A DYNAMIC EXPRESSION OF MOVEMENT

IN ARCHITECTURE

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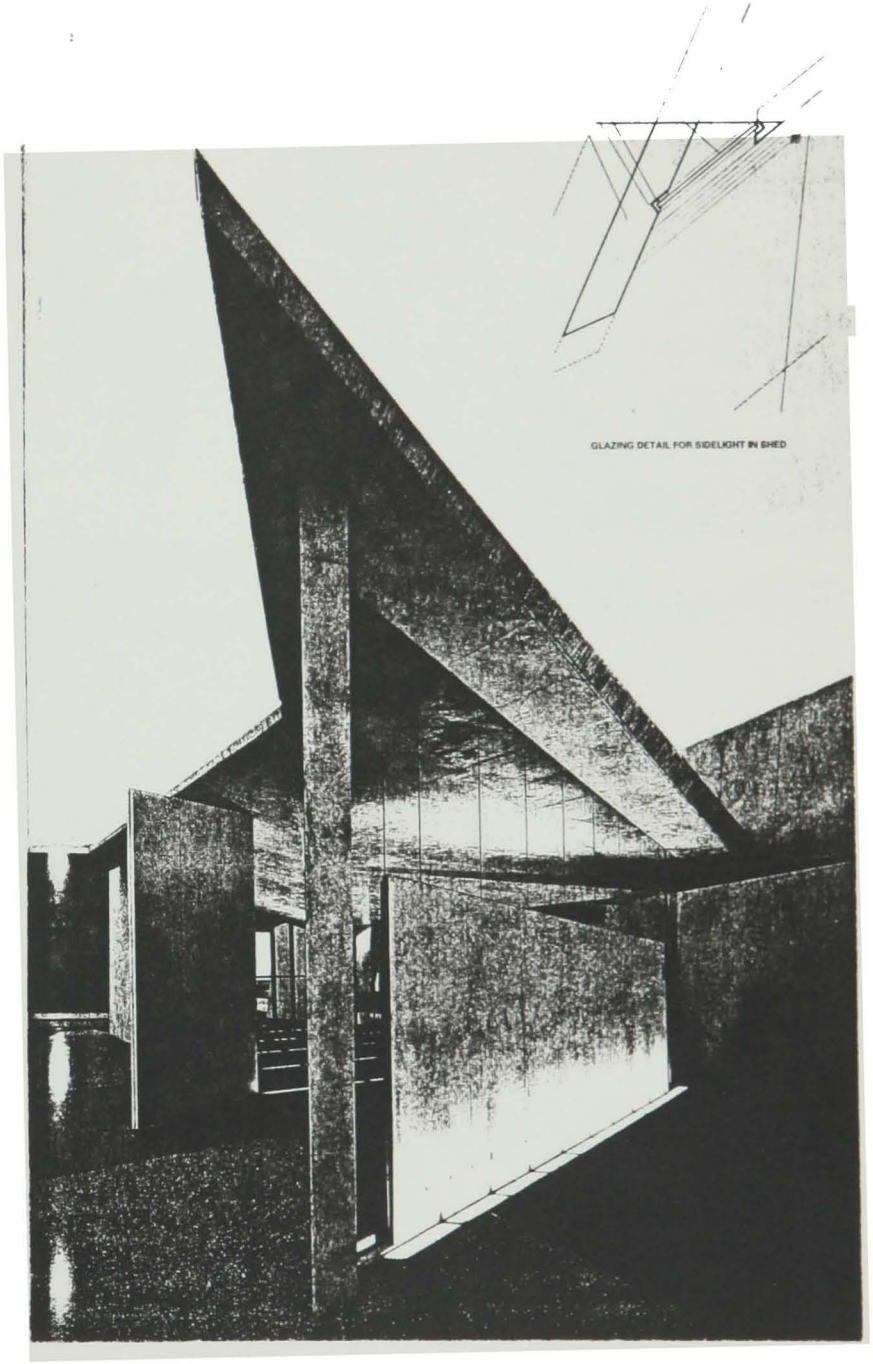
Part I

Thesis

THESIS STATEMENT

Architecture should be a means of making the activity of traveling an exciting and memorable event. Since this activity is of a dynamic nature, I believe that a building type in which this activity takes place should be of a dynamic nature also. It would completely contradict the laws of statics and stability, yet still remain standing. *Therefore, architecture should be a free-flowing and dynamic expression of form and space.*



ABSTRACT

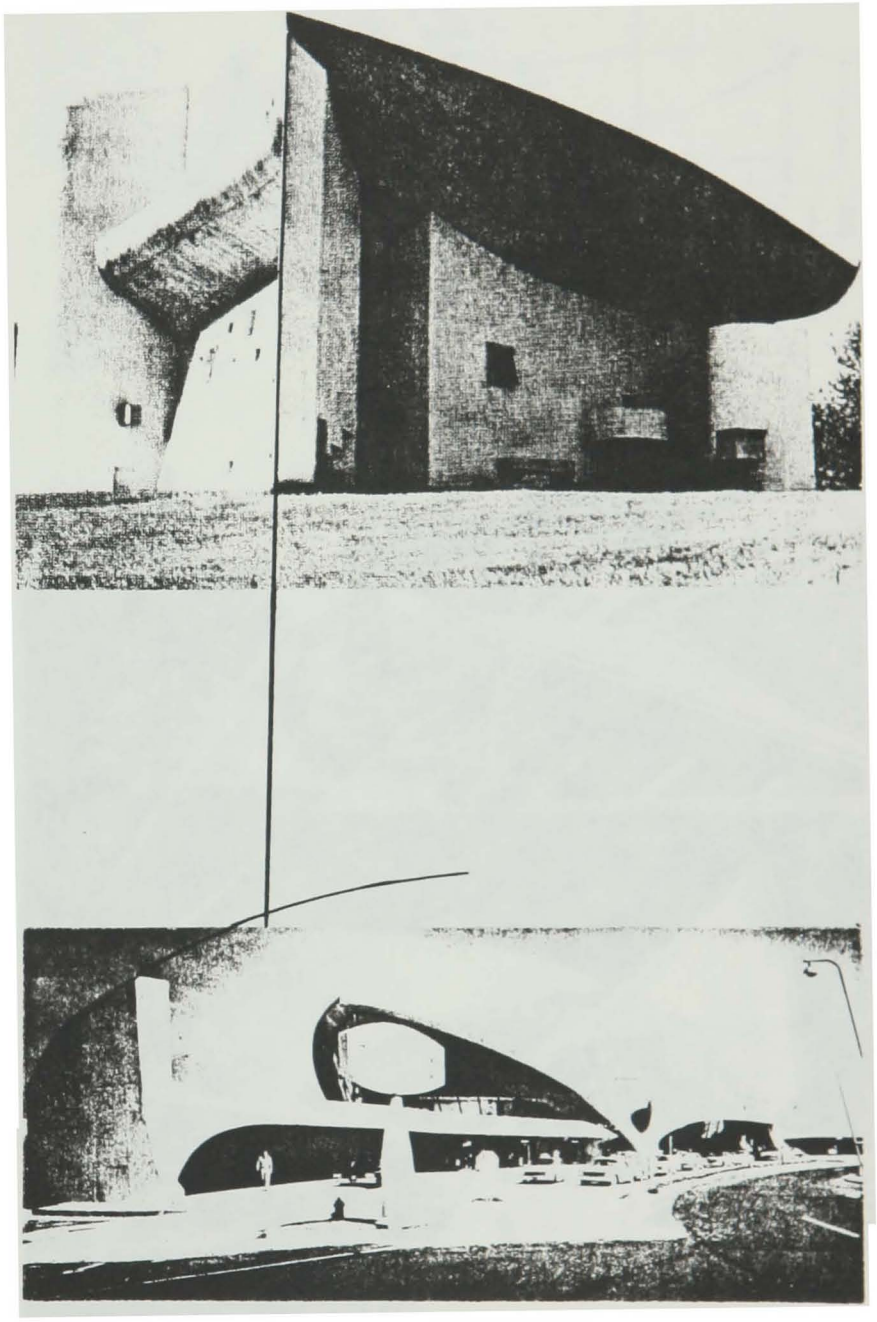
Architecture should be a free-flowing and dynamic expression of form and space. This architectural expression should run freely; proceed steadily and continuously; and appear harmonious while at the same time seeming forceful (marked by energy and vigor) and expressed in a metaphorical way. The metaphorical representation in architectural terms can be of two kinds: biomorphic or abstract. From free-flowing forms (biomorphic) to fragmented shapes (abstract), this is an expression of movement. Using these forms of architectural expression, I want to create an image which will reinforce the design of a transportation facility. This facility type being a bus terminal which will be a place instantly recognizable by travelers, fulfill their expectations as they arrive, and offer them a memorable impression as they depart. The context for my thesis is located in an undeveloped area on the northwest part of San Antonio's Central Business District. This area is easily accessible by the two major Texas State Highways (I35 and I10), and downtown streets.

THESIS ISSUE(S) AND

POTENTIAL DESIGN RESPONSES

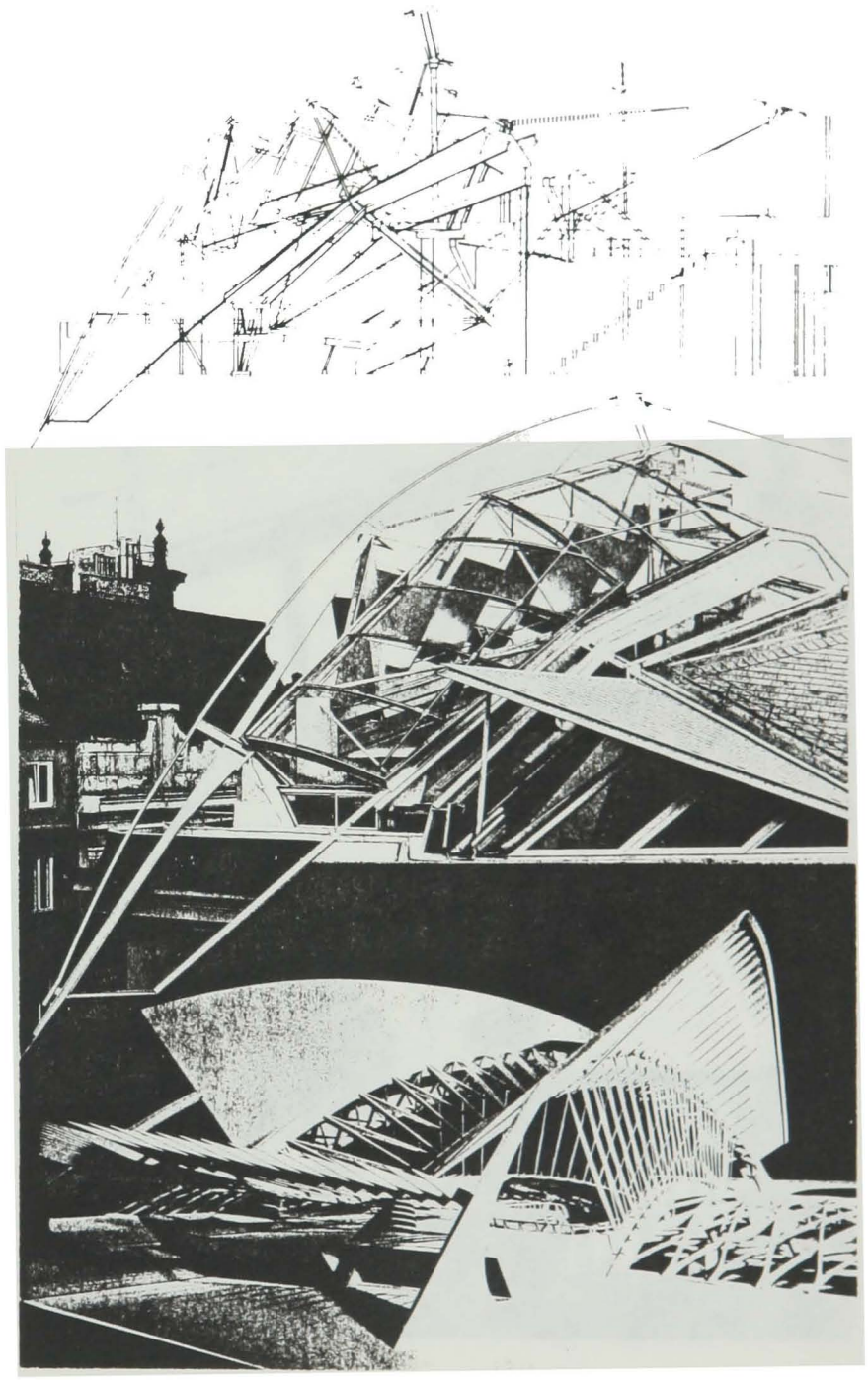
The thesis issue of free-flowing and dynamic expression of form and space would be achieved in a building that captures movement. Architects have always been concerned with movement in their works. To address these concerns, they use lines, shapes, texture, shadows, contours and color to lead our eyes over the surface or around edges. (Brommer, pg. 46) There are many buildings that have produced and generated architectural movement. For example, The Time Life Tower in New York uses vertical movement to create a feeling of balance and stability. Another example of this is the Chapel of Notre Dame in France which uses a sweeping movement on exterior contours. Yet another is the TWA terminal in New York. This terminal transmits a sensation of flight in which the eyes are led along the ridges and surfaces (both inside and out) in a free flowing and dynamic manner. (Brommer, pg. 73) Finally, "buildings do not move", nor are they shaped by movement. (Tzonis, pg. 285) Calatravas' buildings (being metaphorical representations of movement) can also be seen as structures "shaped" by movement since they tend to be structures meant to serve movement.

In response to the thesis issue, I propose the use of architectural metaphorical representation created through abstract or biomorphic forms. I believe that this can be accomplished with either an abstract form (describing a quality of thought apart from any concrete object or reality)



or a biomorphic form (mimetically describing an object or an integral part of it). In the case of Rooftop Remodeling at Vienna Austria, Coop Himmelblau used the abstract representation of either flight or an explosion. In both flying and exploding, the continuity of the form of the complete figure is broken into pieces of matter. (Tzonis, pg. 222) In other words, the figure is the product of a series of juxtaposition of fragmented forms and elements. In the case of TGV Railway Station of Lyon-Satolus in France, Santiago Calatrava used the biomorphic representation of a bird taking flight. In Calatrava's structure the streamlined motif of the general figure is repeated in the constituent components. Forms of the same family are fixed firmly in a fractal manner. (Tzonis, pg. 222)

Another response is proposing the use of implicit movement. Klaus Kada used this kind of approach in the Glasmuseum at Barnbach, Austria. Implicit movement is found when one first moves toward the museum. Alexander Tzonis explains how there is one's own movement as one is pulled into the structure, presented with "prospects and retrospects". (Tzonis, pg. 208) There is also the implicit movement of the parts which make up the structure, as if they had all been arrested in the process of being taken apart. (Tzonis, pg. 208) There is a third sense of movement that comes from the light. The way it is caught by the intersection surfaces as it penetrates the loosely defined volumes of the building through their wide-open seams (Tzonis, pg. 208) Klaus Kada accomplished all this through the use of glass. I also propose the use of glass in my design to obtain implicit movement.

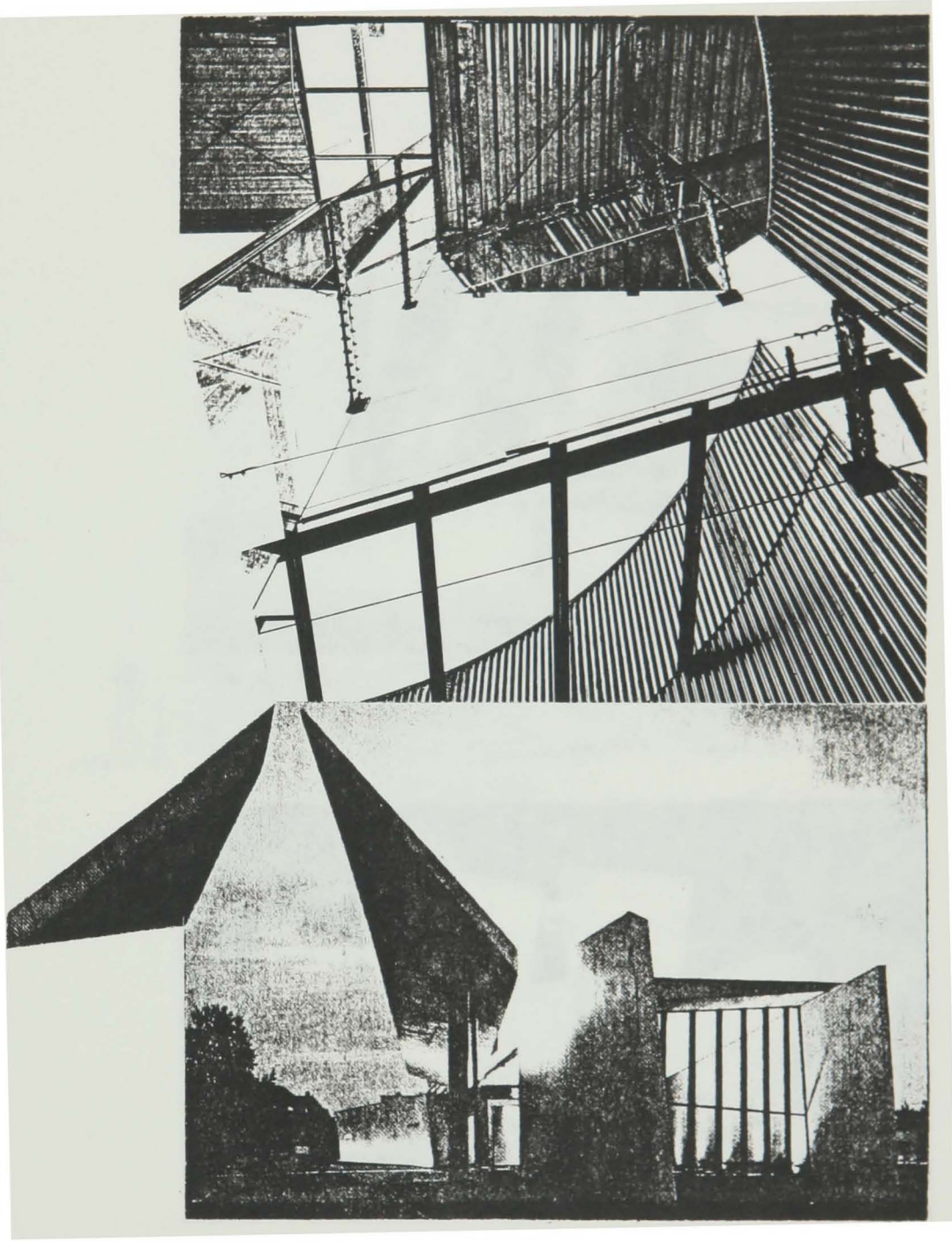


The use of high ceilings, curved and tilted walls, and flared volumes is yet another response to this thesis issue. These features will be important in evoking free-flowing and dynamic movement throughout the terminal. As in the case of Vitra Fire Station, Joseph Giovannini points out how Zaha Hadid used long-span cantilevers and walls, raised ceilings, curved and tilted walls, and flared volumes to freeze movement in concrete. (Giovannini, pg. 69)

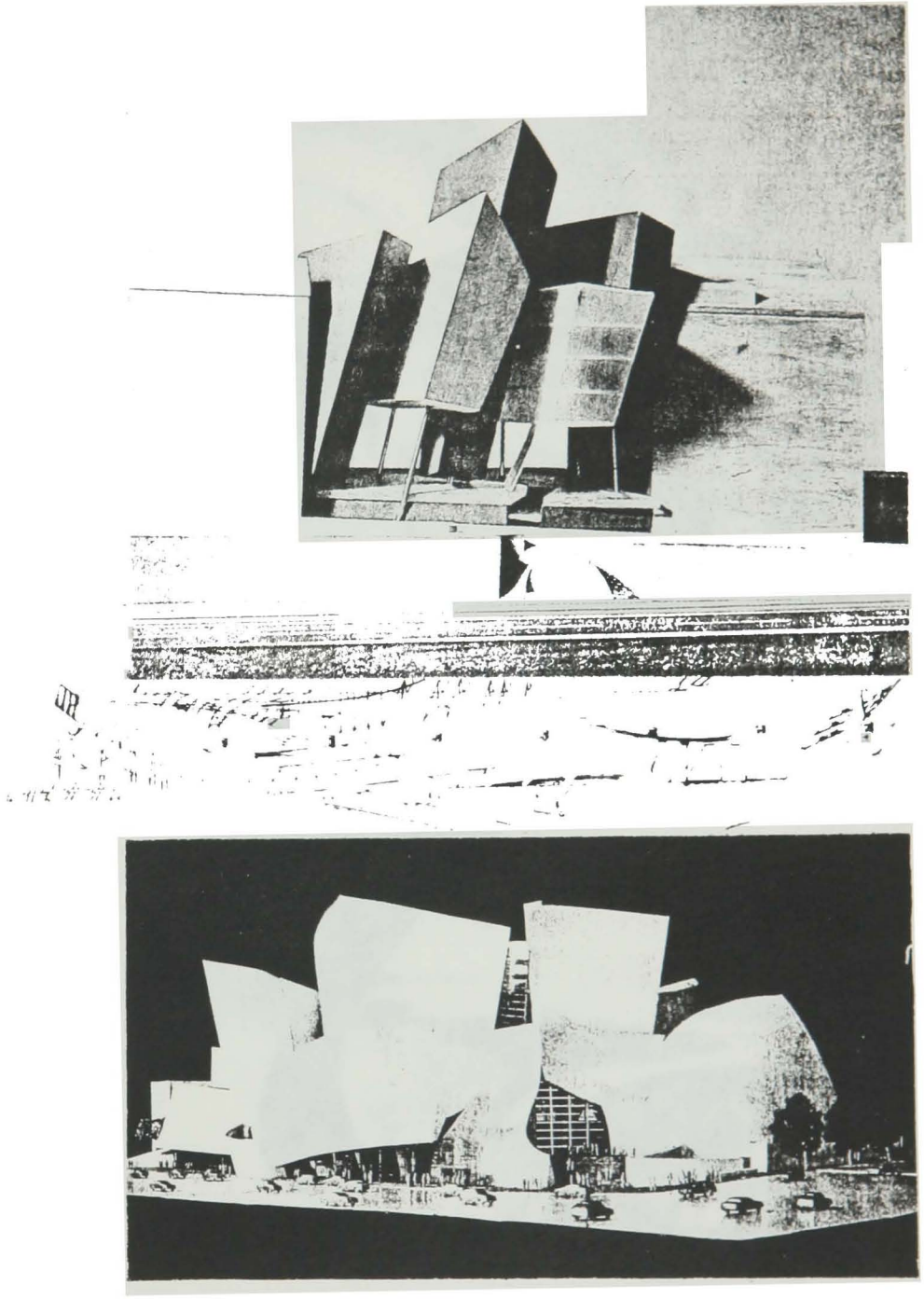
In responding to this thesis issue I also propose the lack of use of details and joints. Details and joints should disappear to enhance the illusion of movement. At the Vitra Fire Station, Zaha Hadid used frameless glazing placed into the concrete with virtually no intermediary [joint]. (Freeman, pg. 54) This would be done to allow the eye to continuously move through the dynamic shapes of the terminal without having to stop on bolts, struts and mechanical protrusions.

For this issue, I am also proposing the use of a straight line movement. Straight line movement is rapid and direct, not allowing for much wandering and discovery. Zaha Hadid used this same kind of movement in the Hatenstrasse Housing Project at Berlin. She managed to make her building envelope virtually "fly" out of the normally constraining urban block system of that city. (Peter Cook, pg. 67) Hadid accomplished this straight line movement by maintaining a consistency in the parts of her design. She used clear surfaces, pointed ends, darted and folded forms. (Peter Cook, pg. 67) I propose a similar response.

In response to the thesis issue, I propose to stress a unifying feeling throughout the facility. When several parts of a



building are placed together <clustered, overlapped, aligned> it is important to produce <express> movement from one part to the other, strengthening the design unity. The unifying design was achieved at the Disney Concert Hall by Frank Gehry. Here, the parts and volumes of the Concert Hall seem to flow together, giving a feeling of movement to and/or something alive. (Sarfati, pg. 88)



THESIS ISSUE(S) AND

POTENTIAL DESIGN RESPONSES

A second way of achieving my thesis issue of a free-flowing and dynamic expression of form and space is to infuse the space with a spirit which relates to the activities that take place in it. Architecture must provide differentiated form and space for different activities. It must also articulate them in such a way that the emotional content of the activity which takes place in them is reinforced.

In response to the second way of achieving my thesis issue, I propose an adequate 'fit' between form and function. At the TWA terminal in New York, Saarinen carried the curvature of the exterior shell into the interior, down to the smallest elements: the build-in seating, the lighting fixtures, even the waste receptacles in the restrooms. (Fisher, pg. 6) Such "total design" in which all aspects of a building derive from the same formal rules does not have adequate allowance for change, making most alternations both difficult and expensive. (Fisher, pg. 6) As a possible solution to this problem, I propose a looser fit between form and function.

In response to the different ways of achieving the issue of free-flowing and dynamic expression of form and space, I propose to 'uniquely' shape the spaces in order to give cues about circulation. The TWA terminal in New York is to some extent a built circulation diagram, with flowing and dynamic shapes fitting fairly closely to the movement of

passengers. (Papadementriou, pg. 103) In conclusion, Saarinen used biomorphic forms to represent the building's function. I also plan to use a form that will reflect the activities that occur inside a terminal. In this case, the terminal would be a place where constant movement of passengers and vehicles occur. In other words, a place of movement and transition. Therefore, passengers would be informed through a clear differentiation of volumes about where they are and how to find their destination.

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Part 2

Context

PSYCHOLOGICAL CONTEXT ISSUES AND POTENTIAL DESIGN RESPONSES

Orientation

I think that a very important area of the psychological context is that of spatial orientation of passengers. The passenger will be considered spatially oriented if he or she has an overall mental image or representation of the surrounding setting and is able to situate himself or herself within that representation. (Passini, pg. 23) In this case, the setting is the city of San Antonio, and the passenger could be a local resident, from another city or state, or even from a foreign country. Due to a bus terminal's confusion and disorientation, passengers' frustration and stress may arise by just trying to get to and around the terminal and even more by getting lost. These may cause the passenger to miss the bus. Therefore, I believe that through the use of environmental and architectural communication the passengers will be oriented enough to successfully find their destinations.

The first issue is the utilization of environmental <graphic audible, tactile> communication as a means of providing orientation and direction. The use of multiple means to communicate the same information is the best guarantee that messages get across. In a bus terminal, people need graphic information <signs> to orient and direct themselves and identify spaces. Visually impaired

people need audible and tactile information. This needs to come from a trained attendant, audible maps, and buzzers.

In response to this issue, I propose the use of signs. I will provide proper signage throughout the terminal. This type of information will have a variety of purposes such as: directing people from public city streets to a semi-public parking lots, from parking lots to the entrance of the terminal, and from the entrance to a specific interior location.

The second issue is the utilization of architectural communication also as a means of orientation and direction. Many people think that signs are the most important means of providing orientation clues in an urban or architectural setting. Nevertheless, natural and built context provide a person with a great variety of orientation clues, especially to a language-illiterate person. For instance, in San Antonio, a great percentage of the total bus ridership is people coming in and out of Mexico, who are unfamiliar with the language. Therefore, I believe that these will have to find their way in and out of the terminal by relying on its architecture and landscaping.

In response to this issue is to communicate to the people the type of layout and circulation system that the terminal has. Communicating the circulation system may be very difficult, but at the same time, may be very useful in orientating passengers. This system will be communicated through both the form and the volume of the building since this space should also be considered architecture. (Passini, pg. 139).

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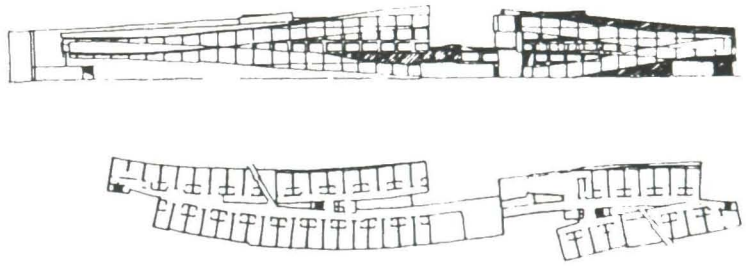
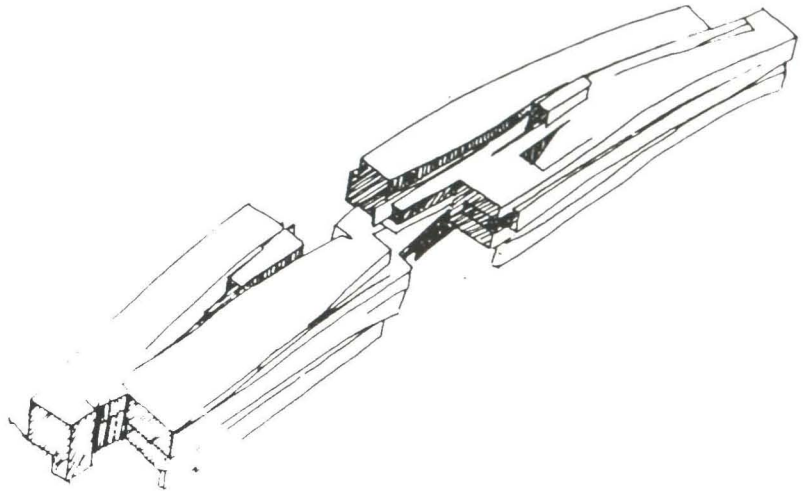
In regards to type of layout, <its spatial content, its form, its organization and its circulation system> the aesthetic quality of a building is not important, but in terms of architectural communication (the layout) should be clearly expressed through the building form. For instance, The Banyoles Hotel in Spain by Peter Eisenman is a building form expressing linear layout in which plans and elevations are very similar. (Passini, pg. 139).





NATURAL CONTEXT ISSUES AND POTENTIAL DESIGN RESPONSES

Climate

San Antonio covers 305 square miles in South Central Texas. The city lies just south of the Balcones Escarpment, at the confluence of three distinct geographic areas: the Hill Country of Edwards Plateau; the West Coastal Gulf Plains and the Rio Grande Plains (Collier's, pg. 388). It is situated at an altitude of 700 feet above sea level, 30 degrees North latitude. San Antonio is 190 West of Houston, and approximately 200 miles from the Gulf of Mexico coastal lines. The population of San Antonio was 935,933 in 1990. The population of the metropolitan area, covering all of Bexar, Comal, and Guadalupe counties, was 1,302,099 in 1990. (Collier's, pg. 388).

One issue is the use of appropriate technology in the design of the facility that will be climate responsive and energy efficient. San Antonio has moderately warm temperatures throughout most of the year. One can consider the weather as a hot, humid climate region with daily highs averaging 78 F. degrees and the low averaging around 53F degrees. The extreme temperatures can reach up to 107 F. degrees and in December drop down to -16 F. degrees. Sunshine blankets the city 62 percent of the year, providing over 203 days of clear to partly cloudy skies.

In response to appropriate technology, I propose the use of shading devices and natural light. Because many hours of day lighting is available, windows and skylights will have to be placed in areas where natural light will be more of an advantage. The layout and arrangement of the spaces of the facility will have to be thought out according to the orientation and sun angles to provide sunlight in desired areas as well as avoiding excessive in others through the use of shading devices.

Another issue is that of ventilation and temperature control. San Antonio receives most of its winds during the summertime and occasionally during the winters from the southeast. The average wind speed is under 8 mph. The northerly winds prevailing during most of the winter months bring with it the cold. The relative humidity for San Antonio averages above 80 percent during the morning hours dropping to 57 percent during the hours of the afternoon.

In response to this issue, I propose the use of natural ventilation. Ventilation and temperature in every space must be controlled through HVAC; especially in areas where the passengers and visitors will be spending most of their time. But it is preferable that the design of the facility allow natural ventilation for summer breezes to enter. Also, I want to keep the areas of the platforms and concourse open to the natural breezes, because I do not believe that providing airconditioning for such a large area is feasible.

Another issue is to provide shelter from the rain. Because the Gulf Coast is only 140 miles away, San Antonio is

frequently hit with rain storms and flash floods, averaging 27 inches of rain per year.

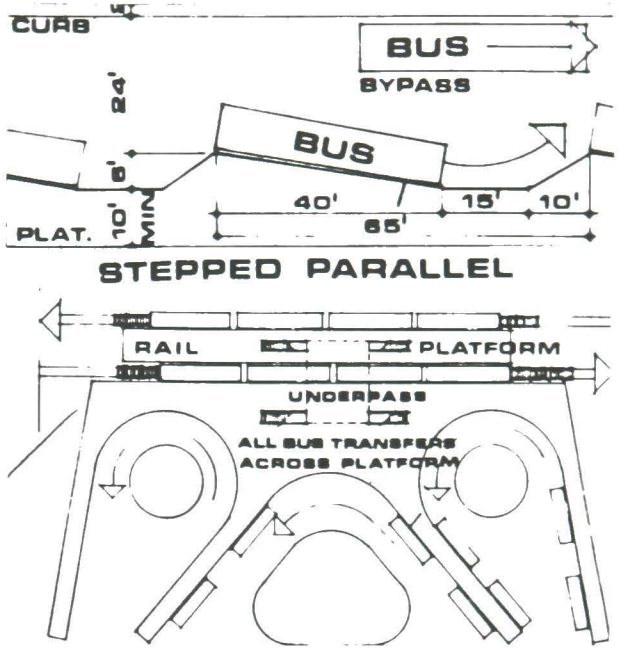
In response to this thesis issue, I propose that the arriving and departing platforms and concourse should be sheltered in some way. It may be that this area will be completely covered to provide protection from rain, but yet may be open enough to allow for natural breezes. The entrance to the terminal also has to have some covering to provide shelter. Perhaps a covered walkway, underpass or overpass can also be used to connect the terminal with the parking areas. This way people would be protected from inclement weather conditions.

Part 3
Facility

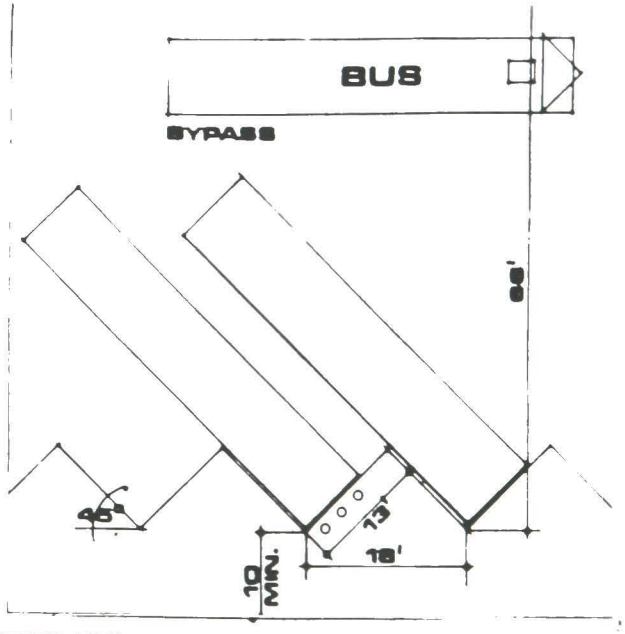
FACILITY PROGRAM ISSUES AND POTENTIAL DESIGN RESPONSES

One issue of the facility program is the type of platform layout the terminal would have. There are four types of platform layout. The first is the parallel loading type, which requires an excessive amount of space. Buses must usually wait until the first bus exits. This type of platform also requires pedestrian under or overpass facilities to protect passengers while crossing lanes. (John J., pg. 1115) The second layout and the least desirable is the right angle loading in which bus maneuvering is quite difficult. The third type is the sawtooth loading in which the passenger has direct approach to the loading door and the baggage truck can operate between buses for side loading. The last type of platform layout is the radial sawtooth loading. The buses swing into position along a natural driving arc. The space required at the front is minimum while a wider space at the rear makes it easier to maneuver. (John J., pg. 1115).

In response to the issue of platform type layout, I propose either the radial sawtooth loading layout or the parallel single lane island. The radial sawtooth loading type was chosen because it seems to be the most efficient layout. However, I intend to change the front space width to allow easy baggage truck maneuvering between buses for side loading. The parallel single lane island was chosen because it seems to be the next most efficient layout. However, I propose to make the single lane island into an island that



2 SINGLE ISLAND BUS RAIL TRANSFER



3 COUNTERCLOCKWISE MOTION

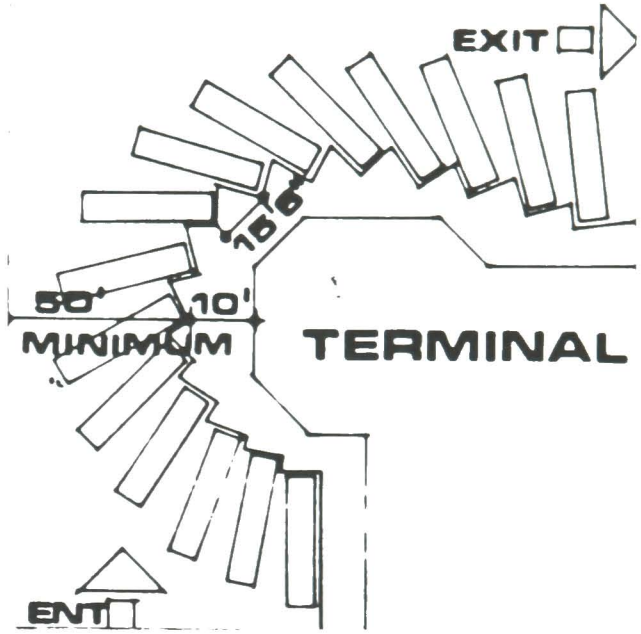
would accommodate a single bus. This would solve the problem of buses waiting for the first bus to exit.

Another issue of the facility is the critical separation of arriving and departing passengers. It is common to vertically separate arriving and departing vehicles at airports and to provide connecting bridges or underpasses for pedestrians circulation to and from the parking garage

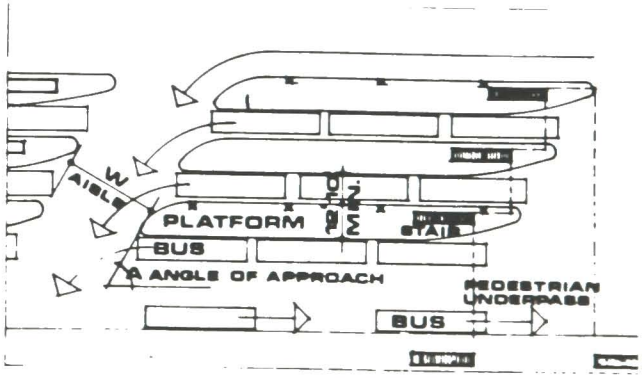
Vertical separation within the facility is my proposal for this issue. I intend to keep the arriving and departing buses on two separate levels. In doing this there will be a reduction to the risk of delays and congestion of passengers.

Another issue to consider is that passengers and buses should meet only at the moment of departure. Perhaps the reason most bus stations are so intensely unpleasant is because people are made to wander in a directionless manner in a garage full of fumes and oil slicks.

In response to this issue, I propose to extend the length of the interface between buses and building. This was done at the bus terminal in Stockholm. This proposal allows for as many buses as possible to be placed in such a way so that passengers can access them through a simple glass wall, without being exposes to fumes. Thus, the time when the passengers are not in either a bus or in a well-controlled environment will be very short. (Davey, pg. 6).



4 RADIAL SAWTOOTH



1 PARALLEL SINGLE LANE ISLAND

Bus Related Spaces

Main Entry <S1>

Provide sufficient space for an average of 37 people exiting the terminal. This separation between both activities is required to avoid conflict among between arriving and department passengers and visitors. The standard capacity of a free-swinging door is 20 persons per minute for free-flowing traffic.[i]

---Therefore, provide a main entry area of 225 sq. ft for a total of 75 passengers and visitors. Provide two entry doors and two exit doors plus an additional door for impaired persons' use.

Lobby <S2>

This is the transitional space which connects and leads into the most important areas. It is also the first place encountered when entering the terminal, and for which ample space is required for the ease of mass movement. Also required are the directional signs to help with orientation. This space should be directly accessible to the concourse. The passenger total quantity is calculated by multiplying the number of loading berths (12) by an average bus capacity of 37 persons.[ii] I assume that only two-thirds of the passengers will use the lobby at the terminal's busiest time. The other one-third of the passengers will be scattered throughout the terminal. This area will also have restroom facilities for both women and men. The women's restroom will require 15 water closets, 5 lavatories with

mirrors and a vestibule area. The men's restroom will require 6 water closets, 5 urinals, 4 lavatories, and vestibule area.[iii]

---Therefore, provide a lobby area of approximately 4000 sq. ft. for an average of 296 passengers. Provide also 800 sq. ft. for restroom facilities.

Information Counter <S3>

This space is at a counter area where the passengers or visitor may obtain information related to the bus terminal, bus schedule or San Antonio. It should be a small area located near the terminal entrance and adjacent to the lobby or in the lobby. The location should be highly visible and easily accessible to passengers. It should also contain a well-lighted directory or map with letters of appropriate size and contrast to be easily read.[iv]

---Therefore, provide 120 sq. ft. for two information attendants.

Ticket Counter <S4>

This space is a counter area where the passengers purchase their tickets. It is one of the firs spaces that a passenger should encounter. This ticket counter should be open to the front for the benefit of the passenger. One selling position should be provided for each 25 to 30 waiting-room seats.[v] The counter space may vary between 50 to 60 sq. ft. per position. The height of the counter is usually 42 inches.

---Therefore, provide an area of 360 sq. ft. for 6 ticket agents.

Baggage Check In/Collection Counter <S5>

This area is where the passengers will check-in and collect their baggage. It can also serve as the greeting place where

friends and relatives greet the arriving passengers. This space needs to be adjacent to the ticket counter. It should also be in an area close to the entrance/exit to prevent passengers from carrying their baggage for long distances. The baggage room should be accessible from both the public area and the concourse and should have an area of 50 sq. ft. for every loading berth (12).[vi]
---Therefore, provide an area of 600 sq. ft. for 4 baggage handlers. Certain percentage of this total square footage should be used for storage.

Package Express Counter <S6>
Bus package service would be provided together with the regular route services. High accessibility to the baggage room is required. It should also function without interfering with concourse traffic.
---Therefore, provide an area of approximately 120 sq. ft. for two package attendants.

Waiting Room <S7>
This space is where departing passengers get together and wait until it is time to board the bus or where visitors wait for arriving friends and relatives. This area will require comfortable seats and should be a stimulating and pleasant environment. It should also be in close proximity to eating and drinking areas. It should be also directly accessible to the concourse. There is an architectural rule of thumb that determines the amount of public seating needed. This rules provides one seat for every three passengers.[vii]
---Therefore, provide 2000 sq. ft. of waiting area. Provide 148 comfortable seats.

Car Rental Counter <S8>
This space is where passengers may rent automobiles for business or personal needs. This area should supply a variety of car rental companies together for the convenience of the passengers renting a car. It should also be situated next to the baggage claim area so that it will be easily accessed after getting their baggage.
---Therefore, provide about 240 sq. ft. for 4 rental agents.

Locker Rental <S9>
This space is where passengers rent lockers to store baggage and other personal belongings. Space must be close to waiting area. Tables will be provided for passengers to repack luggage if necessary. This locker rental area will have a total of 192 lockers of a standard size which is 15 in X 18 in X 12 in.[viii]
--Therefore, provide about 700 sq. ft. of locker rental area.

Shower Room and Restroom (2) <S10>
This space is where the passengers may take a shower and change clothes if necessary after a long journey. This space should be close to the general restrooms. It will have 48 lockers and 12 individual shower/dressing room combinations. The minimum size of an individual room is 6 ft. X 7 ft.[ix]
---Therefore, provide about 650 sq. ft. for shower rooms. Use 150 of this total square footage for the locker area and a restroom facility.

Security Office <S11>
This space will serve the bus terminal as well as the retail and administrative areas. It will manage and direct

vehicular and pedestrian traffic. It will also deal with conflicts and uphold the law. It will have a monitor area and observe possible congested and conflict areas.
---Therefore, provide a total area of 340 sq. ft. for four security officers. Use 100 of this total square footage for the monitor area.

First Aid Room <S12>
This space will be used to immediately give care to a passenger or visitor needing aid due to a sudden illness or injury. This area should be easily and quickly accessible from all areas of the terminal. This space will have a few shelves, sink and all medical supplies necessary to assist a patient.
---Therefore, provide 240 sq. ft. of first aid area for a nurse and a doctor.

Concourse and Platform <S13>
This space will be the main and busiest areas of circulation in the terminal and will need ample space for movement. It will have people moving in two or more different directions. In relation to the platform, the bus geometrics, physical dimensions and maneuverability of the bus would be determine the width of roadways, shape of platform(s), column spacing, ceiling heights and other aspects of bus level design.[x]
---Therefore, provide 5000 sq. ft. of platform area to accommodate a maximum of 12 buses at once. Provide a concourse of 2000 sq. ft.

Dispatch Office <S14>

This space controls all bus movement. It should be located on the concourse so that it can observe all loading berths. The size of the dispatch area varies form 50 to 150 sq. ft.[xi]

---Therefore, giving 50 sq. ft. per dispatcher position, provide 150 sq. ft. for 3 dispatchers.

Telephone Area <S15>

Communication through the use of the telephone is necessary in every building. In the terminal, for example, passengers will use the telephone to communicate their arrivals to friends or relatives. Standard telephone stall width is 30 inches.[xii]

---Therefore, provide a telephone area of 100 sq. ft. to accommodate 8 telephone stalls.

Restaurant <S16>

The place where passengers and visitors can enjoy a meal while waiting for their departure or while waiting for arriving friends or relatives. This space should be attractive enough to lure customers other than just passengers. It will have a lobby/cashier area to accommodate an overflow of crowds that could not be seated immediately. A dining area will also be provided with round tables, booths and single tables to promote a variety of social activities. It will require a few other secondary spaces, such as restrooms, kitchen/storage and manager office.

---Therefore, provide a dining area of approximately 2000 sq. ft. for 100 clients. Provide 260 sq. ft. for lobby/cashier area, 600 sq. ft. for restrooms, 900 sq. ft. for kitchen/storage, and 200 sq. ft for manager office.

Coffee Shop <S17>

A coffee shop is the place to get a quick meal, drink, or snack. This provides a faster service for passengers who are pressed for time. It is small place unlike the restaurant. It will require a small kitchen, a minimum number of tables and chairs, raised tables for eating while standing, a counter, and stools.

---Therefore, provide an area of 800 sq. ft. for 48 passengers and visitors.

Vending Area <S18>

The space where one can buy a soft drink and snacks through the use of a vending machine. This should be located near areas such as the waiting room so that people can have easy access to it. It will require a variety of vending machines such a change machine, microwave, cold food, cold beverages, hot beverages, ice cream, candy and snacks. Sizes of vending machines vary from 12 to 38 in. wide by 15 to 35 in. long.[xiii] It will also have a dining area of 300 sq. ft., two telephone stalls and a janitorial closet.

---Therefore, provide a total vending area of 900 sq. ft.

Shops (5)/Gift Shop (1) <S19>

These spaces will be necessary for the passenger and visitor to brows and shop while waiting. The terminal can also benefit financially by the incomes the shops will be producing. The area where the shops will be located should be like a mall-type arrangement. These spaces should be separate from the bus-related spaces to avoid traffic between passengers and visitors who are in a rush and those that are passing time. Perhaps they must be located on a different level. There should also be a variety of shops, such as souvenirs, gifts, clothes, art work, toys and candy. The shops' dimensions are 15 to 18 ft. wide by 60 to 80 ft. long.[xiv]

---Therefore, provide an area of 900 sq. ft. for every shop. Use 200 of this square footage for a storage room.

Game Room <S20>

This space will be used for the housing of video games which may provide people with the opportunity to relax and relieve stress from their journey. This space will require

sufficient room for the placement of the video games. Electrical outlets, more than usual number needed for any room, are also required. The lighting in this room should also be dimmer so that there will not be excessive glare on the screen of the video games. Stools for seating while playing may be necessary.
---Therefore, provide an area of approximately 1500 sq. ft.

Bank <S21>
This space will blend excitement and attractiveness with a feeling of security. It will contain a seating area, tellers, loan office, a manager office, a check-writing counter, a safety vault, and 2 ATM's. Teller should be located so that they are easily accessible and so that the spaces surround them allow easy circulation of the public. The loan office should be readily available.
---Therefore, provide a total area of 900 sq. ft. to the house 3 tellers, one manager, and one loan agent.

Newsstand <S22>
Retail space where passengers would purchase items such as newspapers, magazines, candy, etc. This space will need to be in close proximity to the waiting room. Direct access to the magazines and newspapers displayed as well as sufficient light for comfortable vision is required.[xv]
---Therefore, provide an area of 800 sq. ft.

Post Office <S23>
This space will be used to collect, sort, and distribute mail of passengers and visitors. The size of this area is calculated by giving 2 sq. ft. for each 1000 sq. ft. of leasable space.[xvi]
---Therefore, provide an approximate area of 360 sq. ft.

Restroom <S24>

Restrooms are needed in almost every king of building. In the terminal, they should be located near eating areas. There will be a separation between men's and women's restrooms. The men's restroom will require 3 water closets, 4 urinals, 3 lavatories, and vestibule area. The women's restroom will require 9 water closets, 4 lavatories and a vestibule area.[xvii]

---Therefore, provide about 600 sq. ft. for both restroom facilities.

Supervisor Office <S25>
This space will be occupied by the top official and naturally will be the largest and best office area. The supervisor needs more space not only for prestige, but because he or she has more than the usual amount of business meetings.
---Therefore, provide an office area of approximately 300 sq. ft.

Bookkeeping Office <S26>
This space will be adjacent to the supervisor and secretary areas. It is the place for maintaining records, calculating payrolls, etc. This space is of confidential nature and requires isolation from the general public. Desirable private offices vary from 300 sq. ft.[xviii]
---Therefore, provide an office area of 225 sq. ft.

Passenger Agent Office <S27>
It is the space used for maintaining public relations, providing information and receiving complaints from the passengers. This space would have a great number of visitors. Consequently, it should be located so that the visitor will have a short, direct and convenient route. This space should be partially separated from the rest of the

administrative spaces to offer the least amount of disturbance to employees.
----Therefore, it provide an office area of 225 sq. ft.

Secretary Office (3) <S28>
This space will provide general service for the supervisor, bookkeeper and passenger agent. This space could be a general open office space, which will house 3 secretaries. The size of the space will be based upon the furniture and equipment necessary to perform their work.
---Therefore, provide an area of 150 sq. ft. for each secretary position.

Copy Room <S29>
This space would handle the printing of all terminal letterheads, forms, time schedule, etc. Sufficient space is required to accommodate two copy machines, paper and a table to work on.
---Therefore, provide an area of 100 sq. ft for a copy room.

Conference Room <S30>
It will be the gathering place for retail and terminal personnel for meetings related to the terminal. Meetings concerning public affairs can be discussed as well. This space should be located in an interior area within the terminal. This location would eliminate outside distraction and the need for window coverings during visual presentations. Conference rooms should be designed to accommodate an average (but not maximum) attendance.[xix] Extra chairs can be used to achieve additional seating.
---Therefore, provide an area of 800 sq. ft. for an average of 30 employees.

Break Room <S31>

An area where the employees can relax and rest during their breaks during working hours. This area will be a large room which can be divided according to the activities performed, such as sitting, eating, watching television, etc.
---Therefore, provide a break room area of 600 sq. ft.

Utility Room <S32>

This space will house general office supplies essential to the terminal. The supplies should be readily available to employees.
---Therefore, provide an area of 200 sq. ft.

Restrooms <S33>

These restroom facilities will serve mainly the terminal's employees and occasional visitors. The men's restroom will have 2 water closets, 2 urinals, and 2 lavatories. The women's restroom will have 4 water closets, 2 lavatories.[xx] Therefore, provide about 400 sq. ft. for both restroom facilities.

Mechanical Room <S34>
This will be the space(s) which house all the mechanical equipment necessary to run the terminal. Air conditioning/heating units, water heater, electrical equipment, etc. will all be incorporated in this area. The total mechanical area for this type of building will usually be 15% of the total net square footage.[xxi]
---Therefore, provide a mechanical area of 5450 sq. ft.

Janitor's Room <S35>
The housekeeping and maintenance areas are very important in every building. It is necessary to provide sufficient space for all custodial functions and equipment. This area will also have restroom facilities for both men and women and a break room. The men's restroom will require 2 water closets and 1 lavatory. The women's restroom will require 2 water closets and 1 lavatory.[xxii]
---Therefore, provide a total area of 900 sq. ft.

Delivery and Storage <S36>
The space will be mainly used to store and deliver food for the restaurant and coffee shop. It will also be used for the delivery of merchandise to retail shops. It is necessary to provide sufficient space to accommodate two conventional semitrailers at once. The average dimensions for these vehicles are 55 ft. long by 8 ft. wide. Its practical turning

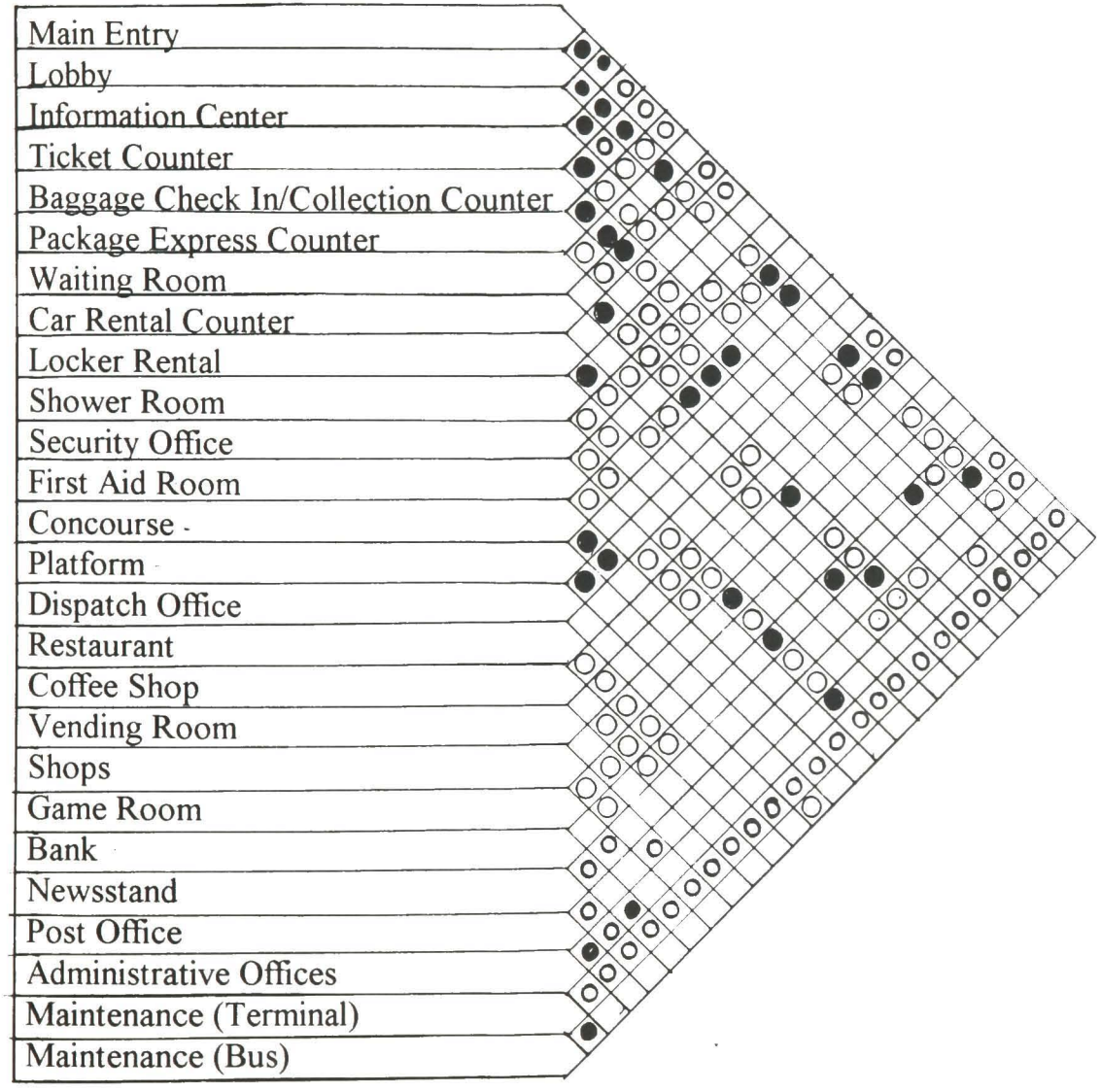
radius is 45 ft.[xxiii] Certain space will be assigned for a dumpster.
---Therefore, provide a delivery and storage area of 1000 sq. ft.

Bus Maintenance Garage <S37>
This space will be used for the upkeep of buses. This area would be where buses are cleaned, fueled, stored, or repaired. The space required to perform any of these activities is about 500 sq. ft. per bus.[xxiv]
---Therefore, provide an approximate area of 2000 sq. ft. to house 4 buses.

PARKING

1. Employee Parking
   This area is reserved for the employees of the bus Terminal.
2. Short-Term Parking
   Short-term parking will be used by those people that are not going to stay for long periods of time in the terminal. Mainly, they are the ones who pick-up or drop-off travelers.
3. Long-Term Parking
   Long-term parking will be used by passengers who are going to be away for long periods of time.
4. Pick-up and Drop-off Zone
5. Taxi service

SPACE RELATIONS



Strong Separation □
Minimal Relation ○
Maximum Relation ●

SPACE SUMMARY

Bus Related Spaces

SPACES	Capacity	NSF	Refer
Main Entry	75	225	S1
Lobby	296	4000	S2
Restrooms (2)		800	S2
Phone Area		100	S15
Information Counter	2	120	S3
Ticket Counter	6	360	S4
Baggage Check In/Collection Counter	4	600	S5
Package Express Counter	2	120	S6
Waiting Room	148	2000	S7
Phone Area		100	S15
Car Rental Counter	4	240	S8
Locker Rental		700	S9
Shower Room and Restrooms (2)	24	650	S10
Security Office	4	340	S11
First Aid Room	2	240	S12
Concourse and Platform		7000	S13
Dispatch Office	3	150	S14
TOTAL NSF		18395	

Bus Support Spaces

SPACES	Capacity	NSF	Refer
Restaurant	100		S16
Lobby/Cashier		260	"
Dining Area		2000	"
Manager Office		200	"
Restrooms		600	"
Kitchen and Storage		900	"
Coffee Shop	48	800	S17
Vending Room	24		S18
Vending Area		600	"
Dining Area		300	"
Shops (5) /Gift Shop (1)		900	S19
Game Room		1500	S20
Bank	5	900	S21
Newsstand		800	S22
Post Office		360	S23
Restrooms (2)		600	S24
TOTAL NSF		11000	

Administrative Spaces

SPACES	Capacity	NSF	Refer
Supervisor Office	1	300	S25
Bookkeeping Office	1	225	S26
Passenger Agent Office	1	225	S27
Secretary Office (3)	3	150	S28
Copy Room		100	S29
Conference Room	30	800	S30
Break Room		600	S31
Utility Room		200	S32
Restrooms		400	S33
TOTAL NSF		3000	

Maintenance <Bus/Terminal>

SPACE	Capacity	NSF	Refer
Mechanical Room		5450	S34
Janitorial			S35
Storage		300	"
Break Room		300	"
Restrooms		300	"
Delivery and Storage		1000	S36
Bus Maintenance		2000	S37
TOTAL NSF		9350	

SPACE SUMMARY

Terminal Square Footage

- Total Net Sq. Ft. = 41,745 sq. ft.

(X 1.3)

- Usable Sq. Ft. = 54, 268.5 sq. ft.

(X1.2)

- Gross Sq. Ft. = 65,122 sq. ft.

PARKING

- Employees (60) (333 sq. ft.) = 19,980 sq. ft.
- Passengers (250) (333 sq. ft.) = 83,250 sq. ft.

PROJECT COST

-Building Cost*
($ 74.50/s.f x 65,122 s.f) = $ 4,851,589.00

-Land Cost
($1.50/s.f x 168,352 s.f) = $ 252,528.00

-Site Work
13 % of building cost
(.13 x $ 4,851,589.00) = $ 630,706.57

-Architectural Fees**
7 % of building cost
(.07 x $ 4,851,589.00) = $ 339,611.23

- Construction Loan Cost
11 % of building cost
(.11 x $4,851,589.00) = $ 533,674.79

- Contigency Cost
5 % of building cost
(.05 x $4,851,589.00) = $ 242,579.45

TOTAL COST = $ 6,850,684.04

INCOME

- Total income
(54,268.50 u.s.f x $ 12 s.f/yr) = $ 651,222.00

PAYBACK

payback = project cost / project income (P = C/I)
($ 6,850,689.09 / $ 651,122.00) = $ 4 1/2 years

* Based on Assemblies Cost Data , 1992 edition
** Base on Means Square Foot Cost, 1993 edition

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Endnotes

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iv. Joseph de Chiava, Time Saver Standards for Building Types, 2nd ed. (New York: McGraw Hill, 1980), p. 789.

v. Ibid. p. 985.

vi. Ibid. p. 985.

vii. Ibid. p. 985.

viii. Ramsey\Sleeper, Architectural Gaphic Standards, 8th ed. (New York: McGraw Hill, 1987), p. 22.

ix. Ibid. p. 22.

x. Joseph De Chiara, Time Saver Standards for Building Types, 2nd ed. (New York: McGraw Hill, 1980), p. 987.

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xii. Ramsey\Sleeper, Architectural Graphic Standards, 7th ed. (New York: McGraw Hill, 1981), p. 699.

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xv. Ibid. p. 740.

xvi. Ramsey\Sleeper, Architectural Graphic Standards, 7th ed. (New York: McGraw Hill, 1987), p. 513.

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xxi. Architectural Rules of Thumb, (Guidelines Publications), p. 40.

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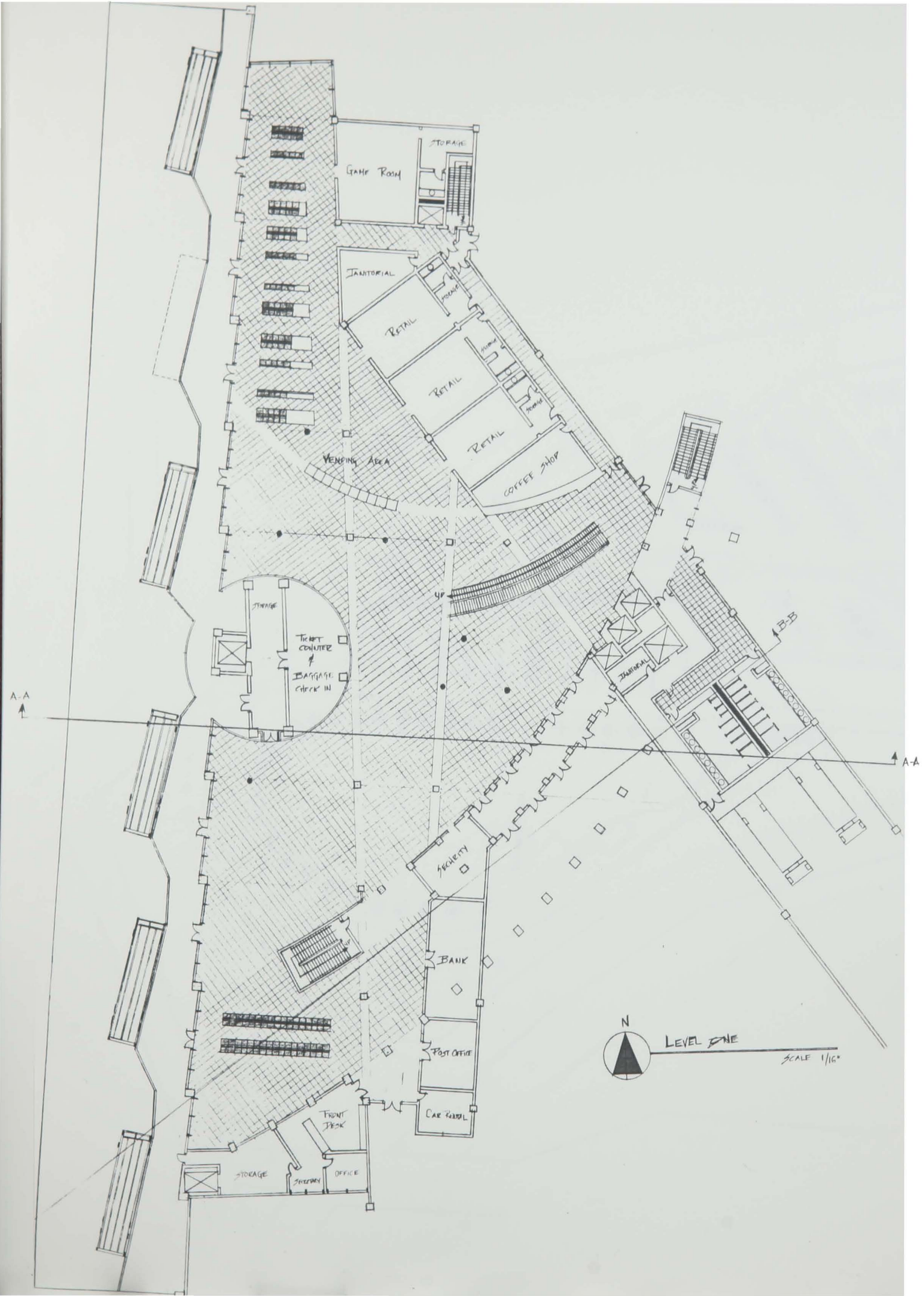
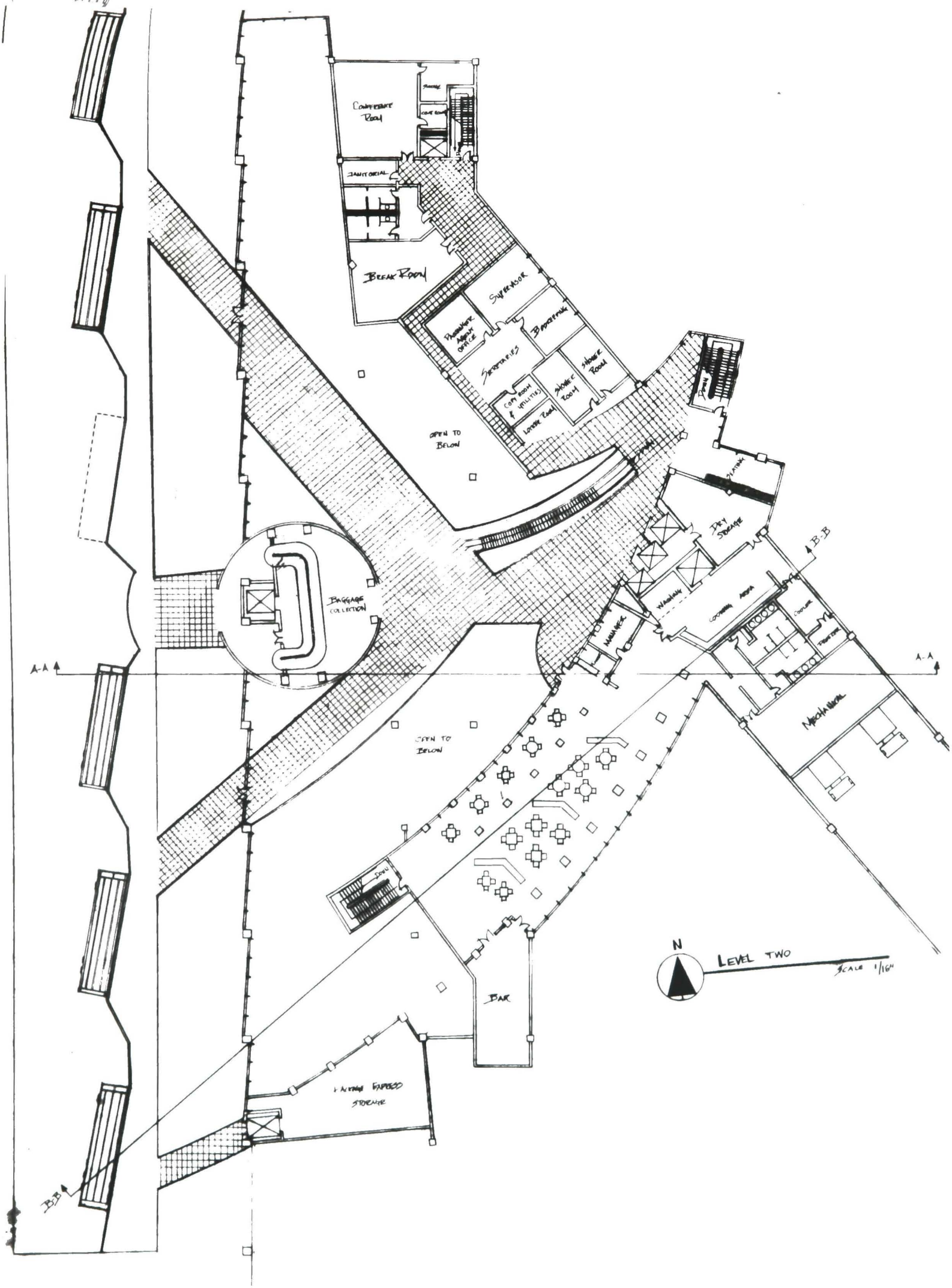
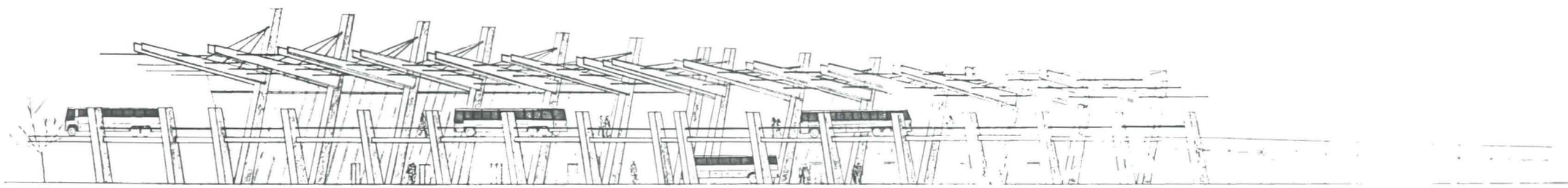
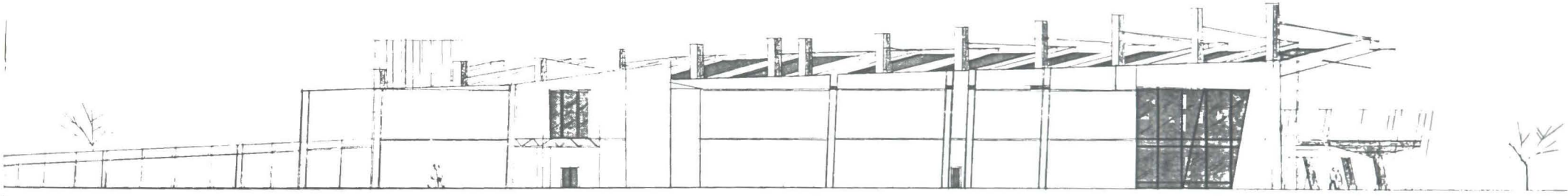
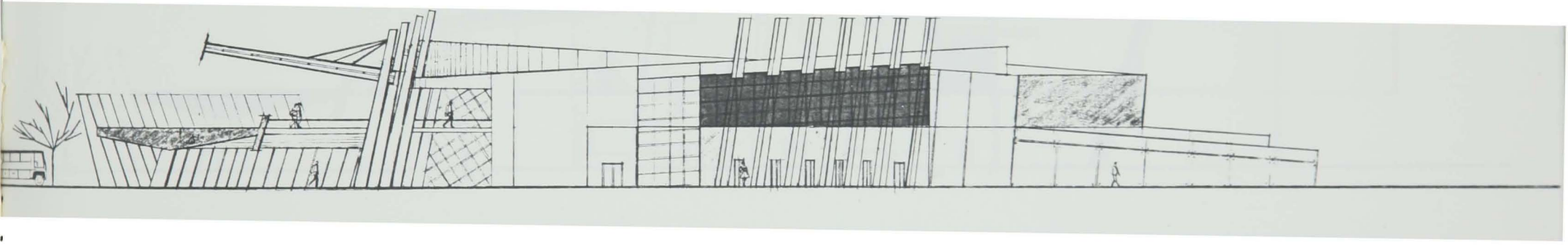
N
Site Plan


STORAGE
GAME ROOM
JANITORIAL
STORAGE
RETAIL
STORAGE
RETAIL
STORAGE
RETAIL
VENDING AREA
COFFEE SHOP
UP
STORAGE
TICKET COUNTER
BAGGAGE CHECK IN
A-A
A-A
B-B
JANITORIAL
SECURITY
UP
BANK
POST OFFICE
CAR RENTAL
FRONT DESK
STORAGE
SCREENING
OFFICE
N
LEVEL ONE
SCALE 1/16"

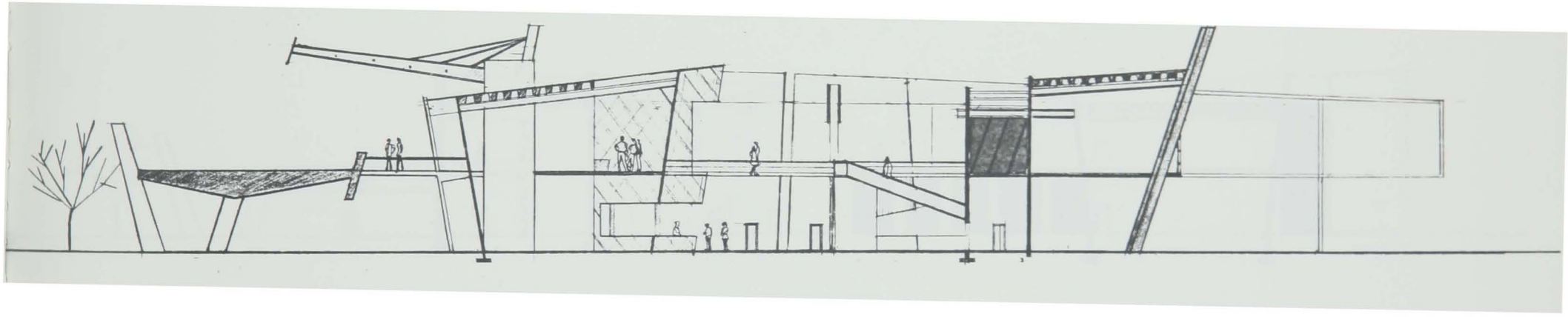

CONFERENCE ROOM
JANITORIAL
BREAK ROOM
SUPERVISOR
PASSENGER AGENT OFFICE
BAGGAGE
SECRETARIES
COM ROOM & UTILITIES
LOCKER ROOM
SHOWER ROOM
SHOWER ROOM
OPEN TO BELOW
DRY STORAGE
WASHER
MANIFOLD
COOKING AREA
COOLER
TRAY STORE
MECHANICAL
BAGGAGE COLLECTION
OPEN TO BELOW
BAR
BAGGAGE STORAGE
A-A
B-B
N
LEVEL TWO
SCALE 1/16"





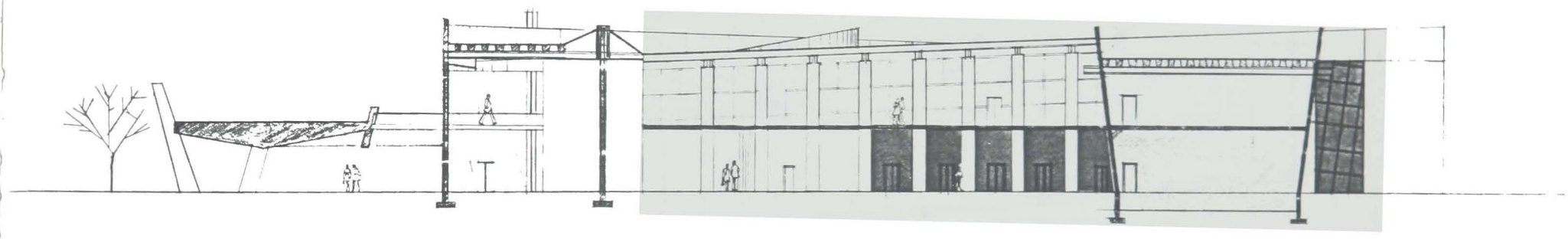


SOUTH ELEVATION



SECTION A-A

1/16"



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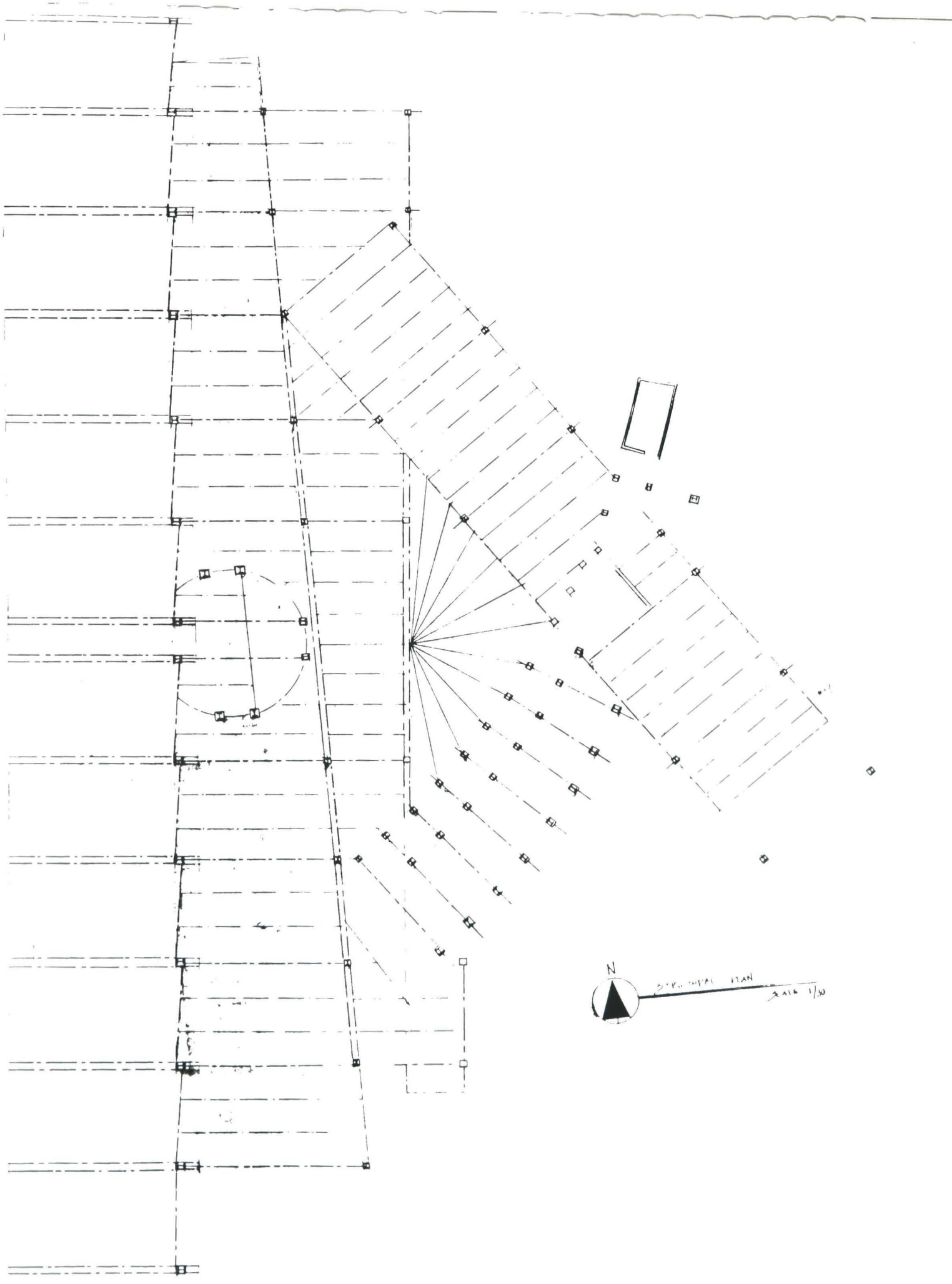
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