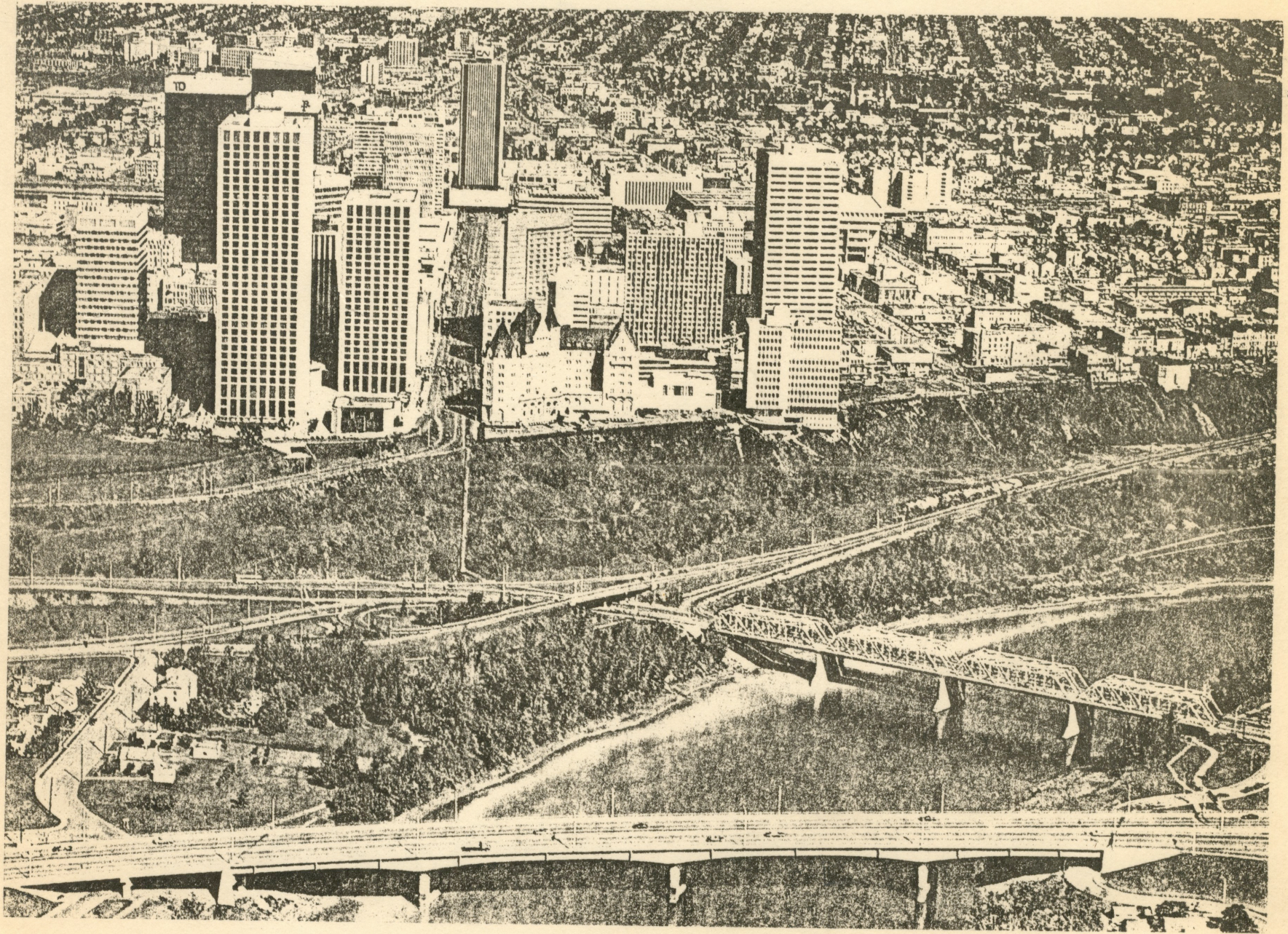






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A CONVENTION CENTRE FOR EDMONTON, ALBERTA

by

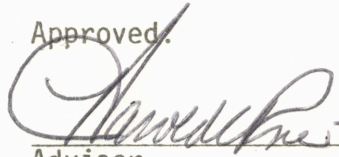
GERALD JAMES LISOWSKI

A thesis submitted in partial fulfillment
of the requirements for the degree

of

BACHELOR OF ARCHITECTURE

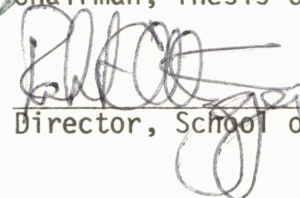
Approved.



Advisor



Chairman, Thesis Committee



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MONTANA STATE UNIVERSITY
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dedicated to
my Father and Mother

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INTRODUCTION

During recent years the scene of contemporary architecture has been dominated by the reoccurrence of an ancient architectural device--the atrium.

This relatively new trend in design has only become popular since its re-introduction in 1967 with architect-developer, John Portman's Hyatt Regency Hotel in Atlanta. Until then, the concept of the atrium had been lost in architectural history. Now atria appear everywhere, and are found in almost all climatic conditions and nearly every conceivable building type.

In view of this sudden popularity, I felt it would be interesting to study the atrium phenomena more closely.

This thesis contains two areas of study. The first section, which constitutes the primary body of my thesis, deals with an investigation of atrium design--past and present, exploring both advantages, and disadvantages of its use as an architectural device. The second section is comprised of additional research relating to my thesis project. It is a study of the convention centre as a generic building type, and examines aspects of planning and design.

The final objective of this thesis is to develop an understanding of the value and application of the atrium in modern architecture as well as the external and internal factors which influence the design of a typical convention centre, and demonstrate this in the design of a convention centre for Edmonton, Alberta, Canada.

THESIS STATEMENT

The atrium - an architectural device to humanize the built environment, that is both appropriate and applicable.

THESIS TOPIC

A study of atrium design in modern architecture.

THESIS PROJECT

A Convention Centre for Edmonton, Alberta, Canada

A STUDY OF ATRIUM DESIGN 1

HISTORICAL PRECEDENT

Although the atrium, as we know it today, only attained its popularity during this past decade, atria date back as far as historical knowledge goes.

Atria were common in the days of Pompeii around the year 60 A. D. The central feature of a Roman house was the atrium - a covered court with an opening to the sky, beneath which, was a tank called an "impluvium" to catch rain water from the inward sloping roof. Streets of Pompeii were very narrow, as little as 8 feet, and houses typically presented a plain windowless facade to the street for reasons of security and a desire for privacy. Instead, light entered perimeter rooms through openings into an internal court - the atrium. It is conceivable that the idea of the atrium evolved out of necessity to satisfy primary basic needs of water, light, security and privacy. However, atria served many other functions - as a waiting room for guests or clients and a place to display a family altar and ancestral statues.

In most cases, a Roman house design also included a peristyle, a space very similar to the atrium in size and function, only more private and often containing a garden.

Early Christian architecture extensively used atria in basilican churches, modeled after the Roman house. In S. Clemente (Rome, 1084 A. D.) the atrium became an open rectangular forecourt surrounded by an arcade, which gave an imposing approach to the church. In its center, a fountain used in bathing rituals, replaced the water tank of the Roman house.

In later years, after the basilican church, open-air atria became rare; replaced by large, fully enclosed, opaque vaults of space common to cathedral architecture. Spaces, similar in function to the atrium were clearly evident, but identified by a different terminology.

In nearly all cases of the atrium in residential architecture, it was referred to as a court.

In cathedrals of English Mediaeval architecture, the atrium resembled the cloister, an open-air secluded place surrounded by covered passages, separated from the main body of space by a colonnade.

In architecture of the Italian Renaissance, the atrium was comparable in function to the piazza at S. Peter in Rome.

In many Venetian palaces it was similar to a "cortile" or "grand cortile."

Early in the 19th century, two major events led the way to an entirely different kind of architecture - the technical changes in building materials and the industrial revolution. This era, commonly referred to as *"the age of iron and glass"* changed the form of atria permanently. It suddenly evolved into a completely enclosed space, skylit by means of a glass and iron roof.

Joseph Paxton's Crystal Palace (England, 1851) was probably the finest piece of iron and glass architecture ever built. Essentially, the entire building could be considered an atrium. It had been designed for the Great Exhibition of 1851 and based upon a previous design of Paxton's for the Great Conservatory at Chatsworth. The roots of our modern predilection for greenery in architecture originate with the Victorian green house or conservatory.

The Galleria Vittorio Emanuele II (Milan 1865) designed by Giuseppe Mengoni, became the first major commercial use of iron and

glass - clearly influenced by Paxton's Crystal Palace. Its design consists of a barrel vault of iron and glass which enclosed a portion of two important intersecting streets. At their point of intersection, a square was created, topped by a gigantic glass dome. Surrounding walls of buildings supporting the dome are decorated with paintings and frescos. This enormous enclosed space, although very linear, is clearly another example of an atrium.

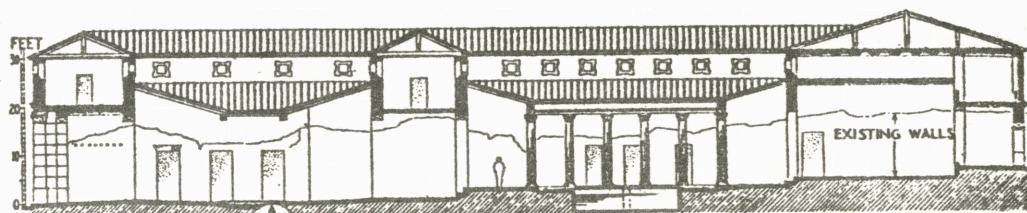
Evidence of British and European influence toward use of iron and glass in architecture, and their concept of atrium space, became visible in North America at the close of the 19th century.

The Bradbury Building (Los Angeles, 1893) designed by George C. Wyman illustrates this influence, but the design of its atrium is far more innovative. Many levels of cast iron balconies surround a skylit court, linked with stairs and a skeletal elevator. Wyman's design could be the predecessor of John Portman's atrium designs.

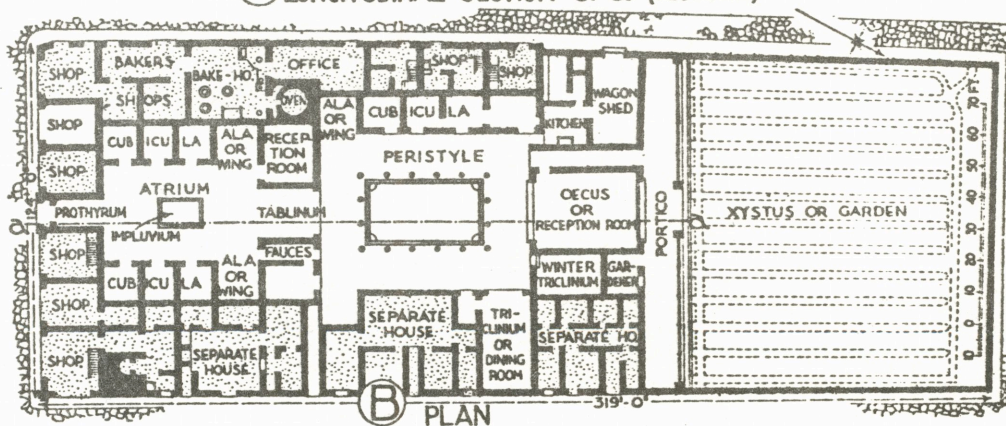
Frank Lloyd Wright's Larkin Building (Buffalo, N. Y. 1906) incorporates a fine example of an atrium in its design. Wright's atrium is an airy skylit central court which vertically links all four stories of the building. "Wright saw the atrium as a romantic

tool with which to fight the smoke, dirt and noise of an industrializing American."¹ His functional use of the atrium, in this case, was to unify and supply natural light to the four floors of clerical staff by giving all a common space. One of the first attempts at air conditioning occurred in Wright's Larkin Building where fans pulled air from the atrium space and washed it with a sheet of water. Modern examples of enclosed atria remained isolated and infrequent until 1967 when John Portman's Hyatt Regency Hotel in Atlanta transformed the atrium into an overnight success.

From this brief analysis of the atrium's historical evolution we are able to see a great diversity in the types of spaces which have all been described by the word "atrium". However, today, the atrium is commonly thought of as any enclosed space (generally secondary in nature or a circulation space), which projects through one or more storeys and has some form of natural illumination. For the purpose of further study in this thesis the word "atrium" and all research pertaining to atria, will apply to this common definition.

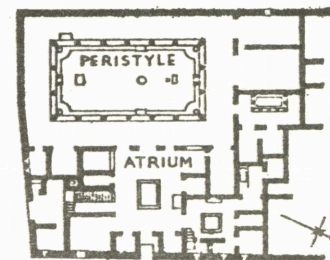


(A) LONGITUDINAL SECTION a-a (RESTORED)

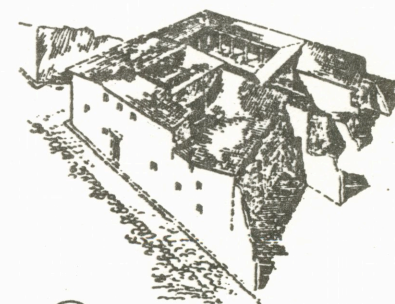


(B) PLAN

House of Pansa: Pompeii

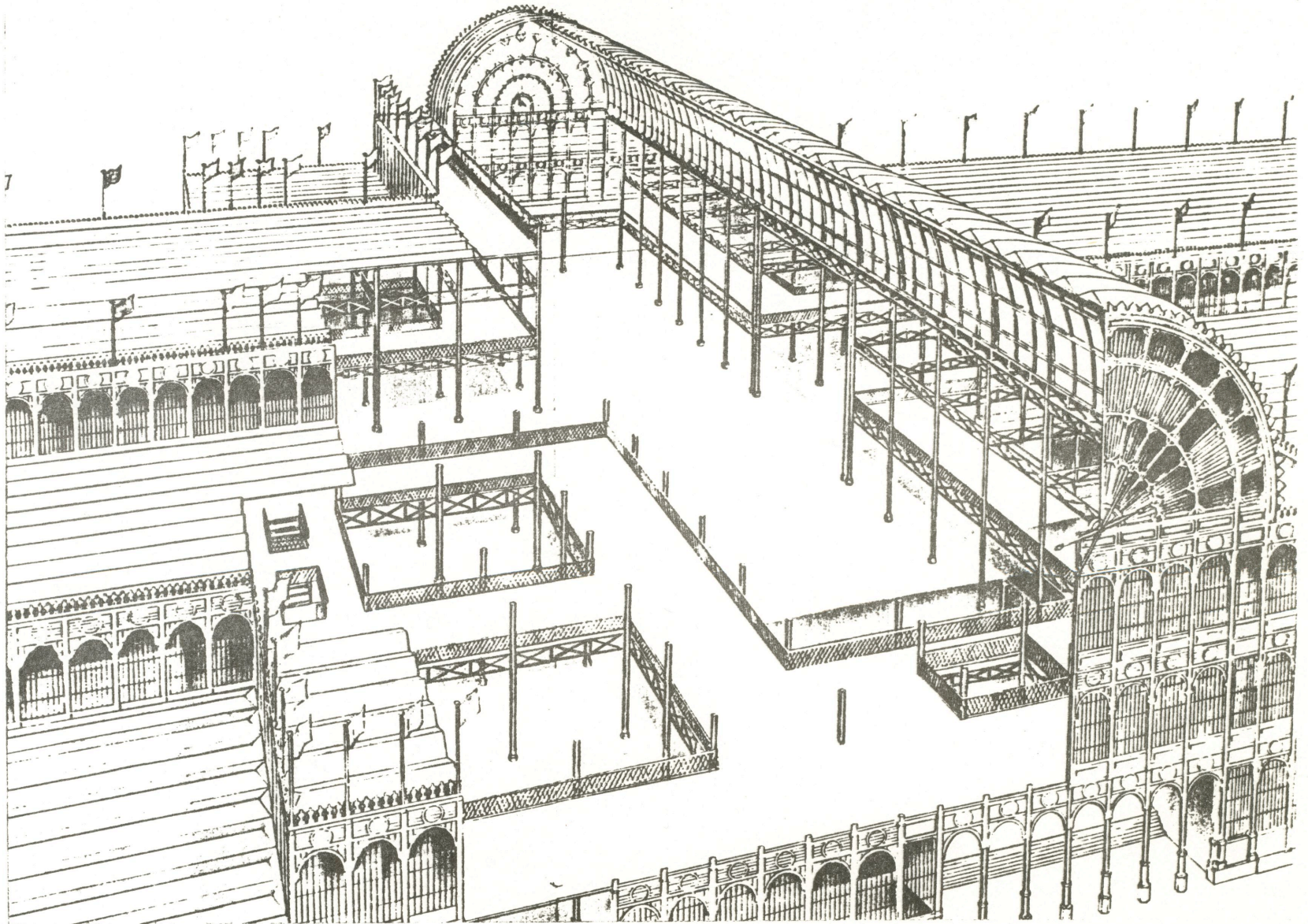


(D) PLAN



(F) EXTERIOR FROM N.

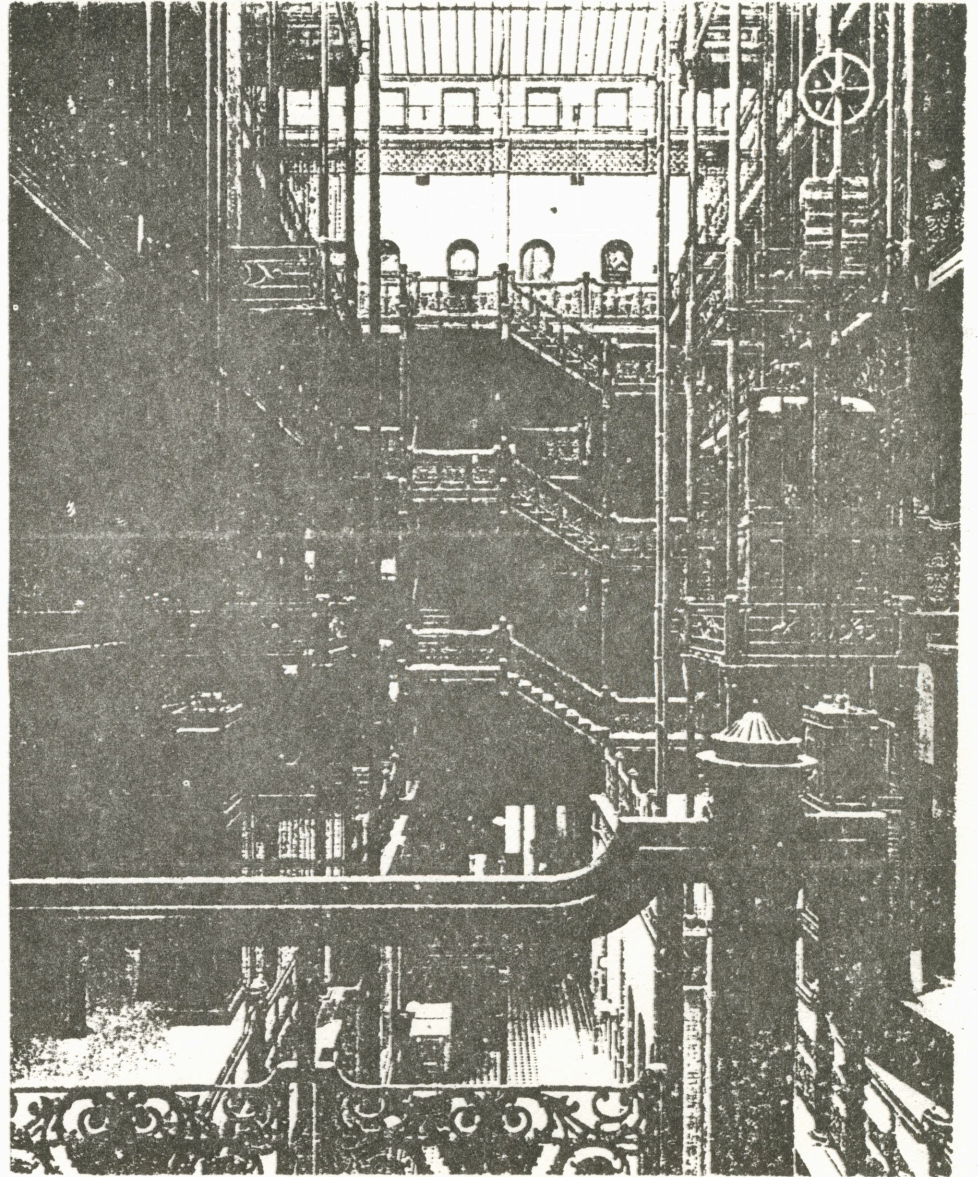
House of Vettii: Pompeii



Crystal Palace, London



Galleria Vittorio Emanuele, Milan



Bradbury Building, Los Angeles



Larkin Building, Buffalo

CASE STUDIES

The following five case studies illustrate, what I feel to be, successful use of the atrium as an architectural device. In each case building type, climatic condition and the atrium's primary functions vary considerably, yet in all instances, atria were used in an innovative, advantageous manner.

THE SOLOMON R. GUGGENHEIM MUSEUM - New York, N. Y.

Designed by architect Frank Lloyd Wright and completed in 1959, the museum was conceived of, and built for Solomon R. Guggenheim, to house and display his personal art collection.

Since its opening it has received both criticism and acclaim simultaneously. Critics have stated that the building, being a superb piece of art in its own right, tends to compete with the art being displayed.

The commanding feature of the gallery, and target for much of this criticism, is a large seven storey skylit atrium. Around this grand central space, a continuous spiraling ramp leads visitors through gallery spaces, moving them from alcove to alcove where art is displayed. A lift first transports the visitor to the uppermost gallery space, at which point he becomes free to wander down the gentle slope of the ramp to the ground floor.

Wright's innovative use of the atrium as an architectural device accomplishes several specific functions.

First, it provides the visitor with a visual, physical and psychological release from spatial confinement - a particularly important

feature to consider in gallery or museum design. The tremendous success of this aspect of Wright's design is described by architect John Portman after his visit to the Guggenheim.

"About halfway down the ramp I began analyzing why this experience felt so good and worked so well. I would look at a few paintings and then I'd walk over to the rail, look around and see people, look down into the space, and then go back and look at more paintings. I also observed that other people were doing the same thing. Anybody who goes through a museum and finds himself being led from one closed compartment to another knows that he soon longs for relief. In that respect the Guggenheim is very successful. You can go through it comfortably without feeling fatigued or bored."²

Second, it fills the many gallery spaces with indirect natural light, to which Wright attaches a special importance. It was his opinion that the type of light required to properly display art should be three dimensional, a combination of artificial and natural. The success of this aspect is somewhat questionable as museum operating personnel have often complained about a lack of control over light entering the galleries via the atrium.

A third function which the atrium fulfills is to unify all gallery spaces into one central space. Wright describes this image of unity which his atrium projects: "All is one great space on a continuous

floor ... the net result of such construction is greater repose, an atmosphere of the unbroken wave."³

The design accomplishments of Wright's atrium are very significant and, of course, more numerous than the primary functions already mentioned. In addition, Wright's design provides a sense of privacy, allowing the viewer to communicate with the individual piece of art while generating a feeling of both participation in, and communication with, the total space.



Central Atrium Gallery - The Guggenheim Museum

THOMAS JEFFERSON UNIVERSITY HOSPITAL - Philadelphia, Pa.

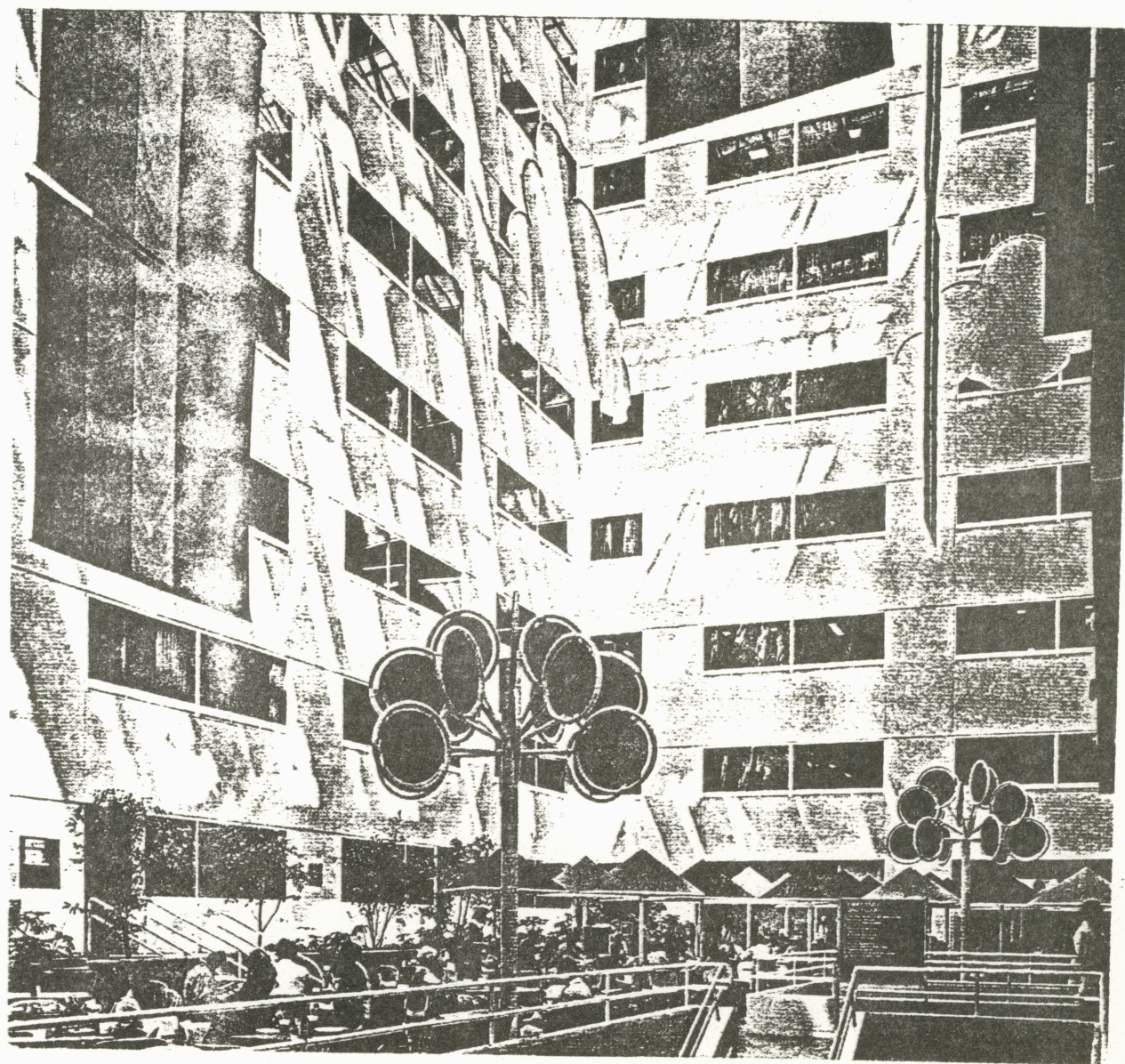
This children's hospital, designed by the firm of Harbeson Hough Livingston and Larson, and completed in 1975, is an addition to an existing facility. The addition is quite sizable - just over 1,000,000 square feet, and contains 904 beds.

Its unique feature is a eight storey atrium space. The hospital is basically a U-shaped structure made whole by the atrium court.

The architects chose to use an atrium for two specific reasons. First - to increase the number of windows for individual patient rooms without significantly increasing the area of the building's exterior skin. Second - to reduce energy costs. With a building of this volume and spatial complexity, which must be operated on a 24 hour basis, energy costs could be very high. Basically, the atrium conserves energy in the following manner. Fans and compressors in key locations, are used to move heat generated by occupants, machinery or passive solar gain in the atrium. In winter, this heat is used at the building's perimeter, where it experiences the greatest heat loss. In summer, play decks on the atrium's glazed south facing wall act as shading devices reducing solar penetration and heat gain in the court. The

atrium's fully glazed roof has a sawtooth configuration angled to reflect summer sun. Also, during the summer, the atrium is used as a return air plenum with air discharged into the space through slots in corridor balcony floors. This factor alone resulted in a saving of \$100,000 on ductwork.

Aside from its two important primary functions, the atrium has several other advantages. The court has become an orientation device, particularly for visitors, who are able to maintain visual contact while moving around the court on balcony type corridors, which also serve as circulation paths to patient rooms. The atrium space also relieves the sobering image of institutionalized care and provides a form of sensory stimulation by exposing patients to all its sights, smells and sounds. Bright multicoloured hanging graphics of clouds, rainbows and "lollipop trees" give the space a whimsical outdoor appeal.



Atrium Lobby - Thomas Jefferson University Hospital

STUDENTS UNION HOUSING - Edmonton, Alberta, Canada.

The University of Alberta's Hub Mall was designed by the architectural firm of Barton Myers and completed in 1973. This ingenious approach to student housing has become a prototype cold climate community.

The atrium, in this case, is a dramatic skylit galleria, traveling the full 950 foot length of the building. The complex basically consists of two parallel seven storey banks of apartments and shops joined by a galleria one and one half storeys above grade, spanning a service road below. Shops are located only at mall level and occupy both sides of its entire length. Above these two rows of shops are three levels of student apartments. Stairwells, equally spaced along the building's length, join the mall with grade and provide access to all seven levels of apartments.

The architects have used the galleria to fulfill two major functions.

The first was to reunite students with campus life and produce a sense of involvement. During years prior to Hub Mall's design and construction, there had been a continuous drift of students to off

campus housing. Increasing numbers of students preferred the apartment-type living unit presently unavailable on campus. This steady migration was beginning to fragment university identity and create numerous commuter traffic problems. Hub Mall satisfies not only the student preference toward apartment living units, but also involves its residents in campus life and activity. All three levels of apartments above the shops have shutter-type window panels which open into the mall, furnishing occupants with the sights, sounds and smells of activity in the mall below.

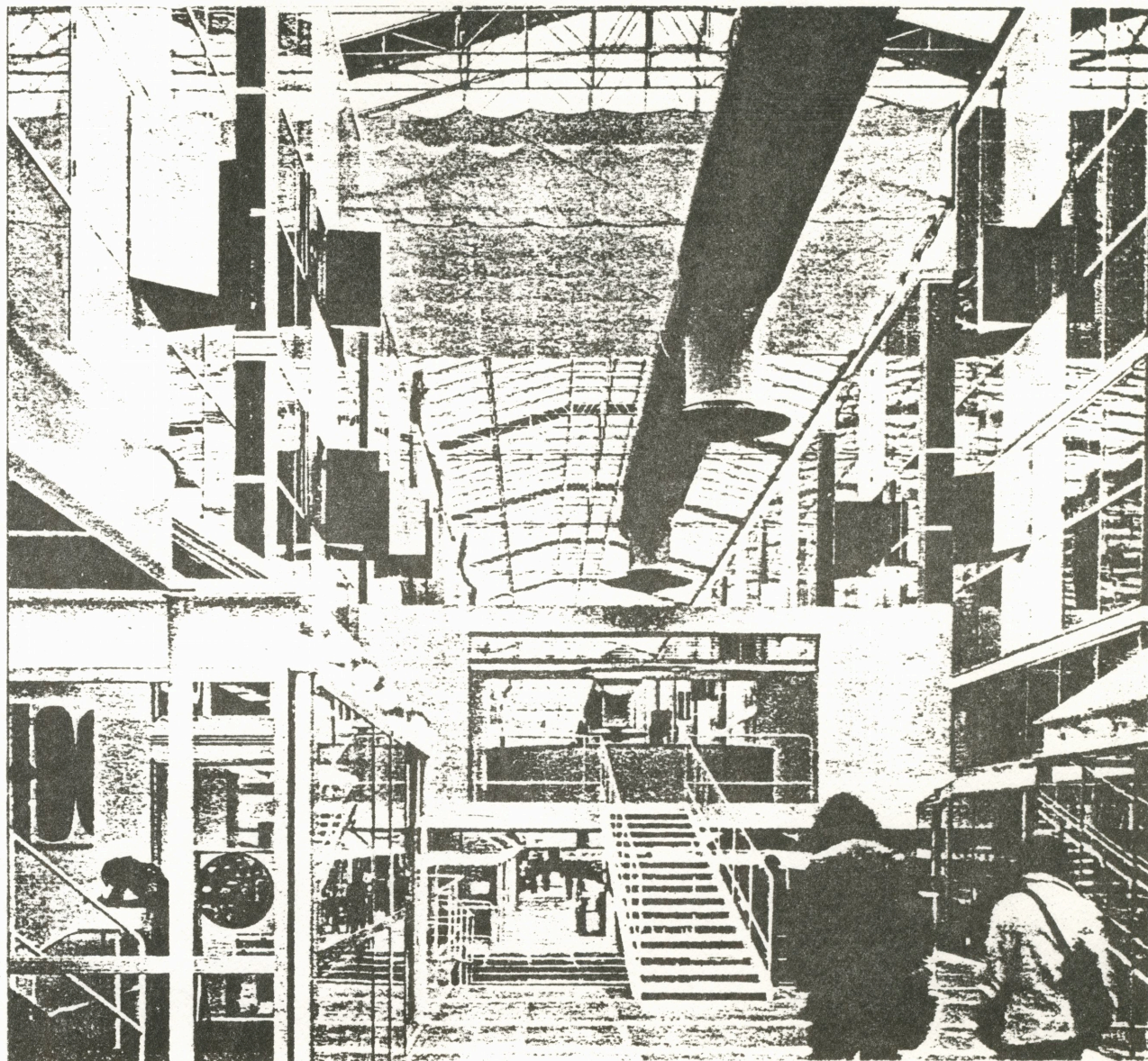
A second aspect of the design which the galleria concept fulfilled was the architect's concern for energy conservation and cost. Edmonton's climate is quite severe with winter temperatures sometimes falling to -40°F. The galleria reduces the area of the building's exterior skin by approximately 30%. Savings in cost result from the lower material and construction cost of the interior galleria facing walls as opposed to regular exterior walls, and the significantly lower heat loss of these interior facing spaces.

The galleria also attempts to utilize the sun to contribute some of the heat required through passive solar gain, however, due to its

linear shape and north-south orientation, the mall receives direct sun for only a short period of time during the day.

Glare is controlled, to a limited extent, by fire-resistant canvas awnings hung from the skylight's steel structure.

Unfortunately, a major problem with the galleria has been sound transmission. A limited budget did not allow for carpeting or use of other sound absorbing materials in the mall. As a result, the textured concrete surface used turns the galleria into a sound conduit, transmitting noise into the apartments above and disturbing residents.



S. U. B. Mall - University of Alberta

HYATT REGENCY HOTEL - Atlanta, Ga.

No study of atria would be complete without examining the work of John Portman, who is considered by many to be the true pioneer of atrium design in modern architecture.

Portman's Hyatt Regency Hotel, his first major atrium building, has initiated an architectural trend - the resurgence of the atrium as an architectural device. This hotel was a testing ground for Portman's concepts of atrium design, enabling the development of a "formula" - a formula which he has used repeatedly and has won him great notoriety.

The Atlanta Hyatt's atrium is a 120 foot square space, twenty-two storeys high, surrounded on each level by balcony corridors that give access to hotel rooms.

This atrium space, like others discussed in previous case studies, also fulfills several important functions for which it was initially conceived. His primary design function was a physical and psychological release from the types of spacial confinement that were typical in hotel designs of the past. Portman describes this feeling of confinement in the following manner:

"The typical central city hotel of the past had always been a cramped thing with a narrow entrance-way, a dull and dreary lobby for registration, elevators over in a corner, a closed elevator cab, a dimly lighted corridor, a non descript doorway, and a hotel room with a bed, a chair and a hole in the outside wall."⁴

Portman's atrium is created by combining these "dreary" spaces and exploding them into one enormous, exciting space - a dramatic release of spatial tension.

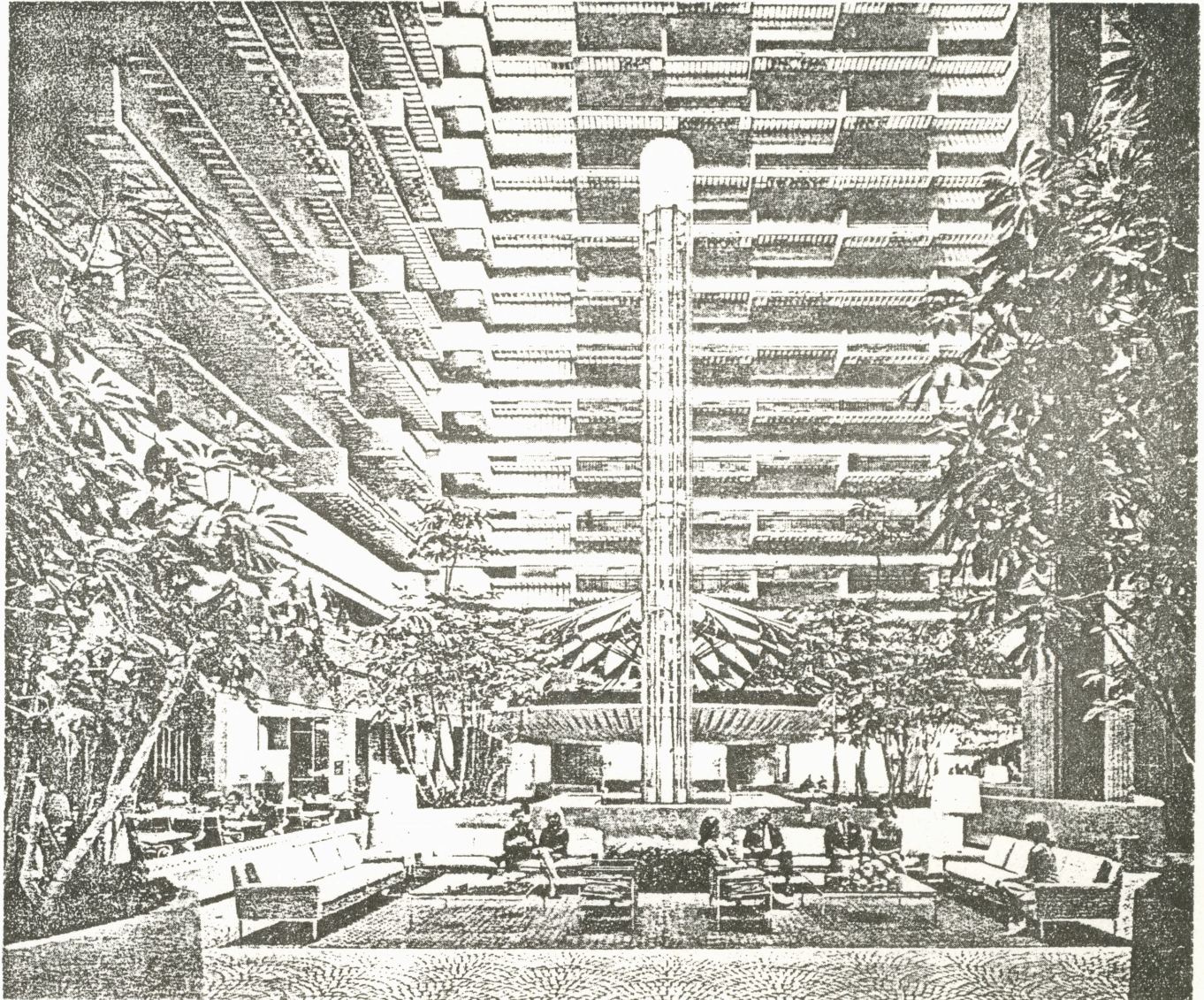
However, the importance of the atrium's economic function, by far, outweigh those of its design functions. Above all else, it is a major sales feature for the hotel that has achieved tremendous success. Since the hotel opened in 1967, it has operated at 85% capacity, a figure which alone more than compensates for the atrium design's higher cost.

A minor drawback for this particular atrium design is a reportedly high consumption of energy - a bill for the entire hotel, amounting to a half a million dollars a year. In response to this criticism, Portman explains that energy was not the issue here. "A basic element of his firm's design philosophy is to create spaces that lift the human spirit and create a sense of unity with the outdoors"⁵ - a statement

revealing additional design functions which the atrium is intended to fulfill.

Portman utilizes extensive vocabulary of architectural treatments and articulation in the Hyatt Regency to accomplish this humanizing experience he speaks of. Glass enclosed elevators travel up exposed tracks. The elevators, delineated by strings of lights to emphasize their movement, become a "huge kinetic sculpture." Natural means such as water (fountains and ponds) and plants also play an important role in humanizing the Hyatt's atrium space. Scale received very careful consideration. Lighting and canopys suspended on cables hang above the lobby level, not only serving to define space, but also psychologically reducing the size of the atrium to a more personable level.

In conclusion, despite the atrium's success in achieving the design goals Portman has set for his firm, in this particular case his design remains a trade off. High occupancy or high energy consumption? Portman seems to feel the choice is obvious. He states that "an atrium space is an example of where the positive effect on people would outweigh strict and limited devotion to energy conservation."⁶



Atrium Lobby - Hyatt Regency Hotel

THE WEST OFFICE BUILDING OF DEERE AND CO. - Moline, Ill.

A new building for Deere and Co., completed in 1978, exhibits the finest example of atrium design explored in these case studies.

The 200,000 square foot building provides work facilities for an additional 900 administrative employees, and is linked to Deere's first building via an enclosed pedestrian bridge. The building form is a broken donut shape with a linear atrium occupying its centre. Its surrounding site is a magnificently landscaped, 1044 acre preserve overlooking the Rock River. Both buildings are architecturally elegant - the latter following precedents set by the earlier with its unique sunscreen facade and use of weathering steel as an exterior cladding.

However, the overwhelming success achieved by the building, can almost entirely be attributed to its greenhouse like atrium.

The atrium is an 11,000 square foot multilevel garden rising the full height of the building to gambrel shaped skylights.

The atrium fulfills several important design functions all of which deal purely with aesthetics. First - architects Roche and Dinkeloo set out to create a pleasant working environment that would

stimulate employees and provide a sense of visual relief - a welcome contrast to the reading and writing tasks typically involved in office duties. This design goal has been accomplished through a reunion with nature exhibited by the atrium's garden. It was Roche's contention that "contact with nature acts as a spur to the psychological well-being of people."⁷ William Marlin, in his critique of the building, comments on the atmosphere which the architects have created within the atrium. "The sense of ease within and around this garden is real and even unrelenting; a sense of peace permeates the space."⁸... This cumulative architectural achievement, wherein efficiency and enchantment are at a parity, is a fine incentive system."⁹

A second function involved the corporate image Deere wished to preserve. Deere builds farming, gardening and construction equipment, and one tends to develop agricultural images when dealing with Deere's architecture. The lush garden atmosphere of this new atrium space is the manifestation of a character which the company desired to express.

A third function deals with a union of building and site. As I have previously mentioned, the surrounding site is a virtual garden in its own right. The garden-type atrium instills a sense of a continual

flow of nature, through the building establishing it firmly yet delicately in the context of its site.

The architect's selection and use of materials and finishes within the building is superb - the rust brown of its weathering steel structure, the greens of an extensive array of planting, and the soft earthy tones of fabrics and furnishings. A pedestrian bridge, crossing the atrium at a midpoint, has a tinted, mirrored glass parapet allowing reflections of planted surroundings to hide its existence. A highly polished ceiling reflects the atrium's greenery deep into the office space, giving all its personnel a feeling of continual contact with the atrium.



Atrium Garden - West Office Building of Deere

ARCHITECTURE OF ATRIA

Atria possess an architecture and vocabulary unique to their form and situation. As is the case with any interior space, atria require articulation for human involvement. Aesthetic qualities furnish the atrium with its humanizing influence on our built environment and should, therefore, be one of our most important considerations in atrium design. However, there are several other aspects involved, which must also be examined in order to place these aesthetic contributions into proper context.

The following section of this thesis presents an overview of atrium design, weighing both advantages and disadvantages, and constitutes a body of knowledge necessary for proper application of an atrium space to any given situation.

AESTHETIC APPEAL

By far, the most meaningful benefits atria bestow upon our built environment, are their humanizing influences. For designers, the atriums grand scale encourages aesthetic flights of fancy.

This section will examine some of the elements involved in the articulation of atria, essential for human involvement.

Nature

In downtown core areas of nearly all our major cities, the exteriors of both buildings and surroundings typically consist of concrete and asphalt. The atrium, however, provides a return to nature - a connector between man and his built environment. "There is an underlying harmony in the natural environment that is very appealing to the human being."¹⁰

Plants and Trees

They create, modify and define space and spatial parameters. Their foliage form canopies, filtering sunlight and effectively lowering ceiling heights without destroying a sensation of the larger, surrounding space. They produce air-enriching oxygen, and odours to

stimulate our sense of smell.

Water

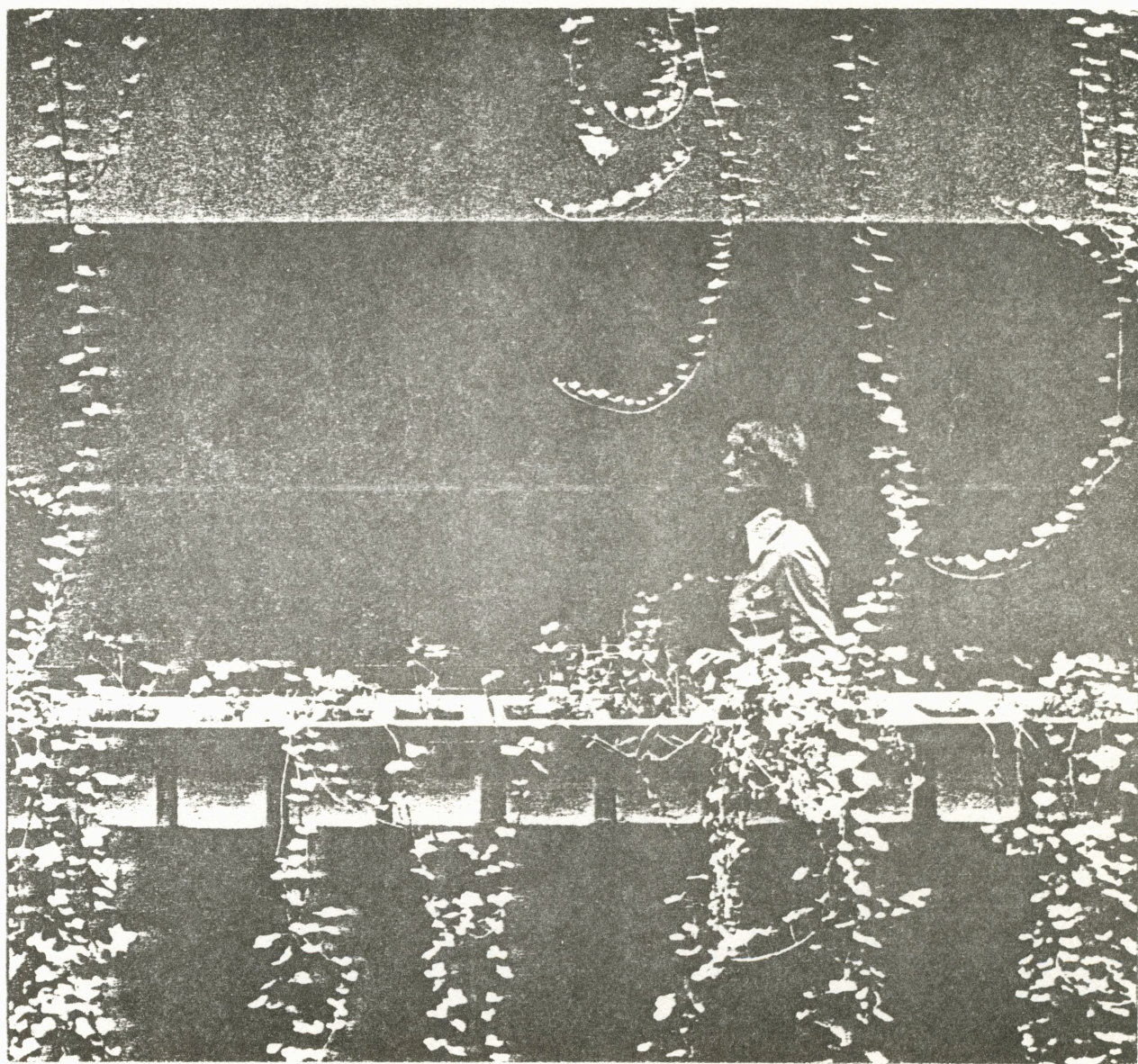
Water seems alive - kinetic, active - with movement and reflections that capture our visual interest, and sound to soothe our thoughts, allowing momentary isolation from our surroundings. "It is one of the elements which can transform a building from a static object to a dynamic environment."¹¹

Natural Light

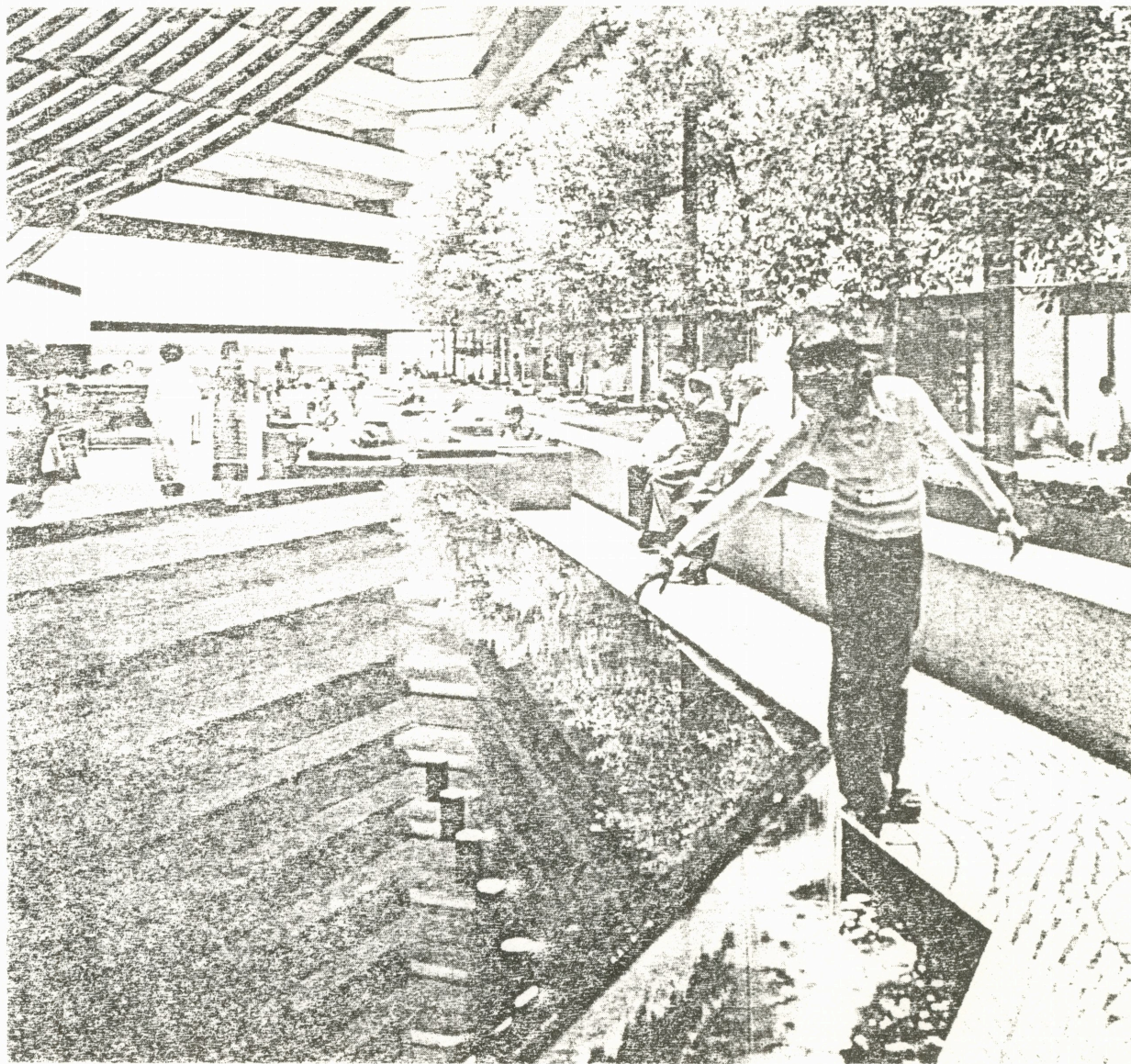
Sunlight is truly unique - constantly moving and changing, defining form and shape, creating patterns of shadows, and affording us with a sense of time and a feeling of the outdoors.

Materials

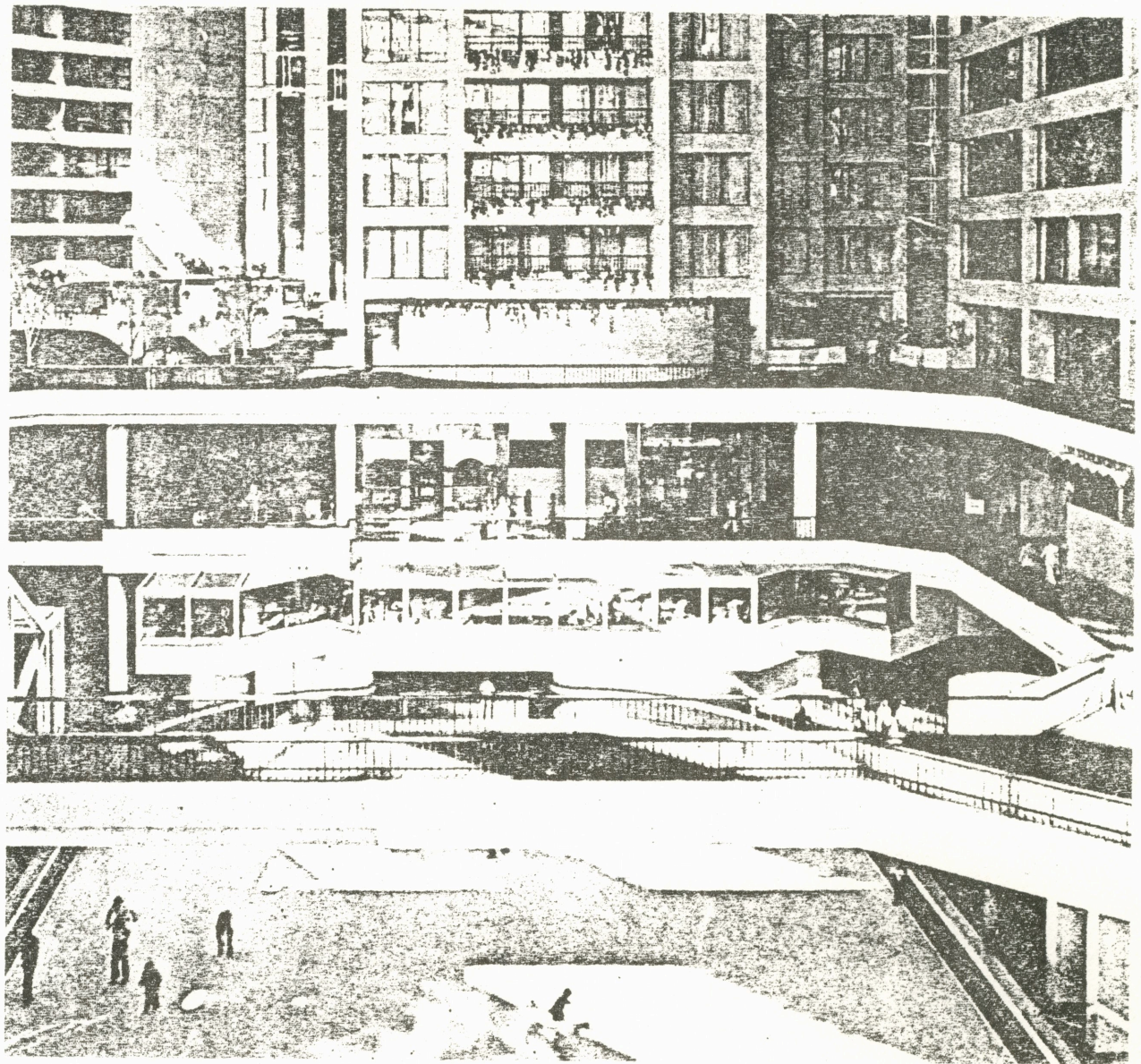
Materials give a space integrity and produce character. When we use materials which we commonly associate with the outdoors, such as stone or wood, their natural affinity transfers to our interior spaces.



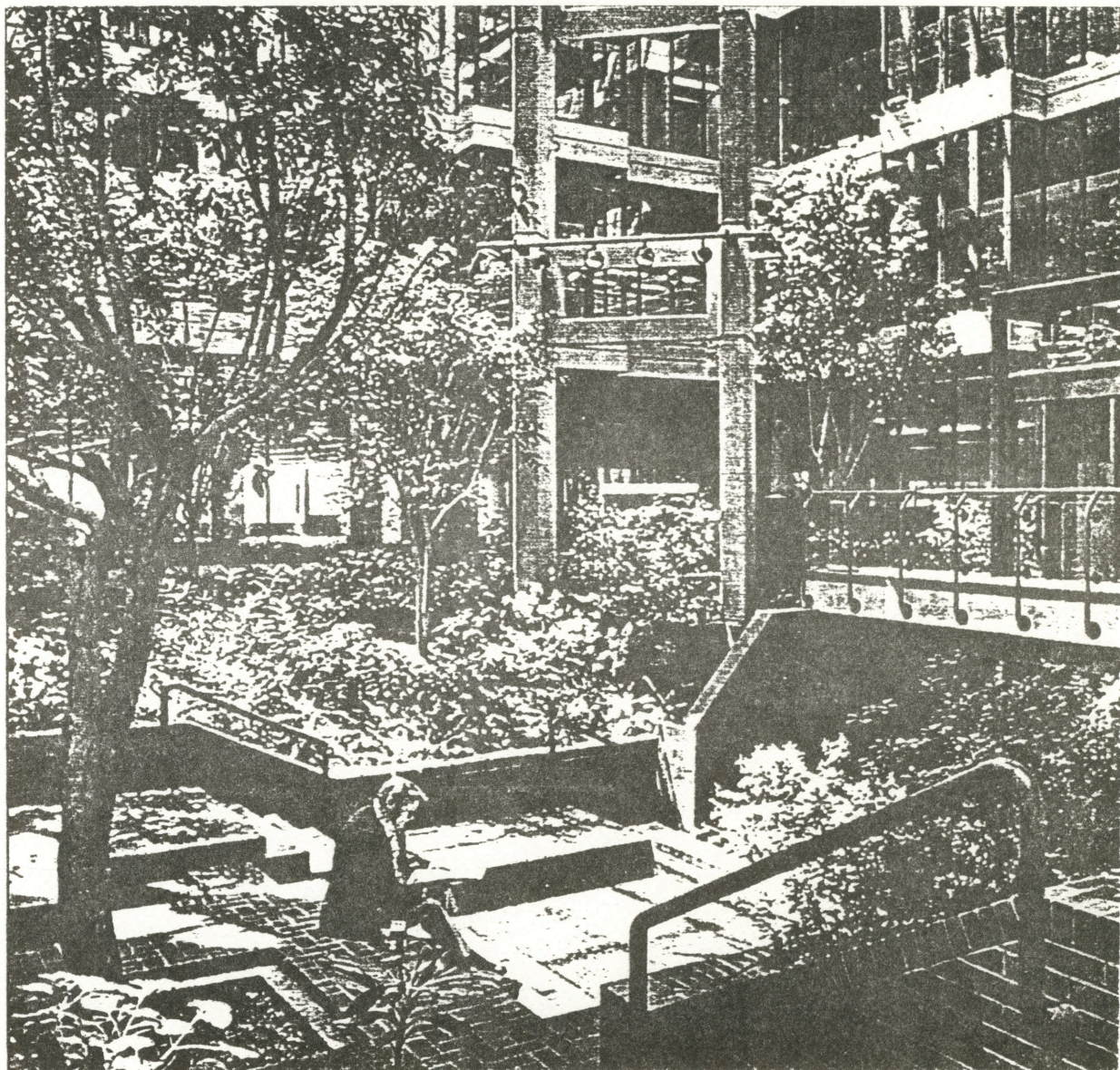
Hanging Plants - Hyatt Regency, Atlanta



Water Fountains - Hyatt Regency, San Francisco



Patterns of Natural Light - Omni International

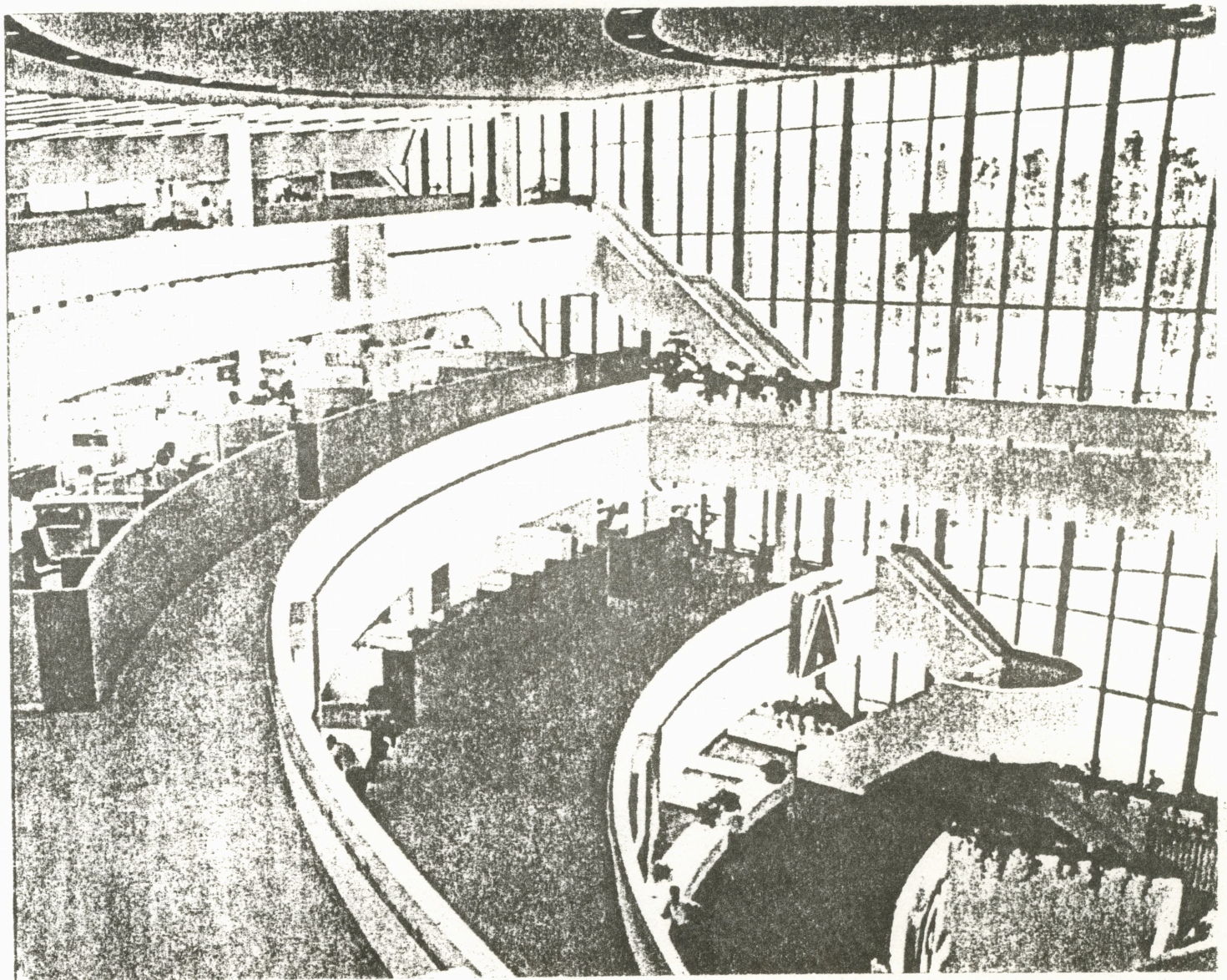


Texture and Materials - Atria North, Toronto

Kinetics

Kinetics deals with a visual emphasis of movement to expand human involvement.

Exposed circulation elements, such as stairways, bridges and elevators, serve to heighten the transitional experience for a user, and enhance visual interest for an observer.



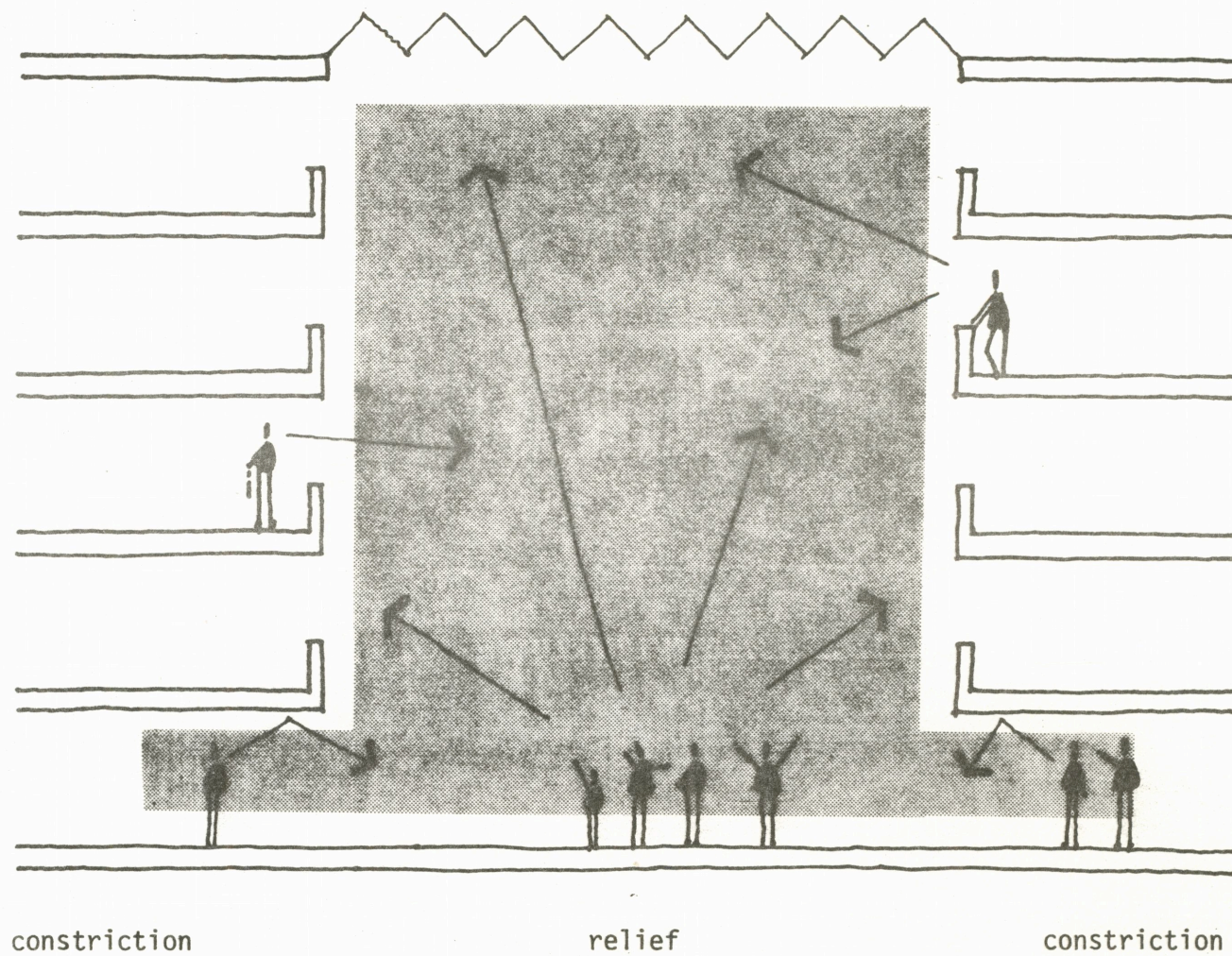
Exposed Circulation Elements - Scarborough Civic Centre

Scale

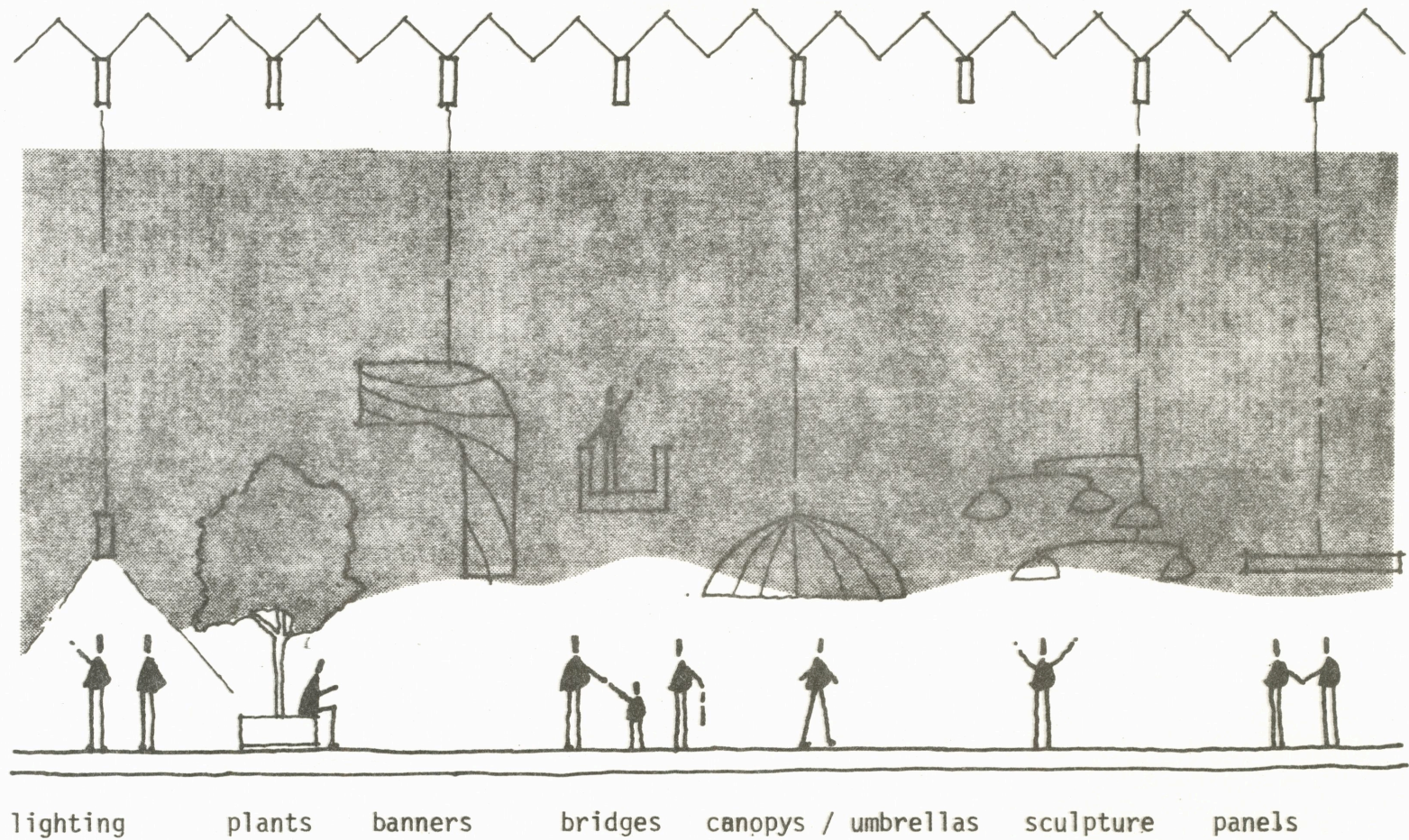
Control of scale in an atrium is a deciding factor in what ultimate effect it will achieve. This enormous volume of space can either provide a comfortable, welcome release from spacial confinement, or be distressing and utterly overwhelming.

Any device, which can moderate the impact or shock created by this type of spacial exposure, becomes a viable solution. Artificial lighting, trees, bridges, fabric hangings, and sculpture have all been used in the past, with great success. They tend to fill overhead volume and lower ceiling heights.

RELEASE FROM CONFINEMENT

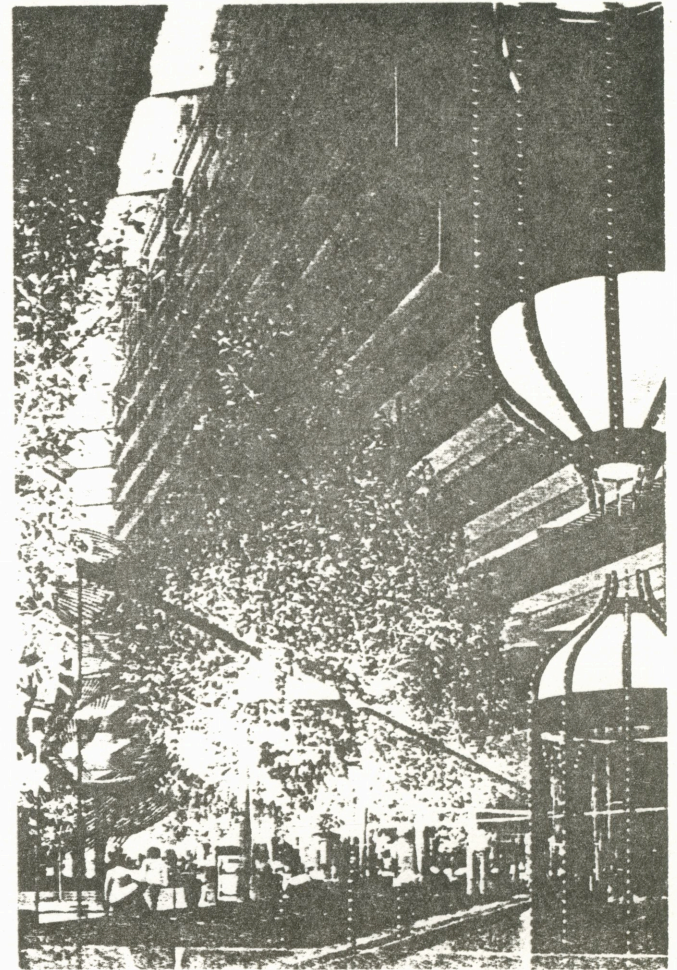


CONTROLLING SCALE



Artificial Light

Our complete control over artificial light, permit its use to define space and scale, emphasize movement and direction of movement, create atmosphere, and visually accentuate special features



Lighting - Hyatt Regency Hotel,
San Francisco

Colour

In an atrium, use of bright colours - in the form of banners, sculpture or finishing materials, add a sense of vitality that often, green plants alone, cannot seem to inspire. Colours provide visual interest and can clarify spacial use and circulation - an important quality in an atrium where no walls exist to define spacial boundaries.



Hanging Banners - Johns Manville Headquarters

Sound

Sound is both an asset and a serious problem in an atrium. It can create atmosphere, act as a background, or instill a sense of activity - but unwanted sound is disturbing and objectionable. Sound travel can be very difficult to control in an atrium, for its volume tends to resonate and amplify sound. Some control can be achieved through careful material selection (floor, wall and ceiling finishes), suspended sound absorptive materials (banners, canopies), and proper spatial (public-private) zoning; however, sound remains one of the atrium's worst problems.

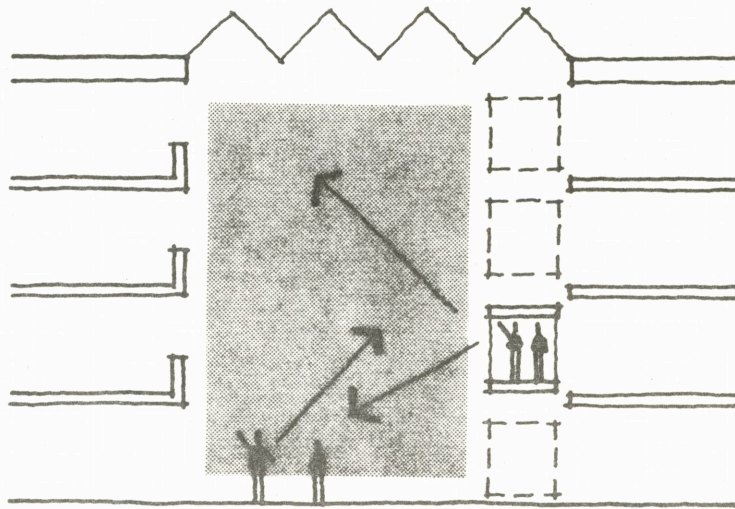
FUNCTIONAL CONTRIBUTIONS

An atrium has numerous design-related advantages which, from a functional viewpoint, can increase interior legibility of any building.

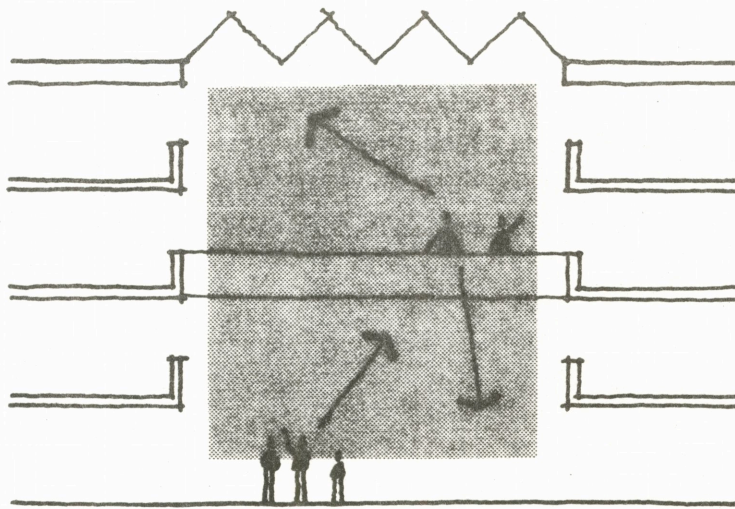
Circulation

Exposing circulation elements (stairways, elevators, corridors, etc.) within an atrium can reinforce our path of movement, allowing us to experience the space we are moving through, both in terms of where we are going and where we have been.

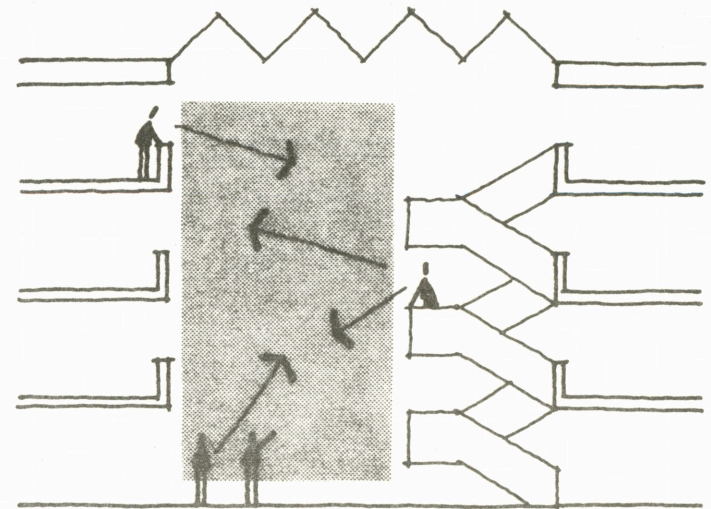
CIRCULATION



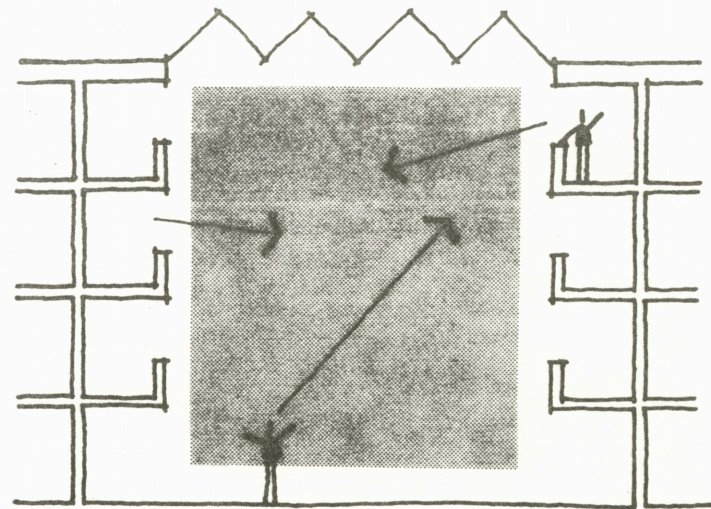
elevators



bridges



stairways



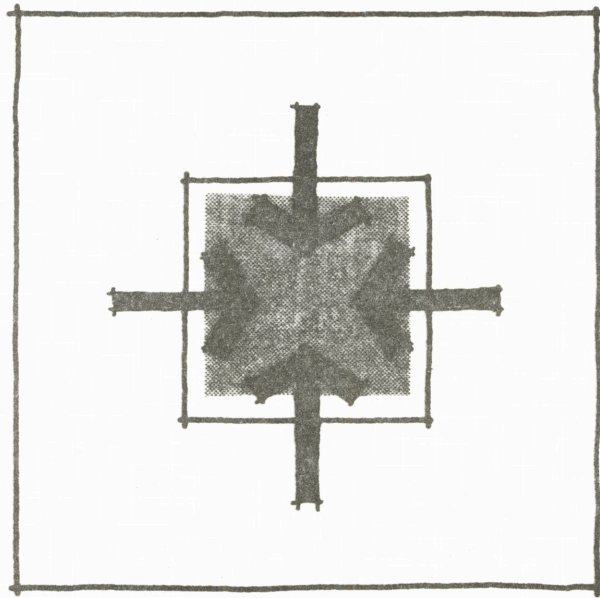
balcony corridors

Focus

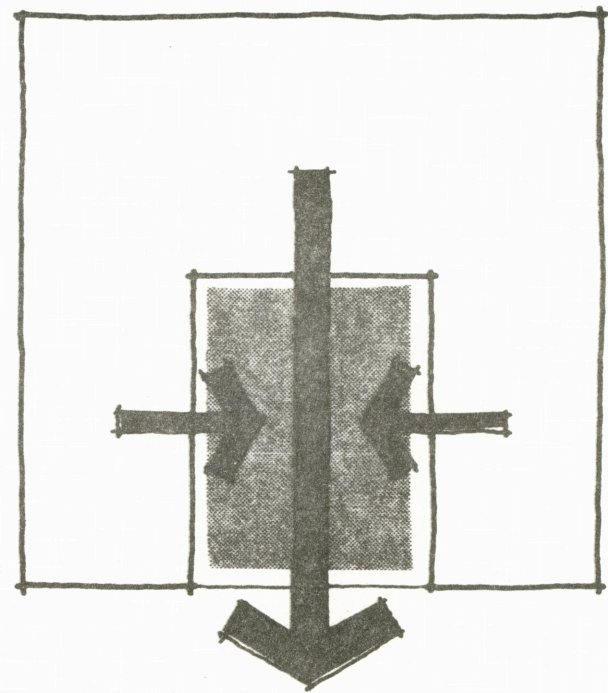
Often the surrounding environment is harsh, in the case of a cold northern climate or, in an urban setting, unsightly, with little or no view. By utilizing an atrium, the designer can shut out a brutal exterior environment, instead opening the building into a controlled interior, thus, creating a strong interior focus.

Opening one of the atrium's sides to the exterior creates a dominant outward focus or axis, in the direction of the opening, allowing the space to capitalize on a good view or significant feature beyond.

FOCUS



primary focus - interior

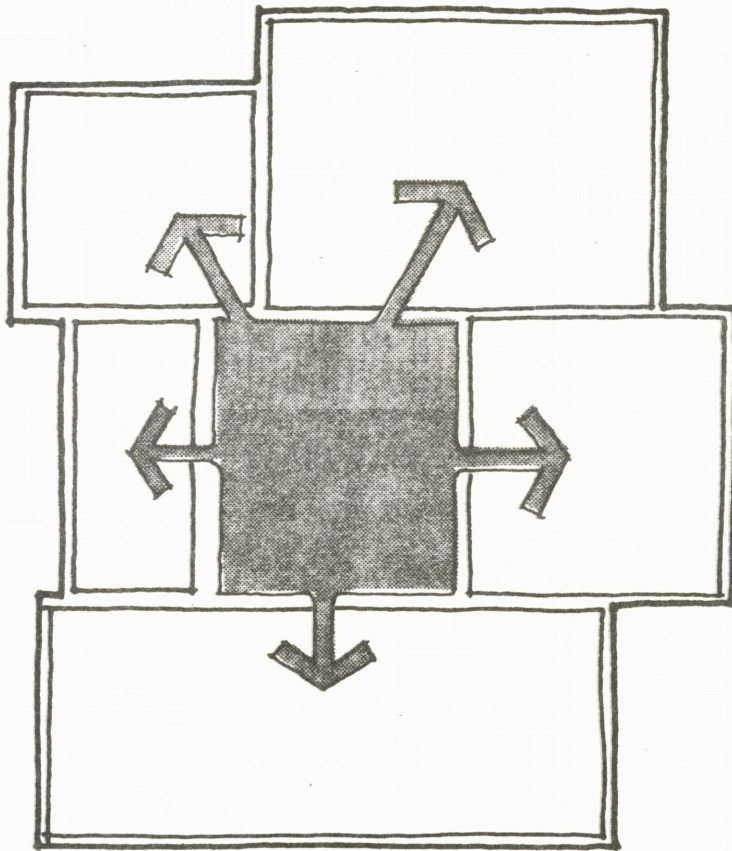


primary focus - exterior

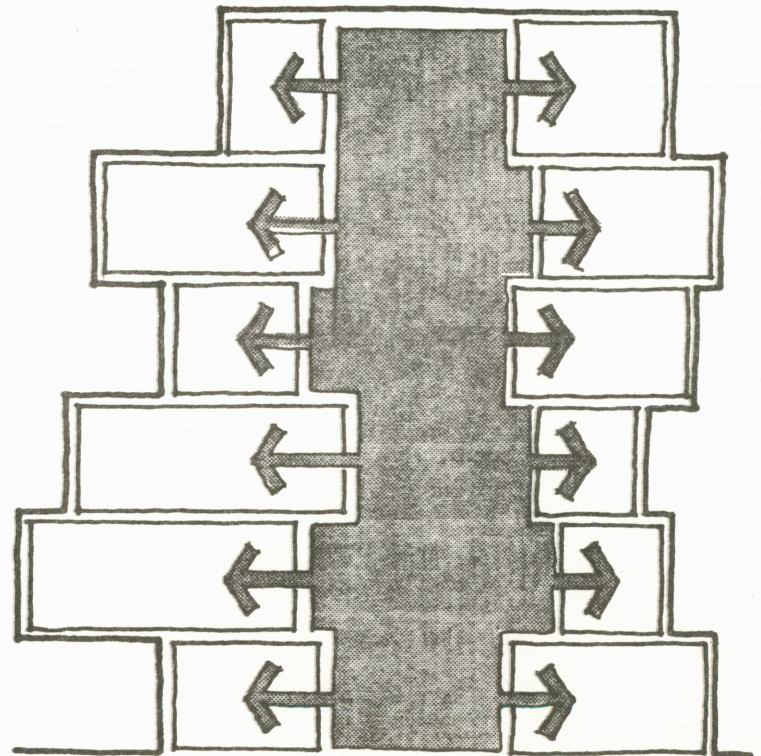
Spacial Unity

Mixed use or multi-purpose centres commonly present an architect with difficult problems of functional zoning, since quite often, many of these spaces are totally unrelated to each other. However, when organized around an atrium, all display a sense of functional unity, both horizontally and vertically. The atrium becomes a dominant central space common to all secondary functions which surround it.

SPACIAL UNITY



horizontal relationship

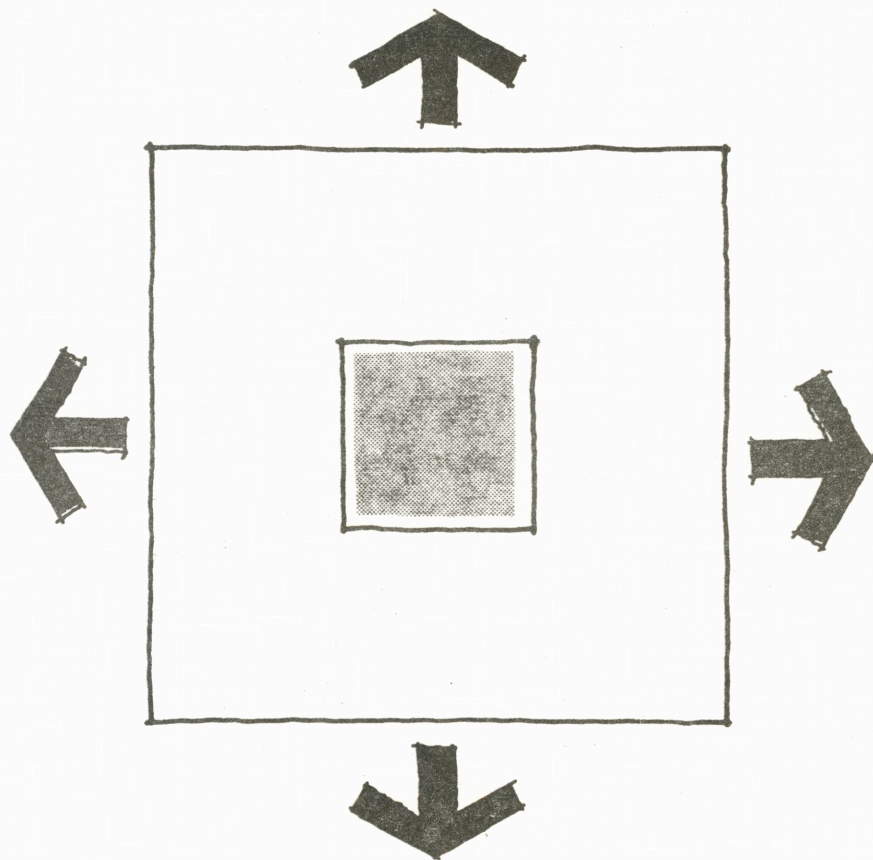


vertical relationship

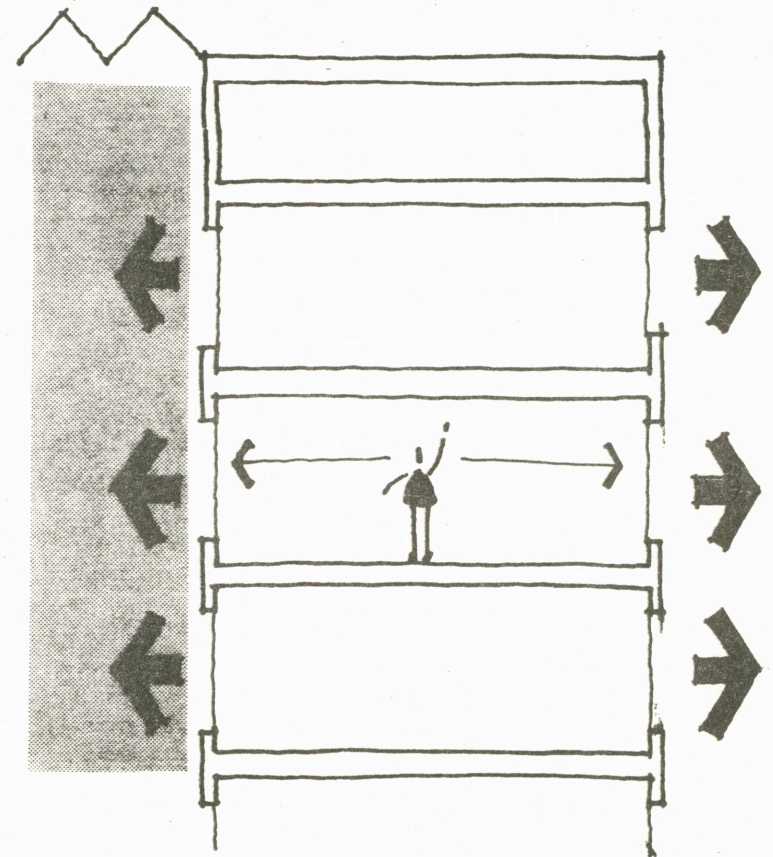
Flexibility of Form

The atrium reduces the architect's dependence on perimeter windows for light, enabling him to expand the building outwards in all directions, both horizontally and vertically. This can be a great asset in solving some of the problems which result from complex zoning or interspatial relationships that often incarcerate interior spaces from any form of natural illumination.

FLEXIBILITY OF FORM



horizontal expansion in all directions



Orientation Device

An atrium, being a commanding feature, can serve as a point of reference to determine ones location with the building. This aspect allows unfamiliar visitors to find their way about, with ease, particularly if circulation occurs in or around the atrium providing constant or periodic contact with this central space.

ENERGY CONSERVATION

For some time now, the atrium has been thought of as an energy waster, which in many cases, was true. However, research in the energy conservation field has found that an atrium can also be an efficient energy conserver. Like any architectural device, atria have certain principles or rules which should be understood, before an atrium can be successfully applied to a specific situation.

Atria work in both hot climates and cold climates. In a hot climate you want to maximize the surface area of the building envelope to dissipate heat, so the atrium should be an open-air space. In a cold climate you want a compact building form to reduce heat loss, so the atrium should be covered. The design load is affected by the amounts of sunshine, wind and degree days.

All three factors should be considered simultaneously. An atrium can be much more feasible in a cold climate having more degree days, but with more sunshine, available for passive solar gain, than in a warmer climate having less degree days, but receiving less sunshine.

Atria conserve two types of energy - light and heat.

Light

Often spaces deep within a building are too far from perimeter window walls to receive any natural light. An atrium acts as a light well, supplying these interior spaces with daylight, thereby reducing artificial lighting demand and electrical energy consumption.

Heat

The atrium conserves heat energy in several basic ways.

First - the atrium acts as a large insulating air space (a buffer space) minimizing the effects of the external environment on the internal occupied spaces. By reducing the temperature differential between these occupied spaces and the adjacent atrium space, heat loss is also reduced.

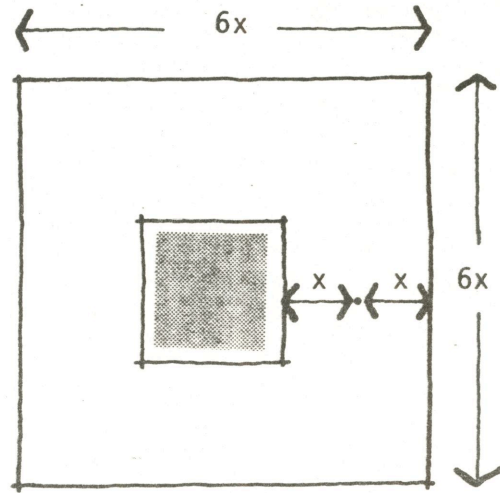
Second - the atrium building form provides a larger window area without significantly increasing the perimeter window wall area. A reduction of exterior wall area is also a reduction of heat transfer losses, which are highest for exterior facing perimeter wall areas.

The following diagram and chart, comparing three atrium building types with a conventional building type, illustrate this advantage of the atrium.

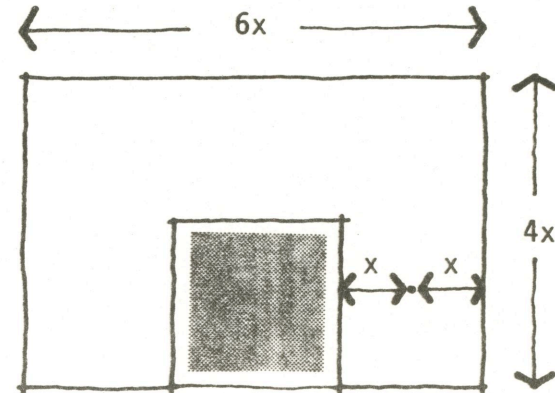
X is a fixed dimension taken to be the farthest acceptable distance from a window. The type 'A' atrium building has 2.57 times less perimeter wall area than the conventional type 'D' building, both with equal floor areas. However, the atrium type 'A', 'B' and 'C' buildings have larger building envelope areas (except when X is very small) because of their broader forms and the sizable area contributed to the envelope area by their roofs. A roof is generally easier and cheaper to install, and capable of higher insulation values than a perimeter window-wall, so there can, eventually, be a saving, when all factors are considered.

This study deals only with a type 'A' atrium building of one level. If additional storeys were added, the roof area would become smaller in proportion to the total perimeter wall area, eventually reducing the total envelope area below that of the conventional type 'D' building.

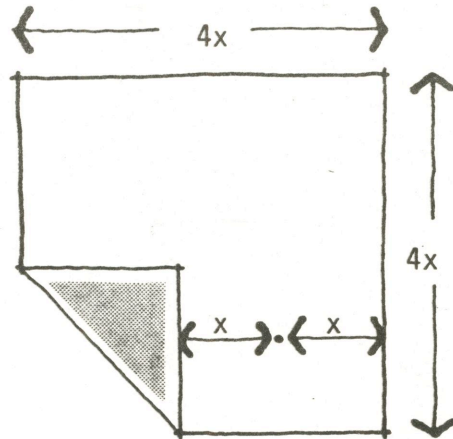
COMPARISON OF PERIMETER WALL AND ENVELOPE AREAS



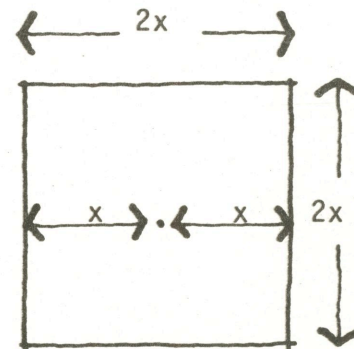
type 'A'



type 'B'



type 'C'



type 'D'

COMPARISON OF PERIMETER WALL AND ENVELOPE AREAS

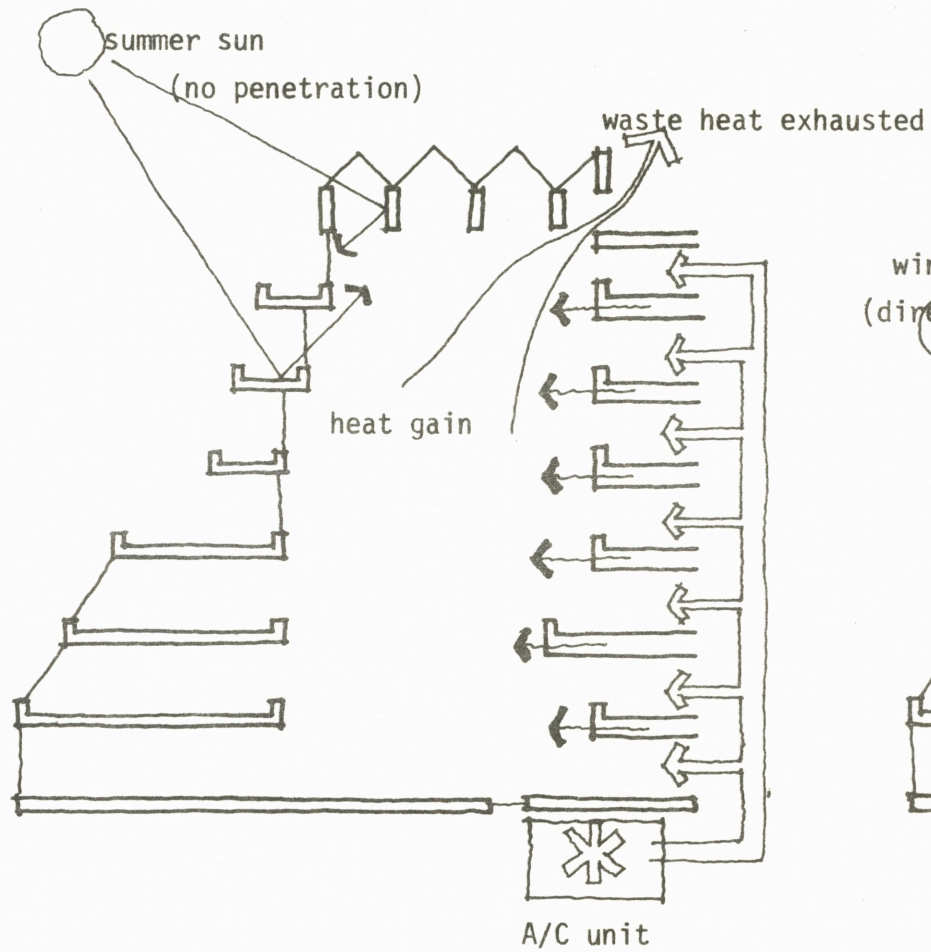
	TYPE 'A'	TYPE 'B'	TYPE 'C'	TYPE 'D'
PERIMETER	24x	20x	14.8x	8x
PERIMETER AREA @ 10' FLOOR TO FLOOR	240x	200x	14.8x	80x
AREA PER FLOOR	$32x^2$	$24x^2$	$14x^2$	$4x^2$
NO. OF FLOORS REQUIRED FOR EQUIVALENT AREAS	1	1.5	2.57	8
TOTAL PERIMETER AREA	240x	300x	380x	640x
MULTIPLYING FACTOR FOR EQUIVALENT TOTAL PERIMETER AREA	1	1.25	1.58	2.67
TOTAL AREA OF ENVELOPE (ADD ROOF AREA)	$32x^2 + 240x$	$24x^2 + 300x$	$14x^2 + 380x$	$4x^2 + 640x$
AREA OF ENVELOPE SMALLER THAN TYPE 'D' WHEN:	$x < 14.5'$	$x < 17'$	$x < 26'$	—

Third - an atrium can be designed to increase passive solar heat gain and use this heat gain to reduce mechanical heating requirements. This heat can be used directly, stored in a mass wall and given off later, or used to pretemper fresh air for a normal A/C system or heat pump. The following three diagrams illustrate systems, which utilize passive solar gain to reduce energy consumption.

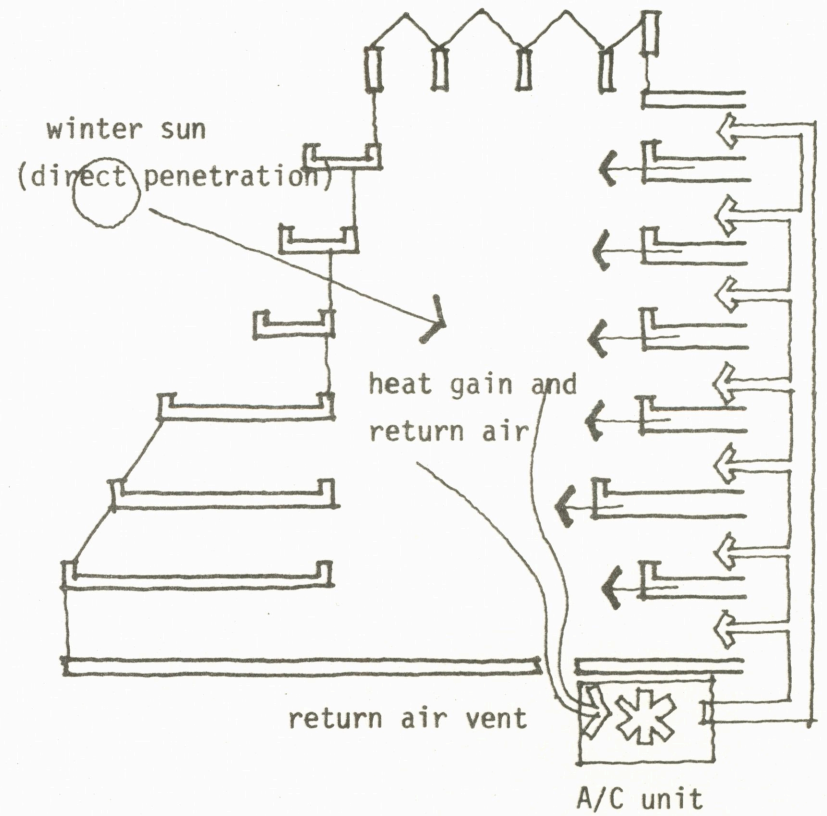
System A - Thomas Jefferson University Hospital

Playdecks on the atrium's glazed, south facing wall have been calibrated to sun angles allowing solar penetration, only by winter sun. Heat gain in the atrium is used to pretemper fresh air and pumped to exterior perimeter walls, in winter, where heat losses are highest. In summer any excess heat can be exhausted. The atrium also functions as a return air plenum, eliminating a substantial amount of duct work.

SYSTEM A



summer system



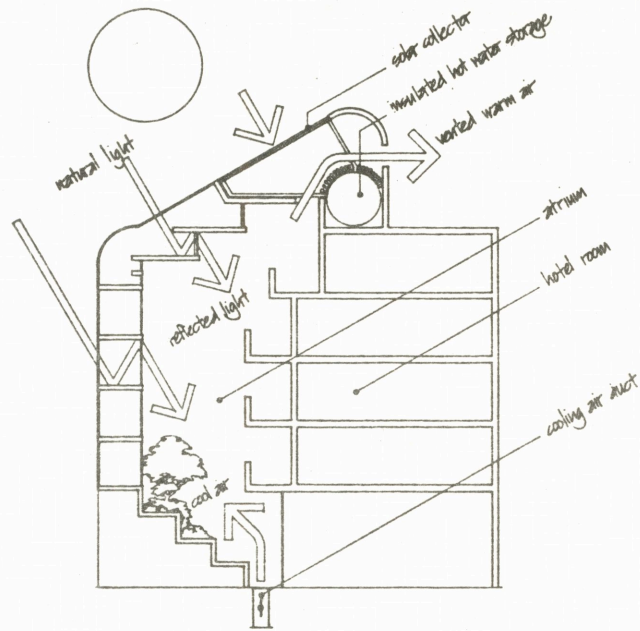
winter system

System B - Low Energy Complex, Regina

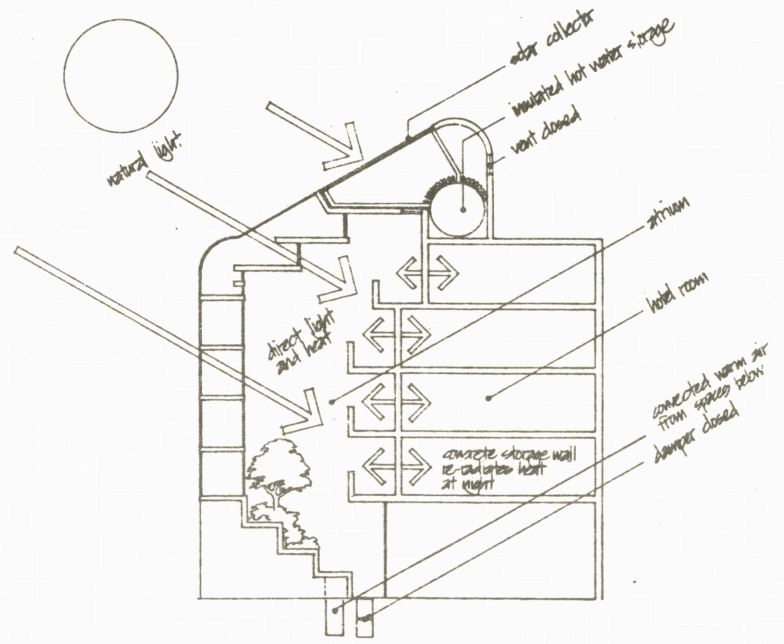
In this system, the atrium serves as a buffer space between occupied areas and the external environment minimizing temperature differential and, therefore, reducing heat loss. Shading devices allow penetration of winter sun only. The micro climate within the atrium is regulated totally by architectural control of sun and wind, while the macro climate of the occupied spaces is self contained and controlled by standard mechanical systems.

During winter, passive solar heat gain in the atrium, is absorbed by mass walls and re-radiated into the occupied spaces at night.

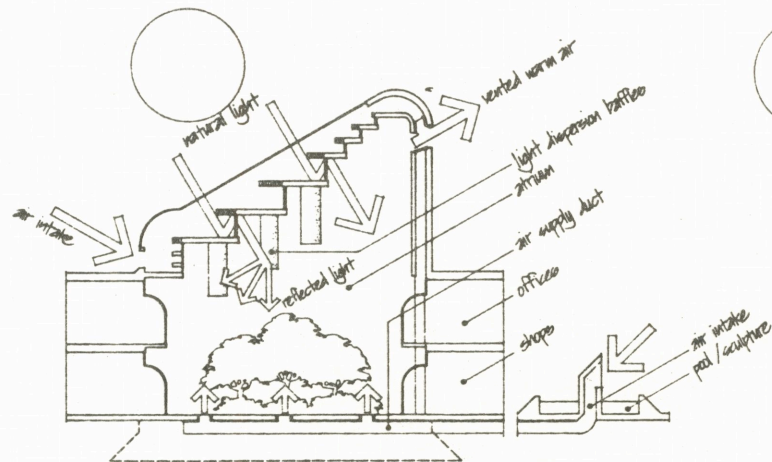
System B



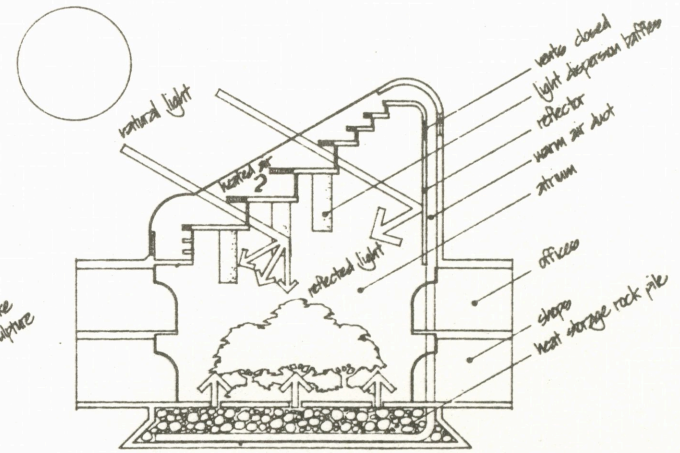
SUMMER-HOTEL



WINTER-HOTEL



SUMMER-OFFICES/SHOPS



WINTER-OFFICES/SHOPS

System C - The Envelope Concept

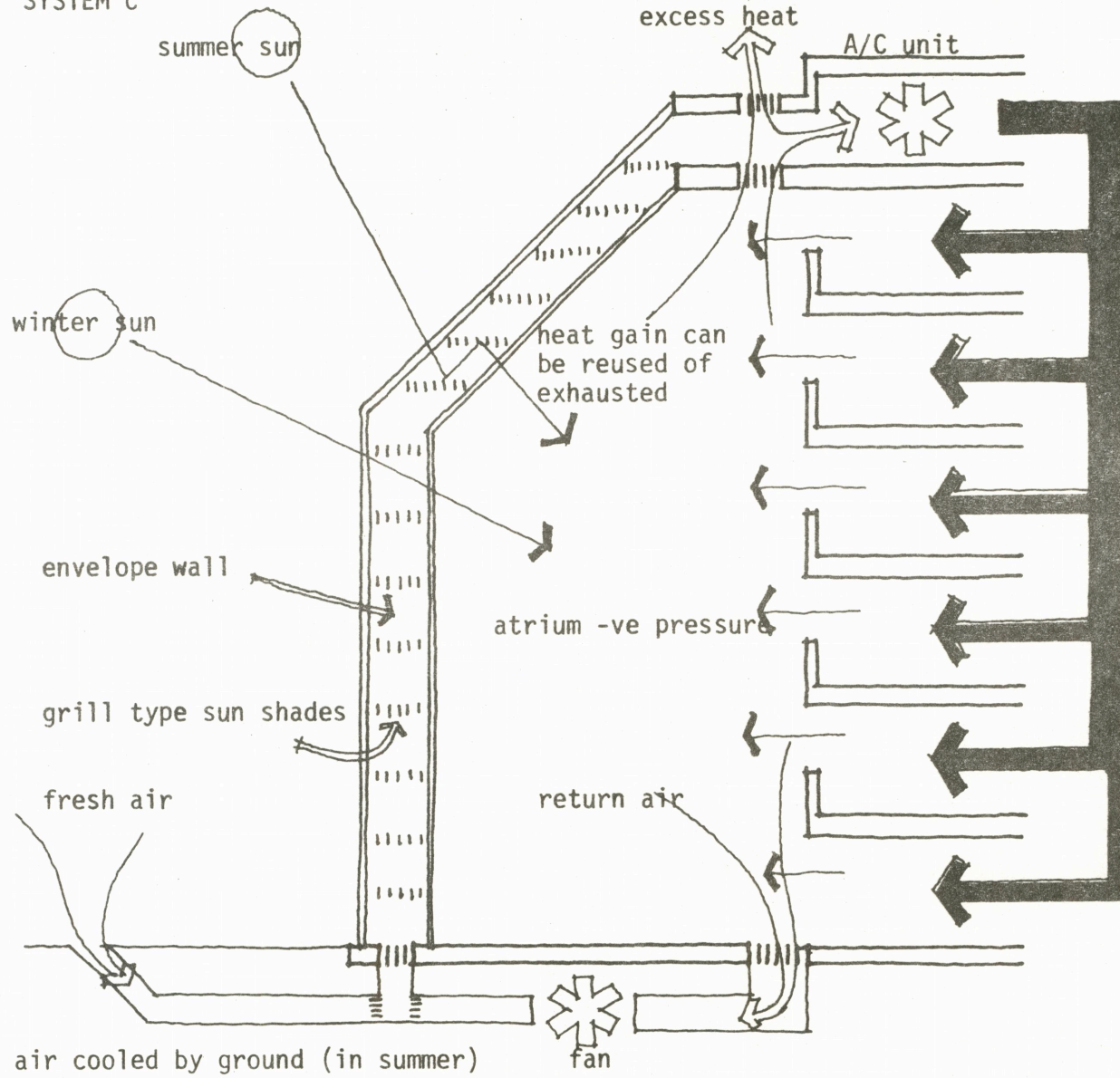
This system is one of my own invention and is basically an adaptation of the envelope concept of environmental controls.

The atrium's south facing wall is actually two individual glazed walls separated by an air space. This air space contains a constantly moving, insulating air stream. Grill or louver-type shading devices permit penetration of winter sun only. Air movement between these double walls occurs by natural convection.

In winter, heat is gained in both, this air space and the atrium. Through natural convection this heat rises to A/C units above where it can be used to pretemper fresh air added to the system. The atrium, the double wall, and the moving air stream all act as insulation, separating occupied areas from the exterior and minimizing heat loss. In summer, additional fresh air is drawn through an underground passage-way and cooled by the surrounding earth. This cool air rises between double walls, absorbing and removing heat gain to a point above, where it is exhausted.

The atrium also serves as a return air plenum, year round.

SYSTEM C



HEALTH ASPECTS

Atria possess numerous health advantages by virtue of their form and function.

Tendencies in past years were toward a tightly sealed building envelope, reducing infiltration of unconditioned outside air and heat losses of treated air - an energy conservation measure.

Also, recent government legislation has lowered ventilation standards, in terms of numbers of air changes, which various functions had normally required - a decision which attempts to reduce energy consumption by saving energy normally used to preheat fresh air, admitted with every air change.

These two trends, combined, have been traced to many health related problems by several studies recently completed - problems resulting from a constant recirculation of basically stale air which, even in a typical office environment, often contains toxins. Air fresheners, solvents, adhesives in building products, cleaning fluids, chemicals to prevent aging of paint and finishes, even copy machines - all are common to any office environment and all were found, in many cases, to produce harmful fumes. Concentrations of fumes or toxins

increase with every air change because reduced amounts of fresh air are being added to the system. Instead, air is merely reconditioned and recirculated. Headaches, upper respiratory infections and pulmonary disease are just some of the health problems traced to this increased concentration of common toxins.

A third growing trend, developing over the last 25 years, involves use of less daylighting and a dependence on manufactured or artificial light. A common component of many lighting systems has been the modular fluorescent tube. Recent studies of health values of narrow band fluorescent light have shown "they can lead to mental and physical stress, reductions in strength and motor skills, ... and have been linked to hyperactivity in children."¹²

So it seems our entire concept of environment control is backfiring. The enclosed office atmosphere, originally designed to increase productivity by reducing external influences is, in fact, reducing productivity through sensory deprivation and health related problems.

Atria can reduce, or even eliminate, many of these problems. An atrium generally contains a large volume of air. Increased volume reduces concentration. Obviously, this only presents a temporary solution, for eventually all air within the building envelope will

reach the same level of concentration, but the period of time for this to occur can be considerably longer. If the volume of air, which the atrium contains, is of sufficient size, this concentration may not be reached during times of heavy occupancy (office hours), giving the A/C system a chance "to catch up" in periods of lower occupancy (at night) when less toxins are being produced through lower use.

A more obvious solution to this problem is to introduce more fresh air into the building, first preheating it in the atrium through passive solar gain, thereby offsetting energy costs normally accrued to pre-tempering fresh air.

Atrium spaces, which often abound with vegetation, also present a partial solution. Plants are known to absorb many toxins harmful to man while producing oxygen.

The atrium, as a light well, allows natural light to penetrate portions of a building not able to receive natural light from perimeter windows - particularly in building types with large floor areas, reducing dependence and use of fluorescent lighting.

Aside from these solutions, the atrium as a humanizing aspect of our built environment, can reduce sensory deprivation and other related psychological problems which often result in physical illness.

ECONOMIC CONSIDERATIONS

Aside from possible energy savings discussed earlier, the atrium can be economically attractive in several other ways, which add to its feasibility.

Sales Features

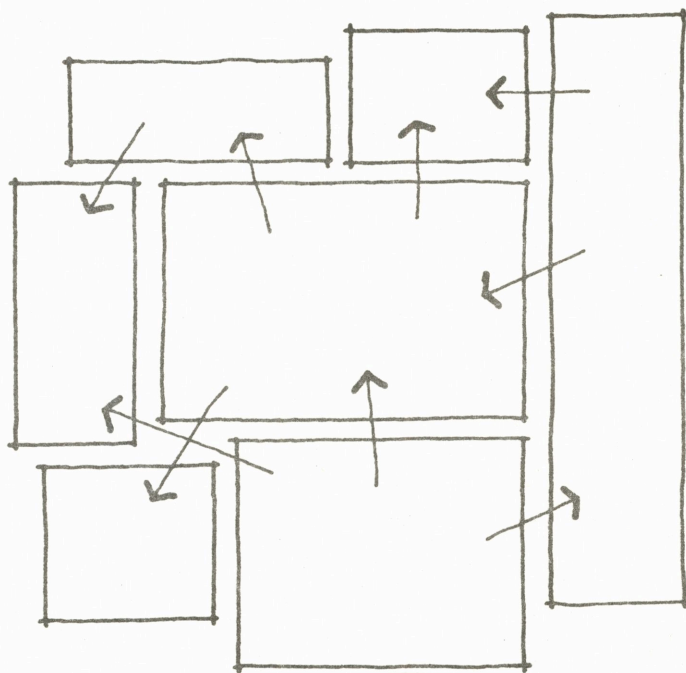
In architecture of today, atria have been used most extensively, as selling features. Speculative buildings, financed and constructed by both architects and developers, which contained an atrium or two, rent out in record time. Architect/developer, John Portman's Hyatt Regency in Atlanta has operated at 85% occupancy since opening in 1967. High occupancies are also boasted by the many atrium hotels which followed Portman's Hyatt. The economic prosperity attained through constant high occupancy is a factor which alone, can offset an atrium's initially higher cost, or even a higher operating cost, if its design was not energy conscious.

Shared Space

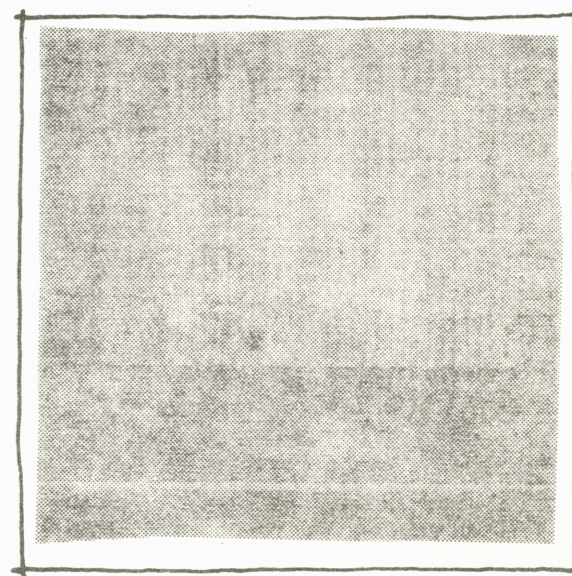
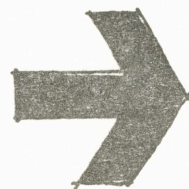
The principle of shared space is, yet another means used by many, to justify the atrium's feasibility. An atrium should not be thought

of as one separate and distinct space, but rather as a collection of the areas and volumes of several spaces. In Portman's hotels, his atria function as main hotel lobbys, front desk reception areas, waiting areas, circulation spaces, bars, restaurants, and elevator lobbys. Extra square footage is really not being built, although more internal volume is enclosed - and is reflected in a marginal increase of the building's perimeter wall area. Instead an absence of walls and ceilings normally required to enclose a space, result in a saving of construction and material costs.

SHARED SPACE PRINCIPLE



volumes and areas of a group of related spaces



combined into one space

Reduction of Perimeter Wall Area

As shown by a study appearing earlier, in the energy conservation section, an atrium-type building has a significantly smaller perimeter wall area than a conventional-type building when both contain equal floor areas. Perimeter walls, often are the most expensive portion of construction and material costs, and any area reduction is an obvious cost saving. However, the atrium's cost effective qualities drop, when additional walls open to the exterior or with complex forms requiring sloped glazing or specialized systems of lateral bracing.

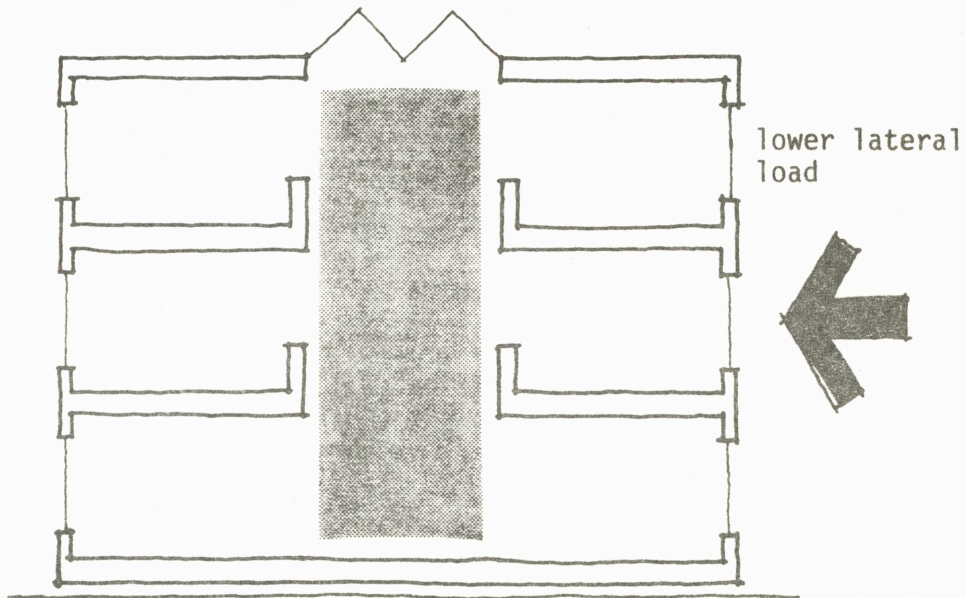
Structural Efficiency

An atrium-type building is generally lower and broader than a conventional type building of equal floor area.

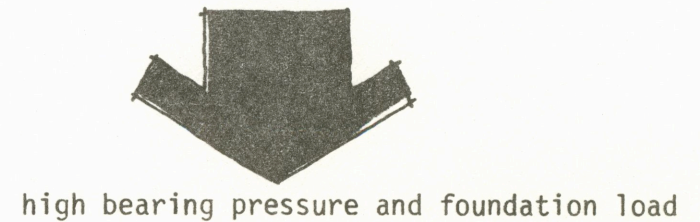
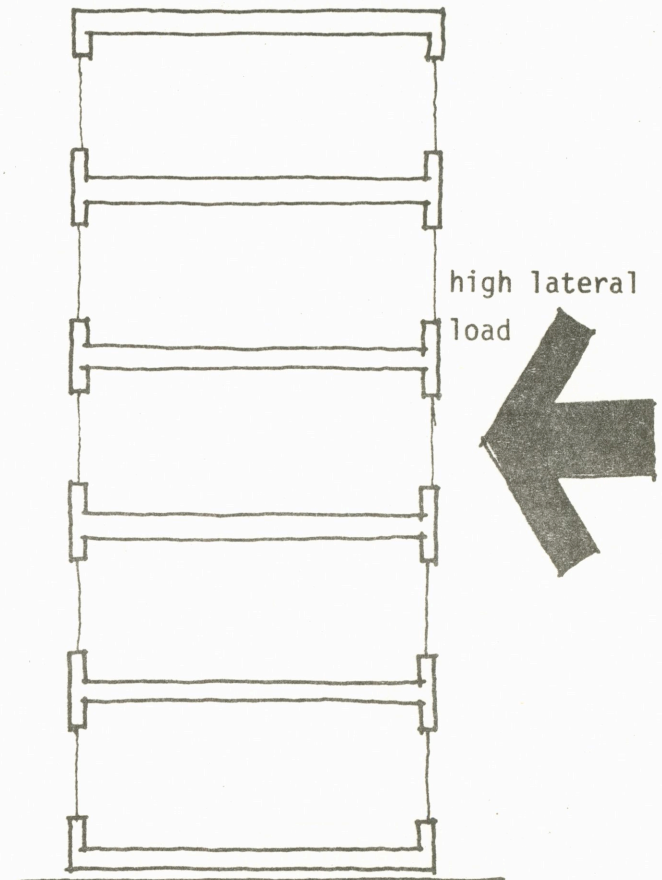
A broader building has its weight spread over a larger area, thereby lowering bearing pressure. This can be a welcome advantage if soil conditions present foundation problems. However, there are increased construction costs, resulting from a greater number of foundations to be built.

A lower building has lower lateral loads which can result in smaller structural members and faster erection time.

STRUCTURAL EFFICIENCY



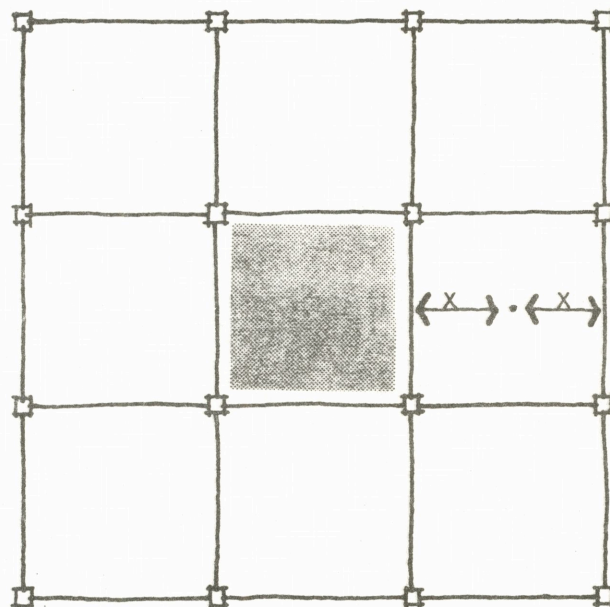
Atrium Building



Conventional Building

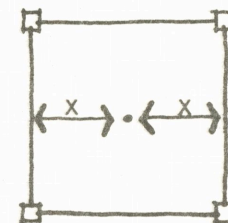
The atrium-type building also has fewer structural members than a conventional-type building of equal floor area. The diagram on the following page clearly illustrates this statement in a comparison of the two building types with equivalent gross floor areas. Once again 'x', being a maximum desired distance from a window wall, is introduced for the purpose of maintaining some constant which will allow a comparison to be made.

FEWER STRUCTURAL MEMBERS



Atrium - Type Building

- 1 level
- 16 columns
- 18 beams



Conventional - type Building

- 8 levels
- 32 columns
- 32 beams

BUILDING CODES

A significant disadvantage of atria arise from exiting and fire protection problems.

Neither open stairways, bridges nor exposed elevators can be used in a fire situation. Additional fire rated stairways, elevators and corridors must be provided at extra expense.

The atrium provides a potential avenue for the spread of fire and smoke, acting as a natural flue. Building codes normally require a one hour fire separation between floor areas; however, in many types of atria, this can be impossible to achieve. The following points illustrate some of the individual, alternate means of fire protection. Combinations of these points could form an acceptable fire protection system.

- . enclose surrounding spaces to obtain one hour separation (defeats purpose of atrium).
- . an extensive automatic sprinkler system to limit the spread of fire and smoke, with additional perimeter sprinkler heads capable of creating a wall of water spray, thus limiting travel of smoke into other areas from the atrium.
- . oversizing of exit stairways and corridors to allow simultaneous exiting of entire floor occupancies.

. an exhaust fan system to quickly clear smoke from the atrium,
reducing smoke damage or inhalation on other levels.

The above points are only some basic suggestions, since a total system
of fire protection would depend upon atrium size, configuration,
circulation, occupancy and building type, and surrounding site conditions.

CONCLUSION

The atrium is not in any way a complete solution, but rather a means to achieve an end - a device with numerous advantages available to the architect. Through proper application in an appropriate manner, neither its humanizing influences nor other qualities, need be acquired at an additional expense or sacrifice of some other area of design.

The atrium is yet a relatively new concept, lacking development, with several disadvantages, which possess only weak solutions. But the atrium's monumentality of space urges creativity, and in time these problems will be resolved, for the positive aspects of atria are far too significant to overlook.

A STUDY OF CONVENTION CENTRES

2

HISTORICAL EVOLUTION

The early history of the convention centre is one that is shared by several other building types, all of which are the products of specialization from a similar origin. Convention centres, arenas, coliseums, stadiums, concert halls, auditoriums and theatres all share their evolution to a certain degree. All are public assembly spaces.

The origin of these assembly spaces date back to early Rome. One of the first assembly spaces was Rome's Circus Maximus (329 B.C.), an open air structure seating more than 150,000 spectators who came to watch the chariot races or gladiator battles. Later, around 72 A.D. and also developed in Rome, was the amphitheatre. Much smaller than its predecessor, it seated fewer spectators but gave all a better view.

In Greece during this time, but on a higher cultural level, was the development of small outdoor theatres specifically intended for drama.

With the evolution of need, growth of populations, and advances in building technology, covered structures began to appear, which could shelter spectators from inclement weather, extending a facility's

usability. In America probably the first public assembly space was the log cabin, which, on many occasions served as a meetingplace for several neighboring farms. The 17th and 18th centuries saw the development of a larger more centrally located facility--the meeting house. Concert halls, theatres, town halls and opera houses are all direct descendants of the early meeting house and are the result of specialization to meet specific requirements of a particular function. The town hall, however, underwent further evolution in concept. In small communities it was a multipurpose city auditorium serving many functions. In large cities with greater economic means, several facilities could be built each being more refined and single-purposed, such as New York's Carnegie Hall.

During the 1930s a staggering number of small public assembly facilities were built as a result of government funding. Many of these facilities carried the term "multipurpose" to an extreme, thus serving all functions poorly. Arenas were typically the kind of facility most small towns relied upon to house their sports events, conventions, dances and banquets.

With the end of the war in the late 1940s came a boom in arena and stadium construction which continued through the 50s and 60s, with

each successive facility becoming more specialized, stretching technical limits with increased size and seating capacities.

Also during the 50s and 60s came the introduction of the specialized convention centre, a descendant of the town hall and city auditorium. These structures which now housed complete display, meeting, and banquet facilities, were competing for a share of the post-war industrial boom. They provided a community with the opportunity of achieving economic growth and stability on a local level by attracting trades, industry and hopefully, thereby creating jobs and prosperity within their municipality. The convention centre became a symbol of local pride serving the general public as well as the private business sectors of the economy.

Today's modern convention centres are merely more sophisticated versions of their predecessors of the 50s and 60s. New materials, design concepts and technical advances in structures have led to larger, more luxurious facilities with greater amenities including in some cases, on-site accommodations or recreation facilities--extras used to attract a clientele in a very competitive market. Their original functions and purpose, however, remain unchanged.

ROLE

One of the most important considerations in the design of any convention centre is the specific role a centre must play within the fabric of its community, town or city. Obviously, if a need did exist for such a facility, then there must be some basis for that need, from which we may be able to discern its role. If this initial approach to be taken is clear, then further study and eventual planning and design of the actual facility becomes much easier.

The events and attractions encouraged by a convention centre can stimulate public interest in their city providing a sense of local pride and a feeling of progress.

The facility should be considered an important resource, encouraging business interest through trade shows and conventions, and providing entertainment for the general public with events such as consumer shows. As well, the centre's meeting space can serve local groups and organizations.

By its location, a convention centre can spark economic growth and encourage surrounding development. If sited in an older urban area, new development will take the form of civic improvement or on a

larger scale, urban renewal, with the centre as its focus. If sited in a newer area, more suburban in nature, possibly even on the outskirts of the city, the centre can become an anchor for all surrounding development.

In both cases the architecture of the centre is an equally important factor. It can initiate a new image for surrounding development to follow or perhaps, with the older urban site, reinforce an image which should be preserved.

A well designed facility should bring regional, national, or possibly international recognition, creating a stronger identity for a community, town or city on a very large scale. With this recognition would come obvious economic and marketing benefits.

ECONOMIC IMPACT

A convention centre will generate several types of economic activity. The most evident is money spent by convention delegates or trade show exhibitors. The following chart illustrates the percentage distribution of a convention dollar.

	%
hotel room and incidentals	37.66
hotel restaurants	15.99
other restaurants	16.18
beverages	6.01
retail stores (not food)	10.28
local transportation, sight-seeing, theatres	3.82
night clubs, sports events	3.51
automobile service	1.75
other items	4.80
	100.00

Source: International Association of Convention and Visitors Bureaus, 1978.

A fact of additional value to consider is where the money being spent originates. Since this capital was brought in from outside the immediate area it has increased the capital within this area. When the "multiplier effect" is considered this increase in capital becomes very significant. "The multiplier is said to be the estimated number of times a given dollar will 'turn over' before it leaves the area in which it was first spent."¹³ This multiplier or ratio varies from 3 to as high as 7 with 3 being the most commonly accepted ratio. A first round spending of 10 million dollars will increase to 30 million in generated capital, within the area the centre serves.

Additional spending among local residents for admission to attractions or rental of meeting space also contributes to the local economy.

Another economic impact, although not occurring with any great frequency except under ideal conditions, is the attraction of job and revenue producing new business or industry. Trade shows or conventions encourage business interest in the area, affording out of town businesses or manufacturers an opportunity to test local market potential. If a market exists of sufficient size the business could decide to relocate or possibly open a branch office or plant.

PLANNING CONSIDERATIONS

FACILITY INVENTORY

The first step in the planning process requires a determination of which facilities are actually required. This is done by first studying the following three areas: (1) existing facilities; (2) current demands; and (3) future requirements. A synthesis of the above three studies should enable a decision to be made as to which facilities are truly necessary and should be built at this time. From further detailed study of these spaces in the design programming stage, seating capacities, number of rooms, room dimensions and square footage can be determined.

FEASIBILITY AND MARKETABILITY

With a firm grasp of what facilities are to be built further study is now necessary concerning the centre's feasibility and marketability. The following are some of the considerations which should be examined at this time.

1. geographic location
 - relationship to other major cities
 - severity of climate
 - natural attractions (mountains, lakes, etc.)
2. accessibility
 - relationship to major transportation routes
 - transportation schedules--frequency of rail, bus, jet service
3. population
 - is the population base of sufficient size to support the centre?
 - is the population base increasing or decreasing?
4. economy
 - current and projected future condition of the economy within the centre's regional area of influence

FUNCTIONAL AND OPERATIONAL DESIGN

During both programming and design phases careful attention should be given to the functional aspects and operational procedures of the centre.

From a functional view the building plan should reflect an affinity to certain important spatial relationships. For example, if the exhibition hall is the space of primary importance in the centre, then its location in plan and relationship to other critical spaces such as the public lobby/entrance should reflect this significance. The basis for these functional concerns is not just one of efficient spatial planning but also involves the building's internal legibility.

A building such as a convention centre will have many visitors who are completely unfamiliar with the facility. This is particularly true for conventions or trade shows where a great portion of the delegates or exhibitors are from out of town. It is, therefore, extremely important that circulation (vertical and horizontal), access and egress, spatial class (public, semi-public, private), and location of public support facilities (washrooms, phones, etc.) are fairly obvious to all users of the facility.

Operational considerations primarily involve daily functioning of the facility. Good operational planning can not only lower the cost of the completed facility, but decrease staffing requirements, thus reducing overhead. Some of these savings involve the following points.

1. careful planning and location of access and egress to simplify security and admission control procedures
2. clear internal organization of individual spaces, their furnishings and equipment to simplify use and maintenance
3. efficiency of the building's receiving and distribution system
4. convenient location of maintenance, and custodial spaces and equipment as well as an efficient refuse disposal system

SITE SELECTION AND ANALYSIS

Perhaps the most critical decision to be made in the entire project involves the selection of a suitable site--a decision which could ultimately decide either the success or failure of the facility.

Locations generally fall into two categories: the urban site and the suburban site, with the primary advantages of the latter being greater available areas for both the buildings and parking. However, these two factors, although seemingly very significant, are not enough to warrant the selection of a suburban site over one of an urban nature.

The role which the centre will play, as previously discussed, is an equally important factor. If the centre is to be used as a catalyst for the rejuvenation of a downtown area then its location should obviously be an urban one. If, however, the facility being planned is more community-oriented, then the centre's location should make it accessible to its potential users.

Generally convention centres have been located on urban sites, as the support facilities they require are usually not available near sites of a suburban nature.

The following is a list of factors to analyze before selecting a site, portions of which have been directly extracted from Jewel's book, entitled *Public Assembly Facilities*.

1. Accessibility

- streets and highways--ingress and egress
 - roads linking the facility must be capable of absorbing impact traffic loads
 - certain routes should be capable of handling receiving traffic (heavy trucks and transports) and either be approved truck routes or possible truck routes
- transit access
 - with urban sites where parking is often in critically short supply, many users will arrive by mass transit
 - current and projected energy shortages will lead to increasing numbers of users arriving by mass transit
- pedestrian access
 - convention oriented facilities usually entail that most delegates will be arriving on foot from nearby hotels
 - urban sites generally result in large numbers of users, particularly in the case of the general public, arriving on

foot from parkades or parking lots in the vicinity.

2. Parking

- on site capabilities
 - preferred, but typically in the case of an urban site, unattainable in any significant number
- off site capabilities
 - convenient access essential with locations ideally not more than a 5 minute walk to the facility

3. Support Services

- proximity to hotels, motels and restaurants
 - proximity to retail stores
 - proximity to entertainment and recreational attractions
- These factors are typically more critical for a suburban site.

4. Site Adaptability, Availability and Cost

- site size
- possibility of acquisition of land
- site preparation
- utilities

- site cost
- possibility of future expansion

These factors are of greater concern with an urban site where site area is often limited, land acquisition usually difficult, land costs very high and area for future expansion severely restricted.

CASE STUDY

WINNIPEG CONVENTION CENTRE - Winnipeg, Manitoba, Canada

The centre was designed by the consortium of Number Ten Architectural Group and the Libling Michener Architectural Group, and completed in 1976.

The building site is completely flat and consists of an entire city block within Winnipeg's downtown core. Major east-west and north-south vehicular routes are only two blocks north and three blocks east, respectively. It is on a bus route and has good access to several large hotels, downtown retail and entertainment facilities and additional surrounding parkades. The site is contained on all four sides by secondary traffic routes and the building's plan is rectangular in shape closely following these strict confines. The building form is rectangular and very box-like.

Basically, the centre is comprised of six levels--3 levels of parking below grade for about 600 cars, and 3 levels of facilities above grade. At ground level the main entrance, lobby, and passenger

drop off zone all occur on the south side of the site with smaller, secondary entrance/lobby spaces at the north-east and north-west corners of the building. Virtually all of the east and west sides of the centre on all levels have been devoted to vehicular ramps for service/receiving as well as access to the parkade. The entire north side of the building at ground level consists of a service lane and truck docks for kitchen receiving.

Principle facilities provided include a 33,000 square foot banquet hall divisible into meeting rooms, 6700 square feet of additional meeting rooms, a 7000 square foot cinema, 47,000 square feet of rental space and a 70,000 square foot exhibition hall.

The rental space and concourse which occupy nearly all of the second level, were included to increase the centre's economic feasibility.

The most unusual feature of the centre's design is the third floor location of the exhibition hall and truck docks. Truck ramps travel up the east and west sides of the building for nearly its entire length. The architects chose this location for the building's major space for a number of reasons. First, it was possible that the depth and size

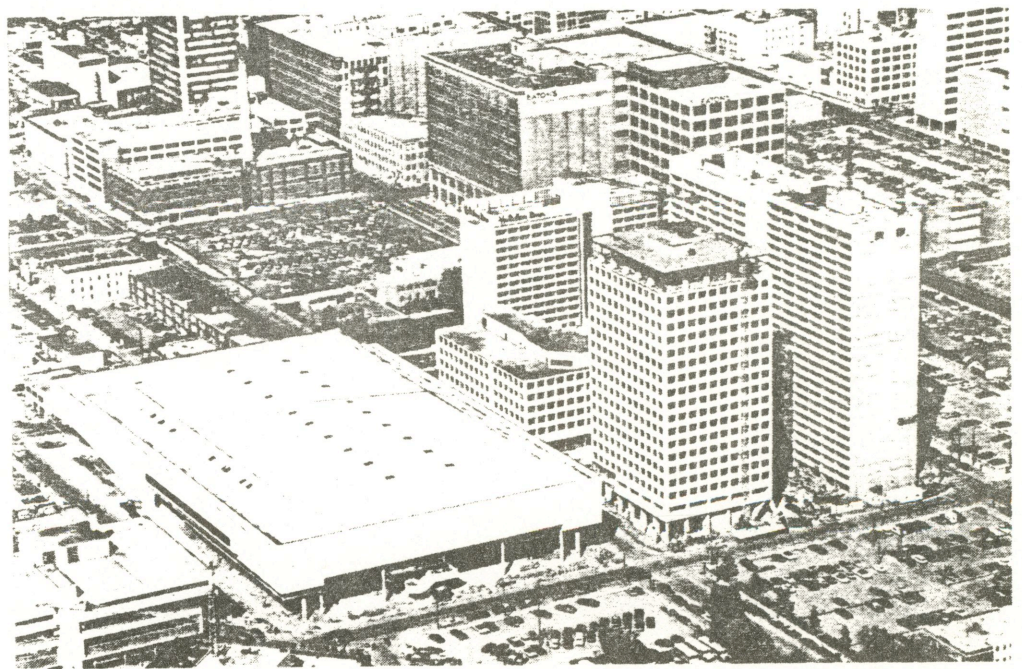
of structure required to clear span the exhibition hall could be reduced since it has no floor loading from above. This lowers structural costs. Second, it was felt that the ground floor did not contain sufficient area for the exhibit hall, loading docks, a main lobby space, and a passenger drop off zone without reducing the area of the exhibit hall below an economically feasible size.

The design concept for the centre has a number of distinct disadvantages. Due to the tight constraints of the site and the exhibit hall's third floor location there is absolutely no possibility of expansion. The only expansion space of any kind would involve conversion of the rental space on the second level. The exhibit hall's third floor location has also caused some awkward circulation problems resulting in a seemingly extravagant amount of space which it occupies.

Truck ramps from grade to the exhibit hall completely control the east and west elevations limiting the possibilities for internal organization of spaces which require or could use natural light. This only places a greater demand on artificial light.

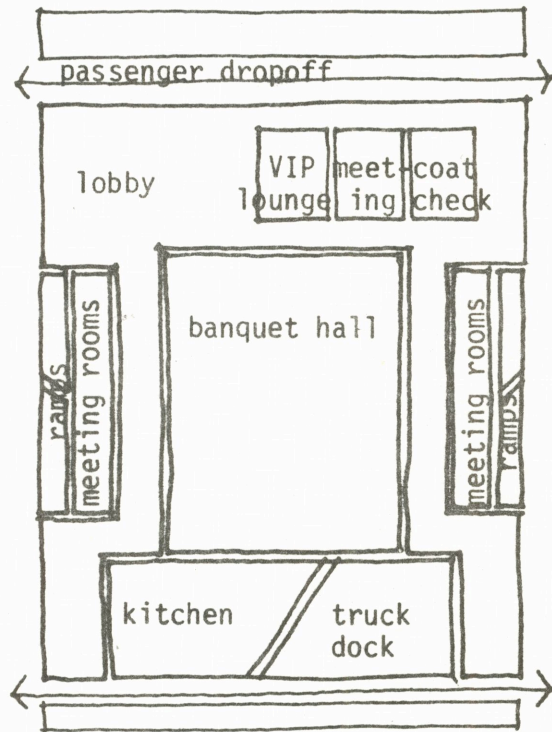
In conclusion it would seem that the architects have probably arrived at the best possibly solution for their site, but it certainly

appears that this particular site was not the best one which could have been chosen within Winnipeg's downtown core. It places severe limitations on the design and future expansion of the centre.

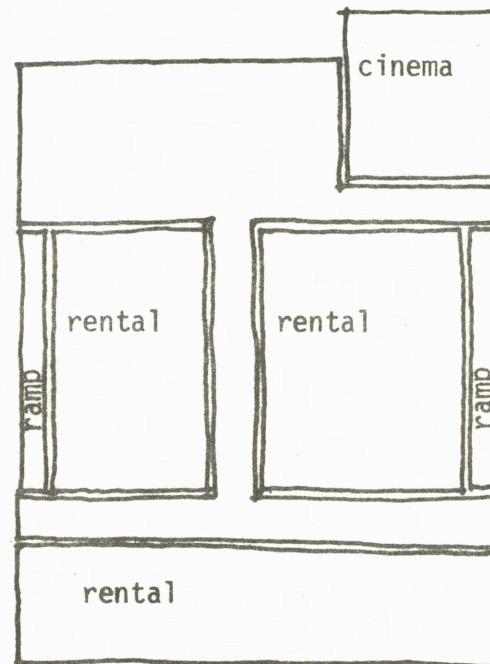


Winnipeg Convention Centre - Aerial View

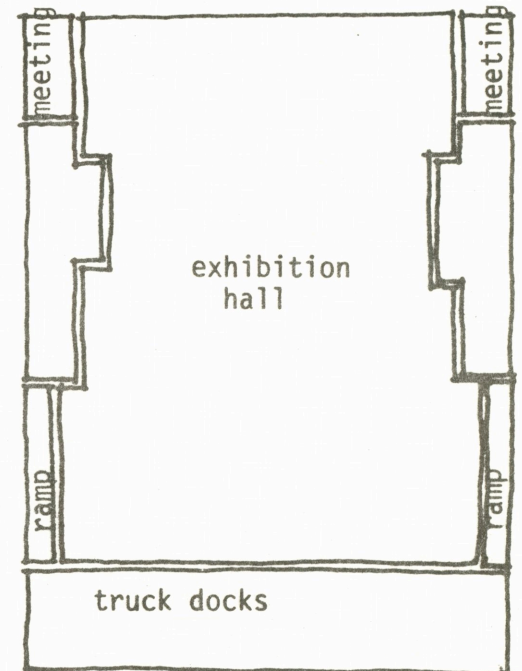
SCHEMATIC PLANS



Ground Floor



Second Floor



Third Floor

EDMONTON
CONVENTION
CENTRE

3

BACKGROUND

The city of Edmonton is located in central Alberta, Canada, approximately 350 miles from the Canada-United States border and 180 miles from the city of Calgary, the province's other major population centre. The terrain in and around the city is essentially flat with the exception of the North Saskatchewan River Valley. It meanders through the city, generally, in an east-west direction and, in effect, divides the city into two parts - north and south.

Edmonton's downtown core is centrally located within the city on the northern edge of the North Saskatchewan River Valley.

The city's climate is quite harsh with hot summers, cold winters, and temperatures of 75-85°F in summer and as low as -20 to -35°F in winter. Precipitation is moderate year round with an annual average of 12.8 inches.

During the past two decades Edmonton has experienced a tremendous economic boom initiated by several major oil discoveries in its immediate vicinity. Over the last decade alone, the city has had an extremely large population growth from approximately 450,000 in 1970 to nearly 700,000 in 1979. Naturally with this economic boom came

a construction boom that still continues, hastily trying to build facilities for its expanding population.

With this relatively new economic prosperity, Edmonton has attracted a great deal of interest from the industrial, commercial and financial centres in eastern Canada who are now rapidly relocating within the city.

Due to this shift in economic importance from east to west, Edmonton faces an urgent need for some form of trade and convention centre with large meeting and banquet facilities which cannot presently be provided by any of the numerous hotels within the downtown core. A facility of this nature would be an asset to the city's continuing growth, giving industry, finance and commerce a centre in which to meet or exhibit, testing Edmonton's market potential.

But there is also a need to sew this centre firmly into the city fabric. Some means to make it uniquely Edmonton's own, responding to the city's more personal needs and cultural heritage. This resulted in a concept to combine a cultural centre with a trade and convention centre, found not only to be a new and exciting idea, but also feasible from an economic point of view.

In 1974 a Citizen's Advisory Committee was appointed to study this concept and report, not only on its economic feasibility, but select a site and establish basic planning principles to guide the design of the cultural and convention centre.

Site Selection

The committee reviewed six sites, all within the immediate downtown core area. The sites were identified as:

1. The City Site
2. The Marlboro Site
3. Grierson Hill Site
4. Edmonton Labour Site
5. C. N. Site
6. Eaton Warehouse Site

The following criteria were considered in the analysis of each of the above mentioned sites:

1. Transportation
 - a) rapid transit
 - b) buses
 - c) roadways

- d) parking
- e) pedways
- 2. Proximity to major hotels
- 3. Acquisition possibilities
- 4. Area of site
- 5. Aesthetic appeal

Primarily due to location, sites 4, 5, and 6 were rejected. Their analysis rated the desirability of the remaining three sites as being:

- # 1: Grierson Hill Site
- # 2: The City Site
- # 3: The Marlboro Site

The following is a direct extract from the committee's report outlining their final reasoning and decision of site selection:

"The Grierson Hill Site presents some very exciting development possibilities for a cultural and convention complex. Its physical characteristics are such that a structure can be designed to take advantage of the slope and thus gain considerable developable area, while at the same time displace a minimum of present commercially usable land. The consequent effect on the civic tax revenue is obvious.

"Sites 1 and 2 are potentially ready for commercial redevelopment. The majority of Site 1 is owned by a leading Edmonton developer and a proposed new office tower is slated for Site 2. There would be an estimated \$600,000 per year tax revenue from these two sites if they were developed to their highest and best

use. There is no likelihood of this type of revenue from commercial development of the Grierson Hill site. In addition, the land acquisition of site two is expected to be particularly difficult, and both sites 1 and 2 present problems of relocation, particularly with the Chinese community along 97 Street.

"The configuration of the Grierson site is such that its potential for commercial redevelopment is limited. It is a very narrow site and bank instability problems will likely make high density development confined solely to the present contours relatively unsound. The Planning Department is further concerned that private redevelopment proposals might be expected to incorporate tall east-west slab orientations, which would create an additional problem - that of blocking a substantial amount of southerly exposure, creating a dark canyon like effect. These factors, coupled with a relatively great number of private owners, make it reasonably unlikely that the land will be redeveloped in the near future.

"Yet the site is ripe for development. Many of the buildings are very old and in less than well maintained condition. Some of the space is vacant as is some of the land itself. While the character of the surrounding area is presently such that the appearance of the buildings may not be out of place, any redevelopment on the north side of Jasper Avenue will certainly render this site an eyesore. The view from the river valley is certainly not at all enhancing.

"In short, civic redevelopment of this site may be the only possibly alternative.

"The site is in close proximity to all major hotels and neither pedway nor rapid transit connections should pose a great problem.

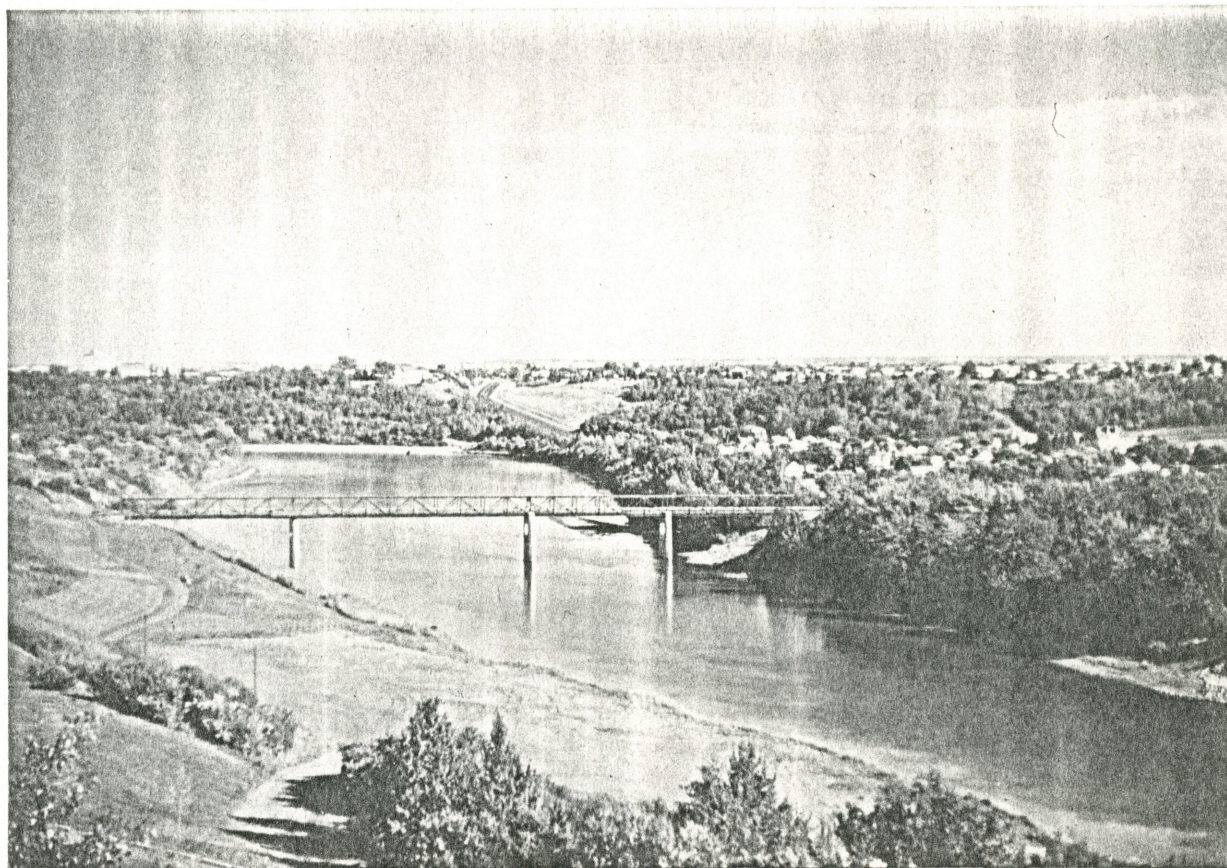
"Certain questions of feasibility were raised by the Administration, mainly concerning a proposed connection of 97 Street to the river valley. However, because of the severity of grades encountered in such a connection the Engineering and Transportation Department does not recommend this connection be made, now or in the future.

"There is a known problem with bank instability in the area of Grierson Hill. However, experienced soil consultants, upon review

of presently available information, see no reason why the site could not be developed as intended. Certain special designs and precautions will undoubtedly be required, and these can be identified and overall feasibility confirmed at a minimal cost.

"Present City policy prohibits development of buildings below a certain contour into the river valley. The Committee recognizes that the development of this site may violate the policy per se, but we feel it should not violate the intent of the policy. We foresee a terraced structure flowing down the bank, featuring open concourses and providing access to a park development below. We expect the total project to include a park extending from the lower level of the complex south down the bank to the river. The complex will provide a tremendous aesthetic improvement to the face of the bank, replacing a steep, ungrassed, debris-covered incline, with a pleasing mixture of glass, masonry and greenery. The observer will be able to look out from the building over the beautiful river valley to the park across - the site of the new Muttart Conservatory.

"It is the view of the Committee that the development of a cultural and convention centre will provide a unique opportunity for redevelopment of the Grierson Hill Site. It is our firm recommendation that the Administration begin immediately to acquire and consolidate this site."¹⁴



River Valley view from top of site

proposed site



Jasper Avenue (looking east toward site)

Planning Guidelines

Working with the Grierson Hill site in mind, the committee established several planning principles to guide the design of the centre. The following is a direct extract from the committee's report outlining these principles.

"The structure should provide minimum obstruction to the view of the river valley from Jasper Avenue and the City Centre. If possible, it should 'open up' the river valley to downtown Edmonton.

Located at the intersection at the proposed 'Queen's Walkway' (connecting Sir Winston Churchill Square with the river valley), the proposed 'Heritage Walk' (joining the Queen's Walkway to the Provincial Legislative building area), and the 'Capital City Park' system, the Cultural and Convention Centre provides an opportunity to create a focus for the connection of these features of the City plan, and a logical access point.

The City requires a Convention facility to serve groups from 800 to 3,500 delegates, complete with exhibition and ancillary facilities.

Many of the City's ethnic groups require a facility to provide accommodation to encourage the formation of organizations capable of sustaining their cultural heritage. Presently organized groups that have inadequate facilities require accommodation to meet and carry on their group activities. Larger groups that are not only organized but have substantial physical facilities in the community wish to support a central facility in which their culture will be represented to the community as a whole.

Convention facilities have been programmed to meet the requirements of any local, regional, national or international convention. Though these facilities have been programmed with the primary intent of accommodating conventions in excess of 800 delegates, the flexible, multi-purpose nature of the facilities will make them capable of accommodating trade exhibition, various entertainment performances, large or small assemblies, meetings and social functions of any kind.

Major conventions are scheduled as far in advance as ten years, the majority several years in advance, and never less than a year in advance. Therefore, any time unscheduled space one year in the future is available it can be scheduled for other than convention activities. Conventions which fully occupy the facility will occupy a minor portion of the annual convention centre schedule.

The Cultural Heritage groups will use the Centre

1. As a meeting place which can be accommodated in the various meeting rooms that will be available when not in use for conventions. Their activities are usually complementary to the convention use as conventioners use them during the day and Cultural Heritage groups require meeting rooms in the evenings. Also, convention activities will seldom use all meeting facilities at once.
2. As a display, both static and dynamic, to illustrate to conventioners and citizens alike the ethnic backgrounds and interests of the peoples of Edmonton. An effort then must be made to identify these activities and provision made so they can happen with a minimum of difficulty. A central area is programmed to accommodate basic office functions and storage for basic operating necessities.

Visual Arts facilities will consist of a central location of operation from which to display throughout the Centre. It is intended that the public spaces and meeting rooms serve as galleries

for display of local art and crafts. As these articles are subject to theft and vandalism, provision must be made for their security.

Canada's Aviation Hall of Fame is to be accommodated. This space will consist of display gallery, a director's office, and a small preparation room.

All the programmed spaces are to serve a multitude of functions consequently they must have a built-in flexibility. This flexibility must include room shape and size, audio visual potention, lighting and mechanical."¹⁵

DESIGN DEVELOPMENT

PROGRAM

In 1976 the architectural firm of B. James Wensley Architects Ltd. was commissioned to work with the Citizens Advisory Committee. Based upon committee recommendations, the firm has written a complete but lengthy design program for the Convention Centre. It includes area breakdowns of any facilities as well as requirements for finishes, ceiling heights, lighting facilities and storage, to mention a few.

For the purpose of this thesis, I have abbreviated many portions of this program and supplemented others with interspatial relationship diagrams not originally included. The program is as follows.

Area Summary

A. Exhibition Hall	64,500 FT ²
B. Banquet Hall	43,450
C. Meeting Rooms	38,700
D. Aviation Hall of Fame	20,250
E. Central Administration	12,200
F. Food Service	18,100
G. Support	34,800
H. Ancilliary and General Use	43,750
Total	274,750 FT ²

Area Breakdown

A. Exhibition Hall and Related Areas	50,000 FT ²
1. exhibit hall	400
2. wall panel storage	600
3. exhibitor storage	5,000
4. equipment storage	400
5. show manager's office	1,500
6. electrical storage	2,000
7. rest rooms	1,600
8. concession stands/storage	

9. security office and holding	300
10. operations room	400
11. coat check	300
Total	63,500 FT ²
B. Banquet Hall and Related Areas	
1. banquet hall	35,000 FT ²
2. wall panel storage	400
3. equipment storage	3,500
4. permanent storage	600
5. projection/translation	400
6. lighting control	200
7. rest rooms	2,000
8. coat room	300
9. stage	450
10. dressing/change rooms	600
Total	43,450 FT ²
C. Meeting Rooms	
1. 1 x 10,000 FT ² (2 x 5,000 FT ²)	10,000 FT ²
2. equipment storage (for 1.)	400

3. projection (for 1.)	200
4. wall panel storage (for 1.)	200
5. sound and light control (for 1.)	100
6. 1 x 10,000 FT ² (4 x 2,500 FT ²)	10,000
7. equipment storage (for 6.)	400
8. projection (for 6.)	200
9. wall panel storage (for 6.)	200
10. experimental theatre	5,000
11. 1 x 4,000 FT ² (2 x 2,000 FT ²)	4,000
12. 2 x 2,000 FT ² (4 x 1,000 FT ²)	4,000
13. 2 x 1,000 FT ² (4 x 500 FT ²)	2,000
14. 5 x 400 FT ²	2,000
Total	38,700 FT ²

D. Aviation Hall of Fame

1. exhibit hall	17,500 FT ²
2. director's office	200
3. secretary/reception	150
4. workshop	1,000
5. theatre	1,000

6. storage	400
Total	20,250 FT ²
E. Central Administration	
1. building manager	400 FT ²
2. operations manager	300
3. conference	700
4. director of marketing/sales	350
5. general office	2,000
6. reception/waiting	400
7. comptroller/accounting	1,700
8. reception/waiting (for 7.)	300
9. staff washrooms	1,000
10. office storage	500
11. food/beverage manager	250
12. convention bureau offices	1,000
13. V.I.P. lounge	1,500
14. show manger's office	300
15. conference (for 14.)	250
16. reception (for 14.)	250

17. press room	1,000
Total	12,200 FT ²
F. Food Service	
1. production kitchen	6,200 FT ²
2. serving	3,000
3. storage	2,500
4. waste	400
5. dishwash	2,100
6. staff washrooms/lockers	1,000
7. administrator's office	500
8. mobile bars	400
9. fast food mobiles	500
10. cafeteria	1,500
Total	18,100 FT ²
G. Support	
1. loading docks	7,200 FT ²
2. dock office	100
3. general storage	1,800
4. trash docks	2,000

5. trash container storage	400
6. maintenance/custodial	2,000
7. carpentry shop	600
8. housekeeping storage	600
9. mechanical/electrical	18,000
10. central control room	500
11. electrical/mechanical shop	600
12. staff restrooms/lockers	1,000
Total	34,800 FT ²
H. Ancilliary and General Use areas	
1. cultural and heritage preparation	2,000 FT ²
2. visual arts preparation	2,000
3. first aid	600
4. tickets/information	400
5. registration	200
6. building security	600
7. public washrooms	2,500
8. circulation/public space	35,000
9. vending machines	200

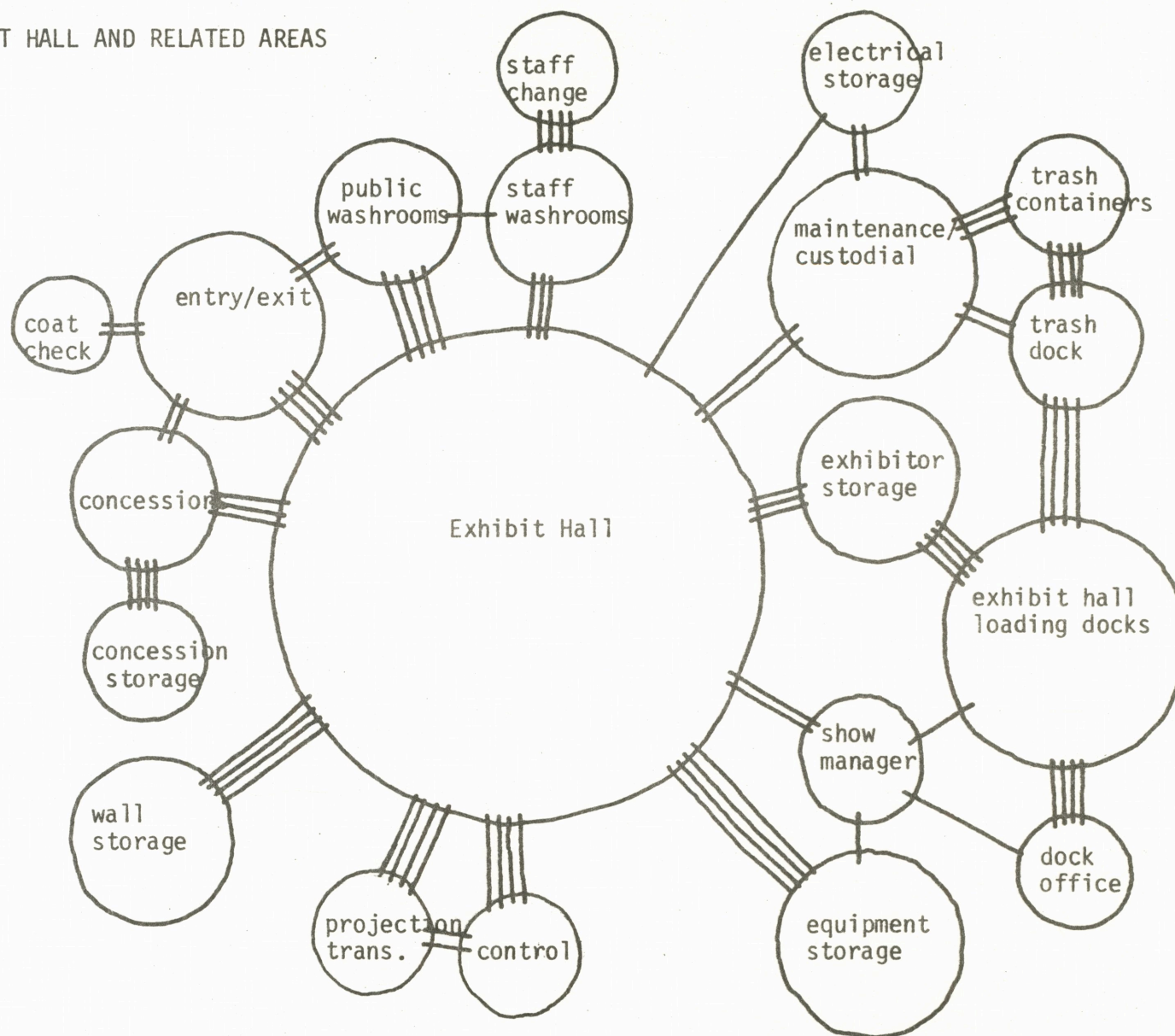
10. public phones

250

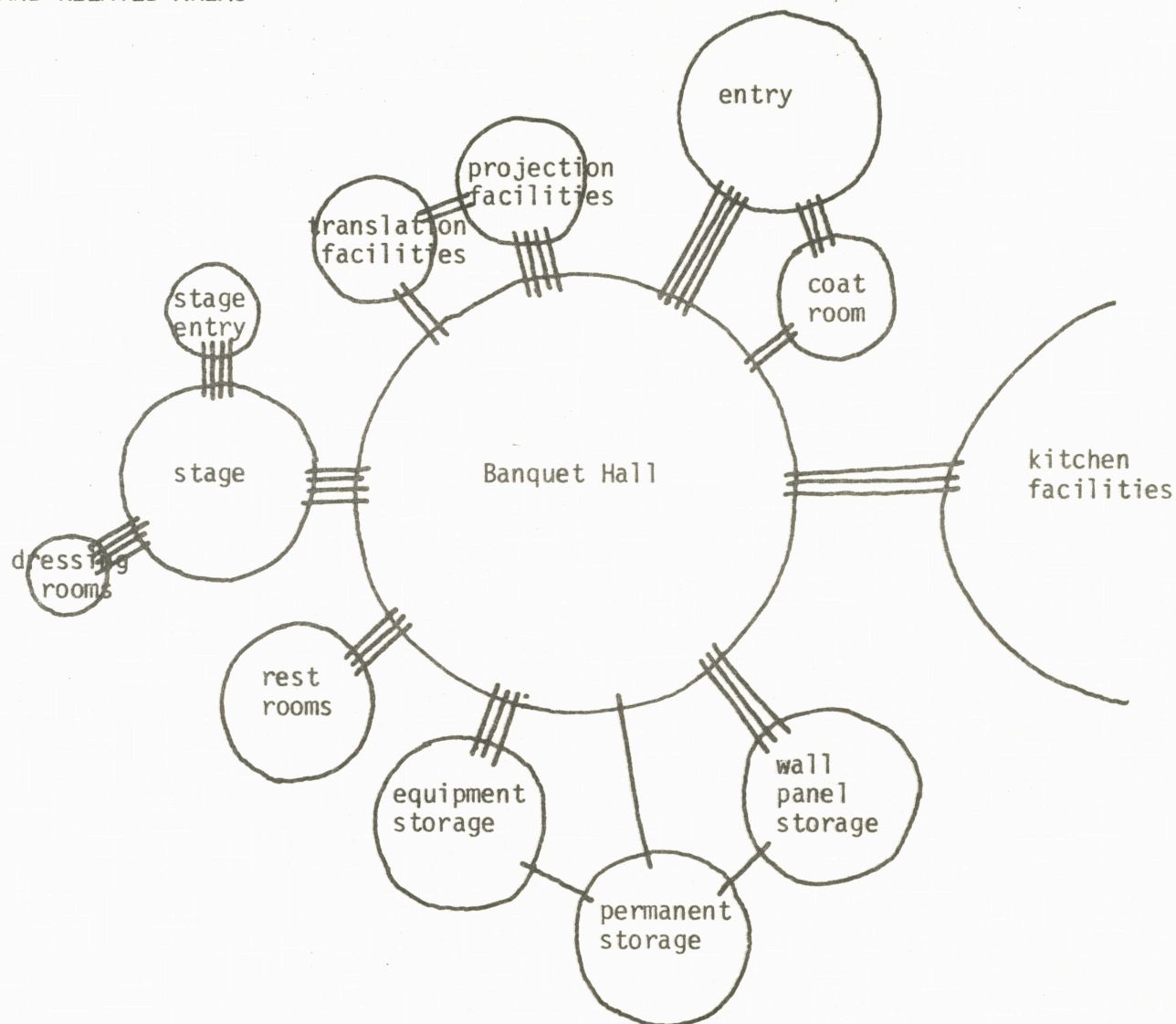
Total

43,750 FT²

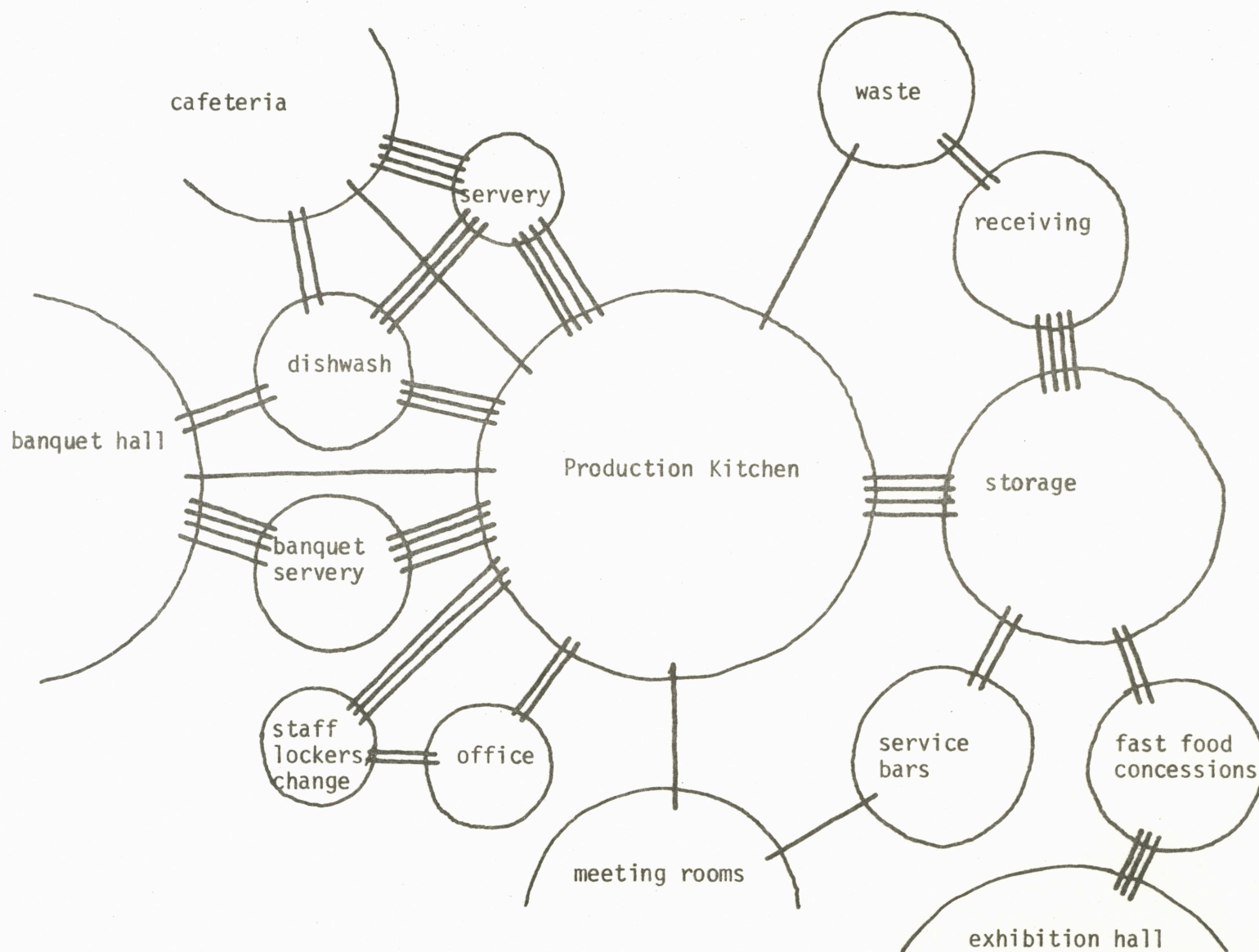
EXHIBIT HALL AND RELATED AREAS



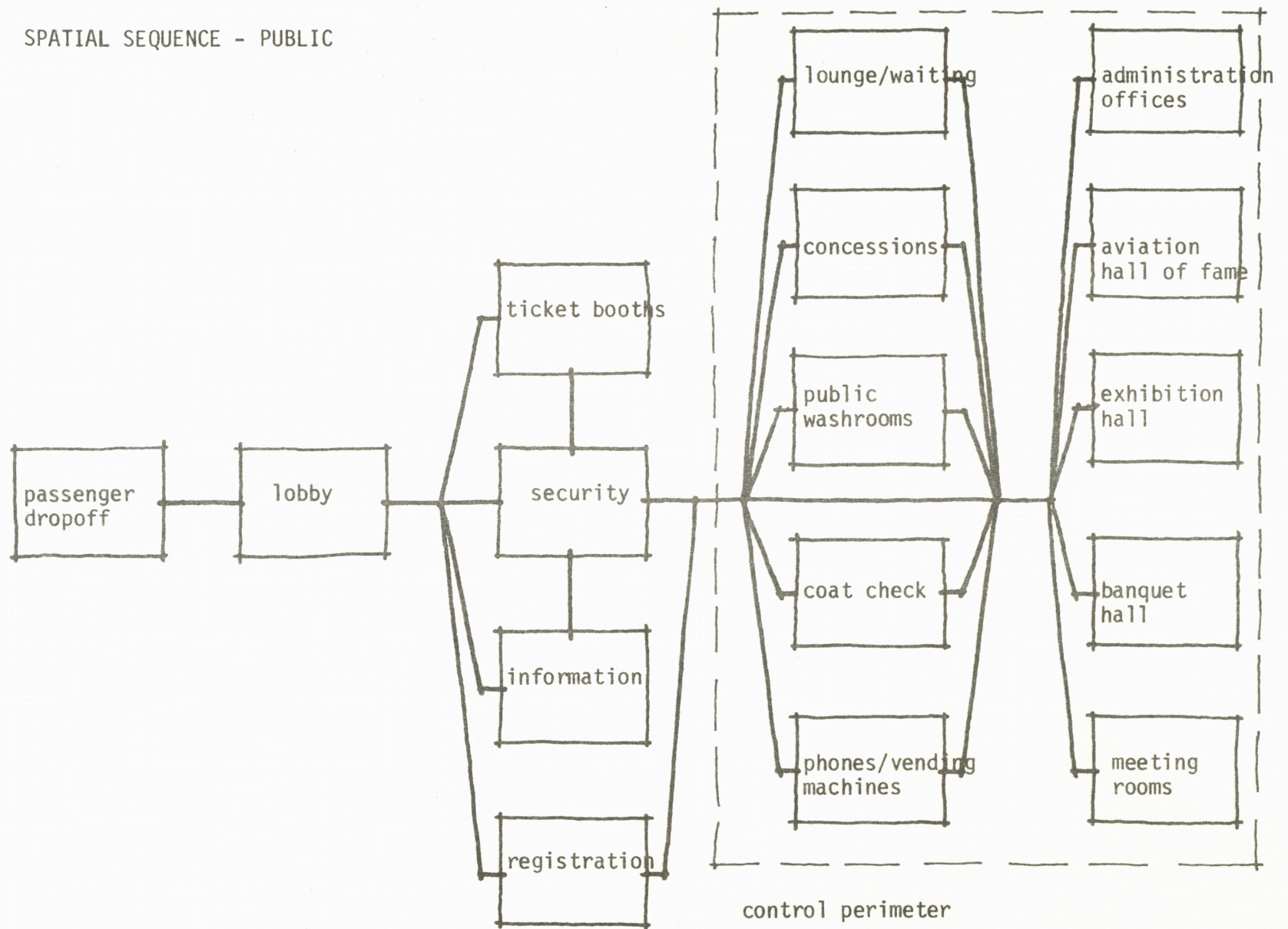
BANQUET HALL AND RELATED AREAS



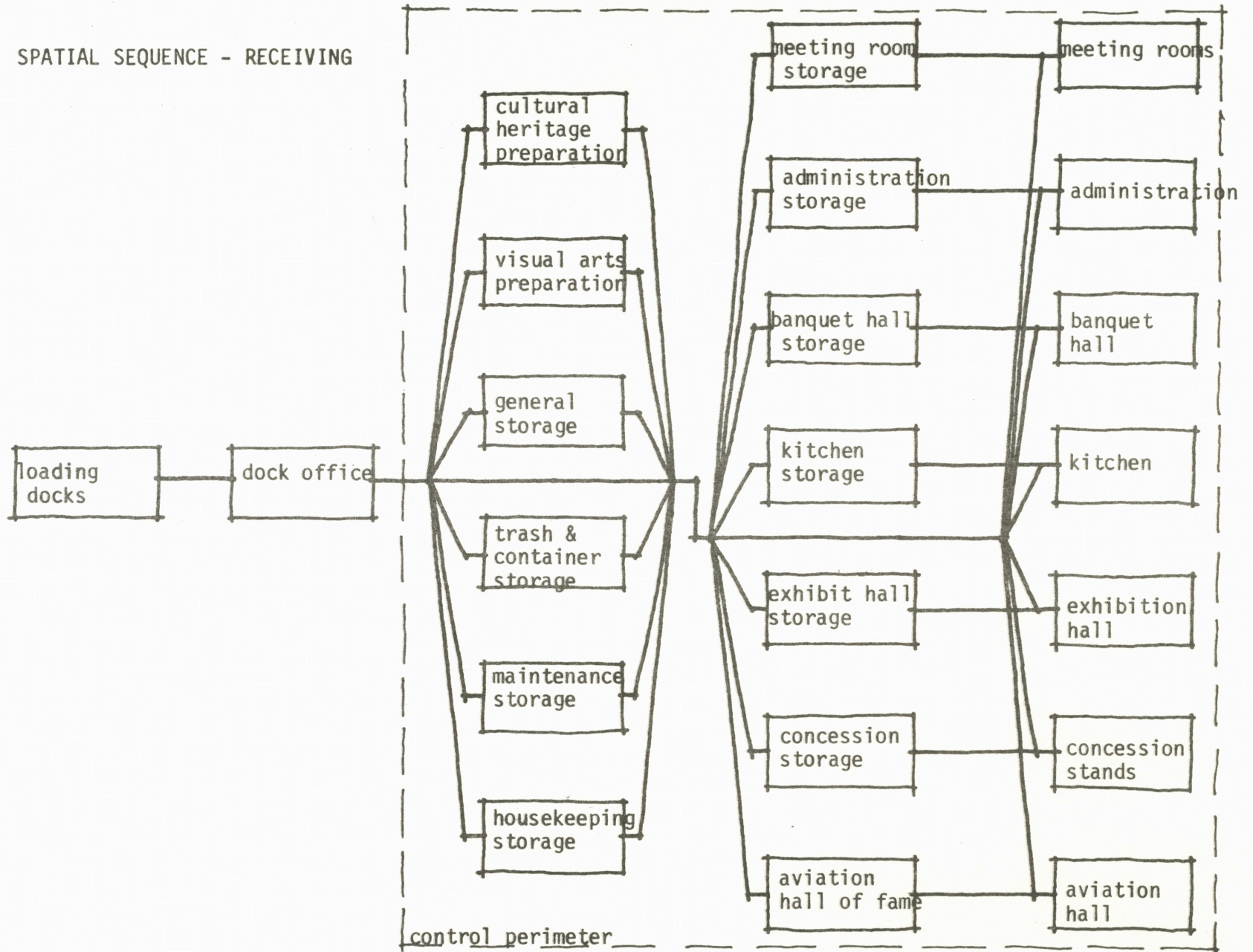
FOOD SERVICE AND RELATED AREAS



SPATIAL SEQUENCE - PUBLIC



SPATIAL SEQUENCE - RECEIVING



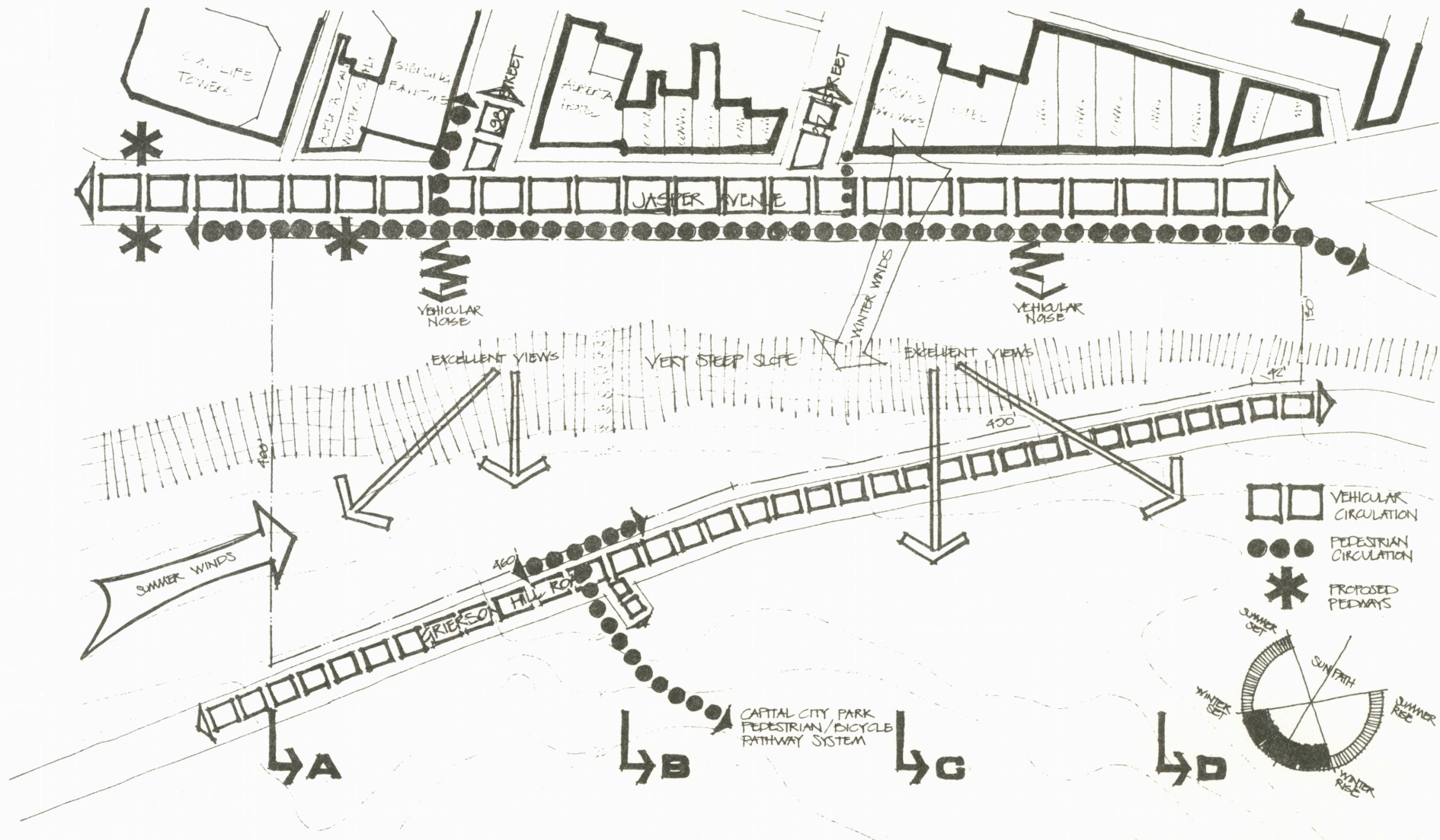
SITE ANALYSIS

The Grierson Hill site is not only very vertical in nature but also very linear with a total length more than twice it's width. Jasper Avenue and Grierson Hill Road form the site's north and south boundaries, respectively with west and east boundaries being a property line and the Grierson Hill - 101 Avenue intersection. The site's south boundary (Grierson Hill Road) is somewhat flexible. The city, realizing the site's constraining width, has consented to a shift of Grierson Hill Road south, as required, to provide greater site area.

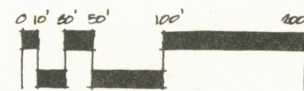
The site has excellent views of the North Saskatchewan River Valley, good southern exposure and is sheltered from cold northerly winter winds by the downtown core and it's natural slope.

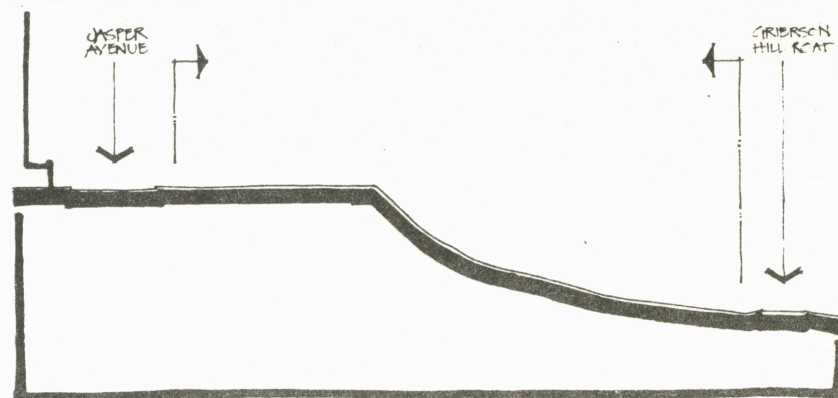
Major pedestrian and vehicular access occur at the top, or Jasper Avenue side of the site with pedestrians arriving from a nearby subway station, bus stops, or surrounding parkades. Vehicular (passenger dropoff) traffic will come directly from Jasper Avenue which is the downtown cores major east-west route. Delivery and support traffic, however, will most likely arrive on Grierson

Hill Road which is a secondary route with considerably less traffic and directly connected to the river valley freeways.

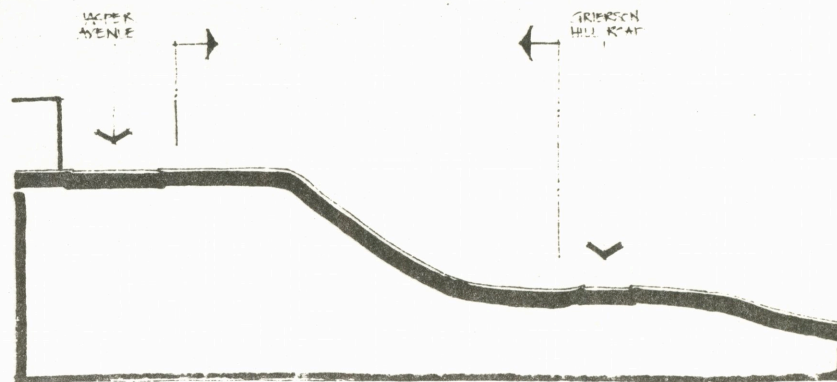


ANALYSIS

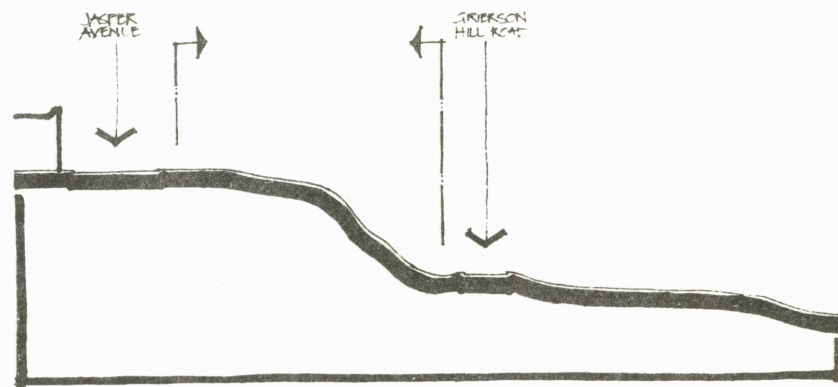




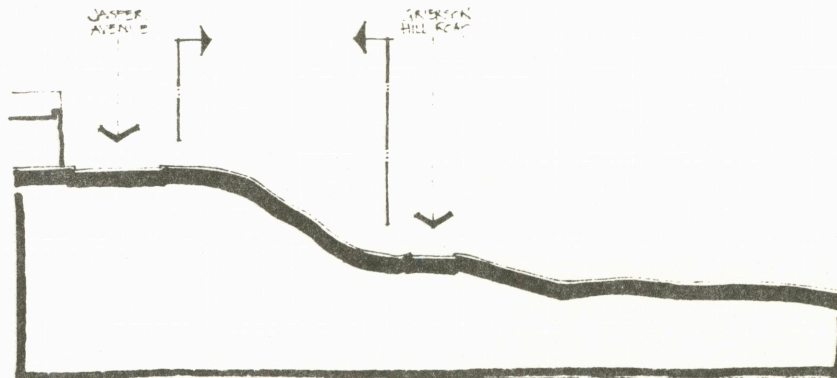
A—A



B—B

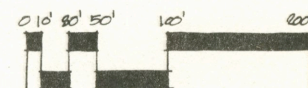


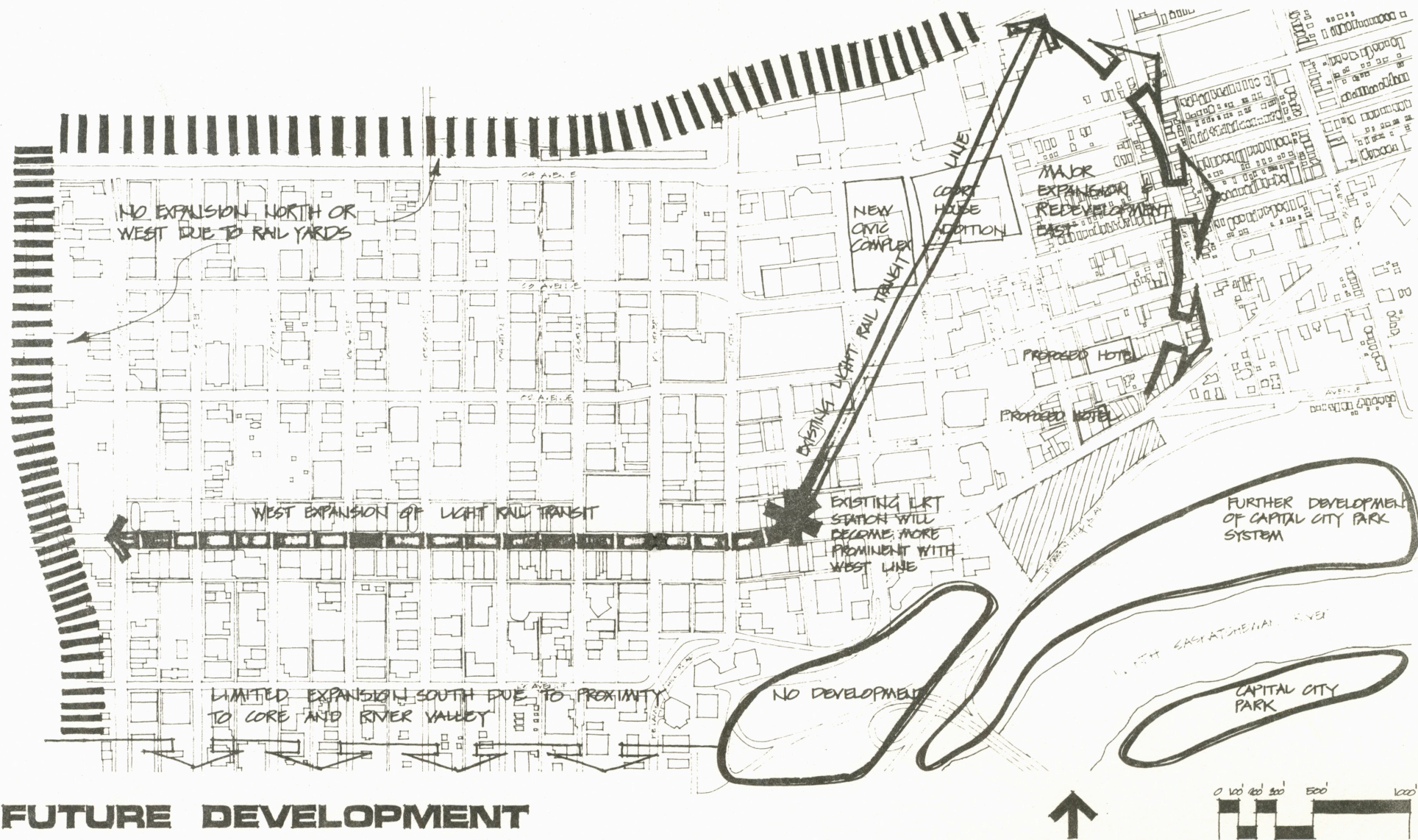
C—C



D—D

PROFILES





CONCEPT

Early in the design process it became evident that, by demands of both site and programmed area, the building would infringe upon land across Grierson Hill Road, presently zoned parkland. A desirable outcome would be a scheme that is advantageous to both building and park. Simply stated, the initial design concept became 'an integration of building and park that enhances both.' I envisioned the building as a series of landscaped terraces extending into the lower parkland, softening the transition between both, with building becoming an extension of park and park becoming an extension of building.

THE DESIGN

Access proved to be the critical organizational factor which dictated much of the Centre's design. The only logical location for the receiving docks was the bottom west corner of the site where large trucks have easy access to both the site, and major freeways via Grierson Hill Road. Functional necessity required placement of the exhibition hall immediately adjacent the receiving docks. The banquet hall's location (adjacent the exhibition hall) provides greater flexibility allowing expansion of the exhibit hall from its moderate 50,000 FT² area to an area of 85,000 FT² plus, capable of handling even large shows.

However, major public access to the centre occurs at the top of the site along Jasper Avenue placing the centre's principle entrance a great distance from its two largest spaces. A vertical lobby (atrium) became a necessary means to link these lower spaces with the centre's principle access point.

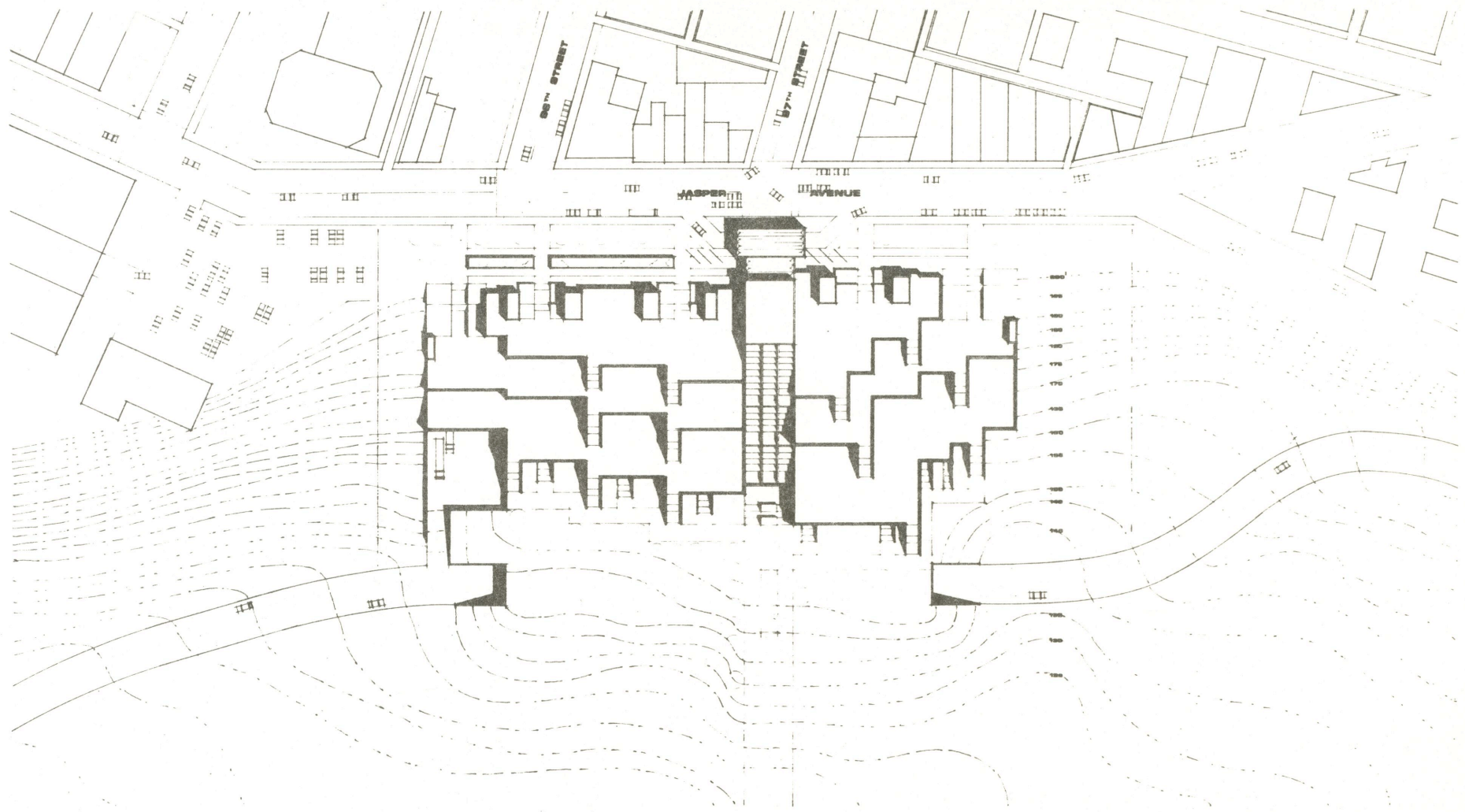
A terraced massing was suggested by the physical nature of the site and further indicated placement of other facilities by their size and area. The terraced atrium lobby echoes this theme.

The transitional experience from upper to lower spaces is significantly heightened by excellent views of the river valley and lower park, while gradually ascending or descending through the building. The experience created seems almost processional and clearly emphasizes the convention centre's relationship to the parkland beyond by the atriums obvious directional focus.

Lowering the centre's Jasper Avenue profile tends to reunite the downtown core with the river valley by 'opening up' to it.

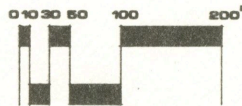
Grierson Hill Road has been rerouted south and bermed over to maintain continuity of the buildings transition to park.

DRAWINGS AND MODEL PHOTOS

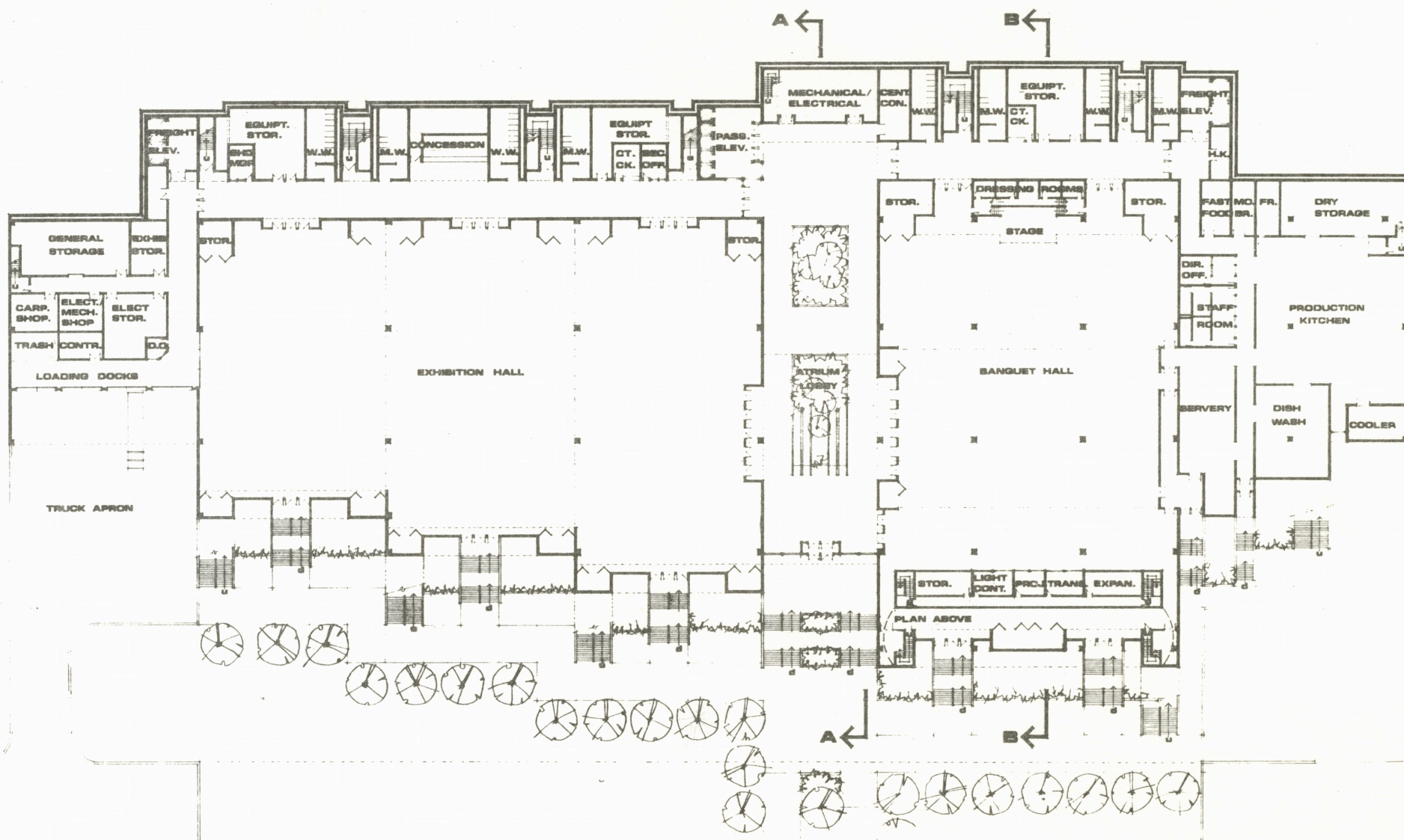


**EDMONTON
CONVENTION CENTRE**

**SITE
PLAN**

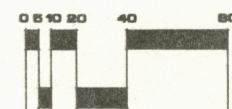


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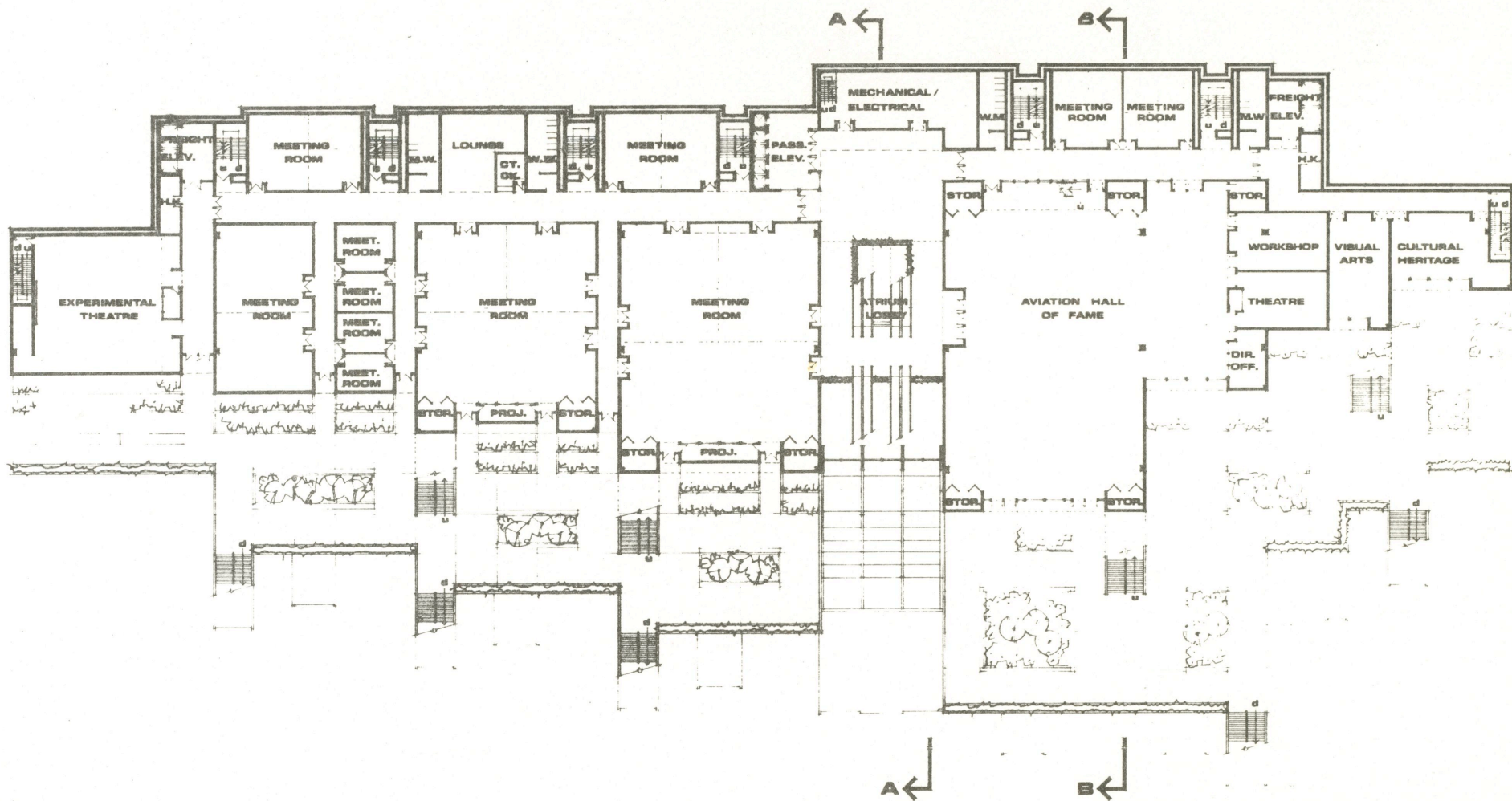


EDMONTON CONVENTION CENTRE

LEVEL
ONE

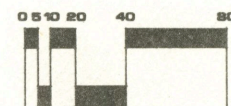


2



**EDMONTON
CONVENTION CENTRE**

**LEVEL
TWO**



3



A ←

B ←

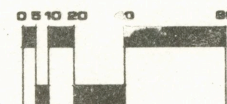
UPPER
LOBBY

A ←

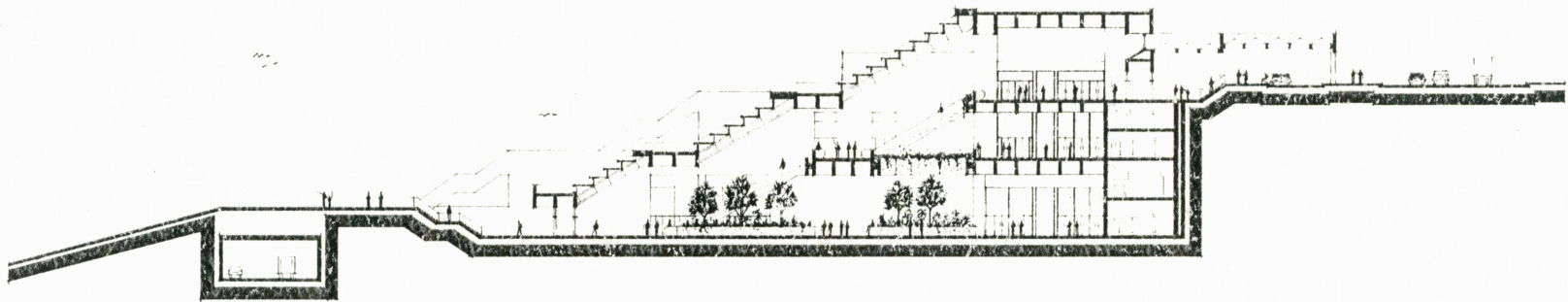
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**EDMONTON
CONVENTION CENTRE**

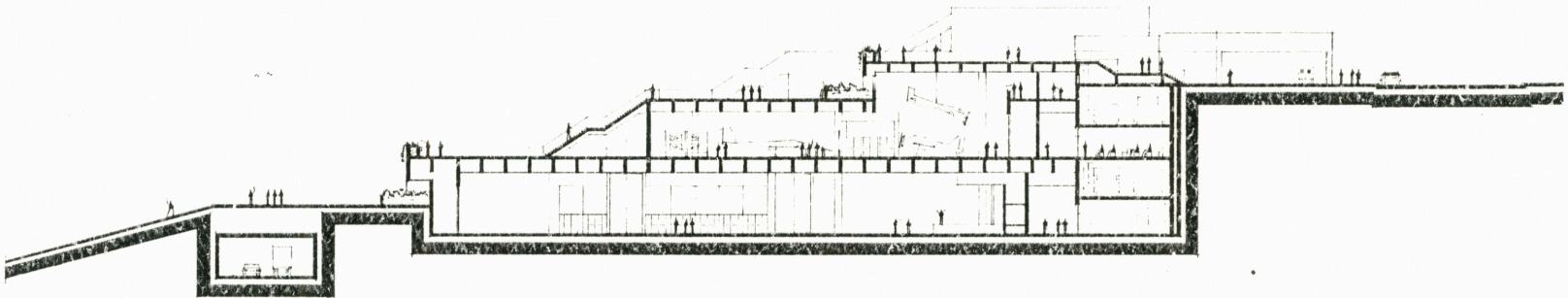
**LEVEL
FOUR**



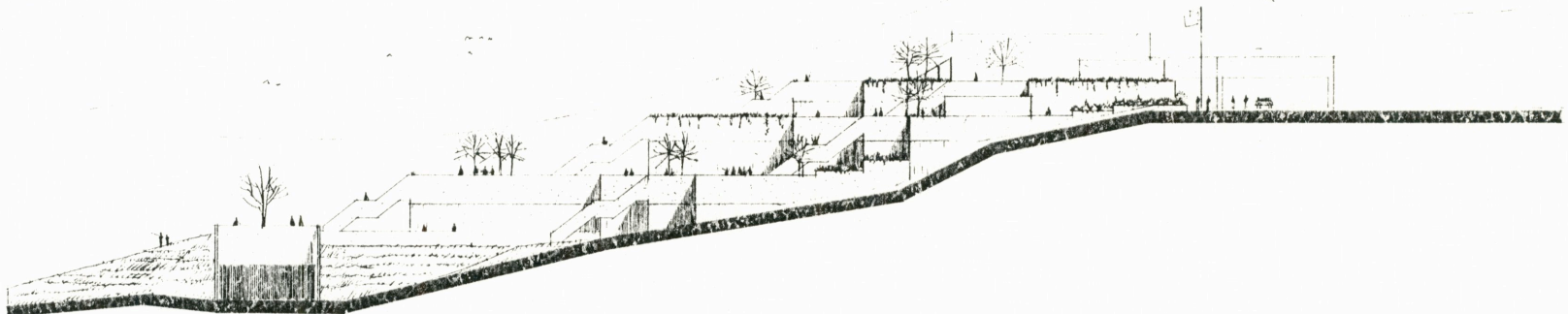
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SECTION A - A



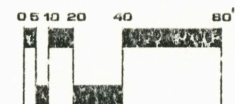
SECTION B - B

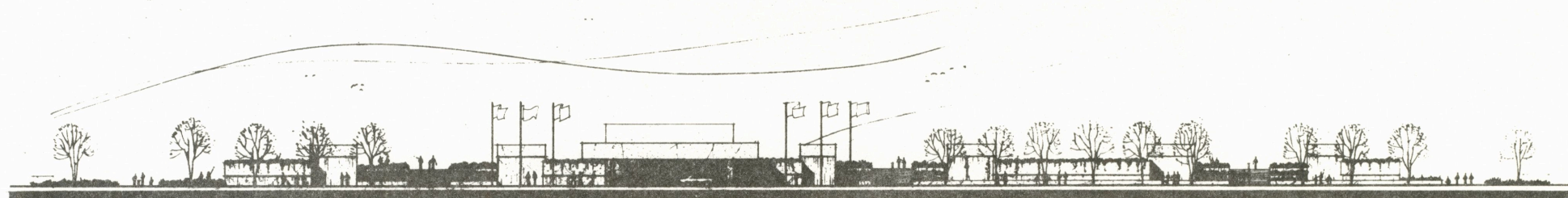


EAST ELEVATION

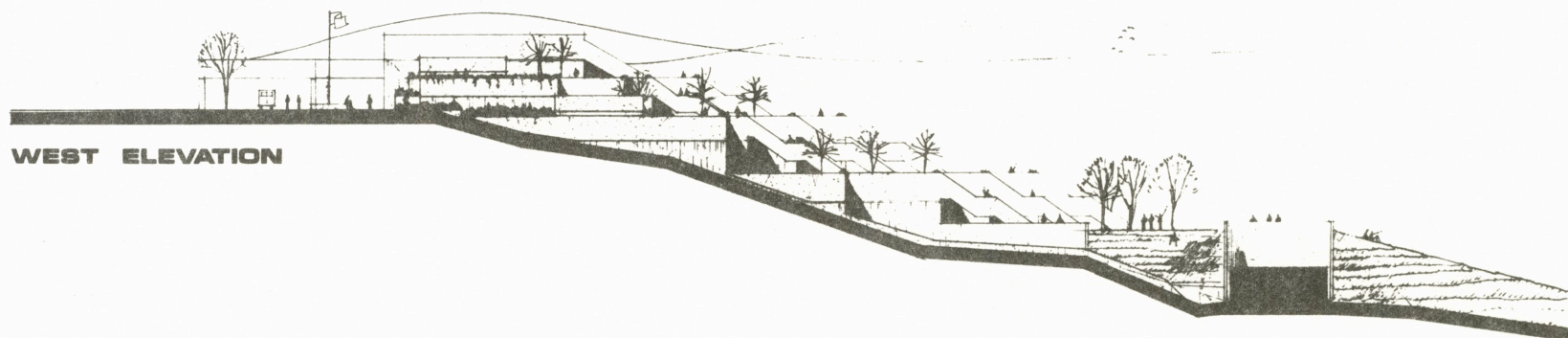
EDMONTON CONVENTION CENTRE

SECTIONS &
ELEVATION

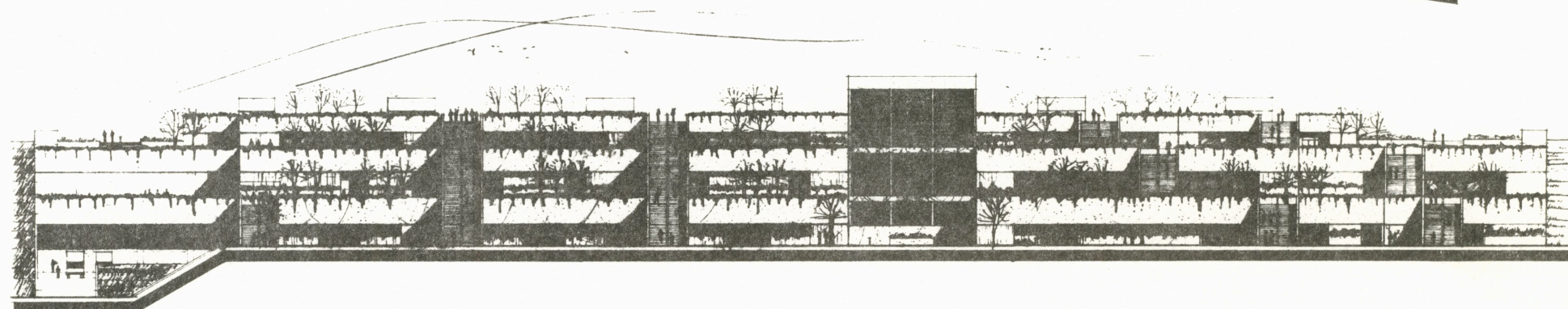




NORTH ELEVATION



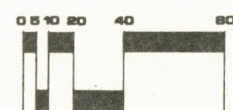
WEST ELEVATION



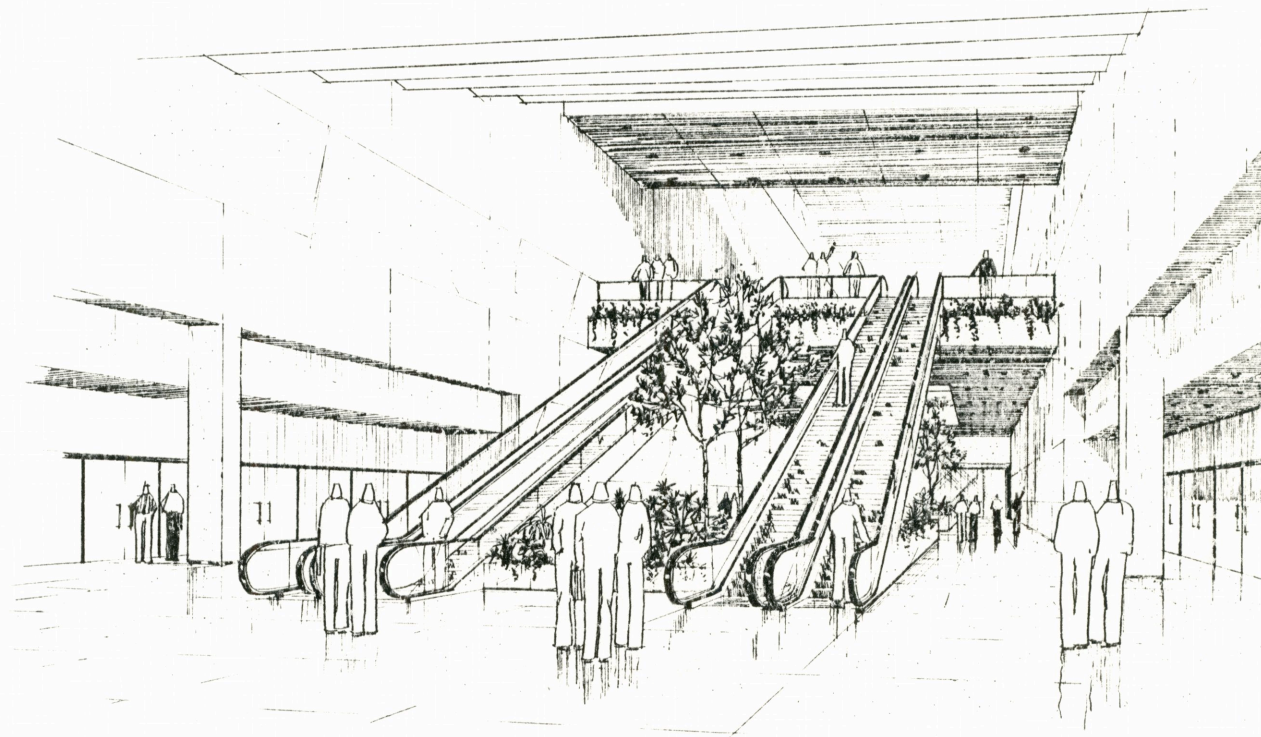
SOUTH ELEVATION

EDMONTON CONVENTION CENTRE

ELEVATIONS

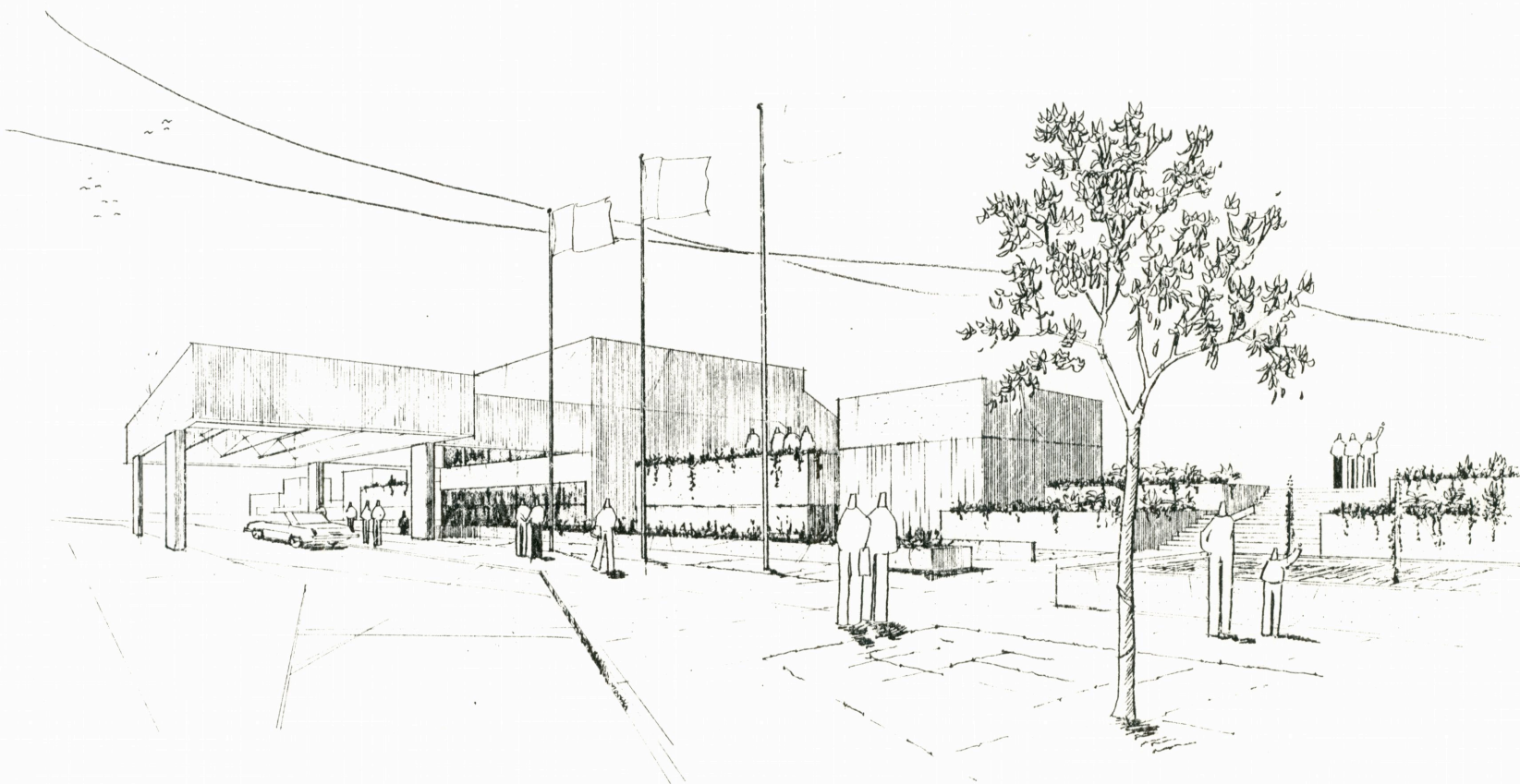


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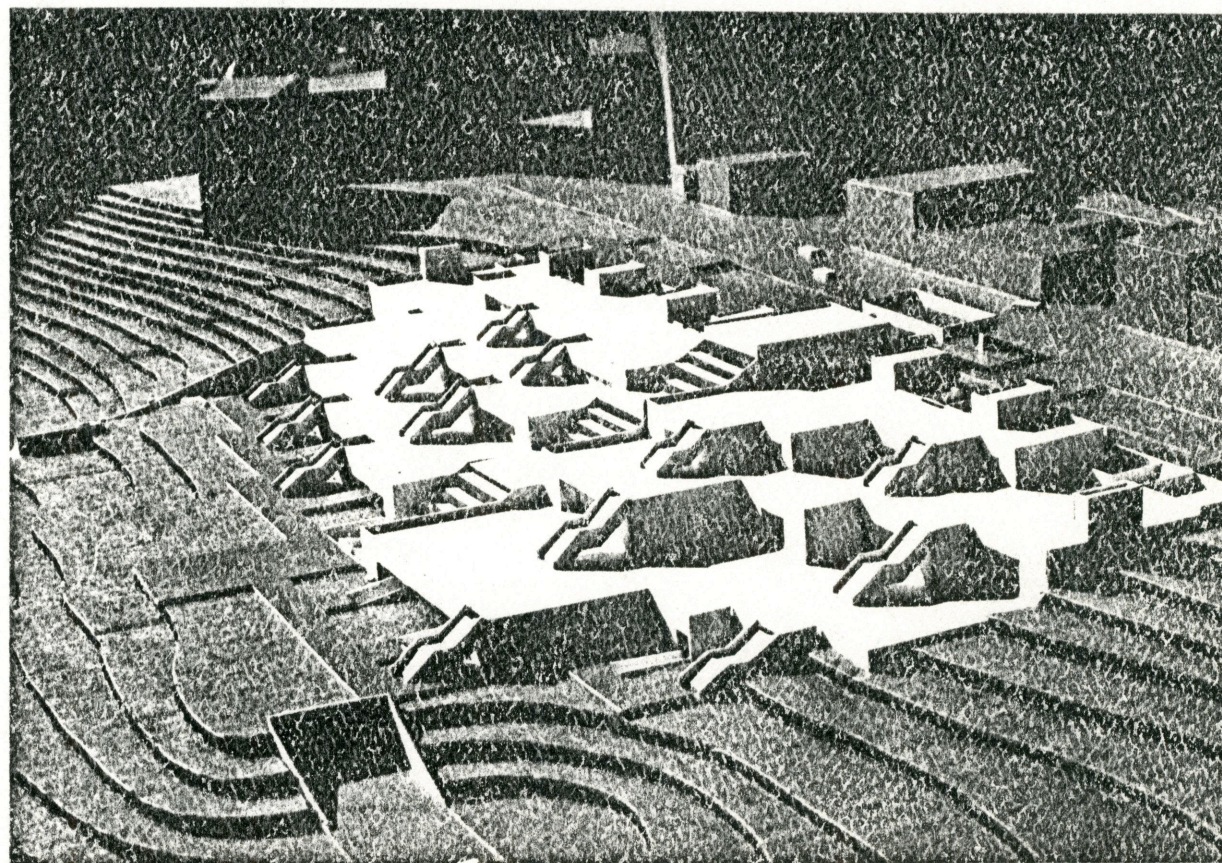
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CONVENTION CENTRE**

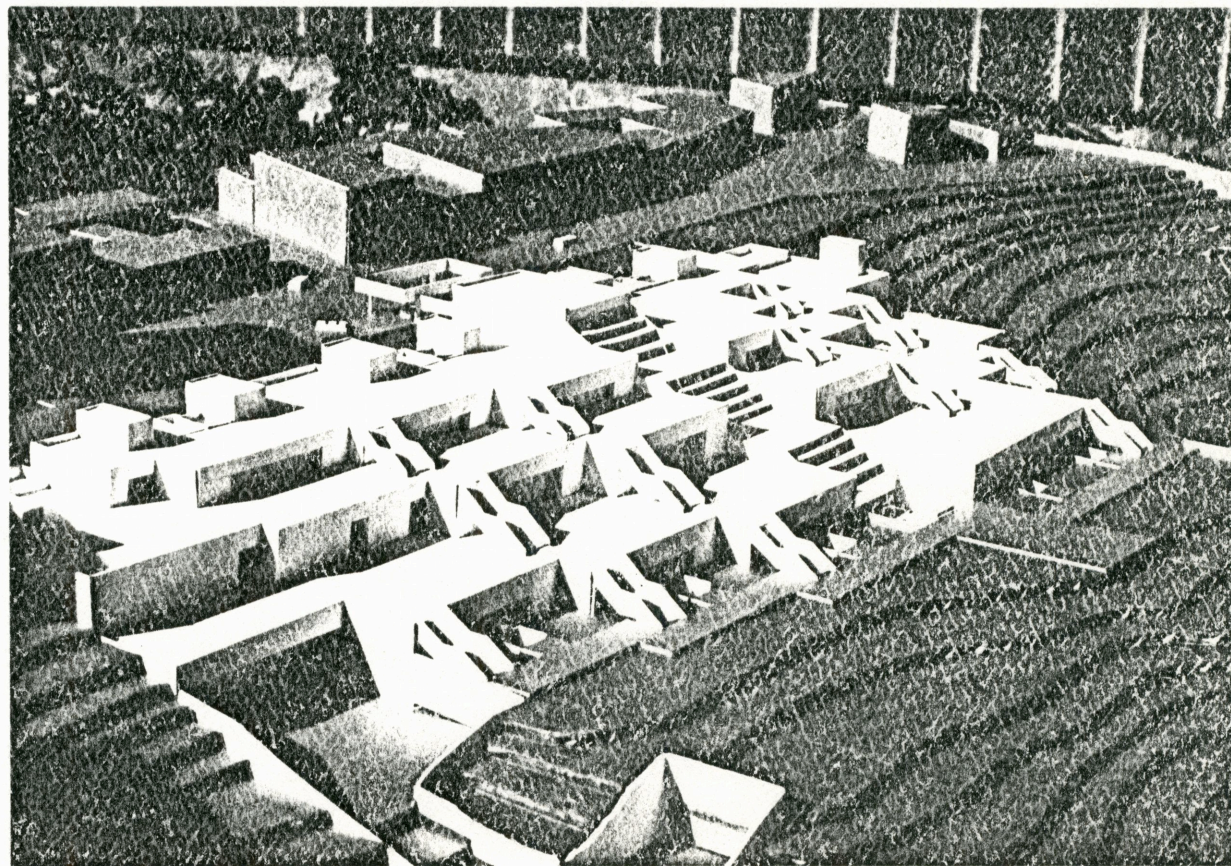
**ATRIUM
LOBBY**

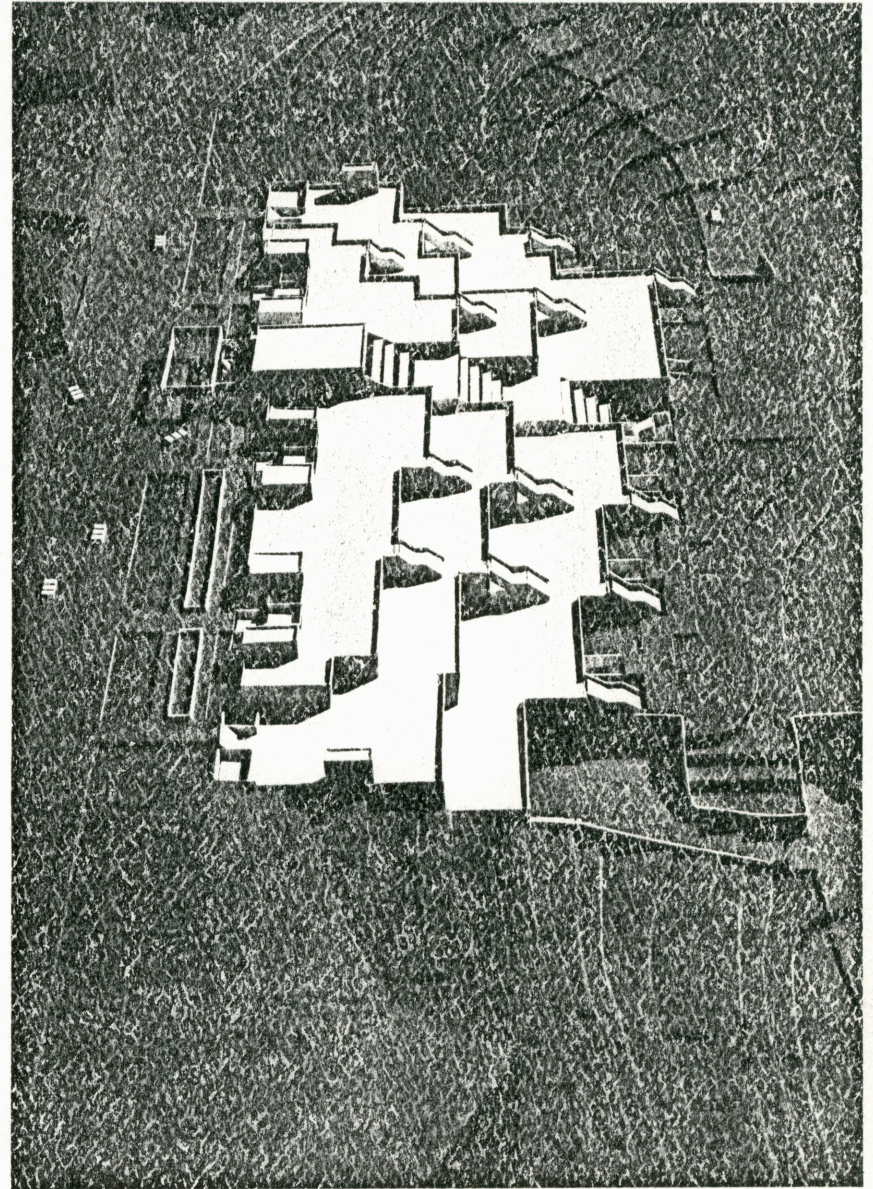


**EDMONTON
CONVENTION CENTRE**

**JASPER AVENUE
ENTRANCE**







FOOTNOTES

- ¹ Andy Leon Harvey, "Those Proliferating Atria," *AIA Journal*, Vol. 68 (July 1979), p. 52.
- ² John Portman, *The Architect as Developer*. New York: McGraw-Hill Book Company, 1976, p. 117.
- ³ Frank Lloyd Wright, *The Guggenheim Museum*. New York: The Solomon R. Guggenheim Foundation and Horizon Press, 1960, p. 68.
- ⁴ John Portman, *The Architect as Developer*, p. 28.
- ⁵ Cathy Stanton, "Portraits: John Portman, Architect Plus," *AIA Journal*, Vol. 64 (April 1975), p. 61.
- ⁶ IBID
- ⁷ "The West Office Building of Deere & Co.," *Interior Design*, Vol. 50 (April 1979) p. 216.
- ⁸ William Marlin, "Excellence Attracts Excellence," *Architectural Record*, Vol. 165 (February 1979), p. 89.
- ⁹ IBID, p. 87.
- ¹⁰ John Portman, *The Architect as Developer*, p. 96.
- ¹¹ IBID, p. 102.
- ¹² George Rand, "Caution: The Office Environment May Be Hazardous to Your Health," *AIA Journal*, Vol. 68 (October 1979) p. 41.
- ¹³ Don Jewell, *Public Assembly Facilities: Planning and Management*, New York: John Wiley and Sons, 1978, p. 31.

- 14 Advisory Committee, Edmonton Convention Centre. *Cultural and Convention Centre - Final Report*, Edmonton, Alberta Canada, September 1974.
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- 7** House of Pansa, Pompeii, *A History of Architecture*, p. 234.
- 7** House of Vettii, Pompeii, IBID.
- 8** Crystal Palace, *Anatomy of Architecture*, p. 150.
- 9** Galleria Vittorio Emanuele, IBID, p. 149.
- 10** Bradbury, Building, Los Angeles, *The Architecture of Four Ecologies*. Great Britain: Harper and Row Inc. 1971, p. 209.
- 11** Larkin Building, *Frank Lloyd Wright: Writings and Buildings*. New York: Horizon Press, 1960, p. 110.
- 16** The Guggenheim, *The Guggenheim Museum*. p. 42.
- 19** Thomas Jefferson University Hospital, *Interior Design*. November 1978, p. 42
- 23** S.U.B. Mall, *Progressive Architecture*. February 1974, p. 47.
- 27** Hyatt Regency Hotel, *Interiors*. July 1967, p. 71.
- 31** West Office Building of Deere and Co., *AIA Journal*. Mid-May 1979, p. 138.
- 35** Hanging Plants, *The Architect as Developer*. p. 99.

- 36** Water Fountains, *IBID.* p. 103.
- 37** Patterns of Natural Light, *Progressive Architecture*. May 1976, cover.
- 38** Texture and Materials, *The Canadian Architect*. February 1980, p. 21.
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- 45** Artificial Light, *The Architect as Developer*. p. 47.
- 66** Low Energy Complex, *The Canadian Architect*. January 1980, p. 20.

APPENDIX

The Exhibition Hall

By demands of its primary function, the program for an exhibition hall calls for a box-like structure offering maximum floor loading, unhampered free space within and a ceiling height of not less than 25 feet (more if possible in some areas).

In summary, adoption of 50,000 gross square feet as the final program for the exhibition area should enable it to meet the trade show needs of most conventions to be served. It would not be adequate for those with unique space needs, or those in excess of 300 exhibits; it would probably not meet the requirements for major consumer-type shows.

Halls of a rectangular shape are favoured for the maximum development of booth layouts. A square hall presents few, if any problems but round buildings or those with diagonal corners are considered most difficult for standard booth arrangements.

The average show or convention will offer its exhibitors booth space ten feet wide with depths of either eight or ten feet. While some Canadian associations offer 8' x 8' exhibit booths, this would not appear to be the norm. Aisles are normally 10' or 12' in width. Booths provided exhibitors are customarily of pipe and drape construction, eight feet in height at the rear with four-foot railings along each side. Drape equipment is normally provided by a professional show decorator under a rental or lease agreement with the association.

Some trends to free-form exhibit spaces with curvilinear aisles or salon space where an exhibitor reserves a block of 500 to 1,000 square feet or more have been noted, but such layouts are still in the minority.

With reference to supporting posts, it can be said that none are best - the fewer the better. If posts prove necessary, their location related to 30-foot modules appears to be the most common and acceptable.

Movable walls enabling the Centre management to reduce the size of the exhibition hall will serve greatly to increase the flexibility and usability of the facility. Use of divider walls make it possible to use space simultaneously for two or more activities; areas for crate storage can be created if all space is not required for exhibits, etc.

It is recommended that trackage for the walls be planned in two or more locations dividing the hall perhaps into three or four sections. Sufficient panelling for only two divisions would probably be required. These walls must be reasonably soundproof and at the same time provide proper security for each space. The room may therefore accommodate a convention-related trade show while at the same time serve a local group (social or cultural).

Floors, Ceilings & Walls -

Floors for exhibit halls are subjected to extremely hard usage. Motorized vehicles leave rubber marks, packing crates scratch the surface, exhibitors frequently spill paint or other liquids. The most economical and durable floors are concrete.

While unlimited floor loads are recommended and desirable, few exhibit producers present demands for much in excess of 300 to 350 pounds per square foot. A portion of the floor may be designed to take loads of up to 1,000 psf.

Ceiling heights for the hall should ideally be around 25 feet. This height permits easy access of any size over-the-road truck, most heavy commercial or construction equipment and also multi-level exhibition booths. Further, when stages or platforms are introduced into the exhibit hall, the higher ceiling becomes less restrictive insofar as the types of entertainment or other activity which may be presented. Ceiling heights much in excess of 25 feet may present illumination problems and also create other handicaps, particularly if utilities for exhibitors are to be provided from the overhead.

Wall surfaces should normally be of as durable material as possible. All surfaces are subjected to frequent scratching and scraping by vehicles as well as packing crates. Exhibitors and others also often use wall surfaces for displaying of signs and advertising materials. Where possible, utilization of a tack strip at the ceiling line of all walls is useful in reducing wall damage. The tack strip should be a replaceable type.

Where corners are exposed to vehicular traffic, such as fork-lift trucks, electric carts, scrub machines, etc., it is highly recommended that steel corner protectors be specified.

Insofar as design and colour are concerned, wall surfaces should be treated to avoid interference with show themes, colours, drapes and lighting. Many show managers and decorators now drape all walls from floor to ceiling to present uniformity of appearance and design.

Constant custodial work is normally required during exhibit hours. In addition, frequent spillages and other minor problems occur which require immediate attention. With these facts in mind, the location of janitor closets at convenient points throughout the exhibition hall is most desirable.

Lighting -

Proper lighting is of great interest to show management and exhibitors alike. Most halls are illuminated with fluorescent, mercury-vapour or similar lights. While dimmers are not necessarily required, some system of reducing the amount of light by switching is necessary.

Windows into exhibit halls should be avoided. During ingress or egress of shows and, occasionally when empty, the appearance of exhibit halls is unsightly and lacking in good house-keeping. Sunlight through windows is disliked inasmuch as it fades the decorator's equipment, washes the colour and lighting of many exhibitors, may prove distracting to exhibit viewers and may also serve as a conveyor of undesirable heat loads.

Further, display booths are normally arranged with drapery backs to the wall to create facing exhibits. This practice in turn, places the back of the exhibit booth to the window creating a less than pleasant picture for the viewer from the outside.

Windows could invite trade show thefts and create some security problems for show management during hours when the show is closed.

Should windows be deemed necessary, adequate blackout provisions would be needed.

Utilities -

In addition to both 110-volt and 220-volt power, exhibitors may require water, gas, compressed air, telephone service, and some floor drains. It is also highly desirable to provide at least a limited capability for exhausting fumes when exhibitors find it necessary to demonstrate gasoline combustion engines or other types of odor-producing equipment.

Power for exhibitors may be distributed from overhead busses or through tunnels under the exhibit hall floor. In some instances where the exhibit hall is constructed over basement or garage space, excellent distribution systems have been developed through the use of accesses through the floor.

Normal practice calls for the facility to provide heavy power lines at convenient locations throughout the hall. From these sources, either the show electrician or the house electrician will connect distribution boxes from which to run the harness that supplies individual booths.

Both closed-circuit and broadcast television accommodations will also be required.

If possible, heating units should be positioned to avoid any direct blowing of air on an area where exhibits may be erected. The same suggestions applies to air-conditioning.

Inasmuch as loading doors into the hall will be open during most of the ingress time immediately preceding the opening of displays and shows, heating equipment should be of a type to provide reasonably quick recovery of room temperature for the comfort of show visitors. Some form of heat or "air-curtain" near the loading doors should perhaps be investigated.

Loading Facilities -

Special attention must be paid to the loading and unloading facilities since the capability of moving a show in and out rapidly may be a primary factor in acceptance or rejection of a particular event.

If at all possible, separate receiving facilities should be provided for the Centre in addition to those for the exhibit hall.

Demands and desirability of loading and unloading directly on the exhibit hall floor will vary depending on the size and nature of the exhibit. Large conventions will normally see most materials being shipped to a common warehouse and then brought to the exhibition hall in large vans within a short period of time. Regional or locally-oriented shows will probably result in a larger number of smaller trucks from exhibiting companies.

Speaking ideally, the hall should offer several large doors providing easy access to the exhibit hall floor. In addition, a loading dock is highly recommended. For agricultural equipment and similar exhibits, a dock becomes a virtual necessity.

Establishment of a dock, however, brings with it the need for an observation point containing communication equipment and door controls.

Storage -

Storage requirements in the exhibit hall normally fall into two major categories - those of the hall management and those of the exhibitors or show manager. Consideration of the first is a necessity for proper functioning of the facility and in the maintaining of reasonable operating costs. Exhibit hall management will require space to store equipment such as tables, chairs, material handling equipment, stages and other items not in use during exhibits.

Show management is faced with the need for crate and box storage for exhibitors during a show. While on-site storage is highly desirable, a show which takes up the whole exhibition floor will require arrangements for off-site storage. In many cases, a vacant meeting room could be used for this purpose. Or, the unused portion of the exhibition hall could be screened off and used for this purpose.

Some exhibitions generate a large volume of highly inflammable items, such as cardboard cartons so storage off-site is often desirable as the fire hazard will be reduced.

Rest Rooms -

Rest rooms for the exhibit hall may require some special consideration because of the frequent dual use by the exhibitors who will be using same as an "employee washroom" and also the public.

Availability of a laundry sink plus hose bibs at some convenient location is also recommended as an assistance to exhibitors with special cleaning or maintenance problems.

Because of admissions control as well as security requirements, location of rest rooms should be within control perimeters.

Security -

Security of exhibits is of special concern. Concentration of emergency exits and other doorways where possible is highly desirable since this reduces the amount of guard service required.

Emergency exits should, wherever possible, not be located in areas where long-range observation is not possible. Use of glass in security exits is not recommended ... again, due to security problems.

An office or room in which security guards may change clothing, use for lunch breaks and possibly temporary detention purposes is most desirable. Location of this space near an exit is recommended.

Office Spaces -

Some office and service space is required for all exhibit halls. If possible, minimal dressing rooms with rest rooms are highly desirable.

It is presumed that major office spaces for administrative personnel will be provided elsewhere in the Centre. The exhibit hall should provide, however, some minor on-site office space for Centre personnel.

In addition, the hall will require a room for an operational base. This space may also house lighting and temperature controls, sound controls, public address and/or paging controls, etc.

Show management will require office space. Highly desirable are two spaces perhaps in the form of an inner and outer office. Either or both should open into the exhibit hall. If possible, access to the show office from outside of control perimeters is highly desirable.

There may be substantial advantages to the location of the control space at an elevation higher than the exhibit hall floor. Establishment of this space with a viewing window can prove helpful.

Whether or not the show management office should be located above the hall floor is a subject of debate. While an "overview" is desired by some show managers, it appears a majority prefer easier and more direct access between the exhibits, and show office.

A first aid room either in or immediately adjacent to the exhibit hall is also required. Ideally, an emergency room of this nature would provide a sink and toilet, a nurses station with desk and storage cabinet, two beds with proper screens plus normal first aid equipment.

Concessions -

Detailed information relating to complete or overall food and beverage service for the Centre is anticipated in Food Services section of this program.

Concession stands, however, will be needed in the exhibition hall. Location of such stands is extremely critical in order not to interfere with any type of booth layout which may be developed by show management.

While portable stands will be necessary for specific types of shows, most experienced concessions operators point out that wherever possible permanent locations produce the greatest profit margins and also the best product. The permanent stands should be provided with closures for proper security and sanitation. In addition to the front and back counter, the stand will require a "back room" providing storage space for merchandise, equipment, ice-makers, etc.

If beer or liquor is to be purveyed in the Exhibit Hall, these items would ideally be sold from locations other than the regular concession stands. Many convention groups require discontinuance of liquor sales during their tenure in the facility ... the availability of separate locations for such sale can help to avoid any misunderstandings.

Vending machines providing soft drinks, hot drinks, candy and cigarettes should be provided for those periods of time when regular concession stands are not operating. These should be located in both public and employee areas.

Trash Disposal -

Ingress and egress of most exhibit-type shows can be expected to produce a high volume of trash in a short period of time. A disposal system employing a compactor if possible should be included in the program.

Preferably the system would call for wheeled carts which can be pushed throughout the hall and then returned to the compactor for dumping.

Public Access -

When serving as a convention site, the exhibit hall will normally be required to provide a registration area and

possibly public space or a lounge area for delegates. In the Edmonton situation where visitors may likely be housed in several different hotels, it would appear likely that the Convention Centre may serve as the central meeting place or gathering point for delegates.

Such a registration area should be located close to the main entrance of the Centre and be easily located by the delegates. It should be as near the exhibit hall as possible. While some trade shows will want registration inside the exhibit hall, most will locate this activity outside the hall for control or admission purposes.

Registration counters are normally supplied by the official show decorator. Ample power outlets for electric typewriters and other office equipment should be available.

Many convention groups are now employing closed-circuit television systems as message indicators for their delegates. This would suggest the programming of adequate conduit for TV cables in the registration area and elsewhere.

When serving as a site for a consumer show open to the public the exhibit hall will be expected to provide at least two ticket booths. These should be located in a space where lines may form easily and be protected from inclement weather. Some area should be available wherein the purchaser can proceed from the ticket window to the main entrance of the show where he will surrender his ticket and enter through a turnstile. The turnstiles can be portable equipment.

Public Telephones -

Ranks of public telephones should be located in an area outside of admissions control and available to all facilities of the Centre. Public telephones will also be required inside the exhibition hall.

A substantial demand for temporary telephone service in the individual display booths may be anticipated. The need will vary from show to show. Necessary conduits and space for telephone company equipment will be required.

Public Address Systems -

A few general comments relating to performance of sound amplification and similar equipment are as follows:

Throughout the facility a paging system is desirable. For Centre personnel, either some form of an auto-call and/or radio paging is necessary. All three systems will probably be needed to properly cover the operation.

The size of the exhibit hall will probably indicate that the best performance the sound system can achieve will be to make the spoken word intelligible. Demands upon the banquet hall system, however, will be substantially more sophisticated.

Simultaneous translation facilities for the banquet hall, meeting rooms and possibly the exhibit hall will be required.

Banquet Hall

The banquet hall is envisioned as a space designed to handle large meetings, food functions, parties, dances, receptions and other social events, both for conventions and for the community at large (cultural and ethnic groups, banquets, and also for large business and community organizations). Basic appointments and finish should be similar to that of a modern hotel ball room.

The banquet hall should be programmed at 35,000 square feet of usable space. This should provide adequate room for plenary or general sessions of most convention groups.

Meeting planners like to hold their delegates at the convention site through the day by the scheduling of luncheons, buffets or other mid-day activities. This indicates therefore, frequent need for dual usage of the banquet hall.

In view of the need for proper handling of small groups and also for providing both meeting and food serving areas simultaneously, it is recommended that sound-proof divider walls be considered. Trackage for a variety of room sizes would be most desirable for management.

Ideally, the banquet hall should be designed as space immediately adjacent to the exhibit hall with movable sound-proof walls separating. Such an arrangement would permit use of the banquet hall as additional space for exhibits where necessary. The continuity of such display spaces is most important.

With exhibit capabilities in mind, the ballroom should be engineered to provide ample electrical power for displays. For such auxiliary space, however, water, gas, compressed air and floor drains can be eliminated if necessary.

Terrazzo flooring would be acceptable; a parquet wood floor might present a better appearance. Portable carpeting will be used for all events where appropriate.

The hall should be post free if possible.

It is assumed that all references to food and beverage serving matters in this space will be made in Food Service Section of this program.

While portable risers will be used to elevate head tables, establishment of a permanent stage or platform should be considered. Such a stage would be used for display of products. It would also be used as a band platform, possibly for small concerts or recitals, etc. Lecturers and other special speakers may also prefer the use of a stage podium.

Such a stage is envisioned as a thrust stage with minimal curtains. Further comment regarding this phase may be expected from the project's theatre consultant.

Off-stage access would, of course, be desirable. Small dressing rooms with toilet facilities are also recommended.

Inasmuch as many activities in the banquet hall will be ticketed, design should provide for an outer lobby in which early arrivals can wait until the hall is opened. Further, some method of providing for a ticket sale booth or booths should be considered.

Rest room facilities for the banquet hall should be within the room or should be accessible from hallways within the control perimeters of the hall. Coat room facilities are also a must.

Banquet hall equipment inventory will include a large variety and quantity of tables and chairs plus such items as risers, podiums, backboards, etc. Storage for such equipment reasonably close to the banquet hall will do much to reduce labour costs and improve the speed of the service.

Special Lighting -

Of special interest in a room such as the banquet hall is location of booth for public address system and lighting controls. They would preferably be located where operators

could observe the entire hall, controlling overhead illumination, monitoring the sound and also operating moving spotlights when required.

Some accommodations for providing pre-set or fixed spotlights or floodlights for head tables and special entertainment should also be considered.

Both the reception and origination of closed-circuit or other television can be anticipated. Some basic provisions, possibly even simple access panels through walls, may be adequate at the present time.

Meeting Rooms

Meeting rooms must be available to convention organizations and local groups in a highly flexible and convenient manner.

Convention programs vary widely among associations and even existing schedules are subject to frequent change.

Employment of sound-proof, movable walls provides the capability of altering sizes and capacities to fit the changing needs.

A highly flexible room arrangement would be as follows:
(Capacities shown as theatre style at 10 square feet per person.)

<u>Undivided</u>		<u>Divided</u>		<u>Total</u> <u>Capacity</u>
<u>Rooms</u>	<u>Area</u>	<u>Rooms</u>	<u>Area</u>	
1	10,000	2	5,000	1,000
1	4,000	2	2,000	400
2	2,000	4	1,000	400
2	1,000	4	500	200
5	400*	5	400	200
10		15		2,200

* No divider walls

Convention Use

Seminars, workshops and other convention sessions should be conducted in facilities as closely connected with the exhibit section as physically possible. The reasons and need for delegate exposure to the exhibits are obvious.

To be acceptable as meeting spaces, the rooms must be reasonably sound-proof, offer ceiling heights of not less than 15 to 16 feet, good illumination, preferably with black-out switches and ample 110-volt power outlets. The larger rooms may need permanent public address systems.

Ideally, the meeting rooms should be reached easily from the exhibit hall and banquet hall. They should be served by convenient and accessible rest rooms. The design must permit access to at least some of the meeting rooms without interference with the admission controls of other activities. Such a layout would assist Centre management in making the facilities available for a multiplicity of uses at any given time.

Cinema Use

All rooms must consider audio visual requirements. The larger meeting rooms are to be equipped with permanent movie projection room complete with light and sound control. Such a room can be used to show foreign language films of interest to the ethnic community.

Visual Arts Use

Two meeting rooms will be designed to function as gallery display spaces for visual arts. These rooms shall be equipped with specialized lighting and security provisions.

Experimental Theatre Use

One large meeting room will be designed and outfitted to function as an experimental theatre. Design criteria for this function include a 24'-0" high ceiling, gridiron at ceiling, theatre lighting, and a sound and light control room.

Acoustics are critical but most rooms can be modified by use of curtains and baffle which will be arranged to suit the nature of the show.

Dance Studio Use

Two meeting rooms are to be designed as dance studios. Special attention must be given to the floor surfaces. Either the dance floor is permanent to be covered when in use for a non-dance function or a portable floor installed when in use as a dance studio.

Central Administration

The administrative sector of the Centre will require executive offices, a boardroom, reception area, space for the secretarial, clerical and financial personnel, restrooms, store-rooms and other spaces normal for offices of this nature.

Show Manager's Office

This office will consist of a reception area, washroom and large private office/conference area. Primarily it is used by the manager of the convention as a control centre. This area must be equipped with all the communication mediums used at any convention and located for quick access to the activities of a convention exhibition.

Maintenance and Stores

This is a central receiving and distribution of janitorial supplies. Allow a small area for maintenance manager. Combined with this is a central stores for distribution of equipment to be used throughout the Centre.

Convention Bureau

It is highly desirable to house convention bureau offices in the convention facilities and close consideration of this in Edmonton is recommended.

Electrical and Mechanical Shop

Operational personnel of the Centre will require space for a carpentry workshop and an electrical workshop. Engineering personnel will be housed near the mechanical section of the building.

Press Room

Some space should also be set aside for press, radio and television usage in a central area. Demands on a "press room" vary greatly depending on the individual convention or meeting involved. Normally, a convention centre will provide a room or rooms sized to meet the day-to-day needs of the working press in its community. This may include space for a lounge area, small kitchen or snack bar, washroom, coat closet and counter space for typewriters, teletypes, photo-transmitting equipment, etc. Ample telephone connections in the press room are most important.

V.I.P. Room

The facility should also provide space for visiting dignitaries. Location of this area is important and should afford easy access to the banquet hall and meeting rooms. Direct and easily secured access to exits from the Centre are also desirable. Such a V.I.P. room would ideally provide space for a small bar or kitchen plus a private washroom. Proper furnishings, lighting and other amenities are also needed in special spaces of this nature.

Cultural Heritage Preparation and Storage

This area is provided for the Cultural Heritage groups as a central location where they have minimum facilities from which they can organize meetings which will be held in available meeting rooms throughout the Centre.

This space will include a few desks outfitted with typewriters, and a copy machine and other office basics.

The storage areas are intended to keep basic equipment and files for the groups who regularly use the complex as a meeting place and do not want to cart the basic necessities in and out each week, or as often as they hold their regular meetings.

Visual Arts Preparation and Storage

This area also is designated as a basic organization space for the visual arts groups. This space shall be used to organize shows which will be set up in the public areas of the complex. Basic minimal storage is a necessity for this part of activity.

Dressing Rooms

In conjunction with the banquet hall, exhibition hall and meeting rooms, four dressing rooms shall be provided, two at 500 square feet and two at 1,000 square feet. These rooms shall serve the needs of any performers in any of these areas, whether related to convention activities or local cultural heritage activities.

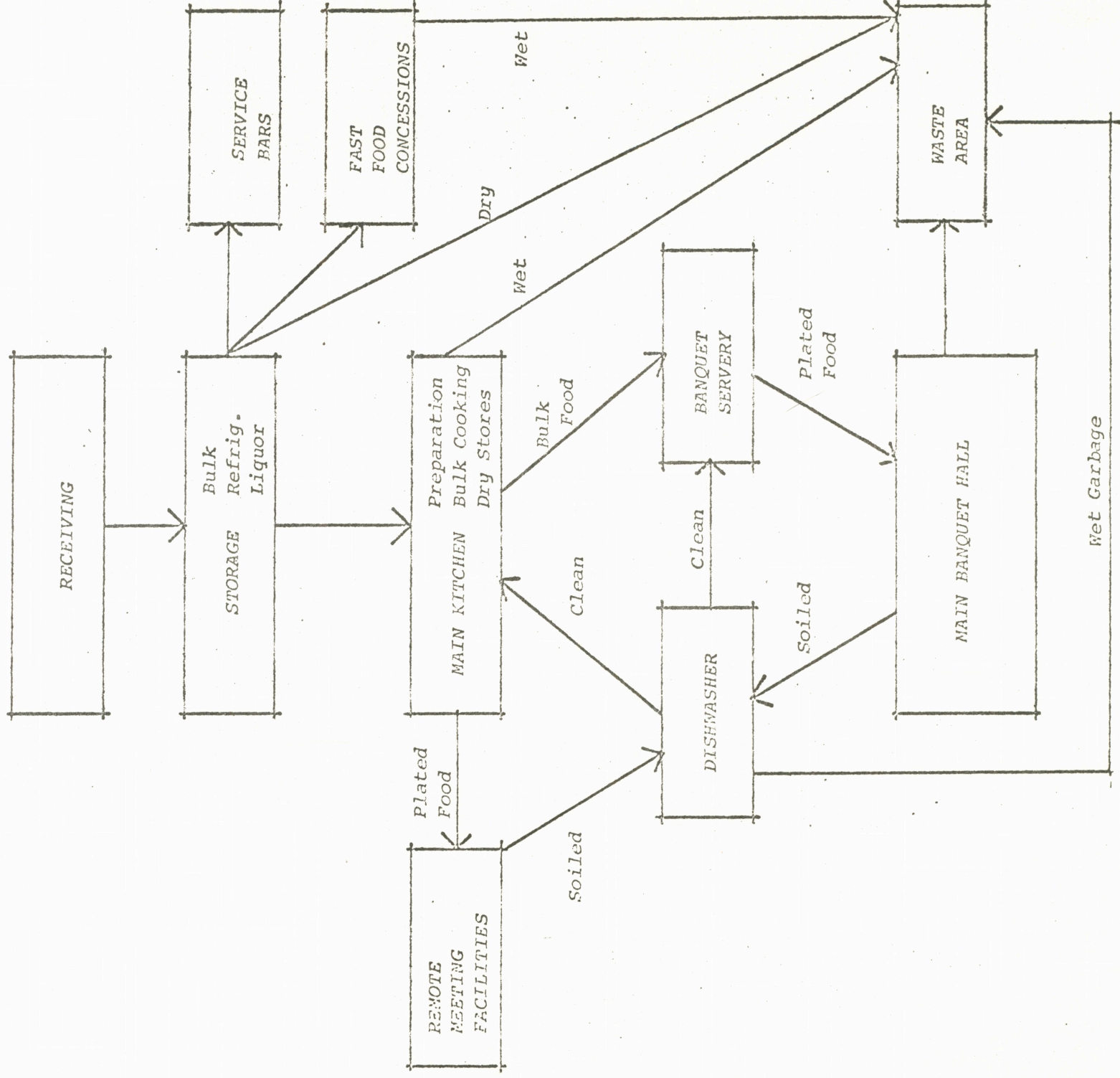
FOOD SERVICE FACILITIES

Good meals are an important factor in being able to ensure the return of a convention. The food service facilities in the Cultural and Convention Centre have been designed with this intent in mind. Approximately 17,600 sq.ft. of the total building area have been allocated to house the food services facilities servicing the Centre.

The convention-oriented facilities will include a full-production kitchen, along with ancillary requirements such as waste handling, storage, servery, dishwashing, fast food mobiles, bars, and cafeteria. All meals may be completely prepared on-site, with the kitchen operated by the City or leased to a specific caterer or caterers.

FOOD SERVICES FACILITIES

RELATIONSHIP DIAGRAM



A broad range of food service and production facilities will be provided.

(a) Banquet Facilities -

Provision of banquet food service for convention delegates requires three components:

- seating area
- service, storage and dishwash area
- production area.

The seating area must incorporate adequate area for circulation to facilitate rapid distribution of meals. An allowance of 10 square feet per person can accommodate both seating and circulation requirements but is generally considered "tight".

A servery area immediately adjacent to the seating area is mandatory to maintain hot, appetizing food. Dishwashing is to be done "in-house" so this area should be located close to the servery to minimize distribution time.

(b) Fast Food Facilities -

These facilities will feature very limited menus (although they may be changed to suit the market) and emphasize very fast service. The market segment that supports this type of facility is impulse oriented and seeks food service as a compliment or diversion from some primary activity.

Production and service capability is limited and seating usually non-existent, although informal "sidewalk cafe" or "planter box" seating can be considered here. The actual fast food unit may be fixed in location or mobile and completely self-contained except for service connections. A mobile cafeteria line is one example of

a specialized facility. This unit is essentially a conventional cafeteria line completely self-contained except for service connections. Food is transported from a remote production section by hot or cold food trucks and held in hot or cold holding sections of the line. Using a limited menu, a rapid throughput serving up to 10 people per minute is possible. Seating is temporary and arranged to accommodate the projected diners for a specific event. This serving rate will feed 600 people in a one hour period.

Hot and cold food carts are integral components of special service requirements where groups are served at locations remote from production facilities. Actual service may be directly from the carts or a temporary serving area may be allocated.

(c) Specialized Facilities -

Within a unique multi-purpose complex like the Cultural and Convention Centre, there may be a number of specialized requirements. Nine potential requirements are for special catered food service to smaller meeting areas.

Banquet Feeding -

On the basis of available data and projections of potential convention business, the proposed banquet area of 35,000 square feet is reasonable. Using a dense seating allowance (10 square feet per person), 3,500 people can be served a meal of appetizer, entree, dessert and beverage. More elaborate menus would unduly tax the circulation and serving system at this density. The scope of menu and service may be expanded as the total number of people decreases within the same seating area.

A servery should be provided adjacent to the main banquet hall that includes adequate space for dish storage and a dishwash area adjacent to the servery.

Exhibit and Supplementary Convention Feeding -

To satisfy anticipated demand for supplementary food service during Exhibit functions and between main convention functions, the following additional food service facilities are indicated:

- Mobile Cafeteria Line: complete with all services capable of providing a limited luncheon menu. This unit will be located as required to satisfy food service requirements. Food will be prepared in the central production facility and transported by hot food carts for service. Seating would be temporary and informal, located close to the serving line. The need for flexibility of area allocation is emphasized to accommodate this auxiliary food service.
- Fast Food Concessions: at least two fast food concessions will be required to provide snack food during exhibits and "breaks" in convention activity. Two mobile fast food units are recommended because of the benefits gained by strategically locating these units. Optimum service and revenue are important criteria that govern these units. However, there are certain types of exhibits that are not compatible with fast food service adjacent to them or in keeping with the actual displays. This restriction can be satisfied by locating the mobile fast food units outside the main exhibit area.
- Bar Service: The demand for beverage service should logically be satisfied by a combination of fixed service bars and mobile units. Two fixed full service bars complete with secure storage facilities should be located in the Foyer of the exhibit-convention areas. Mobile bars will be required to service remote areas of the convention banquet area and exhibit hall as well as meeting rooms. Issue to these remote bars should be from the permanent bar storage area.

EXHIBIT HALL

A space sensitive to the feeling of aviation accommodating exhibits honoring Canadian Aviators.

The Exhibit Hall is to be an open space allowing operating by one staff member and containing the following:

- 82 free-standing 4' x 8' panels
- a wall or partition system allowing for the future addition of approximately 30 4' x 8' panels
- display cases
- Link Trainer
- DC-6 Flight Simulator
- a space with controlled lighting for the purpose of projecting movies to approximately 12 people
- sales and admission area
- viewing deck around perimeter for visitors to view the River Valley and the Edmonton Cultural and Convention Centre

Director's Office

An office space for the Director of the Hall of Fame with the following:

- reception area with space for a secretary
- Director's office
- storage and workshop

Can be located separately from the Exhibit Room but within reasonable distance.

Public Washrooms

Washrooms are provided to serve specified major functions in the Centre. There are other functions too small to provide assigned washrooms for, therefore, a central set of washrooms shall be provided. As the City encourages visitors to the Centre with no specific reason except to be part of the activity, washrooms shall be provided for their comfort.

Cafeteria

Space allotted for this is for preparation and sales only. The menu will be fast food. Seating will be arranged in public space to best serve the particular function on any given date.

Public Space

A generous allowance shall be made for public spaces among the various functions of the Cultural and Convention Centre. Their primary function is to provide circulation between functions. They shall be pleasant, welcoming spaces, furnished with comfortable seating and decorated with art works.

Careful consideration shall be given to graphic and other means to provide orientation and information to visitors of the Centre.

The public space shall be so designed to accommodate a variety of functions such as small exhibitions, small/short performances, processions, etc. Wherever possible, visitors should be able to sense the activities happening throughout the Centre.

The area requirements are to be established as the design is developed that is, as related to adjacent spaces and functions.

Stairs, Corridors, Elevators and Escalators

Stairs, corridors, elevators and escalators must be provided to facilitate ease of movement of the people, equipment and supplies throughout the building. The design of the complex, in conjunction with the Building Code, will determine the type and nature of these.

Service Space, Mechanical and Electrical

Space shall be made available for electrical, mechanical and telephones equipment. Size and location of these rooms will be determined as the types of systems to be used are chosen.

Unassigned Space

Because of the difficulty in predicting all of the possible functions that could take place in the Centre, allowance is made here for future unknown functions.

Unassigned spaces shall be allocated for future functions which will add to the activity and use of the Centre. They shall be so designed and located so that they could be used individually or in conjunction with other functions.

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