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MOSES LAKE INTERNATIONAL AIRPORT

Moses Lake, Washington

James Devine

Thesis

Spring 1993

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THESIS STATEMENT

The thesis project is to design an international airport in Moses Lake, Washington that would serve as a satellite airport for SEA-TAC. The airport would be linked by a high speed Maglev train to Seattle-Tacoma and Spokane.

GOALS

1. *To design an airport that is futuristic.*

2. *To successfully bring together three forms of transportation - the plane, the train, and the car.*

3. *To create an airport that is user friendly.*

4. *To design an airport that is interesting as well as functional.*

5. *To utilize and combine the skills and education of the past five years into one synthesis project.*

HISTORY of MOSES LAKE

Moses Lake is located approximately the middle of the state of Washington amidst the Columbia Basin. The name of the community was derived from an Indian Chief by the name of Sulktalthscosum. It may seem like an accomplishment to get Moses out of Sulktalthscosum, but it was simple. A group of Presbyterian missionaries occupied the area and had many dealings with Chief Sulktalthscosum and began to call him Moses. It might have had biblical ties, but it could have also been a good reason to not have to try to pronounce such a long and difficult name. The Chief was accused of murder in 1878 and forced to move from the community by the American government. The people in the area felt he was innocent and put blame on another Indian tribe that operated in the area. The community, out of respect for the fallen leader, changed the name of the hamlet of Neppel to Moses Lake in his honor.

The history of the community itself began in 1910 still under the name of Neppel. It was founded on agriculture and is now a commercial hub for the Columbia Basin in Grant County. The farmers came and settled because of a lake which provided irrigation for their crops and also various forms of recreation. The community is like an oasis in an almost desert like atmosphere that surrounds the area.

The city now consists of 11,235 citizens who have endured a few major blows to the economic structure of the community. The Air Force base was closed in 1965, and a major business closed in 1978 leaving many jobless. Also they endured the eruption of Mount St. Helens in 1980 which left four to six inches of fine glass like ash, which still remains in smaller quantities throughout the area.

Within a five mile radius the population springs to about 25,000 consisting of agriculture and people living outside the drawn city limits.

The community, however, is starting to grow again with the introduction of new businesses providing a better economic base and the hope for further introduction of business to the area to make use of its ideal location. The location of other major cities in Washington are:

Wenatchee	*70 miles*	*Northwest*
Yakima	*110 miles*	*Southwest*
Tri-Cities	*75 miles*	*South*
Spokane	*102 miles*	*East*
Seattle	*176 miles*	*West*

The location makes it an ideal location for trade and as a major transportation hub. The future of Moses Lake depends highly on this location.

CLIMATE

The climate is characterized by warm summers and mild winters. The average rainfall is about eight inches and the average snowfall is fifteen inches. "Chinooks" add to the effects of a mild winter by increasing temperatures in an often quick and erratic manner. The average afternoon temperature in the summer is in the upper 80's with the nighttime low being in the 50's. During the winter the daytime temp. is around freezing with the nighttime lows being around 15 to 20 degrees Fahrenheit.

Temperature Range (in Fahrenheit)	Min.	Ave. Min.	Max.	Ave. Max.	Median
January	-3	18.8	52	34.1	26.5
March	23	29.7	69	52.6	41.2
May	36	42.9	78	71.1	57.1
July	48	53.7	100	86.8	70.3
September	33	44.6	91	76.5	60.5
November	18	27.7	61	45.9	49.0
Year		36.6		61.4	49.0

Temperature Duration	Ave. Number of Days
Below 32 degrees F	21
Above 90 degrees F	30
Growing Season	140-160

Precipitation	Ave. Inches	Ave. Days
Snowfall, sleet, Hail (1.0 inch or more)	17.60	19
Rain (.01 inch or more)	7.74	53

Note: Severe electrical storms are rare occurrences and limited to narrow paths. There are no tornados and winds only occur frequently in the spring with less frequent appearances in the fall and summer.

CONTEXT AND HISTORY

The site is located at the Clark County Airport and covers the area of land used by the existing terminal and outbuildings comprising the airport. It also extends into the existing parking apron. It is located in a desolate area with little or no architectural precedent.

The history of the airport dates back to the 1940's. Moses Lake Army Air Base was activated on November 24, 1942 and was used for training of B-17 and P-38 pilots. The name was changed to Larson Air Force Base in 1944. In 1945, the base was put on standby status. During the fall of 1948, the air base was reactivated and equipped with facilities and personnel necessary to function properly. During this period, Larson Air Force Base served as an Air Defense Command Base which protected Hanford Atomic Works, Grand Coulee Dam, and the entire Pacific Northwest. In 1952, the base became a Tactical Air Command Base with 3,500 military service personnel and 300 civilian employees. In 1964, the Defense Department announced that the base would be declared surplus for any further military purpose. Realizing that adversity forces decisive action, a group of farsighted Moses Lake residents lost no time in forming the Port of Moses Lake and the former Larson Air Force Base was re-dedicated as the Grant County Airport. It became the home of the Port of Moses Lake established for the purpose of developing recreational, aeronautical, and industrial use.

The greatest asset to the growth of Moses lake and the Columbia River basin lies with the Port of Moses Lake. The boundaries consist of 140,800 acres with room for expansion. The facilities are excellent in the department of technology. The airport has the most advanced radar systems in the world, the ASR-9 System, which allows them to monitor both air traffic and weather on separate channels. The field has two runways capable of handling the world's largest jet planes. The primary runway is 13,500 feet long and 300 feet wide, with 1000 foot paved overruns, with a load capacity of 350,000 pounds. It is orientated from 140 degrees to 320 degrees. The second runway is orientated from 30 degrees and is 10,000 feet long. There is also a smaller runway for smaller aircraft.

Boeing uses the airport for flight testing new planes. Both domestic and foreign airlines use the field for training pilots and flight crews. Japan Air Lines has been training pilots at the airport since 1968.

The surrounding area is characterized by open fields to the north and northwest. To the northeast are various

hangers used by Boeing and Japan Airlines along with other private outbuildings. To the immediate southeast it is open field with and industrial park in the distance. To the south is low-income housing and a school separated by one city block from the terminal. To the southwest is more low-income housing followed by more open areas.

The site is ideal for expansion because of it's location in Washington and the existing airstrips. It has been considered by both the Washington legislature and the Sea-Tac planning department as a future site for a major international airport linked via a high speed train to Seattle-Tacoma and Spokane. The community backs this proposal for the economic stability it would create along with all the new job opportunities. Noise seemed not to be a factor to the residents I spoke to because Japan Airlines and Boeing are conducting touch and go's all day which would not be dissimilar to the function of a major international airport. They were also interested in the high speed train as a mass transport system to get them to both Seattle and Spokane for shopping, etc. The combination of the expanded airport and the mass transport system is not only appealing to those of Moses Lake, but to most in the state who can see it a viable solution to the problems that Sea-Tac has and to create a method of transportation that would eliminate many commuter flights from Spokane to Seattle without spending more travel time.

PROGRAM

Airports are functionally driven. Areas must maintain an order for both security and user functions. Airports require many different elements to serve the needs of its users, many of which make it so the user does not have to leave the airport to perform certain functions such as cashing a check, etc.. Listed below are the necessary elements needed in an international airport and on the following page is a flow chart depicting the sequence of events travelled through by a user.

Landside-Exterior

Parking - Public/employee
- short/long term
- car and bus
Access for Vehicles - Car and taxi pick up/set down
- Bus pick up/set down
- through lanes
Terminal for MagLev train associated with airline terminal.
Landside service road

Airside-Exterior

Airside service road
Baggage and cargo roads
Control post
Substation
Taxiways/Runways (existing)

Landside Concourse

Departures - Restrooms
- Phones
- Bank
- Post Office
- Offices
- Shops/Bars/Restaurants
- Departure/Arrival Lounge foreign/domestic
- Immigration
- Search/strong rooms
- Offices/lounge/lockers/restrooms
- Security
- Offices
- Bars/restaurants/duty free shops
- Gate zone
- Restrooms

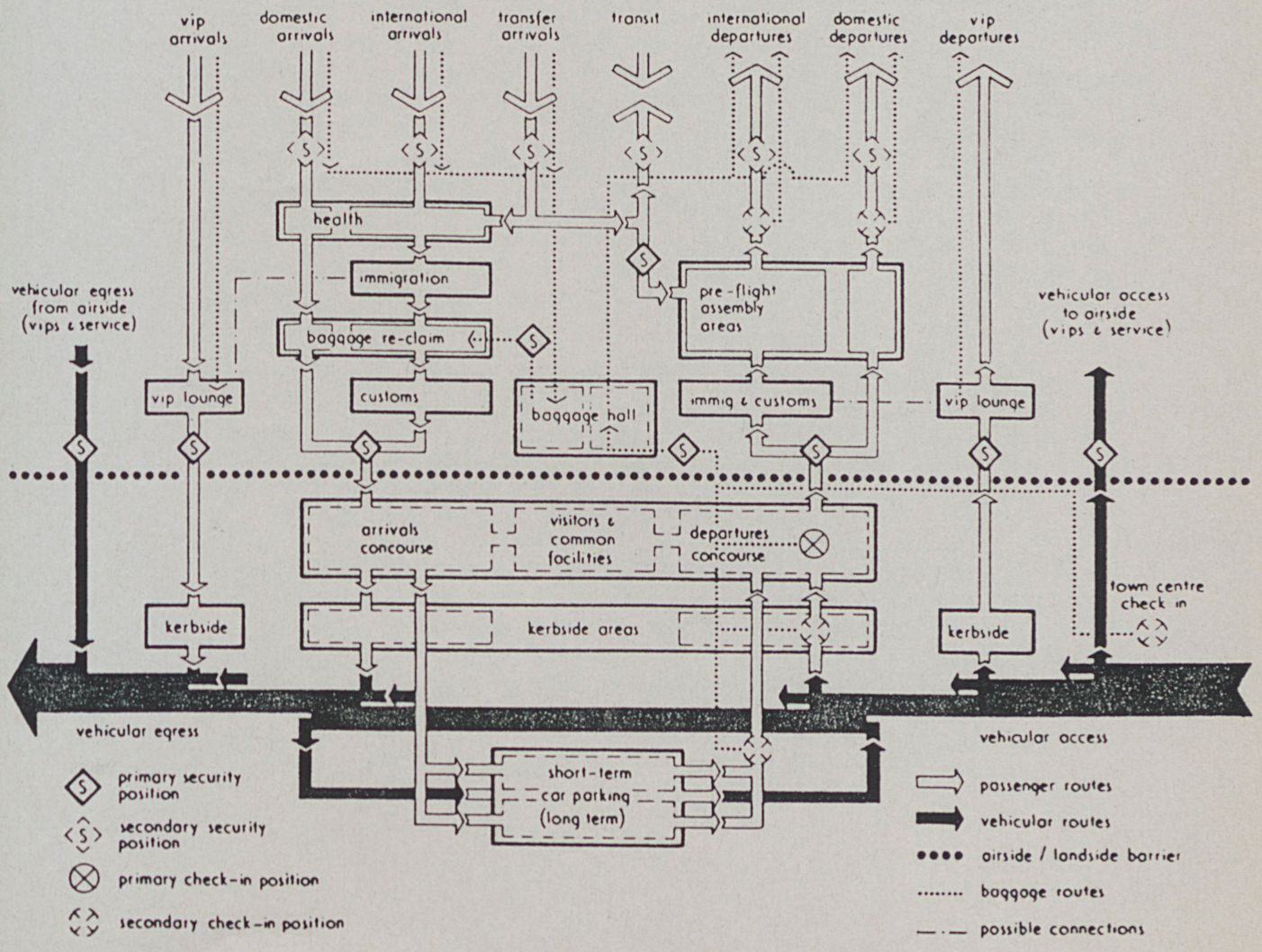
- VIP Lounge
- Departures/Arrivals Baggage
- Information
- Car rentals/Maglev tickets/hotels
- Customs
- Delivery

Airline/Airport offices

Ground Handling
Administration
Conference Room
Duty Office
Manager offices
Mechanical/electrical
Janitorial rooms
Store Rooms

Tower

Maglev terminal/track



ARCHITECTURAL VALUES

Throughout my college career in the field of architecture I have found myself sticking to many basic ideas that drive what I design and very rarely stray from this palette. I have had the privilege, like most students, to design projects that were very small in scale to large scale projects. This range is very beneficial in learning design, and I found that design principles hold true for every project from the simplest to the most complex.

If I were to be classified in any category of design, I feel I would be called a Modernist, but I would like to become more of a futurist which is something that my thesis project will make me think about and do. I like clean lines on buildings, the use of light and shadow, using various palettes of materials that complement one another and make the building more visually appealing, and trying to create spaces that people will enjoy being in, whether a worker or a passer-through. I design buildings which may seem to be practical, but I feel that architecture should not only look good, but should work. I have seen many projects which were interesting to look at, but when you got down to some aspects, they didn't work. This may be ok for school and may go un-noticed, but in the real world it doesn't work that way. I was fortunate to be able to work in an architecture firm in Seattle and do design work and meet with clients. Clients see their needs first and some could care less how it looks, just as long as it works. There are exceptions to this, but as an architect one must design something that is both interesting and usable. However, school is the time for experimentation in one's architecture, which is beneficial to creativeness.

The architects that I feel have similar basic design ideas in certain areas are Richard Meier, Helmut Jahn, Richard Rogers, Frank Lloyd Wright, and Peter Eisenman. All of these have elements of design that I feel I use or wish to use in a greater extent in both the completion of thesis and in my career.

Richard Meier's buildings are easy to spot because his style is of stark white buildings using tile and gridded pattern windows. His buildings, however, for the lack of color are very visually stimulating. He takes a simple plan and develops it to a point that seems very complicated, but is very simple. His buildings create many different arrays of light and shadow with the use of spandrels and screen walls. I have used sprandrels to obtain the same effect of

keeping a plane going and setting back the wall or windows. Most of my buildings that I have designed in school are simple in plan, but I try to make them more complicated without loosing the simplicity. I feel Richard Meier exploits this aspect to the fullest, and I hope to someday be able to do it as well as he.

Helmut Jahn is an architect whom I did not know much about until I started my thesis project. I found that he designed quite a few airports including the United Airlines Terminal in Chicago. I was immediately impressed with some of the things he accomplished in his buildings. He, like Meier, is able to create visually stimulating architecture out of simple plans and uses light and shadow too. He uses a lot of tile in his projects, something which I also like to use for its texture and pattern. He also experiments with color, much more than Meier. I have design quite a few buildings using tile as the main exterior cladding and have found the use of different colors and patterns can add a lot to a design. Jahn is more of a futurist in some of his designs, which is something I am striving for, especially in my thesis. I feel it is important to design something that is forward looking rather than tied to the past or the present.

Richard Rogers is another architect who I have found influence for my thesis and that I can look back and see similarities in design. He, too, designs fairly simple plans and makes them complicated with detail. His uses of steel, both as structure and cladding is very impressive. I feel that steel and glass are very important to designing modernist or futurist buildings, especially when its an airport. He uses cables as supports in many buildings, which is something that looks and feels more futuristic and creates visual excitement in both design and in light and shadows.

Frank Lloyd Wright has always been one of my favorite architects because of the way that his designs were always way ahead of the times and in the way that he used materials to their fullest capacity. His use of horizontally is something I have always strove for in design. He also has a great sense for human scale by bringing in this horizontally which is another thing that I strive for. I have also tried to blend materials that worked well together to create more of a visual excitement. Wright was a master at detail, and I have only been able to create good detail in small parts of a project, but am striving for complete detail in the future. I am also am trying to push the envelope of materials that exist in order to achieve a better, more futuristic architecture.

Peter Eisenman is yet another architect who seems to start simple and get complex results. I have found that in most architecture I like that is how the architect did it.

He starts with very simple concept drawings and creates very interesting architecture.

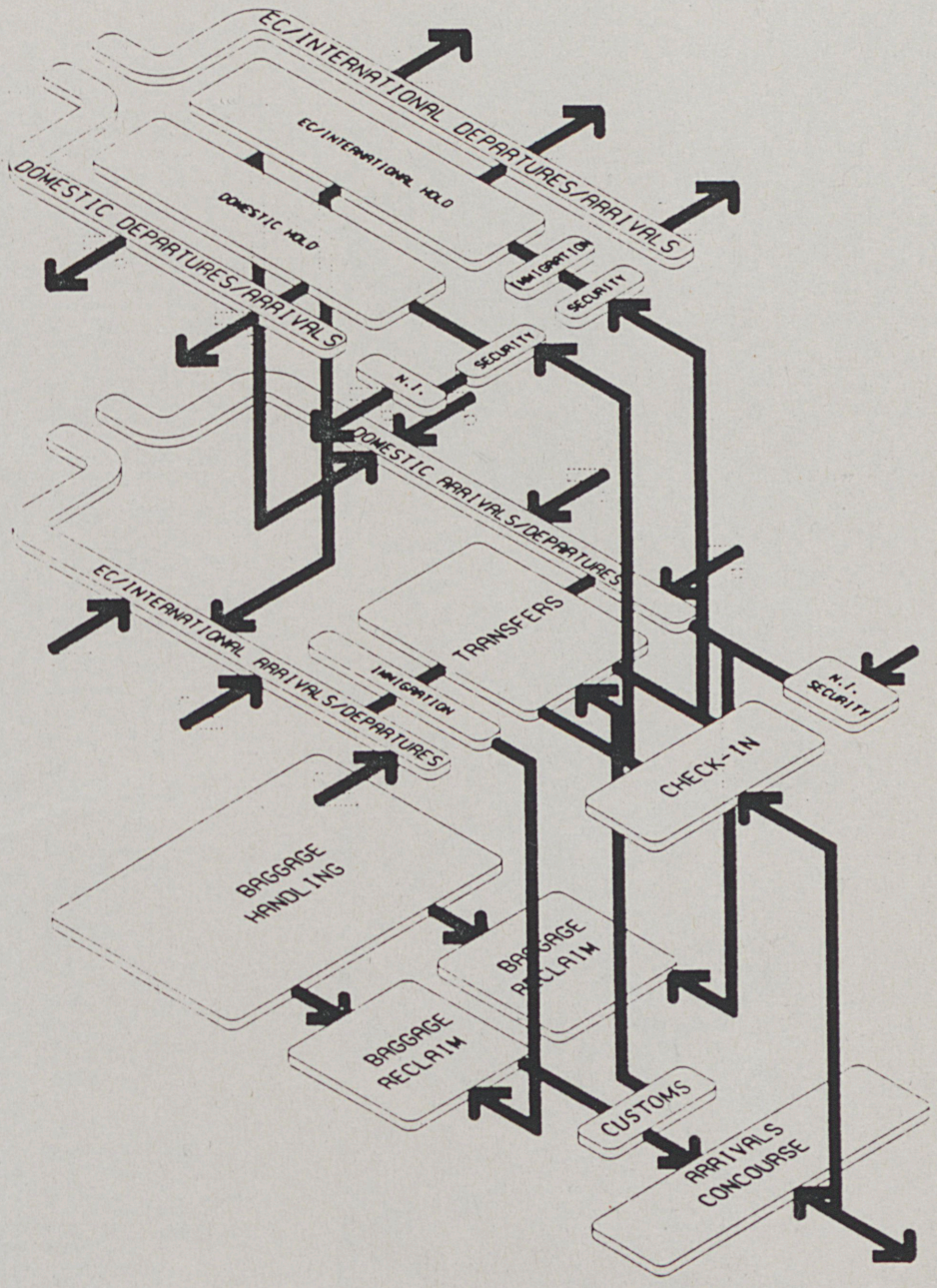
Overall, I feel that I can draw from past successes and failures in projects to build my own base for the way I design. I design from the simple to get a complex finished project which is rich in detail. In my thesis I hope to achieve something that takes all of the elements I like and make interesting architecture and use these principles to create something that is forward looking, user-friendly, and works in every aspect of design and usage. Airports are functionally driven, but I feel that they can also be interesting.

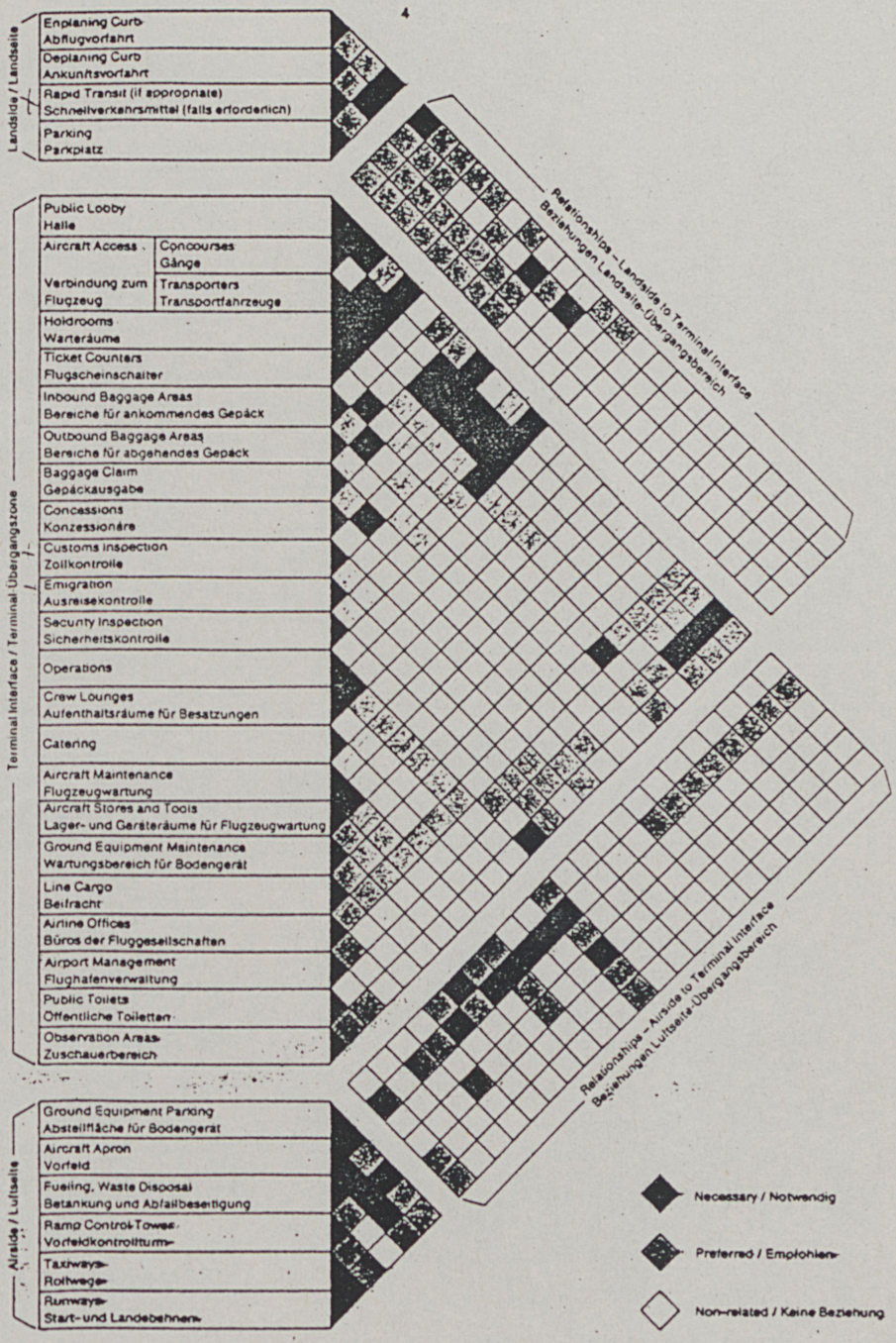
AIRPORT DESIGN

Airport terminal design is characterized by a functionally driven factor which plays a major role in the overall design. In order to be successful terminals must be user-friendly as well as interesting pieces of architecture. This blend of design and function is often four parts function and two parts design. In other words, function begins to take over the design to the point where it becomes the most important issue. It is very rare to find an airport that is both user-friendly and well designed architecturally.

Traffic of passengers plays another key role in the design with signage being a major factor. Signage must be readily seen and easy to interpret. Therefore, it must also be included in the design process in order to work in harmony with the rest of the building. Passenger routes through the airport must also be as short and as easy as can be accomplished.

There are several configurations of traditional airport design. These are basic terminals with mobile lounges, linear, single or multiple piers, single or multiple satellites, multiple island piers, and hybrid. The following section discusses precedents in each case.


EC/INTERNATIONAL DEPARTURES/ARRIVALS
EC/INTERNATIONAL HOLD
DOMESTIC HOLD
DOMESTIC DEPARTURES/ARRIVALS
IMMIGRATION
SECURITY
SECURITY
N.I.
DOMESTIC ARRIVALS/DEPARTURES
EC/INTERNATIONAL ARRIVALS/DEPARTURES
TRANSFERS
IMMIGRATION
N.I.
SECURITY
CHECK-IN
BAGGAGE HANDLING
BAGGAGE RECLAIM
BAGGAGE RECLAIM
CUSTOMS
ARRIVALS CONCOURSE


Landside / Landseite
Enplaning Curb
Abflugvorfahrt
Deplaning Curb
Ankunftsvorfahrt
Rapid Transit (if appropriate)
Schnellverkehrsmittel (falls erforderlich)
Parking
Parkplatz
Terminal Interface / Terminal Übergangszone
Public Lobby
Halle
Aircraft Access
Verbindung zum Flugzeug
Concourses
Gänge
Transporters
Transportfahrzeuge
Holdrooms
Warteräume
Ticket Counters
Flugscheinschalter
Inbound Baggage Areas
Bereiche für ankommendes Gepäck
Outbound Baggage Areas
Bereiche für abgehendes Gepäck
Baggage Claim
Gepäckausgabe
Concessions
Konzessionäre
Customs Inspection
Zollkontrolle
Emigration
Ausreisekontrolle
Security Inspection
Sicherheitskontrolle
Operations
Crew Lounges
Aufenthaltsräume für Besatzungen
Catering
Aircraft Maintenance
Flugzeugwartung
Aircraft Stores and Tools
Lager- und Geräteräume für Flugzeugwartung
Ground Equipment Maintenance
Wartungsbereich für Bodengerät
Line Cargo
Beifracht
Airline Offices
Büros der Fluggesellschaften
Airport Management
Flughafenverwaltung
Public Toilets
Öffentliche Toiletten
Observation Areas
Zuschauerbereich
Airside / Luftseite
Ground Equipment Parking
Abstellfläche für Bodengerät
Aircraft Apron
Vorfeld
Fueling, Waste Disposal
Betankung und Abfallbeseitigung
Ramp Control Tower
Vorfeldkontrollturm
Taxiways
Rollwege
Runways
Start- und Landebahnen
Relationships - Landside to Terminal Interface
Beziehungen Landseite-Übergangsbereich
Relationships - Airside to Terminal Interface
Beziehungen Luftseite-Übergangsbereich
Necessary / Notwendig
Preferred / Empfohlen
Non-related / Keine Beziehung



Airport
Flughafen



Departure
Abflug



Arrival
Ankunft



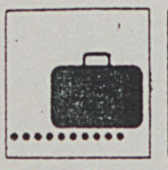
Transfer
Passengers
Umsteiger



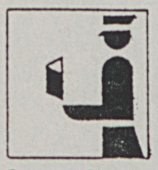
Passenger
Services
Passagier-
Abfertigung



Baggage
Check-in
Gepäck-
abfertigung



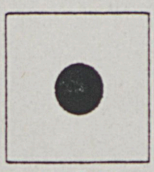
Baggage Claim
Gepäckausgabe



Passport Check
Paßkontrolle



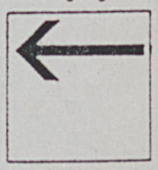
Customs
Zoll



Meeting Point
Treffpunkt



Holding Room
Warteraum



Direction
Richtungspfeil



Exit
Ausgang



Entrance
Eingang



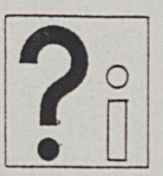
Escalator up
Rolltreppe
aufwärts



Escalator down
Rolltreppe
abwärts



Lift/Elevator
Fahrstuhl



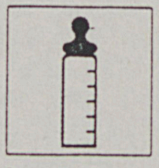
Information



Lost Property
Office
Fundbüro



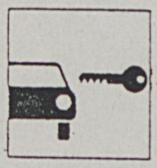
Lost Children
Verlorene Kinder



Room for Babies
Babyraum



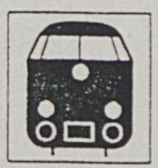
Taxi



Car Rental
Mietwagen



Helicopter
Hubschrauber



Railway
Bahn



Regional Rapid
Transit
S-Bahn



Subway
U-Bahn



Tramway
Straßenbahn



Bus



Check-room
Gepäckauf-
bewahrung



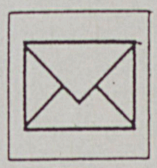
Lockers
Schließfächer



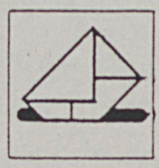
Porter
Gepäckträger



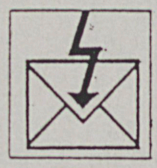
Baggage Cart
Gepäckkarren



Post Office
Post



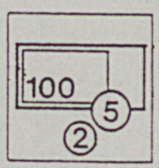
Letter Box
Briefkasten



Telegram
Telegramme



Telephone
Telefon



Exchange
Geldwechsel



Duty-free Shop
Zollfreie Waren



Shop
Laden

Restaurant

Snack Bar

Bar

Café

First Aid
Erste Hilfe

Hairdresser
Friseur

Shower
Dusche

Bathroom
Bad

Women
Damentoilette

Men
Herrentoilette

Toilets
Toiletten

No Smoking
Nicht rauchen

No Thoroughway
Kein Durchgang

BASIC TERMINALS WITH MOBILE LOUNGES

Washington Dulles

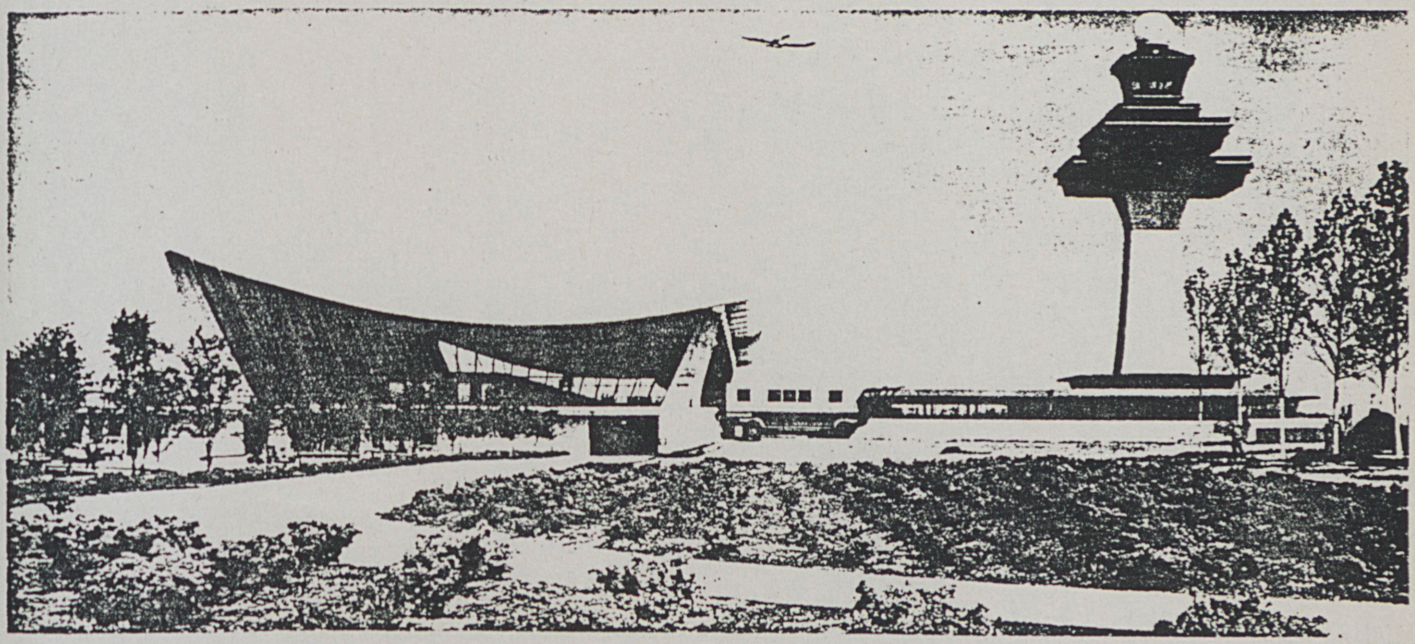
The Dulles airport was designed by Eero Saarinen and completed in 1962. The airport is a basic terminal with mobile lounges. It was the first such airport which made it futuristic in its design and unique. Its shape makes it to be one of the most widely recognizable airports in the world.

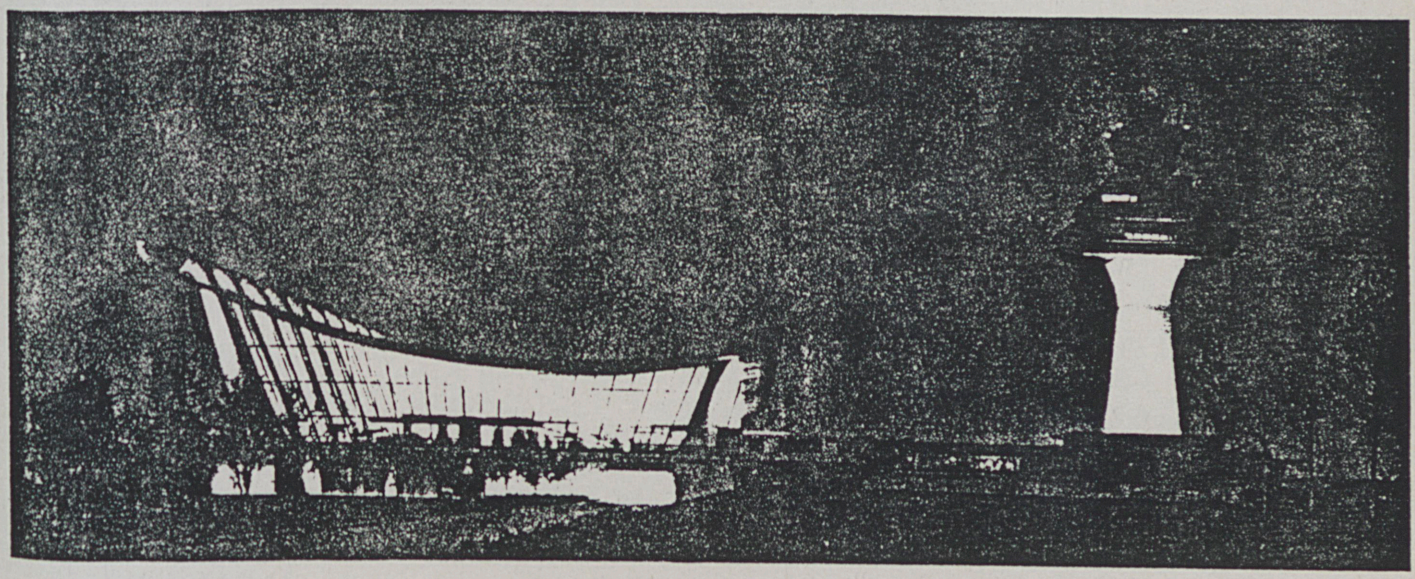
This configuration allows the terminal to designed without having the design problems of docking the plane to the terminal. The passengers get to and from the airplane via buses which taxi between the building and the airplane.

This enables the designer to be more flexible and takes away some pressures of the maneuvering of an aircraft. However, it also has its problems. Passengers have to have a lounge to wait for the bus to pick them up and once to the airplane they must again go outside to load. In bitter cold temperatures this can be seen as a hindrance. Also, disabled people have severe problems with this since one that is in a wheelchair has to wait for the proper equipment to load that person.

Airports designed in this manner have gone to buses which allow the passenger to get into and out of the bus via a enclosed "bridge". The terminal and its transportation work much better when designed in this manner. The Dulles airport was designed in this manner with vehicles that had hydraulic rams which raise and lower it to the height of the terminal and of the plane. This is yet another reason why this particular airport was so successful.

The Dulles airport has undergone expansion and lost its hydraulic rams, but is still a good airport design and was very futuristic when it opened. Following are illustrations of this airport and its basic configuration principles.

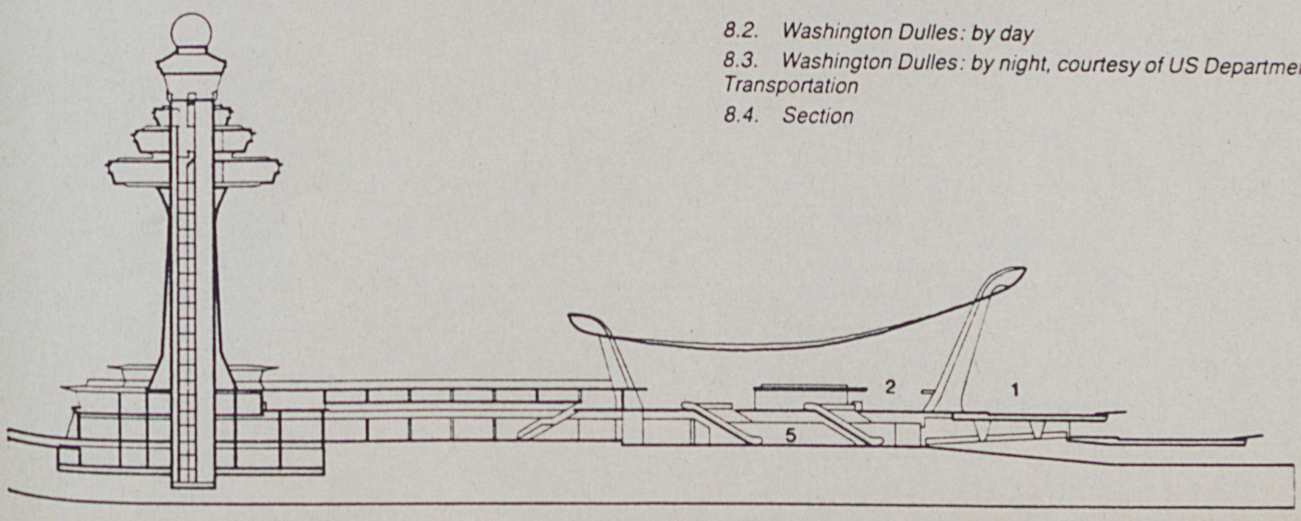


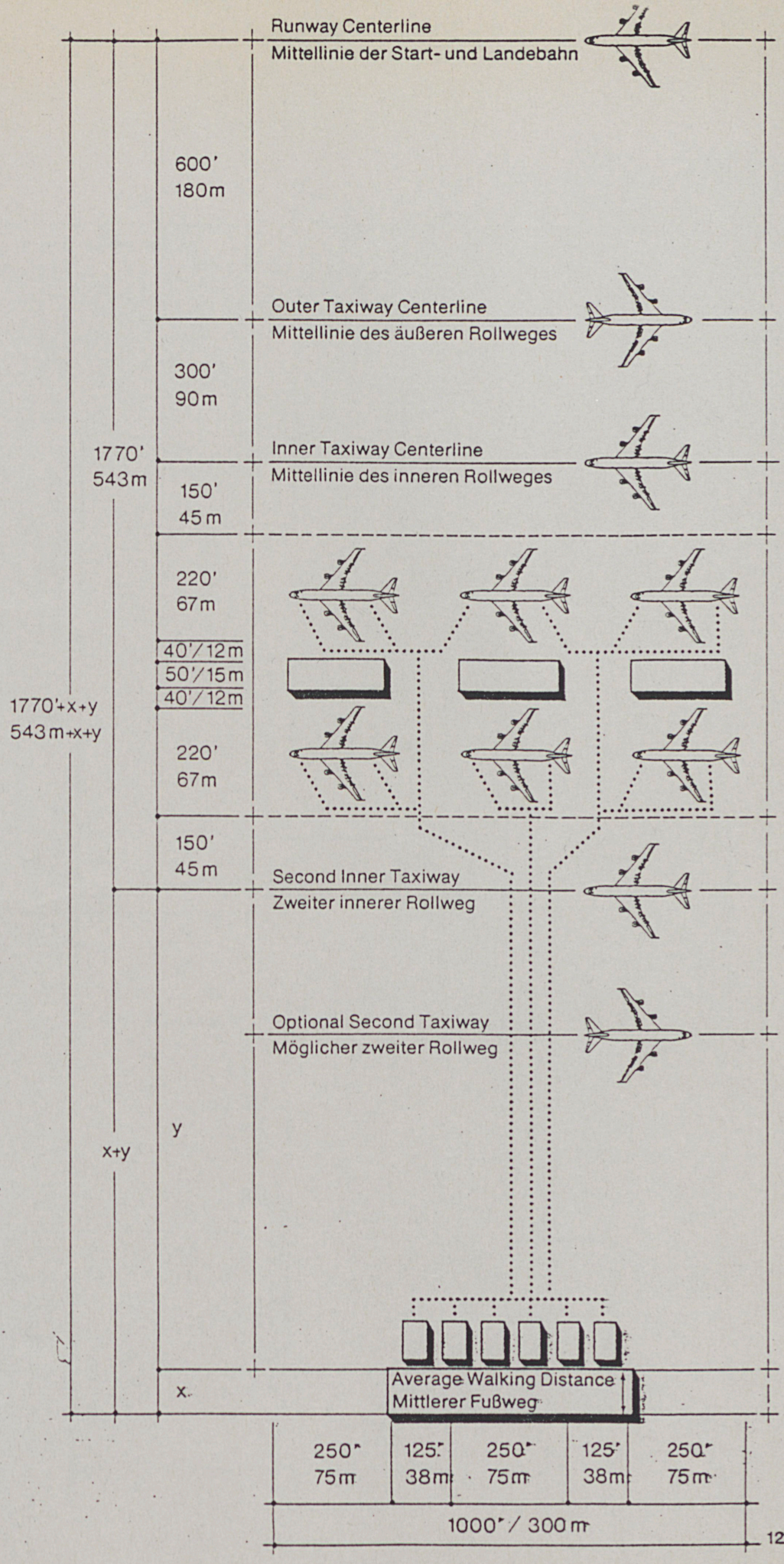


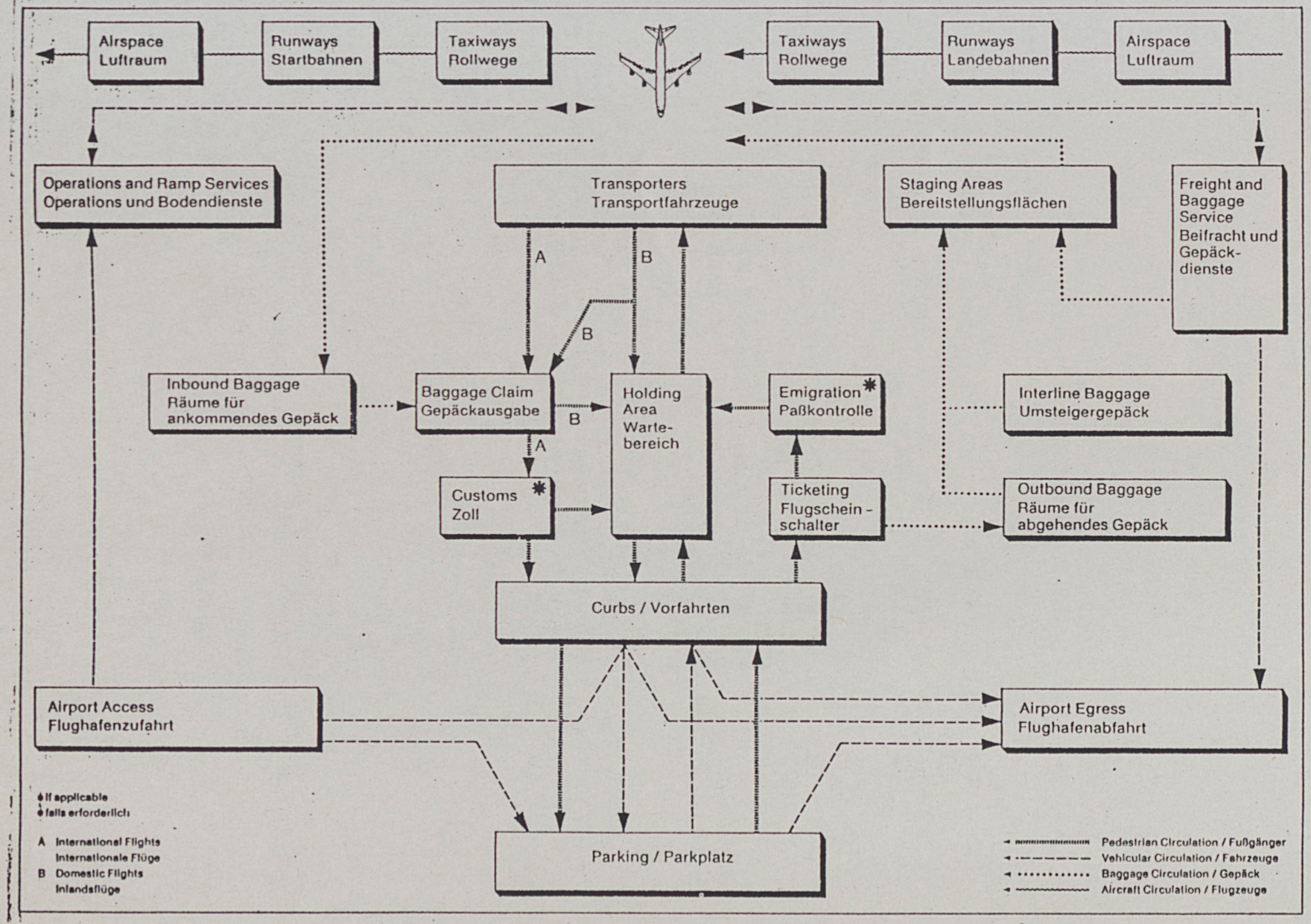
8.2. Washington Dulles: by day

8.3. Washington Dulles: by night, courtesy of US Department of Transportation

8.4. Section




Runway Centerline
Mittellinie der Start- und Landebahn
600'
180m
Outer Taxiway Centerline
Mittellinie des äußeren Rollweges
300'
90m
1770'
543m
Inner Taxiway Centerline
Mittellinie des inneren Rollweges
150'
45m
220'
67m
40'/12m
50'/15m
40'/12m
1770'+x+y
543m+x+y
220'
67m
150'
45m
Second Inner Taxiway
Zweiter innerer Rollweg
Optional Second Taxiway
Möglicher zweiter Rollweg
y
x+y
x
Average Walking Distance
Mittlerer Fußweg
250'
75m
125'
38m
250'
75m
125'
38m
250'
75m
1000' / 300m


Airspace
Luftraum
Runways
Startbahnen
Taxiways
Rollwege
Taxiways
Rollwege
Runways
Landebahnen
Airspace
Luftraum
Operations and Ramp Services
Operations und Bodendienste
Transporters
Transportfahrzeuge
Staging Areas
Bereitstellungsflächen
Freight and
Baggage
Service
Beifracht und
Gepäck-
dienste
A
B
B
Inbound Baggage
Räume für
ankommendes Gepäck
Baggage Claim
Gepäckausgabe
B
Holding
Area
Warte-
bereich
Emigration*
Paßkontrolle
Interline Baggage
Umsteigergepäck
A
Customs*
Zoll
Ticketing
Flugschein-
schalter
Outbound Baggage
Räume für
abgehendes Gepäck
Curbs / Vorfahrten
Airport Access
Flughafenzufahrt
Airport Egress
Flughafenabfahrt
Parking / Parkplatz
* If applicable
* falls erforderlich
A International Flights
Internationale Flüge
B Domestic Flights
Inlandsflüge
Pedestrian Circulation / Fußgänger
Vehicular Circulation / Fahrzeuge
Baggage Circulation / Gepäck
Aircraft Circulation / Flugzeuge

LINEAR TERMINALS

Manchester UK, Terminal 2

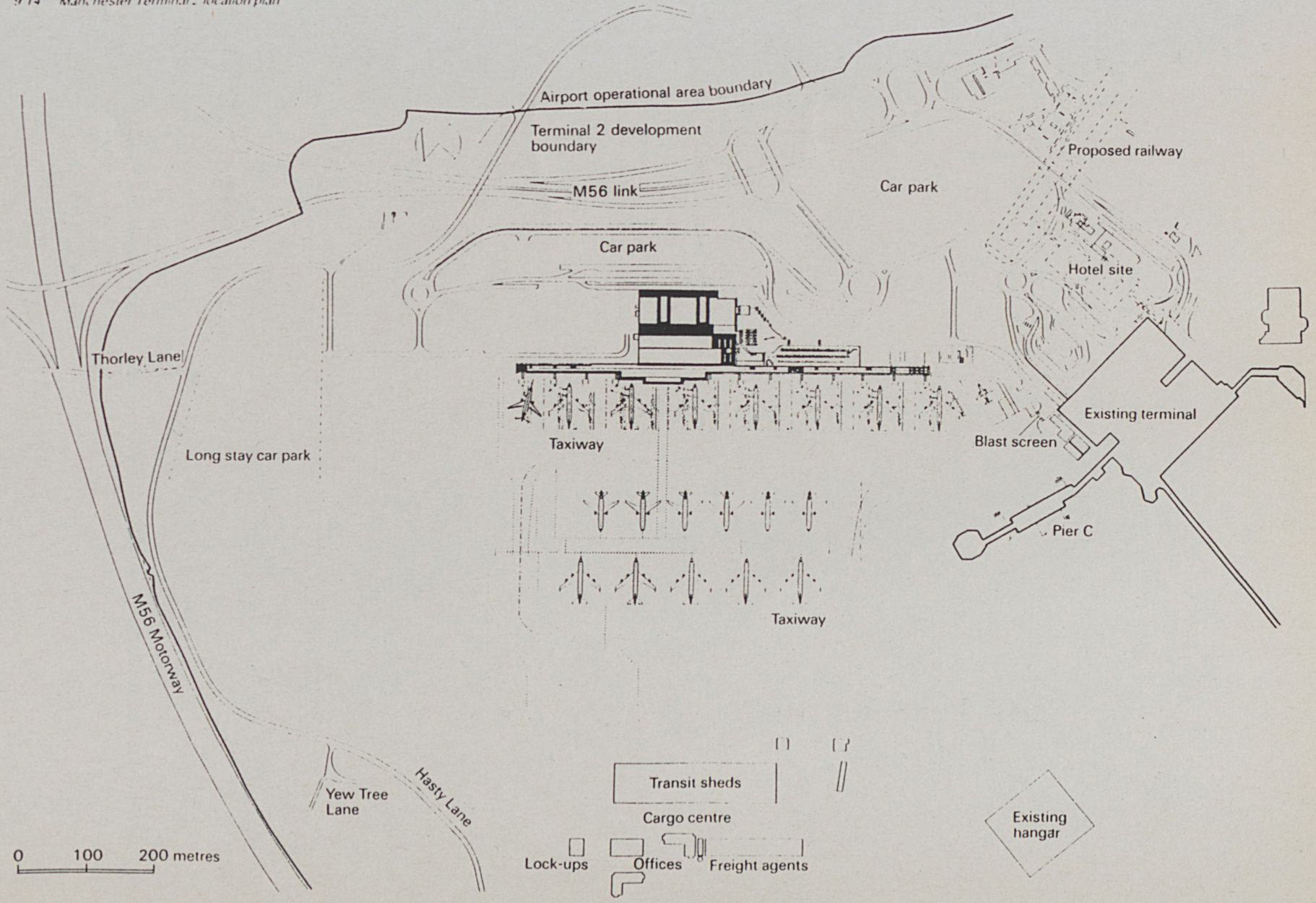
The Manchester terminal 2 was designed by Scott Brownigg & Turner, Guildford with expected opening date in 1993. The airport is an expansion to the existing terminal and is in the configuration of a linear terminal.

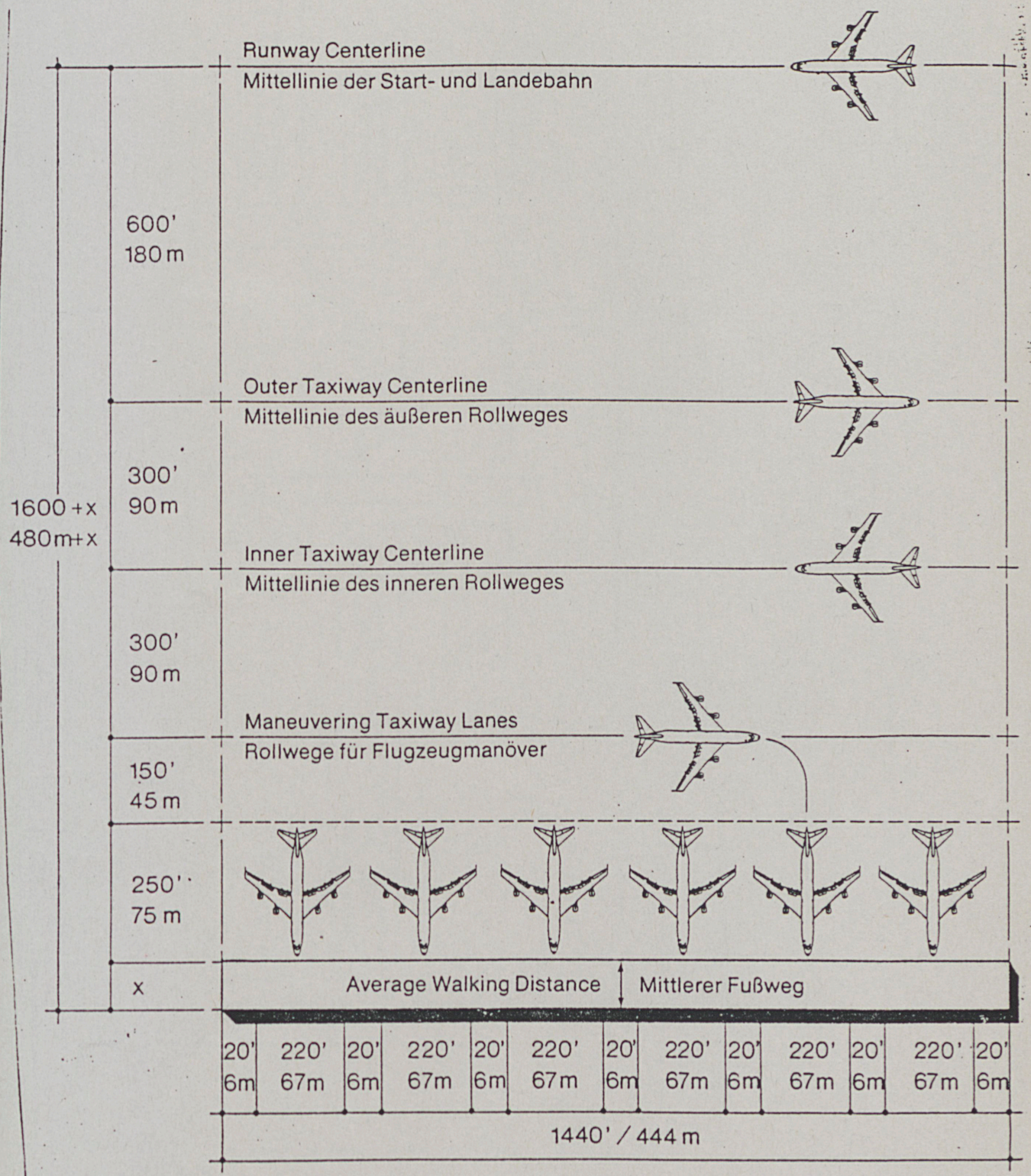
The linear terminal is known for the short walking distances from curbside to airside, but is also characterized by long travel distances from gate to gate. This terminal tries to solve this problem by centering the main terminal building so travel distances are cut in half. The terminal also segregates arriving and departing passengers on two different levels. These levels are connected by series of elevators and escalators. This was done to make the arriving and departing passengers journey through the airport a more easy one. Traffic of passenger through the terminal is a major concern in airport design and it is critical to make it as easy and as simple as possible, but still make it interesting.

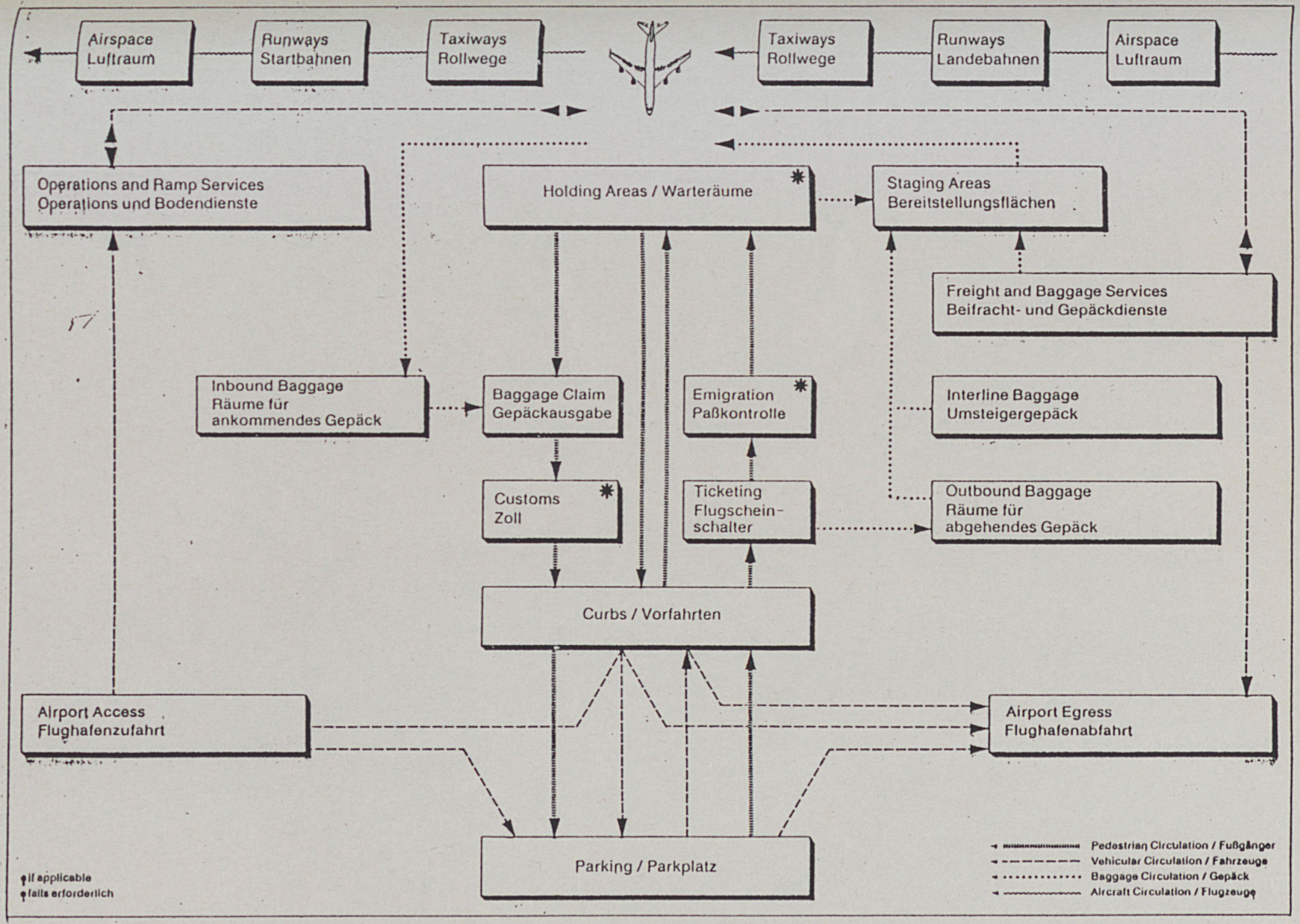
This is a recent design of a terminal, but it seems not to be too forward looking. It comprises a configuration which is probably the oldest in terminal design and does not try anything new. The methods of design by using CADD was more in the way of futurism, but was not innovative. However, it was designed to be user-friendly which is a major issue in terminal design and it will be interesting to see how well it does work.

Overall, Manchester Terminal 2 is a basic design for an airport utilizing one of the oldest configurations known to create a simple access for passengers. The following pages include illustrations of this airport and the basic design principles it has.

9.14 Manchester Terminal 2 location plan




Runway Centerline
Mittellinie der Start- und Landebahn
600'
180 m
Outer Taxiway Centerline
Mittellinie des äußeren Rollweges
300'
90 m
1600 +x
480m+x
Inner Taxiway Centerline
Mittellinie des inneren Rollweges
300'
90 m
Maneuvering Taxiway Lanes
Rollwege für Flugzeugmanöver
150'
45 m
250'
75 m
x
Average Walking Distance
Mittlerer Fußweg
20' 6m
220' 67m
20' 6m
220' 67m
20' 6m
220' 67m
20' 6m
220' 67m
20' 6m
220' 67m
20' 6m
220' 67m
20' 6m
1440' / 444 m


Airspace
Luftraum
Runways
Startbahnen
Taxiways
Rollwege
Taxiways
Rollwege
Runways
Landebahnen
Airspace
Luftraum
Operations and Ramp Services
Operations und Bodendienste
Holding Areas / Warteräume *
Staging Areas
Bereitstellungsflächen
Freight and Baggage Services
Beifracht- und Gepäckdienste
Inbound Baggage
Räume für
ankommendes Gepäck
Baggage Claim
Gepäckausgabe
Emigration *
Paßkontrolle
Interline Baggage
Umsteigergepäck
Customs
Zoll *
Ticketing
Flugschein-
schalter
Outbound Baggage
Räume für
abgehendes Gepäck
Curbs / Vorfahrten
Airport Access
Flughafenzufahrt
Airport Egress
Flughafenabfahrt
Parking / Parkplatz
* if applicable
* falls erforderlich
Pedestrian Circulation / Fußgänger
Vehicular Circulation / Fahrzeuge
Baggage Circulation / Gepäck
Aircraft Circulation / Flugzeuge

SINGLE OR MULTIPLE PIERS

Zurich Kloten Terminal B

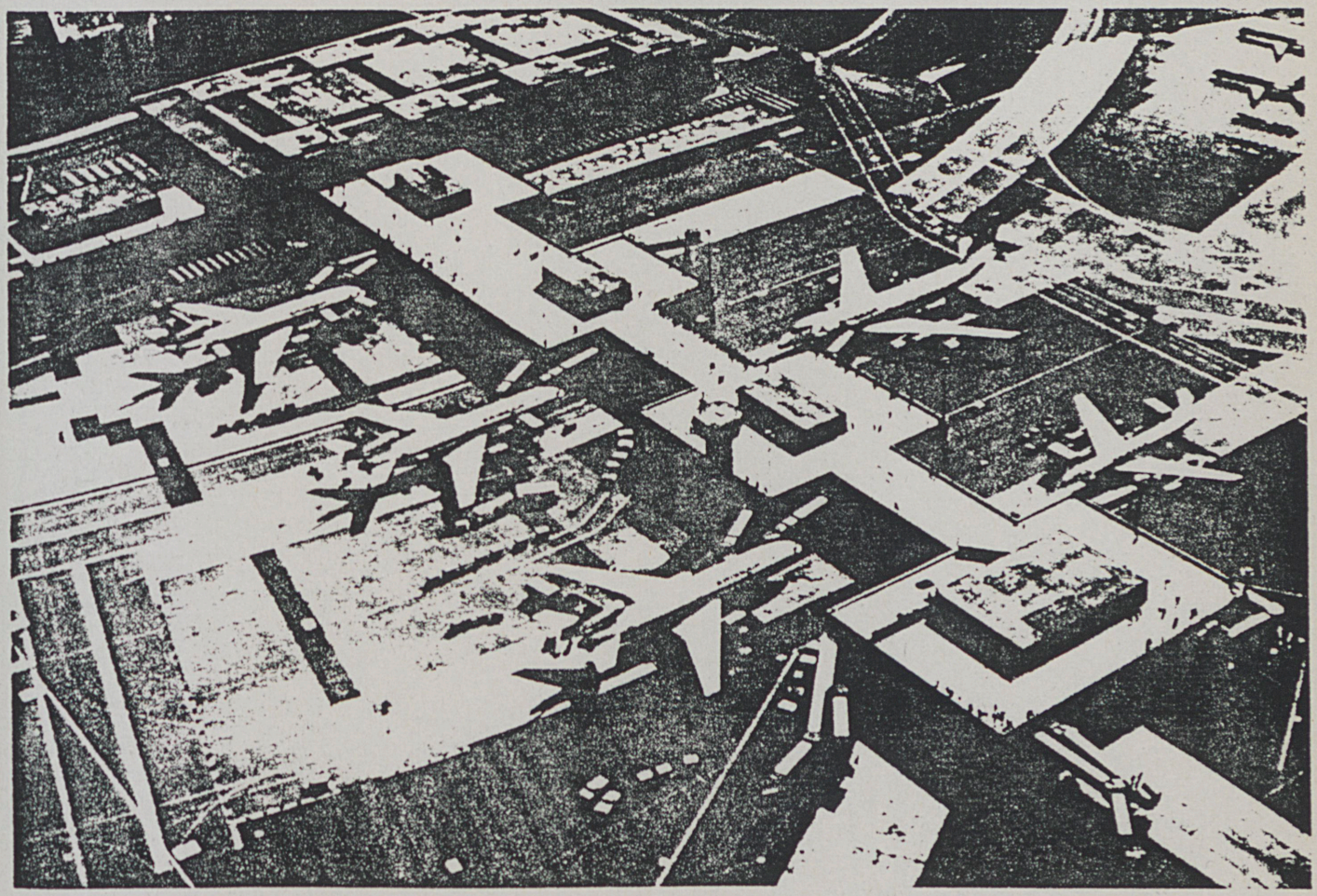
Zurich Kloten Terminal B was designed in the pier configuration. The airport was completed in 1975 and consists of a single pier. It is a simple design which uses open trusses and allows light to penetrate the areas where passengers change levels in the terminal. It was designed for its function and is not a great example of airport architecture, but is important in its configuration.

It is traditional in their configuration which is a perpendicular extension to the main terminal. The travel distance is short to extremely long depending on the location of the desired gate. This is one problem because if one needs to go to the end of the pier it is an extremely long distance. It is not a major problem in this airport because of its single pier, but is emphasized in multiple pier configurations.

In multiple pier configurations one may have to travel from the far end of one pier to the far end of another and this is only accomplished by going back into the main terminal, over to the desired pier, and then to its far end. This is a long distance to walk, and even moving sidewalks don't seem to make the trip better. However, the configuration does allow for double loaded docking which cuts down the area need for the airport. The double loading is a major factor that seems to out weigh the need for the user-friendly aspect of the design. I feel that this configuration has ability to become better by introducing an easy way to travel from pier to pier without going back through the main terminal building.

Zurich Kloten Terminal B seems to function well as a pier because it has only one pier. Another interesting point is that it incorporates a direct link to the rail system which goes into the city. This allows passengers easy access to and from the city by convenient public transportation. This configuration is becoming more and more popular with the airport design providing a hub for three major forms of transportation- plane, trains, and automobiles.

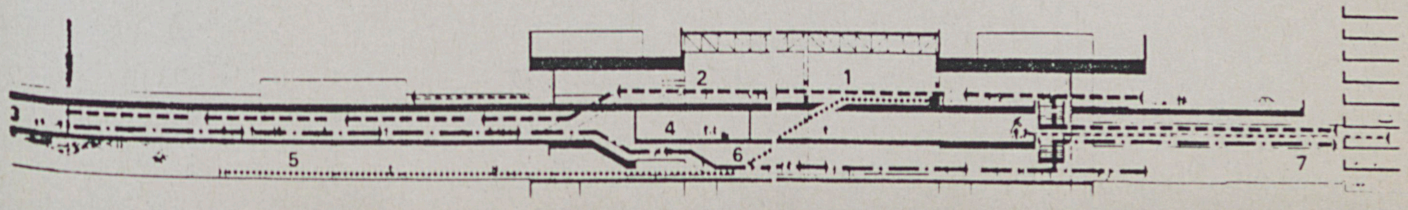
The following is illustrations of the airport and its basic layout configurations of the pier concept.

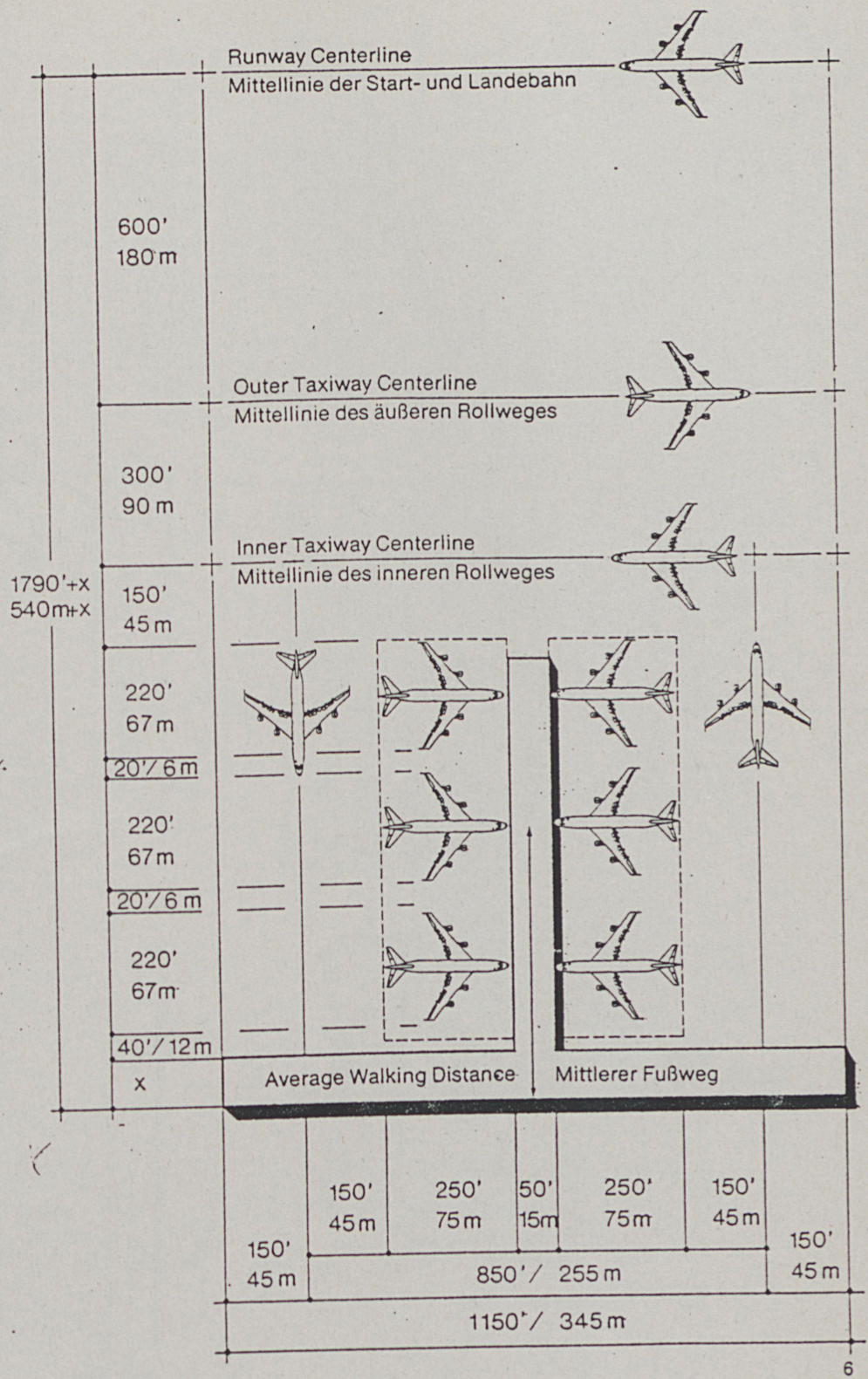


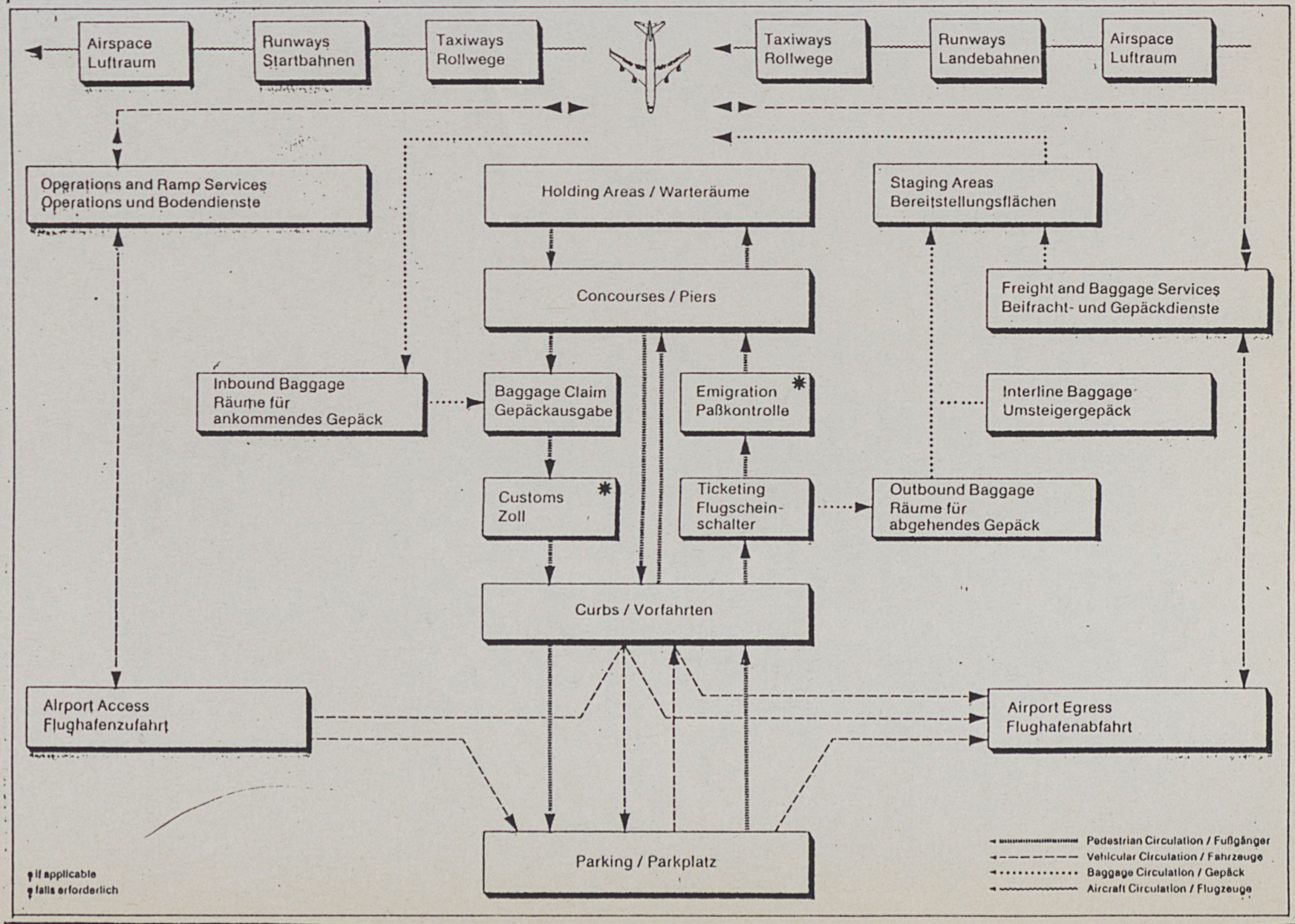
10.3. Aerial view

10.4. Section, courtesy of Airport Forum

Key to sectional drawing:
1 Check-in desks
2 Passport control
3 Gate lounge
4 Transit area
5 Service roads
6 Baggage reclaim
7 Bridge to multi-storey car park




Runway Centerline
Mittellinie der Start- und Landebahn
600'
180 m
Outer Taxiway Centerline
Mittellinie des äußeren Rollweges
300'
90 m
Inner Taxiway Centerline
Mittellinie des inneren Rollweges
1790'+x
540m+x
150'
45 m
220'
67 m
20'/6 m
220'
67 m
20'/6 m
220'
67m
40'/12 m
x
Average Walking Distance
Mittlerer Fußweg
150'
45 m
150'
45 m
250'
75 m
50'
15m
250'
75m
150'
45 m
150'
45 m
850'/ 255 m
1150'/ 345 m


Airspace
Luftraum
Runways
Startbahnen
Taxiways
Rollwege
Taxiways
Rollwege
Runways
Landebahnen
Airspace
Luftraum
Operations and Ramp Services
Operations und Bodendienste
Holding Areas / Warteräume
Staging Areas
Bereitstellungsflächen
Concourses / Piers
Freight and Baggage Services
Beifracht- und Gepäckdienste
Inbound Baggage
Räume für
ankommendes Gepäck
Baggage Claim
Gepäckausgabe
Emigration *
Paßkontrolle
Interline Baggage
Umsteigergepäck
Customs *
Zoll
Ticketing
Flugschein-
schalter
Outbound Baggage
Räume für
abgehendes Gepäck
Curbs / Vorfahrten
Airport Access
Flughafenzufahrt
Airport Egress
Flughafenabfahrt
Parking / Parkplatz
* if applicable
* falls erforderlich
Pedestrian Circulation / Fußgänger
Vehicular Circulation / Fahrzeuge
Baggage Circulation / Gepäck
Aircraft Circulation / Flugzeuge

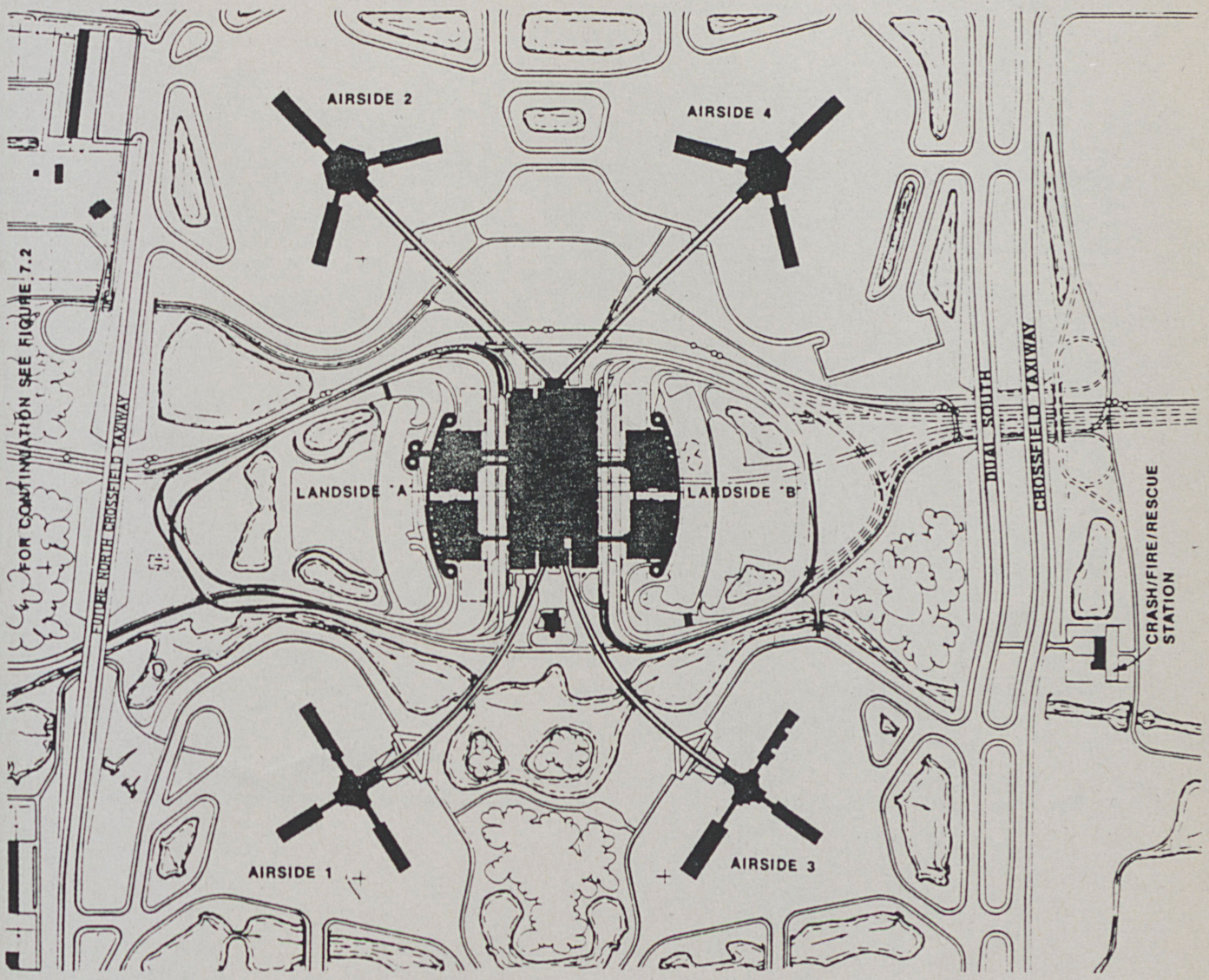
SINGLE OR MULTIPLE SATELLITES

Orlando, Florida

The Orlando airport was designed by KBJ Architects INC/Schweizer Associates Inc. and opened in 1980 with further expansion in 1990. It is designed in the satellite configuration which consists of a main terminal building which houses the paring and other main terminal facilities. The satellites are reached by a railway system. The airport was designed for further expansion which is readily available in this type of configuration.

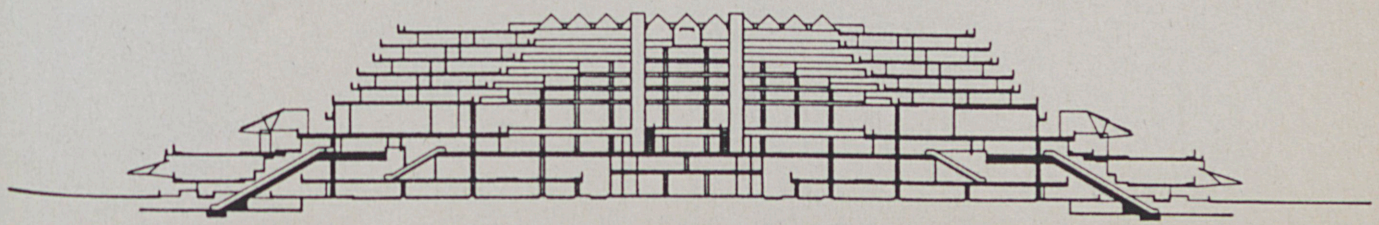
Satellites are probably the most flexible of all airport designs because they rely on a transport system to transfer passengers to a remote location. The location could be miles away and in any configuration which is plausible. Their flexibility in design, however is lost in its user friendliness. As in multiple pier designs one must travel through the terminal to get to the desired pier which is even a longer commute in the satellite configuration. The design can be confusing for passengers who must travel from one pier to another, a trip which could take up valuable time when they must catch a connecting flight. However, this design also can have design solutions to this problem. Individual satellites can be connected together with domestic and international located near one another for quicker changer over time.

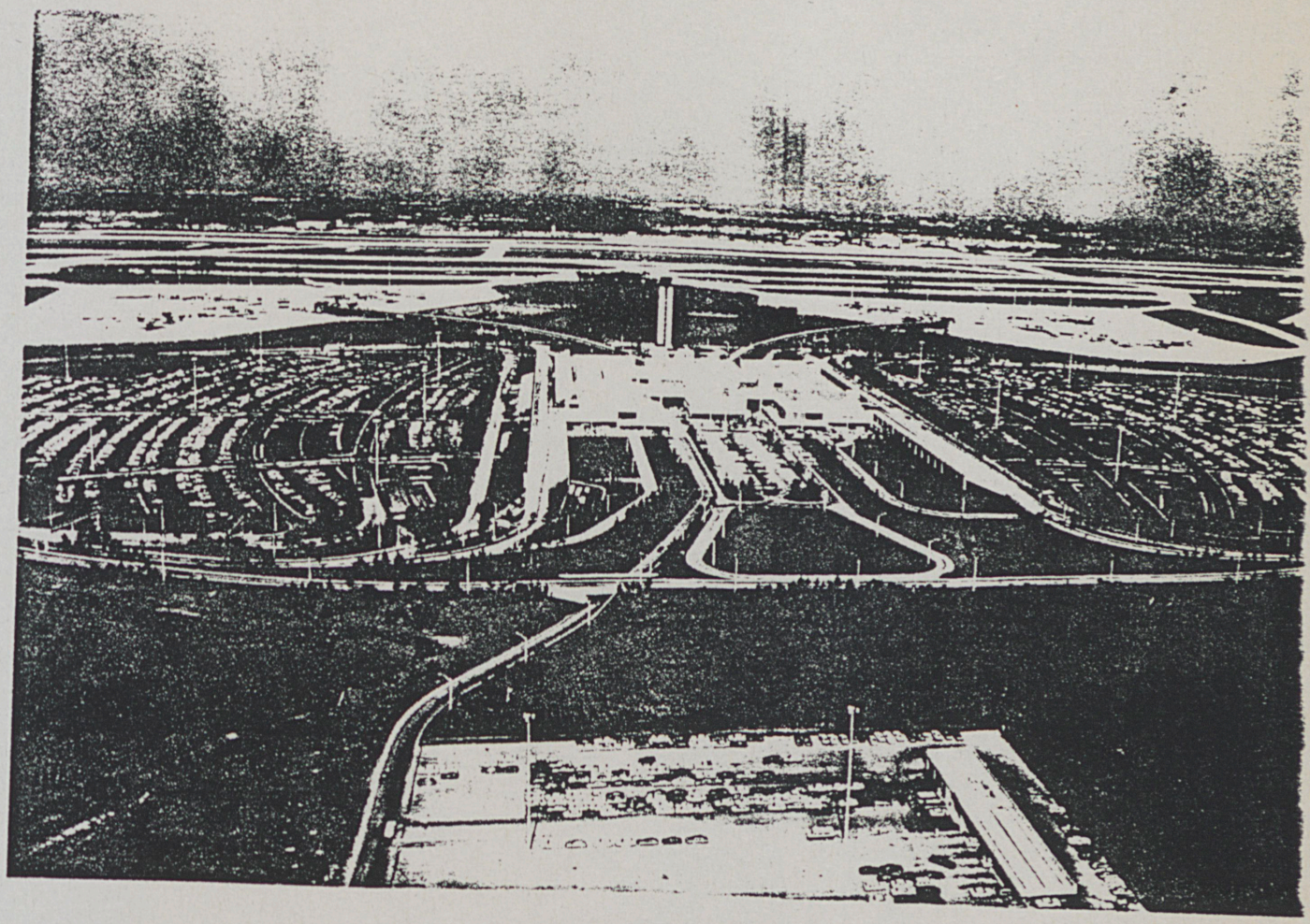
The Orlando airport has set up more expansion plans including providing a hotel near the terminal building and the introduction of a new satellite. The configuration allows a sea of parking to be built around the main terminal adding the much needed parking for the resort city. The following pages include illustrations of the airport, itself, and of the basic design considerations associated with it.

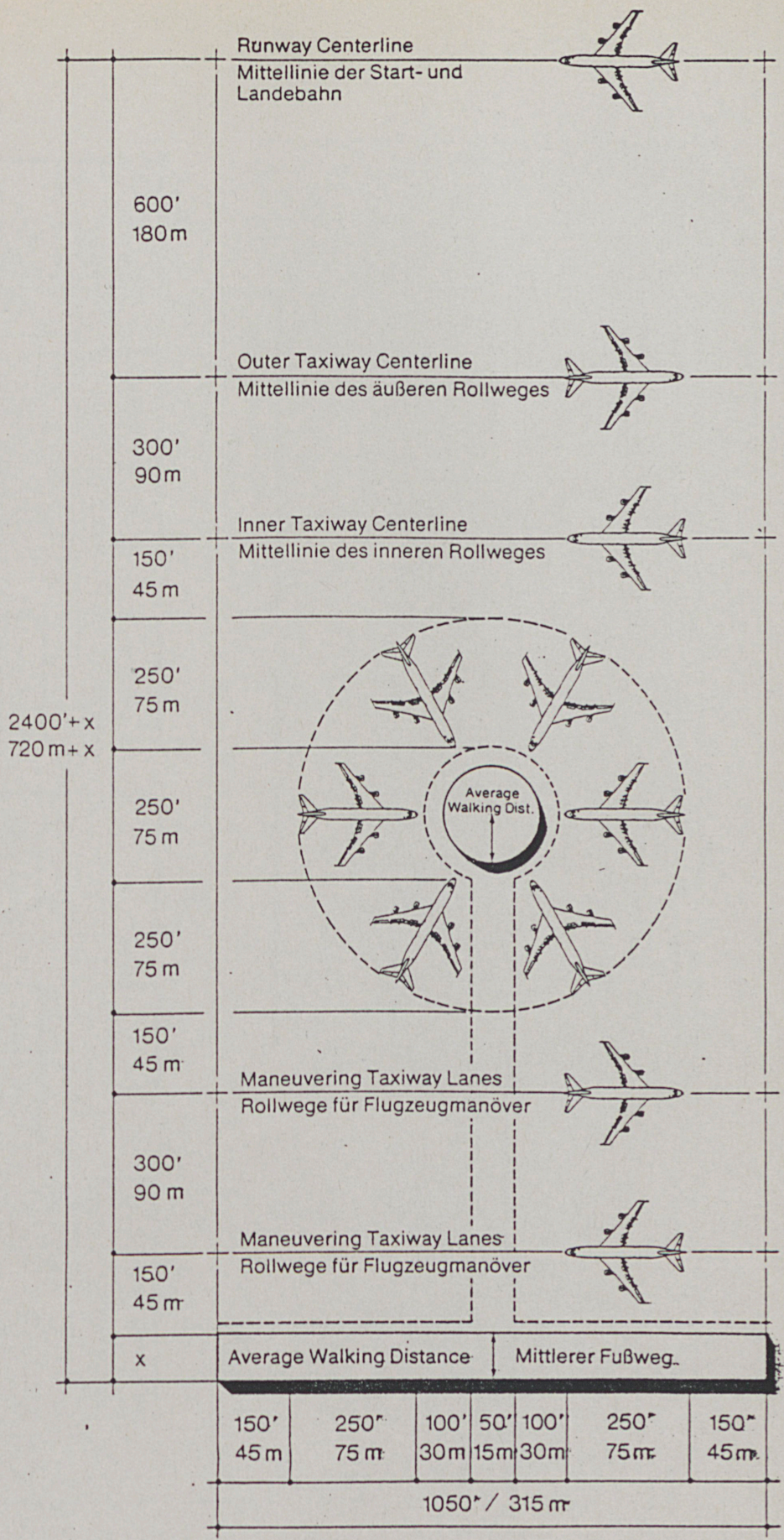


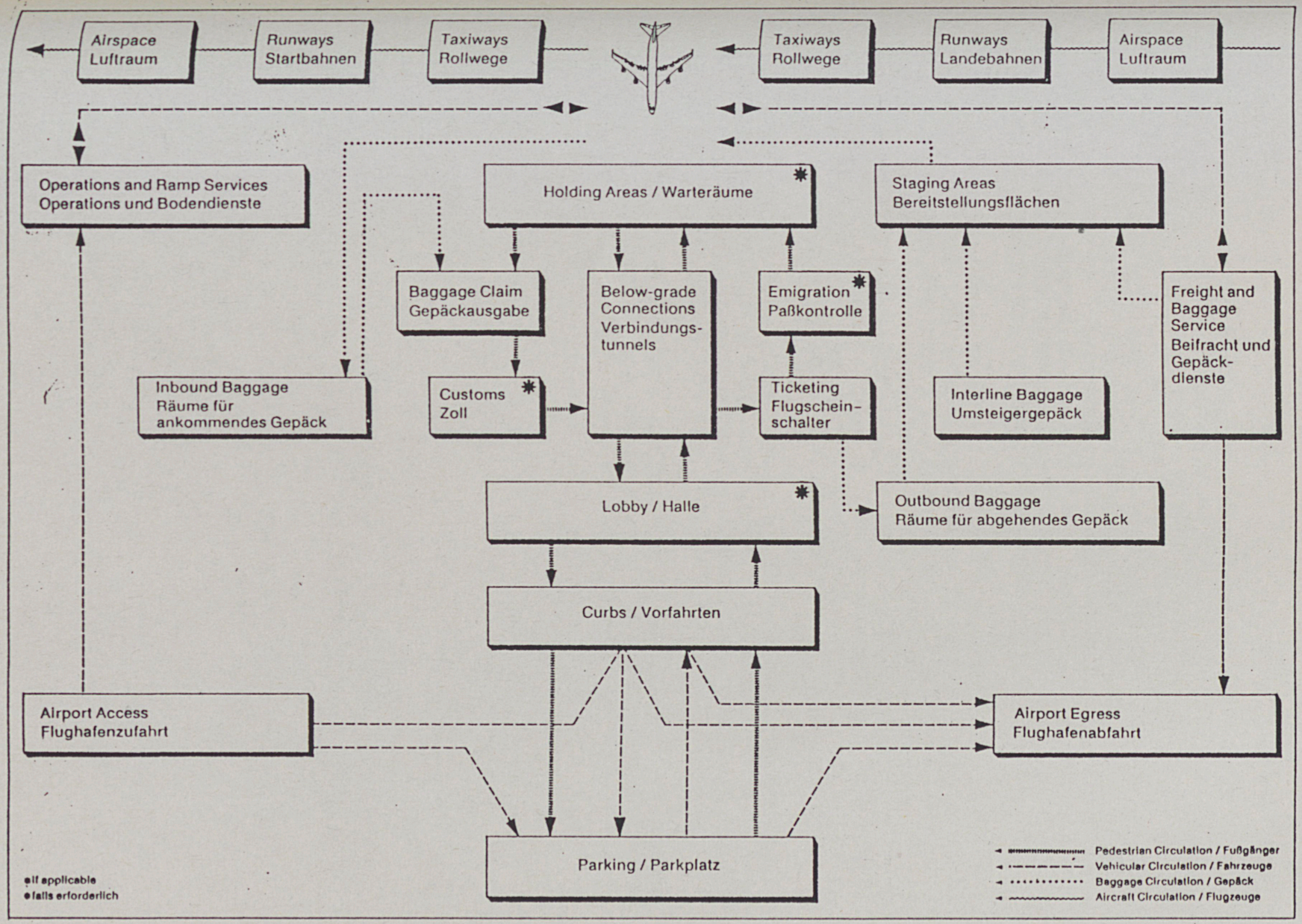
11.8. Site plan, 11.7, 11.8 courtesy of Greater Orlando Aviation Authority

11.9. 1990 expansion section






Runway Centerline
Mittellinie der Start- und Landebahn
600'
180 m
Outer Taxiway Centerline
Mittellinie des äußeren Rollweges
300'
90 m
Inner Taxiway Centerline
Mittellinie des inneren Rollweges
150'
45 m
250'
75 m
2400'+x
720 m+x
Average Walking Dist.
250'
75 m
250'
75 m
150'
45 m
Maneuvering Taxiway Lanes
Rollwege für Flugzeugmanöver
300'
90 m
Maneuvering Taxiway Lanes
Rollwege für Flugzeugmanöver
150'
45 m
x
Average Walking Distance
Mittlerer Fußweg
150'
45 m
250'
75 m
100'
30 m
50'
15 m
100'
30 m
250'
75 m
150'
45 m
1050' / 315 m


Airspace
Luftraum
Runways
Startbahnen
Taxiways
Rollwege
Taxiways
Rollwege
Runways
Landebahnen
Airspace
Luftraum
Operations and Ramp Services
Operations und Bodendienste
Holding Areas / Warteräume
Staging Areas
Bereitstellungsflächen
Baggage Claim
Gepäckausgabe
Below-grade
Connections
Verbindungs-
tunnels
Emigration
Paßkontrolle
Freight and
Baggage
Service
Beifracht und
Gepäck-
dienste
Inbound Baggage
Räume für
ankommendes Gepäck
Customs
Zoll
Ticketing
Flugschein-
schalter
Interline Baggage
Umsteigergepäck
Lobby / Halle
Outbound Baggage
Räume für abgehendes Gepäck
Curbs / Vorfahrten
Airport Access
Flughafenzufahrt
Airport Egress
Flughafenabfahrt
Parking / Parkplatz
Pedestrian Circulation / Fußgänger
Vehicular Circulation / Fahrzeuge
Baggage Circulation / Gepäck
Aircraft Circulation / Flugzeuge
*if applicable
*falls erforderlich

MULTIPLE LINEAR UNITS

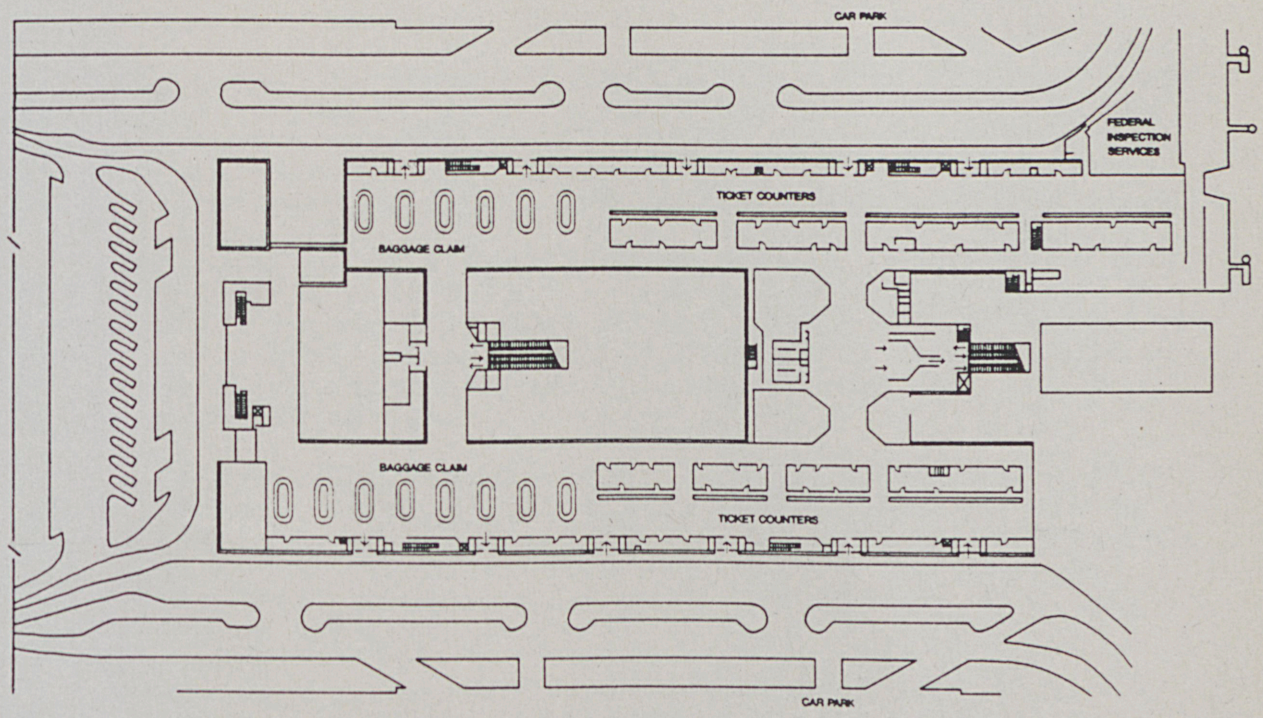
Atlanta Hartsfield

Atlanta Hartsfield was designed by Stevens & Wilkinson/Smith, Hinchman & Grylls/Minority Airport Architects & Planners and opened in 1980. It a multiple linear design with many piers. It was designed to be a major airline hub for the south second only to Chicago in airline traffic. It is unique in design because of its configuration. Passengers arrive cerbside at one of two landside terminals and are then security cleared and checked in. They then travel through an underground "city" which connects the various terminals together.

The deign itself has been praised for its originality and although the travel distances from the main terminal building to the furthest most pier is a large distance it still works well. However, it is a long distance to cover and moving sidewalks do little to help the feeling of the distance. Since it uses a pier configuration the access rout run through the center so travel distance fro the end of the pier to the accessway is reduced to half the distance.

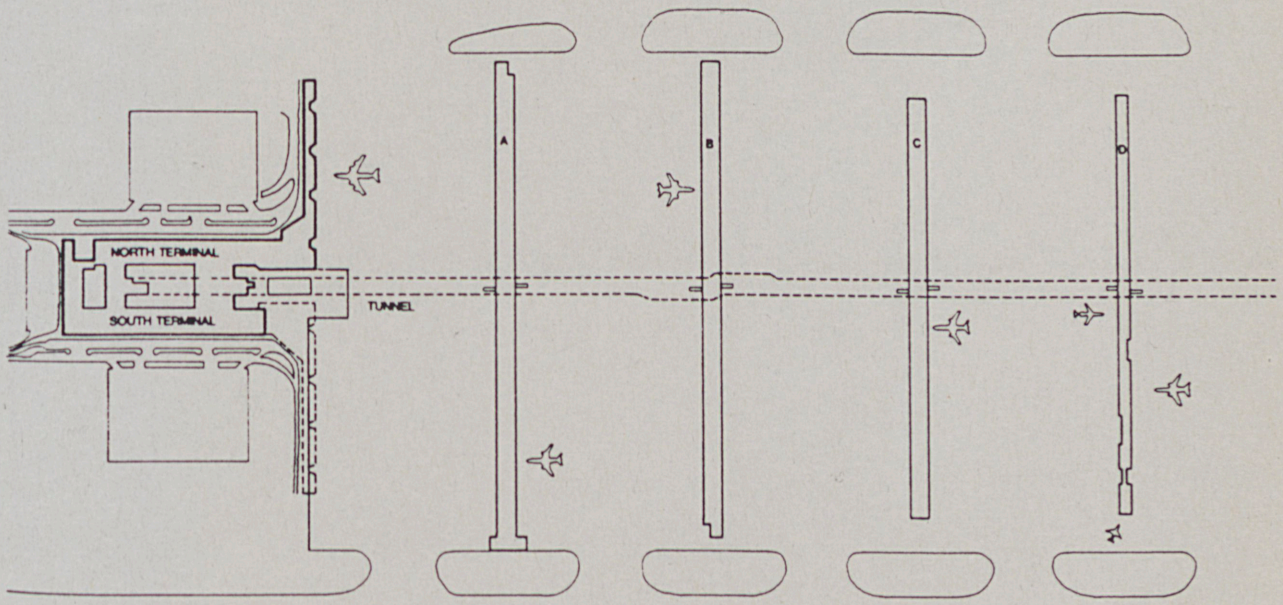
The airport sets itself up for further expansion by allowing the growth of the airport further past the last pier. The airport, however, can become much less user-friendly by extending the distance one must travel.

Overall, Atlanta Hartsfield is an innovative design which has become a popular airport for many. Its hybrid design lends itself well to the function of an airport.



13.2. Landside terminal building, main level plan

13.3. Atlanta, William B Hartsfield International, site plan



HYBRIDS

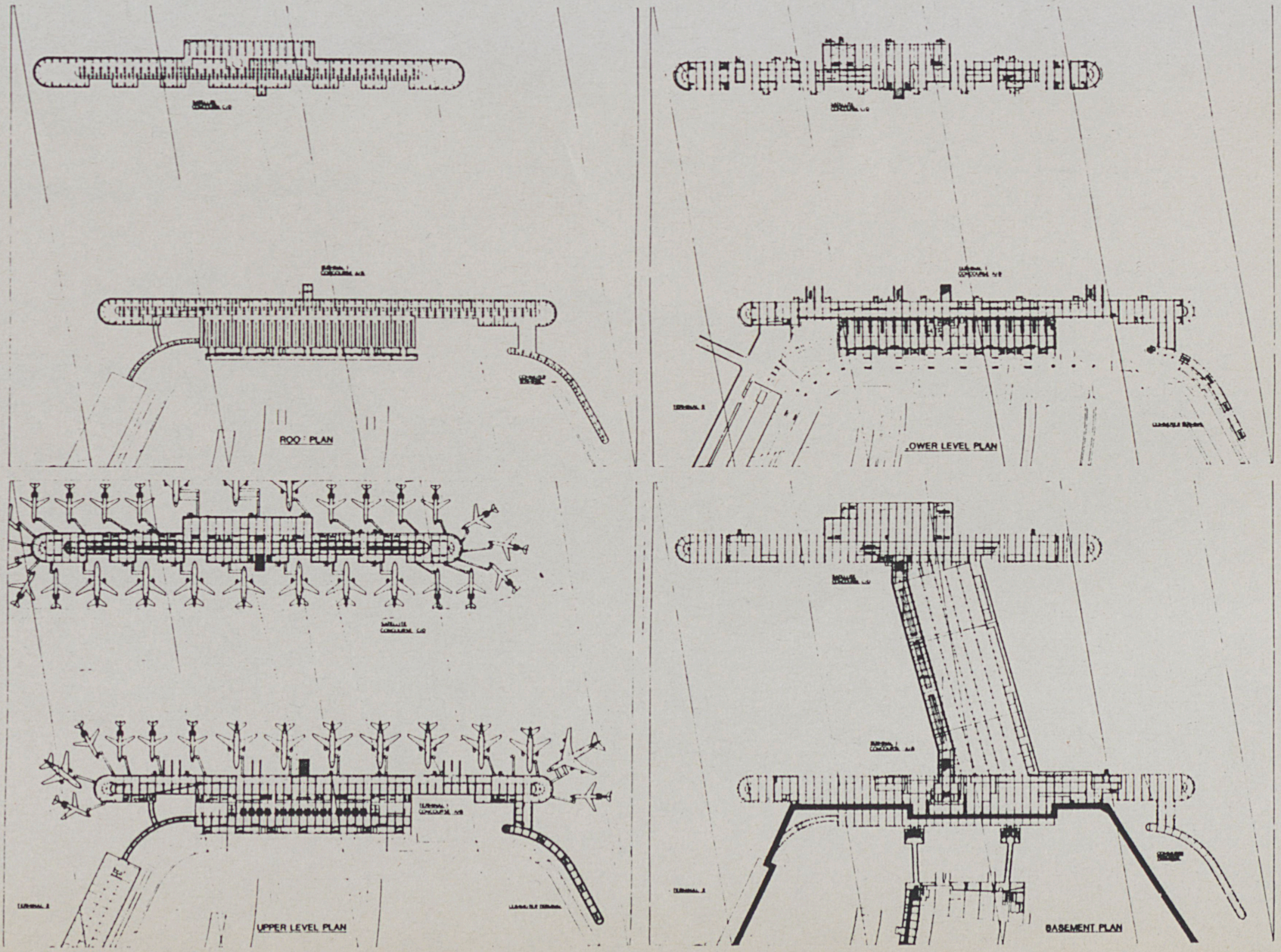
United Airlines Terminal, Chicago

The United Airlines Terminal was designed by Helmut Jahn and opened in 1988. It is designed for United airlines and is the latest expansion to the world's largest and busiest airport, Chicago O'Hare. It is another Hybrid form which takes use of pier configuration and the linear configuration.

The terminal is interesting as a piece of architecture, but has received criticism for long travel distances by passengers. However, it does create a good link between the plane, car and the mass transit system. The link is seen in plan with the horseshoe shape on landside with the linear elements on the cerbside.

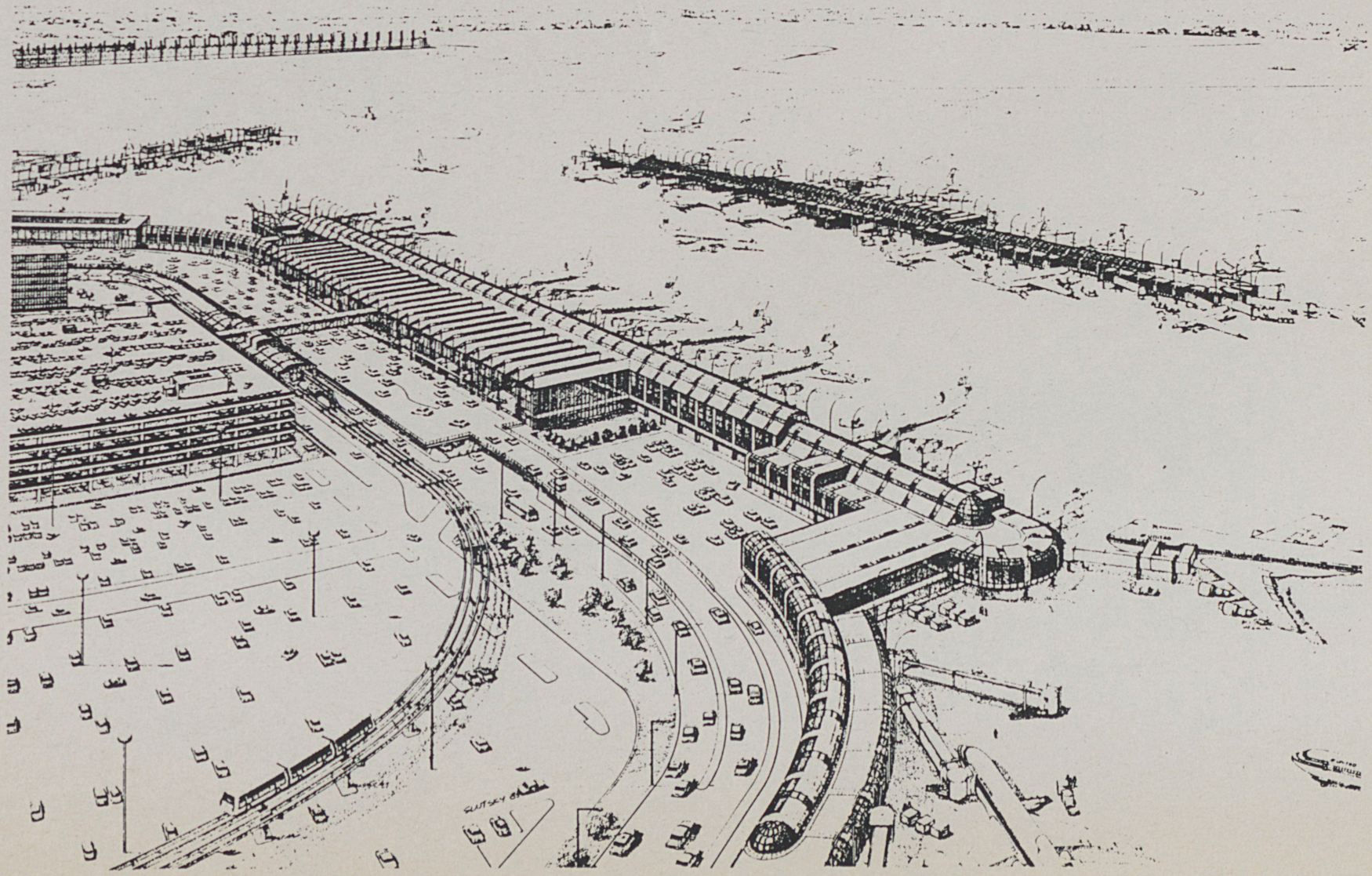
The terminal deserves recognition for its architecture which is simple in plan, but complex in design. It crates an interesting form of light and shadow and its use of steel and tile adds to the visual excitement. However, it does not function as well as it should because it is seen as a very user-friendly airport.

Overall, Jahn created an interesting airport terminal, but could have created one that was more user-friendly. However, that is something that every architect has suffered with, how to make a terminal both interesting and user-friendly.



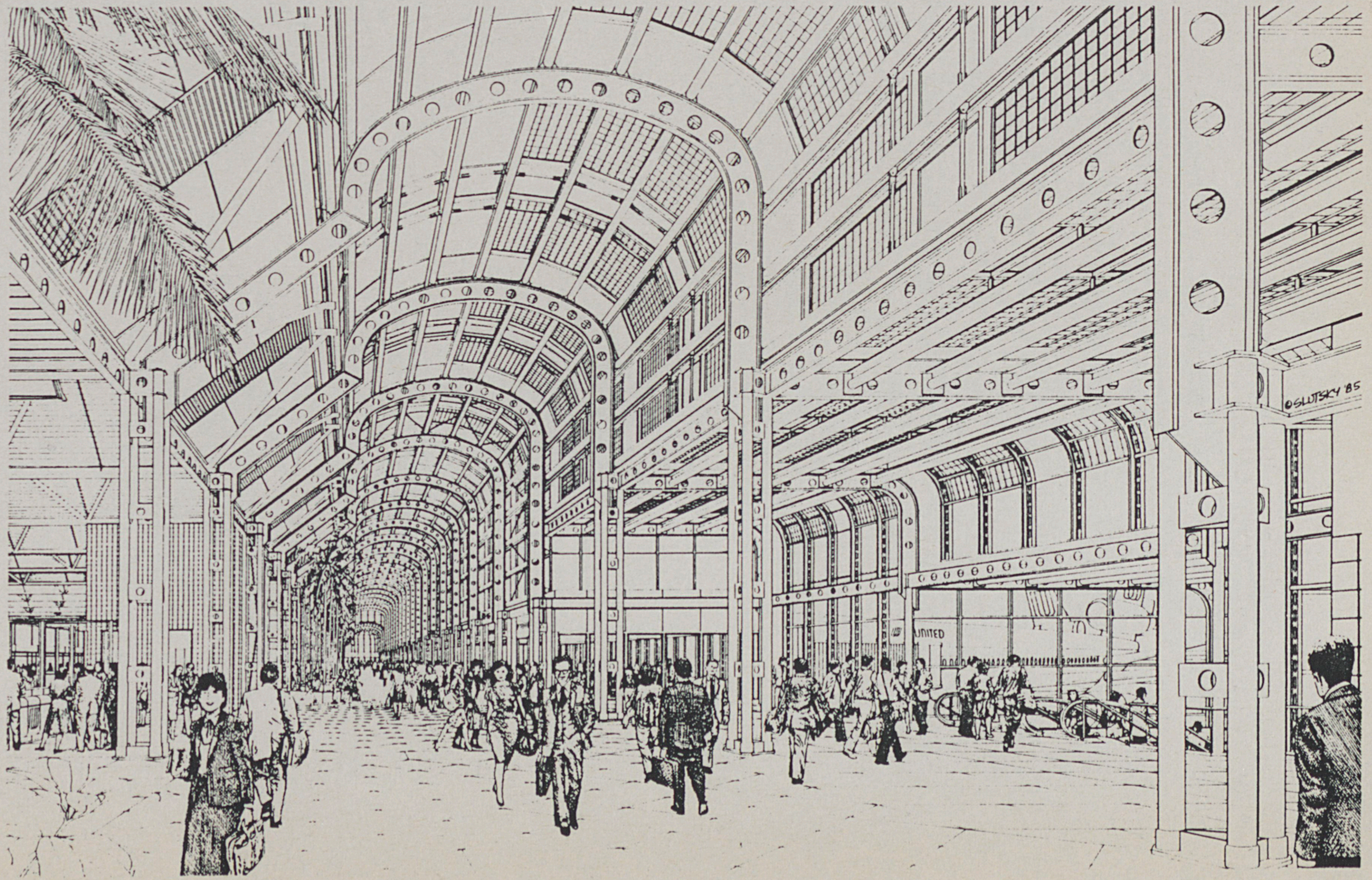
14.3. Plans 14.1–14.3 courtesy of architects: Murphy & Jahn, New York

Rendering, by Rael Slutsky



Ticketing Pavilion and Concourse

Rendering by Rael Slutsky



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Jahn, Helmut, Helmut Jahn Airports, 1991.

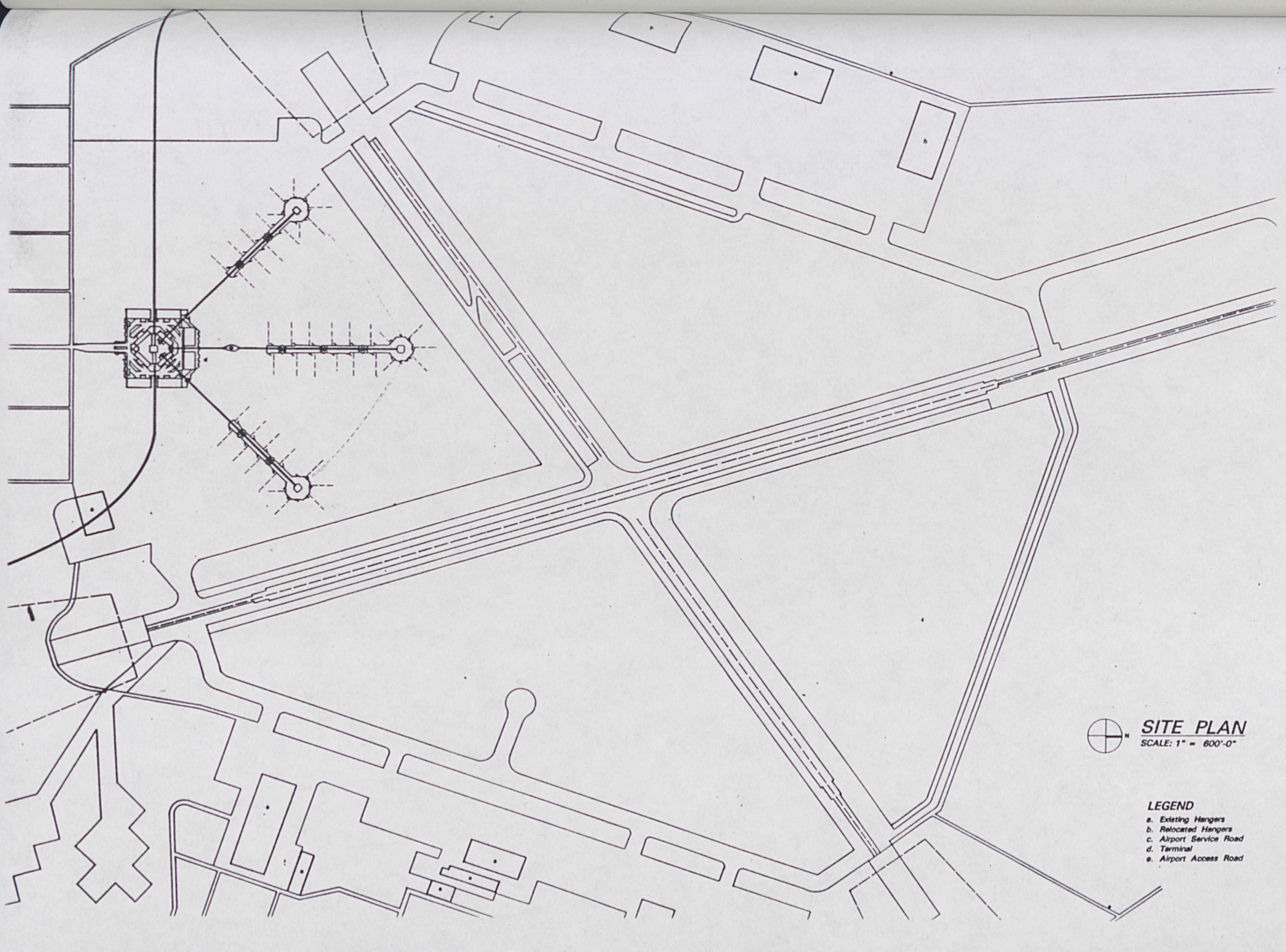
Storrer, William Allin, The Architecture of Frank Lloyd Wright, 1982.

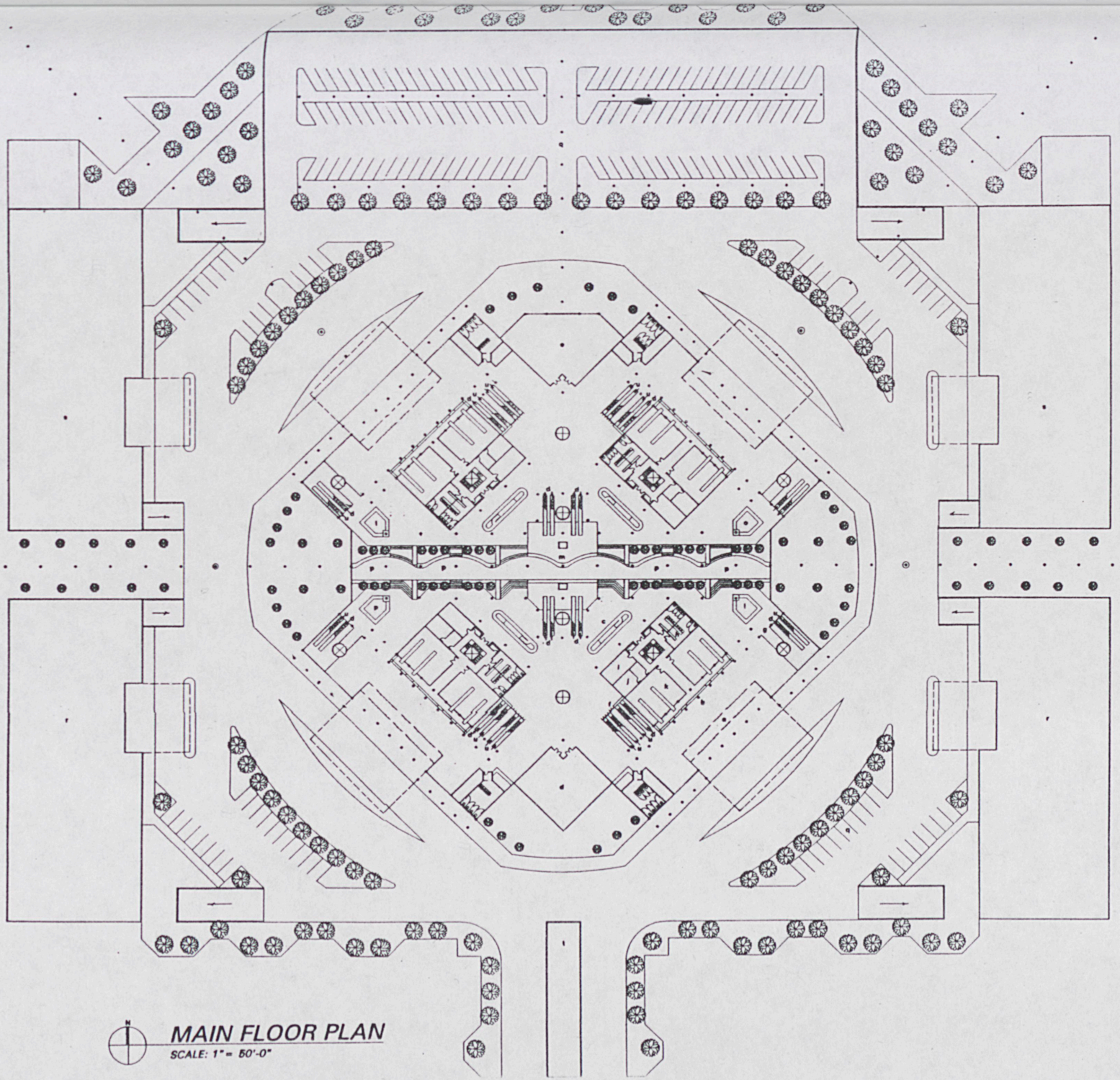
Rogers, Richard, Richard Rogers + Architects, 1985.

Jahn, Helmut, Helmut Jahn, 1986.

Eisenman, Peter, Peter Eisenman House of Cards, 1987.

Meier, Richard, Richard Meier Architect, 1984.


SITE PLAN
SCALE: 1" = 600'-0"
LEGEND
a. Existing Hangers
b. Relocated Hangers
c. Airport Service Road
d. Terminal
e. Airport Access Road

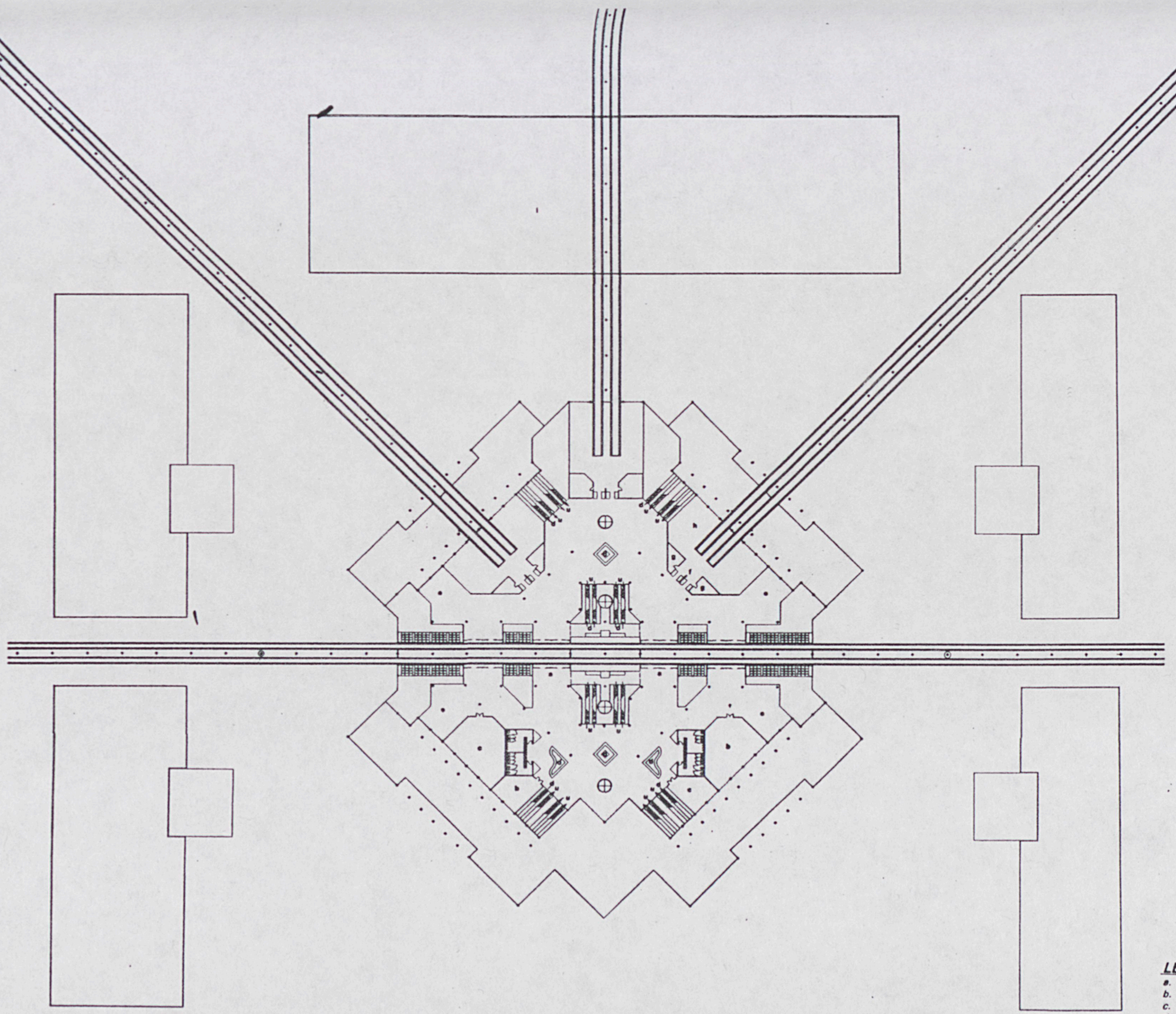


MAIN FLOOR PLAN

SCALE: 1" = 50'-0"

LEGEND

a. Entry
b. Check-in
c. Baggage Claim
d. Gift Shop
e. Duty Free Shop
f. Phones / Lockers
g. Access to Sublevel 1
h. Employee's Change Room
i. Employee's Break Room
j. Offices
k. Departure's Baggage
l. Concessions
m. Bar / Coffee Shop
n. Information
o. Car Rental
p. Passenger Seating
q. Parking
r. Hotel
s. Administration
t. Service Access

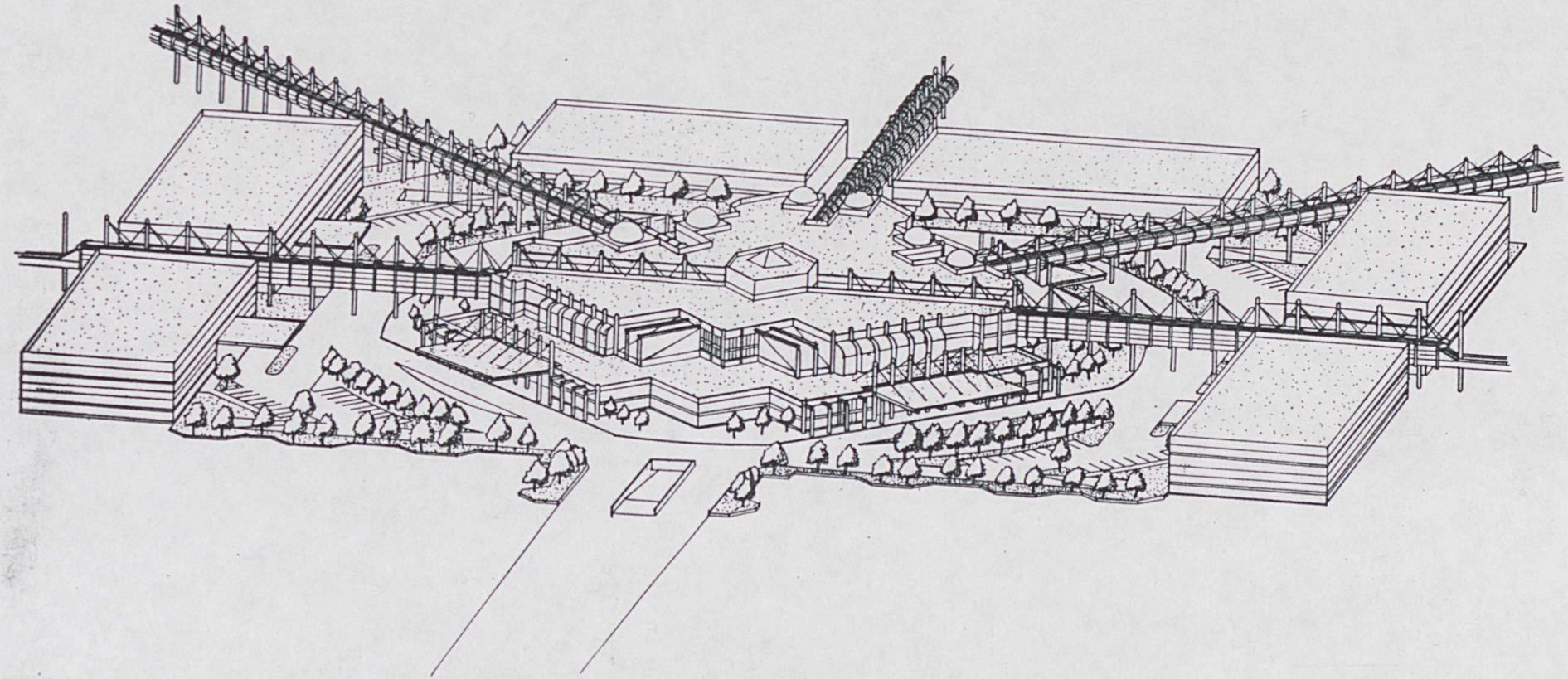


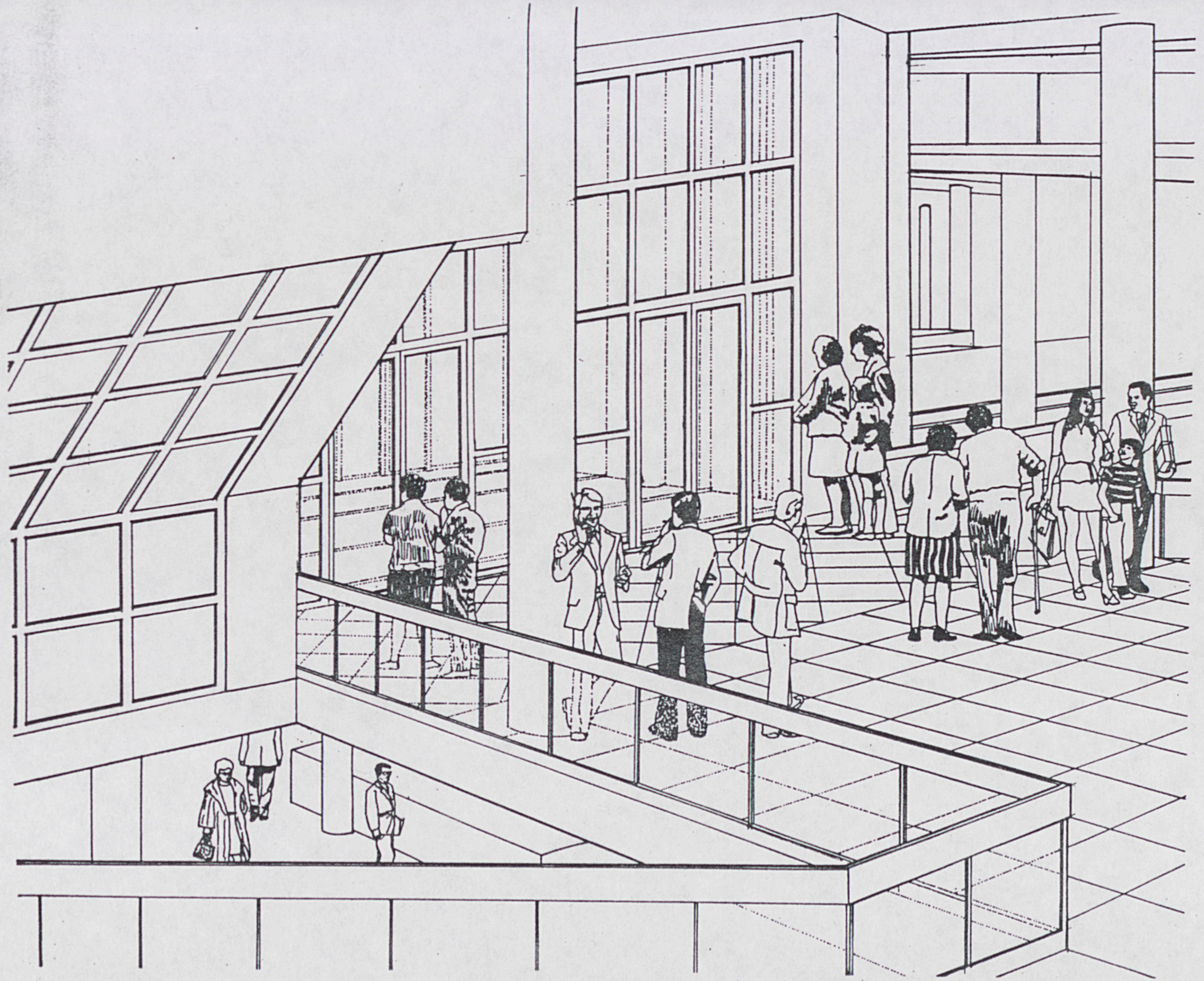
SECOND FLOOR PLAN

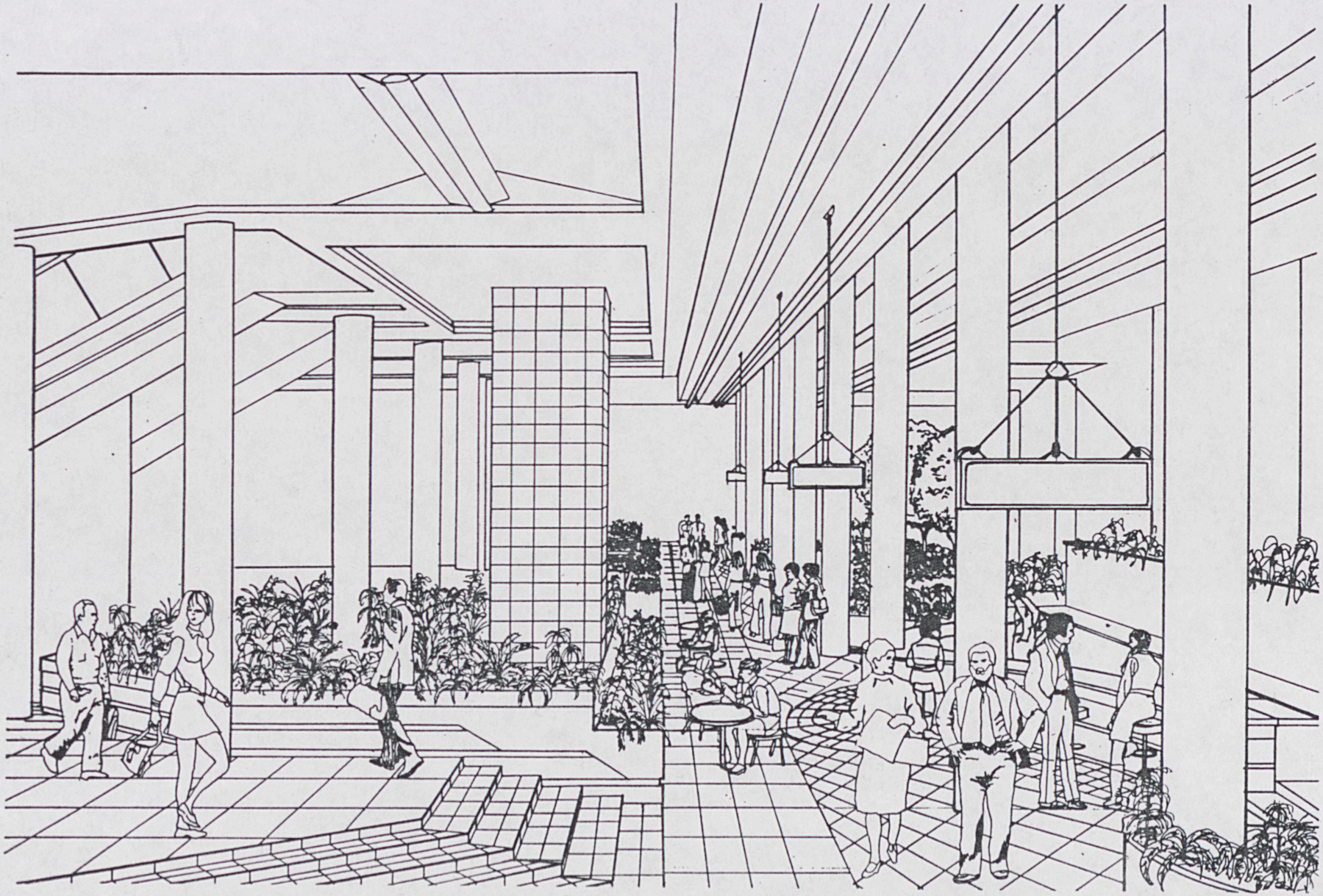
SCALE: 1" = 50'-0"

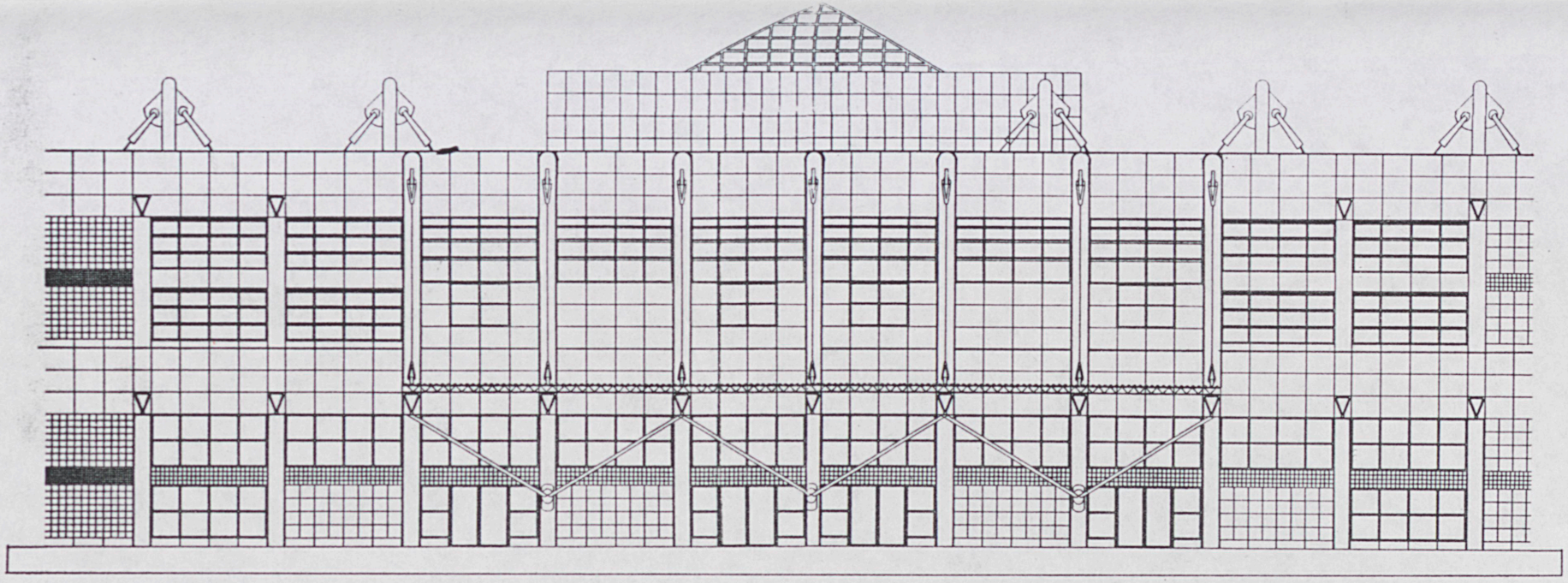
LEGEND

a. Maglev Arrival / Departure
b. Retail
c. Bar / Restaurant
d. Concessions
e. Passenger Seating
f. Security / Immigration
g. Security / Immigration offices
h. Airside Transport Lounge
i. Airport Services / Future Expansion



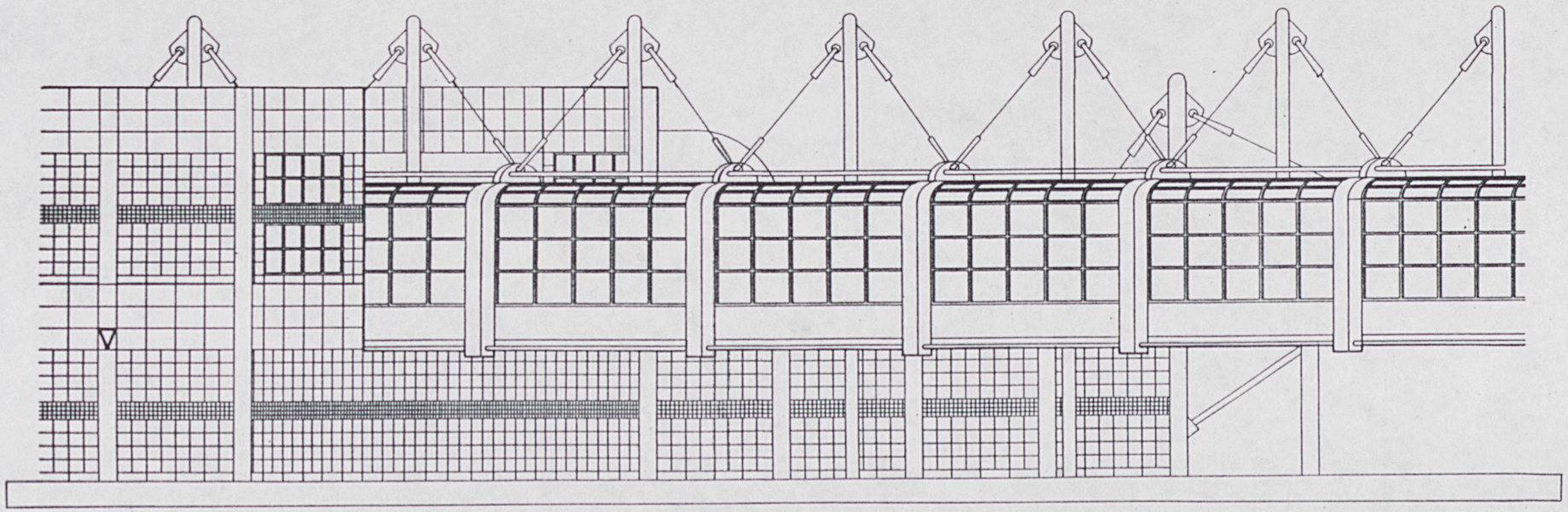






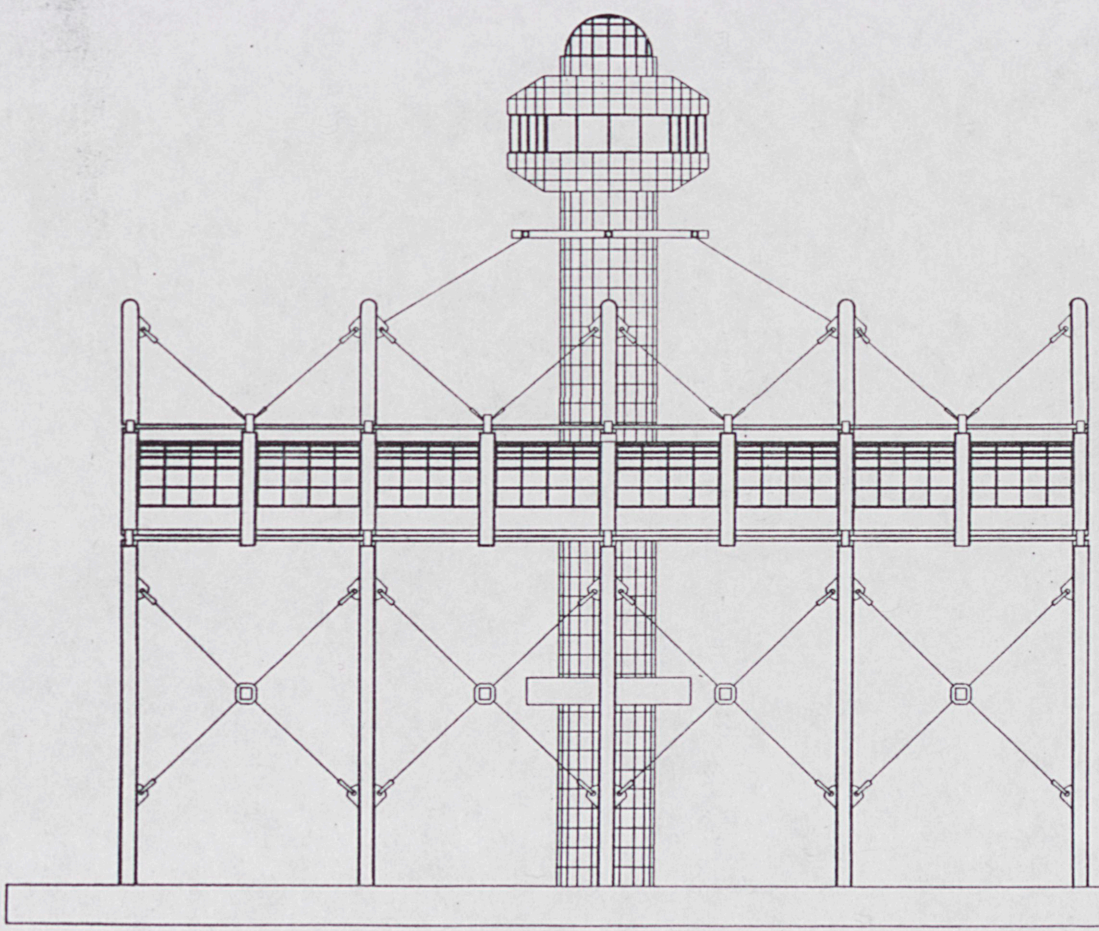
SOUTHWEST ELEVATION

SCALE: 1" = 10'-0"

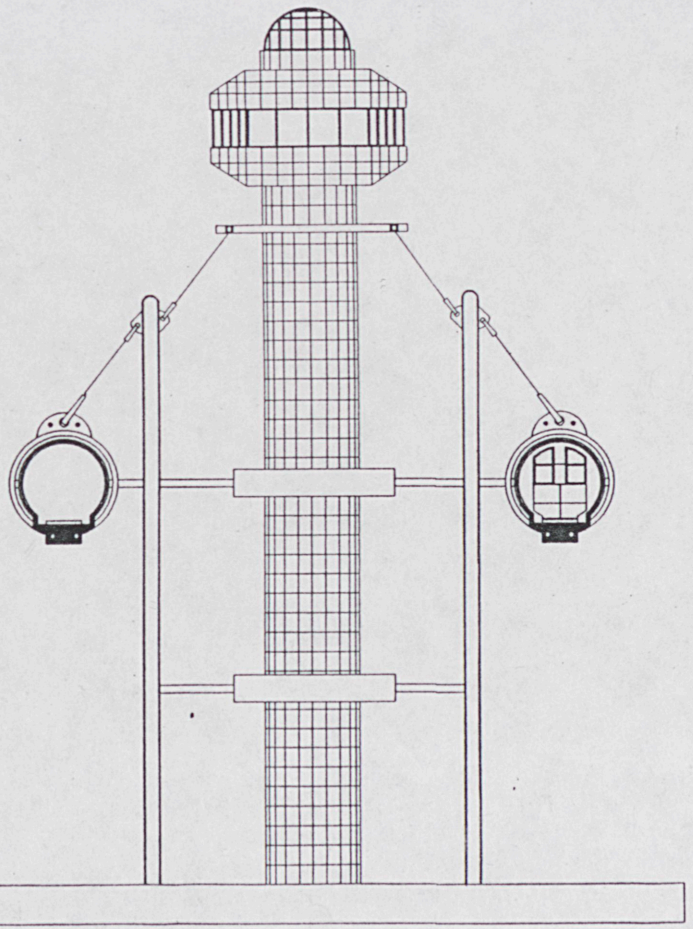


SOUTHWEST ELEVATION

SCALE: 1" = 10'-0"

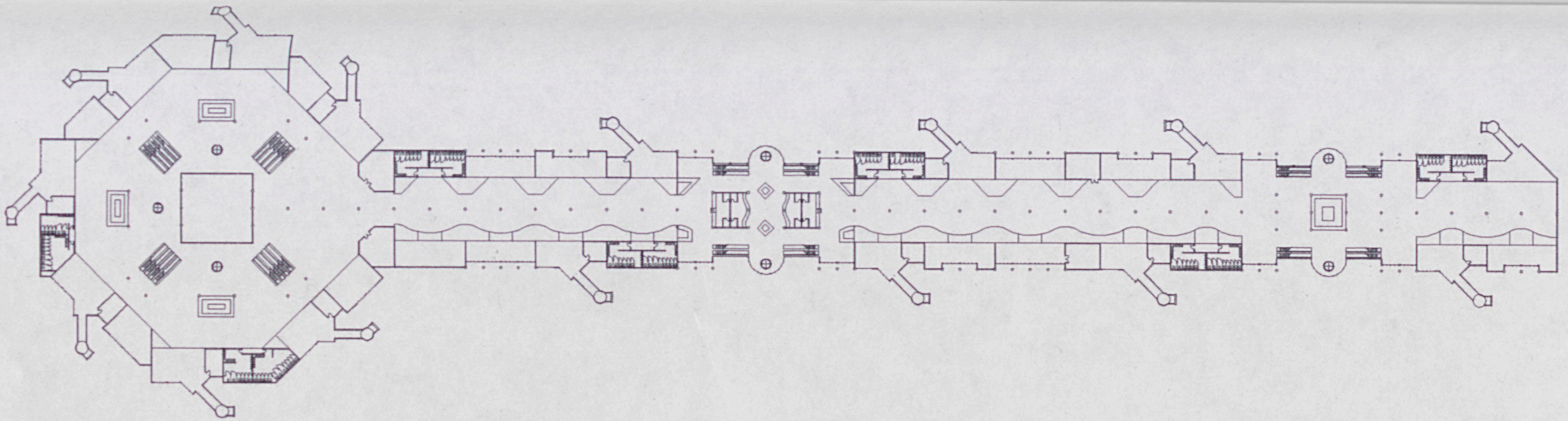


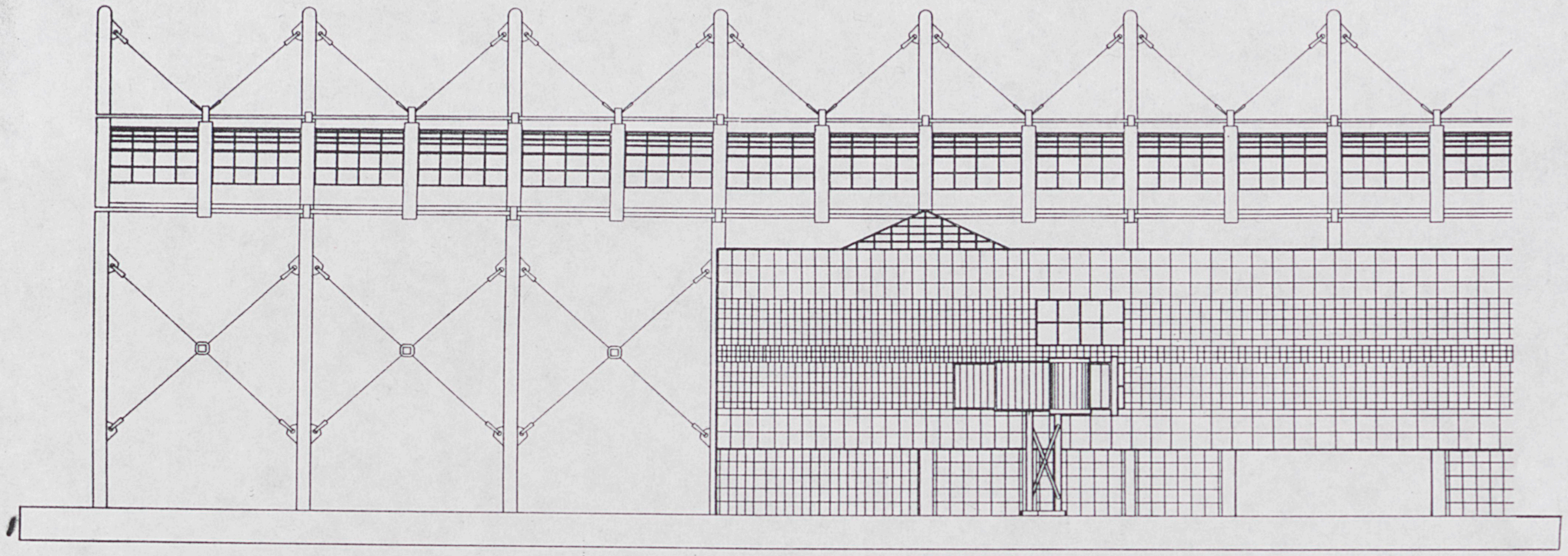
EAST ELEVATION
SCALE: 1" = 10'-0"



NORTH ELEVATION
SCALE: 1" = 10'-0"

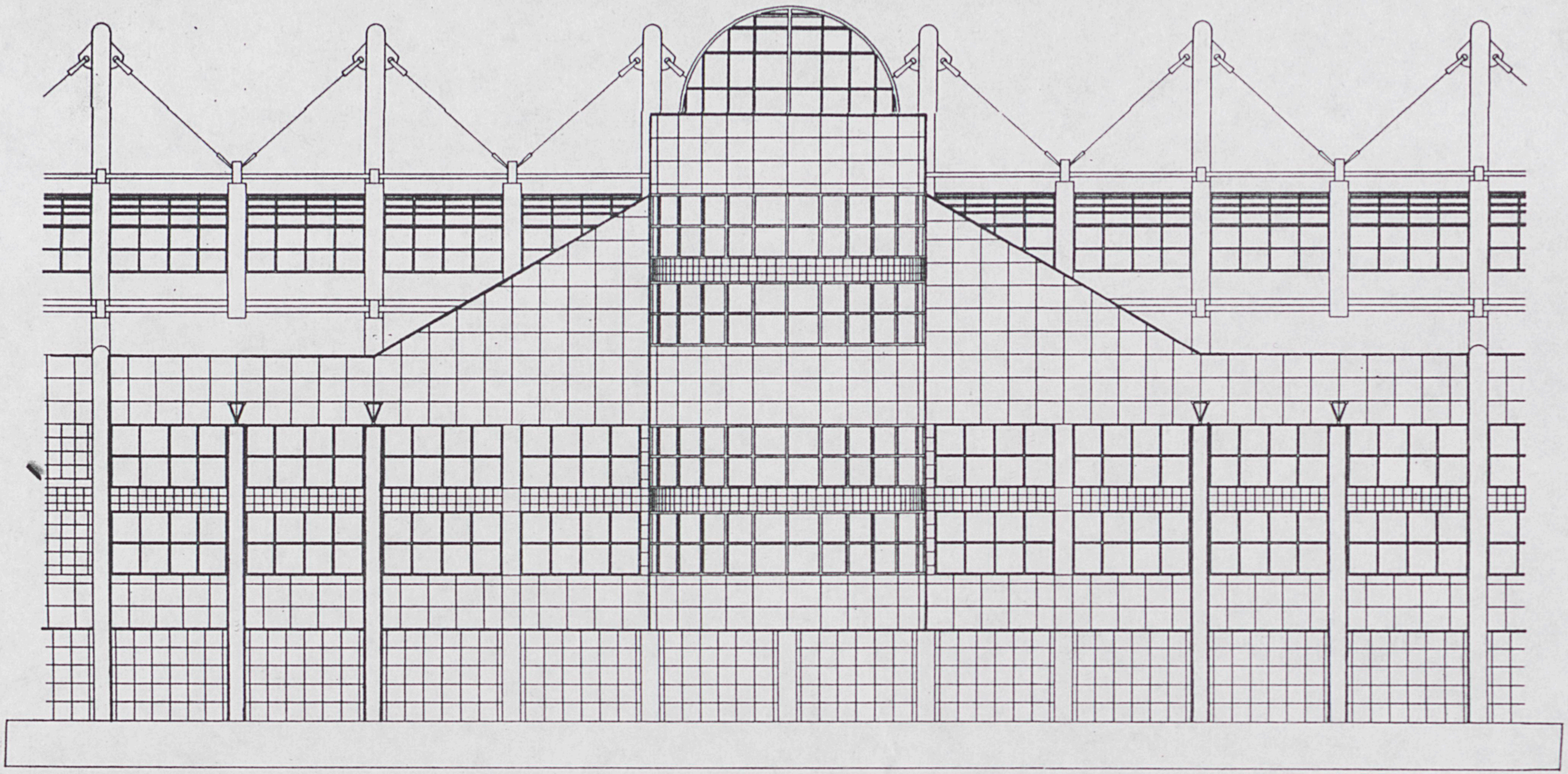
CONTROL TOWER





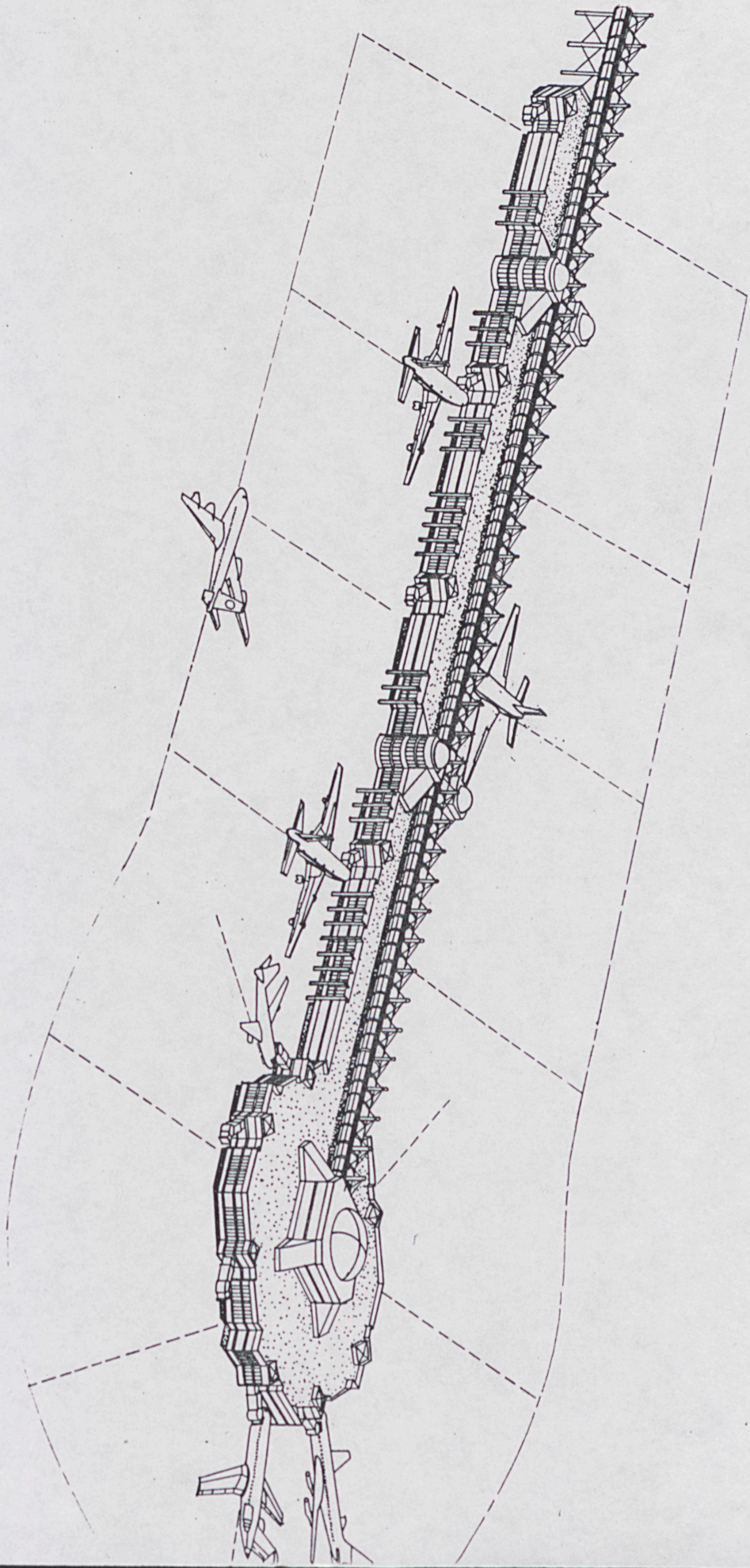
SOUTHWEST ELEVATION

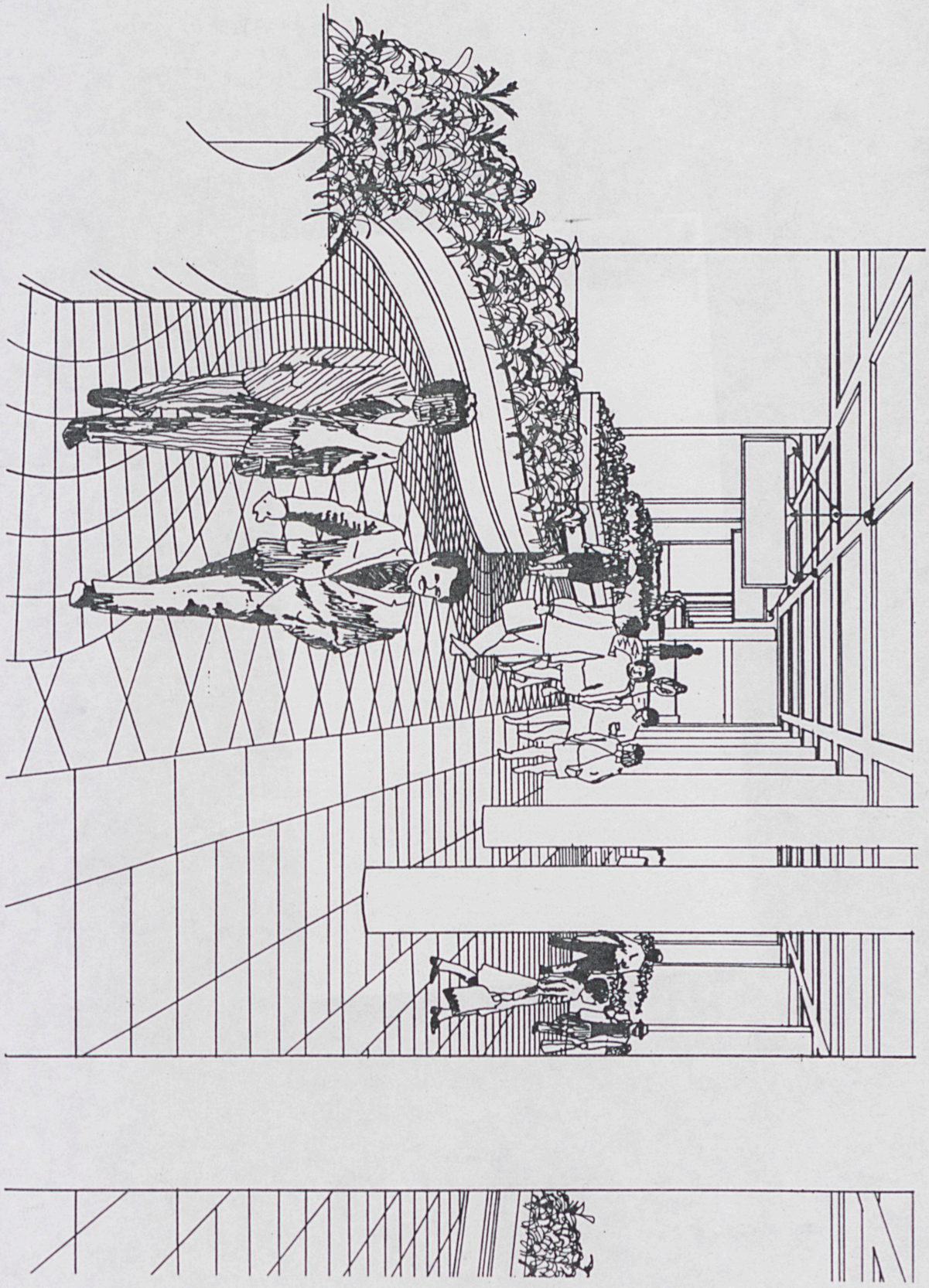
SCALE: 1" = 10'-0"



SOUTHWEST ELEVATION

SCALE: 1" = 10'-0"





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