape, there are two important relationships which the eye can recognize. First, the eye possesses a remarkable power of recognizing the relationships between objects having the same shape. It can exercise this power whatever the distance of the object, and too a large extent it can overcome the distortion caused by viewing the objects from different angles. The power of recognizing similar shapes is acquired very early in life and one on which we depend in finding our way about. The second relationship is that of objects having

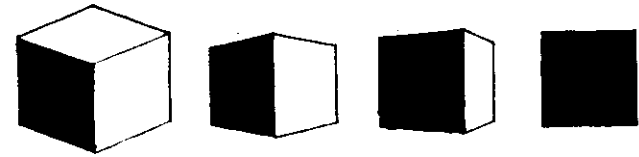


Palladio

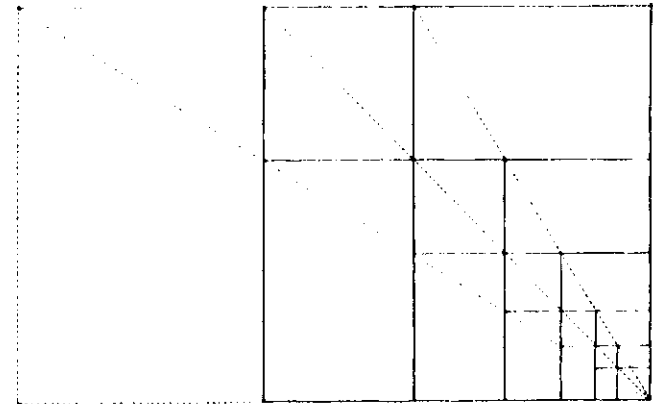
Corbusier

the same size as well as the same shape, But the recognition of this relationship demands comparatively favorable conditions. We can see at a glance that the sun and moon are of the same shape, but from the evidence presented to our eyes, we might think that they are also the same size. In looking at buildings, however, the eye can recognize this relationship fairly easily.<sup>1 2</sup>

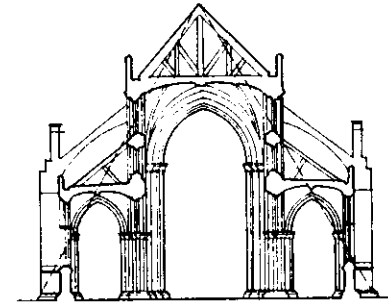
The second relationship, that of objects having the same size and shape is fairly easily recognized. The repetition in design of elements of the same shape and size leads to various forms of symmetry (Bilateral symmetry, radial symmetry and so on). The use of symmetry is well understood, and we need not consider it further here. Finally, the first relationship, that of similarity of shape alone is all that is left as a possible key to the theory of visual proportions in architecture. The importance of similarity of shape as a source of unity in design has seldom been denied. Its simplest and most familiar use in architecture lies in the repetition of some shapes taken from the structural system. Obvious examples of this are the round arches and vaults of gothic architecture. We can give this unity to a building by the repetition of one



Visual Proportions: Objects having the same shape and the same size, (Second Relationship).



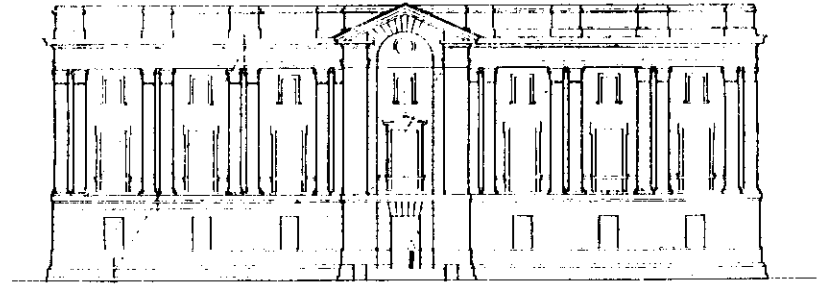
Visual Proportions: Objects having the same shape only. (First Relationship).



Use of similar shape in design. The repetition of the gothic arch.

dominant shape in a number of its parts. Some writers have stressed the possibilities of repeating the shape of the plan or elevation as a whole in the parts into which it is subdivided. In this case, not only are certain of the parts related, but a still greater sense of order is achieved by relating these particular part to the whole. Of course, it is not possible to make all the parts of a building similar in shape, even if such complete uniformity was desired, but the possibilities of introducing visual order is not exhausted by the repetition of one shape alone.<sup>13</sup>

In a building where all the parts are of different shapes, the visual effect is one of disorder. Order can be introduced by the repetition of similar shapes and the highest degree of order results when comparatively few shapes are used, repeated as often as possible. This type of order is one in which the eye can recognize. It is not a purely mathematical order which has to be consciously understood before it can be appreciated. We can therefore reasonably define the object of architectural proportions as the creation of a visual order by the repetition of similar shapes.<sup>14</sup>



Similar Shapes. Notice the order created in the facade of this building which is a result of the repetition of the rectangular shape. The rectangular form is found in the windows, doors and bay spacings between columns.

## RHYTHM

Rhythm refers to the regular or harmonic recurrence of lines, shapes, form or colors. It incorporates the fundamental notion of repetition as a device to organize forms and spaces in art and architecture.

The different types of art with which we are familiar may be divided into two groups according to the way in which the impressions are conveyed to our senses or according to the manifestations of their qualities. Some may be permanent in their characteristics, as those executed in stone. Others may be transitory, as is sound, so the arts, whether fine or applied may be listed as follows:

Static arts: architecture, sculpture painting, and literature.

The evanescent or dynamic arts: music, dance and dramatics.

In spite of this division, the arts have certain characteristics in common - they have organization, unity and character. Often analogies are drawn between the process of creating compositions in architecture, in sculpture and in painting.



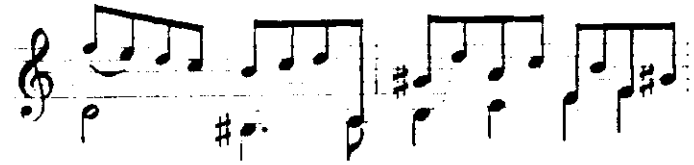
Static art: sculpture



The evanescent or dynamic art  
dance

However, the purpose of this immediate study is to discuss the relationship between music and architecture to make the quality of rhythm the basis of this analysis.<sup>15</sup>

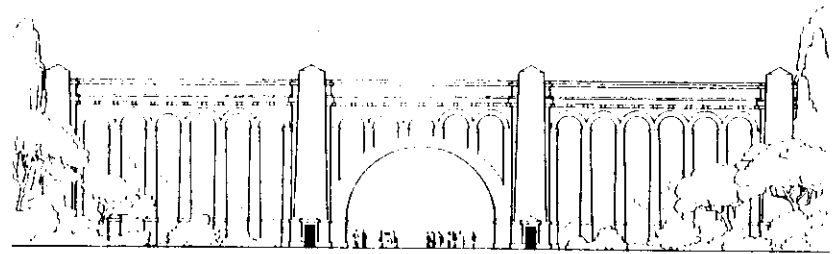
Music is an art that is meant to heard. It is a combination of sounds arranged in such a manner as to arouse various reactions of pleasure interest and excitement. Architecture is an art that is meant to be seen. It is a composition of elements so arranged as to serve a utilitarian purpose and in addition to have an emotional appeal. Rhythm is the foundation of music. Although it is necessary that there be tones of pleasing quality, still these tones must first be organized into some kind of time or spacing. Unorganized sound results in discord or dissonance. Unorganized architectural forms cause confusion. Movement is the basis of rhythm. The movement in music may consist of the time which may be fast or slow. There is the same feeling of movement in architecture. A building is of course static. It remains upon its foundation indefinitely, but there is



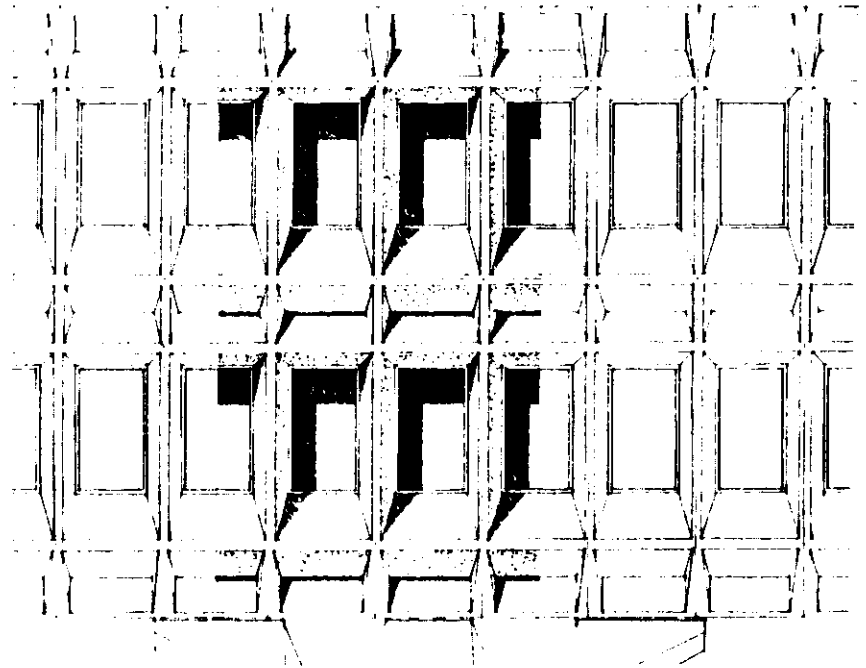
Musical Notes.

movement of the theme as it travels across the facade of the building - the eye pausing here to look at this detail and then going on to the next. An unbroken wall has no rhythm. There is nothing except texture to arrest the attention. Nothing to be seen beyond the shape and contour of the surface. However, if equally spaced windows are introduced, then regular repetition is present and we have unaccented rhythm. If the openings or details are arranged in such a manner that some are more important than others, then the eye grasps the significance of this relationship and pause longer in contemplating the larger elements. This brings about an accented movement, a skipping along quickly over the minor divisions and a rest upon the major motifs.<sup>16</sup>

This movement which we call rhythm must be directed and controlled. If unrelated noises occur, then there is no organization and hence no rhythm. If windows and doors are thrown into the facade of a building in a haphazard manner, there is no scheme or sense to the arrangement and again no



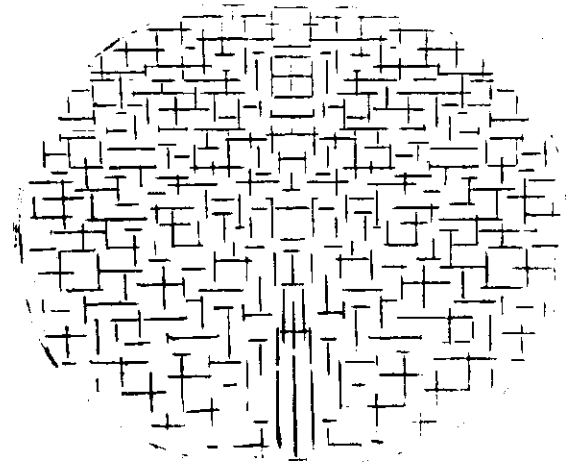
Rhythm. The movement of the theme as it travels across the facade of the building.



Rhythm. The placement of the windows in Breuer's building produces a continuous unaccented rhythm. However, the play of light and shadow will add interesting variations to the composition.

rhythm. Rhythm, then is organized movement. It may be the movement of your eye across a painting from spot to spot of similar color- the rhythmic use of color. It may be the repetition of a similar type of line in sculpture or painting such as a Mondrian- the rhythmic use of line. It may be the movements of dancers, the rhythm of motion which constantly changes and offers new rhythmic patterns constantly. It may be found in the continuity of a series of arches forming an arcade - the rhythm of direction. It may be as simple as in architecture, or as complex as in a symphony. However, both forms of expression have this in common: the pleasure derived from music depends more on the manner in which the tones are combined than upon the tones themselves; in architecture, the arrangement of masses and details contribute more to the success of the composition than do the motifs themselves.<sup>17</sup>

Music is presented to us in time: that is its intervals are time intervals, which follow each other processionally and separately, so that they can be exactly measured: and harmonic



Mondrian- rhythmic use of line.



Rhythm of direction.

relationships are precisely stated no matter how complex the rhythmic structure may be.

But, visual design exists in space, with all its parts and intervals presented to us simultaneously. For these reasons, the rhythmic structure of visual design is readily perceptible, it may become far less legible than most intricate musical compositions. It does not exist in one dimension of time, but in four including time. It may be constructed of not one material alone -musical notes- but of many expressed in line, areas, forms etc. . It is probable that we would not be aware of visual rhythms or feel their necessity at all, if it were not for the special way we see thing. The eye, by its structure and method of observing, if properly guided may supply the time intervals in which rhythms become perceptible. <sup>18</sup>

## CHAPTER TWO: ANALYSIS

- PROGRAM BRIEF
- CONTEXTUAL ANALYSIS

At the beginning of Winter quarter, I did an indepth study of my site and context to determine its impact on my desing. Chapter two is an analysis of my site and neighboring buildings and how they influenced the role of proportions and rhythm in the design of the school

## PROGRAM BRIEF: THE COLLEGE

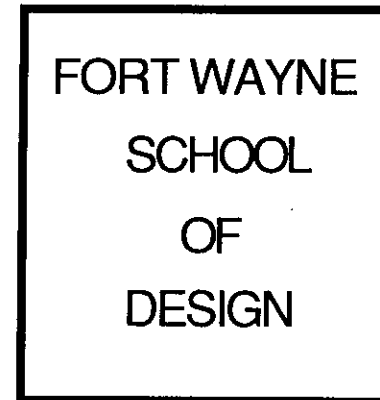
The proposed Fort Wayne School of Design is a private college devoted to education and research in the areas of environmental design. The category "environmental design" is a broad term referring to the more specific disciplines of architecture, interior design, landscape architecture and urban planning. Also, the college will offer degree programs in the areas of fashion design and graphic design.

The college and its programs have been designed to function as an internally, inter-related system. That is, the various programs of the college will contribute to and draw support from the other disciplines. Through this interaction, each student will benefit by learning some of the basic design criteria of the other related disciplines.

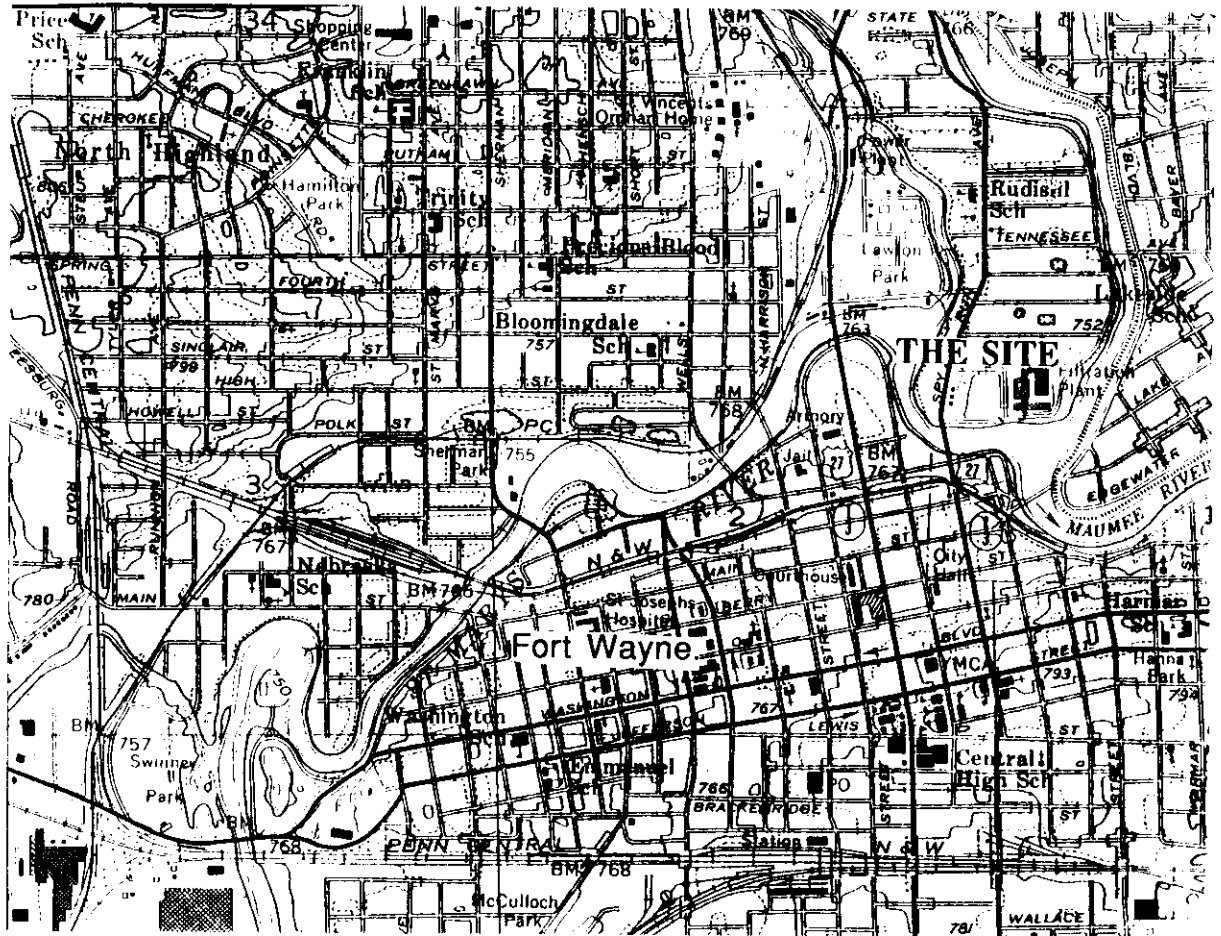
The main focus of the college is "excellence in design". All the programs at the college will support the proposition that the design arts are "utilitarian arts, and the corollary premise that the focus of any education or research must include the end product of the

design process as well as the process itself."

Therefore, the goals of the Fort Wayne School of Design are to objectively train each student to seek better approaches and solutions to contemporary environmental design problems. In order to achieve these goals of the program, the college must focus on the issues of psychology of design, the philosophy of design, and the history and development of design theories and design methodology.



# PROGRAM BRIEF: THE SITE



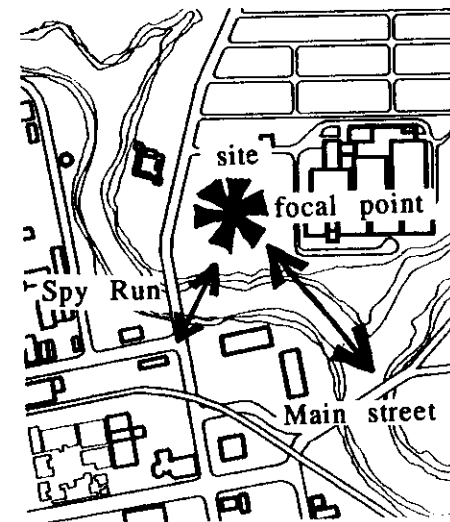
SITE PLAN NORTH 4

The site I have chosen for my Design School is located in the city of Fort Wayne Indiana. I choose Fort Wayne for several reasons, mainly, because of their effort in historic preservation and urban renewal. Fort Wayne's concern for the proper restoration of their downtown buildings is evidence of their concern and interest in architecture. Also, because of the cities concern for architecture, I feel both the college and the city will be able to benefit and contribute to the success of each others programs. Below are a list of advantages to the College and the city that were important determinants in choosing a location for my project.

Because of the buildings location near the Main street bridge and Spy Run, the building can act as a focal point as businessmen and visitors enter and leave the northeast side of Fort Wayne. I feel it is important for a city to have a definate boundary, such as a point or line which you pass by that states you are entering or exiting the city. At the present, however, Fort Wayne is lacking in these types of icons. Nevertheless, They are attempting to change that with the proposed project by E. Kuhne.



SITE PLAN NORTH 4

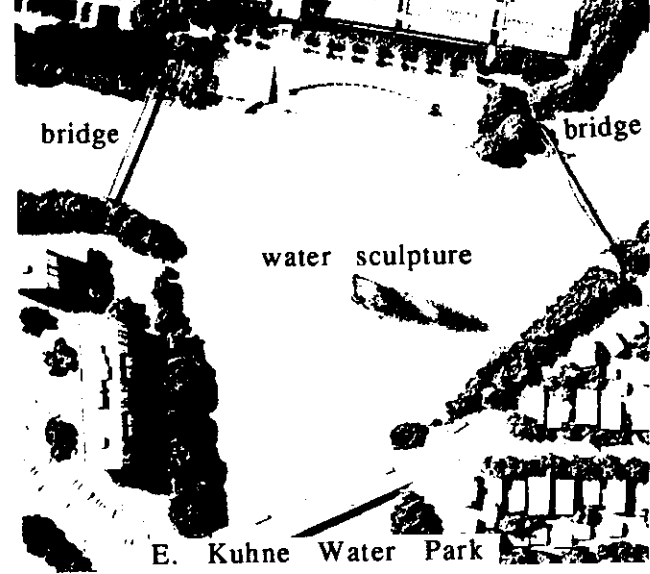


SITE PLAN NORTH 4

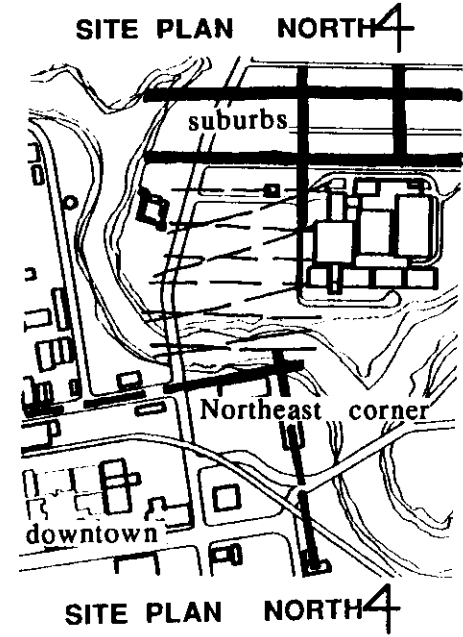
E. Kuhne Water Park is located at the meeting points of the three rivers. He is proposing that the city terrace the banks of the river for seating and put pedestrian foot bridges over the rivers to allow the people using the space to have access to all the banks. Also, the focal point of the whole park is the 250 foot water sculpture in the middle of the river. With the proposal of this park and the integration of my building into the park design, this would be a nice start in defining the northern boundary of the city,

The site is also important because it defines the Northeast corner of the downtown grid shift. The shift in the downtown grid, in relationship to the surroundings suburbs, is due to the flow of the St. Mary's river. The shift in the grid is important in helping define some definite boundaries between the city and the surrounding housing divisions.

Another important aspect of the site is its location along the Cities river greenway project. I feel the river greenway project, located along the southern border of the site, can be integrated into the design of the college campus. This will offer the college students and faculty a place to relax between



E. Kuhne Water Park

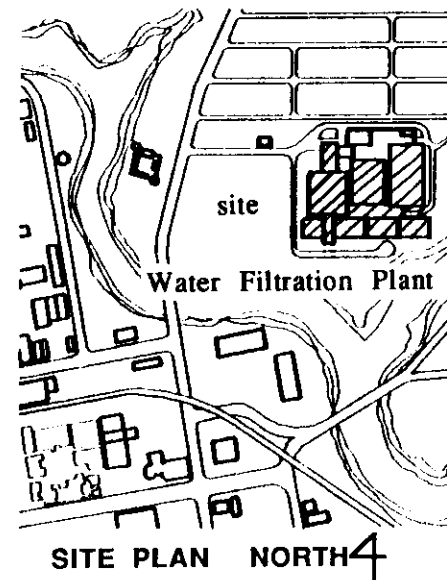
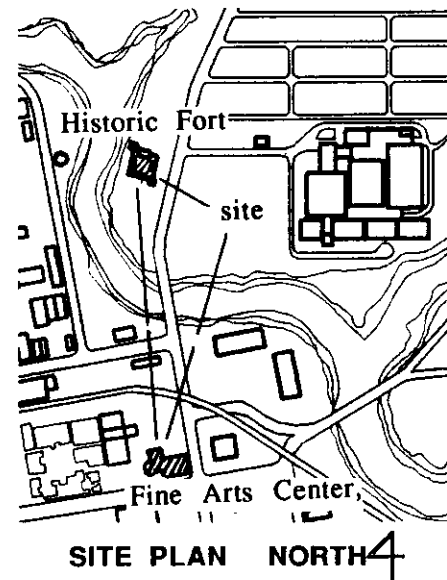


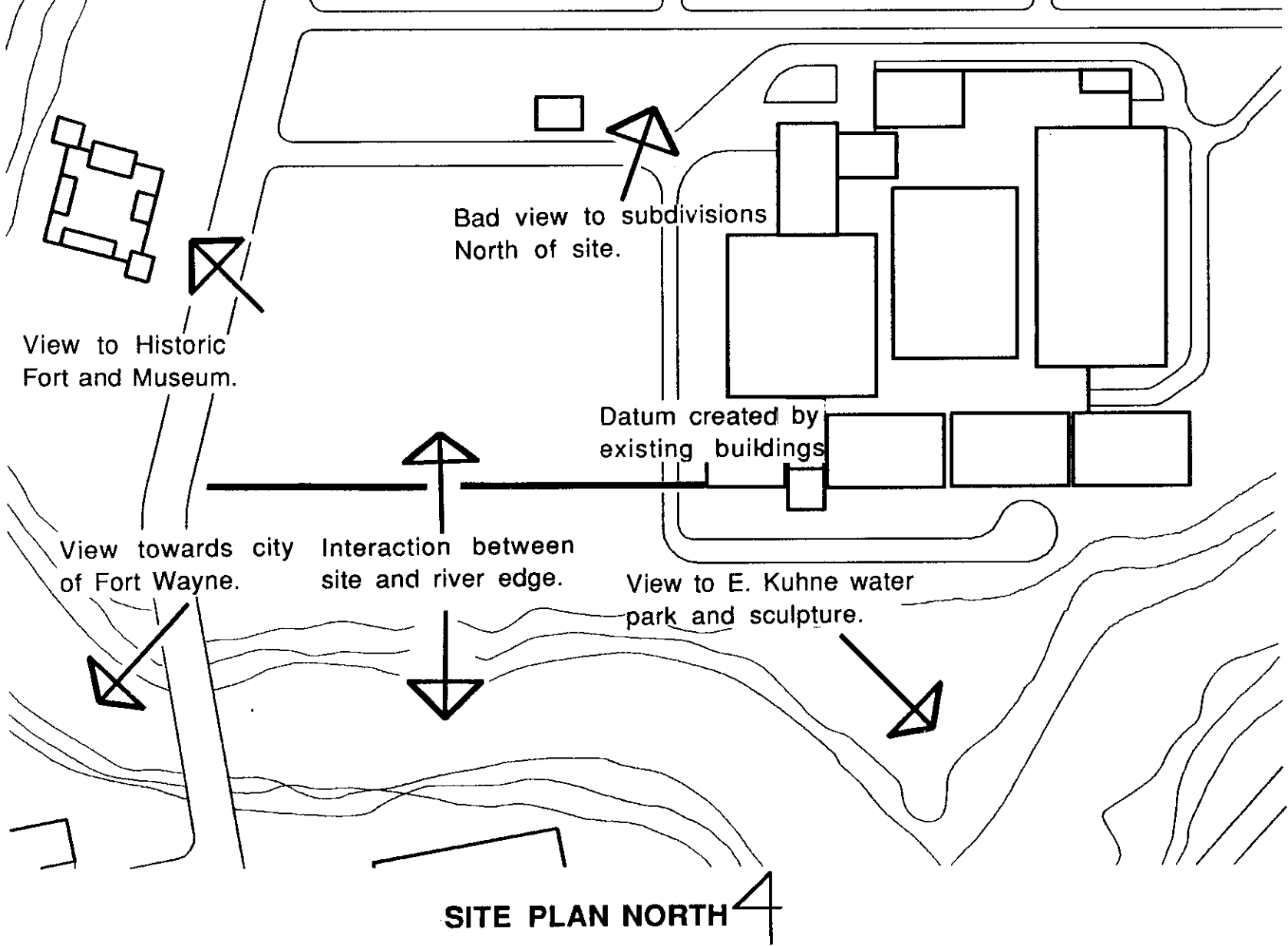
classes and ensure the city of its daily use.

In addition, the close proximity of the river to my site is another added benefit. The fact that the river is constantly changing will provide new views and experiences daily and will add to the dynamics and vigor of the site and my design.

Also, this site is important because of its proximity to the Fort Wayne Fine Arts Center, designed by L. Kahn and the replicated Historic Fort and its museum. There is a great opportunity here to create a link of connection between the College, the Fort and the Fine Arts Center. These areas can be used as resources by the students and faculty in their research.

The last and possibly the most influential factor which governed a considerable amount of my design is the Fort Wayne Water Filtration Plant located to the east of my site. The Water Filtration Plant is a 1931 PWA Art Deco Building. It is one of the few remaining historic icons left in the city of Fort Wayne, and offers a wide variety of contextual responses from proportions which govern the articulation of the facade to the massing of the building parts themselves.





# **CHAPTER THREE:**

## **EXPLORATION**

- PROJECT PROGRAM
- CONTEXTUAL RESPONSE
- SITE RESPONSE
- BUILDING RESPONSE

Chapter three is an indepth documentation of my experimentation into the theory of proportions. It contains my successes as well as my failures in the implimentation of proportions and a series of brief statements explaining why a certian part of hte design was successful and how, through the suggestions of the jury I could have improved my design.

**PROGRAM SPACIAL REQUIREMENTS**

**1. ADMINISTRATION**

Director	280.0	sq. ft.
Administrative Ass't.	150.0	
Ass't. Director	175.0	
Budget Director	175.0	
Promotions Director	175.0	
Secretarial 4 @ 125.0	500.0	
Reception Area	350.0	
Conference Room	500.0	

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	Sub-Total	2,305.0 sq. ft.
	+25%	576.0
		<hr/>
		2,881.0
	Use	3,000.0 sq.
ft.		

**2. GRADUATE AND UNDERGRADUATE STUDIES**

Director	180.0	sq. ft.
Ass't. Director	180.0	
Secretarial Area	600.0	
Reception Desk	100.0	
Reception Area.	200.0	
Conference Rooms	300.0	

Faculty Offices 40 @ 100

4000.0

Classrooms	6 @ 300	1800.0
Studio Space	20 @ 450	9000.0
Student Lounge		1000.0
Vending Area		200.0
Conference Rooms	2 @ 300	600.0

	Sub-Total	18,160.0sq. ft.
	+20 %	3,272.0
		<hr/>
		21,432.0
	Use	21,800.0 sq. ft.

**3. ARCHIVES**

Archivist	180.0	sq. ft.
Ass't Archivist	150.0	
Secretary	250.0	
Reception	250.0	
Conference Room	300.0	
Exhibit Area	1000.0	
Study Area	1000.0	
Storage Area	3000.0	
Work Area	700.0	

	Sub-Total	6,830.0 sq. ft.
	+20%	1,366.0
		<hr/>
		8,196.0
	Use	8,200.0 sq. ft.

**4. LIBRARY**

Head Librarian	180.0 sq. ft.
Ass't. Librarian 2 @ 150	300.0
Secretaries 3 @ 125	375.0

**USER AREAS**

Information Counter	200.0
Reference Area	500.0
Microforms etc.	300.0
Computer Catalogue	240.0
Periodical Reading Area	600.0
Periodical Stacks	1700.0
Audio Visual	300.0
Special Collections	650.0

**STUDY AREAS**

General Stacks	2600.0
Reading Rooms	600.0
Study Carrels	700.0
Research Tables	420.0
Conference Room	300.0

**TECHNICAL AREAS**

Work Room	500.0
Book Storage	800.0

Sub-Total	11,115.0 sq. ft.
+ 25%	2,778.0

**5. SLIDE LIBRARY**

Slide Librarian	150.0 sq. ft.
Ass't. Librarian	150.0
Secretary	150.0
Slide Storage	700.0
Work Area	150.0
User Work Area	300.0

Sub-Total	1,600.0 sq. ft.
+ 20%	320.0

Use	1,920.0
	2,000.0 sq. ft.

**6. PUBLIC CONFERENCE.**

Lecture Hall	3500.0 sq. ft.
Multi-Purpose Room	4000.0
Dining Area	4500.0
Kitchen Area	1800.0
Bookstore	1500.0

b Sub-Total	15,300.0 sq. ft.
+ 20%	3,060.0

Use	18,360.0
	18,400.0 sq. ft.

**7. COMPUTER LAB**

Director	150.0 sq. ft.
Ass't. Director	125.0
Micro Lab	1000.0
Macro Lab	1000.0
Graphics Lab	1500.0
Mainframe	300.0

Sub-Total 4,050.0 sq. ft.  
+ 20% 810.0

4,860.0  
Use 5,000.0 sq. ft.

**8. TECHNICAL RESOURCES**

Manager	150.0 sq. ft.
Ass't Manager	100.0
Wood Shop	600.0
Plastic Shop	400.0
Metals Shop	400.0

Sub-Total 1,650.0 sq. ft.  
+ 20% 330.0

1,950.0  
Use 2,000.0 sq. ft.

**9. REPRODUCTION AREA**

Manager	150.0 sq. ft.
Ass't Manager	150.0
Photo Technician	150.0
Dark Room	250.0

Light Room	250.0
Photo Copy Area	200.0
Printing Area	600.0

Sub-Total 1,700.0 sq. ft.  
+ 20% 340.0

2,040.0  
Use 2,000.0 sq. ft.

**PROGRAMED SPACES TOTALS**

1 ADMINISTRATION.	3,000.0 sq. ft.
2. GRADUATE AND UNDERGRADUATE STUDIES.	21,800.0 sq. ft.
3. ARCHIVES	8,200.0 sq. ft.
4. LIBRARY	14,000.0 sq. ft.
5. SLIDE LIBRARY	2,000.0 sq. ft.
6. PUBLIC AND CONFERENCE FACILITIES.	18,400.0 sq. ft.
7. COMPUTER FACILITIES.	5,000.0 sq. ft.
8. TECHNOLOGICAL RESOURCES.	2,000.0 sq. ft.
9. REPRODUCTION FACILITIES	2,000.0 sq. ft.
TOTAL SQ. FT	76,400.0 sq. ft.

## CONTEXTUAL RESPONSE

After a complete analysis of my site and adjacent buildings, I realized I had a lot of variables to address and that it would be tough to develop a solution which gives equal emphasis to them all. So, after further review, I decided that there were five contextual relationships that I wished to focus on during the development of my design. They ar

- Proportion
- Rhythm
- Massing
- Datum
- River Greenway

These five relationships were chosen because their influence around the site is very strong and to deviate and or ignore their influence would be a mistake on my part as a designer.

## PROPORTIONS and RHYTHM

How was I going to use proportions in the design of my school? This was a big dilemma I needed to get answered early winter quarter. Was I going to use proportions in a very rigid manner like Corbu's modular, or was I going to use proportions as a means to help enhance the aesthetic beauty of the buildings and spaces created between them.

The more I studied and thought about this, the more I realized that Corbusier's buildings were very interesting as a composition of elements, but as an environment within which to live, they were not so successful. People did not seem to want to live in his spaces (apartments) for a very long length of time.

Even though Corbu's modular was based on the dimensions of the human body, perhaps a less rigid application of the modular would have been more successful in creating spaces where the public enjoyed spending time.

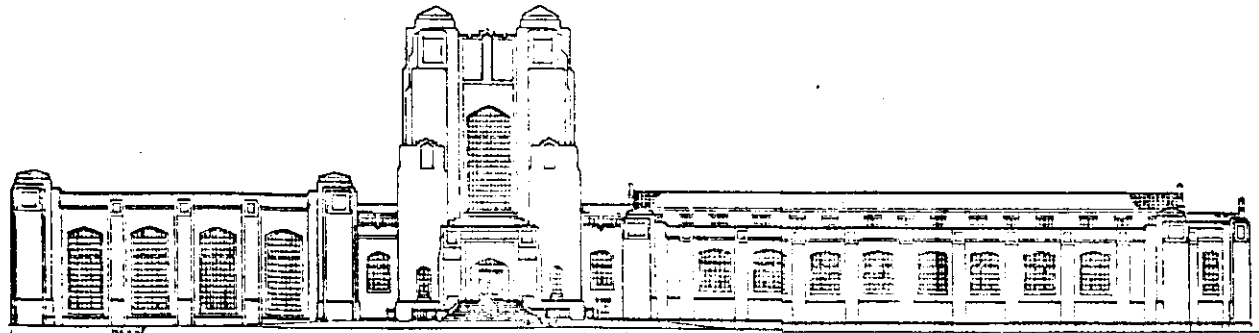
From my research and personal analysis, I decided to use proportions as a supplement to my design rather than a generator of my design ideas. A design is only as good as the

ability of the designer and implementing a rigid system of proportions is not solution a to achieving a good design. Rather a good design should first be conceived and work out and then, after the conceptual development is complete, is the appropriate time to overlay a system of proportions to add another layer of complexity to the design.

The Fort Wayne Water Filtration Plant located adjacent to my site has been a landmark building in Fort Wayne since the early 1930. The Building and the grounds around it are very important to the inhabitants of the city of Fort Wayne. They represent the good times during the Three Rivers Festival when the residents of the city and visitors gather together to celebrate and have fun as well as the bad times when the city has to rally together to fight floods in the spring. Because of the present image of the Water Filtration Plant, I feel that is important that my design be sympathetic to the existing guidelines set up by the building and the image that is recognized by the city and its residents.

Therefore, rather than introduce a new system of proportions into the existing context, I decided to take advantage of the existing proportional systems created by the Water Filtration Plant.

The proportioning system, which is a function of the structural requirements of the building is evident on the exterior of the building in the form of piers. These piers, spaced about twenty feet apart, divide up the facade of the building into a series of equal sections which are further subdivided by the breakdown of the space into windows. As a result of the structural system, the piers and windows create a dynamic movement or rhythm which moves the observers eye across the facade of the building pausing at certain high points and passing over other small minor points.



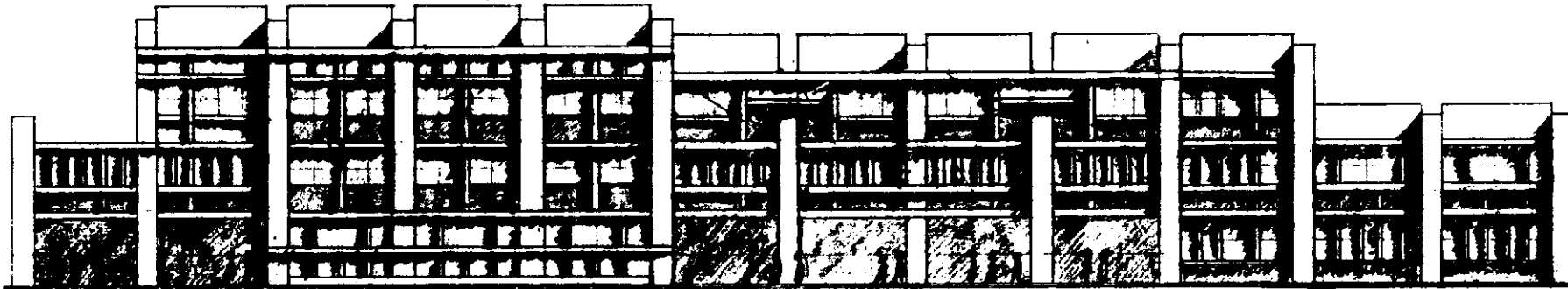
Fort Wayne Water Filtration Plant

When designing, I wanted to take the idea of proportions past the purely functional and technical determinates of form and space. I looked to proportions to provide an aesthetic rationale for dimensions, spacial sequences and facade divisions. By implimenting this system, proportions helped me in creating rhythm, order, hierarchy and unity among the various parts of the design.

Rhythm refers to the regular or harmonous recurrences of line, shape, forms or color. It incorporates the fundamental

notion of repetition as a device to organize forms and spaces in architecture.

In my design, the rhythms that were created in my design are the results of a proportional breakup of the facade and the spaces behind. For example, my design intentions for the facade were to create variety, interest and movement which coherently moves the observers eye across the facade of the building pausing at certain points to view the detail and passing over less articulated areas.

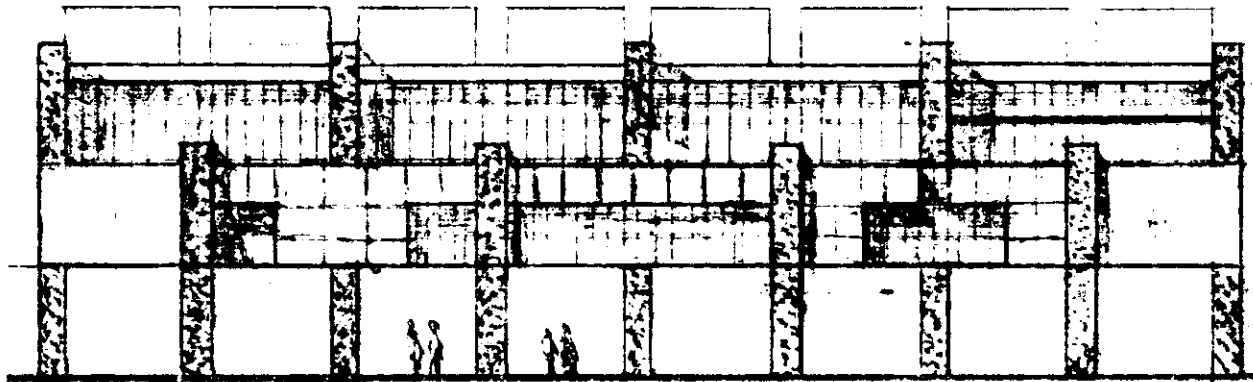


Partial Elevation.

Final design solution. South Facade.

This elevation, in a orderly and coherent manner, produces the variety and interest I was trying to achieve in my design. .. Although

I am happy with the success of the two dimensional application of proportions, I feel my building would have benefited greatly if the elevation were more tree dimensional rather than flat plains.



Partial Elevation.

Preliminary design sketches.

This elevation study was one of my first attempts at solving my design problem. Even

though the elevation shows a rhythm or movement, this attempt lacks the variety and interest I had hoped to achieve in my design.



Partial Elevation.

Preliminary design sketch.

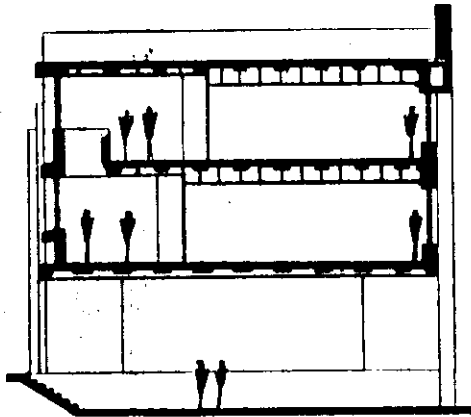
In this attempt, I tried to add variety, interest and movement into the facade depending on the function of the space behind. Although

this was a big step in my design development, which latter lead to the final solution, this attempt seemed to lack a sense of order, some unifying element or elements that could hold it together.

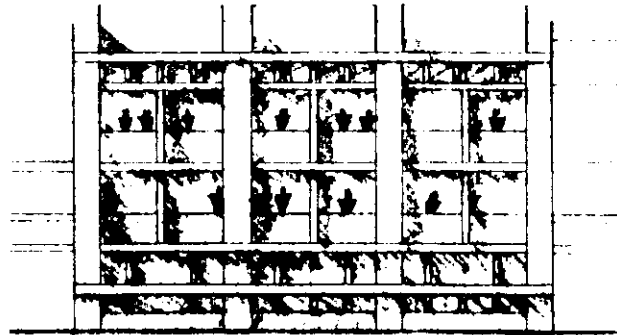
Another aspect of rhythm which I looked at was static vs. dynamic rhythm. The building being the static rhythm and the people walking through the corridors and using the spaces being the creator of the dynamic rhythm. This idea of dynamic rhythm intrigued me. I thought it would be interesting if I could incorporate this type of constantly changing rhythm into my design. If I could, my design would benefit greatly

because the character of the elevations would constantly be changing depending on the number of people walking through the corridor and using the spaces.. It was this idea which became the catalyst for creating single loaded corridors.

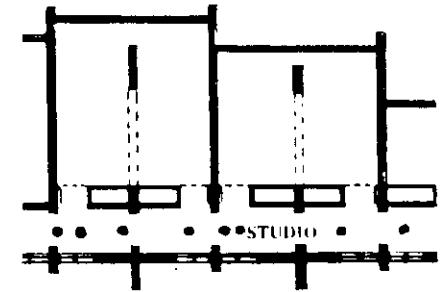
This concept of dynamic rhythm is best displayed along the south elevation where the corridor is located next to the building facade.



SECTION.



PARTIAL ELEVATION.



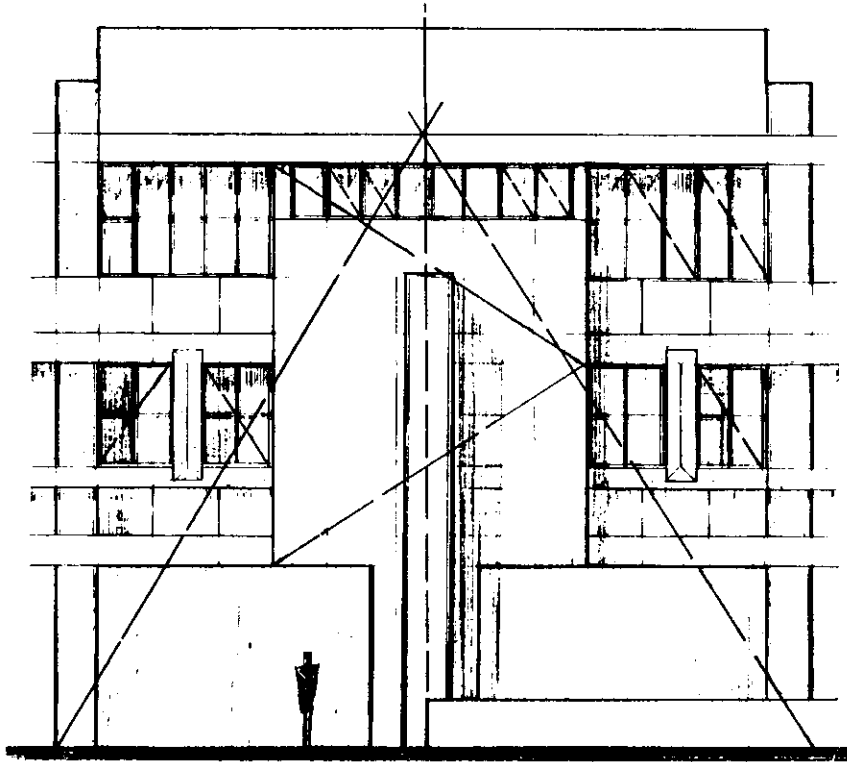
PARTIAL FLOOR.

These diagrams are trying to show the idea of dynamic rhythm occurring within the building rather than on the facade. Part of the reasoning behind having so much glass rather than equal amounts of solid and voids, is so that people using the garden can take advantage of the movements and activities inside. This is basically the reverse of what we

are use to, only using windows to look out. I want to use the windows not only to look out at the site, but also to watch the activities going on inside the building from the garden. The visibility, however, of this dynamic rhythm is limited to the surrounding site. Beyond that point, observers would probably not notice the movement within the building.

## Facade analysis.

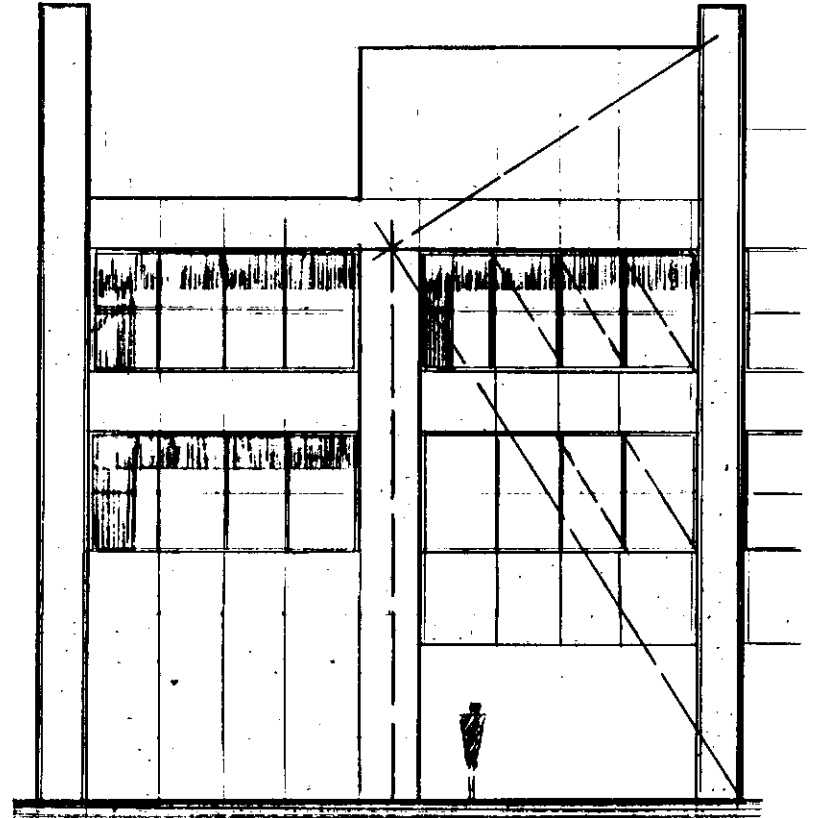
After determining the proportioning system of the Water Filtration Plant and using that as the basis for my structural system, I decided to sub-divide the facade and interior spaces through the use of regulating



Partial Elevation

After establishing a base proportioning system from the filtration plant, I used regulating lines to help me quickly and effectively

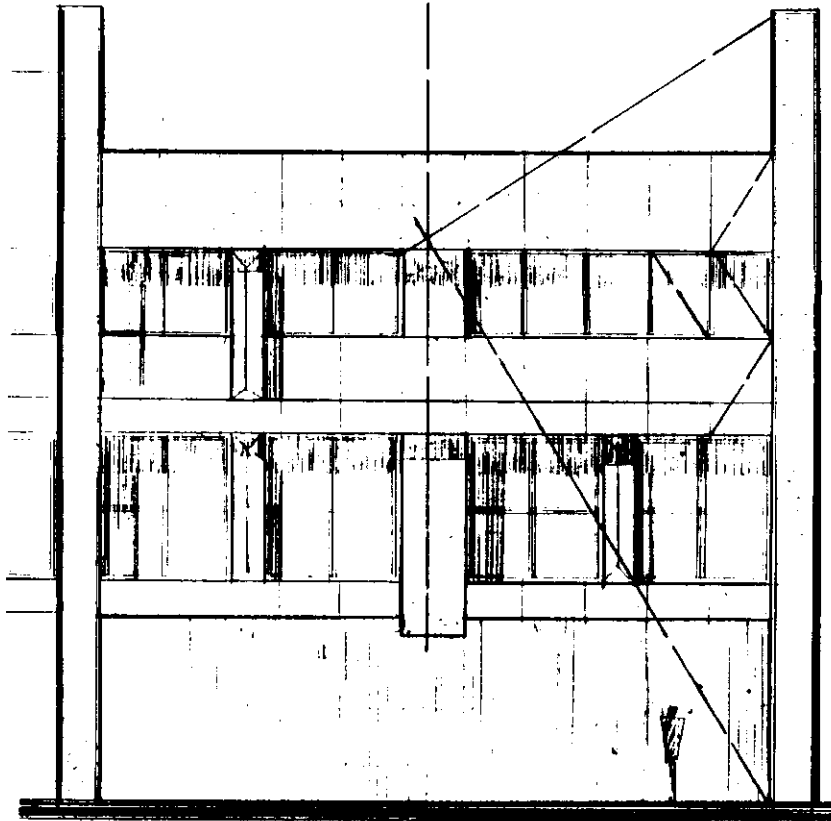
lines. This allowed me to quickly and effectively develop elevations and plans which were coherent and ordered without having to calculate every division of the facade and interior spacial sequence.



Partial Elevation.

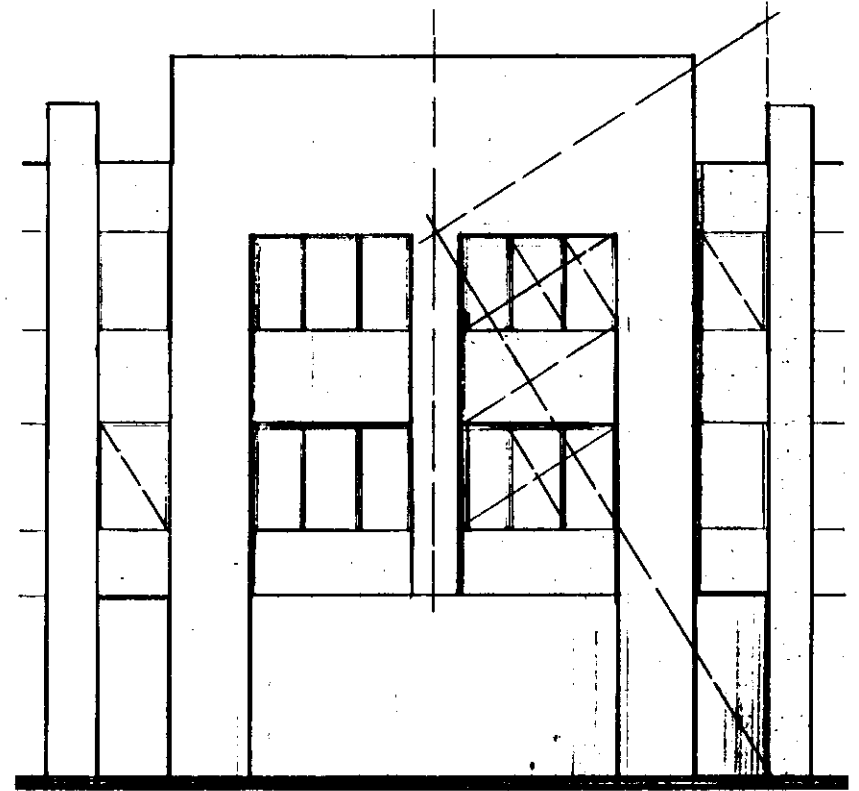
subdivide the facade according to the interior space requirements.

## Facade analysis.



Partial Elevation

Regulating lines are lines which are either parallel or perpendicular to each other. In proportions, regulating lines are usually the diagonal of the rectangles. These lines when



Partial Elevation

used properly, can help order the facade of a building making the various parts similar in area to each other.

## ORDER

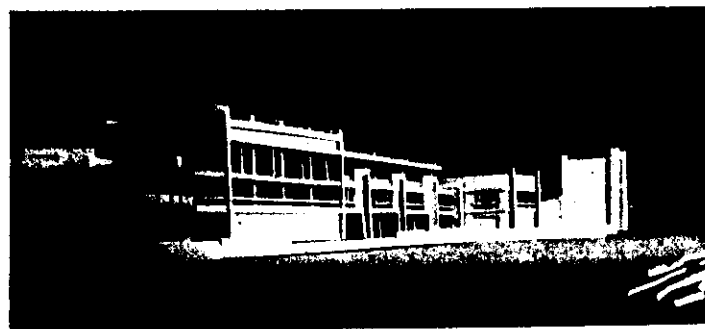
Excitement. This seems to be a word of most importance when speaking to life. Striving for success. The quest for Adventure. These are ideals which add excitement to an individual's life and makes it an adventure. These environments which we live and work in should create and hold feelings of adventure and excitement, there fore making positive contributions to the quality of life.

Yet there must be order. It seems to be the case that too often order opposes excitement. They seem to be at opposite ends of the spectrum when creating architecture. Order can in fact restrain and create monotonous repetition if the designer so allows. The key to innovation is to create excitement within a new or established order (being my context).

-It should in fact be a simple and as pure an order as possible. It should answer all the questions yet it should allow for variety and excitement. I believe however, that this order does not and perhaps should not necessarily become apparent to the observer at first. This element of uncertainty is what generates excitement, and it lets the individual travel through the process of understanding it. Things he does not immediately understand creates interest and

inquisition therefore occupying his mind and keeping him content. However, the system must be spatially pure so as to not create confusion as the participants moves through a series of spaces. That is to say that the excitement should be discovered through the mind and eyes in visual articulation and complexity.

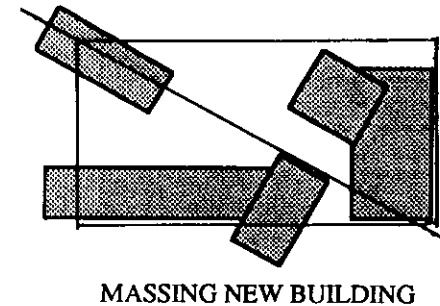
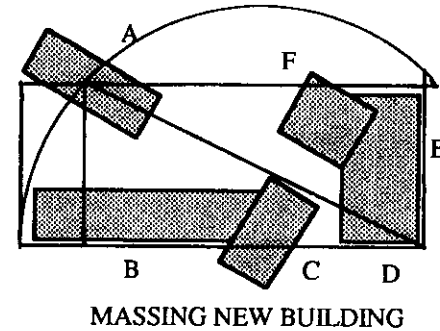
Order and excitement are opposites in that order tends to reduce complexity while complexity tends to reduce order. However, order and complexity cannot exist without each other. Complexity without order provides confusion and order without complexity produces boredom. Also, however, when you increase the complexity of a building or object, order will be harder to achieve.



## Unity

Unity suggests harmony. It means that all the unrelated parts of an architectural arrangement are brought into proper relationship to each other so that a satisfactory composition is obtained. In order to obtain a coherent and organized composition in terms of building placement, I looked to the plan of the Golden Section to provide guidance. The construction of the Golden Section provided the ordering system needed to obtain the desired unity among the various parts.

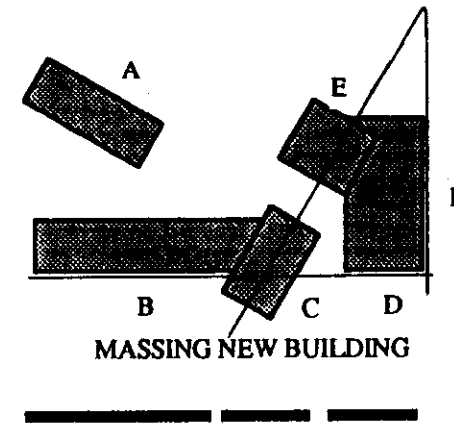
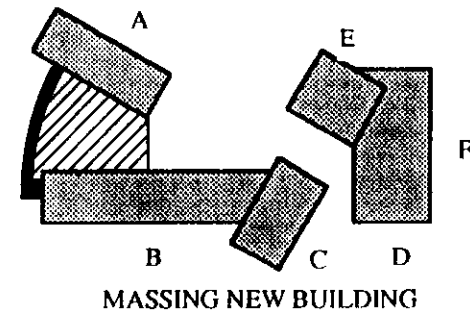
For Example, building A's position along the diagonal of the Golden Section rectangle makes it a special building. The building houses some of the studio and classroom spaces which are the essence of the school. Because this is an institution of learning, it is appropriate to give these spaces special treatment. My intent was that this building becomes almost a jewel in the landscape, the focus of the whole institution. And since, learning centers around the classroom and studios where creative and ingenious ideas are, developed and implemented, this building should rightly be the focus of the whole institution



Also, because of the angle between buildings A and B, the dynamic quality of the exterior space is greater than if the building were parallel or perpendicular to one another. The spacial dynamics are related to the shape of the space and the amount of enclosure the adjacent buildings provide.

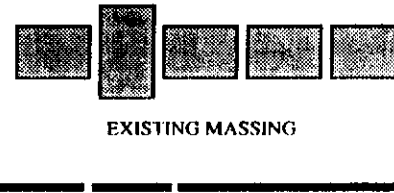
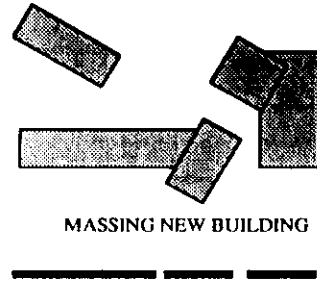
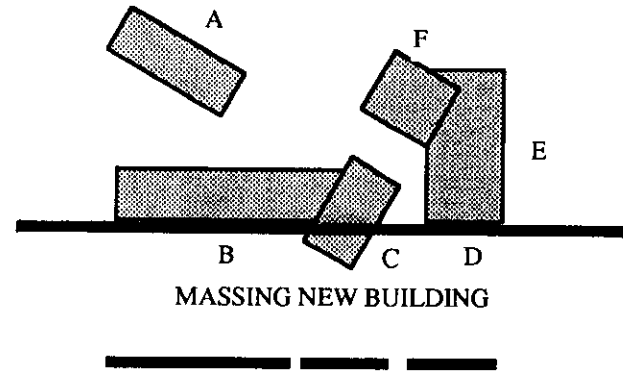
Along the same lines, building C and E are located along the diagonal of the reciprocal of the Golden Section Rectangle. As in all my buildings, circulation occurs along the diagonals of the Golden Section Rectangle. This allowed me the opportunity to coherently and efficiently move people through my spaces and at the same time provide them with variety and excitement in the form of views out side and path configuration. A positive result of the diagonal circulation is the juxtaposition of masses that occurred. The dynamic character of the collision of forms adds to both the interest and excitement of the interior as well as the exterior spaces.

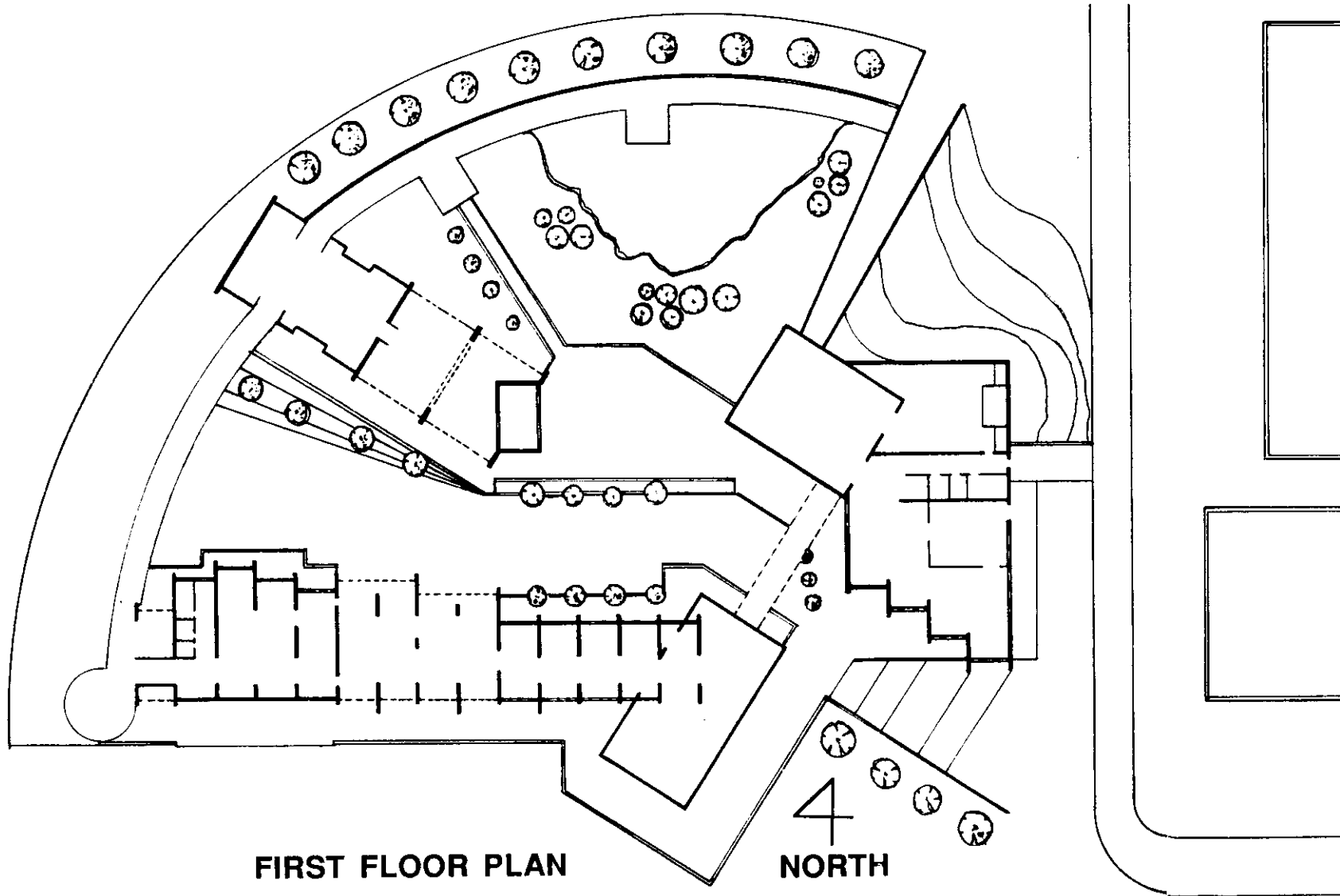
Also, the fact that building E projects through the datum created by the south facade of the Water Filtration Plant and my building gives it significance and draws attention to the fact that something special



occurs within those walls. That space, which houses the archives of the school, take on the same role as the tower in the plant in breaking up the rhythm and movement of the facade and in noting that something important is happening here, whether it is entry or a special space.

The massing of the building in both plan and elevation is similar to the massing of the water filtration plant. Although the buildings functions and visual appearances are different, the location where rhythm and mass changes occur are the same. The massing similarities are part of my contextual response in arriving a a solution to the problem.

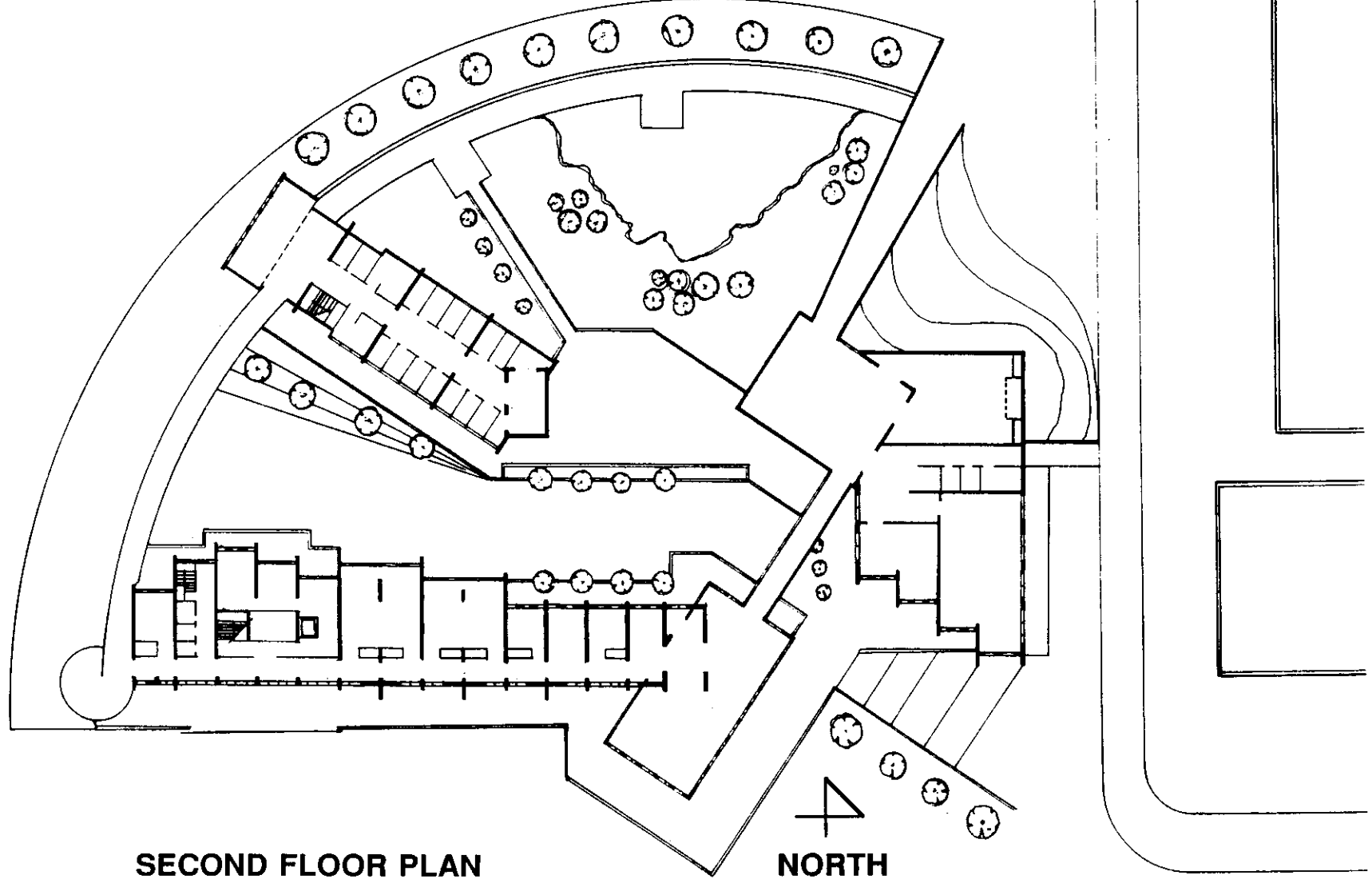




**FIRST FLOOR PLAN**

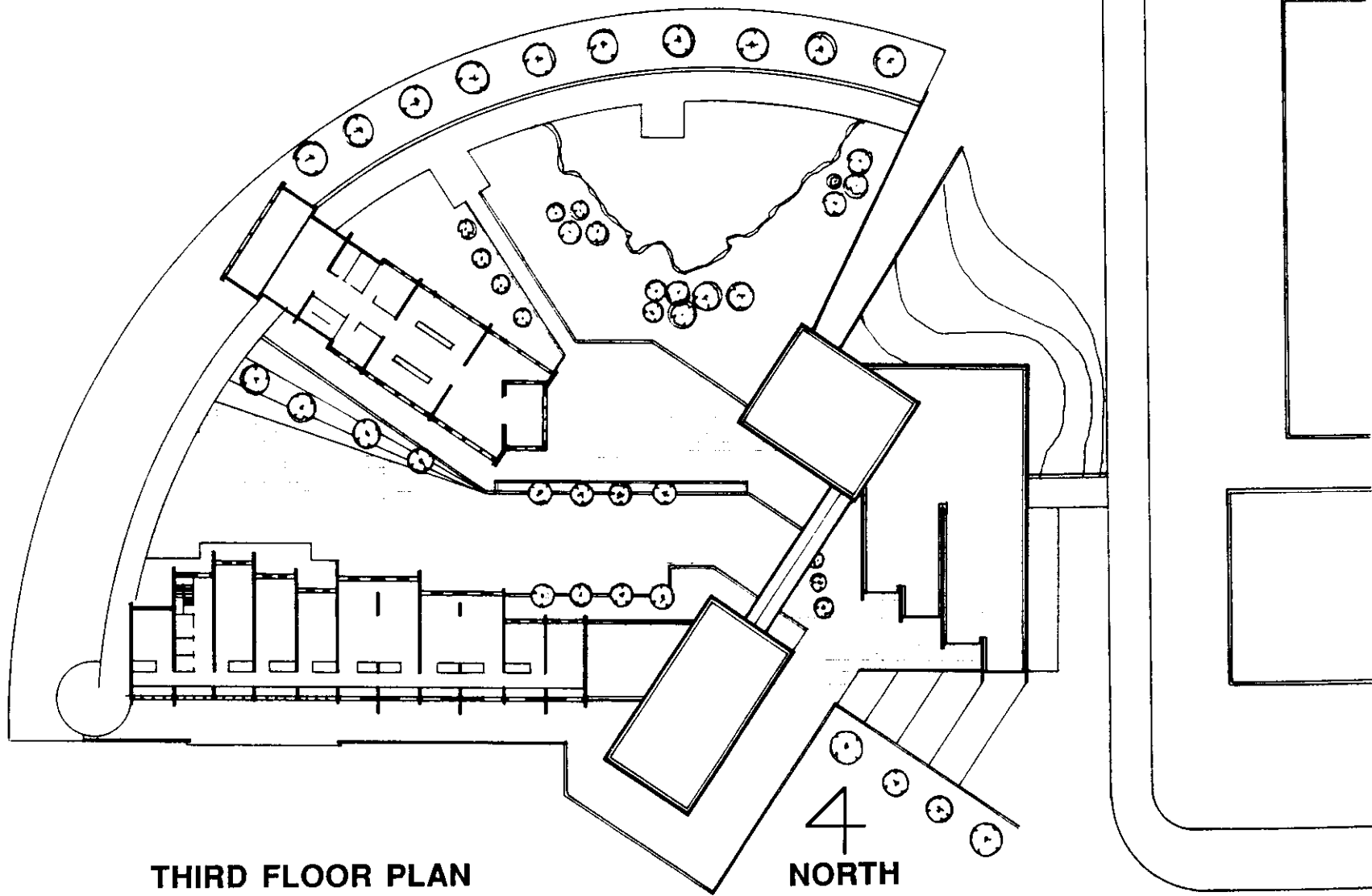
**NORTH**

The following are partially completed and revised floor plans showing the changes in building collisions and form.



**SECOND FLOOR PLAN**

**NORTH**



**THIRD FLOOR PLAN**

**NORTH**

## CONCLUSION.

This finishes my design experimentation.

I know, however, that my design can and should be taken farther. Never the less, I am pleased with hte various directions my project has taken whether they were good or bad, I learned from them all.

When I went into my thesis year, I choose to study proportions because I thought they were a "means to an end" in the design process. However, I have since learned that a design is only as good or creative as the designer and that a theory of proportions won't significantly change a design for the better if the design was not good in the first place. Proportions are meant to supplement the design rather than produce it.

I think this attitude of a "means to an end" slowed me down in the beginning of the design process (late fall quarter and early winter quarter). I was looking for answers to be handed out through the use of proportion. I was wrong. As you know, I had to work just as hard if not harder to produce the final design and at several times spring quarter, I struggled to design the facades and the three dimensional articulation of the spaces behind.

1. Ching, F. "Architecture: Form, Space and Order" page 298.
2. Ibid, page 298.
3. Scofield, P. "The Theory Of Proportions in Architecture." page 106.
4. Ibid, page 110.
5. Ibid, page 125.
6. Ibid, page 5.
7. Hambidge, Jay. "Elements of Dynamic Symmetry." page 32.
8. Ibid, page 33.
9. Scofield, P. The Theory of Proportions in Architecture." page6.
10. Ibid, page 7.
11. Colin Rowe, "Mathematics of an Ideal Villa." page 60.
12. Fischer, Roger. "On the Application of the Golden Section in the Visual Arts." page 40.
13. Pickering,E. "Architectural Design" page 241
14. Ibid, page 242.
15. Ibid, page 243.
16. Ibid, page 259.
17. Ching,F. "Architecture : Space Form and Order". page 368

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