

seventh place center

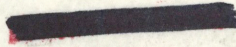
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SEVENTH PLACE CENTER
AN EXERCISE IN URBAN DESIGN

by

Martin D. Woody

A professional paper submitted in partial fulfillment
of the requirements for the degree

of

Bachelor of Architecture

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To Barb and Ed

Acknowledgements

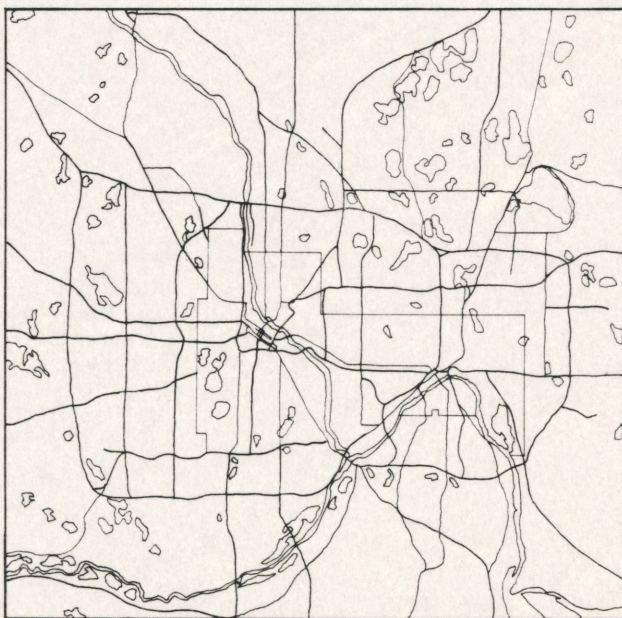
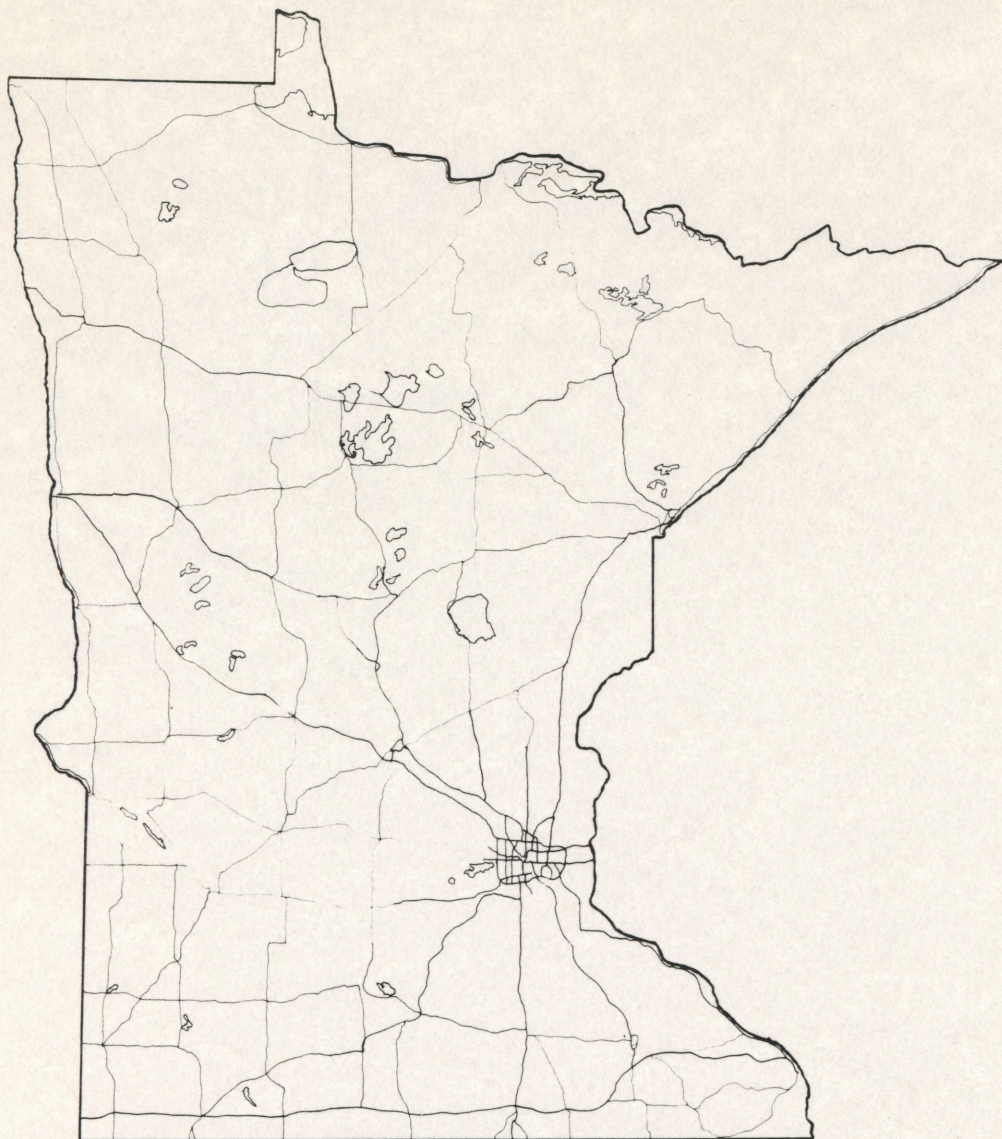
In beginning, I would like to thank all of the people of the Minnesota Mutual Life Insurance Company for taking the time to meet with me on several occasions and for heading me in the right direction when it came to assembling information that was required to embark on this project. Mr. Richard Engen and Mr. Steve Nystedt of Minnesota Mutual were of great help in spending time with me during the early stages of data gathering. Thanks also to the architectural firm of Bergstedt, Wahlberg, Berquist and Rohkhol of St. Paul, Minnesota, who contributed to this project by way of providing base maps and other essential information. I also wish to thank the people of the City of St. Paul Planning Division who were also very cooperative and helpful.

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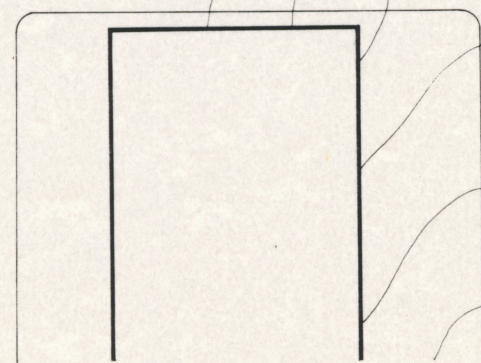
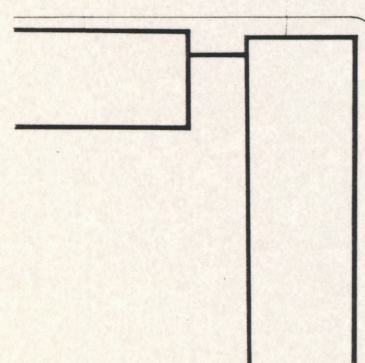
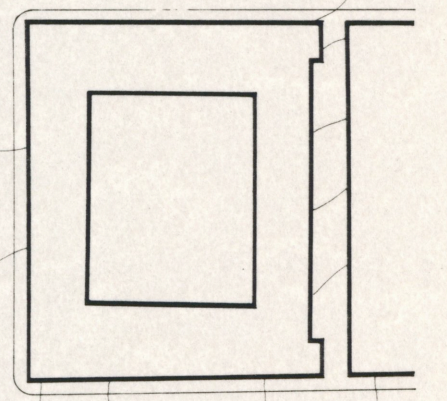
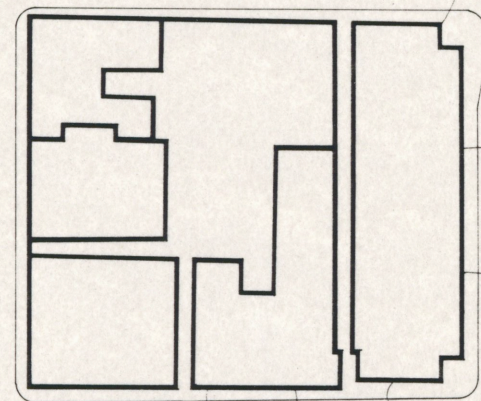
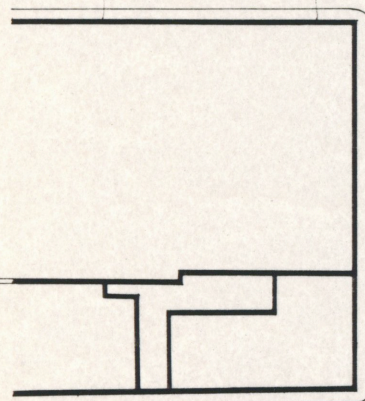
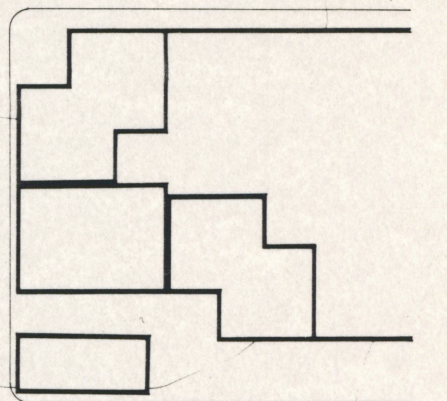
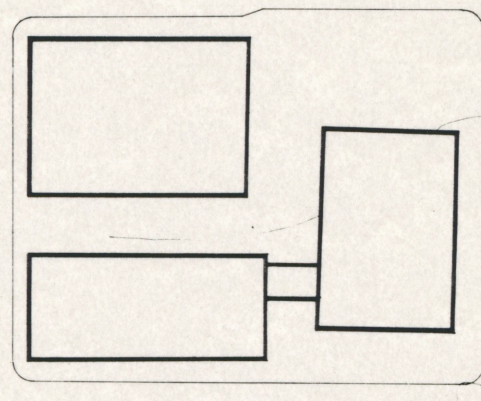
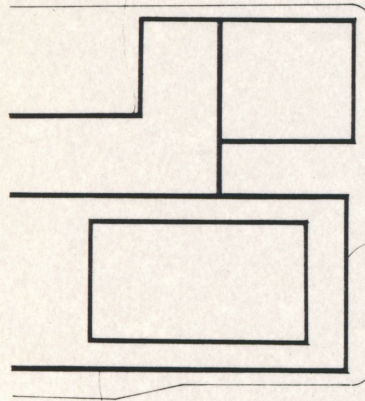
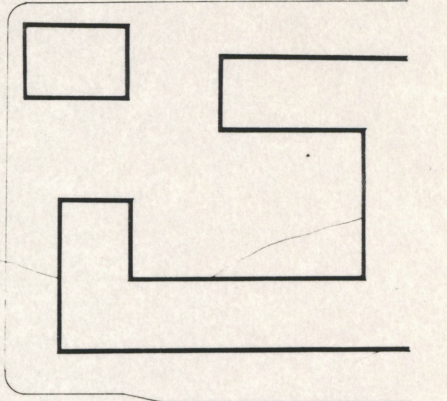
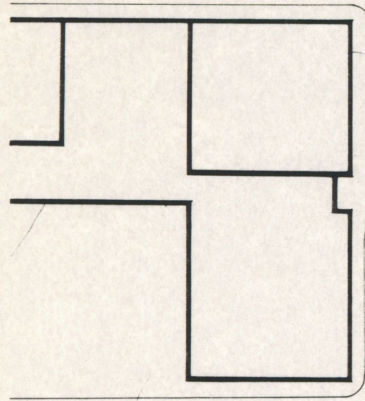
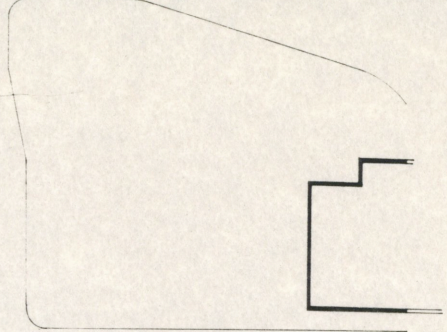
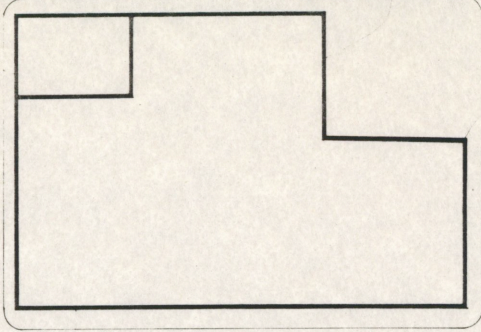
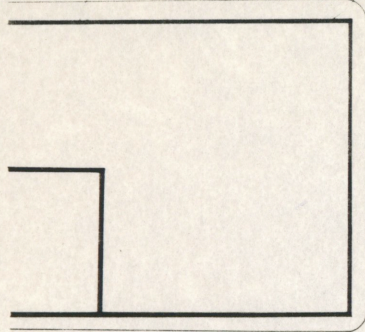
List of Maps

- Minnesota State Map and Minneapolis/St. Paul Metro Area Map
- Downtown St. Paul, one inch equals two hundred feet
- Seventh Place/Financial District Area, one inch equals one hundred feet
- Seventh Place/Financial District Area, one inch equals fifty feet









Site Views

The following site photographs show the character of the city surrounding the site.

- Looking South
- Looking North
- Looking East
- Looking West









CHAPTER 1

PROGRAM SYNOPSIS

Introduction

Urban design is the arrangement of physical forms and activities in the city to be both functional and visually pleasing.¹ Special aspects of the city such as form, space and activities play an important role in the overall structure of a city. The cities of Minneapolis and St. Paul, Minnesota, are improving examples of this type of urban structuring. In particular, the city of St. Paul is achieving this type of urban setting through the preservation of significant historical structures, the building of new structures and the improvement of urban spaces at human scale. The downtown area of St. Paul prides itself in the constant improvements of the orientation of itself to the pedestrian. These types of improvements have been accomplished through landscaping and lighting at street level and by opening up new structures at street and skyway level via public oriented space.

The following are recommendations for urban design in downtown St. Paul:²

1. Create visually attractive entrances to the downtown along major transportation corridors.
2. Continue the skyway system and concentrate street level pedestrian improvements in specific areas such as Seventh Place Mall.
3. Provide open space in strategic locations for public enjoyment and for visual relief and contrast to structure.
4. Public improvements such as landscaping, lighting, and street furniture should be internally consistent within each section of downtown and should enhance the character of that specific area.

5. Preserve structures which are architecturally and historically significant.
6. Preserve views of natural features, such as the Mississippi River Corridor and the bluff lines.
7. Consider special design districts for sections of downtown which have a particular character or identity.
8. Capitalize on the Mississippi River as an amenity.

Rationale

The client for this project is the Minnesota Mutual Life Insurance Company, one of the largest life insurance companies in the United States. The approximately thirty-five story building will house Minnesota Mutual Life's national headquarters while opening up the lower floors to the public via commercial and retail space. The outgrowth of their previous headquarters led the client to the building of a new structure that would be close to the financial community of St. Paul while at the same time providing ample space for growth in the years to come. In designing this building, the client has certain goals in mind:

1. To project an image of strength and permanence.
2. To recognize, through the building's position, the client's close relationship with the financial community while providing an inviting atmosphere for pedestrian traffic in the center of downtown St. Paul.
3. To create a significant structure that would harmonize with the historic buildings of the area and at the same time reflect the current revitalization of the city.

Site

The site lies in the heart of downtown St. Paul in an area known as the financial district. The area of the site is approximately 121,875 square feet which is equivalent to about 2.8 acres. The financial district area is the major retail/office/service district bounded by the Mississippi River to the south, the Lowertown area to the east, and the Civic Center area to the west and the Arts and Science Center area to the north. These areas make up the Downtown Intensified Center of St. Paul and the architecture is of a high density mixed use nature as well as a number of historical buildings eligible for National Register Historic Property designation. To the north of the Downtown Intensified Center lies the State Capitol area which is elevated above the downtown plane to give a view of the whole city of St. Paul. The State Capitol area is divided from the rest of the city as a major highway passes through to the north of the Downtown Intensified Center with only the major downtown vehicular collectors servicing this major open space area.

Zoning

B-4, Central Business District. Intent. The B-4 Central Business District is intended to permit those users which provide for a variety of retail stores and related activities, and for office buildings and service establishments which occupy the prime frontages in the Central Business District; and which serve the consumer population beyond the corporate boundaries of the city.

The district regulations are also designed to provide for the needs of daytime work force, a Central Business District resident population and transient, along with the recreation demands of such population groups.³

Program Summary

	Gross Square Footage
A. Plaza Level	
Retail	15,000
Circulation	14,000
MML Special Purpose	4,000
B. Skyway Level	
Retail	12,000
Circulation	15,000
MML Reception	2,250
C. Typical Office Floor	
Approximately 15,000/floor	500,000
D. Mechanical Floor	10,000
E. Penthouse Floor	5,000
F. Parking	
Provide a parking facility for approximately 400 cars.	175,000
G. Service Area	
Provide loading docks for 2 large trucks as well as service and storage space.	2,000
Area Tabulation Summary:	
Office Floors	500,000
Commercial/Retail	27,000
Plaza Level Public Space	14,000
Skyway Level Public Space	15,000
Service Areas	12,000
Parking	175,000
Total Area	743,000

CHAPTER 2

THE PLACE

Downtown St. Paul is a complex and intensely developed center of commerce, industry and government. The Central Business District is where the city began to develop and still functions as the center of the city. The Downtown Intensified Center is zoned to attract a variety of activities to preserve and build on what is unique about the city. Five general objectives have been adopted:⁴

1. To create a multi-functional role for downtown.
2. To centralize major downtown activities within the downtown core.
3. To create a pedestrian-oriented downtown.
4. To achieve a compatible mix of new development and restoration or rehabilitation of existing structures and streetscapes.
5. To emphasize downtown's unique heritage, topography, architectural features, and cultural opportunities.

A multi-functional role of the Downtown Intensified Center of St. Paul is intended to create a place where people can live, shop, work and play. This is being achieved by expanding some existing downtown features such as retail centers, medium and high density housing and the creation of a twenty-four hour environment in the downtown area including security measures and police protection. Other areas of downtown expansion would include measures to create a regional employment center for the surrounding area and the additional numbers of leisure, recreational and entertainment activities within the downtown area.

Existing policy is the encouragement of development on unused or underdeveloped sites within the Downtown Intensified

Center. Development plans are trying to create a compact core of mixed high density uses which would be contained by lower density area uses around the perimeter. These perimeter areas are encouraged to continue development of lower density to reinforce the Downtown Intensified Center.

Public and private developments should help create a pedestrian oriented downtown. Recommendations for this type of development include elements such as public spaces and plazas within the city, climate controlled access to areas of the intensified center, and the clarification of pedestrian paths, activities, and points of exit and entry. Other elements related to the pedestrian should include pedestrian oriented activities at street level and the creation of a pedestrian mall system with the Seventh Place Mall as its focus.

Transportation and circulation are a very important part of the development of the downtown area. Downtown St. Paul is one of two major metropolitan centers of the area which requires a sensible accessible vehicular system to and from the city. Recommendations for vehicular circulation include such elements as the diversion of trucks around the Downtown Intensified Center, the provision of short and long-term parking within the downtown and the control of amounts of traffic to improve access.

The increase in development in the downtown area will lead to an increase in the amount of parking facilities required. Measures such as public transit and car pooling will probably not reduce the amount of parking needed. Development plans call for short and long-term parking structures to be located beyond the

edges of the Downtown Intensified Center to reduce congestion and free up downtown parking for short-term purposes.

Public transit is a developing method of meeting increased transportation needs as the city expands and develops. St. Paul being one of the major metropolitan centers of the area has a very high level of public transportation. The increase of the public transit system due to development will have to be met and controlled by measures such as bus only lanes and predetermined routes of service. Elements of public transit shelter should be incorporated into existing and proposed developments.

Pedestrian circulation plays an important role in the development of downtown St. Paul. Pedestrian circulation falls into two categories, a climate-controlled skyway system and street level circulation. The skyway system provides safe, climate-controlled access to areas of downtown and is an ever expanding network. The second major element is street level circulation which is being improved by elements that create a pleasant environment for pedestrians. Downtown development requires the following vehicular and pedestrian circulation improvements:⁵

Vehicular Circulation and Parking

1. Complete the downtown ring route, including the east Central Business District Bypass and the Pleasant Avenue/I-35E corridor. Transfer the major truck route from Sibley Street to the east CBD Bypass.
2. Complete the 8th-9th Street pair to carry east-west traffic into and out of the center of downtown. On the eastern end, route traffic around the proposed residential area in Lowertown.
3. Improve the common section of I-94 and I-35E north of downtown by providing additional continuous lanes and eliminating weaving.

4. Improve Shepard Road to facilitate traffic movement around the downtown.
5. Encourage use of car pools and transit in order to save energy and to reduce downtown traffic congestion and pollution.
6. Minimize on-street parking in order to facilitate traffic flow and allow for pedestrian amenities.
7. Provide commuter parking for downtown employees and others who must leave their cars all day.
8. Parking spaces in the center of downtown should be used primarily for short-term parking.
9. Adequate parking should be provided with each major development in the downtown core.
10. Provide public information regarding parking and uniform signage of downtown parking.

Pedestrian Circulation

A. Street Level

1. A System of pedestrianways should be developed, including:
 - the vehicular free pedestrian mall on Seventh Place between St. Peter and Jackson.
 - a pedestrian walkway connecting downtown with the state capitol.
2. Provide pedestrian amenities such as landscaping, ornamental lighting, and street furniture in areas where pedestrian travel is primarily at the street level, such as the Rice Park area.
3. Create plazas where possible at entrances to the skyway system, to connect the street level with skyways.
4. Encourage outdoor cafes and concessions during the warm months of the year.
5. Incorporate passenger waiting shelters within buildings or set back from the sidewalk.

B. Skyway Level

1. Expand the skyway system to connect with the Science Museum, Lowertown and the Civic Center.

2. Continue to use existing guidelines, which provide for uniform design and signing in skyways and indicate how skyway construction should be financed.
3. Future skyways should be constructed so that they could be open from 7 a.m. and 10 p.m., Monday through Friday, and 7 a.m. to midnight on Saturday and Sunday.
4. Add street level signage to indicate entrances to skyways; add directional signs and maps within the skyway system.

Public Transit

1. Encourage use of public transit, especially for work trips, and increase the number of employers who are providing their employees discounts on bus passes.
2. The primary transit routes through downtown St. Paul should be on Cedar, Minnesota, Fifth and Sixth streets. These streets should be equipped with exclusive transit lanes to provide additional capacity for transit vehicles.
3. Continue and expand shuttle service to connect commuter parking facilities with downtown.
4. Provide passenger waiting shelters, incorporated with existing and proposed development for maximum convenience and comfort.

The Seventh Place/financial district study area is the major retail/office/service district and is located in the heart of downtown St. Paul. The major landmarks in the area are the City Hall/County Courthouse on Fourth Street and the historical Hamm Building on St. Peter Street. Because of the high number of employed in the area, the traffic flow is significant. The Wabasha and Robert Street bridges serve as gateways to the downtown from the south. Every transit route into and out of the downtown carries a substantial amount of traffic, especially during peak hours. This area is of the highest mixed use density in the downtown and is reaching 100% development.

CHAPTER 3

PRECEDENTS AND PATTERNS

History

Early skyscrapers of the late nineteenth century were buildings that fit into their urban context without imposing on the skyline. Steel framing and the development of the elevator were technological advances of the age and building heights were of twelve to fifteen stories. The turn of the century saw building heights increase in major cities such as New York and Chicago which led to new building codes to control growth. Buildings such as Louis Sullivan's Wainwright Building in St. Louis, Missouri, were significant to the aesthetic development of the skyscraper with its tripartite facade organization. Chicago becomes the first city to build skyscrapers as an expression of technological innovation. The early skyscrapers of New York were significant in height but of a renaissance style associated with Europe.

The years from 1900-1920 were the Eclectic Age in New York City, as building heights increased. Buildings expressed height through the application of historical references.

By the early 1920's, American architects in New York were designing buildings which were compositions of historical reference. This style of design made itself evident also in the Chicago Tribune competition. The Modernist International Style developing in Europe at this time also had some influence on American Architects. The end of the 1920's saw a large rise in the height of buildings in New York. Structures such as the Chrysler Building were models of what the city was trying to

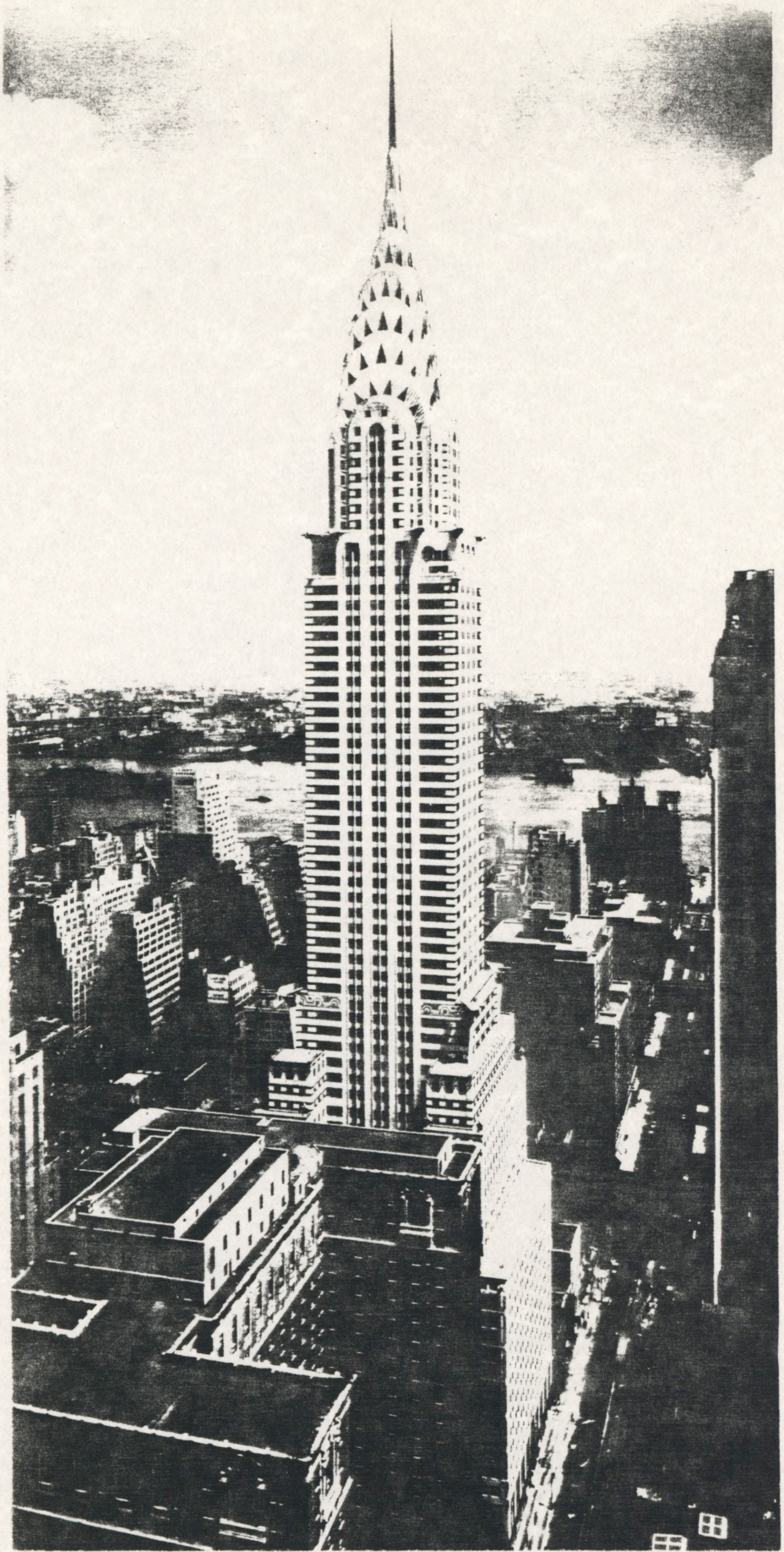
achieve through an Art Deco Style. Buildings soared in height in New York and Chicago as well as in other major cities.

The coming of the 1930's saw architects like Raymond Hood, who produced a new direction in skyscraper design away from the romanticism associated with the 1920's. Rational organization, along with total building composition, was an attempt at an International Style before the onset of war and depression.

The 1950's saw the coming of the end of the historical revivalism and the Art Deco Movement associated with the prewar years. This led to a new style of modernism which began to incorporate simple forms, new materials and facades free of ornament. Skidmore, Owings and Merrill and Mies Van Der Rohe were the most influential architects of the age with buildings like the Lever House and the Seagram Building.

The 1960's and 1970's marked the movement of creation of abstract shapes and the relation to urban design and plazas. Buildings such as the IDS center in Minneapolis, by Phillip Johnson and John Burgee, and the City Corp Building in New York City, by Hugh Stubbins, were relating themselves more to the urban environment and the design of space, a design criteria more defined than the movement of the 1950's.









CASE STUDIES

THE PORTLAND BUILDING
Portland, Oregon
1982

Michael Graves: Architect

The Portland Building was a competition sponsored by the city of Portland. The site is of two hundred square feet and surrounded by dated government buildings. The building is cube-shaped and adorned with oversized classical elements. The design reinforces its surroundings with its three part divisional facade, and entry is expressed by large columns placed on the building's main axis. Public spaces are placed on the ground floor and are painted green in relation to the ground plane. Elements common to Portland are used on the building's facades to relate it to the city.

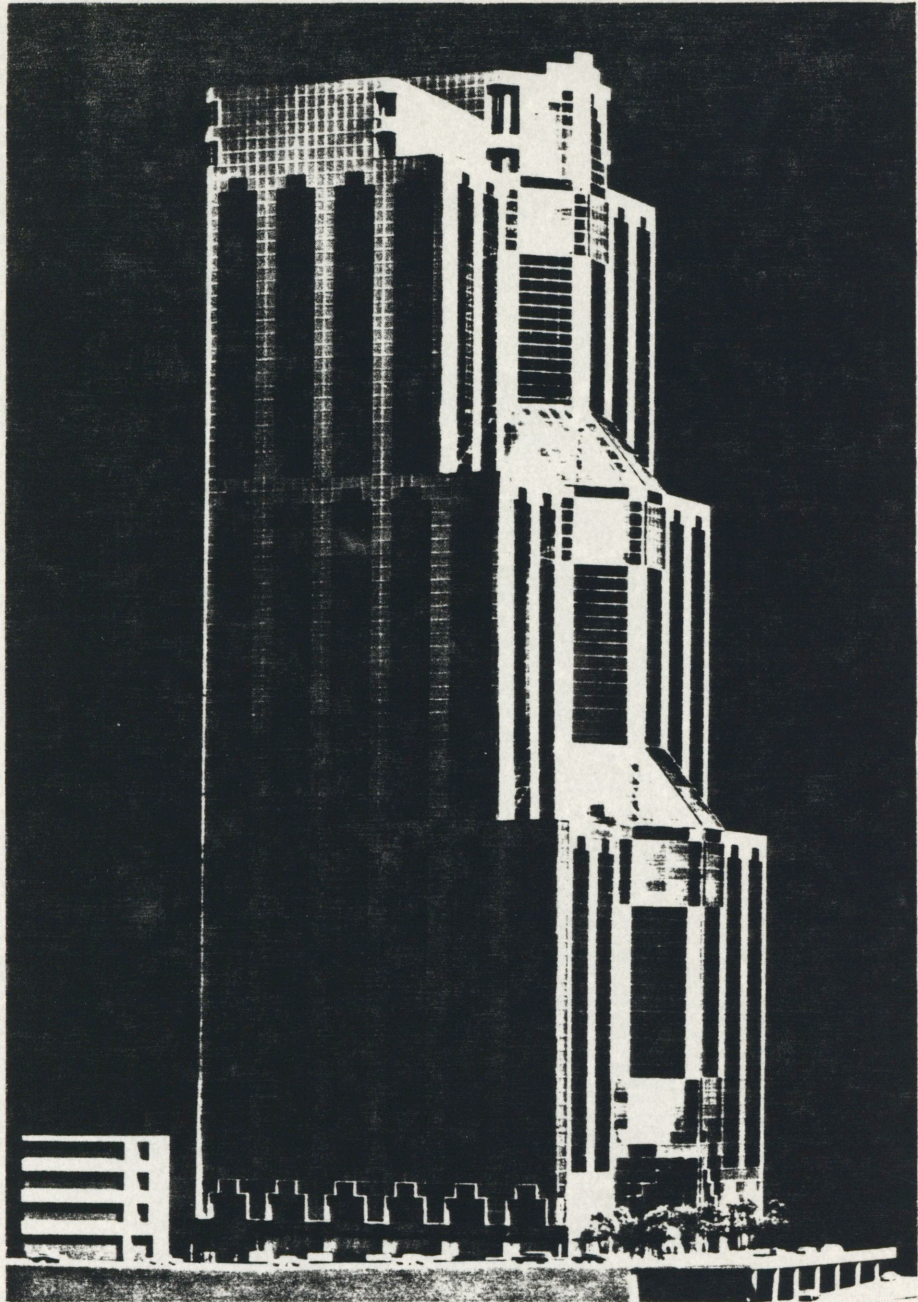


NORTHWEST TERMINAL BUILDING
Chicago, Illinois
1982

Helmut Jahn with James Goettsch, C.F. Murphy and Associates

The building contains forty floors of office and commercial space with two levels of parking and six loading docks. The concept is based on large floor areas, complete site coverage and three story atriums. The ground level is galleria type space consisting of through site pedestrian flow, centrally located elevators and perimeter retail space.

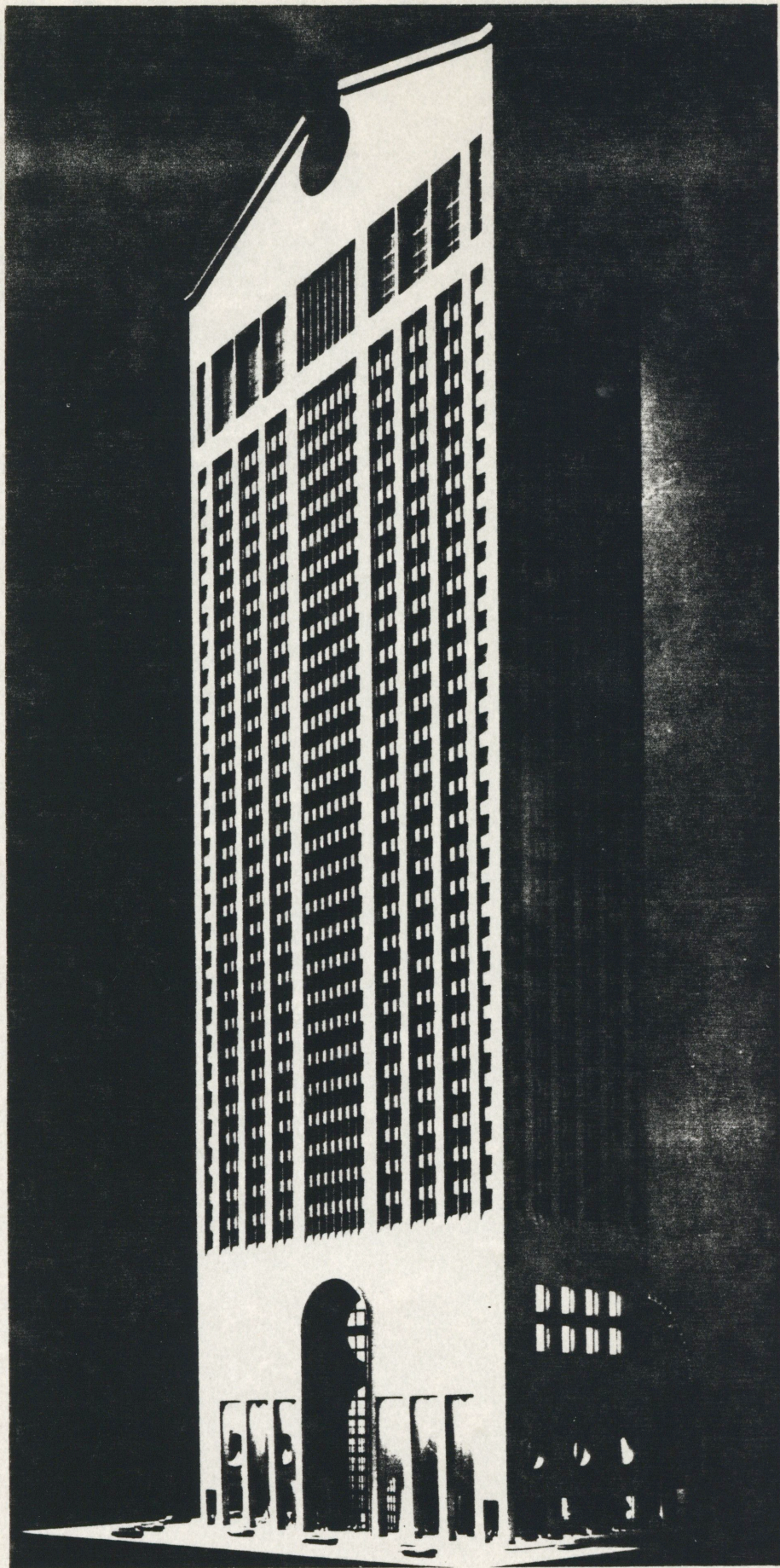
The structure is composed of concrete and based on a thirty square foot bay. The skin is based on a five foot module to reinforce the shape of the tower's two colored glass verticals. Resistance to wind is provided by shear walls placed in the building's cores.



AT&T CORPORATE HEADQUARTERS
New York City, New York
1983

Phillip Johnson and John Burgee: Architects

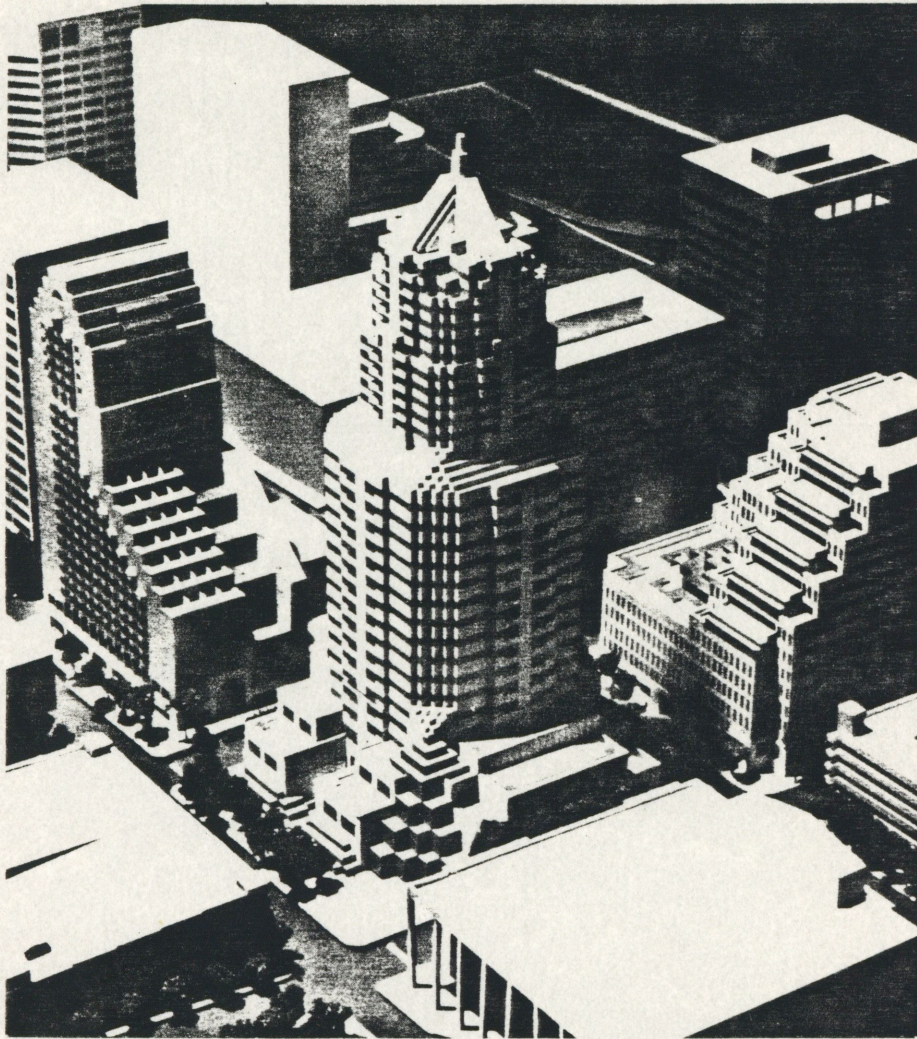
One of the most controversial buildings of the 1980's, the building's tri-partite division is of renaissance inspired arches at its base, one vertical shaft and a broken pediment as a topping off element. Two ground floors open up the building to the public with a galleria placed at the rear of the building. The three parts of the building are hard to read from vantage points around the site. The building is composed of structural steel clad in pink granite.



KOIN CENTER
Portland, Oregon

Zimmer, Gunsul, Frasca Partnership: Architects

The building is a thirty story multi-use tower incorporating television operations and retail at its base with offices and condominiums contained in the shaft. The tower uses historical and classical sources to enrich its character. The composition reflects its different uses on the exterior with the use of different materials. The building acts as a transition space between the various functions that surround the site.



CHAPTER 4

BUILDING SYSTEMS AND TECHNOLOGY

The Atrium and Its Functions

Today's atrium invites people to spend time in the city. The need to come to the city to work is declining due to technical advances and telecommunication. Atriums encourage movement through space, enjoyment of nature, and social interaction. Atriums contribute to buildings also by restoring character, redefining street lines, and by creating usable space.

Economic functions of today's atriums are in usable space such as retail and office which are rented quickly at premium rates that become working parts of the atrium. The atrium also functions as shelter as it creates all weather public space in an urban environment.

Influences and History

Atrium design in the 19th century was in the greenhouses which incorporated the use of glass to create a stable environment. Later in the century saw the adoption of use of iron and glass to create large well-lit interiors.

In the period from 1900-1960, Frank Lloyd Wright was a link between the 19th and 20th centuries, with works incorporating different sized atrium spaces in different buildings. He remained interested in the flow of space from one level to another. Some of his projects that included atriums were the Johnson Wax Headquarters, Racine, Wisconsin, 1936, and the Guggenheim Museum, New York, 1959.

Development of the modern shopping mall in the 1950's was a major step forward in the development of the modern atrium.

Early suburban centers had open air malls and canopies which led to the design of completely enclosed shopping malls that enabled complete protection from climatic elements.

The years from 1960-1967 saw architects such as John Portman (The Regency Hyatt, Atlanta Georgia, 1967) and Kevin Roche and John Dinkeloo (Ford Foundation headquarters, 1967), led the way in the conceptual development of the enclosed atrium. During this period there were primarily two types of thinking in atrium design.⁶

Carnivorous: Optimistic, progress oriented, high tech, futuristic.

Herbivorous: Conservation of energy and old buildings, sensitivity in urban design, historical and cross-cultural awareness, and love of growing things.

Urban Design Factor

The modern development of urban space has led to a sprawling of towns that disrupt harmony between old and new structures. Modern development of buildings has ignored the concept of street, it's definition, and the creation of open public space.

Atrium buildings can add to the character of an urban area and more precisely to pedestrian space in and around buildings. Defining public space attracts people to use the space and thus give meaning and reason to spaces contained within. Atria projects have a lasting and defining or direction giving characteristic to the urban centers in which they are placed. The attraction of people to these places makes atrium design

coexistent with building design, a very valuable design tool at an urban scale.

Atriums and Energy

Two functions of atria design are shelter and economy. Atrium building is one of the strategies for getting more comfort for less energy cost.⁷

Elements of buffering are used in atria design to lessen the impact of the elements on the particular space. Such elements might include earth shelter and landscaping, passive solar gain, and glassed spaces. Atrium spaces need to respond to seasonal changes in environment so as not be to entirely dependent on costly energy for control.

Daylighting in atrium design is one factor that can lessen the amount of energy consumed by artificial lighting. Daylighting systems must be designed to allow for heat loss and gain in different climates so as not to use more energy for heating and cooling systems than is saved by daylighting.

Design and Atriums

Atrium spaces in an urban environment become centers for public activity. Atriums are used in hotels for pools and restaurants and in civic buildings as theater and gathering spaces. Atriums create good conditions for retail stores and businesses by providing perimeter space and pleasant public atmosphere. The development of atriums play an important part in the potential of urban design by relating old buildings to new settings and new buildings to street level.

Atrium buildings need to be designed with energy in mind by reducing load in artificial lighting, heating and cooling, by incorporating natural methods into the design. The light distributed in atria space depends on the length, width, and depth of the space. There are methods of design used to distribute the amount of light that reaches different parts of the space such as the reflective value of wall finishes, window placement and amount of glass per floor level, and use of reflective glass. Daylight and artificial lighting systems should be combined to work together for maximum economy.

Most building atriums of large size require mechanical and electrical systems to operate along with solar heat gain and natural movements of air within the space. Elements such as climate, economic conditions, and function are all very important in the design of atriums. With these factors taken into account, atriums can be designed as warming, cooling, or convertible.

Design For Fire Safety

There are three categories for fire safety in atrium design as in building design which are means of escape, smoke control, and fire control.

Means of escape is designed with the entire building in mind and is designed for safe escape to ground level or a safe level of a building. There are many types of escape designs combined with preventable measures that can ensure safe exiting from a burning building. The use of circulation concepts, staged escapes, and fire evaluation awareness all play a part in the fire safety of a building.

Smoke control is obtained in atrium buildings by control and extraction. Controlling amount of smoke in atrium space is by means of keeping the size of a fire to a minimum by the use of sprinkler systems and by exhaustion of smoke by mechanical or natural venting contained in the atrium. Other methods of smoke control include extraction of smoke by the building's ventilation systems and by screening parts of the building from smoke.

Fire control in buildings and atria buildings can be limited by mechanical means also such as sprinkler systems, screening, and placement of hazardous materials within the building. Fire detection devices such as smoke alarms should be required for any building. Sprinkler systems are expensive but very effective in controlling fire size and smoke quantity.

After seventeen years of atrium building and code relaxation, recognition that large atrium spaces can be safely handled has arrived in the 1981 edition. The code now allows atria provided that:⁸

1. They are at least 20 feet wide and one thousand square feet in area per level, to give adequate volume to cool flame and handle smoke.
2. All space in the building is sprinklered, including the atrium if less than fifty-five feet high.
3. Engineered smoke control or smoke removal systems are provided.
4. Control and alarm systems are activated by smoke detectors and sprinkler heads.
5. Only three floor levels (at any level) are open to the atrium.
6. Other floors are behind one hour resistance partitions, or glass screens with drenchers.

7. Space use in the building is of low to normal hazard type.

Access to fire stairs can be via atrium galleries, and escape from the base of the stair towers can be across the atrium floor.

Structure of Atriums

Atriums are defined as those spaces between building blocks which are enclosed with transparent or translucent materials so as to create space. Problems arise when constructing atria space, of which a few are water drainage, expansion and contraction of atrium elements due to fluctuations in temperature, and problems of heating and cooling due to drafts.

Structural Building Components

Buildings are composed of structural elements that are connected to each other in such a way so as to make the building perform as a whole. Building cores, columns, and walls are the components that make it perform as a single unit against the forces that act upon the structure. Such forces include those of dead loads, live loads, wind loads, etc.

The vertical cores in a building have the opportunity to perform a dual function. Cores are composed of continuous vertical members that act as wind braces and stabilize the building as a whole. Contained within these cores are service elements such as elevators, stairs, restrooms, and spaces for mechanical and HVAC systems. Cores can be placed freely in the building as function dictates. Centrally located cores are the norm for placement of vertical circulation and other services. Cores placed off center create the opportunity to visually

express them on the exterior. Many other factors contribute to core placement such as building height, travel distances of HVAC systems, and circulation patterns.

Wind bracing systems today can span greater distances between columns than before. These advanced types of systems are stronger by configuration and therefore require less material and less weight in structural members. Technology has developed to the point where it becomes cost effective to design in lightweight steel. Wind bracing systems can have a great visual impact on exterior facades when exposed. Bracing systems can also be contained within the building's cores where it becomes cost effective and cannot be seen.

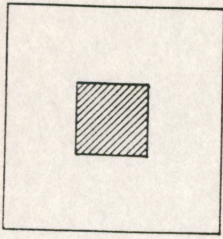
Vertical members in buildings carry different loads at different points and thus are not all the same size. Larger loads can be visually expressed throughout the building. Most architects tend to exaggerate the size of corner supporting members to reinforce the look of a building's corner. Corners become a very important design tool to convey certain meanings by turning a corner and expressing facade continuity of difference.

Schematic Core Diagrams

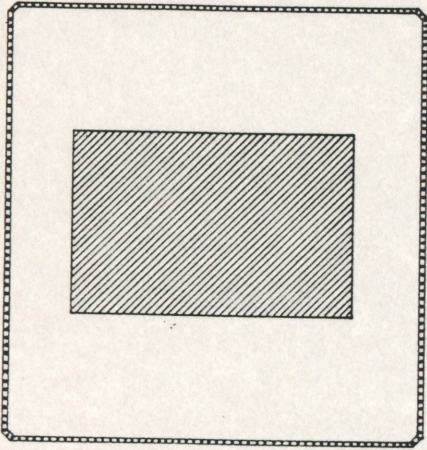
The accompanying schematic core diagrams illustrate a variety of ways cores can be located within a building plan.⁹

Location of Mechanical Equipment

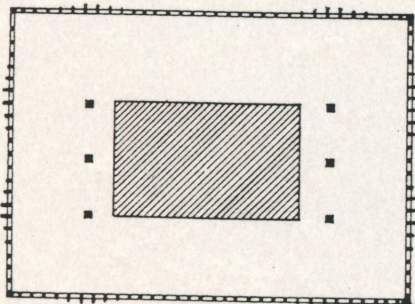
Mechanical equipment consists of the piping, ductwork, and wiring. This is necessary to maintain comfort levels in a building. Mechanical systems are usually located in a building's



WEST COAST TRANSMISSION



WORLD TRADE CENTER



ONE SHELL PLAZA

WEST COAST TRANSMISSION

Square Central Core

acts as a wind bracing inner tube.

WORLD TRADE CENTER

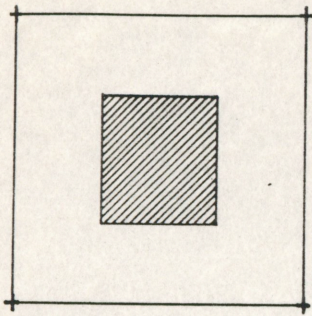
Central Steel Core

contributes to wind bracing. The major wind bracing is provided by closely-spaced (3'-4") columns which act together to form an exterior rigid bracing tube.

ONE SHELL PLAZA

Central Concrete Core

Walls act as inner tube; closely-spaced columns act as outer tube. Resulting effect is tube-within-a-tube wind bracing solution.

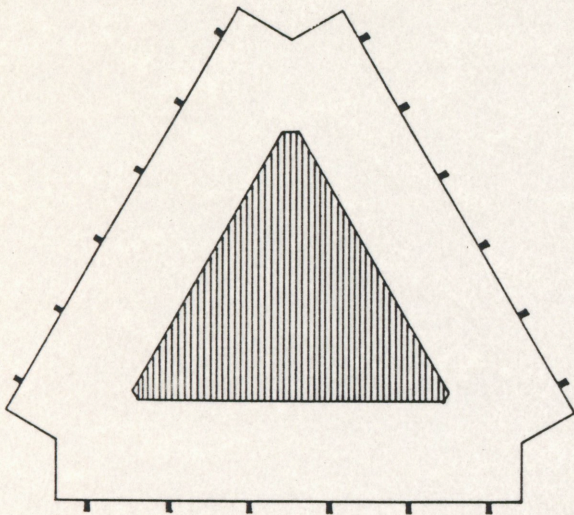


BOSTON COMPANY

BOSTON COMPANY

Square Central Core

contains some wind bracing.
Exterior walls express
diagonal steel bracing.

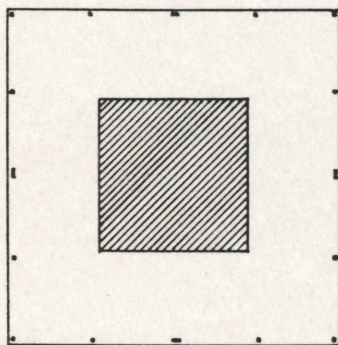


U.S. STEEL

U.S. STEEL HEADQUARTERS

Triangular Central Core

Wind bracing is provided
by a combination of core
wall bracing, hinged joints
between secondary floors
and columns, and a cap truss
at the top.

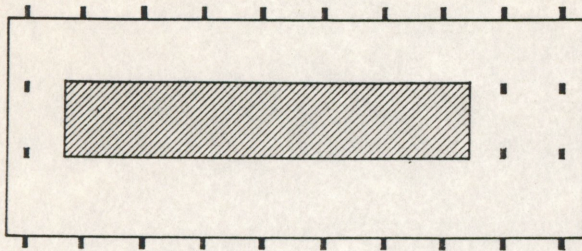


CITICORP

CITICORP TOWER

Central Core

Diagonal bracing in the
core is supplemented by
diagonal chevrons on the
exterior walls and a
400-ton concrete weight
(tuned mass damper) at
the top which slides
horizontally in opposition
to wind-caused sway.



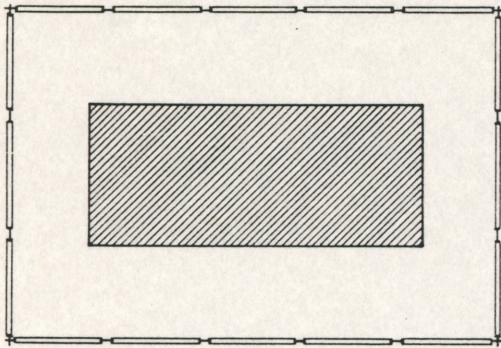
CHASE MANHATTAN

CHASE MANHATTAN BANK

Rectangular Core

is offset to provide two different office space depths.

One-story K-bracing in core walls is supplemented with 3'-0" deep wind girders.



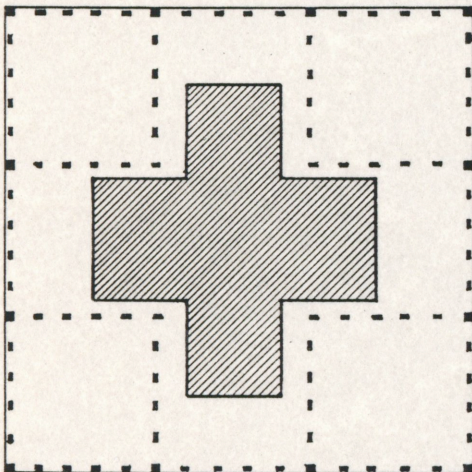
ONE LIBERTY PLAZA

ONE LIBERTY PLAZA

Rectangular Core

provides a central corridor.

Two-story K-bracing in core wall is more efficient than the more common one-story K-brace. The extra-wide core makes this arrangement feasible.



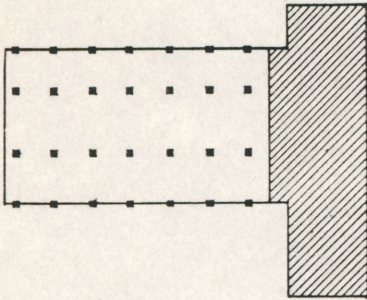
SEARS

SEARS TOWER

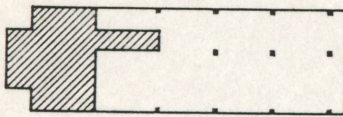
Five-part Multi-Core

Building is divided into nine square structural tubes which terminate at different heights.

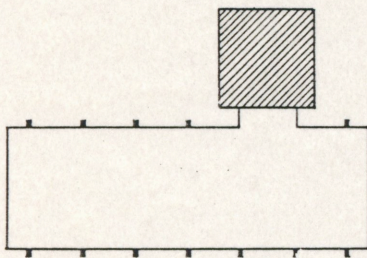
Wind bracing uses a combination of all individual tubes, resulting in a bundle-tube system.



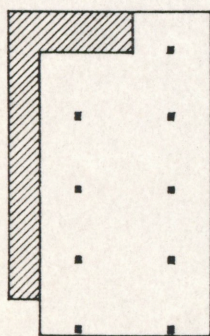
PHILADELPHIA SAVINGS FUND (PSFS)



LEVER HOUSE



INLAND STEEL



PEPSI

PHILADELPHIA SAVINGS FUND SOCIETY

End Core

Poor exiting pattern because of common path to stairs.

Wind bracing provided by knee braces at beam-to-column connections. Modest height and heavy dead loads minimize wind problem.

LEVER HOUSE

End Core

with questionable exiting pattern.

Wind bracing in core walls with additional transverse rigid frames in column bays past core area.

INLAND STEEL HEADQUARTERS

Offset Core

presents a concentration of exit locations.

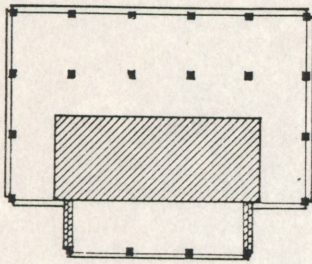
Wind bracing is provided by rigid steel wind girders which span entire width.

PEPSI HEADQUARTERS

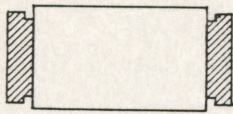
Angle Core

provides remote stair location and frees open space for maximum use.

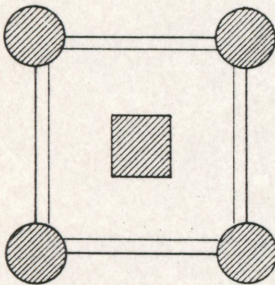
Wind bracing requirements are modest (11 floors) and are provided by rigid beam-to-column connections and core wall bracing.



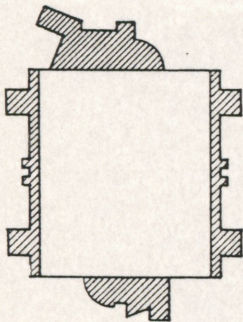
SEAGRAM



M.I.T. EARTH SCIENCE



KNIGHTS OF COLUMBUS



CORNELL AGRONOMY

SEAGRAM BUILDING

Eccentric Core

permits adequate depth for office space.

Shear walls in the core extend beyond the core into the exterior walls.

M.I.T. EARTH SCIENCE LAB

End Cores

provides excellent exiting paths from all areas as it eliminates dead ends.

Concrete cores are connected longitudinally at both top and bottom to provide needed wind bracing.

KNIGHTS OF COLUMBUS

Corner Cores

have similar exiting advantages as end cores.

The five monolithic cores each act as a separate wind bracing tube.

CORNELL AGRONOMY LAB

Perimeter Core System

provides mechanical spaces on east and west sides while north and south ends house stairs.

Perimeter shear walls stiffen concrete frame skeleton.

cores, be it purely mechanical, structural or circulation, and can be expressed visually throughout the building or be hidden. Larger mechanical equipment can be placed on a building's rooftop or contained in the base to avoid visual impact. Large buildings typically have two air systems for each floor consisting of interior and exterior zones. These zones serve as intake and exhaust of air for each floor by means of ductwork to try and maintain constant temperatures against seasonal heat loss and gain.

Life Safety

Life safety has become a more important element in the design of buildings in the past few decades due to increased awareness and the technological advances in building structures and systems.

Elements of structure in high rise buildings such as steel and concrete are vulnerable to heat from fires and must be fireproofed to provide adequate protection against failure. There are a number of ways that structural elements can be fire protected such as selection of material, insulation, isolation and cooling by means of sprinkler systems.

Exists. The number of, travelling distance to, and locations of, are also very important factors in the life safety design of a building. Although building codes go into minute detail describing exit requirements and the ways in which exiting enclosures must be constructed, the five points that follow have a major impact on the overall building design.¹⁰

1. Use of the building, for example, as an office, store or school.
2. Total number of people in the building as a determinant of the required number of separate exits.
3. Limitations on the maximum travel distance permitted to reach an exit enclosure.
4. Provisions for a choice of paths to an exit and a choice of exits in case one is blocked.
5. Provisions that exist must lead the occupants to a safe area.

Building codes have a large number of impacts on the design of a building and many effect the selection of structural materials as well as its size and shape. Zoning ordinances determine what type of building can be built where, how much of the site the building can occupy and how large the building can be. Among the major items covered by most zoning ordinances are the following.¹¹

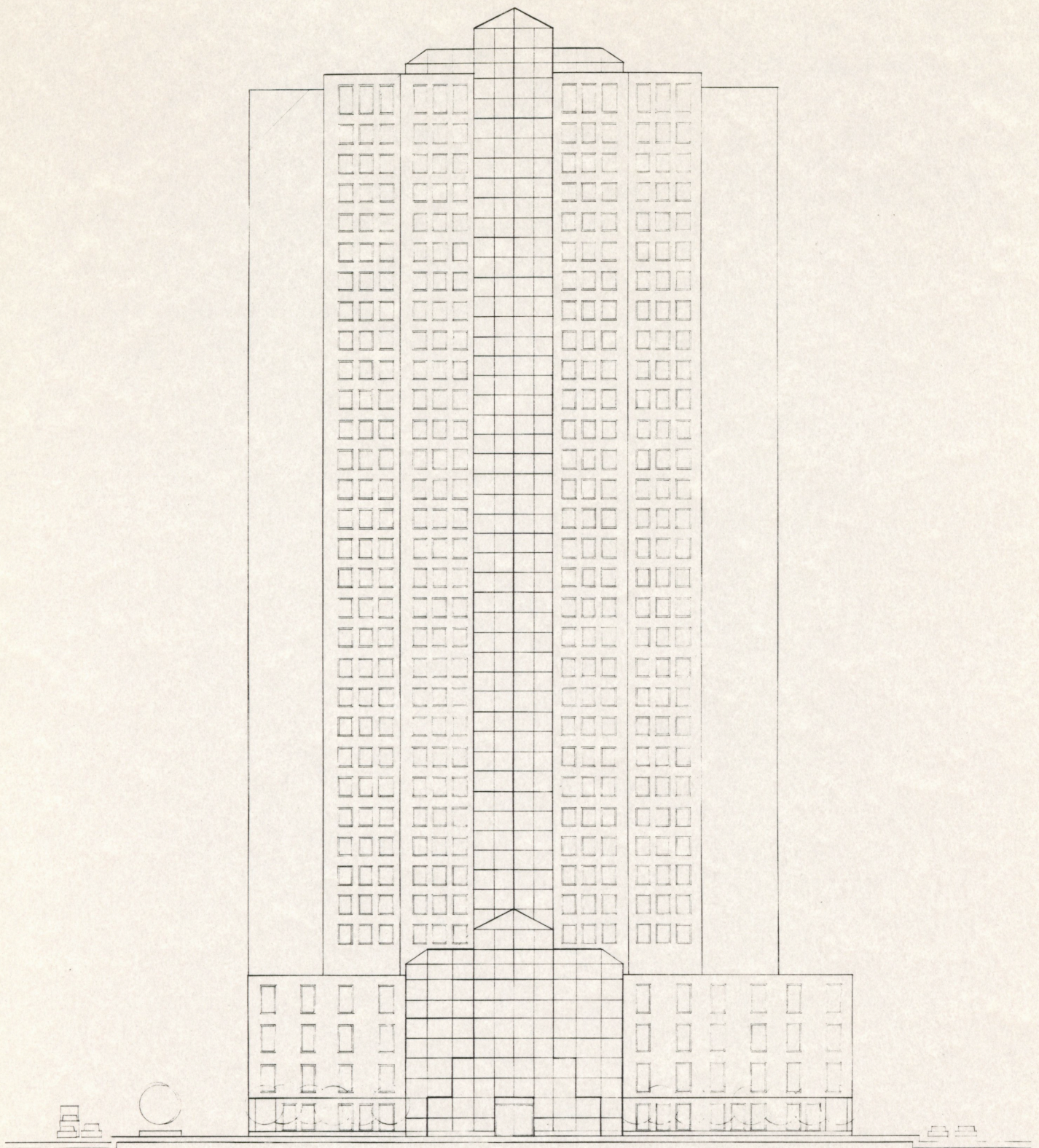
1. Building use permitted in each area of the community.
2. Lot-area regulations.
3. Yard-size regulations.
4. Building height and setback requirements.
5. Distance between buildings.
6. Parking and truck dock requirements.
7. Ratio of floor area to total building size.
8. Ratio of open space on the ground to the maximum height of the structure.

Building codes and zoning ordinances together have impacts on the design of all buildings; and guidelines set forth by both, along with other types of agencies, must be adhered to.

CHAPTER 5

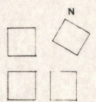
DESIGN DOCUMENTATION

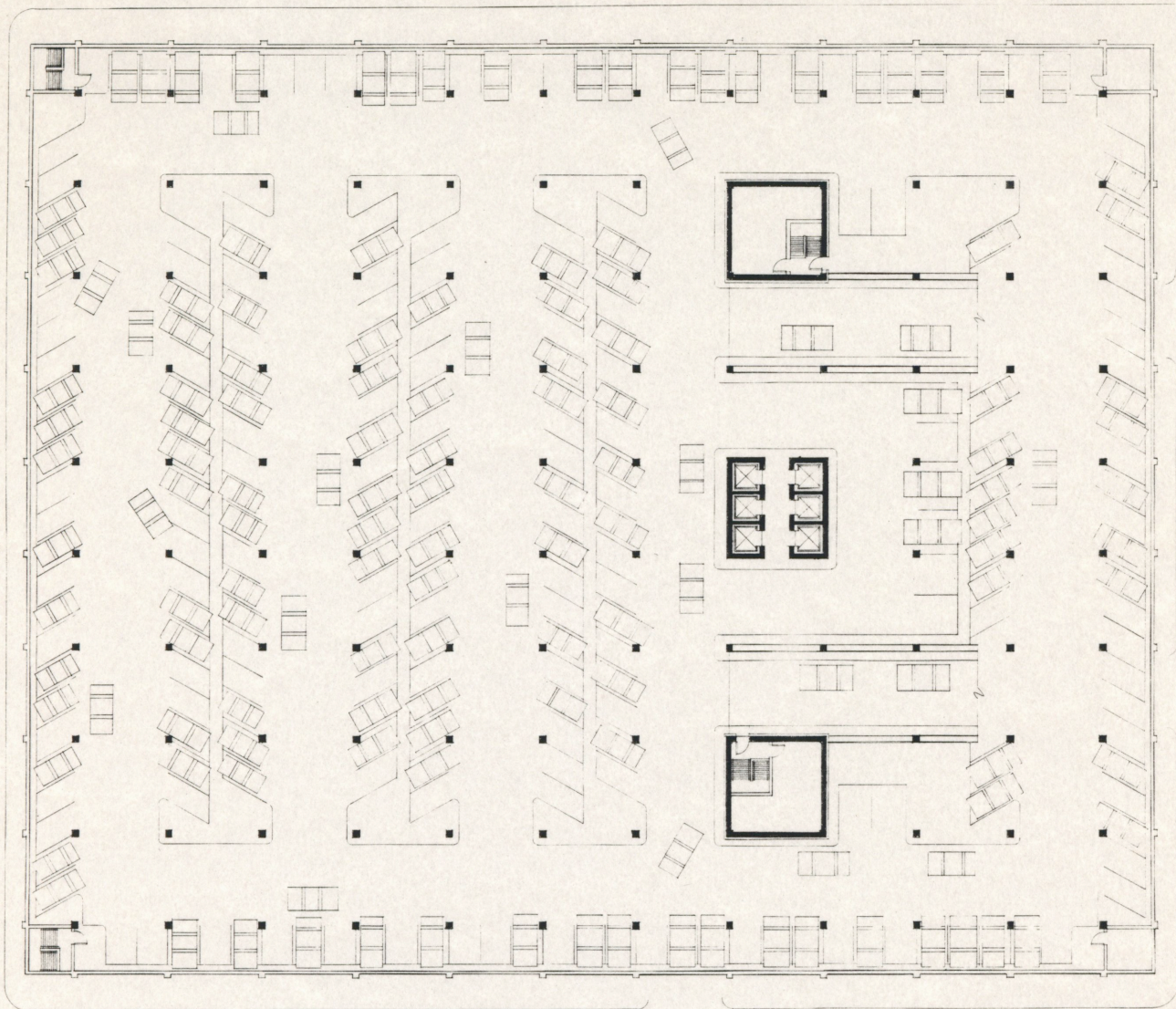
The following is a graphic representation
of the project's final solution.



elevation

one inch equals sixteen feet



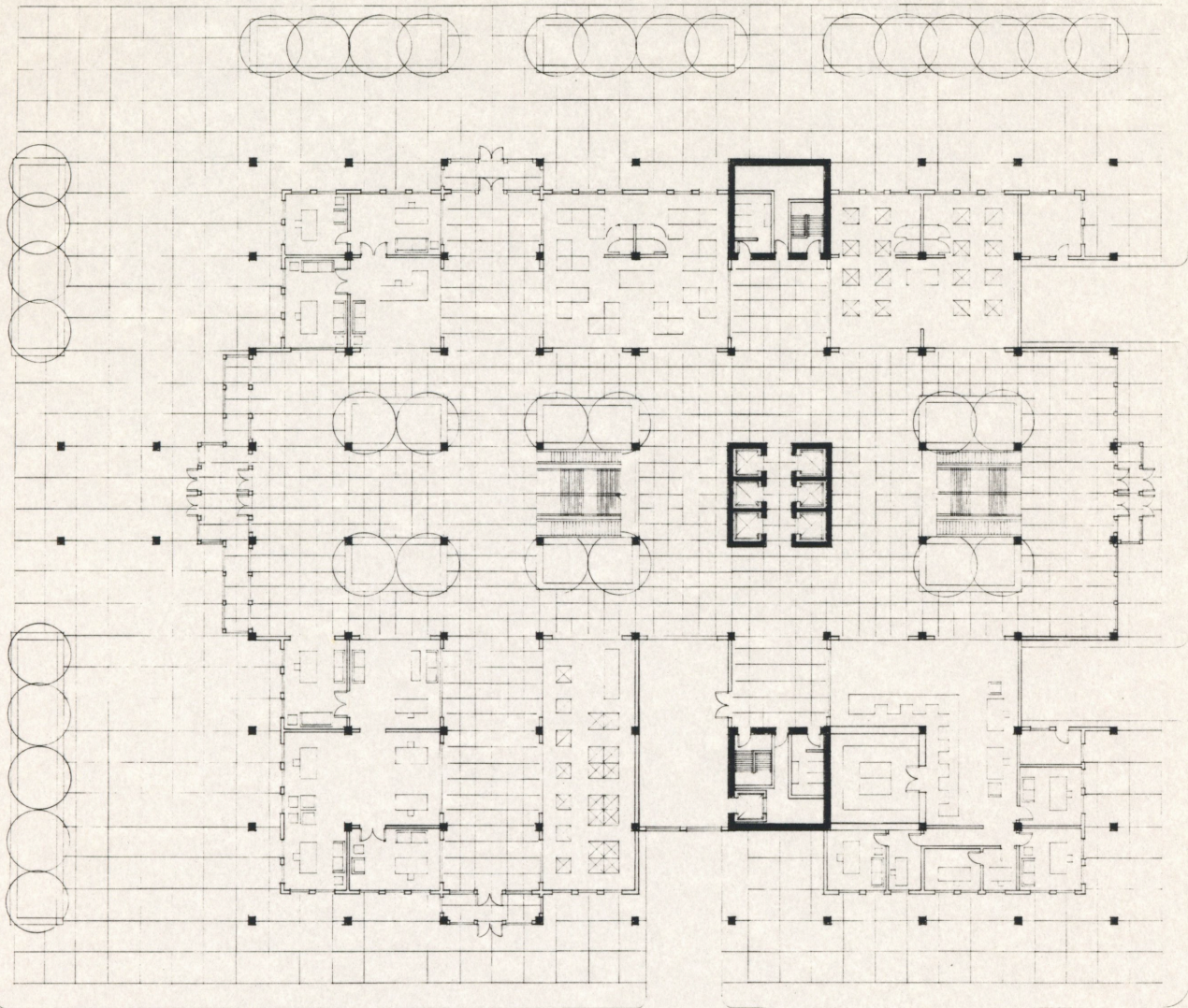


parking plan

one inch equals sixteen feet



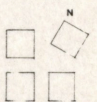
seventh place mall

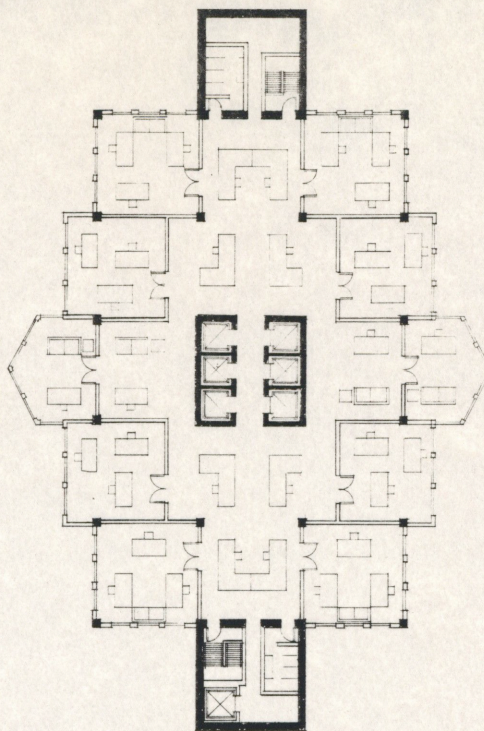


sixth street

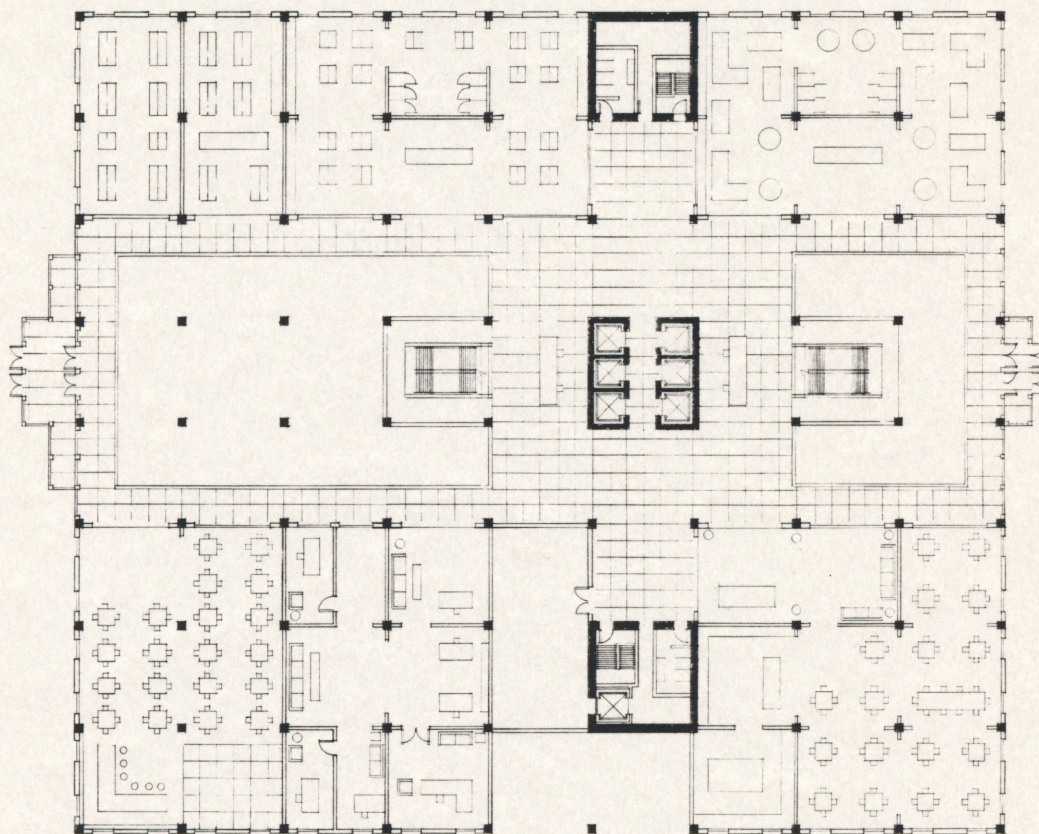
ground level plan

one inch equals sixteen feet



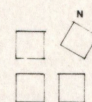


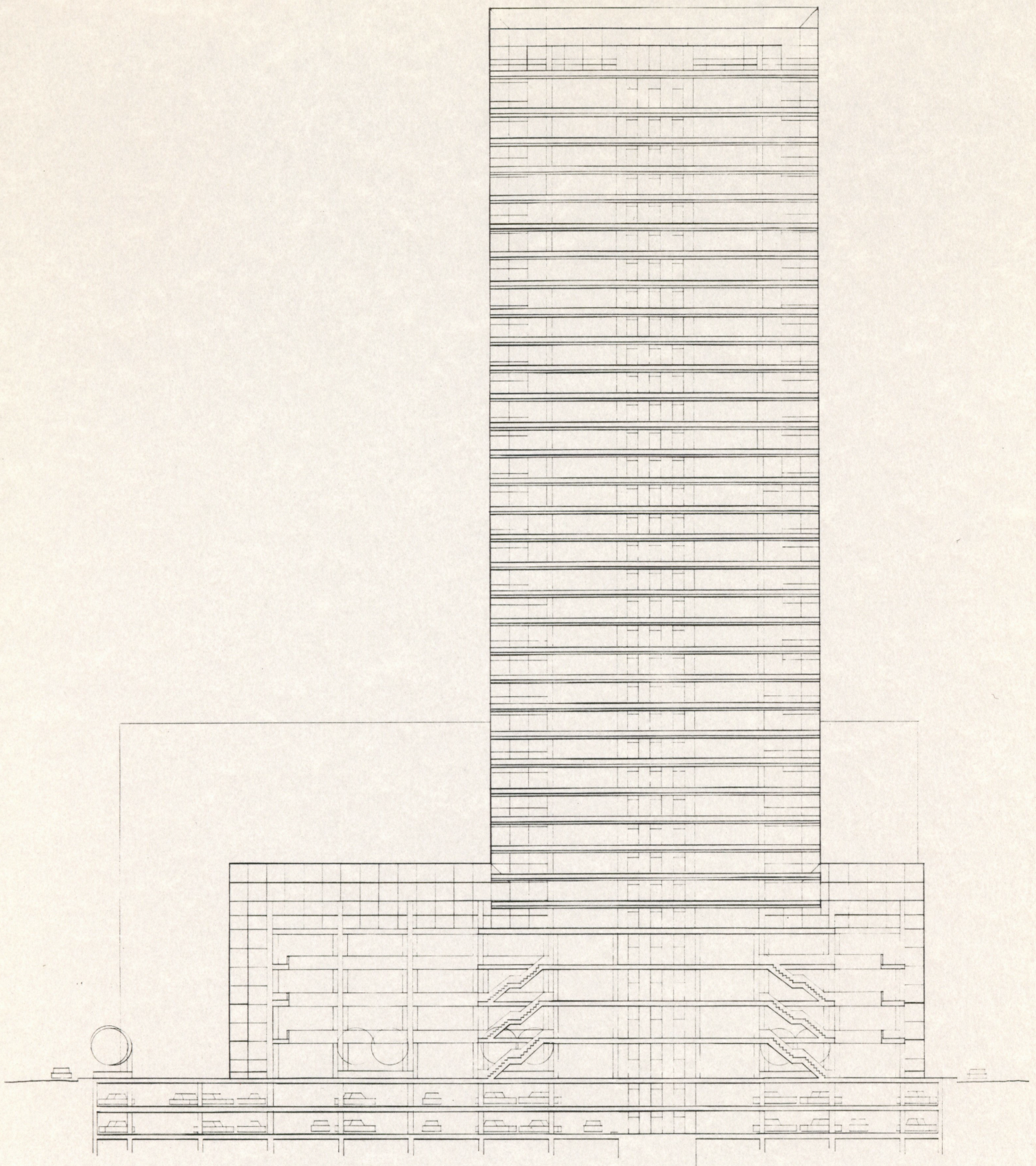
tower plan



skyway level plan

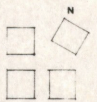
one inch equals sixteen feet

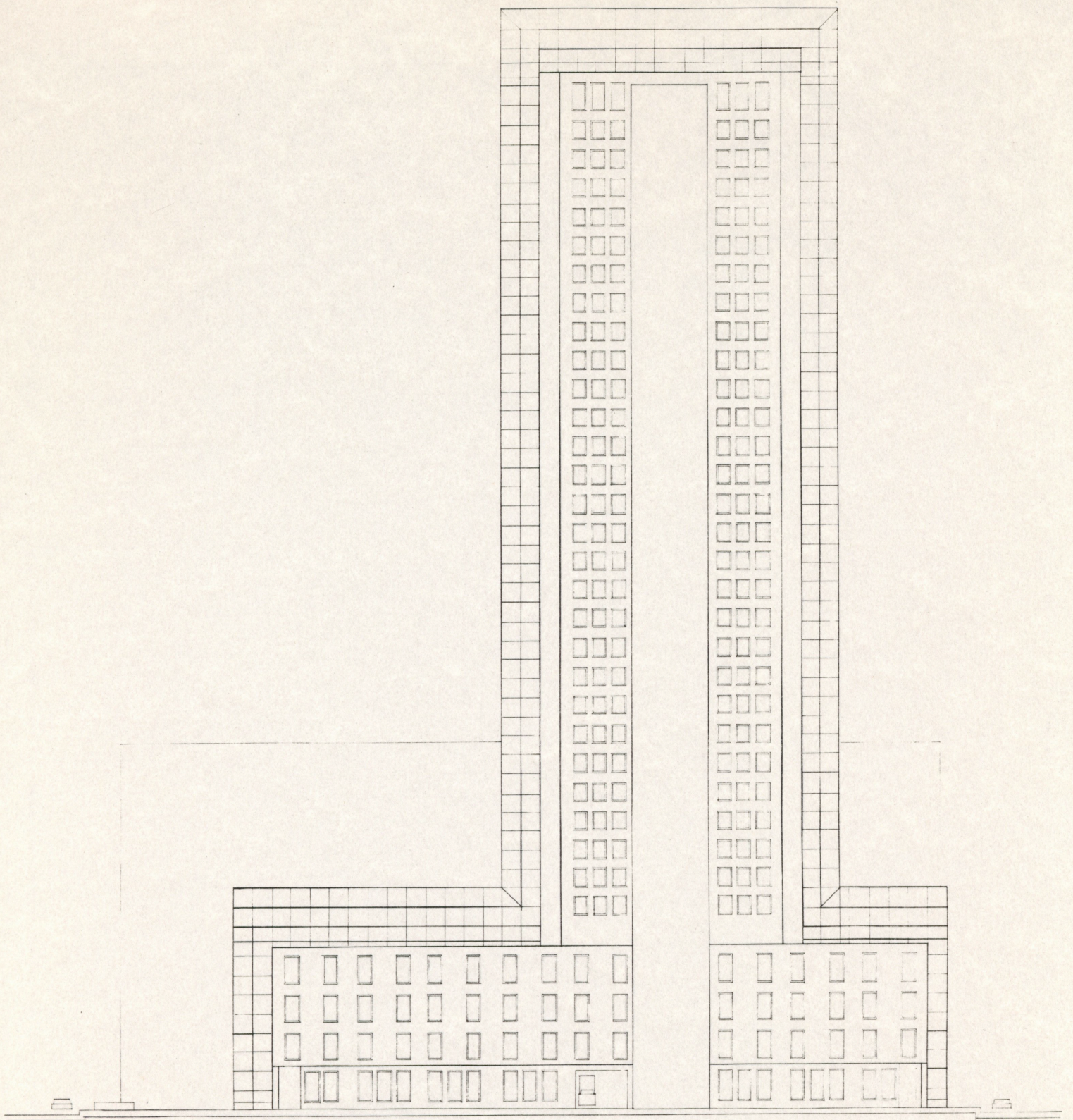




section

one inch equals sixteen feet

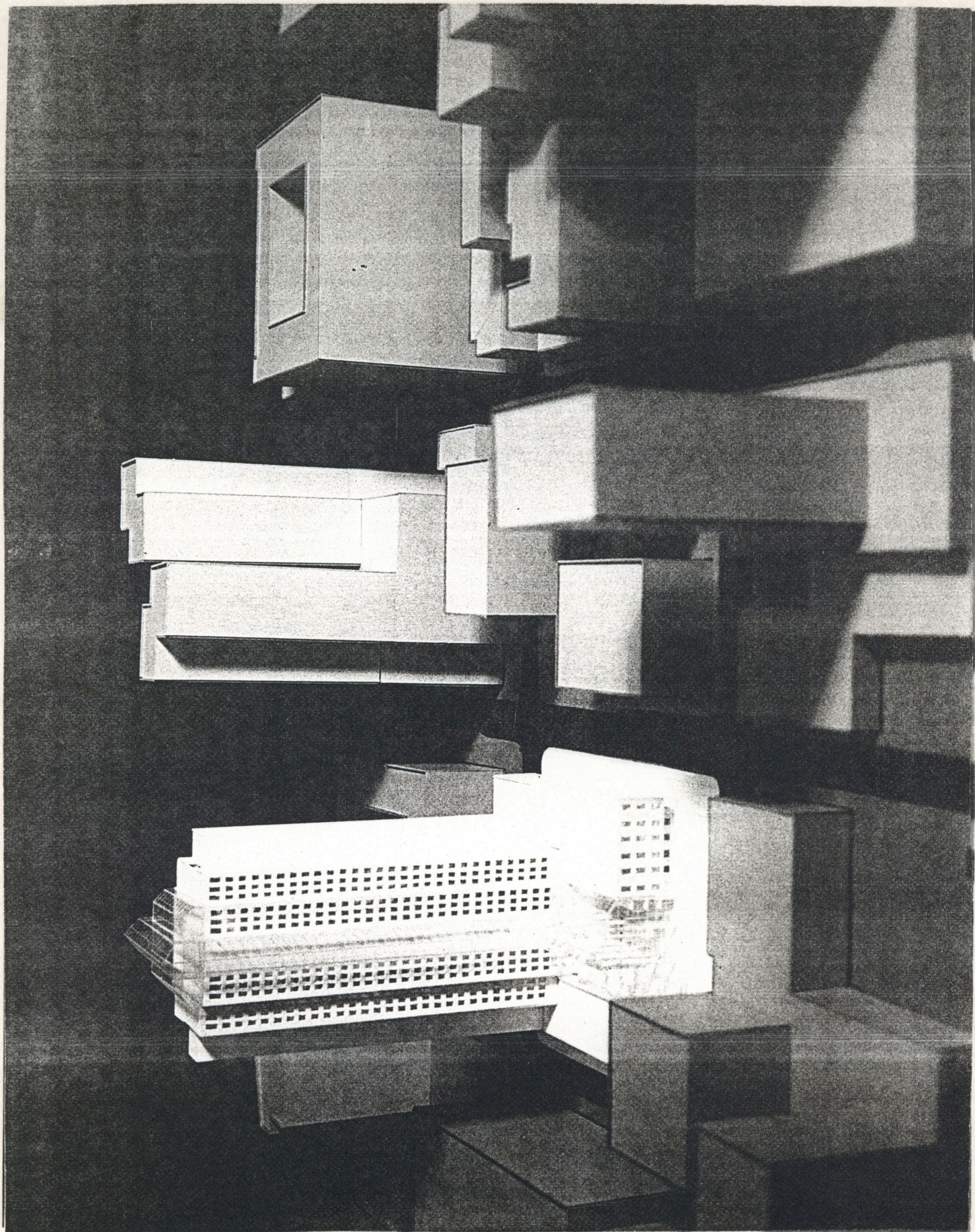


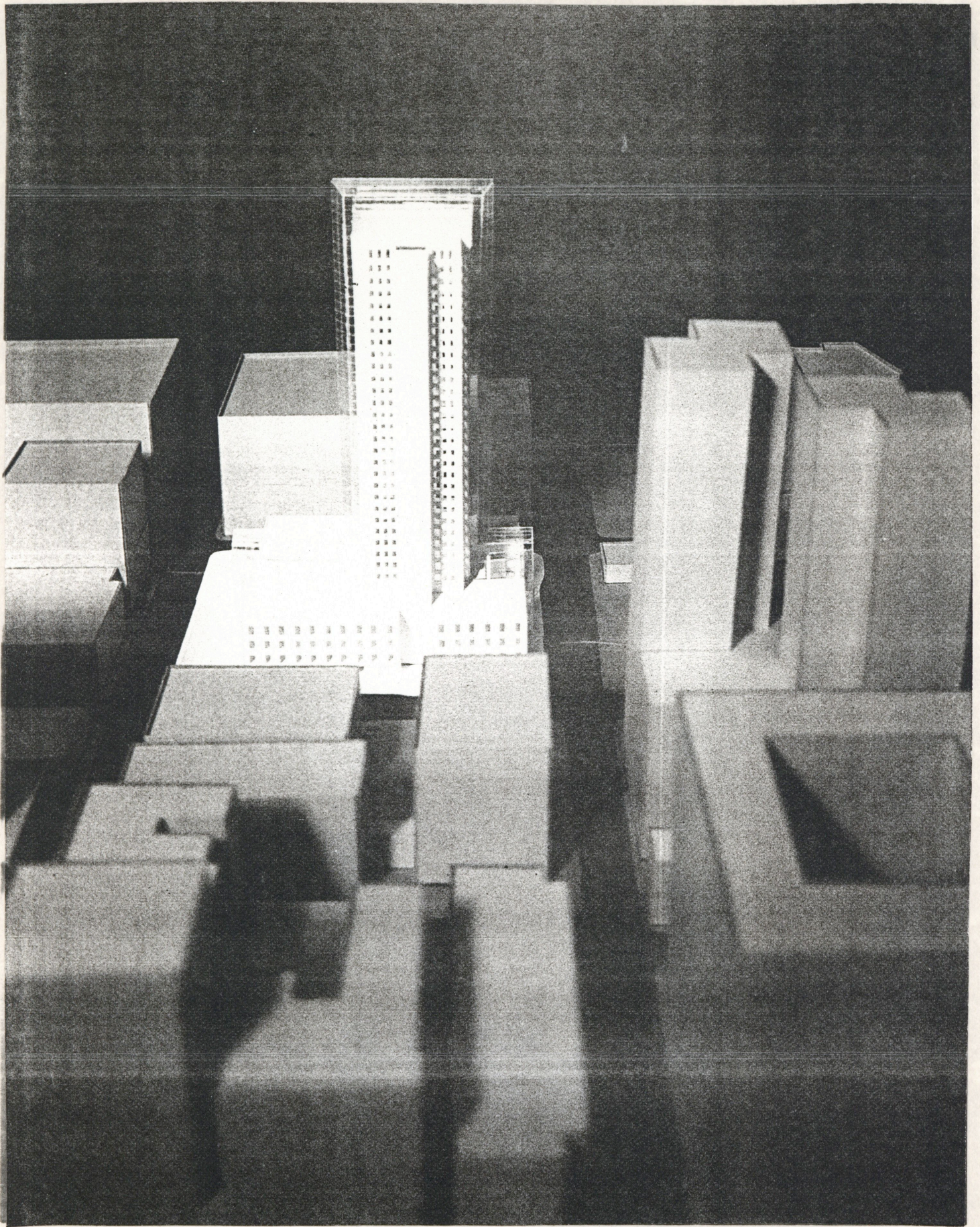


elevation

one inch equals sixteen feet







Footnotes

¹Downtown Development Plan, Planning Division, City of St. Paul, Minnesota., 1983, p. 16.

²Downtown Development Plan, Planning Division, City of St. Paul, Minnesota., 1983, p. 17.

³Zoning Code, 60.543 - 61.103, 7 July 1982.

⁴Downtown Development Plan, Planning Division, City of St. Paul, Minnesota, 1983, p. 1.

⁵Downtown Development Plan, Planning Division, City of St. Paul, Minnesota., 1983, p. 14.

⁶Richard Saxon, Atrium Buildings, Development and Design, (Van Nostrand Reinhold Company, Inc., New York, New York, 1983), p. 17.

⁷Richard Saxon, Atrium Buildings, Development and Design, (Van Nostrand Reinhold Company, Inc., New York, New York, 1983), p. 55.

⁸Richard Saxon, Atrium Buildings Development and Design, (Van Nostrand Reinhold Company Inc., New York, New York, 1983), p. 111.

⁹David Guise, Design and Technology in Architecture, (John Wiley and Sons, Inc., 1985), pp. 59-65.

¹⁰David Guise, Design and Technology in Architecture, (John Wiley and Sons, Inc., 1985), p. 82.

¹¹David Guise, Design and Technology in Architecture, (John Wiley and Sons, inc., 1985), p. 83.

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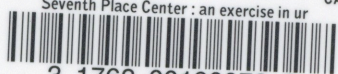
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