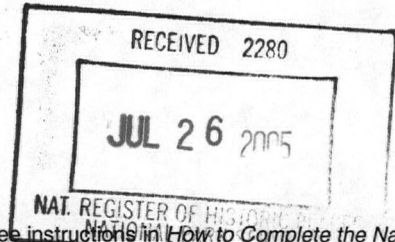


994

United States Department of the Interior
National Park Service

National Register of Historic Places Registration Form

This form is for use in nominating or requesting determinations for individual properties and districts. See instructions in *How to Complete the National Register of Historic Places Registration Form* (National Register Bulletin 16A). Complete each item by marking "x" in the appropriate box or by entering the information requested. If an item does not apply to the property being documented, enter "N/A" for "not applicable." For functions, architectural classification, materials, and areas of significance, enter only categories and subcategories from the instructions. Place additional entries and narrative items on continuation sheets (NPS Form 10-900a). Use a typewriter, word processor, or computer to complete all items.



1. Name of Property

historic name Trans World Airlines Flight Center

other names/site number TWA Terminal 5

2. Location

street & number John F. Kennedy International Airport [] not for publication

city or town Jamaica [] vicinity

state New York code NY county Queens code 081 zip code 11430

3. State/Federal Agency Certification

As the designated authority under the National Historic Preservation Act, as amended, I hereby certify that this [X] nomination [] request for determination of eligibility meets the documentation standards for registering properties in the National Register of Historic Places and meets the procedural and professional requirements as set forth in 36 CFR Part 60. In my opinion, the property [X] meets [] does not meet the National Register criteria. I recommend that this property be considered significant [X] nationally [] statewide [] locally. ([] see continuation sheet for additional comments.)

William Carlos, SRP

6/22/05

Signature of certifying official/Title

Date

New York State Office of Parks, Recreation & Historic Preservation

State or Federal agency and bureau

In my opinion, the property [] meets [] does not meet the National Register criteria. ([] see continuation sheet for additional comments.)

Signature of certifying official/Title

Date

State or Federal agency and bureau

4. National Park Service Certification

I hereby certify that the property is:

- [X] entered in the National Register
[] see continuation sheet
[] determined eligible for the National Register
[] see continuation sheet
[] determined not eligible for the National Register

[] removed from the National Register

[] other (explain) _____

Signature of the Keeper

date of action

Jeffrey M. Savage

9-7-05

Trans World Airlines Flight Center

Name of Property

Queens County, New York

County and State

5. Classification

Ownership of Property

(check as many boxes as apply)

- ☐ private
☐ public-local
☒ public-State
☐ public-Federal

Category of Property

(Check only one box)

- ☒ building(s)
☐ district
☐ site
☐ structure
☐ object

Number of Resources within Property

(Do not include previously listed resources in the count)

Contributing	Noncontributing	
<u>1</u>	<u>0</u>	buildings
<u> </u>	<u> </u>	sites
<u> </u>	<u> </u>	structures
<u> </u>	<u> </u>	objects
<u>1</u>	<u>0</u>	TOTAL

Name of related multiple property listing

(Enter "N/A" if property is not part of a multiple property listing)

N/A

Number of contributing resources previously listed in the National Register

0

6. Function or Use

Historic Functions

(enter categories from instructions)

Transportation: air-related

Current Functions

(Enter categories from instructions)

Vacant/Not in use

7. Description

Architectural Classification

(Enter categories from instructions)

Modern Movement

Other: Expressionistic Architecture

Materials

(Enter categories from instructions)

foundation Concrete

walls Concrete

Cement Plaster

Glass

roof Concrete

Narrative Description

(Describe the historic and current condition of the property on one or more continuation sheets)

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Trans World Airlines Flight Center

Name of Property

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7. Narrative Description

The Trans World Airlines Flight Center, also known as TWA Terminal 5, is located at John F. Kennedy International Airport, in Queens, New York. It is adjacent to the International Arrivals Building and Airlines Wings, at the midpoint of a curve in the airport service road. It is fronted by two roads and a canopy structure built in 1990 to shelter waiting passengers. The elevated tracks of the recently constructed Air Train wind in front of the Terminal, with the nearest stop to the west at the Jet Blue Terminal 6.

The structure consists of the terminal building—a vaulted reinforced concrete structure of four interlocked shells, bilaterally symmetrical, creating an opened, half-circular fan in plan—and two satellite “flight wings”, or departure terminals, connected to the main terminal by “flight tubes”. Flight Tube No. 2 and Flight Wing No. 2, to the south of the main terminal, were constructed at the same time as the main terminal in 1962. Flight Tube No. 1 and Flight Wing No. 1 were built a few years later in 1967, designed by Eero Saarinen’s successor firm to accommodate the much larger jumbo jets. The two flight wings have been described as being shaped like violins, radiating out towards the airstrip, with their “necks” connected to the main terminal. The terminal structure is two stories in height, with a sunken first floor waiting area and open mezzanines. The signature view is the landside elevation, the principal side of the building facing the airport access road, as seen from ground level. This perspective captures the sweeping and expressive concrete forms conceived by the architect Eero Saarinen.

The building’s design breaks from the sleek, orthogonal geometries of the International Style, co-opted as the era’s signature corporate style, and with its expressive wing-like forms and swooping, curvilinear lines, it is a compelling visual metaphor for the modern airport terminal. The roof is a system of four independent, balanced segmental concrete shells, with two large upward-slanting side shells resembling wings poised for flight, and two smaller downward-sloped shells at the front and rear of the building. The concrete is up to 19 inches thick in several locations. Each shell is anchored at two points by flowing y-shaped piers, located on either side of the main entrance and flanking the oval window facing the tarmac on the airside elevation. The piers continue the thrust of the valleys in the roof between the shells down into the ground; they are angled in towards the roofline from the ground up, and split into two arms that sweep up into the roof shells in a continuous gesture. The side shells rise up from their structural spine and cantilever over the main terminal building up to 75 feet. The front and rear shells are smaller, and slope down from the roof’s center point, where each of the four shells is delicately supported by the other three lobes.¹

The glazed walls of the main terminal consist of large, vertically oriented panes of glass, laterally reinforced by a lightweight steel bow truss system. Each truss is a different length and angle as it follows the curve and slope of the roof above. In the recent past a dark purple mylar film has been applied to the inside surfaces of the glass in an effort to reduce the amount of solar infiltration, which greatly reduces visibility through the glass and substantially changes the perception from both the exterior and interior sides of the building.

¹ Christopher Hart Leubkeman, “Form Swallows Function,” *Progressive Architecture* (May, 1992): 106-108

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Section 7 Page 2

Trans World Airlines Flight Center

Name of Property

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The main entrance to the terminal is on the landside, where the roof is at its lowest point. The rake of the roof comes together into a sculptural scupper at the center, arching down over the front sidewalk and greeting passengers at the entrance. In the original design, cars would drive up under the slope of the roof, dropping off travelers at the curb. The road has since been replaced with an extension of the original sidewalk, the curb of which can still be seen. The imprint of the formwork boards is visible on the sculptural piers that rise up on either side of the main front doors, adding texture and movement to the concrete roof and piers. The main entrance has been modified by the addition of two pairs of aluminum glazed vestibules. At the center of the entrance is a monumental bowl-shaped bronze light fixture. More recently, miscellaneous identification and directional signage, street furniture, entry vestibules and security devices have also been installed along the perimeter of the building.

Single-story concrete wings extend laterally from the two piers flanking the entrance and follow the curve of the road, terminated at each end by sculptural forms that actually conceal large mechanical exhaust louvers. These wings are an extension of the interior mezzanines; their concave walls extend into curved, sheltering roofs, which connect to the floor of the mezzanines inside. White elastomeric coating was applied to the roof in 1999 to prevent further water penetration through the concrete shell. The bright color of the paint and its thick texture has significantly altered the raw concrete finish of the original design. The original door openings of the wings are framed by rib-like projections. On the east wing, two of the openings have been converted with floor-to-ceiling windows and aluminum glazed vestibules project from the other two openings. On the west wing, the five openings have two projecting aluminum glazed vestibules, two pairs of recessed glazed doors, and a pair of flush glazed doors.

The original view of the airside elevation from the runway has been greatly altered by the addition of miscellaneous baggage handling facilities, and other later improvements. The two piers on this side of the building swoop up into the roofline as do their counterparts on the landside, and then join to frame the oval-shaped window wall facing the tarmac. Through these piers extend elevated tubes which lead to the flight wings. A large red 'TWA' sign is affixed onto the roof above the glazing, from which point the east and west shells jut out to either side of the oval window. The two tubes rise and gently arc to either of their respective flight wings, supported by concrete piers at regular intervals.

The interiors of the TWA Terminal reflect the same swooping forms and feeling of dynamic motion as the exterior. The four shells of the roof arc gracefully overhead, delineated by four skylights forming transparent voids between the segments of concrete structure. A custom designed combination loud-speaker and clock punctuates the point where the roofs and skylights come together. Most of the wall and floor surfaces consist of small ($\pm 1/2"$) gray-flecked ceramic tiles, in many locations with marble details. This, and the consistently sculptural forms of the signs, information boards, staircases, counters and sculptural HVAC elements help create a unified interior environment.

The sculpted information desk in the main entrance hall springs up from the floor in a single, flowing motion. Solid marble slabs mark the counter-tops. The entry hall accesses the ticketing areas to the east and the ticketing areas (once baggage claim) to the west. New baggage claim and other baggage handling equipment are in a subsequent addition at the far west end of the building. The

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lower lobby is connected to the upper lobby and the sunken waiting area by a wide central flight of stairs divided by two landings. The sunken waiting area faces the tarmac, and was once filled with benches so that passengers could relax and watch arriving and departing flights as they waited to board. At some point, the original curved marble partition defining the area was demolished and replaced with 16 additional ticket counters. The counters have since been demolished and replaced by a carpeted wall similar to the original one. Auxilliary spaces to the east and west of the sunken waiting area could be accessed through the upper lobby, which included restrooms, snack bars and elevators. Other areas in the east and west wings were for staff and employees, such as offices and a cafeteria. These areas have kept their original function, with some minor alterations. It is also through the upper lobby that the passengers reached the flight wings to board their flights, via the connector tubes.

Flowing staircases and continuous aluminum handrails connect the main level to the east and west mezzanine levels, which contain restaurants, lounges and first-class waiting areas. Original balustrade pickets at the handrails were interspersed with newer, narrower, intermediate pickets to decrease the non-code compliant width of the opening. The two mezzanines are connected at the upper level by a reinforced-concrete bridge. The Ambassador's Lounge on the west mezzanine level was an elegantly designed interior space with a series of cantilevered benches, wall sconces, marble fountains and sculptures, most of which is still intact. The reception and club support layouts and interior detailing have been renovated to accommodate modern club services. The east mezzanine contained the Paris Café and Lisbon Lounge, and it still maintains some of the original kitchen and dining areas. These spaces have been greatly altered over time, however, and do not reflect the original design intent. The original bathrooms were removed to make a seating area, and the original kitchen size was reduced to make room for new tables and seating.

Additional office, service and mechanical spaces occupy a partial basement located under the upper portion of the main level. This level was accessed by various stairs and elevators throughout the building. A new underground passenger access tunnel to Flight Wing 1 was added on this level in 1970.

The connector tubes to the flight wings are constructed of a lightweight steel hoop frame with a cement plaster exterior finish and architectural plaster on the interior. Horizontal ellipses in section, the tubes rise approximately six feet along a slightly bowed arch to the taller flight wing floor level. The tubes are supported on a series of concrete piers. The interiors are finished in a suspended acoustic tile ceiling with concealed light coves and a carpeted floor. The newer, west tube is slightly wider in section and shorter (232 feet), than the east tube (272 feet).

Flight Wing 1, constructed in 1967 with subsequent additions in 1970 and 2000, and Flight Wing 2, built in 1962, were the major gate structures for TWA Airlines. Flight Wing 1 is located to the north of the main terminal and Flight Wing 2 is located to the south. Both flight wing structures have a concrete block and plaster base that curves into the slightly cantilivered floor above. Flight Wing 2, constructed at the same time as the main terminal building, is comprised of a main circular structure with a small flight operations station situated above the main passenger level, and two glass

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enclosed bridges on piers that lead to the departure lounges. Each sized for approximately 100 persons (or the passenger load of a Boeing 707), these spaces are largely intact, with the original seating, ceramic tile faced curved walls, ceilings and lounge accessories all extant. Virtually the only significant modification is the change of the "TWA Red" carpet to a more neutral gray. The location of these gate lounges affords an excellent vantage point to observe the airfield activities of a large international airport.

While Flight Wing 1 and Flight Tube 1 were part of the original design of the terminal as conceived of by Saarinen, due to financial considerations these were actually constructed in 1967 by Saarinen's partner, Kevin Roche, after Saarinen's death and well after the completion of Flight Tube 2 and Flight Wing 2. Flight Wing 1 was tailored to handle the Boeing 747 jumbo jets that TWA Airlines was starting to use for their flights. Containing passenger amenities, service and inspection spaces, it had the least impressive public spaces of the TWA complex, and alterations over time have only exacerbated this condition. It is much larger than Flight Wing 2 and has three levels of passenger, Federal Inspection Station (FIS), and operations spaces. Many interior and systems modifications have been made over the years to accommodate changing passenger, baggage handling and security needs. Currently only the service cores of this building remain, including shop spaces, offices and bathrooms. All furnishing have been removed.

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8. Statement of Significance

Applicable National Register Criteria

(Mark "x" in one or more boxes for the criteria qualifying the property for National Register listing.)

- ☒ **A** Property associated with events that have made a significant contribution to the broad patterns of our history.
- ☐ **B** Property is associated with the lives of persons significant in our past.
- ☒ **C** Property embodies the distinctive characteristics of a type, period, or method of construction or that represents the work of a master, or possesses high artistic values, or represents a significant and distinguishable entity whose components lack individual distinction.
- ☐ **D** Property has yielded, or is likely to yield, information important in prehistory or history.

Criteria Considerations

(Mark "x" in all boxes that apply.)

- ☐ **A** owned by a religious institution or used for religious purposes.
- ☐ **B** removed from its original location
- ☐ **C** a birthplace or grave
- ☐ **D** a cemetery
- ☐ **E** a reconstructed building, object, or structure
- ☐ **F** a commemorative property
- ☒ **G** less than 50 years of age or achieved significance within the past 50 years

Narrative Statement of Significance

(Explain the significance of the property on one or more continuation sheets.)

9. Major Bibliographical References

Bibliography

(Cite the books, articles, and other sources used in preparing this form on one or more continuation sheets.)

Previous documentation on file (NPS):

- ☐ preliminary determination of individual listing (36 CFR 67) has been requested.
- ☐ previously listed in the National Register
- ☐ previously determined eligible by the National Register
- ☐ designated a National Historic Landmark
- ☒ recorded by Historic American Building Survey
NY-6371
- ☐ recorded by Historic American Engineering Record

Areas of Significance:

(Enter categories from instructions)

Architecture

Engineering

Transportation

Period of Significance:

1962-1970

Significant Dates:

N/A

Significant Person:

N/A

Cultural Affiliation:

N/A

Architect/Builder:

Eero Saarinen and Associates, Architects

Amman and Whitney Structural Engineers

Grove, Shepherd, Wilson & Kruge, Inc.

Contractors

Primary location of additional data:

- ☐ State Historic Preservation Office
- ☐ Other State agency
- ☐ Federal Agency
- ☒ Local Government: NYC LP – 1915
(July 19, 1994)
- ☒ University: Yale University
- ☒ Other repository: Peter Brandt Photography
The Library of Congress

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8. Narrative Statement of Significance

Summary

The Trans World Airlines Flight Center (also known as TWA Terminal 5) at JFK International Airport in New York, opened in May 1962, is a nationally significant example of mid-20th century modern architecture, engineering and airline terminal planning that meets National Register criteria A and C. A masterpiece of expressionistic architecture, it was designed by Eero Saarinen, one of the preeminent architects of mid-century modernism in America, as a direct rebuttal to the abstracted rectilinear forms of the International Style which dominated corporate American architecture in the 1950s. The Terminal was a carefully considered response to the conditions at New York International Airport (now JFK), specifically the Terminal City master plan adopted by the Port of New York Authority (PA) in 1955. Its use of satellite passenger loading areas was an influential innovation in airport terminal design. Linked to the historical development of JFK Airport, the history of the TWA Company, and airport design, the TWA terminal has made a significant contribution to the history of American air travel.

The period of significance for the TWA Flight Center has been established as 1962-1970, corresponding to the time of initial occupancy through the completion of Flight Wing No.1. This period is characterized as the "Golden Era" of passenger jet travel. The TWA Flight Center was originally planned for the first generation of passenger jet aircraft. The waiting lounges at Flight Wing No. 2 seat approximately 100 persons, equivalent to the passenger load of a Boeing 707 aircraft. By the end of the decade, the Boeing 747 jumbo jet, with over 400 seats, had begun operation. The facilities in Flight Wing No.1 were scaled to accommodate this much larger seating capacity. The period of significance encompasses the maturation of the passenger jet age and concludes at the realization of Saarinen's original master plan for the terminal, that is, the construction of the terminal structure, the two connecting tubes and the two satellite flight wings.

Trans World Airlines was given the opportunity to construct a Flight Center as a result of a bold decision made in 1954 by the Port Authority of New York to develop Idlewild (New York International) Airport with each major American airline providing the design for their individual airline terminals. Trans World Airlines selected Eero Saarinen and Associates (Eero Saarinen and Kevin Roche) to design their showpiece. In addition to wanting a building which would "represent a daring departure from conventional air terminal concepts"², the airline wanted to continue its reputation as being on the cutting edge of aviation by incorporating the latest innovations in airport technology. The TWA Terminal is nationally significant in the history of terminal design because it integrated many of these innovations and as a result has greatly influenced contemporary airports. From the very form of the terminal – the now common "satellite" plan where aircraft gates are clustered around structures built on the runway ramps away from the terminal – to equipment such as jetways, baggage carousels, electronically controlled doors, and huge Solari boards that kept flight information up to date, the technology of the TWA Terminal has helped define airline terminals as we know them today.

² *The Story of the Trans World Flight Center*. Flyer from the TWA Public Relations Department. May 28, 1962

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Eero Saarinen (1910–1961) designed a number of important works of the post–World War II modern era. His most significant projects include: the General Motors Technical Center in Warren, Michigan (1945–56, listed on the National Register of Historic Places since March 2000); the Jefferson National Expansion Memorial in St. Louis, Missouri (a.k.a., the Gateway Arch, 1948–64, listed on the National Register of Historic Places since May 1987); the Kresge Auditorium and Chapel at M.I.T., Cambridge, Massachusetts (1953–56); the Ingalls Hockey Rink at Yale University, New Haven, Connecticut (1956–59); Dulles Airport in Chantilly, Virginia (1958–62); and CBS Headquarters in New York City (1960–64). In addition to Saarinen, associates Kevin Roche and Cesar Pelli also worked on the design and construction of the Terminal. After Saarinen's death, Kevin Roche and John Dinkeloo formed a successor firm which was responsible for several of the later alterations to the Terminal.

The TWA Terminal is nationally significant as a masterpiece of architectural design because it has become Saarinen's most recognized work, resulting from his evolving design philosophy and experiences gained from preceding works. Along with other great architects and designers of the time, including Le Corbusier and Frank Lloyd Wright, Saarinen was dissatisfied with the restrictive minimalism of the International Style, as it had been interpreted in America. He wanted to imbue modern spaces with a monumentalism appropriate to public structures, and make them "dynamic" and "expressive." Initially Saarinen first developed this interest in expressive forms through his furniture designs. Later he experimented with the sculptural properties of concrete on several of his projects, resulting in the Ingalls Hockey Rink at Yale University (1956–59), which he was just finishing when he received the commission from TWA Airlines.

The TWA Terminal was the ultimate expression of Saarinen's facility with concrete design as well as his "systems approach" to design, whereby he carefully analyzed each design problem and tried to find a unique form and structure to express his concept architecturally. The Terminal was meant not only to satisfy the practical programmatic requirements of the clients, but to visually "interpret the sensation of flying" and to "be experienced as a place of movement and transition."³ Saarinen achieved his goal through a design approach that involved construction documents based on carefully developed models, and the expertise of the famous engineering firm, Amman and Whitney.

The signature view of the landside elevation captures the sweeping and expressive concrete forms Saarinen conceived. The complex and dramatic concrete roof system, with its curving shells, supported by expressively canted piers that swoop up into pointed, wing-like forms symbolizing flight, was unprecedented. The continuous flow of forms from exterior to interior, combined with the glazed wall and wide open views onto the runway inextricably linked the building to its surroundings, and to the experience of air travel. Indeed, the interiors of the TWA Terminal reflect the same swooping forms and feeling of dynamic motion as the exterior, and present a series of subtly changing forms and patterns as the visitor passes through the interior. The four shells of the roof arc gracefully overhead, delineated by four strips of skylights, allowing views to the sky overhead. The low wings that extend from the vaulted portion of the terminal, curved in plan, with their concave walls extending as cantilevered canopies to shelter passengers at curbside, echo the forms of the main portion of the

³ "Saarinen's Twa Flight Center", *Architectural Record* (July, 1962): 129

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terminal and relate to the curving service road. The elevated and gently arched concrete walkways leading to the flightwing structures are unusual in their windowless tubular form, and served a function not yet widespread but soon typical in airport terminals.

From the moment its design was first presented in 1957, the TWA terminal was hailed by the architectural and popular press as the most important building of JFK's Terminal City complex. The finished project was presented in architectural periodicals in England, France, Germany and Mexico. Even thirty years after its construction, the TWA terminal continued to be praised by the critics. In 1992, *Progressive Architecture's* Thomas Fisher called the TWA Terminal JFK's "one truly great work of architecture...an inspired work by a brilliant architect for an audacious client."⁴ *Progressive Architecture* concluded by saying "whatever the drawbacks in the original design or the limitations in current capacity, the TWA terminal remains one of the best works of architecture." In 1994 *New York Times* architecture critic Herbert Muschamp wrote that "TWA sits aloof amid the architectural hodgepodge of JFK's Terminal City," and called the interior of the terminal "the most dynamically modeled space of its era."⁵

TWA Terminal and its innovations have made a significant contribution to the development of airline terminal design. It is also the culmination of the evolving design philosophy and experience of Eero Saarinen, a master architect of the 20th century. Hailed as a masterpiece by critics and scholars of both the past and present, the TWA Terminal has become an icon of the golden age of air travel. This landmark of the recent past is exceptionally significant and retains a relatively high degree of period integrity.

History of Post WWII Aviation Development

The development of commercial aviation in the United States started off mostly unregulated as both public and private entities engaged in a variety of aeronautical activities. The passage of the Air Commerce Act of 1926 initiated an important formative period in the evolution of public policy, promoting and regulating the development of airports in cities across the country. An important step in the history of aviation, it signified that the United States was beginning to acknowledge the potential of air commerce. The Act created an air transportation network based on the maritime system, whereby it relegated the design of airports largely to local governments, in accordance with Federal Standards.

Initially airport designers borrowed their ideas from engineers and architects of railway terminals. Early airports consisted of a simple one room waiting area, with an attached or detached waiting hangar for the aircraft. Tickets were purchased away from the airport at ticket offices, which were basically storefronts with a counter for a clerk to sell tickets, give information and provide

⁴ Thomas Fisher, "Landmarks: TWA Terminal", *Progressive Architecture* (May, 1992): 93

⁵ Herbert Muschamp, "Stay of Execution for a Dazzling Airline Terminal," *New York Times* (November 6, 1994): section H, 31.

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transportation to the airport. Terminal design evolved as a result of federal efforts between the World Wars to standardize airport design, with many new terminals starting to have a similar program: passengers boarding planes walked directly through the building entrance, through the waiting room, past a ticket office on the side, and out under a gable-roofed pergola to a telescoping canopy. This canopy, the precursor of the modern "Jet way", extended and retracted to protect and control movements of passengers boarding and deplaning. Later developments of this theme involved the expansion of the waiting area to house restaurants, and providing separate circulation for enplaning and deplaning passengers.

After WWII, changes resulting from the postwar economic boom rippled through every aspect of the air transportation industry, and greatly affected terminal design considerations. One operational change was the use of a "hold area" for processed passengers near the aircraft gate, which became known as the departure gate lounge. The gate lounges eliminated the need for large central waiting rooms, and prompted the relocation of passenger services nearer to aircraft gates. This resulted in various terminal finger and satellite configurations: the finger terminal had one or two-story fingerlike appendages that projected out from a central landside ticketing area; the satellite terminal had aircraft gates that were grouped around a central waiting and service area which was connected to the main terminal by an elevated walkway. Both of these forms became the basis of contemporary terminal design. Separating routes through terminals for arriving and departing passengers, minimizing passenger walking distances, reducing congestion during peak hours of travel, and automating baggage handling were airport planning issues addressed during the period. Air traffic control towers were constructed as separate specialized buildings as opposed to small projections from the roof of the passenger terminal.

Airplane hangars also grew in size. In addition to employing steel truss systems, engineers began to apply previously uneconomical structural methods such as thin-shell concrete, folded-plate concrete, and cantilevers, all with clear-span interiors of unprecedented height and length. At Municipal Airport in Chicago (now Midway Airport), Charles Whitney of Ammann and Whitney (who would later be the structural engineers for Saarinen on the TWA Terminal), designed two such airplane hangars. They were quite innovative in their use of concrete ribs and thin concrete barrel vaults. The use of thin shell concrete became a popular medium for architects in terminal design as well. In Missouri, at the St. Louis Airport, the City Airport Commission employed the young architectural firm of Hellmuth, Yamasaki and Leinweber to design a new terminal at the southeast edge of the airport. The final design, which opened in 1956, was a long series of concrete barrel vaults, which could be extended by the removal of huge windows at the east and west ends of the building (with subsequent additions of barrel vaults). While beautiful, this method of construction and extension proved too expensive; after 1967 thin shells ceased to be economically feasible and were abandoned.

The need to accommodate ever-growing numbers of passengers and larger aircraft since the 1950's has resulted in the construction of many new terminals as well as the expansion of existing ones. Between 1955 and 1962, when the TWA Terminal opened, passenger traffic through New York International Airport, JFK Airport's historical name, more than tripled, rising from 3.65 million to 11.5

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million passengers a year. Five years later it was at nearly 20 million.⁶ In 2002 the number was at 30 million per year.⁷ Another factor affecting terminal design was the change in aircraft design. Larger aircraft, increased noise levels and jet blasts, and the need to safely convey passengers to and from the planes at an elevated level were all issues that have since made many early airports obsolete. The first commercial aircraft (the Boeing 707 and the Douglas DC-8), for example, were not introduced until 1958 and 1959 respectively, well after the TWA Terminal's design was finished.

Currently, as companies continue to develop bigger and faster aircraft offering greater economies of scale, they are also in the process of developing smaller commuter craft and regional jets, such as the Boeing 727 and 737, the Douglas DC-9 and the Fokker 100. Increased traffic carried by this wider range of aircraft has stimulated airport redevelopment and construction. Many smaller cities and towns now need airport service; and architects, engineers and planners are designing modestly sized terminals for local governments. At the same time, in order to serve larger aircraft of different sizes, architects have had to find ways to divide the airport into separately functioning areas, all easily accessible. At the larger airports, for example, such as Chicago, Seattle, Atlanta and Denver, Washington, D.C. and Tampa, landside and airside terminals are far apart, but are linked by internal transit systems. Since the devastating attacks of September 11th, 2001, when airplanes were hijacked and used as weapons, all airports have to adapt to a vast array of security considerations that has greatly affected both new and existing facilities.

Air travel has become an important and even commonplace part of life in America and around the world. Once a dream, then a luxury, and now a widespread means of transportation for work or pleasure, air travel has grown and adapted to the times. The TWA terminal holds a significant place in the history of air travel and remains a vivid reminder of the dreams and visions associated with an exciting new mode of transport. Even today, when airlines are perhaps trying to reclaim some of the glory of air travel's past, new terminal designs take many cues from Saarinen's TWA Terminal; with the symbolic representation of lightness—in terms of both weight and natural illumination—clear views onto the runway, and radiating boarding gate wings.

Trans World Airlines

Like many other major airlines in the United States, TWA traces its history back to the air-mail delivery companies of the 1920s. The airline grew out of a merger between Transcontinental Air Transport (TAT) and Western Air Express, and was originally called Transcontinental and Western Air, Inc. (TWA). Subsequent mergers occurred with Standard Airlines and Maddux Airlines. Even though its name ultimately changed to Trans World Airlines in 1950, the acronym remained the same.

⁶ *The TWA Terminal: Photographs by Ezra Stoller* (New York: Princeton Architectural Press, 1999) 3.

⁷ JFK Facts Page of Web Site: <http://www.panynj.gov/aviation/jhisfram.htm>

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TWA's history is associated with a number of famous personalities. William John Frye, a former Hollywood stunt flier and TWA's first director of operations, was instrumental in the development of the Douglas DC-1 and DC-2 aircraft, the first in a series of aircraft that would revolutionize commercial aviation. In 1934, at the age of 30, Frye became president of TWA. A licensed pilot, he ensured that TWA was at the forefront of modern technological advances, piloting the single DC-1 that Douglas built. He was responsible for convincing Howard Hughes to become financially involved with the airline. Hughes would go on to become the principal stockholder.

During World War II, TWA used its planes in support of the U.S. military, as did many other airlines. After the war, the Civil Aeronautics Board (CAB), the organization that distributed flight routes for U.S. airlines, decided to allow other airlines to share in Pan American's monopoly of international routes. TWA had battled American Airlines and United for the prized transcontinental route for over for a decade, and was one of the airlines granted permission to fly to Europe and India.

TWA had a reputation for its determination to offer the most advanced aircraft available. As United and American began using the DC-6 aircraft, TWA responded by introducing the Lockheed L1049 Super Constellation. The new aircraft had a 35 percent greater passenger carrying capacity than its predecessor. TWA was the first airline to inaugurate regularly scheduled nonstop transcontinental service between Los Angeles and New York on October 19, 1953. Contrary to what its name would suggest, however, the airline was late in introducing jet service internationally, preferring instead to focus on domestic jet services. TWA's first regularly scheduled international jet flight took place on November 23, 1959—a New York-London-Frankfurt flight – a year after its main rivals. It took several years for the airline to regain the competitive advantage it lost because of this delay.

TWA Airlines has had a long association with New York City. It was one of the first carriers to contract for space at LaGuardia Airport, from where it operated the first scheduled flight in 1939. TWA's inaugural flight to Europe was from LaGuardia to Paris in 1946. The carrier was the sixth international airline to sign an agreement with the Port Authority in New York City for use of the Idlewild facility (New York International Airport). TWA and Pan Am were assigned positions at either side of the International Arrivals Building, with TWA receiving the site to the east. The carrier would be the only one to operate both foreign and domestic service from one terminal at the airport. Though the leadership of the airline underwent several changes during the course of the planning and construction of the terminal, including a well-publicized suit against the difficult and eccentric Howard Hughes in 1961, it was during the term of President Ralph S. Damon that the TWA Terminal was conceived.

TWA continued to remain a powerful player, both in the international and national markets, through the 1960s and 1970s. In 1961, it became the first airline to introduce in-flight movies. In 1967, it acquired the entire chain of Hilton Hotels. In July 1969, TWA overtook Pan American as the world's number one transatlantic airline. In February 1970, only one month after Pan Am, TWA began flying the Boeing 747 jumbo jet on the New York to Los Angeles route.

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In the 1980s TWA's fortunes began to lessen in the wake of deregulation of the commercial aviation industry. In September 1985, TWA accepted a bid from another corporate raider, Carl Icahn, who bought up most of the TWA stock. The following year, in October 1986, the new TWA acquired Ozark Airlines. Although TWA profited from the demise of Pan Am by acquiring its international routes, the airline eventually filed for bankruptcy in January 1992 after problems with increasing debt. It sold some of its key routes to other airlines at the time. In January 1993, Icahn finally relinquished all control over the company, which was then under the control of a management committee appointed by employees, unions, and creditors. After several reorganizations in the 1990s, TWA's financial outlook seemed to improve by the end of the decade. In December 1998, as part of plans to expand its routes and flights, it announced the order of 125 new aircraft, the largest acquisition in the company's history.

Hopes for a new future were thwarted once again by financial problems and bankruptcy. On April 9, 2001, TWA's 75-year existence as an independent airline came to an end when American Airlines purchased TWA's assets. TWA flew its last official flight on December 1, 2001, ending an era in American commercial aviation. It was at this time that the TWA Terminal at JFK Airport was officially closed.⁸

History and Evolution of JFK International Airport

New York City entered the age of commercial aviation in 1938, when the first passenger flight service was established at North Beach (now LaGuardia) Airport. Only one year after the construction of North Beach was completed in 1940, Mayor Fiorello LaGuardia recognized the need for much greater air travel capacity in the New York City region. Determined to maintain New York's preeminence as a port in the age of aviation, Mayor LaGuardia had the City acquire land on Jamaica Bay in south Queens for a new municipal airport which would eventually become John F. Kennedy International Airport. Formally announced as Idlewild Airport in Mayor LaGuardia's state of the City address in January 1942, the airport was originally slated to occupy 1,600 acres in the area around the former Idlewild Golf Course.⁹ By the time the airport opened for service in 1948, the scope of the project had quadrupled in size to 4,900 acres and had undergone at least four master plan designs. Throughout the history of the airport, numerous master plans have been introduced, updated, abandoned or revised as JFK's planners have continually tried to keep pace with technological innovations and the explosive increase in air passenger travel.

⁸ This section is based on Betsy Bradley, *New York City Designation Application for the Trans World Airlines Flight Center*, July 19 1994.

⁹ *New York Times* (January 8, 1963): 18.

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Airport Planning

When first proposed, Idlewild Airport was envisioned as a terminal for the Pan Am Clipper seaplanes which had instituted transatlantic passenger service in 1938.¹⁰ At the end of World War II, a larger land-based airport was proposed. This scheme, which was the first fully-developed master plan for the Airport, had a series of runways laid out in a pinwheel pattern around a central core of hangars, support structures and a single terminal building.¹¹ The first terminal designs were proposed by the architectural firm of Delano & Aldrich (who were also the designers of LaGuardia Airport) and included semicircular and horseshoe-shaped plans with projecting arms as well as a later proposal for a figure-eight shaped plan. In each of these proposals, the terminal was to have been a two-story structure dominated by a Classical arcade.¹²

In 1945, the cost of the Idlewild project began to exceed the City's ability to fund it. In response, the City began to curtail the scope of planning, as well as to explore the idea of an independent airport authority to operate both Idlewild and LaGuardia Airports. In early 1946, the New York City Airport Authority (NYCAA) was formed and took over planning and construction at Idlewild, and in June of that year declared Delano & Aldrich's figure-eight terminal inadequate.¹³ Although the NYCAA had taken over the planning at Idlewild, the Authority was never authorized to receive funding from the City, or to issue the bonds needed to fund planning or construction; thus the City retained control of the project's budget. In August 1946, facing continued budget constraints and concerns over the expandability of the existing terminal proposal, the City terminated its contract with Delano & Aldrich and issued new contracts to three associated firms of architects and engineers. The architectural services were contracted to Harrison & Abramowitz for the design of a new terminal.¹⁴ At the same time, the Port of New York Authority (PA) was preparing its own proposal for taking over operations at the City's airports, and in December 1946 both authorities presented their proposals to the City.¹⁵ In January 1947 the PA completed lease negotiations with the City and took control of Idlewild and LaGuardia airports in New York City and Newark Airport in New Jersey. Planning for Idlewild continued with Harrison & Abramowitz as the lead designers for the project.¹⁶

New York International Airport, the official name of the Idlewild facility, opened to commercial traffic in July 1948. From the date of its opening until December 1957 all passenger traffic was handled in a temporary terminal of quonset-hut type buildings (between 1948 and 1953, this temporary terminal was expanded five times). While operations continued in the cramped temporary facilities, the PA

¹⁰ "New marine airport for post-war needs," *New York Times* (April 1, 1943): 11

¹¹ "Final plan for Idlewild Airport," *New York Times* (August 6, 1944): 7; "McKenzie outlines airport programs," *New York Times* (October 5, 1944): 25

¹² Fiorello LaGuardia, "Finest Airport in the World," *New York Times* (January 21, 1945): VI:10

¹³ "Legislature Votes Big Housing Fund," *New York Times* (January 29, 1946): 42; John Stuart, "Idlewild's Plans under Revision," *New York Times* (June 14, 1946): 15

¹⁴ Paul Crowell, "Idlewild Plan Cut to Save \$25 Million," *New York Times* (August 23, 1946): 21

¹⁵ Paul Crowell, "Experts Submit New Airport Plan," *New York Times* December 23, 1946: 1

¹⁶ *New York Times* (January 11, 1947).

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wrestled with a number of master plan concepts for the permanent development of the central terminal area.

Terminal City

In 1955, facing mounting pressure from the City, the Port Authority presented a new master plan for a Terminal City at New York International. Designed by Wallace K. Harrison with Thomas M. Sullivan, the Terminal City master plan envisioned a central international arrivals terminal with seven smaller unit terminals for American airlines as well as other supporting structures (including the control tower, the only permanent structure that had been erected to date). All of the structures would face a 160-acre plaza with landscaping, reflecting pools, fountains and parking. While airlines would be free to design the interior of their terminals, the exterior architecture was to blend with an "over-all pattern" devised by Harrison.¹⁷ At the time of its introduction, Terminal City was a significant departure from contemporary airport design, which continued to rely on single central terminal structures. Terminal City was also significant for its concept of the airport as a cohesive campus, a design program which was becoming increasingly popular in the post-War development of suburban corporate parks. The campus concept traces its roots back to the White City movement and such projects as the 1893 Columbian Exposition in Chicago and Warren & Wetmore's Terminal City project around New York City's Grand Central Terminal. Beyond these Beaux-Arts-inspired precedents, the more immediate ancestors in terms of cohesively designed campuses included Rockefeller Center in New York City (1932-1940), in which Harrison played a significant role.

With its capacity for handling 140 planes at any given time, the PA praised the Terminal City master plan as "adequate and useful for at least 25 years."¹⁸ In fact, Terminal City in its completed form was barely adequate for five years. Introduced at the beginning of the jet age, it was obsolete by 1967, when the Boeing announced its 747 jumbo jet, which required a rethinking of the overall program, and an expansion of many of the small single-airline terminals.

The first completed building of the Terminal City project was the International Arrivals Building and Airline Wings, designed by Skidmore Owings & Merrill (SOM) and opened in December 1957. The first of the unit terminals to open was the Eastern Airlines terminal (Chester L. Churchill), which opened for service in October 1959. This was quickly followed by the American Airlines Terminal (Kahn & Jacobs), the United/Delta Airlines Terminal (SOM), and the Pan Am Terminal (Tippett-Abbott-McCarthy-Stratton), all of which opened between February and July of 1960. In March 1961, Braniff, Northeast and Northwest Airlines opened a joint terminal (White & Mariani). Other buildings which were part of the original Terminal City plan included the Central Heating & Refrigeration Plant (SOM, 1959), the Gulf gas station (Edward Durell Stone & Associates, 1959) and the chapels which

¹⁷ Joseph C. Ingraham, "Vast Airport City Set for Idlewild within Five Years," *New York Times* (February 21, 1955): 1

¹⁸ Ingraham (February 21, 1955): 1

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opened in 1966 – Our Lady of the Skies Roman Catholic Church (George J. Sole); the Protestant Chapel (Edgar Tafel & Associates) and the Jewish Synagogue (Bloch & Hesse).

The TWA Terminal, which opened in May 1962, was the last of the unit terminals to be completed, and thus marked the substantial completion of the Terminal City project (although other terminals and structures continued to be planned and constructed). Even before the unveiling of the TWA plans in 1957, it was clear that the PA had abandoned its “overall pattern” for unit terminal design. From the full-façade stained-glass window of the American Terminal, to the overhanging oval roof of the Pan Am Terminal, to the wing-like structure of the TWA Terminal, New York International’s Terminal City was a mix of design solutions which reflected not only the diverse tastes of the clients and architects, but also the varying approaches to airport design.

Recent Planning and Development

In December of 1963, the City of New York officially changed the name of New York International to John F. Kennedy International Airport.¹⁹ In September of 1966, the Port Authority announced a new 10-year expansion plan designed to handle both jumbo jets and the much anticipated supersonic airplanes of the 1970s. Under this plan, Terminal City would be expanded from 655 acres to 837 acres through the removal of one runway and some taxiway area.²⁰ In the intervening years, the PA had largely abandoned the principals underlying the Terminal City master plan, beginning to fill in the reflecting pools to accommodate additional parking and introducing an ever-growing network of roads to the central plaza. In 1967, TWA became the first of individual airlines to expand upon its original unit terminal design when it announced an expansion of its Terminal to accommodate jumbo jets and increased passenger traffic.²¹ In 1970, Pan Am opened a second terminal at its site and that same year, BOAC (now British Airways) became the first foreign carrier to open a terminal of its own (Gollins Melvin Ward & Partners). In 1972, the National Airlines Sundome (later TWA Terminal B, then jetBlue Airlines) opened (I. M. Pei & Partners). Since 1972, the original Terminal City plan has been further eroded, most of the unit terminals have been demolished, and new multi-airline mega terminals (now identified by number, not airline) have taken their place. As with the initial construction of Terminal City, much of the current construction program is taking place while the existing buildings continue to operate. The redevelopment of the terminal core at the Airport continues in the same central area which was first set aside for terminal buildings in 1942. The scale of this new development is much larger than its predecessor. In addition to the recently completed Terminal 1, one new terminal (4) is nearing completion, and another is being expanded (7), with further development slated in the areas of Terminals 2 (Delta), 3 (Delta, formerly Pan Am) and 5 (TWA). In addition to the new terminals to be constructed, the PA is also undertaking other infrastructure improvements, most notably the construction of the AirTrain which connects the terminal core to outlying parking lots and existing New York City public transit hubs at Howard Beach

¹⁹ *New York Times* (December 5, 1963): 35.

²⁰ Joseph C. Ingraham, “Kennedy Will Expand 25%,” *New York Times* (September 9, 1966): 1.

²¹ “Notes from the Field of Travel: Flight Wing One at Kennedy,” *New York Times* (June 4, 1967): 88

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and Jamaica Station. The Pan Am Terminal and the TWA Terminal are the only flight terminals at John F. Kennedy International Airport that remain from the original Terminal City project.

Eero Saarinen

Eero Saarinen (1910–1961) was born in Finland to textile artist Loja Gesellius Saarinen and the highly regarded international architect Eliel Saarinen. In Finland, Eliel Saarinen was best known for the railway stations of Helsinki and Vyborg, the city halls of Lahti and Joensuu, and the proposal for the Finnish Parliament building. The Saarinen family immigrated to the United States in 1923. Eliel Saarinen contributed significantly to the creation of the Cranbrook School and Academy of Art, a complex of children's schools and an art academy, located north of Detroit. Eliel designed several buildings there, including the Cranbrook School for Boys (1924-1930) and the Kingswood School for Girls (1929-1930). The latter project exemplifies the Arts and Crafts ideal of collaboration between the fine and applied arts. It was a family effort: Eliel oversaw all aspects of the design, Loja designed and wove the fabrics, Eero designed the furniture, and his sister, Eva-Lisa, assisted with selecting the wall and ceiling treatments.

In the early 1920s Eero studied sculpture at the Parisian Academie de la Grand Chaumiere, and received his Bachelor of Fine Arts at Yale University. He later toured Europe and Egypt, and in 1936 joined his father's firm. Together Eliel and Eero Saarinen produced the very well-received Crow Island School (1939-1940) in Winnetka Illinois. Eero entered many design competitions, and won several awards. He collaborated with Charles O. Eames on the scheme for a molded plywood chair which won the Organic Design in home furnishings competition (1940-41), sponsored by the Museum of Modern Art. Saarinen went on to produce many designs for the Knoll furniture company, including the Womb chair (1946-48) and chair series Nos. 71 and 72 (c. 1956).

Eero Saarinen developed a distinct "systems approach" to design. He carefully analyzed each design problem, and tried to find a unique form and structure to express his concept architecturally. As a result, each of his designs has a wholeness and originality. He claimed to be concerned with the "aesthetics of the whole organism" and sought an "expressive architecture, an anti-assembly line architecture", stating that "each building should be as distinctive as each person should."²² The commission that firmly established his architectural career was the General Motors Technical Center (1945-56, with Smith, Hinchman and Grylls) in Warren, Michigan. Though it was initially designed with his father Eliel, its final scheme is attributed to Eero. The complex is ruled by a strict modular design, with fully integrated structure, partitions and mechanical systems. It featured such technological innovations as neoprene window gaskets and walls of thin insulated panels sheathed in porcelainized sheet metal. Eero Saarinen also added brightly colored brick surfaces and his trademark reflecting pool.

²² Walter McQuade, "Eero Saarinen, A Complete Architect," *Architectural Forum* 116 (April 1962): 102-107.

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An intensely devoted and methodical worker, Eero produced a number of buildings that have become American landmarks. His most significant projects include: the General Motors Technical Center in Warren, Michigan (1945–56, listed on the National Register of Historic Places since March 2000); the Jefferson National Expansion Memorial in St. Louis, Missouri (a.k.a., the Gateway Arch, 1948–64, listed on the National Register of Historic Places since May 1987); the Kresge Auditorium and Chapel at M.I.T., Cambridge, Massachusetts (1953–56); the Ingalls Hockey Rink at Yale University, New Haven, Connecticut (1956–59); CBS Headquarters in New York City (1960–64); and two soaring reinforced concrete designs associated with flight: the Trans World Airlines Flight Center (1956-62) at JFK International Airport, probably his best-known design, and Dulles Airport (1958-62) in Chantilly, Virginia. The last four commissions were completed after his death in 1961.

While Dulles is much larger than the TWA Terminal, and has a much different design and layout, there is no question that it was a product of Saarinen's experiences with both the Ingalls Hockey Rink and the TWA Terminal. At Dulles Airport, Saarinen was able to take the pragmatism of terminal planning and the beauty of sculptural design and bring them together into a building that is both beautiful and adaptable.²³ Whereas the TWA Terminal became quickly outdated, Dulles Airport was able to remain functional, even with the ever-increasing amounts of travelers and developments in airport and airline technology.

Saarinen's buildings received extensive publicity in the press, and he was given several prestigious awards. Though many architects and architectural writers sympathetic to the International style criticized Saarinen's work as lacking consistency, his works have withstood the test of time. By 1993, six of his designs received the American Institute of Architects' 25 year award for "exemplify[ing] design of enduring significance." After Saarinen's death, associates Kevin Roche and John Dinkeloo formed a successor firm, which was responsible for several of the later alterations to the Terminal. They also became a significant force in American architecture during the second half of the century. Other architects influenced by his design philosophy were Cesar Pelli, Gunnar Birkerts and Robert Venturi.²⁴

Ammann and Whitney

The firm of Ammann & Whitney was the structural engineer for the TWA Terminal. Ammann & Whitney was founded in 1946 by Othmar Ammann, a preeminent bridge engineer, and Charles Whitney, a renowned structural engineer. Ammann came to the United States from Switzerland, where he was born in 1879. After graduating from the Swiss Federal Institute of Technology in Zurich with a degree in civil engineering in 1902, he worked on various projects in Europe and, starting in 1904, in the United States, specializing in bridge design. He was associated with the planning, design and construction of many record-breaking and world-recognized long span bridges, including

²³ "Eero Saarinen and His Works: Kevin Roche" [interview]. *Architecture and Urbanism* (April, 1984): 20–24.

²⁴ Bradley, Betsy "Transworld Airlines Flight Center at New York International Airport," in Application to the New York Landmarks Preservation Commission (July 19, 1994): 5

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the George Washington, Golden Gate, Delaware Memorial, Triborough, Bronx-Whitestone and Bayonne Bridges. His son Werner, born in Pennsylvania in 1906, followed him into the field, earning a civil engineering degree from Rensselaer Polytechnical Institute in 1928. Werner gained experience with the McClintic-Marshall Company in Chicago and the Bethlehem Steel Company, Pennsylvania, before serving with the Navy's Civil Engineering Corps during World War II. In 1946 he joined Ammann and Whitney as a assistant engineer, becoming a partner three years later. He oversaw construction of a number of concrete designs including the American Airlines Hangar in Chicago, and was the supervising designer of the Pittsburgh Civic Auditorium roof structure.²⁵

Charles Whitney worked for Ammann during summer breaks from the engineering program at Cornell University. After graduating in 1915, Whitney worked on projects in Boston, New York, and Los Angeles, before settling in Wisconsin. In 1924, he became a principal of the Milwaukee engineering firm Hool, Johnson and Whitney. He retained this affiliation and continued to live in Milwaukee after becoming a partner with Ammann in 1946. An expert in reinforced-concrete design, Whitney contributed to the book *Concrete Designer's Manual* and received a number of awards for his work in this area. He was known for the development of plastic theory and ultimate strength methods of reinforced concrete design of long span, thin shell structures.²⁶

The combined experience of Ammann and Whitney propelled their firm to prominence in the United States and around the world. Their skills are exemplified by the University of Illinois Assembly Hall in Urbana (1963), done in collaboration with the architectural firm Harrison and Abramovitz. The folded-plate reinforced concrete dome, spanning 400 feet, tapers to a thickness of only 3.5 inches.²⁷ Other examples of their work with thin-shell concrete construction are the Municipal Airport in Chicago (now Midway Airport) and the Kresge Auditorium at the Massachusetts Institute of Technology (MIT) in Cambridge, Massachusetts.

The unusual form of the TWA Terminal required innovative approaches to structural design. The key to the stability of the structure was a center plate which is the only structural connection between the four shells separated by skylights. The plate receives tensile stress from the outward-leaning field and two side shells, and compressive strength from the forward tilting front shell; the plate was not designed to resist vertical forces, which are transferred through interior edge beams to the piers. Supplementing the piles in resisting the horizontal component of thrust of the piers are three sub-grade post-tensioned ties, and one at the main waiting room level.²⁸

Specialists designed concrete mixes to meet the unusual shape of the building; fairly standard concrete was used for the piers, and then blended with a lightweight mix for the roof shells.²⁹ The

²⁵ Darl Rastorfer. *Six Bridges: The Legacy of Othmar H. Ammann*. (New Haven, Conn.: Yale University Press, 2000).

²⁶ Charles S. Whitney. *A Study in their Art*. (New York: W. E. Rudge, 1929).

²⁷ Charles S. Whitney and E. Cohen. "Guide for Ultimate Strength Design of Reinforced Concrete." *Proceedings of the American Concrete Institute* 53 (1956): 455.

²⁸ *Engineering News Record* 168 (May 31, 1962): 48-52

²⁹ Bradley: 7.

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pour, which began on August 31, 1960 took 120 hours in all and was interrupted by hurricane Diane. More than 10,000,000 pounds of concrete was poured just for the roof, which was constructed first along with the columns. The concrete floors were poured next, after which the non-load bearing elements were added.³⁰

TWA and Thin-Shell Concrete Design

The TWA Terminal was one of Eero Saarinen's last projects and also one of his most revolutionary and influential designs. It was Saarinen's intention that the TWA Terminal express "the excitement of travel" and "reveal the terminal as a place of movement and transition."³¹ Kevin Roche, the design architect on the TWA project, later noted that Saarinen "was interested in pushing the boundaries of architecture out of its Miesian restraints."³² Saarinen did exactly that, not only at TWA, but in earlier projects such as the Kresge Auditorium and Ingalls Hockey Rink, as well as in the contemporaneous Dulles Airport terminal (which, like TWA, was completed after Saarinen's death).

In its break with the orthodoxy of modern architecture, the TWA Terminal contributed to a revival of architectural expressionism in the 1960s. Together with the Ingalls Hockey Rink, the TWA Terminal was one of the earliest free-form shell-structure buildings. Saarinen's design for TWA was influenced by works such as Le Corbusier's chapel at Ronchamp (1950-55), Minoru Yamasaki's terminal for the St. Louis Airport (1956) and Jørn Utzon's Sydney Opera House (1957-67), the competition for which Saarinen judged in 1956. The German architect Erich Mendelsohn's Einstein Tower (1919-22) in Potsdam and the Russian sculpture Naum Gabo's 1931 proposal for the Palace of the Soviets have also been cited as sources for Saarinen.³³ These early works of organic free-form design (including Dulles Airport Terminal) influenced later expressionist architecture such as the Berlin Philharmonic (Hans Scharoun, 1960-63) and the Fabrikhalle in Ghent (Heinz Isler).³⁴

In addition to these architects and engineers, there were many others who were experimenting with the possibilities of thin-shell concrete construction. The structural engineer Anton Tedesko is credited with the introduction of thin-shell concrete roof structures into the United States. His designs include the first major thin shell structure built in 1936, an ice hockey rink for the Hershey Chocolate Company. He later designed the St. Louis Air Terminal and the May D & F Entrance Canopy. Pier Luigi Nervi, born in Italy in 1891, was a civil engineer, whose interest in thin-shell construction focused more on aesthetic rather than theoretical or practical issues. He designed the Agnelli Exhibition Hall in Turin (1948) and three athletic venues for the Olympic Games in Rome in 1960, including small and large sports arenas that displayed his mastery of precast-concrete tracery. Nervi preferred to practice in Italy but did some works abroad including the UNESCO Center in Paris (with

³⁰ "T.W.A.'s Terminal Standing on Own." *New York Times*. (December 8, 1960): 70.

³¹ *Progressive Architecture*, (September, 1961): 162

³² Christopher Hart Leubkeman, "Form Swallows Function," *Progressive Architecture* (May, 1992): 106.

³³ *The TWA Terminal: Photographs by Ezra Stoller*. (New York: Princeton Architectural Press, 1999): 9.

³⁴ Leubkeman: 108.

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Marcel Breuer and Bernard Zehruss, 1953-1957) and the New York Port Authority bus terminal, completed in 1962. Another contemporary of Saarinen's who experimented with thin-shell construction was Felix Candela, a Spanish architect who practiced in Mexico City. His first large-scale concrete roof, which tapered to a thickness of only 1.5 inches at the apex of the arches, covered a factory at Valejo (with Carlos Recamier, 1954). He used paraboloid vaults for the Church of Santa Maria Miraculosa in Mexico City (with Enrique de la Mora, 1955) and umbrella shells for industrial buildings at Linda Vista (1954) and Coyoacan (1955). He covered an octagonal-plan restaurant in Xochimilco with a scallop of shell vaults (with Joaquim and Fernando Alvarex Ordoñez, 1958). Among his works outside of Mexico, one of the most interesting was a plan for a presidential palace at Havana, Cuba, in collaboration with Josep Luis Sert (a Spaniard who was dean of the Harvard Graduate School of Design); unfortunately the design, finished in 1957, was never built.

The form of the TWA Terminal roof, engineered by Ammann & Whitney, was largely determined by the architectural design, rather than the design being derived from the structure, as it was at Kresge, for instance. As is evidenced by the preceding examples, the period following World War II was a particularly active time in the construction of reinforced-concrete shell structures, and the TWA Terminal was one of the last of this building type to be built without pre-stressing. From an engineering standpoint, the TWA Terminal roof is unique in that it consists of four segmental domes, each carried on only two supports on the ground, with a third support at the center of the terminal roof.

The design of the TWA Terminal was a specific response to the programmatic requirements of the PA's unit terminal master plan. It called for a discrete terminal with a capacity for 14 early jet planes. During the planning stages of the project, TWA provided the architect with a list of programmatic requirements, and a projection of passenger traffic in 1970. These projections called for 1,000 people within the Terminal at peak hours, and a turnover of 2,000 arriving and departing passengers per hour.³⁵ Placed on axis with the entrance to Terminal City, the Terminal would also proclaim the airline's corporate identity within the larger collection of single-airline terminals. The result was a highly sculptural and iconic building, which was functional and appropriate only within the parameters to which it was designed.

Design Development and Construction

Of the seven unit terminals proposed for JFK's Terminal City, Saarinen's "bold and futuristic" design for the TWA terminal was the most radical. The design was presented in November of 1957, and ground was broken on June, 1959. Pouring of the concrete began in September 1960, and the building stood on its own when the forms were removed in November, 1960. Saarinen's final design called for a concrete shell of winged vaults embraced on either side by flanking arms. A double-height concourse area with restaurants and waiting lounges was contained within the vaulted structure, while services such as ticketing and baggage claim were concentrated in the flanking arms.

³⁵ *Dream of Eero Saarinen a Tribute to His Memory. Aviation News.* (May 25, 1962): 2.

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Connected to this central terminal building would be two flight wings, which would accommodate seven airplanes each. Utilizing a total design approach to the project, Saarinen sought to create a procession from curb to airplane, including all interior public spaces.³⁶

The Port Authority planners had projected that the unit terminals at Idlewild would have finger configurations. The first group of terminals designed for the airport exhibited several solutions providing a large number of aircraft gates. The first project to be completed, the International Arrivals Building, had long wings and perpendicular fingers. The finger plan was adopted by the American Airlines Terminal, which had staggered lounges off of a central corridor, and the United Airlines facility. The terminal of Eastern Air Lines was based on the concept of large, centralized waiting rooms and "loading arcades", Pan American World Airway's "umbrella" terminal was yet another solution: six jets could be nosed in under the roof, which would protect boarding passengers from the weather. TWA was the only airline to adopt the satellite configuration for its terminal. Elevated walkways, variations on early "Jetways", introduced to commercial aviation by United Airlines at Chicago, were used at the United, Pan Am, American and TWA Terminals at Idlewild.³⁷

From the beginning of the design process, Saarinen envisioned the TWA Terminal as a collection of sculptural concrete vaults. The earliest concepts for the terminal consisted of various experiments with the concrete shell form, but differed very little from the overall effect seen in the final design. The final design used four separate concrete vaults to form the winged central terminal building, with skylights marking the intersection of each of the vaults. Large flanking arms for ticketing and baggage claims were included on either side of the central structure, while at the rear of the terminal, two glass-roofed tubes, with moving walkways within, were to extend out to the flight wings. Each flight wing would house seven passenger lounges, surrounding a central atrium garden.

As constructed, the TWA Terminal differed from its original design in two significant ways. First, the large flanking arms of the final proposal were scaled back in size, allowing the vaulted central portion of the terminal to stand more on its own as a soaring sculpture. As a result, the original footprint of the main building came to be more embracing of the curve in the road and more wing-like in plan. The second significant change to the original design came in the construction of the flight wings and connecting tubes. When it opened in 1962, TWA included only one flight wing (to the south of the main terminal building), and in a cost-saving move, the connecting tube omitted the glazed roof and the moving walkways. The design of this south wing (later rechristened Flight Wing Two) incorporated two telescoping jet ways as a means of boarding the airplanes – one for first-class passengers and the second for tourist class. Introduction of these jet ways (first proposed at JFK in Kahn & Jacobs 1960 American Airlines terminal) may have resulted in the form of Flight Wing Two – a decentralized plan form, consisting of a central pavilion with two satellite lounge areas attached.

³⁶ Edward Hudson, "Bold Design is Set for Airport Terminal," *New York Times* (November 13, 1957): 37.

³⁷ David Brodherson. 2001: *Building for Space Travel*. (New York: Harry N. Abrams, 2001): 84.

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At the time of construction, it was reported that TWA intended to erect a second "loading and unloading building" for seven additional planes once the airline had moved into its new terminal. In March, 1962, TWA opened the south Flight Wing for passenger boarding (even though the terminal itself was still under construction). By the time TWA completed the main terminal, their plans for the second flight wing had changed, and the airline announced that it would construct a temporary wing with only six gates. Flights were conducted out of this temporary wing until the construction of Flight Wing 1 in 1967.

Critical Response to the TWA Terminal

Contemporary Criticism

From the moment its design was first presented in 1957, the TWA terminal was hailed by the architectural and popular press as the most important building of JFK's Terminal City complex. Initial reaction to Saarinen's proposal praised his "bold new design" and "daring architecture." In 1962, *Architectural Forum*, looking at the TWA terminal, called it a "truly fantastic work," and proclaimed, "there can be little doubt about who won" the architectural free-for-all that was Idlewild.³⁸

At the end of the 1962, with much of Terminal City completed, *New York Times* architecture critic Ada Louise Huxtable assessed the state of development at Idlewild, and called the TWA terminal "Eero Saarinen's magnificently detailed and executed *tour de force*." Huxtable further described the TWA terminal as "the most dubious idea, which, paradoxically, has produced by far the best building [at NYIA]." Unlike Saarinen's Dulles airport design (1958-62), the TWA terminal represented "no revolutionary breakthrough in airport design," but rather, was a "subjective demonstration of sculptural form; a questionable approach superbly carried through to an exhilarating conclusion." Huxtable was far less impressed with the rest of Terminal City, calling the overall project "standardized mediocrity," and finding fault with all five of the other terminal buildings.³⁹

Huxtable also called out the significance of the TWA terminal's interior; she was one of the first critics to note that while the exterior was "heavy" it was the interior which "took flight."⁴⁰ This sentiment was echoed by other critics in the 1960s, many of whom were opposed to the "self-conscious" and anti-Modernist design of the terminal's exterior vaulting. Upon the opening of the terminal in 1962, *Architectural Forum* called the view of the terminal from the air "more like a giant horseshoe crab than a bird in flight," but said that "from the ground, and inside, it is a stirring object, its structure swooping in high-speed curves all around, like an oversize Gaudi sculpture of the jet age."⁴¹ Architect Remmert Huygens also found the building itself to "sit low, flat and heavy on the ground."⁴²

³⁸ *Progressive Architecture*. (July, 1962): 72.

³⁹ Ada Louise Huxtable, "Idlewild: Distressing Monument to Air Age", *New York Times* (November 25, 1962): section 2, 25.

⁴⁰ Huxtable: section II, 25

⁴¹ *Progressive Architecture*. (July, 1962): 72.

⁴² Remmert W. Huygens, "Coventry and TWA", letter to the editor, *Architectural Forum* (November 1962): 19.

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Edgar Kaufmann, Jr. called TWA "one of the few major works of American architecture in recent years that reaches its full stature *as an interior*."⁴³ In 1973, John Morris Dixon wrote that, despite a decade of alterations, TWA remained "an interior superbly attuned to the state of mind of the user; it remains the only air terminal I know where the threat of a delay is offset by the prospect of watching the movement of aircraft passengers and ground traffic from a variety of comfortable vantage points."⁴⁴

Retrospective Criticism

Thirty years after its construction, the TWA terminal continued to be praised by the critics. In 1992, the TWA terminal was called JFK's "one truly great work of architecture...an inspired work by a brilliant architect for an audacious client."⁴⁵ The article, written for *Progressive Architecture* by Thomas Fisher, compared Saarinen's more adaptable design for Dulles with TWA, and saw the latter as a "Baroque space tightly wrapped, whose "sculptural forms have an integrity and completeness that almost preempt any attempt at altering or adding to the building." Fisher concluded by saying "whatever the drawbacks in the original design or the limitations in current capacity, the TWA terminal remains one of the best works of architecture." In 1994, *New York Times* architecture critic Herbert Muschamp wrote that "TWA sits aloof amid the architectural hodgepodge of JFK's Terminal City," and called the interior of the terminal "the most dynamically modeled space of its era."⁴⁶

In 1994 the New York City Landmarks Preservation Commission designated the interior and exterior of the TWA Terminal as a local landmark (see Additional Documentation section for copies of these reports). The designation report notes that the terminal ". . . is among the chief works of one of the most highly-regarded architectural firms of the modern era. Saarinen's firm revolutionized air terminals through an expressive approach to design that extended to the interior and the incorporation of technological advances, producing a distinctive and highly-acclaimed work of modern interior design" ⁴⁷

When changes were proposed to the TWA Terminal in 2001 to accommodate construction of a new terminal on its air side, the architectural critics and preservationists raised concern about the proposed plans. Suzanne Stephens of *Architectural Record* wrote that "above all, let's remember that the most important part of TWA is the experiential quality of moving through the building – starting with the entrance – as you prepare to fly. Nothing, including a new arrival point, or alternative uses of the structure must change that. It is worth spending this amount of effort on saving a singular temple

⁴³ Edgar Kaufmann, Jr., "Inside Eero Saarinen's TWA Building", *Interiors* (July 1961): 86.

⁴⁴ John Morris Dixon, "Inside Architecture", editorial, *Progressive Architecture* (November 1973): 83.

⁴⁵ Thomas Fisher, "Landmarks: TWA Terminal," *Progressive Architecture* (May, 1992): 93.

⁴⁶ Herbert Muschamp, "Stay of Execution for a Dazzling Airline Terminal," *New York Times* (November 6, 1994): section H, 31.

⁴⁷ Betsy Bradley, *Trans World Airlines Flight Center (now TWA Terminal A) at New York International Airport*, NYC Landmarks Preservation Commission Designation Report (interior designation). July 19, 1994: 2.

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of flight.”⁴⁸ Stephanie Stubbs, managing editor of *AIA Architect* wrote that “the great, swooping concrete bird - captured the essence of flight poised on the threshold of the Jet Age. It is fitting that all efforts be made to preserve its beauty for us, and for future generations.”⁴⁹ Marilyn Fenollosa of the National Trust for Historic Preservation recently noted that “. . . the terminal is the mid-20th-century counterpart of earlier transportation landmarks such as Grand Central Station.”⁵⁰

Alterations

While the TWA Terminal is regarded as one of the icons of modern American architecture, its design resulted in a building with significant functional limitations. During the 1960s, jets increased in size and capacity, and passenger traffic continued to outpace projections, resulting in the need for airports to have larger loading areas and the ability to handle greater and greater numbers of passengers. Increased security at airports also changed the layout of terminals and the flow of passengers through them, as well as requiring inspection facilities for screening passengers and baggage. Changes in the airline industry, brought on, in part, by deregulation, also resulted in a general trend towards large mega terminal buildings, within which large numbers of passengers could easily make connections between airlines. Saarinen’s design for the TWA Terminal could not be readily altered, inside or out. As a result, changes at TWA have been somewhat ad hoc, and yet still insufficient for current use requirements. In contrast to TWA, at Dulles Airport Saarinen was asked to design a central terminal building for multiple airlines, and its modular design was much more amenable to expansion. In this regard, Saarinen’s two airport projects represent a master architect’s very different responses to two distinctly different sets of program requirements.

Perhaps as early as 1965,⁵¹ TWA recognized several needs for expansion: among them were insufficient terminal capacity to accommodate the new Boeing 747 jumbo jets; the desire to accommodate international arrivals and its attendant Federal Inspection Station (FIS) within its own terminal; and inadequate operations and baggage handling capability. A zig-zag-shaped wing had been constructed in the location of the originally intended Flight Wing⁵², probably as a temporary measure to provide access to additional planes. This structure, completed sometime after the 1962 opening of the terminal, was not adequate, nor was it aesthetically consistent with the rest of the terminal. In addition, all international arrivals to JFK were routed through the International Arrivals Building, making access to connecting domestic flights difficult as passengers were required to leave the International Arrivals Building to go to other terminals. With the construction of a substantial

⁴⁸ Suzanne Stephens, “TWA’s Fight for Flight: what preserves a landmark most?” *Architectural Record* (November, 2001): 63.

⁴⁹ Stephanie Stubbs, “Saarinen’s TWA Terminal and the Moment of Truth.”

⁵⁰ Marilyn M. Fenollosa, National Trust for Historic Preservation, letter to Ruth Pierpont, May 24, 2005.

⁵¹ Existing architectural drawings (on file at Avery Library, Columbia University) suggest that planning may have begun for a new Flight Wing as early as 1965.

⁵² *New York Times*. (December 15, 1968): 24.

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addition to its terminal, TWA would be the first airline terminal "tailored to handle" jumbo jets, as well as the first airline-owned terminal with its own Federal health and customs inspection facilities.⁵³

TWA erected a second permanent flight wing beginning in 1968 and completed in 1970. The design for Flight Wing One, as the new flight wing would be called, was provided by Saarinen's successor firm, Kevin Roche John Dinkeloo and Associates. It followed Saarinen's original concept for the Flight Wings; however, its size, scale and detailing, particularly on the interior, were different. While the original (1957) Flight Wings were "violin-shaped," Flight Wing One was shaped like a "bass viol."⁵⁴ Flight Wing One provided gates for 10 jets, versus 7 gates at Flight Wing Two, and was set at a slightly higher elevation to accommodate the larger 747 jumbo jets. The new Flight Wing was connected to the main terminal structure by a much longer (220') tube walkway. The interior finishes of the new wing were not consistent with those in the rest of the terminal. Flight Wing One, which finally opened in 1970, was larger in floor area than the entire original TWA terminal, in part because it contained four levels within.

Other additions were also completed during the early years of the Terminal. Like Flight Wing One, they were not executed with the same level of design and detail as the original construction, but in plan they reflect some of the original design intent. As constructed, the baggage handling area had been accommodated within the concrete shell structure of the terminal; however, it did not prove to be adequate. Additional space was also required for ticketing and general operations.

Consequently, one addition for baggage claim carousels was constructed in 1970 to expand the baggage handling function; this was connected to Flight Wing One via an underground people-mover. Ticketing counters expanded into the area originally designated for baggage handling. On the other side of the terminal, behind the original ticketing area, another addition was constructed at the same time to accommodate offices and other back-of-house functions. A further large-scale expansion behind the Terminal near Flight Wing Two was completed in early 2000 to house the baggage makeup operation. These additions are tucked in behind the wings of the original terminal building and have little impact from the landside view; however, they certainly changed the footprint of the original construction and their installation altered or obscured the facade on the airside of the building.

Other, later, alterations at the TWA Terminal have further eroded the visual quality of the original Saarinen design. A glazed canopy was added to the front of the building in 1990, "appearing to cut it off at its knees."⁵⁵ Aluminum and glass curb-side baggage-handling enclosures have been added to the front of the building at the ticketing area, breaking up the clean lines of the front facade. Recent additions, completed in the year 2000 include additional baggage handling facilities adjacent to Flight Wing Two, and a small addition to Flight Wing One.

⁵³ Edward Hudson, "T.W.A. Dedicates Huge Terminal at Kennedy," *New York Times* (March 20, 1970): 93.

⁵⁴ Edward Hudson, "Mishap on T.W.A. Inaugural: Film Projector Fails," *New York Times* (February 26, 1970): 78.

⁵⁵ Fisher: 96.

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The Departure of Trans World Airlines

On April 9, 2001, TWA's 75-year existence as an independent airline came to an end when American Airlines purchased TWA's assets. TWA flew its last official flight on December 1, 2001, ending an era in American commercial aviation. In January 2002, TWA's lease on the structure, assumed by American Airlines, expired. It was at this time that the TWA Terminal at JFK Airport was officially closed. Efforts are currently underway to support the preservation and re-use of this icon of modern architecture.

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———. "Idlewild's Plans under Revision." *New York Times*. June 14, 1946: 15.

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———. "Aviation: Idlewild – Ingenious Boarding Ramp Protects Passengers from Inclement Weather." *New York Times*. December 15, 1957, sec. II: 43.

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Pelli, Cesar. Interview with John H. Beyer. March 16, 2000.

Roche, Kevin. Interview with John H. Beyer. March 16, 2000.

Designation Reports

Pan American World Airways Terminal. Inventory/nomination form. Undated.

Sanders, Joel. Trans World Airlines Terminal. United States Department of the Interior, National Park Service: National Register of Historic Places inventory/nomination form. 1978.

United States Department of the Interior
National Park Service

National Register of Historic Places
Continuation Sheet

Section 9 Page 8

Trans World Airlines Flight Center

Name of Property

Queens County, New York

County and State

TWA Domestic Terminal. Inventory/nomination form. Undated.

New York City Landmarks Preservation Commission. *Trans World Airlines Flight Center (now TWA Terminal A) at New York International Airport.* New York: July 19, 1994. Designation report (exterior).

_____. *Trans World Airlines Flight Center (now TWA Terminal A) at New York International Airport.* New York: July 19, 1994. Designation report (interior).

Trans World Airlines Flight Center
Name of Property

Queens County, New York
County and State

10. Geographical Data

Acreage of Property approx. 17.6 acres

UTM References

(Place additional UTM references on a continuation sheet.)

1 1 8 6 0 3 5 2 3 4 4 9 9 8 1 3
Zone Easting Northing

3 1 8 6 0 3 2 6 1 4 4 9 9 8 4 4
Zone Easting Northing

2 1 8 6 0 3 4 4 5 4 4 9 9 7 2 7

4 1 8 6 0 3 2 4 7 4 4 9 9 8 4 4

Verbal Boundary Description

(Describe the boundaries of the property on a continuation sheet.)

Boundary Justification

(Explain why the boundaries were selected on a continuation sheet.)

11. Form Prepared By (**See Continuation Sheet for Author**)

name/title Contact: Kathy Howe, Historic Preservation Specialist
New York State Office of Parks, Recreation and Historic Preservation
organization Bureau of Historic Preservation date 4/13/05
street & number Peebles Island, P.O. Box 189 telephone 518-237-8643, ext.3266
city or town Waterford state NY zip code 12188-0189

Additional Documentation

Submit the following items with the completed form:

Continuation Sheets

Maps

A **USGS map** (7.5 or 15 minute series) indicating the property's location
A **Sketch map** for historic districts and properties having large acreage or numerous resources.

Photographs

Representative **black and white photographs** of the property.

Additional items

(Check with SHPO or FPO for any additional items)

Property Owner (Complete this item at the request of the SHPO or FPO)

name Port Authority of New York and New Jersey
street & number 225 Park Avenue South telephone 212-435-7000
city or town New York state NY zip code 10003

Paperwork Reduction Act Statement: This information is being collected for applications to the National Register of Historic Places to nominate properties for listing or determine eligibility for listing, to list properties, and to amend existing listings. Response to this request is required to obtain a benefit in accordance with the National Historic Preservation Act, as amended (16 U.S.C. 470 *et seq.*)

Estimated Burden Statement: public reporting burden for this form is estimated to average 18.1 hours per response including time for reviewing instructions, gathering and maintaining data, and completing and reviewing the form. Direct comments regarding this burden estimate or any aspect of this form to the Chief, Administrative Services Division, National Park Service, P.O. Box 37127, Washington, D.C. 20503

United States Department of the Interior
National Park Service

National Register of Historic Places
Continuation Sheet

Section 10 Page 1

Trans World Airlines Flight Center

Name of Property

Queens County, New York

County and State

10. Geographical Data

UTM References (cont'd)

	<u>Zone</u>	<u>Easting</u>	<u>Northing</u>
5)	18	603480	4500104
6)	18	603535	4500054

Verbal Boundary Description

The nomination boundary is indicated on the attached Site Plan (April 2005).

Boundary Justification

The boundary is defined by an irregular polygon surrounding the main terminal structure and the two flightwings, and is at no less than approximately twenty feet from the building, except at the land side entrance, where it follows the curb of the median on the east side, as to exclude the non-contributing canopy and signage. The boundary has been established to include all of the components of the existing terminal complex, and the immediate setting. The exterior spaces formed by the connecting tubes, flightwings and terminal structure are incorporated into the boundary. The boundaries are drawn to incorporate the viewer's experience of this sculptural building in its airport setting including the curving roadside approach at the land side as well as the space surrounding the flightwings on the air side.

**United States Department of the Interior
National Park Service**

**National Register of Historic Places
Continuation Sheet**

Section 11 **Page** 1

Trans World Airlines Flight Center

Name of Property

Queens County, New York

County and State

Form Prepared By:

Maya Foty

Beyer Blinder Belle Architects & Planners LLP

41 East 11th Street, 2nd Floor

New York, New York 10003

212-777-7800, ext. 290

United States Department of the Interior
National Park Service

National Register of Historic Places
Continuation Sheet

Section 11 Page 2

Trans World Airlines Flight Center

Name of Property

Queens County, New York

County and State

Additional Documentation

Drawings (Source: Beyer Blinder Belle Architects, April 2005)

- Site Plan showing nomination boundary
- TWA Terminal Morphology diagrams
- Site plan – key to photographs
- Main floor plan – key to photographs
- Mezzanine plan – key to photographs
- Basement plan – key to photographs
- Flight tube and wing no. 1, main floor plan – key to photographs
- Flight tube and wing. No. 2, main floor plan – key to photographs

Black and White Photographs

TWA Terminal 5

Queens County, NY

Photographer: Peter Brandt

Dates: Photos taken on several days between January – April 2005

Negatives on file: HABS #NY-6371, Library of Congress, Washington, D.C.

1. North and west elevations of main terminal. Looking southeast from Airtrain lobby.
2. North and west elevations (land side) of main terminal. Looking southeast from airport road.
3. West elevation of main terminal. Looking north from airport road.
4. East elevation (air side) of main terminal, flight tubes and flight wings. Looking west from tarmac.
5. South elevation of flight wing 1, looking north.
6. North elevation of flight wing 2, looking southeast.
7. South elevation of flight wing 2, looking northwest.
8. View of reception desk/Solari board, looking west.
9. View of sunken lobby, looking east.
10. View of stair connecting lower lobby to upper lobby, looking northeast.
11. View of ticketing lobby in south wing, looking south.
12. Detail of built-in seating at northeast corner of south mezzanine, looking south.
13. View looking toward south mezzanine and upper lobby from top of staircase at north mezzanine. Looking southeast.
14. View looking down toward reception desk and lower lobby taken from southwest corner of north mezzanine. Looking south.
15. Detail of fountain at lounge area of north mezzanine, looking southeast.
16. View of flight wing 1 from waiting area, looking north.
17. Flight tube 2, looking southeast from main terminal towards flight wing 2.

**United States Department of the Interior
National Park Service**

**National Register of Historic Places
Continuation Sheet**

Section 11 Page 3

Trans World Airlines Flight Center

Name of Property

Queens County, New York

County and State

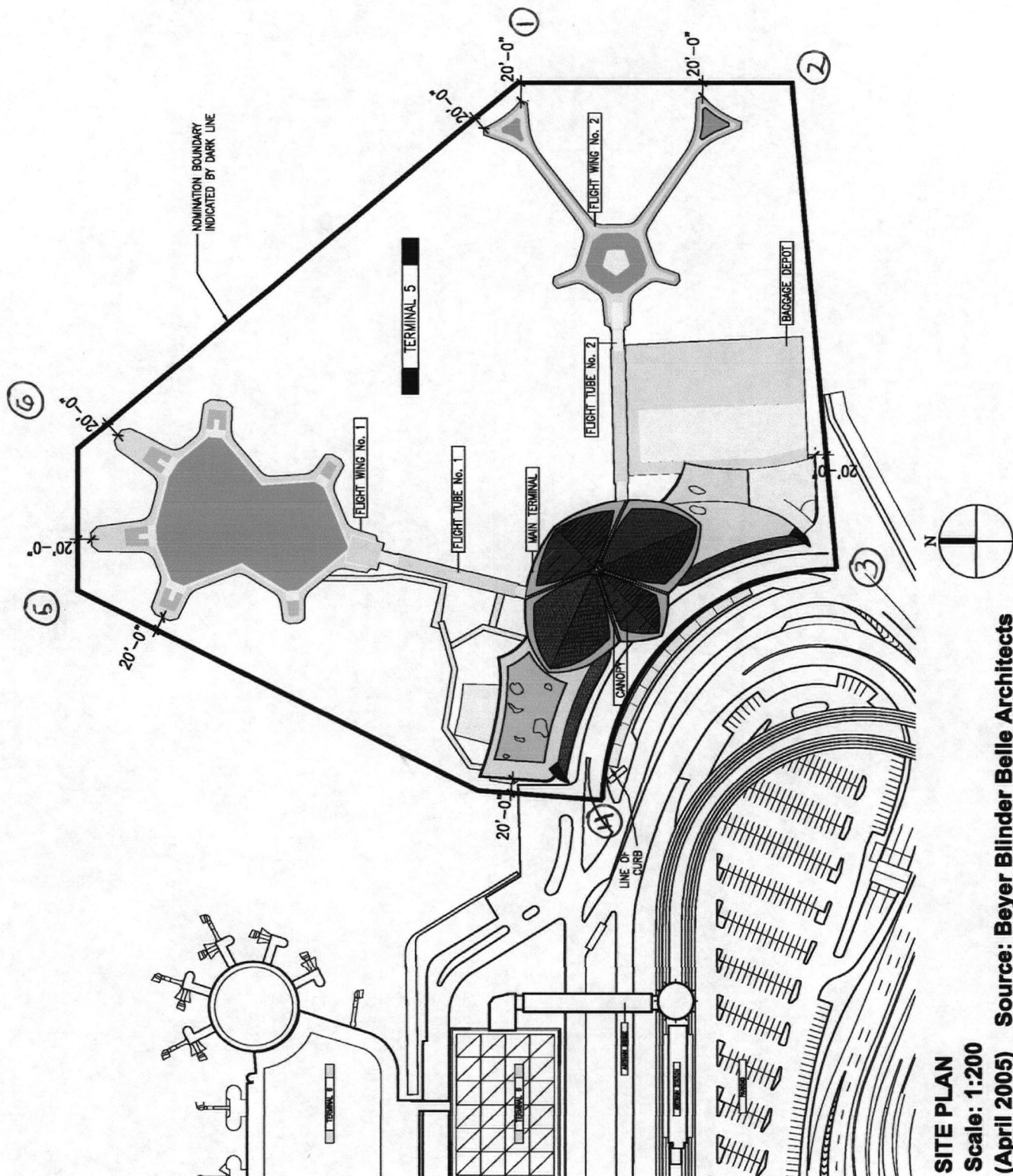
-
18. Flight wing 2, view of entry to glazed corridor leading to departure lounge. Looking east.
 19. Departure lounge in flight wing 2, looking east.
 20. Departure lounge in flight wing 2, looking northwest.

Additional Items

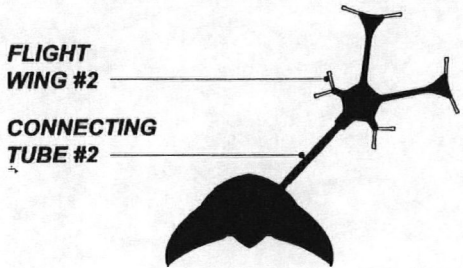
Designation reports TWA Flight Center (interior and exterior reports), NYC Landmarks Preservation Commission, 1994.

UNITED STATES DEPARTMENT of the INTERIOR
NATIONAL PARK SERVICE
NATIONAL REGISTER OF HISTORIC PLACES

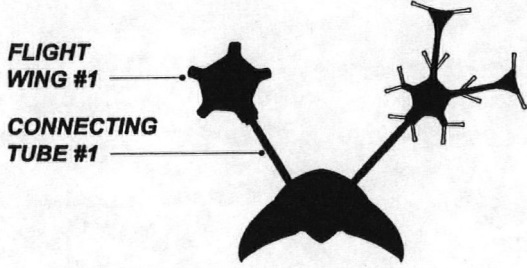
TRANS WORLD AIRLINES FLIGHT CENTER
(TWA Terminal 5)
QUEENS COUNTY, NEW YORK



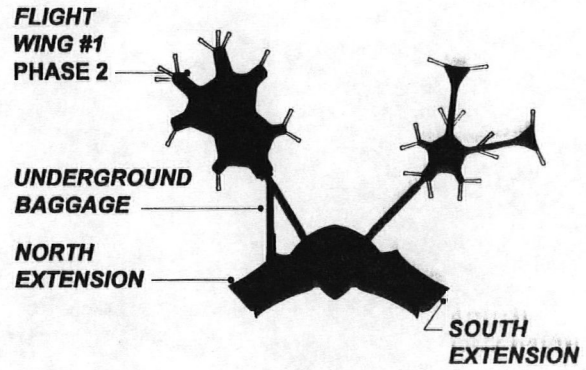
TWA TERMINAL MORPHOLOGY:



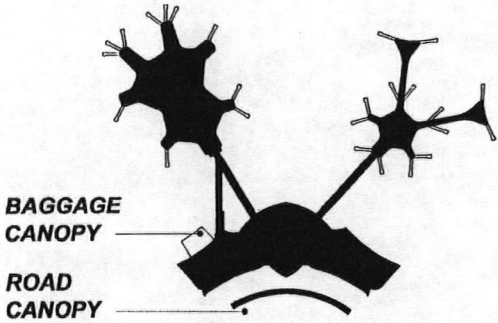
1962



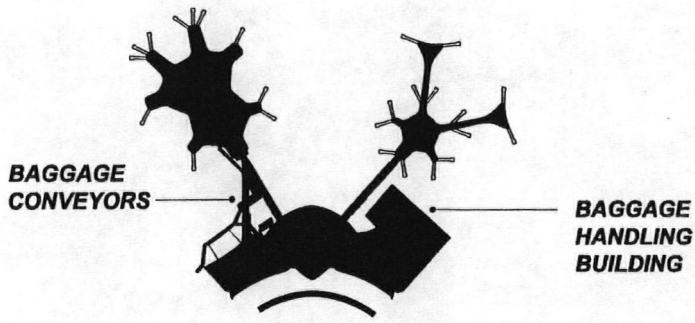
1967



1970



1990



2000

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NATIONAL PARK SERVICE
NATIONAL REGISTER OF HISTORIC PLACES

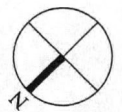
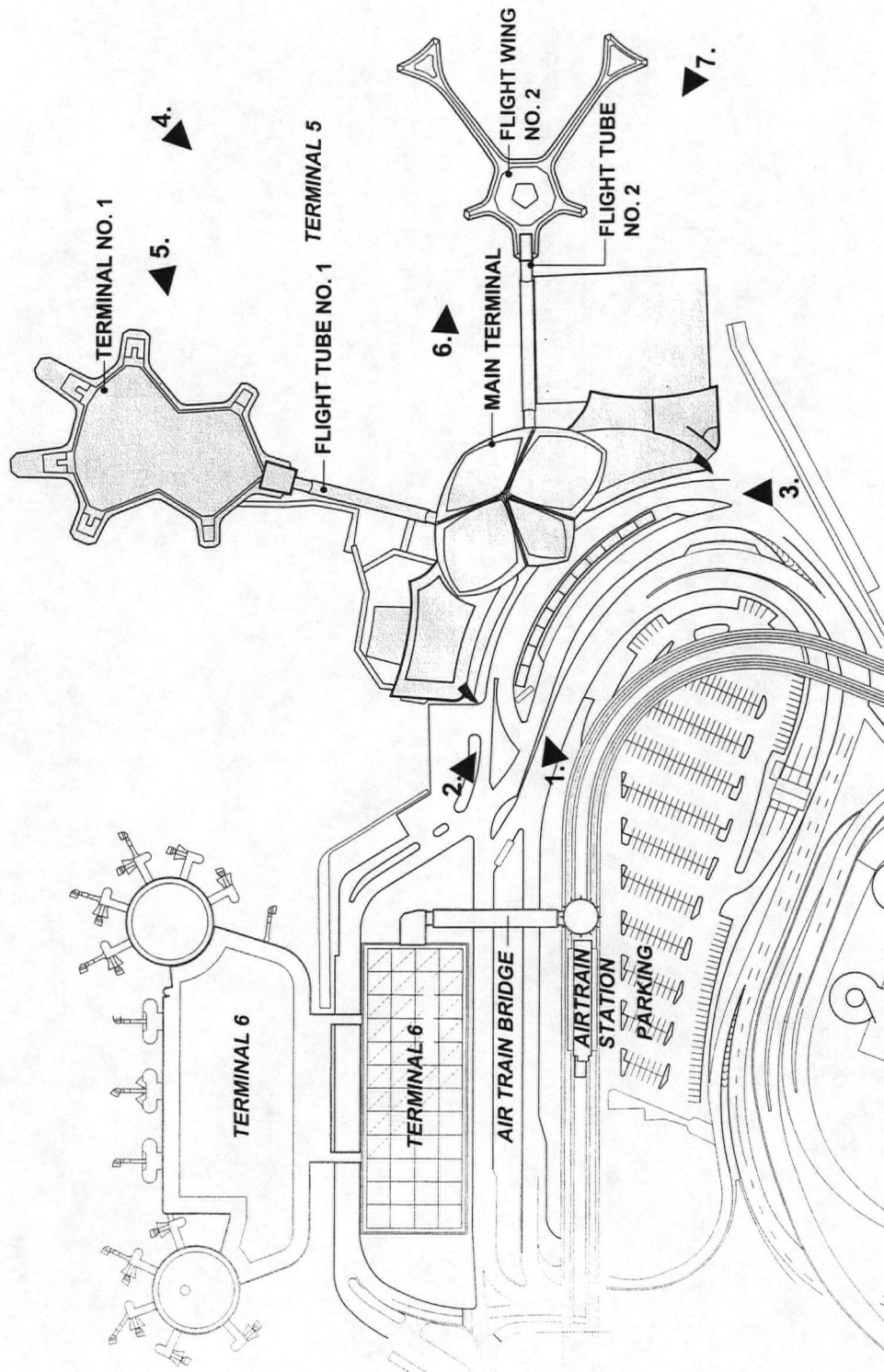
TRANS WORLD AIRLINES FLIGHT CENTER
(TWA Terminal 5)
QUEENS, NEW YORK
MORPHOLOGY DIAGRAMS

UNITED STATES DEPARTMENT of the INTERIOR
NATIONAL PARK SERVICE

NATIONAL REGISTER OF HISTORIC PLACES

TRANS WORLD AIRLINES FLIGHT CENTER
(TWA Terminal 5)
QUEENS, NEW YORK

Key to Photographs
(Page 1 OF 6)



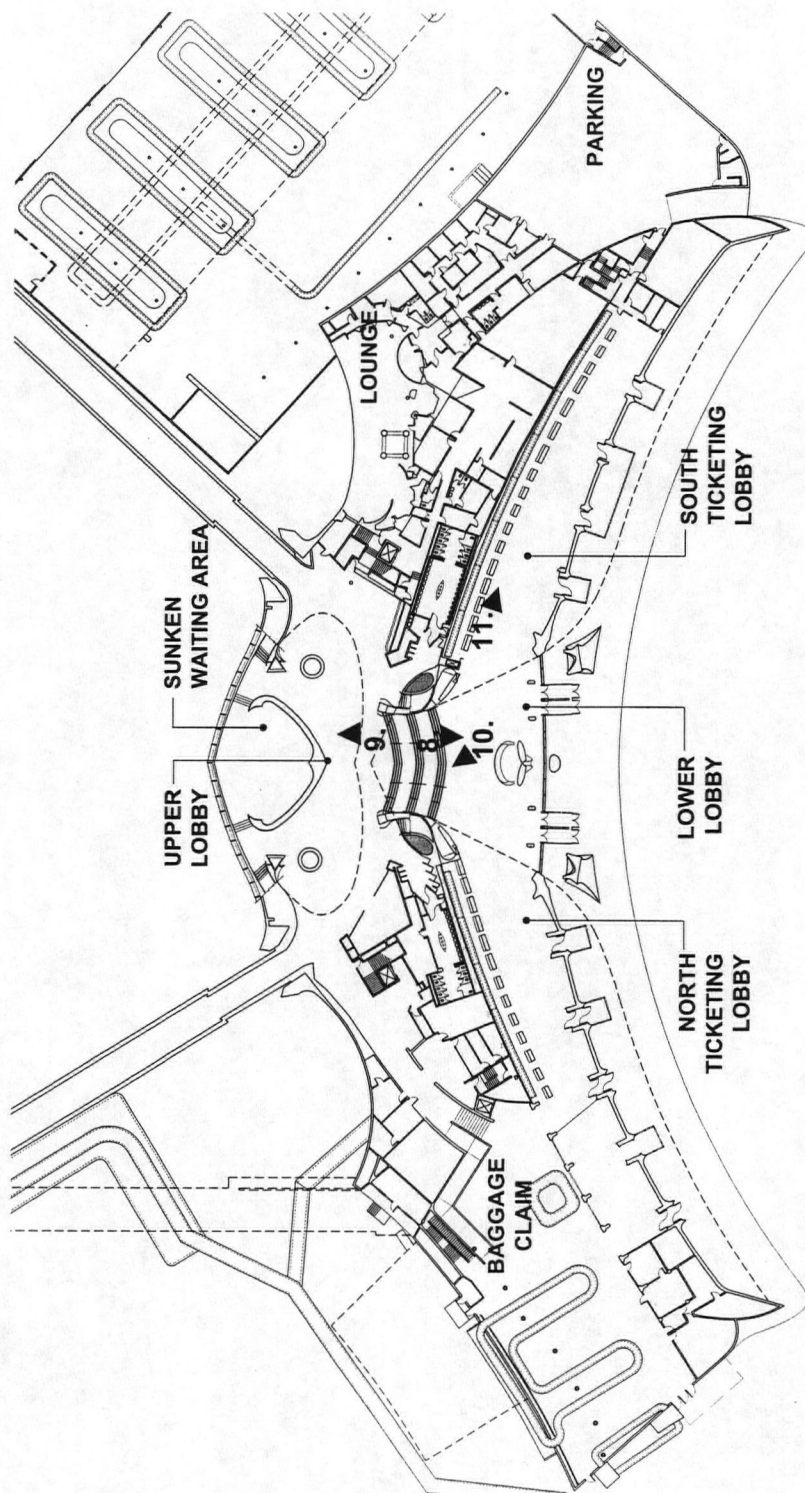
SITE PLAN
(APRIL 2005) Source: Beyer Blinder Belle Architects

UNITED STATES DEPARTMENT of the INTERIOR
NATIONAL PARK SERVICE

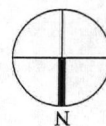
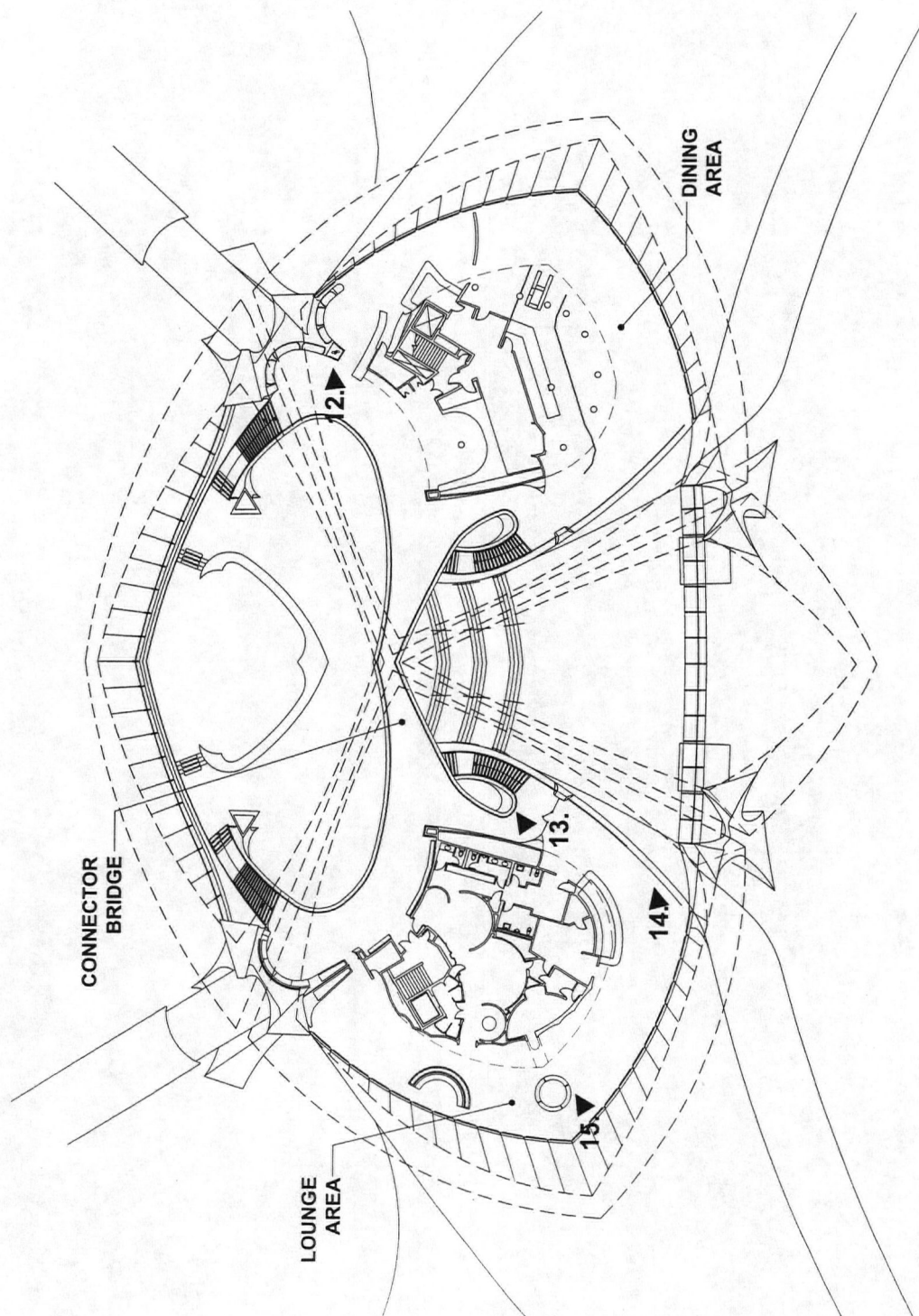
NATIONAL REGISTER OF HISTORIC PLACES

TRANS WORLD AIRLINES FLIGHT CENTER
(TWA Terminal 5)
QUEENS, NEW YORK

Key to Photographs
(Page 2 OF 6)



MAIN FLOOR PLAN
(April 2005) Source: Beyer Blinder Belle Architects



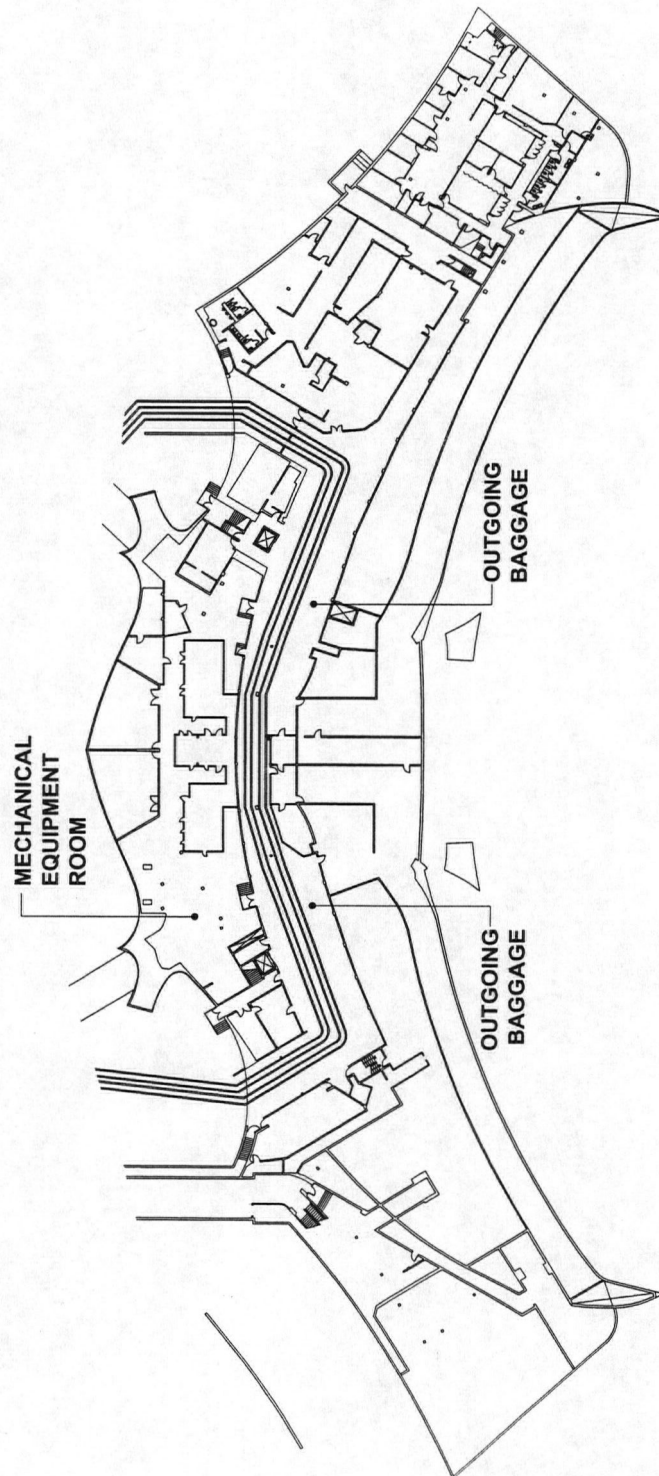
MEZZANINE PLAN
(April 2005) Source: Beyer Blinder Belle Architects

UNITED STATES DEPARTMENT of the INTERIOR
NATIONAL PARK SERVICE

NATIONAL REGISTER OF HISTORIC PLACES

TRANS WORLD AIRLINES FLIGHT CENTER
(TWA Terminal 5)
QUEENS, NEW YORK

Key to Photographs
(Page 4 OF 6)

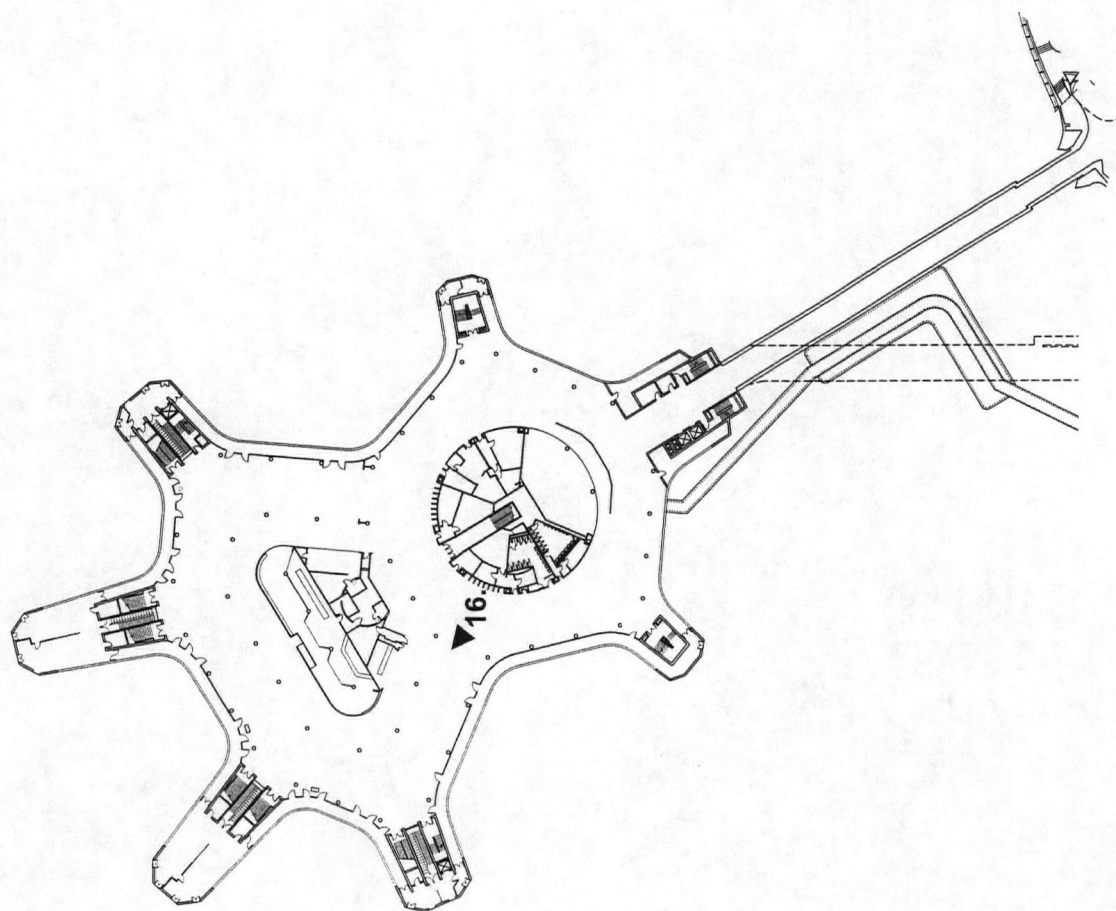


BASEMENT PLAN
(April 2005) Source: Beyer Blinder Belle Architects

UNITED STATES DEPARTMENT of the INTERIOR
NATIONAL PARK SERVICE
NATIONAL REGISTER OF HISTORIC PLACES

TRANS WORLD AIRLINES FLIGHT CENTER
(TWA Terminal 5)
QUEENS, NEW YORK

Key to Photographs
(Page 5 OF 6)



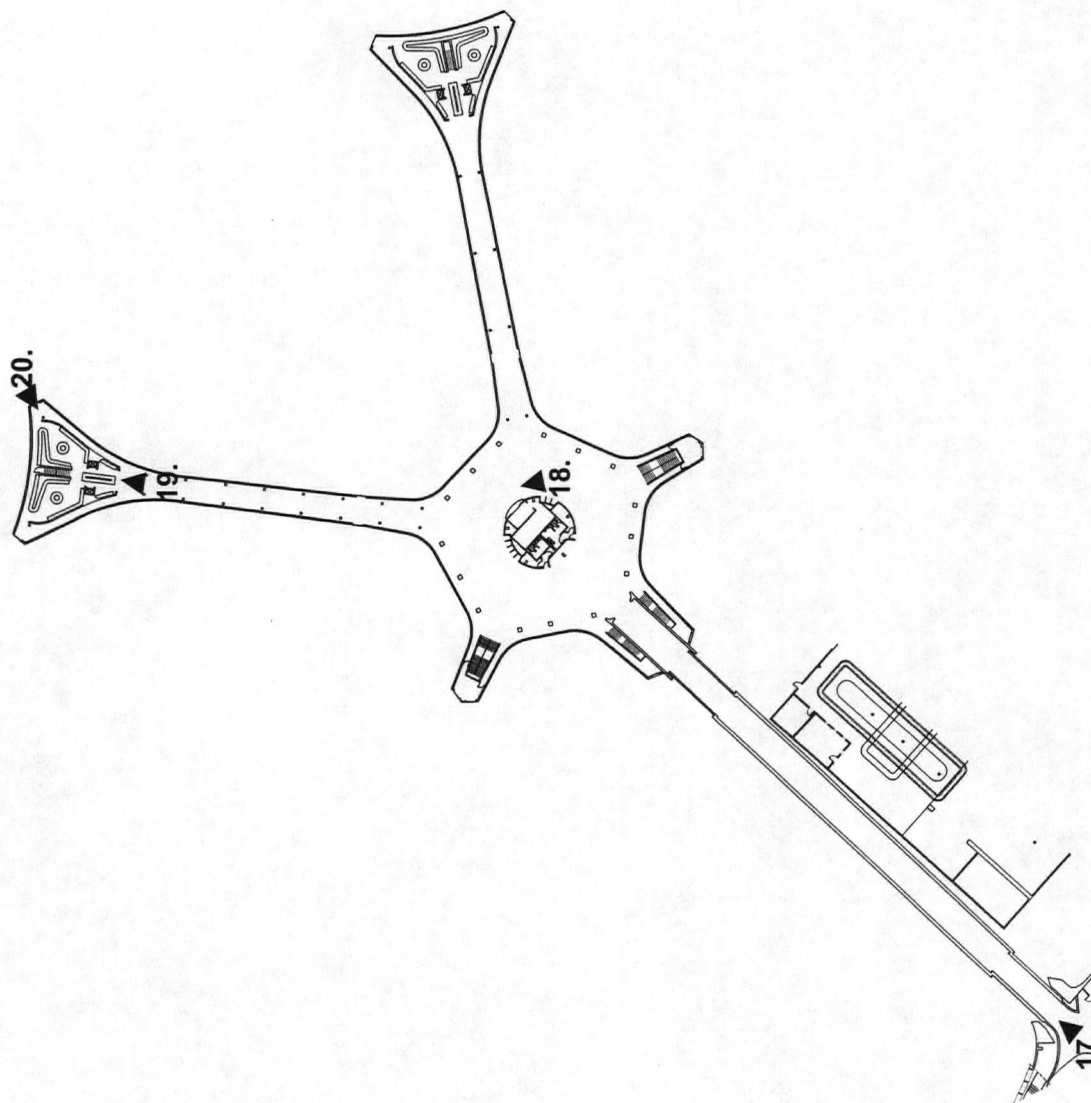
FLIGHT TUBE AND WING No. 1 MAIN FLOOR PLAN
(April 2005) Source: Beyer Blinder Belle Architects

UNITED STATES DEPARTMENT of the INTERIOR
NATIONAL PARK SERVICE

NATIONAL REGISTER OF HISTORIC PLACES

TRANS WORLD AIRLINES FLIGHT CENTER
(TWA Terminal 5)
QUEENS, NEW YORK

Key to Photographs
(Page 6 OF 6)



FLIGHT TUBE AND WING No. 2 MAIN FLOOR PLAN
(April 2005) Source: Beyer Blinder Belle Architects

UNITED STATES DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE

NATIONAL REGISTER OF HISTORIC PLACES
EVALUATION/RETURN SHEET

REQUESTED ACTION: NOMINATION

PROPERTY Trans World Airlines Flight Center
NAME:

MULTIPLE
NAME:

STATE & COUNTY: NEW YORK, Queens

DATE RECEIVED: 7/26/05 DATE OF PENDING LIST: 8/12/05
DATE OF 16TH DAY: 8/27/05 DATE OF 45TH DAY: 9/08/05
DATE OF WEEKLY LIST:

REFERENCE NUMBER: 05000994

REASONS FOR REVIEW:

APPEAL: N DATA PROBLEM: N LANDSCAPE: N LESS THAN 50 YEARS: Y
OTHER: N PDIL: N PERIOD: N PROGRAM UNAPPROVED: N
REQUEST: N SAMPLE: N SLR DRAFT: N NATIONAL: Y

COMMENT WAIVER: N

____ ACCEPT ____ RETURN ____ REJECT ____ DATE

ABSTRACT/SUMMARY COMMENTS:

Designed by Eero Saarinen, TWA Terminal 5 at JFK International Airport is a nationally significant iconographic example of mid-20th century modernism in architecture, engineering and terminal planning. The period of significance is established as 1962-1970, which is characterized as the "Golden Era" of passenger jet travel and corresponds with the full realization of Saarinen's original terminal master plan.

RECOM./CRITERIA Accept AHC, g. realization of Saarinen's original terminal master plan.
REVIEWER Savage DISCIPLINE Architectural History
TELEPHONE _____ DATE 9-7-05

DOCUMENTATION see attached comments Y/N see attached SLR ~~X~~ N

If a nomination is returned to the nominating authority, the nomination is no longer under consideration by the NPS.



TRANS WORLD AIRLINES FLIGHT CENTER
PHOTO 1
Queens County, NY



TRANS WORLD AIRLINES FLIGHT CENTER
PHOTO 2
Queens County, NY











DEPARTURES

FLIGHT TIME GATE DEPARTING TO STATUS

WAKE UP DAWN TO THE GOVERNMENT AND TELL THEM YOU'RE
EAGER TO RIDE BECAUSE YOU KNOW WHAT'S GOOD FOR YOU
USE FIRST AND LAST NAMES WHEN THEY INTERVIEW YOU
SO LONG THAT THEY ARE ASSURED TO HAVE YOU ANYMORE
WHEN A DREAM YOU SEE A WAY TO SURVIVE
HAD YOU WERE FULL OF JOY
GO WHERE PEOPLE SLEEP AND SEE IF THEY'RE SAFE
GAIN STRENGTH BECAUSE CRUELTY
IS ALWAYS POSSIBLE LATER
YOU LIVE THE SURPRISE RESULTS OF OLD PLANS
MODERN FACE SCANS THE SURPRISE ENDING

DEPARTURES

FLIGHT TIME GATE DEPARTING TO STATUS

REASON CAUSES MORE TROUBLE THAN THOUGHT
REAL THINGS ARE DELICATELY INTERCONNECTED
FINDING YOUR MOTIVES IS DESPEACABLE
CHECK OF CHARISMA CAN BE FATAL
BEN DON'T PROTECT YOU ANYMORE
OFFER VERY LITTLE INFORMATION ABOUT YOURSELF
SLOPPY THINKING GETS WORSE OVER TIME
FORTUNE IS BARBARIC
YOU ARE GUTLESS IN YOUR DREAMS

INFORMATION



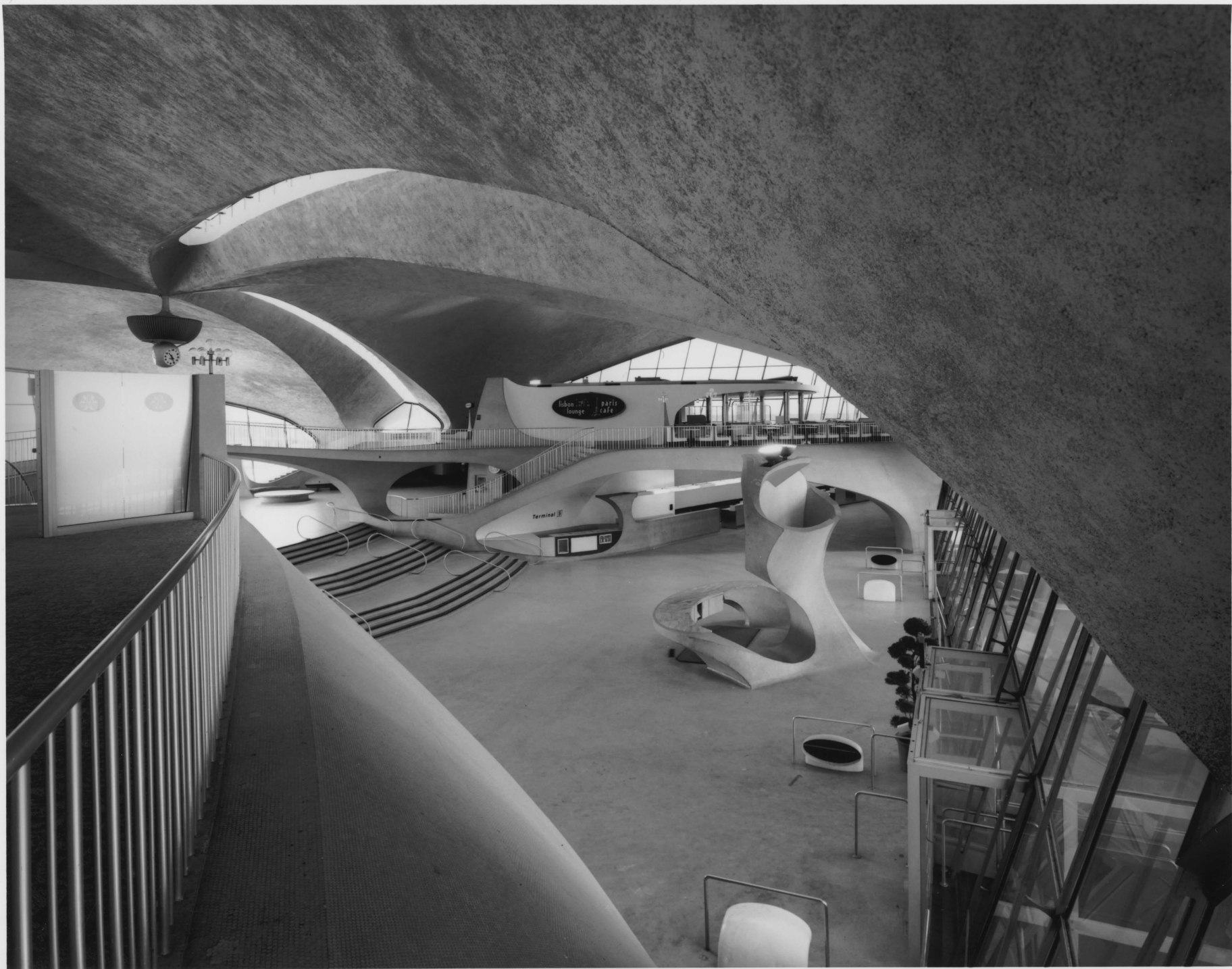








TRANS WORLD AIRLINES FLIGHT CENTER
photo 13 Queens County, NY





TRANS WORLD AIRLINES FLIGHT CENTER

PHOTO 15

Queens County, NY



TRANS WORLD AIRLINES FLIGHT CENTER
PHOTO 16 Queens County, NY



TRANS WORLD AIRLINES FLIGHT CENTER
PHOTO 12 Queens County, NY.



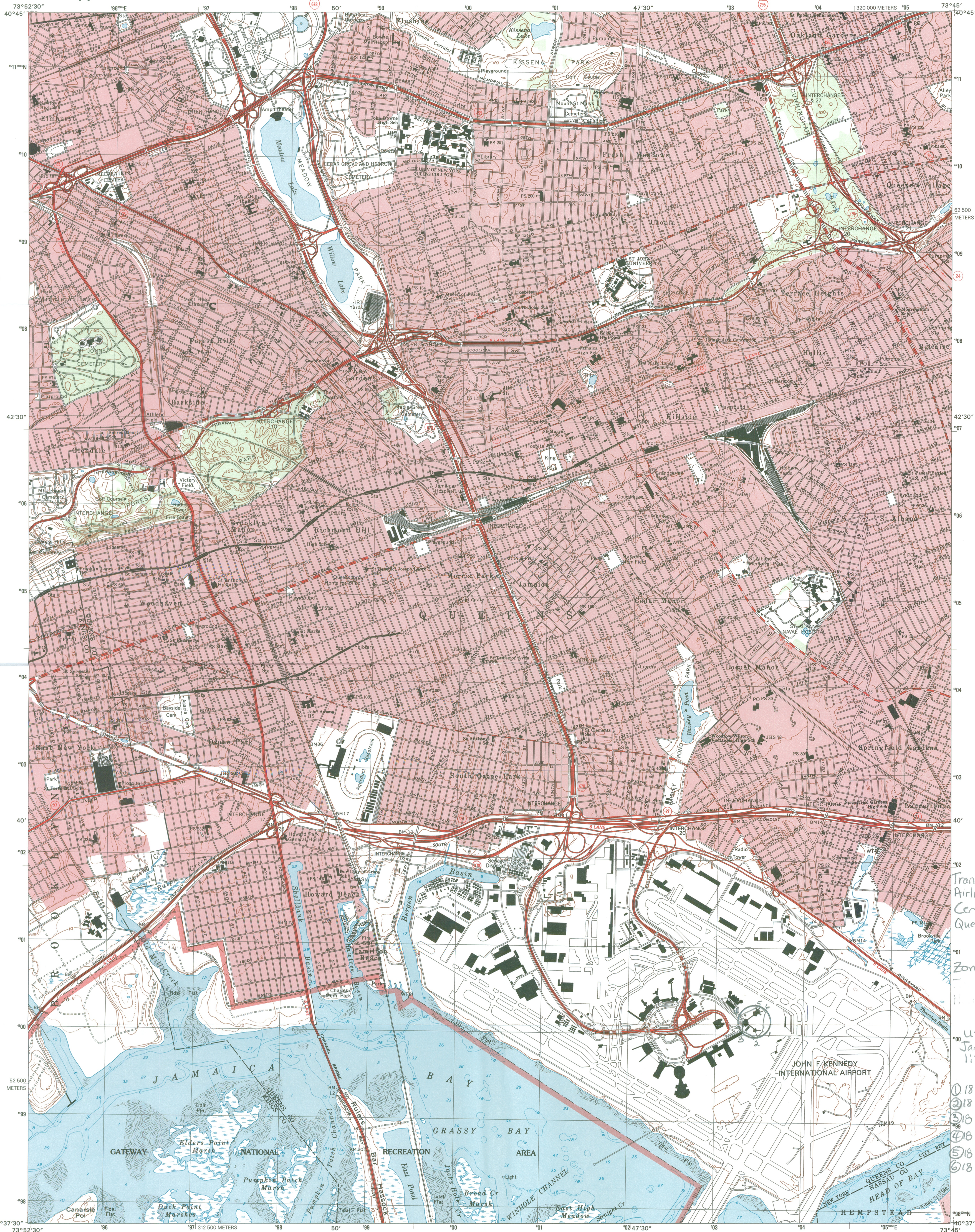
TRANS WORLD AIRLINES FLIGHT CENTER
photo 18 Queens County, NY





TRANS WORLD AIRLINE FLIGHT CENTER, QUEENS COUNTY, NY

PHOTO 20



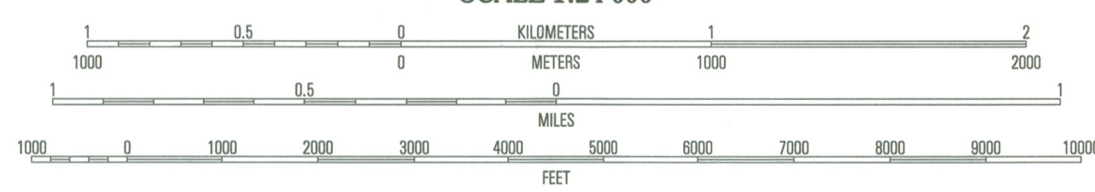
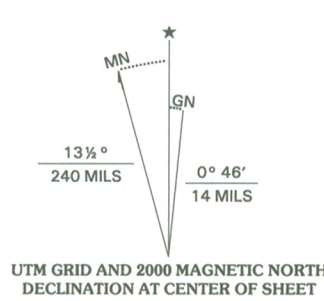
Trans World
Airlines Flight
Center
Queens County, NY

Zone 18

USGS Topo
Jamaica Quad
1:24000

① 18 603523 4499813
② 18 603445 4499727
③ 18 603261 4499844
④ 18 603247 4499984
⑤ 18 603480 4500104
⑥ 18 603535 4500054

Produced by the United States Geological Survey
Topography compiled 1953. Planimetry derived from imagery taken 1994 and other sources. Survey control current as of 1956
Selected hydrographic data compiled from USCGS Chart 542 (1967)
This information is not intended for navigational purposes
North American Datum of 1983 (NAD 83). Projection and 1000-meter grid: Universal Transverse Mercator, zone 18
2500-meter ticks: New York Coordinate System of 1983 (Long Island zone)
North American Datum of 1927 (NAD 27) is shown by dashed corner ticks. The values of the shift between NAD 83 and NAD 27 for 7.5-minute intersections are obtainable from National Geodetic Survey NADCON software
There may be private inholdings within the boundaries of the National or State reservations shown on this map
Landmark buildings verified 1956



CONTOUR INTERVAL 10 FEET
SUPPLEMENTARY CONTOUR INTERVAL 5 FEET
NATIONAL GEODEIC VERTICAL DATUM OF 1929
TO CONVERT FROM FEET TO METERS, MULTIPLY BY 0.3048
DEPTH CURVES AND SOUNDINGS IN FEET, DATUM IS MEAN LOWER LOW WATER
THE RELATIONSHIP BETWEEN THE TWO DATUMS IS VARIABLE
THE MEAN RANGE OF TIDE IS APPROXIMATELY 5.3 FEET

THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS
FOR SALE BY U.S. GEOLOGICAL SURVEY, P.O. BOX 25286, DENVER, COLORADO 80225
A FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST



ROAD CLASSIFICATION

Primary highway
hard surface
Secondary highway
hard surface
Unimproved road
Light-duty road, hard or
improved surface
Interstate Route
U.S. Route
State Route

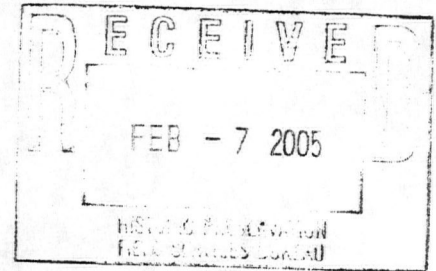
1	2	3	1 Central Park
4	5	4 Brooklyn	5 Sea Cliff
6	7	6 Connetquot	7 Far Rockaway
		8 Lawrence	

JAMAICA, NY
1994

NIMA 6265 III NE-SERIES V821



February 2, 2005



Ms. Ruth Pierpont
Director of Historic Preservation Field Services Bureau
NYS Office of Park, Recreation and Historic Preservation
P. O. Box 189
Peebles Island
Waterford, NY 12188-0189

Re: TWA Terminal at JFK International Airport

Dear Ms. Pierpont:

As Eero Saarinen's principal design associate, I was deeply involved in the design of the TWA Terminal at JFK. After his untimely death in 1961, I oversaw its completion. This seminal building is one of Mr. Saarinen's major works and is the subject of many ongoing scholarly studies, both here and abroad. Several books are underway which feature the building. The Finnish Cultural Institute in New York, Museum of Finnish Architecture, and Yale University are preparing a traveling exhibit schedule to debut in 2006 which will highlight the TWA building. A major Japanese magazine is currently devoting an entire issue to Eero Saarinen with an emphasis on the TWA Terminal.

Given all of this interest combined with the fact that the TWA Terminal is one of the most significant buildings in 20th century modern architecture, I believe it well warrants being included in the National Register of Historic Places; and I enthusiastically support the nomination of this building to the National Register of Historic Places.

Sincerely,

Kevin Roche

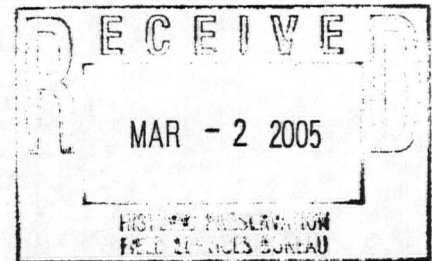
KR:chc

cc Richard W. Southwick, Beyer Blinder Belle

WILLIAM R. DECOTA
DIRECTOR
AVIATION DEPARTMENT
225 PARK AVENUE SOUTH, 9TH FLOOR
NEW YORK, NY 10003
(212) 435-3703
(212) 435-3833 FAX

February 25, 2005

Ms. Ruth Pierpont
Director of Historic Preservation Field Services Bureau
NYS Office of Parks, Recreation and Historic Preservation
P.O. Box 189
Peebles Island
Waterford, NY 12188-0189



Dear Ms. Pierpont:

The TWA Terminal at John F. Kennedy International Airport is currently in the process of being nominated for listing on the National Register of Historic Places. Designed by Eero Saarinen, and constructed between 1959 and 1962, the building is one of the most highly acclaimed examples of expressionistic modern architecture. In addition to its unique form, the terminal was innovative in its use of specific aviation technology suited for the beginning of the jet age: baggage carousels, jetway access from the terminal to the planes and even its satellite or flightwing configuration, remote from the main terminal structure and connected via distinctive, elevated pedestrian tubes.

The thin-shell concrete structural form, configured into four intersecting vaults, is supported in total on four large sculptural piers. Contrasted with large window walls affording views out to the airfield, this unique design was revolutionary for its time and captured the excitement of flight at the dawn of the jet age.

The Port Authority of New York and New Jersey is very proud of the TWA Terminal and its significant place in aviation and architectural history. We strongly support the nomination of this building and look forward to its listing on the National Register of Historic Places.

Sincerely,

A handwritten signature in dark ink, appearing to read "William R. DeCota".

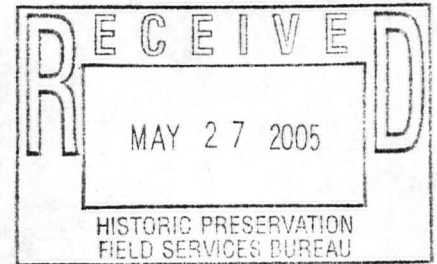
William R. DeCota
Director
Aviation Department

NORTHEAST
OFFICE



NATIONAL TRUST
for HISTORIC PRESERVATION

May 24, 2005



Ms. Ruth L. Pierpont
Director
Historic Preservation Field Services Bureau
Peebles Island
PO Box 189
Waterford, NY 10580

Re: Trans World Airlines Flight Center
John F. Kennedy International Airport
Queens, Queens County, NY

Dear Ms. Pierpont:

On behalf of the National Trust for Historic Preservation, I am writing to add our support for the proposed listing on the National Register of Historic Places of the Trans World Airlines Flight Center at JFK International Airport in Queens.

The National Trust for Historic Preservation, a recipient of the National Humanities Medal, is a private, nonprofit membership organization dedicated to protecting the irreplaceable historic and cultural resources of the United States. With over 270,000 members nationwide, including almost 19,000 in the State of New York, the Trust provides leadership, education, advocacy and resources to save America's diverse historic places and revitalize communities.

Since its completion in 1962, Eero Saarinen's curvilinear TWA Terminal has been hailed as an icon of modern design. Its soaring, graceful form was meant to evoke the romance and excitement of flight, and even the smallest interior details – ticket counters, chairs, signs and telephone booths – were designed to complement the gull-winged shell. The terminal is recognized and cherished by millions of travelers and architecture buffs alike. In a sense, the terminal is the mid-20th-century counterpart of earlier transportation landmarks such as Grand Central Station. And as one of Saarinen's last works, it is a fitting memorial to the memory of this great 20th century architect.

We highly recommend the TWA Terminal for National Register listing, and thank you for giving us this opportunity to comment.

Very truly yours,

Marilyn M. Fenollosa
Senior Program Officer and Regional Attorney

Protecting the Irreplaceable



NORTHEAST OFFICE
SEVEN FANEUIL HALL MARKETPLACE
BOSTON, MA 02109
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1785 MASSACHUSETTS AVENUE, NW
WASHINGTON, DC 20036
WWW.NATIONALTRUST.ORG



The New York City Landmarks Preservation Commission

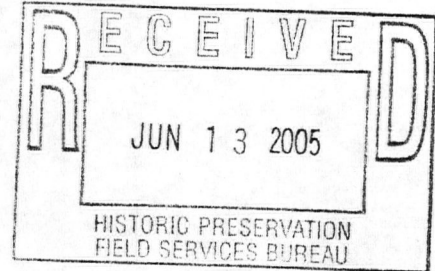
1 Centre Street, 9th Floor North, New York NY 10007 TEL: 212-669-7922 FAX: 212-669-7797

<http://nyc.gov/landmarks/>



RONDA WIST
EXECUTIVE DIRECTOR
rwist@lpc.nyc.gov

June 9, 2005



Ms. Ruth Pierpont, Director
New York State Office of Parks Recreation
and Historic Preservation
Historic Preservation Field Services Bureau
Peebles Island
P.O. Box 189
Waterford, New York 12188-0189

Re: Trans World Airlines Flight Center, John F. Kennedy International
Airport, Queens, New York

Dear Ms. Pierpont:

I write on behalf of Chair Robert B. Tierney in response to your request for comment on the eligibility of the Trans World Airlines Flight Center at John F. Kennedy International Airport in Queens for the State and National Registers of Historic Places.

The Commission supports the nomination of the Trans World Airlines Flight Center. In 1994, the New York City Landmarks Preservation Commission voted to designate the Trans World Airlines Flight Center an interior and exterior New York City landmark. The Trans World Airlines Flight Center is one of the great masterpieces of expressionistic modern design and is a major work by Eero Saarinen (with codesigner Kevin Roche), one of the leading modern architects in the United States.

Based on the Commission's review of the property and the materials submitted by the Historic Preservation Field Services Bureau, the Commission has determined that the Trans World Airlines Flight Center appears to meet the criteria for inclusion on the State and National Registers of Historic Places.

Sincerely yours,

Ronda Wist

cc: Robert B. Tierney, Chair
Mary Beth Betts



New York State Office of Parks, Recreation and Historic Preservation

Historic Preservation Field Services Bureau

Peebles Island, PO Box 189, Waterford, New York 12188-0189

518-237-8643

Bernadette Castro
Commissioner

July 22, 2005

Ms. Alexis Abernathy
National Park Service
National Register of Historic Places
1201 Eye St. NW
8th Floor
Washington, D.C. 20005

Re: Transmittal of National Register
Nominations

Dear Ms. Abernathy:

I am pleased to transmit two National Register nominations to be considered for listing by the Keeper of the National Register as follows:

Fulton-Nassau Historic District, New York, New York Co., NY

Trans World Airlines Flight Center, Jamaica, Queens Co., NY

Please feel free to call on me at 518-237-8643 ext. 3258 if any questions arise.

Sincerely,

Mark L. Peckham
National Register
Program Coordinator

enclosures

TRANS WORLD AIRLINES FLIGHT CENTER
(now TWA Terminal A) AT NEW YORK INTERNATIONAL AIRPORT,
John F. Kennedy International Airport, Queens.
Built 1956-62; Architects, Eero Saarinen & Associates (Eero Saarinen and Kevin Roche).

Landmark Site: Borough of Queens Tax Map Block 14260, Lot 1 in part, consisting of a site encompassed by a continuous line beginning at a point at the southernmost end of the terminal building, extending northeasterly and northerly along the outermost edge of the terminal building, easterly along the southernmost edge of the elevated walkway between the terminal building and the southern gate structure, extending around the outermost contours of the southern gate structure, westerly along the northernmost edge of the elevated walkway between the terminal building and the southern gate structure, northerly and northwesterly along the outermost edge of the terminal building between the elevated walkways, northerly along the easternmost edge of the elevated walkway between the terminal building and the northern gate structure, westerly along the line of connection between the elevated walkway and the northern gate structure, southerly along the westernmost edge of the elevated walkway between the terminal building and the northern gate structure, westerly and southwesterly along the outermost edges of the terminal building to its westernmost end, southerly from the western end of the terminal building to the curblin of the service road, southeasterly along the western edge of the curblin of the service road, southerly and easterly along a line corresponding to the outermost edge of the overhanging canopy of the terminal building, southerly along the western edge of the curblin of the service road to a point opposite the southernmost end of the terminal building and easterly to the point of beginning.

On June 15, 1993, the Landmarks Preservation Commission held a public hearing on the proposed designation as a Landmark of the Trans World Airlines Flight Center at New York International (Idlewild) Airport (now TWA Terminal A), John F. Kennedy International Airport, and the proposed designation of the related Landmark Site (Item No. 11). Two persons testified in favor of designation and both Trans World Airlines and the Port Authority of New York and New Jersey expressed uncertainty about the proposed action. A representative of TWA requested that the hearing be continued. On September 21, 1993, the Commission continued the public hearing (Item No. 10). Both hearings had been duly advertised in accordance with provisions of law. At the continued hearing, time, similar reservations concerning designation were expressed by TWA and the Port Authority. A representative of Queens Borough President Claire Shulman expressed delight at the consideration of the TWA terminal for designation, and also expressed concern about the continued use of the facility by the airline and the airport. The Commission has received three letters in support of the proposed designation. The Commission has since met with the Port Authority to discuss its plans for the terminal.

DESCRIPTION AND ANALYSIS

Summary

The TWA Flight Center, designed by Eero Saarinen & Associates (Eero Saarinen and Kevin Roche), is among the chief works of one of the most highly-regarded architectural firms of the modern era. Saarinen's firm revolutionized air terminal design through its use of daring concrete and glass forms and technological advances, producing a distinctive and highly-acclaimed work of expressionistic architecture with the TWA Terminal (1956-62). Trans World Airlines was provided with the opportunity to erect its Flight Center by the bold decision made in 1954 by the Port of New York Authority to develop Idlewild (New York International) Airport with individual airline terminals. The Flight Center incorporates airport technology adopted at the beginning of the jet aircraft era, ranging from the very form of the terminal – the now-common "satellite" plan where aircraft gates are clustered around structures built on the runway ramp away from the main terminal – to equipment such as jetways and baggage carousels. Taking advantage of the highly-visible site assigned to TWA at the apex, or far end, of the curving service road, Saarinen designed a very distinctive and memorable building while still adhering to the master plan of the airport. The design of the building expressed Saarinen's intention "to interpret the sensation of flying" and "be experienced as a place of movement and transition." The main portion of the terminal – created by four intersecting vaults separated by narrow bands of skylights and supported on four Y-shaped piers – has an upward soaring quality. The broad expanses of window-walls create a transparent quality for the terminal, in strong contrast with the concrete structural elements. The low wings that extend from the vaulted portion of the terminal, with their concave walls which extend as cantilevered canopies to shelter passengers at curbside and curved plan, echo the forms of the main portion of the terminal and relate to the curving service road while the elevated concrete walkways leading to gate structures on the ramp, are unusual in their windowless tube form. The satellite gate structure – a form that has remained a standard in airport design – with its projections for jetway access and its remote gates, one with the airline's control tower on the roof, incorporates some of the first solutions for such facilities. The concrete structure, which required special engineering and construction methods, illustrates the collaboration necessary between the architects, engineers, and construction workers to realize this unusual and significant design.

New York City's International Airport¹

The development of New York's international airport was the result of Mayor Fiorello H. LaGuardia's interest in aviation and his long-range planning for New York City airports. Due to its remoteness from Manhattan, the city's first airport, Floyd Bennett Field on Jamaica Bay, had limited appeal both for mail delivery and passenger service. LaGuardia did not consider the Newark (N.J.) Airport, which had opened in 1928 and rapidly became the major airport on the eastern seaboard, a proper substitute. His first remedy was the construction of the New York City Municipal Airport, LaGuardia Field, commonly known as LaGuardia Airport. Commercial air service at LaGuardia soon surpassed that of Newark, and LaGuardia began planning for a much larger airport, since he was convinced that after the war the city would need another field to accommodate increased

demands for domestic and transatlantic passenger traffic and air freight service.

During the fall of 1941, Mayor LaGuardia announced plans for an additional airport to be constructed on a large area of marshlands on the south side of Long Island. The land purchased for the air field included the Idlewild golf course, an old summer hotel, and the Jamaica Sea-Airport landing strip. Although never officially a part of the name of the airport, the facility was known during its early years as Idlewild, later as New York International Airport, and since late 1963 as John F. Kennedy International Airport.² The initial planning for the large airport, undertaken by the City Department of Marine and Aviation, was based on the concept of one large terminal building and proceeded slowly because of a disagreement over the layout of the runways and the negotiation of leases with each airline. While the final layout of the airport remained

in dispute, construction began in 1942. Commercial flights began to use the airport on July 1, 1948, making use of the first terminal facilities – a small cinder block building and a control tower. Even before the construction of the present terminals began, nearly three million passengers and hundreds of millions of pounds of airmail and air cargo had passed through Idlewild airport; by 1954 the facility had the highest volume of international traffic of the world's airports.³

In 1947, the Port of New York Authority (now known as the Port Authority of New York and New Jersey) and the City of New York signed a leasehold agreement for fifty years under which the Port Authority would finance, develop, and operate the airports in New York City.⁴ The Authority began work on a new master plan for the Idlewild field because after the Second World War air travel had increased more rapidly than first projected. During the late 1940s, thirty to forty percent of all U.S. airline passengers passed through New York City in the course of their air travels, and the city had earned the position of "air capital" of the world. By 1953 it became apparent that the new airport would require more aircraft gates, and that the centralized terminal scheme had serious defects. Consequently, the use of unit terminals – separate terminals for each airline – was considered to avoid the projected two-mile-long centralized terminal, as well as to minimize passenger walking distances, reduce congestion, and provide maximum flexibility. In 1954, the decision was made to use unit terminals in order to eventually provide 140 aircraft loading gates, and in February 1955, the Port Authority and the airlines reached an agreement on a revised master plan.

The plan adopted for New York International Airport – envisioned as the largest and most efficient airport in the world, where there would be "no confusion and no congestion"⁵ – was developed under the direction of Thomas M. Sullivan, deputy director of the Aviation Department for the Port of New York Authority, and Wallace K. Harrison, who served as design consultant and coordinator. The airport's "Terminal City" would consist of the International Arrival Building with flanking Airline Wing Buildings (to be built by the Port Authority); an eleven-story control tower; seven airline terminal buildings; a network of roadways, parking lots, taxiways; and a central plaza with reflecting lagoon (now replaced by parking facilities). The allocation of sites for the airline terminals was based on carriers' traffic, seniority at the Idlewild facility, and relationship to overseas traffic. Each airline would

have the freedom to erect a terminal designed by the architect of its choice to meet individual operational needs.

The New York International Airport, strongly identified with the "Jet Age," incorporates some of the first solutions for accommodating jet aircraft and is a contemporary of facilities built in Los Angeles, San Francisco, and Chicago. Terminals built before the Second World War had been enlarged by the use of "fingers" or covered piers, which led to boarding areas on the ramp for the increasing number of aircraft; the piers – enclosed and enlarged to two-story structures – evolved into the familiar concourses of a later generation of airports. An operational change that had a great impact on airport design was the use of a "hold area" for processed passengers near the aircraft gate, which became known as the gate departure lounge. The gate lounges eliminated the need for large central waiting rooms, and prompted the relocation of passenger services nearer to aircraft gates. During the post-war airport construction boom, engineers and planners analyzed airport design and function, diagramming variations of terminal finger configurations – where aircraft were typically parked on both sides of a concourse that contained walkways, services, and gate departure lounges – and the alternative satellite form, where aircraft gates were grouped around a central waiting and service area which was connected to the main terminal by an elevated walkway. Separating routes through terminals for arriving and departing passengers, minimizing passenger walking distances, reducing congestion during peak hours of travel, and automating baggage handling were airport planning issues addressed during the period. The more widespread use of jet aircraft during the years that the Idlewild was under construction introduced yet another set of concerns: how to deal with larger sizes of aircraft, increased noise levels, and jet blasts, and how to protect passengers boarding planes at an elevated level.

Port Authority planners projected that the unit terminals at Idlewild would have finger configurations. The first group of terminals designed for the airport exhibited several solutions to providing a large number of aircraft gates. The first project to be completed was the International Arrivals Building (designed by Skidmore, Owings, & Merrill), which had long wings and perpendicular fingers. The finger plan was adopted for the American Airlines terminal (designed by Kahn & Jacobs), which had staggered lounges off a central corridor, and the United Air Lines facility (designed by Skidmore,

Owings and Merrill). The terminal of Eastern Air Lines (designed by Chester L. Churchill) was based on the concept of large, centralized waiting rooms and "loading arcades." Pan American World Airway's "umbrella" terminal (designed by Tippetts-Abbett-McCarthy-Stratton) was yet another solution: six jets could be nosed in under the roof which would protect boarding passengers from the weather. TWA was the only airline to adopt the satellite configuration for its terminal. Elevated walkways, variations on early "Jetways" introduced to commercial aviation by United Airlines at Chicago, were used at the United, Pan Am, American, and TWA terminals at Idlewild.⁶ The airline terminals also demonstrated various approaches to passenger service and technological advances in information presentation (electronic signage and closed-circuit television monitors) and baggage handling.

Trans World Airlines

Trans World Airlines⁷ has played a major role in the history of commercial aviation in the United States; the carrier was, for many years, the only airline with both domestic and transatlantic routes and the second-largest one in the country. At the time the terminal at New York International Airport was under construction, TWA linked sixty-five American cities with twenty-three points abroad. A series of mergers, involving portions of several parent airlines, including Western Air Express, Standard Air Lines, Maddux Air Lines, and Trans-Continental Air Transport produced Transcontinental & Western Air, Inc. (TWA); the name Trans World Airlines was adopted in 1950. The history of TWA is dominated by aviation advances, financial reorganizations, and the controversial role of the long-term principal stockholder Howard Hughes. The airline has a long association with aviation in New York City as one of the first carriers to contract for space at the LaGuardia airport; the airline operated the first scheduled flight into that field in 1939. TWA operated a domestic freight and passenger service prior to World War II and expanded to overseas service via southern routes to Europe and the Mid- and Far East, which was inaugurated early in 1946 with a flight from LaGuardia to Paris; weekly transatlantic air-cargo service was established in 1947. TWA competed with Pan Am, the nation's other transatlantic carrier, for passengers by introducing tourist-class transatlantic flights in 1952, switching to jet aircraft for transatlantic passenger service, and by offering an appealing and efficient new terminal at New York International Airport.

TWA was the sixth international airline to sign an agreement with the Port of New York Authority in 1949 for use of the Idlewild facility, and when the locations of the individual airline terminals at New York International Airport were announced, TWA was not especially pleased. TWA and Pan Am, as overseas carriers, were assigned positions on either side of the International Arrivals Building, but TWA would have preferred the opposite side, which was nearer to its new hanger. The carrier would be the only one to operate both foreign and domestic service from one terminal at the airport. Though the leadership of the airline underwent several changes during the course of the planning and construction of the terminal, it was during Ralph S. Damon's term as president that the TWA terminal was conceived. George Scullin reports that Damon was advised by TWA's real estate board and construction engineers to commission the firm of Eero Saarinen & Associates (which was completing the General Motors Technical Center) to design the terminal, and attributes to Damon the vision of the terminal as "a building that starts your flight with your first glimpse of it and increases your anticipation after you arrive," and the statement, "the spirit of flight, inside and out, and nothing less will do." The airline was regarded as a "client with vision and confidence."⁸

Eero Saarinen⁹

A master architect of the mid-twentieth century, Finnish-born Eero Saarinen (1910-1961) was groomed from childhood to be a successful designer by his parents, textile artist Loja Gesellius Saarinen, and highly regarded international architect (Gottlieb) Eliel Saarinen (1873-1950). Eliel's early career is best remembered for his Helsinki Railroad Station (1904-c. 1913, with Herman Gesellius) which successfully demonstrates his sympathies with the Arts and Crafts movement. The Saarinen family immigrated to the United States in 1923, yet visited Finland annually. Eliel contributed significantly to the creation of the Cranbrook School and Academy of Art, a complex of children's schools and an advanced-level art academy, located at Bloomfield Hills, north of Detroit. Cranbrook was devoted to every field of design - textiles, metalwork, architecture, and city planning. Eliel designed several buildings there, including the Cranbrook School for Boys (1924-30) and the Kingswood School for Girls (1929-30). The latter project exemplifies the Arts and Crafts ideal of collaboration between the fine and applied arts: while Eliel oversaw all aspects of design, Loja designed and

wove fabrics (in association with the Cranbrook Looms). Eero designed furniture, and his sister, Eeva-Liisa, assisted with selecting wall and ceiling treatments.

During the early 1930s Eero studied sculpture at the Parisian Académie de la Grand Chaumière, completed a Bachelor of Fine Arts in the Beaux-Arts-oriented architecture program at Yale University, toured Europe and Egypt on a travel fellowship, during which time he was influenced by the architecture of Erich Mendelsohn and Alvar Aalto – before joining his father's firm in 1936. Together, the Saarinens produced the much-praised Crow Island School (1939-40, with Perkins, Wheeler & Will) in Winnetka, Illinois. Eero entered many design competitions, and won several prizes. He collaborated with designer Charles O. Eames on the scheme for a molded plywood chair which won the Organic Design in Home Furnishings competition (1940-41), sponsored by the Museum of Modern Art. Recognized from that point on as an important furniture designer, Saarinen produced many designs for the Knoll furniture company, best represented by his Womb chair (1946-48) and Nos. 71 and 72 chair series (c.1956).

Saarinen has been credited with developing the innovative "systems approach" to design; he carefully analyzed each problem, and usually relied on modern technology, in order to find a unique form and structure to express a concept architecturally. As a result, each of his designs has a certain wholeness about it; he claimed to be concerned with the "esthetics of the whole organism" and sought an "expressive architecture, an antiassembly-line architecture," stating "each building should be as distinctive as each person should."¹⁰ The commission which firmly established his architectural career was the General Motors Technical Center (1945-56, with Smith, Hinchman & Grylls) in Warren, Michigan. Though its initial designs were begun in association with his father, the final scheme was largely due to Eero. The complex is ruled by its strictly modular design (structure, partitions, and mechanical systems are fully integrated) and features such technological innovations as neoprene window gaskets and walls of thin insulated panels sheathed in porcelainized sheet metal; yet the architect also added brightly colored brick surfaces and his signature element, a reflecting pool. During the GM project, the elder Saarinen died and Eero formed a successor firm, Eero Saarinen & Associates. An intensely devoted and methodical worker – he worked 365 days a year, according to his chief of design, Kevin Roche – Eero produced a

number of buildings which have become American landmarks. These include his Jefferson National Expansion Memorial (designed 1948, completed 1964), the famous parabolic arch in St. Louis, Missouri; the Kresge Auditorium and Chapel (1953-56, with Anderson & Beckwith), geometrically-derived enclosures highlighting different materials, at the Massachusetts Institute of Technology in Cambridge; the David S. Ingalls Hockey Rink (1956-59), the undulating concrete roof of which expresses the exhilaration of a hockey game, at Yale University in New Haven; and two soaring reinforced concrete masterpieces associated with flight: the Trans World Airlines Flight Center (1956-62) at New York (now J.F.K.) International Airport – probably his most renowned design – and Dulles Airport (1958-62, with Ammann & Whitney) in Chantilly, Virginia. The last three commissions were completed after Saarinen's death in 1961 as was his other prominent New York project, the somber granite-clad Columbia Broadcasting System (CBS) Headquarters (1960-64) on Sixth Avenue between West 52nd and 53rd streets.

Saarinen's buildings received extensive publicity in the press, and he was given several prestigious awards. Though many architects and architectural writers sympathetic to the International style criticized Saarinen's work as lacking consistency (a necessary by-product of his design method), his *oeuvre* has withstood the test of time: by 1993 six of his designs had received the American Institute of Architects' 25-Year Award for "exemplif[y]ing" design of enduring significance." These include the Crow Island School, GM Technical Center, and Dulles Airport.¹¹ Saarinen's successor firm, Kevin Roche and John Dinkeloo, founded by his colleagues, has been a significant force in American architecture during the second half of this century. Other architects influenced by his design philosophy are Cesar Pelli, Gunnar Birkerts, and Robert Venturi.

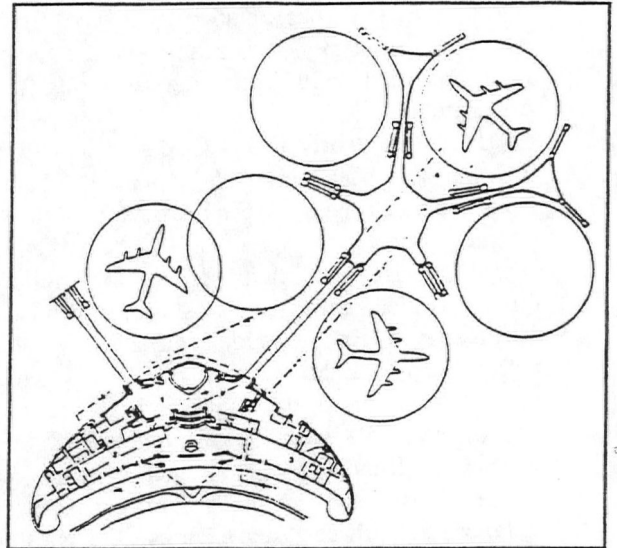
Design and Construction

TWA provided the architectural firm with a catalogue of needs, and its projection of passenger traffic in 1970: 1000 people within the building at peak hours, and a turnover in arriving and departing passengers at the rate of 2000 per hour. Aline Saarinen described her husband as an ardent and incessant air traveler who had deplored the ugliness, shoddiness, and inconvenience of most air terminals.¹² In accordance with his firm's usual approach to a design problem, the staff made a programmatic analysis of airport functions, collected

data on planes and passengers, and toured existing terminals. The architects took advantage of the less convenient terminal site assigned to TWA by capitalizing on its high visibility at the apex, or far end, of the curving service road, and designed a distinctive and memorable building while still adhering to the master plan of the airport. The architects were determined that the building would relate to the tight, wedge-shaped site and it does so with the configuration of the main terminal, walkways extending at angles, and gate structures; the low side wings of the terminal conform to curve of the service road.

According to co-designer Kevin Roche, the first design for the terminal was an oval shell resting on four points with an edge beam, a form that Saarinen found awkward.¹³ A series of clay models, and then larger cardboard forms were used in the three-dimensional design process, especially to refine the forms of the shell and the ridges which emphasize their separation. The complex forms of the supporting piers were first shaped in wire to form the area needed for concrete and steel reinforcing; then a skin of light cardboard converted the shape to a solid volume. The forms that enclose the terminal appear to some as eccentric shells, and to others as intersecting barrel vaults; a recent analysis suggests that the forms are four lobes, or segmental domes, each of which stands alone, resting on two buttress supports. The architects took shell design into a more free-form arena, and made expressive innovations rather than technological ones.¹⁴

When Saarinen's design for the terminal was presented to the public in November 1957, the shape of the structure was described as bold and futuristic. Edward Hudson, aviation columnist for the *New York Times*, assuming that the airline had some misgivings about spending a projected \$12 million on such an unusual plan, thought that TWA was counting on winning public acceptance for the terminal.¹⁵ Attention was focused on the functional aspects of the terminal, both when the design was presented and upon its completion. It would be the airline's solution to three problems of air travel: quick and efficient service at check-in; up-to-the-minute information on arrivals and departures; and rapid baggage delivery. The placement of the long ticketing counter and the baggage claim area in the two low wings, at street level opposite curb areas protected by the projecting roof, was an attempt to increase passenger convenience. Recent advances in technology were employed in the electronically-controlled doors at the drop-off and pick-up points, large electronic signs –



Plan of Terminal

huge Solari (the Swiss watch manufacturer) Datavision boards where flight information could be kept up-to-date – and the transfer of that information throughout the terminal via closed-circuit television monitors. Originally, it was thought that passengers would have to walk to aircraft parked around a one-story structure on the ramp, the "Flight Wing." The use of "Jetways" was under study by late 1957, and the delay in the beginning of construction of the terminal allowed for the evaluation and adoption of this newly-available equipment. The use of jetways raised the height of the ramp structure to two stories, and determined its final form – a more compact "star-shaped" variation of the violin-shaped structure that appears in early images of the design. The projections from the main volume of the building are connections for the jetways, one at the front and one near the rear of each aircraft (for the segregation of first class and coach passengers).¹⁶ The structure has two remote gate lounges in order to accommodate seven aircraft; perched on the roof of the gate near the center of TWA's ramp area is the carrier's control tower, from which personnel direct ground traffic and control the flight information system. The use of baggage carousels in the main terminal area was an addition to the original plan for baggage-handling automation.¹⁷

The unusual form of the terminal required innovative approaches to structural design, engineering, and construction, and it was considered a monument to concrete as a building material and the architects, engineers, and construction workers who created it.¹⁸ Kenneth P. Morris, as project

engineer for contractors Grove Shepherd Wilson & Kruge; and Ralph Yeakel, Saarinen's second in command and resident architect for the project; a staff of fourteen engineers; and 150 craftsmen were responsible for the construction of the terminal.¹⁹ The architects supplied numerous architectural and structural drawings, many of which were of a new type that provided dimensional information; for example, contour lines that indicated the progressive shape of the buttress at one-foot intervals were added to section drawings. Grove Shepherd Wilson & Kruge produced working drawings and developed the techniques by which the structure could be built. For the concrete formwork, steel-pipe scaffolding was erected on a grid, with each vertical accurately placed to support the underside of the form at the proper elevation and position.²⁰ Specialists designed concrete mixes to meet the unusual conditions of the building; a fairly standard concrete was used for the piers and then blended with a lightweight mix for the roof shells.²¹ The pouring of the concrete structure, which is one monolithic form without control joints above the ground, was a carefully-orchestrated event. Once all the forms were removed, the *New York Times* could report: "TWA's Terminal Standing on Own."²² Nearly a year later, the one-quarter-inch-thick tinted glass window walls were installed. Construction, which began in June 1959, was complete enough in May 1962 to allow the terminal to be officially opened as the TWA Flight Center at New York International Airport.²³

A Terminal To Catch the Excitement of the Trip²⁴

Saarinen's design for the TWA Flight Center is the exemplar of expressionistic architectural trends of the late 1950s and 1960s. Saarinen and his like-minded peers expressed their dissatisfaction with the restrictive minimalism of the International Style, as it had been interpreted in America, through attempts to imbue modern architecture with a monumentalism appropriate to public structures.

To paraphrase Saarinen, the design intent of the Trans World Airlines terminal was to create, within the complex of terminals that makes up Idlewild, a building for TWA which would be distinctive and memorable, in which the architecture itself would express the drama, specialness, and excitement of travel, and which would be experienced as a place of movement and of transition. From the time the design was presented, the similarity between the form of a building and a bird was often remarked upon, with critics stating that the "structure is symbolically designed to appear like some huge bird with wings

spread in flight." Saarinen played down that analogy:

*The fact that to some people it looked like a bird in flight was really coincidental. That was the last thing we ever thought about. Now, that doesn't mean that one doesn't have the right to see it that way, or to explain it to laymen in those terms, especially because laymen are usually more literally than visually inclined.*²⁵

Saarinen interpreted the role airport terminal design played in satisfying emotional needs associated with jet travel – security and drama – with a baroque-like use of symbolic forms. The extent to which the terminal was successful in combining the functional realities of the jet age with the aesthetic drama of flight would be its real test in the public's mind. Saarinen's phrase "To Express the Excitement of Travel" appeared in the carrier's print ads in 1962, which noted that "the soaring roof and sweep of glass enclosed a hundred new ideas to speed departure and arrival."²⁶

Saarinen was emphatic that architecture had to be of its own time, and sought to interpret his era in a dynamic, expressive manner. Saarinen's approach to design and his reluctance to embrace fully any one theoretical camp left him free to explore the flowing, irregular forms that were appearing in art, furniture design, and in buildings. Saarinen took the shell, a form much in favor during the 1950s, and made it uniquely his own by exploring new shapes rather than devoting attention to shell dynamics; in a similar manner, he used large expanses of glazed walls, characteristic of airport terminal design, in an unusual manner.

The design of the terminal engendered much interest, and was not without its critics.²⁷ One contemporary writer noted that the building had been received with a great amount of skepticism, but was widely accepted as appropriate architecture for the jet age.²⁸ The *New York Times'* architectural critic, Ada Louise Huxtable, noted that the most dubious idea for a terminal, paradoxically, had produced by far the best building – Eero Saarinen's magnificently detailed and executed *tour de force* for TWA. Her admiration for the TWA terminal was underscored by her disappointment with the airport in general.²⁹ The project was presented in architectural periodicals in England, France, Germany, and Mexico; in 1963 the TWA terminal received an Award of Merit from the American Institute of Architects.³⁰

Description*

The exterior of the TWA terminal is composed of remarkably few elements, and its simplicity is furthered by the two building materials: concrete buttresses and roof, and green-tinted glass walls. The wing-like roof of the central portion rises above low wings that extend on the east and west, and follow the curve of the airport service road. Extending from the main terminal are two raised walkways that connect with gate structures on the aircraft ramp; the two-story eastern gate structure has a pair of remote gate lounges (the western gate structure, built later, is not included in this designation). The exterior concrete areas of terminal are painted in a range of cream shades.

Four complexly-massed piers support the roof over the central portion of the terminal. The four segments of the roof, separated by narrow skylights, meet at the central roof plate. The outward-canting side walls, and smaller front and ramp-facing walls have fixed sash held in an aluminum framework. The piers on the ramp side of the terminal, through which the concrete tube walkways extend, frame a large oval window above a concrete bulkhead. The letters "TWA" are mounted on the edge of the roof. The two front piers support the projecting front roof shell that extends to shelter the main entrances and terminates in a spoon-like scupper. The imprint of the formwork boards that remain visible as the concrete finish on the front piers and on the underside of the overhanging shell express the structural quality of raw concrete. Two glazed vestibules project from the central wall area, flanking an iron bowl-like light fixture attached to the window framing. Several canister spotlights hang at the upper edge of the wall and two spherical spotlights are mounted in front of the windows in the piers.

The curved walls of the flat-roofed side wings rise from a low curb and extend as a roof overhanging the sidewalk; the ends of these wings are terminated with taller, modeled parapet-like forms. There are two rows of recessed spotlights in the soffit

of the overhang. The original door openings are framed by rib-like projections. On the east wing, two of the openings have been converted to floor-to-ceiling windows and glazed vestibules project from the other two openings. On the west wing, the five openings have two projecting glazed vestibules, two pairs of recessed glazed doors, and a pair of flush glazed doors.³¹ The west end of the wing is obscured by a low, one-story enclosed walkway. The sidewalk has been widened, although the original curb line is visible. The aircraft ramp side of the wings is shielded from view by an addition north of the east wing and by baggage-handling equipment on the west wing.

The enclosed concrete walkways, painted white, are tubes with an oval cross-section, modeled on the exterior with curved forms near the main terminal ends. They rise in the center portion in a shallow arc and are supported by battered piers at several points.

The three main sections of the east gate structure have concrete ground stories (painted a light neutral color and coved at the upper edge), and fully-glazed second stories. The main structure is star-shaped with rectangular projections (onto which jetways are attached); it is extended by two glass-enclosed walkways, supported by a solid base and battered piers, to remote triangular gate lounges (Gates 39 and 42). The glazed windows of the operational control tower rise above the roof of Gate 39. The structures have nearly flat concrete roofs.

Subsequent History

In 1972, the west satellite gate structure was built. TWA, which also uses the adjacent terminal to the west, currently shares the Flight Center with America West. Alterations to the exterior of the terminal are limited to signage, the addition of the temporary enclosed walkway to Terminal B, and the placement of baggage-handling equipment on the ramp side.

Report prepared by Betsy Bradley,
with contributions by David M. Breiner,
Research Department

*For the sake of convenience, north is used in the description rather than northeast, and so on.

NOTES

1. This section is based on George Scullin, *International Airport* (Boston & Toronto: Little, Brown & Co., 1968); Thomas M. Sullivan, "Planning Airport Terminal buildings," *Civil Engineering* 29 (May 1959), 334-38; Dudley Hunt, Jr., "How Idlewild Was Planned for the Jet Age," *Architectural Record* 130 (Sept. 1961), 152-154 and Arnold W. Thompson, "Evolution and Future of Airport Passenger Terminals," *Journal of the Aero-Space Transport Division, Proceedings of the American Society of Civil Engineers*, 90 (Oct. 1964), 127-134.
2. In 1943 the airfield was named Major General Alexander E. Anderson Airport, in honor of a decorated veteran of two world wars. In March 1948, the City Council changed the name of the facility to New York International Airport, Anderson Field. In December 1963, during the month following the president's assassination, the airport was named the John F. Kennedy International Airport.
3. Edward Hudson, "New Structures Rise at Idlewild," *NYT*, Dec. 6, 1955, p. 39.
4. All structures at the airport are on property that belongs to the City of New York, which was leased to the Port of New York Authority for fifty years; the Authority subleases terminal sites to various occupants. The construction bills for the terminals and other structures were largely the responsibility of the Port Authority which has been repaid through the subleases.
5. Howard S. Cullman, "Tomorrow's Airport -- A World Fair," *NYT*, June 8, 1947, VI, p. 12.
6. United Airlines tested an "Aero-Gangplank" during the summer of 1958; by 1959 United had ordered "Jetways" for use at its terminals at New York International, LaGuardia, and several other major airports. "Jetway" appears to have been a proprietary name that has become a generic term. *Airports and Airport Engineering* 12 (July-August, 1958), 75 and 13 (May-June 1959), 42-43.
7. Information on TWA was compiled from Geoffrey Arend, *Air World's Great Airports, LaGuardia* (New York: Air Cargo News, Inc., 1979), 84-91; Arch Whitehouse, *The Sky's the Limit* (New York: Macmillan Co., 1971); and Robert J. Serling, *Howard Hughes' Airline: an informal history of TWA* (New York: St. Martin's Press, 1983).
8. Scullin, 154. Ralph S. Damon, the airline's long-term leader during the post-war rebuilding period for the carrier, assumed the presidency of TWA in 1949 and remained in that position until his death in January 1956. Damon was succeeded as president by Carter L. Burgess, who served a brief term of only eleven months. Charles S. Thomas' two-year term as president, from July 1958 to July 1960, preceded that of Charles C. Tillinghast, Jr., who assumed the position in March 1961, presided at the opening of the TWA Flight Center, and continued to lead the airline for a number of years. Edgar Kaufmann, Jr., noted in "Inside Eero Saarinen's TWA Building," *Interiors* 121 (July 1962), 87 the vision and confidence of the airline as a client and the turnover of responsible officials at TWA after 1956; he cited George Clay (an attorney from Missouri who held several positions at TWA prior to becoming a Vice-President for Administration in 1954 and a Director in 1956) and later Byron Rathbun (about whom little is known) as two men played leading roles in the terminal project. Donald Keogh was the TWA project engineer at the time the terminal was nearing completion, according to the *NYT*, April 22, 1962, p. 14.
9. This section is based on: Alan Temko, *Eero Saarinen* (New York: George Braziller, 1962); Walter McQuade, "Eero Saarinen, A Complete Architect," *Architectural Forum* 116 (April 1962), 102-107; Rupert Spade, introduction to *Eero Saarinen*, Library of Contemporary Architects (New York: Simon & Schuster, 1971); "Slouching towards Barcelona," *Progressive Architecture* 56 (Feb. 1975), 78-85; Andrea O. Dean, "Eero Saarinen in Perspective," *A.I.A. Journal* 70 (Nov. 1981), 36-[51]; R. Craig Miller, "Saarinen, Eliel, and Saarinen, Eero," *Macmillan Encyclopedia of Architects* (New York: Macmillan-The Free Press, 1982), vol. 3, 625-633; *Design in America. The Cranbrook Vision, 1925-1950* (New York: Harry N. Abrams, 1983); "Eero Saarinen," *Architecture and Urbanism* extra edition (1984); and Peter Papademetriou, "Coming of Age. Eero Saarinen and Modern American Architecture," *Perspecta* 21 (1984), 116-141.

10. Quoted in McQuade, 107.
11. "Saarinen's GM Technical Center Receives AIA's 25-Year Award," *Architecture: the AIA Journal* 74 (Apr. 1985), 11, 15; "Eero Saarinen's Dulles Airport Wins AIA 25-Year Award," *Architecture: the AIA Journal* 77 (May 1988), 38, 43; "Deere HQ Wins Saarinen a Sixth 25-Year Award," *Progressive Architecture* 74 (Feb. 1993), 18.
12. "Dream of Eero Saarinen a Tribute to His Memory," *Aviation News* 4 (May 25, 1962), 2.
13. Roche's description appeared in "TWA's Graceful New Terminal," *Architectural Forum* 108 (Jan. 1958), 79-83. The descriptions of the TWA terminal design process include graphic scenes such as Saarinen taking a knife to a grapefruit half and pushing on the end to create the bulges in the shell forms, as well as Roche sawing a model in half to make an intermediate design conform to the curve in the service road.
14. The shell forms are discussed in Christopher Hart Leubkeman, "Form Swallows Function," *Progressive Architecture* 73 (May 1992), 106-108. The *Engineering News-Record* reported that the key to the stability of the structure was a center plate which is the only structural connection between the four shells separated by three-foot-wide skylights. The plate receives tensile stress from the outward-leaning field and two side shells, and compressive stress from the forward-tilting front shell; the plate was not designed to resist vertical forces, which are transferred through interior edge beams to the piers. Supplementing the piles in resisting the horizontal component of thrusts of the piers are three subgrade post-tensioned ties (concrete-encased high-strength bars) and one at the main waiting-room level.
15. *NYT*, Edward Hudson, "Aviation: Unusual Terminal for Idlewild," Nov. 17, 1957, p. 37. The *NYT*, Oct., 11, 1958, p. 45, reported that engineers were reworking the plans for the terminal because it was too costly to build as originally designed; what changes were made as a result of this study are undetermined.
16. Several airlines at Idlewild used two jetways to access aircraft parked parallel to terminal structures, but the use of the nose-in parking position and one jetway became favored for economic reasons. According to Glenn Garrison, "TWA Picks Futuristic Terminal Design," *Aviation Week* 67 (Nov. 18, 1957), 40-41, the traveler would have a choice of using a moving sidewalk or walking through the long passageway linking the main terminal with the ramp gate structures. The design of these walkways changed from glass-enclosed structures with moving sidewalks to the enclosed tunnels and the use of the moving sidewalks was abandoned. The functional aspects of the TWA terminal were described in "TWA: Wing-Like Roof, Theater-Type Lounge," *Airlift* (Sept. 1959), New York City Airports Clipping file, Municipal Reference Library and "Newest Terminal Spreads its Wing," *Aviation News* 4 (May 25, 1962), 2.
17. According to Bruno H. Hake, "Baggage Handling: Passenger and Baggage Processing at Air Terminals," in *Journal of the Aero-Space Transport Division, Proceedings of the American Society of Civil Engineers* 39 (Oct. 1963), 42, baggage carousels had been in operation for some time at terminals in Montreal and San Francisco. TWA may have been the first airline to install carousels at New York International Airport; they were located in the ground level of the west wing, not in their present location (neither space is included in this designation).
18. "Architect's Dream Makes Contractor's Nightmare," *Public Works* 92 (Sept. 1961), 204-206; "TWA's Concrete, Wing-roofed Terminal Ready for Flight," *Engineering News-Record* 168 (May 31, 1962), 48-50; "Shaping a two-acre sculpture," *Architectural Forum* 113 (August 1960), 118-123; and Scullin related the construction of the terminal.
19. The firm of Ammann & Whitney were the engineers for the project.
20. The contractor engaged Computer Usage Company of New York City to calculate 400 key elevation points.

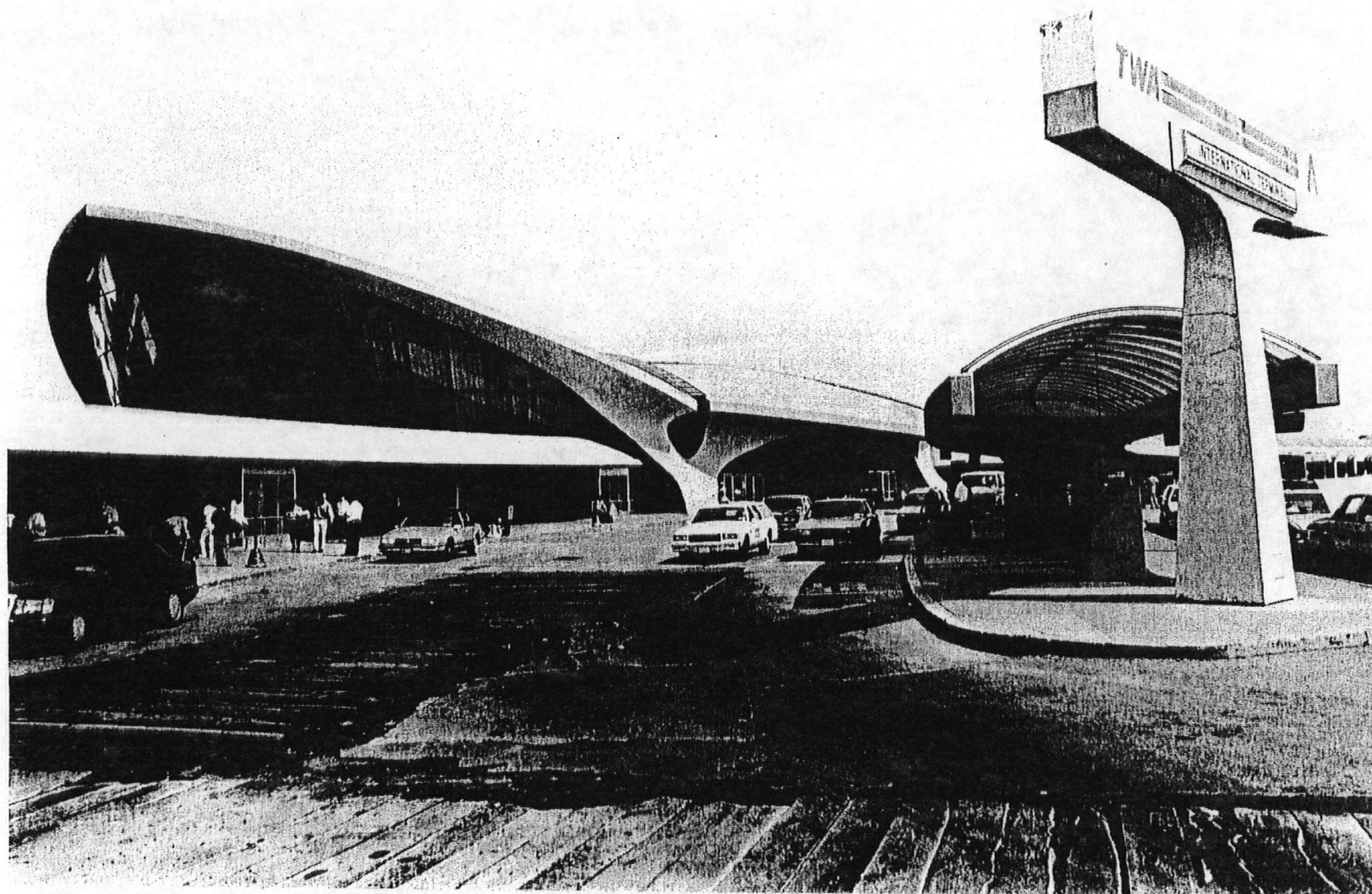
21. Pozzololith and other additives were used as water-reducing and plasticizing agents and to control the setting time of the mixes which were purposely varied in order to allow the removal of the upper forms and finishing of the surface of the concrete. Two types of aggregate of the same color – a coarse stone for the normal weight concrete used for the piers and a lightweight shale aggregate for the shells – were used to produce an overall uniform appearance. Three truck cranes with 180-foot booms lifted one-cubic-yard buckets to the deck for the pours; each bucket was coded for its exact placement. The pour, which began on August 31, 1960, took 120 hours in all and was interrupted by Hurricane Diane. The center plate of the concrete dome was poured first, followed by the ramp-facing and front shells, and finally the larger side shells. The roof of the terminal was left with a wood-float finish while the piers, edge beams, and other members with formed surfaces received a rubbed finish (*Public Works* suggested that some areas were bush-hammered to produce a surface texture desired by the architect).
22. *NYT*, Dec. 8, 1960, p. 70.
23. The opening of the terminal was reported in the *NYT*, May 18, 1962, p. 33, and May 29, 1962, p. 61; and in *Aviation News* 4 (May 25, 1962), 2.
24. This section draws upon criticism of the TWA terminal in Peter Papademetriou, "TWA's Influence," *Progressive Architecture* 73 (May 1962), 102-104; *Eero Saarinen on His Work*, ed. Aline B. Saarinen (New Haven & London: Yale University Press, 1962); "TWA's Graceful New Terminal," *Architectural Forum* 108 (Jan. 1958), 78-85; Michael Brawne, "Airport Passenger Buildings," *Architectural Review* 132 (Nov. 1962), 341-348; Ken Macrorie, "Arriving and Departing," *The Reporter* 27 (Sept. 13, 1962), 52-55; "Recent Work of Eero Saarinen," *Zodiac* 4 (1959), 54-57; Bill Ballantine, "Idlewild Gateway to the World," *Cosmopolitan* (May 1960), "Trans World Airlines," *Architectural Record* 130 (Sept. 1961), 162-162; "TWA Flight Center, Idlewild," *Architectural Record* 132 (July 1962), 129-130; "I Want to Catch the Excitement of the Trip," *Architectural Forum* 117 (July 1962), 72-75; and other sources individually cited.
25. *Eero Saarinen on His Work*, 60 (from a *Horizon* interview, June 19, 1959).
26. For instance, an advertisement in *Aviation Week and Space Technology*, June 11, 1962, p. 46.
27. Gillo Dorfles in "Eero Saarinen: The TWA Terminal, and the Embassy," *Zodiac* 8 (1962), 85-89 wondered if the symbolic quality of the design "rather smack[ed] of an enormous publicity stunt."
28. James Baker, "Architecture," *The New International Year Book 1962* (New York: Funk & Wagnalls Co., 1963) 32.
29. Ada Louise Huxtable, "Idlewild: Distressing Monument to Air Age," *NYT*, Nov. 25, 1962, II, p. 25.
30. *American Institute of Architects Journal*, 39 (May, 1963), 40-41.
31. As-built plans of the terminal indicate of the four openings on the east (ticket counter) wing, the two west ones contained pairs of doors, and the eastern ones contained fixed glass; on the western (baggage claim) wing, the openings contained alternately doors and fixed glass, with a door located in the opening closest to the main portion of the terminal. Currently, three open box-awning-like signs, black with red and white lettering, hang from the overhanging ceiling on the west wing.

FINDINGS

On the basis of a careful consideration of the history, the architecture, and other features of this building, the Landmarks Preservation Commission finds that the Trans World Airlines Flight Center (now TWA Terminal A) at New York International Airport has a special character, special historical and aesthetic interest and value as part of the development, heritage and cultural characteristics of New York City.

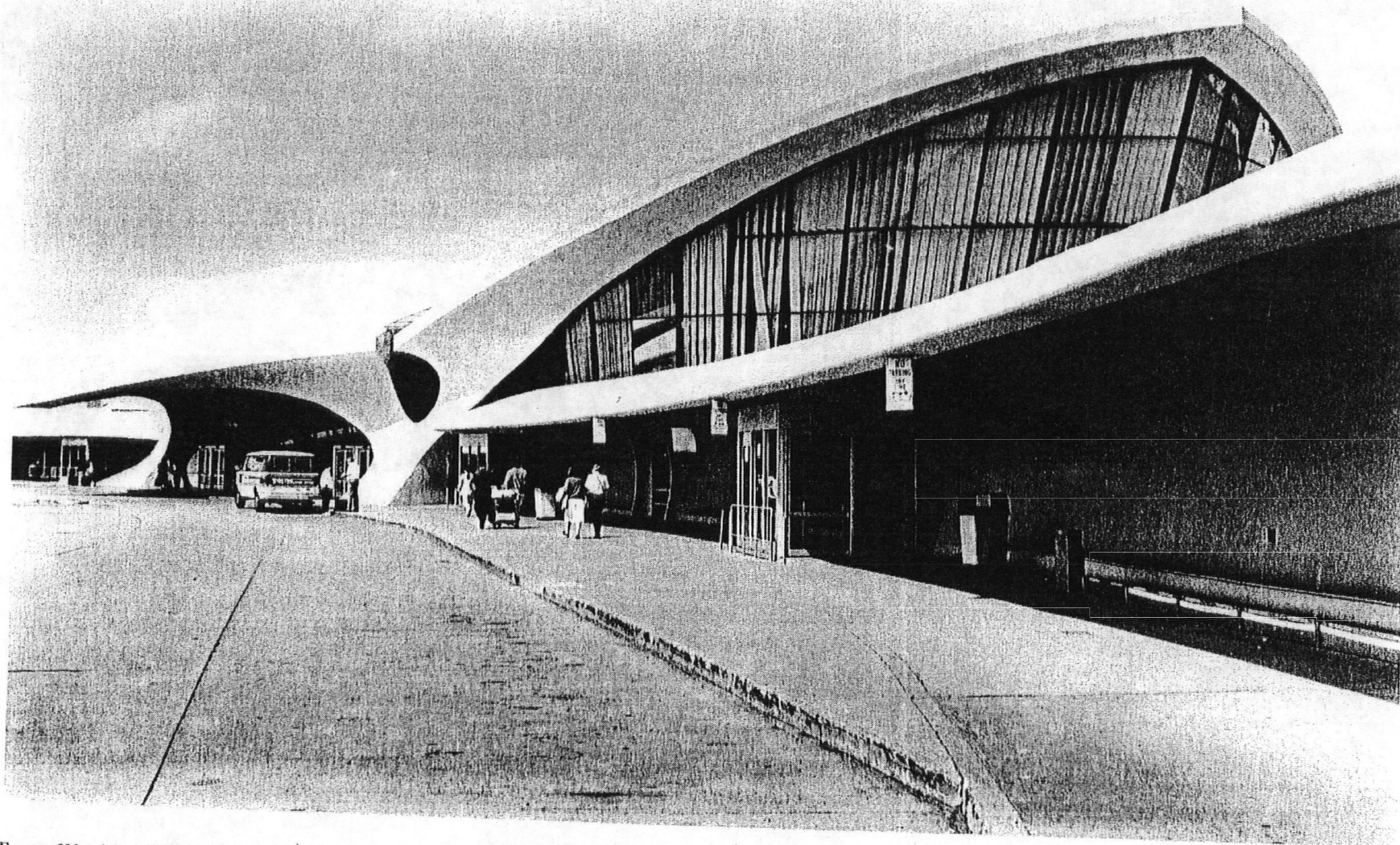
The Commission further finds that, among its important qualities, the TWA Flight Center, designed by Eero Saarinen & Associates (Eero Saarinen and Kevin Roche), is among the chief works of one of the most highly-regarded architectural firms of the modern era; that Saarinen's firm revolutionized air terminal design through its use of daring concrete and glass forms and technological advances, producing a distinctive and highly-acclaimed work of expressionistic architecture with the TWA Terminal (1956-62); that Trans World Airlines was provided with the opportunity to erect its Flight Center by the bold decision made in 1954 by the Port of New York Authority to develop Idlewild (New York International) Airport with individual airline terminals; that the TWA terminal incorporates airport technology adopted at the beginning of the jet aircraft era, ranging from the very form of the terminal – the now-common "satellite" plan where aircraft gates are clustered around structures built on the runway ramps away from the main terminal – to equipment such as jetways and baggage carousels; that, taking advantage of the highly-visible site assigned to TWA at the apex, or far end, of the curving service road, Saarinen designed a very distinctive and memorable building while still adhering to the master plan of the airport; that the design of the building expressed Saarinen's intention "to interpret the sensation of flying" and "be experienced as a place of movement and transition;" that the main portion of the terminal – created by four intersecting vaults separated by narrow bands of skylights and supported on four Y-shaped piers – has an upward soaring quality; that the broad expanses of window-walls create a transparent quality for the terminal, in strong contrast with the concrete structural elements; that the low wings that extend from the vaulted portion of the terminal, with their concave walls which extend as cantilevered canopies to shelter passengers at curbside and curved plan, echo the forms of the main portion of the terminal and relate to the curving service road; that the elevated concrete walkways leading to gate structures on the ramp, are unusual in their windowless tube form; that the satellite gate structure – a form that has remained a standard in airport design – with its projections for jetway access and its remote gates, one with the airline's control tower on the roof, incorporates some of the first solutions for such structures to service jet aircraft; that the concrete structure, which required special engineering and construction methods, illustrates the collaboration between the architects, engineers, and construction workers to realize this unusual and significant design.

Accordingly, pursuant to the provisions of Chapter 74, Section 3020 of the Charter of the City of New York and Chapter 3 of Title 25 of the Administrative Code of the City of New York, the Landmarks Preservation Commission designates as a Landmark the Trans World Airlines Flight Center (now TWA Terminal A) at New York International Airport, John F. Kennedy International Airport, Queens and designates Borough of Queens, Tax Map Block 14260, Lot 1 in part, consisting of a site encompassed by a continuous line beginning at a point at the southernmost end of the terminal building, extending northeasterly and northerly along the outermost edge of the terminal building, easterly along the southernmost edge of the elevated walkway between the terminal building and the southern gate structure, extending around the outermost contours of the southern gate structure, westerly along the northernmost edge of the elevated walkway between the terminal building and the southern gate structure, northerly and northwesterly along the outermost edge of the terminal building between the elevated walkways, northerly along the easternmost edge of the elevated walkway between the terminal building and the northern gate structure, westerly along the line of connection between the elevated walkway and the northern gate structure, southerly along the westernmost edge of the elevated walkway between the terminal building and the northern gate structure, westerly and southwesterly along the outermost edges of the terminal building to its westernmost end, southerly from the western end of the terminal building to the curblin of the service road, southeasterly along the western edge of the curblin of the service road, southerly and easterly along a line corresponding to the outermost edge of the overhanging canopy of the terminal building, southerly along the western edge of the curblin of the service road to a point opposite the southernmost end of the terminal building and easterly to the point of beginning, as its Landmark Site.



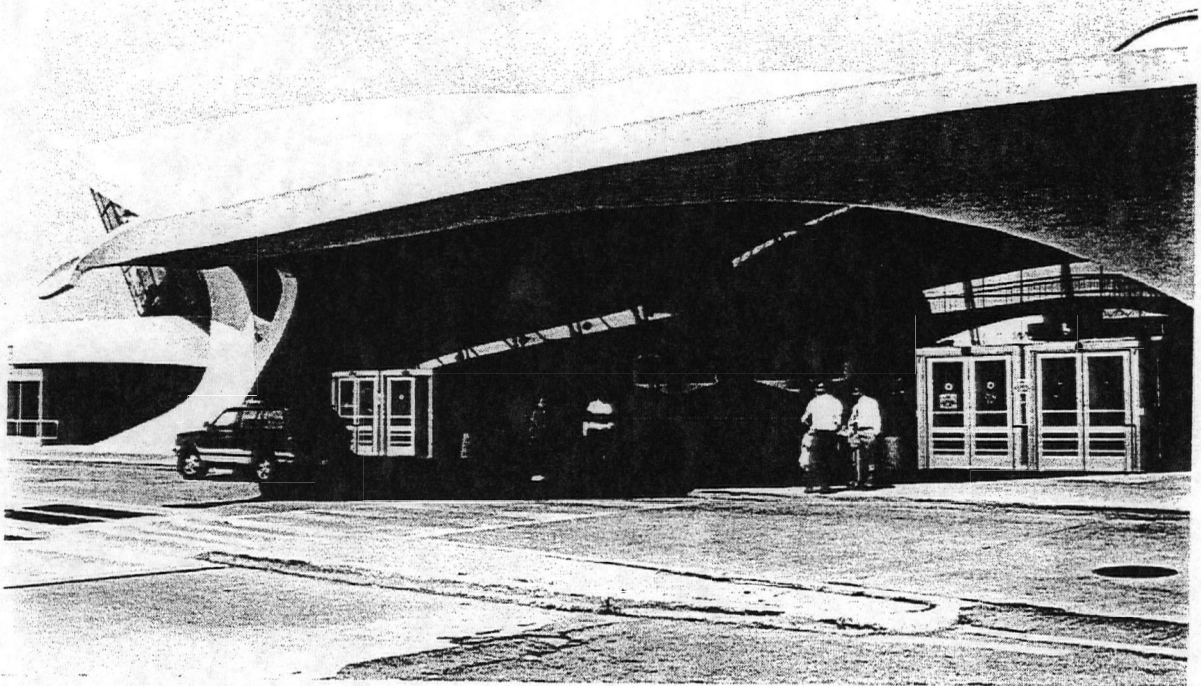
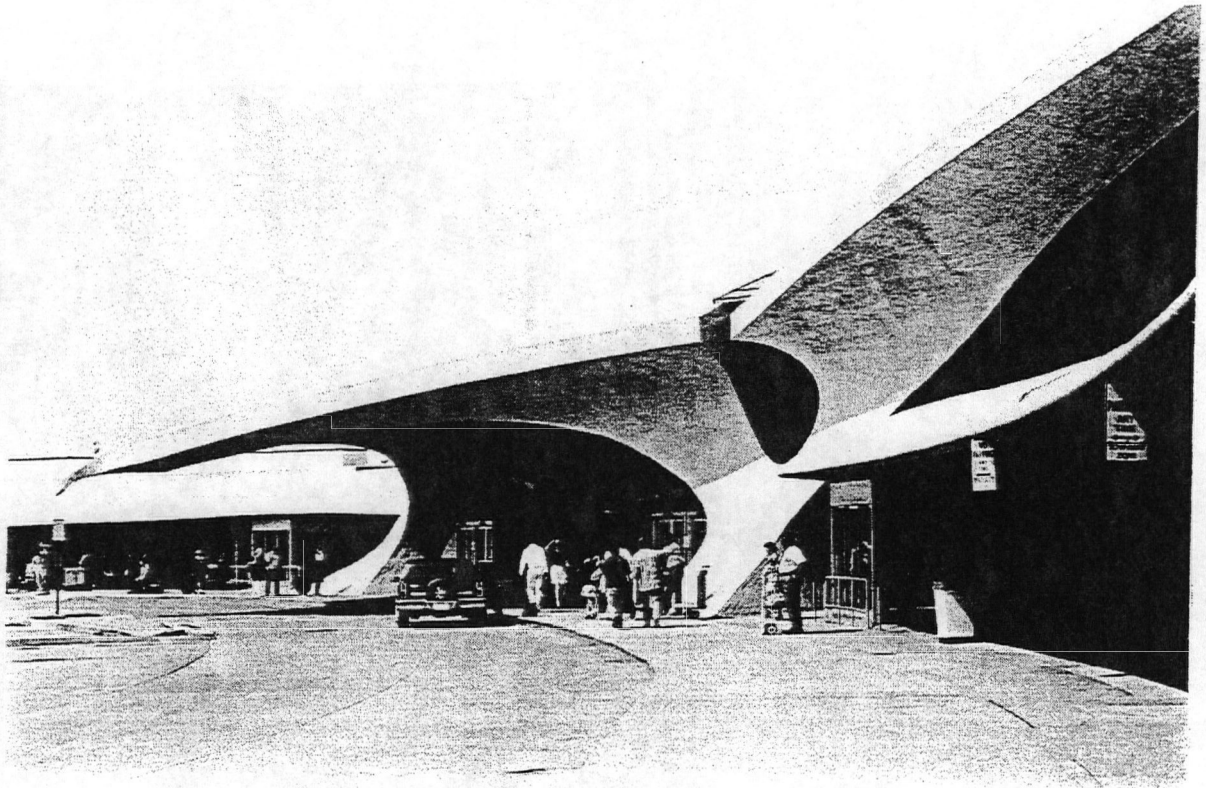
Trans World Airlines Flight Center at New York International Airport.
John F. Kennedy International Airport, Queens.
Main facade.

Photo credit: Carl Forster



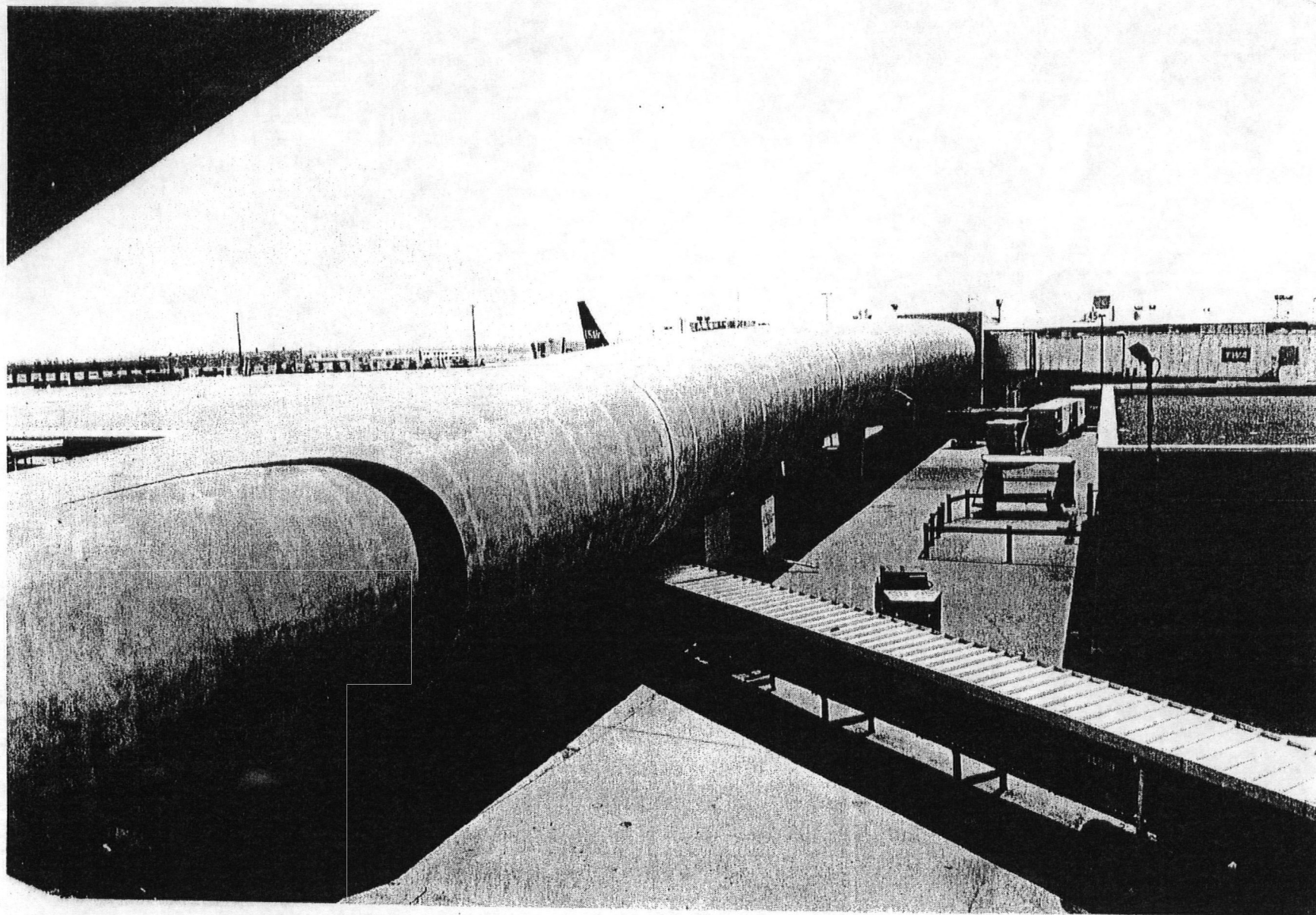
Trans World Airlines Flight Center at New York International Airport.
John F. Kennedy International Airport, Queens.
Main facade.

Photo credit: Carl Forster



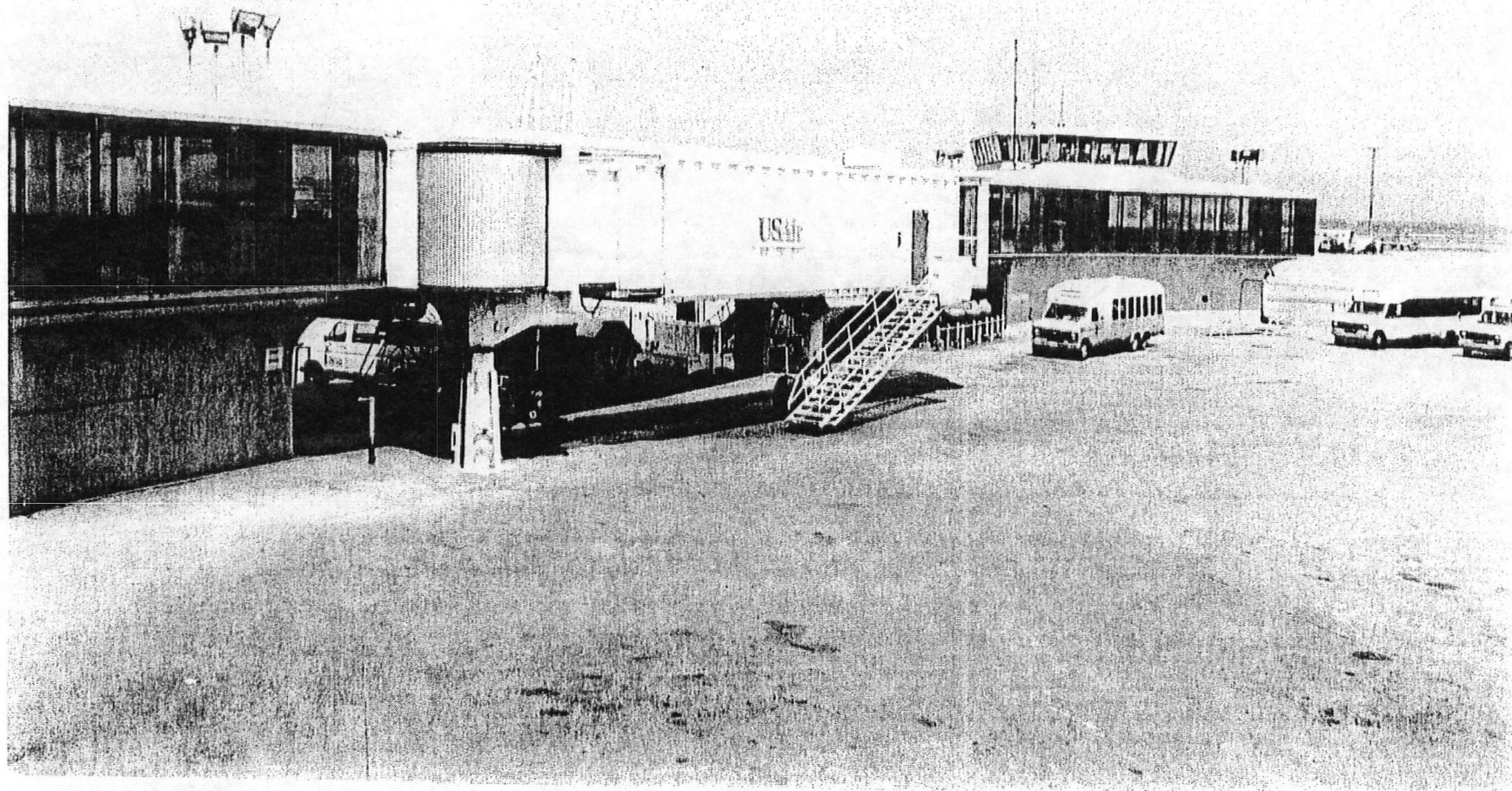
Trans World Airlines Flight Center at New York International Airport.
John F. Kennedy International Airport, Queens.
Two views of the main entrance.

Photo credit: Carl Forster



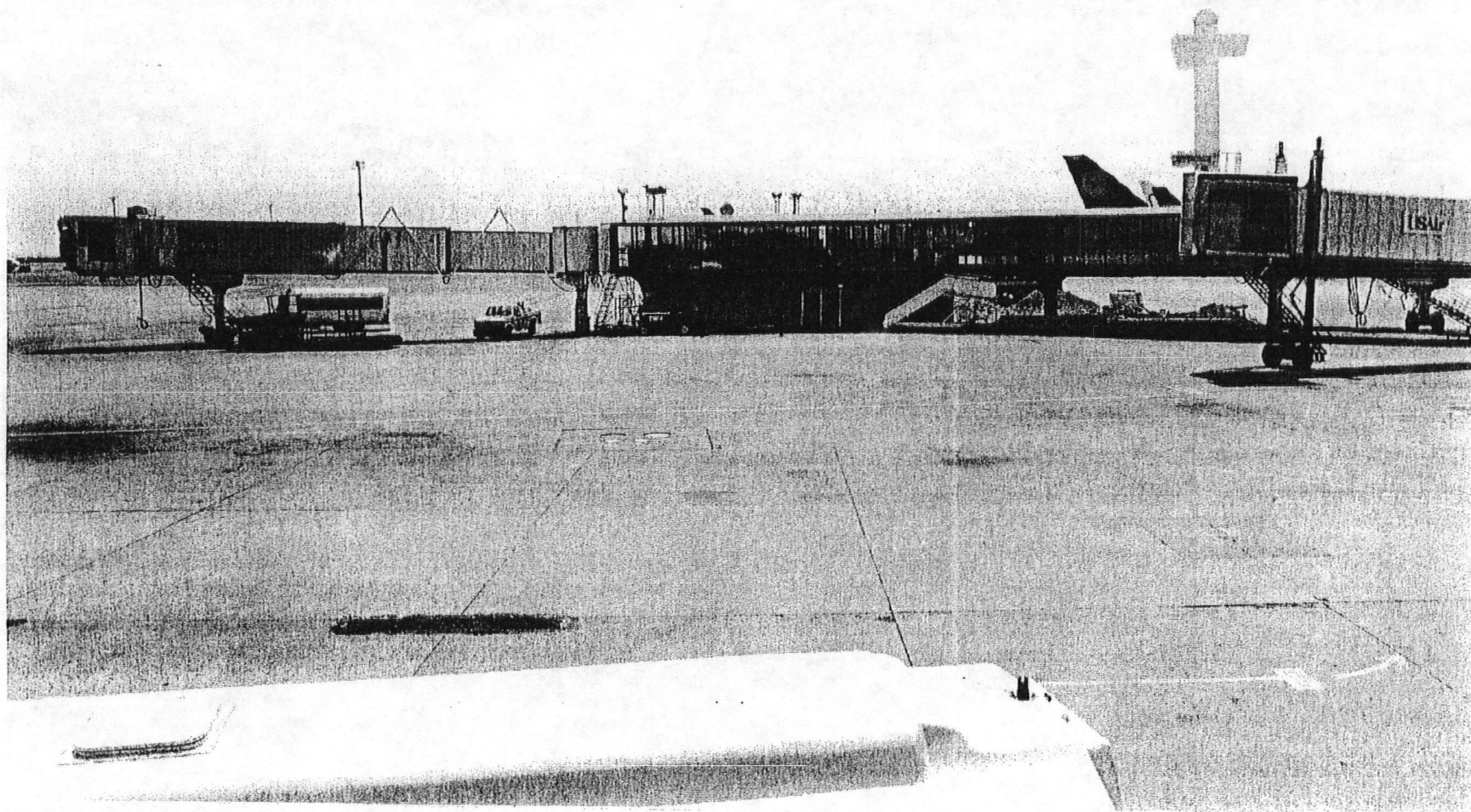
Trans World Airlines Flight Center at New York International Airport.
John F. Kennedy International Airport, Queens.
Walkways to gate structures.

Photo credit: Carl Forster



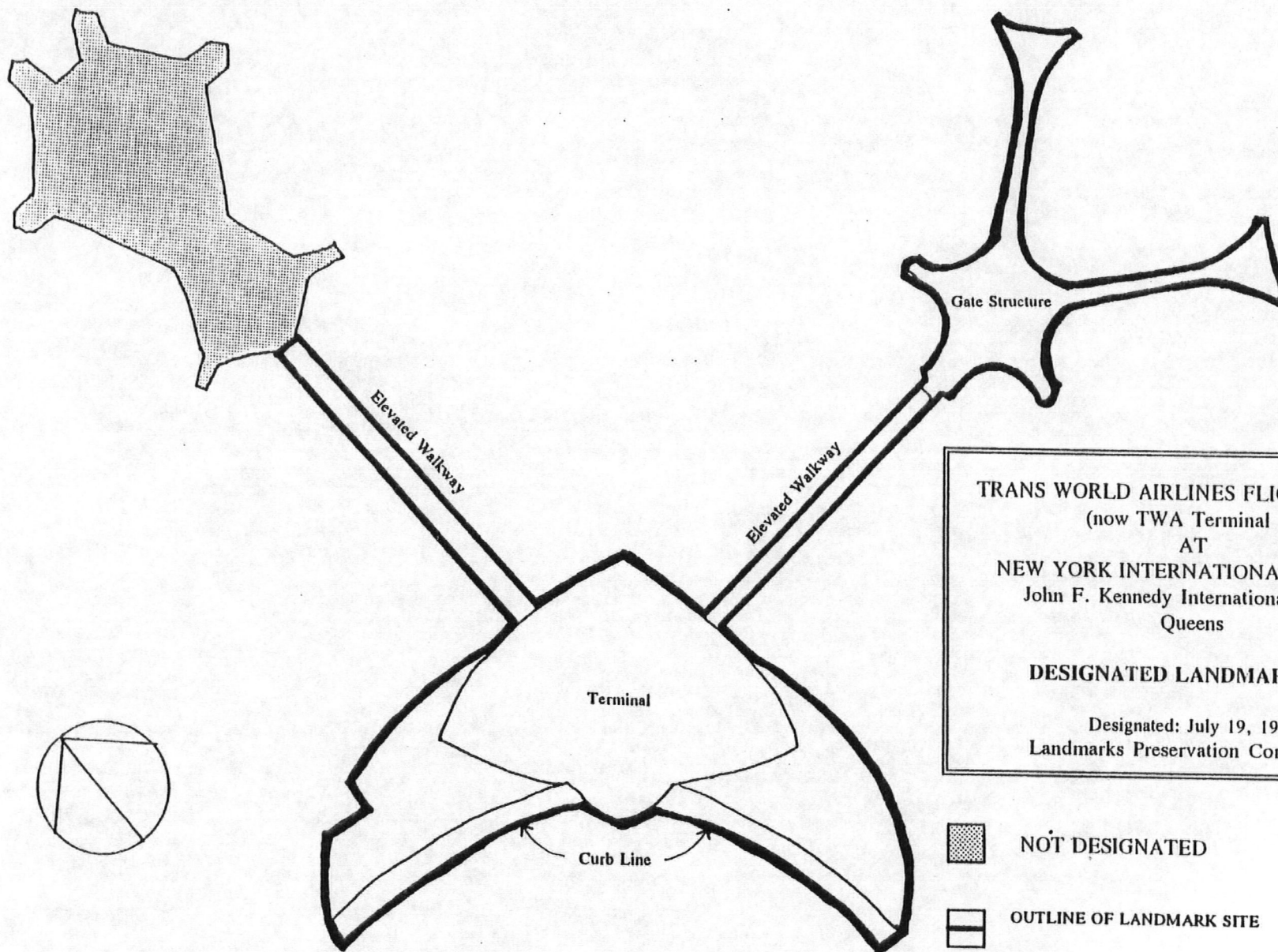
Trans World Airlines Flight Center at New York International Airport.
John F. Kennedy International Airport, Queens.
East gate structure and Gate 39.

Photo credit: Carl Forster



Trans World Airlines Flight Center at New York International Airport.
John F. Kennedy International Airport, Queens.
Gate 42, east gate structure.

Photo credit: Carl Forster



NOTE: THIS DRAWING IS NOT TO SCALE

**TRANS WORLD AIRLINES FLIGHT CENTER
(now TWA Terminal A) AT NEW YORK INTERNATIONAL AIRPORT**

GROUND LEVEL INTERIOR, consisting of the entrance lobby, the information desk, the sculpted piers and archways at the juncture of the side wings, and the stairway leading to the main level; the MAIN LEVEL INTERIOR, consisting of the ticketing area, telephone alcoves, the stairways leading to the balcony level and the adjacent "air fountains" (sculptural ventilation ducts), the elevated walkways leading to the gate structures, and the southern gate structure interior, including the central area, glazed walkways, and two triangular gate areas; and the BALCONY LEVEL INTERIOR, consisting of the balconies and bridge between the balconies, the restaurant and club areas and their sculpted central service cores (excluding the interiors of the service areas), window seats, and the upper portion of the balcony area; and the fixtures and interior components of these spaces, including but not limited to, wall and ceiling surfaces; floor surfaces; windows; skylights; vertical window blinds; doors; balustrades; stairway railings; piers; water fountains; telephone booth dividers; lighting fixtures; signage, including the TWA sign mounted on the window-wall facing the runway; ventilation elements; built-in seating and counter units; and attached decorative and sculptural elements, John F. Kennedy International Airport, Queens.

Built 1956-1962; Architects, Eero Saarinen & Associates (Eero Saarinen and Kevin Roche).

Landmark Site: Borough of Queens, Tax Map Block 14260, Lot 1 in part, consisting of a site encompassed by a continuous line beginning at a point at the southernmost end of the terminal building, extending northeasterly and northerly along the outermost edge of the terminal building, easterly along the southernmost edge of the elevated walkway between the terminal building and the southern gate structure, extending around the outermost contours of the southern gate structure, westerly along the northernmost edge of the elevated walkway between the terminal building and the southern gate structure, northerly and northwesterly along the outermost edge of the terminal building between the elevated walkways, northerly along the easternmost edge of the elevated walkway between the terminal building and the northern gate structure, westerly along the line of connection between the elevated walkway and the northern gate structure, southerly along the westernmost edge of the elevated walkway between the terminal building and the northern gate structure, westerly and southwesterly along the outermost edges of the terminal building to its westernmost end, southerly from the western end of the terminal building to the curblin of the service road, southeasterly along the western edge of the curblin of the service road, southerly and easterly along a line corresponding to the outermost edge of the overhanging canopy of the terminal building, southerly along the western edge of the curblin of the service road to a point opposite the southernmost end of the terminal building and easterly to the point of beginning.

On June 15, 1993, the Landmarks Preservation Commission held a public hearing on the proposed designation as an Interior Landmark of the Trans World Airlines Flight Center at New York International (Idlewild) Airport (now TWA Terminal A), John F. Kennedy International Airport, and the proposed designation of the related Landmark Site (Item No. 11). Two persons testified in favor of designation and both Trans World Airlines and the Port Authority of New York and New Jersey expressed uncertainty about the proposed action. A representative of TWA requested that the hearing be continued. On September 21, 1993, the Commission continued the public hearing (Item No. 10). Both hearings had been duly advertised in accordance with provisions of law. At the continued hearing, similar reservations concerning designation were expressed by TWA and the Port Authority. A representative of Queens Borough President Claire Shulman expressed delight at the consideration of the TWA terminal for designation, and also expressed concern about the continued use of the facility by the airline and the airport. The Commission has received three letters in support of the proposed designation. Since that time, the Commission has met with the Port Authority to discuss its plans for the terminal.

DESCRIPTION AND ANALYSIS

Summary

The interior of the TWA Flight Center, designed by Eero Saarinen & Associates (Eero Saarinen and Kevin Roche), is among the chief works of one of the most highly-regarded architectural firms of the modern era. Saarinen's firm revolutionized air terminals through an expressive approach to design that extended to the interior and the incorporation of technological advances, producing a distinctive and highly-acclaimed work of modern interior design with the TWA Terminal (1956-62). The design of the building interior expressed Saarinen's intentions "to interpret the sensation of flying" and "be experienced as a place of movement and transition." The design concept was carried throughout the entire building with a "family of forms," so that "all the curvatures, all the spaces, and all the elements — down to the shapes of signs, railings, counters, and other elements — ... have one consistent character." The expressive interior, which remains largely intact, was modeled to provide a succession of differentiated spaces in which all elements are integral to the building. Among the elements integrating and articulating the spaces are the circular white marble tile cladding the floor and most of the vertical surfaces which accentuates the monolithic quality of the smaller elements as well as spatial volumes; window walls, narrow skylights, and fixtures which provide striking and controlled lighting in the main portion of the terminal; and a variety of unconventional forms, including walls, piers, and smaller elements such as the information desk. The open central space, enclosed by roof vaults, is divided into three levels and joined by curving staircases and functions as a modern crossroads below the aerie-like balcony space open to the enclosing roof forms and the lower levels. The design of the enclosed walkways to the gate structures creates a feeling of expectancy and transition which is heightened by the rise of the floor surface and the indirect lighting on the upper portion of the concave walls. The main gate structure, with services grouped in a central core and projecting jetway access arms, incorporates some of the first solutions for satellite gate structures for jet aircraft and its interior elements relate to the aesthetic and materials of the main terminal area.

New York City's International Airport¹

The development of New York's international airport was the result of Mayor Fiorello H. LaGuardia's interest in aviation and his long-range planning for New York City airports. Due to its remoteness from Manhattan, the city's first airport, Floyd Bennett Field on Jamaica Bay, had limited appeal both for mail delivery and passenger service. LaGuardia did not consider the Newark (N.J.) Airport, which had opened in 1928 and rapidly became the major airport on the eastern seaboard, a proper substitute. His first remedy was the construction of the New York City Municipal Airport, LaGuardia Field, commonly known as LaGuardia Airport. Commercial air service at LaGuardia soon surpassed that of Newark, and LaGuardia began planning for a much larger airport, since he was convinced that after the war the city would need another field to accommodate increased demands for domestic and transatlantic passenger traffic and air freight service.

During the fall of 1941, Mayor LaGuardia announced plans for an additional airport to be constructed on a large area of marshlands on the south side of Long Island. The land purchased for the air field included the Idlewild golf course, an old summer hotel, and the Jamaica Sea-Airport landing strip. Although never officially a part of the name of the airport, the facility was known during its early years as Idlewild, later as New York International Airport, and since late 1963 as John F. Kennedy International Airport.² The initial planning for the large airport, undertaken by the City Department of Marine and Aviation, was based on the concept of one large terminal building and proceeded slowly because of a disagreement over the layout of the runways and the negotiation of leases with each airline. While the final layout of the airport remained in dispute, construction began in 1942. Commercial flights began to use the airport on July 1, 1948, making use of the first terminal facilities – a small cinder block building and a control tower. Even before the construction of the present terminals began, nearly three million passengers and hundreds of millions of pounds of airmail and air cargo had passed through Idlewild airport in 1954; by that time the facility had the highest volume of international traffic of the world's airports.³

In 1947, the Port of New York Authority (now known as the Port Authority of New York and New Jersey) and the City of New York signed a leasehold agreement for fifty years under which the Port Authority would finance, develop, and operate the

airports in New York City.⁴ The Authority began work on a new master plan for the Idlewild field because after the Second World War air travel had increased more rapidly than first projected. During the late 1940s, thirty to forty percent of all U.S. airline passengers passed through New York City in the course of their air travels, and the city had earned the position of "air capital" of the world. By 1953 it became apparent that the new airport would require more aircraft gates, and that the centralized terminal scheme had serious defects. Consequently, the use of unit terminals – separate terminals for each airline – was considered to avoid the projected two-mile-long centralized terminal, as well as to minimize passenger walking distances, reduce congestion, and provide maximum flexibility. In 1954, the decision was made to use unit terminals in order to eventually provide 140 aircraft loading gates, and in February 1955, the Port Authority and the airlines reached an agreement on a revised master plan.

The plan adopted for New York International Airport – envisioned as the largest and most efficient airport in the world, where there would be "no confusion and no congestion"⁵ – was developed under the direction of Thomas M. Sullivan, deputy director of the Aviation Department for the Port of New York Authority, and Wallace K. Harrison, who served as design consultant and coordinator. The airport's "Terminal City" would consist of the International Arrival Building with flanking Airline Wing Buildings (to be built by the Port Authority); an eleven-story control tower; seven airline terminal buildings; a network of roadways, parking lots, taxiways; and a central plaza with reflecting lagoon (now replaced by parking facilities). The allocation of sites for the airline terminals was based on carriers' traffic, seniority at the Idlewild facility, and relationship to overseas traffic. Each airline would have the freedom to erect a terminal designed by the architect of its choice to meet individual operational needs.

The New York International Airport, strongly identified with the "Jet Age," incorporates some of the first solutions for accommodating jet aircraft and is a contemporary of facilities built in Los Angeles, San Francisco, and Chicago. Terminals built before the Second World War had been enlarged by the use of "fingers" or covered piers, which led to boarding areas on the ramp for the increasing number of aircraft; the piers – enclosed and enlarged to two-story structures – evolved into the familiar concourses of a later generation of airports. An operational change that had a great impact on airport

design was the use of a "hold area" for processed passengers near the aircraft gate, which became known as the gate departure lounge. The gate lounges eliminated the need for large central waiting rooms, and prompted the relocation of passenger services nearer to aircraft gates. During the post-war airport construction boom, engineers and planners analyzed airport design and function, diagramming variations of terminal finger configurations – where aircraft were typically parked on both sides of a concourse that contained walkways, services, and gate departure lounges – and the alternative satellite form, where aircraft gates were grouped around a central waiting and service area which was connected to the main terminal by an elevated walkway. Separating routes through terminals for arriving and departing passengers, minimizing passenger walking distances, reducing congestion during peak hours of travel, and automating baggage handling were airport planning issues addressed during the period. The more widespread use of jet aircraft during the years that the Idlewild was under construction introduced yet another set of concerns: how to deal with larger sizes of aircraft, increased noise levels, and jet blasts, and how to protect passengers boarding planes at an elevated level.

Port Authority planners projected that the unit terminals at Idlewild would have finger configurations. The first group of terminals designed for the airport exhibited several solutions to providing a large number of aircraft gates. The first project to be completed was the International Arrivals Building (designed by Skidmore, Owings, & Merrill), which had long wings and perpendicular fingers. The finger plan was adopted for the American Airlines terminal (designed by Kahn & Jacobs), which had staggered lounges off a central corridor, and the United Air Lines facility (designed by Skidmore, Owings and Merrill). The terminal of Eastern Air Lines (designed by Chester L. Churchill) was based on the concept of large, centralized waiting rooms and "loading arcades." Pan American World Airway's "umbrella" terminal (designed by Tippetts-Abbett-McCarthy-Stratton) was yet another solution: six jets could be nosed in under the roof which would protect boarding passengers from the weather. TWA was the only airline to adopt the satellite configuration for its terminal. Elevated walkways, variations on early "Jetways" introduced to commercial aviation by United Airlines at Chicago, were used at the United, Pan Am, American, and TWA terminals at Idlewild.⁶ The airline terminals also demonstrated various approaches to passenger

service and technological advances in information presentation (electronic signage and closed-circuit television monitors) and baggage handling.

Trans World Airlines

Trans World Airlines⁷ has played a major role in the history of commercial aviation in the United States; the carrier was, for many years, the only airline with both domestic and transatlantic routes and the second-largest one in the country. At the time the terminal at New York International Airport was under construction, TWA linked sixty-five American cities with twenty-three points abroad. A series of mergers, involving portions of several parent airlines, including Western Air Express, Standard Air Lines, Maddux Air Lines, and Trans-Continental Air Transport produced Transcontinental & Western Air, Inc. (TWA); the name Trans World Airlines was adopted in 1950. The history of TWA is dominated by aviation advances, financial reorganizations, and the controversial role of the long-term principal stockholder Howard Hughes. The airline has a long association with aviation in New York City as one of the first carriers to contract for space at the LaGuardia airport; the airline operated the first scheduled flight into that field in 1939. TWA operated a domestic freight and passenger service prior to World War II and expanded to overseas service via southern routes to Europe and the Mid- and Far East, which was inaugurated early in 1946 with a flight from LaGuardia to Paris; weekly transatlantic air-cargo service was established in 1947. TWA competed with Pan Am, the nation's other transatlantic carrier, for passengers by introducing tourist-class transatlantic flights in 1952, switching to jet aircraft for transatlantic passenger service, and by offering an appealing and efficient new terminal at New York International Airport.

TWA was the sixth international airline to sign an agreement with the Port of New York Authority in 1949 for use of the Idlewild facility, and when the locations of the individual airline terminals at New York International Airport were announced, TWA was not especially pleased. TWA and Pan Am, as overseas carriers, were assigned positions on either side of the International Arrivals Building, but TWA would have preferred the opposite side, which was nearer to its new hanger. The carrier would be the only one to operate both foreign and domestic service from one terminal at the airport. Though the leadership of the airline underwent several changes during the course of the planning and construction of the terminal, it was during Ralph S. Damon's term as

president that the TWA terminal was conceived. Scullin reports that Damon was advised by TWA's real estate board and construction engineers to commission the firm of Eero Saarinen & Associates (which was completing the General Motors Technical Center) to design the terminal, and attributes to Damon the vision of the terminal as "a building that starts your flight with your first glimpse of it and increases your anticipation after you arrive," and the statement, "the spirit of flight, inside and out, and nothing less will do." The airline was regarded as a "client with vision and confidence."⁸

Eero Saarinen⁹

A master architect of the mid-twentieth century, Finnish-born Eero Saarinen (1910-1961) was groomed from childhood to be a successful designer by his parents, textile artist Loja Gesellius Saarinen, and highly regarded international architect (Gottlieb) Eliel Saarinen (1873-1950). Eliel's early career is best remembered for his Helsinki Railroad Station (1904-c. 1913, with Herman Gesellius) which successfully demonstrates his sympathies with the Arts and Crafts movement. The Saarinen family immigrated to the United States in 1923, yet visited Finland annually. Eliel contributed significantly to the creation of the Cranbrook School and Academy of Art, a complex of children's schools and an advanced-level art academy, located at Bloomfield Hills, north of Detroit. Cranbrook was devoted to every field of design – textiles, metalwork, architecture, and city planning. Eliel designed several buildings there, including the Cranbrook School for Boys (1924-30) and the Kingswood School for Girls (1929-30). The latter project exemplifies the Arts and Crafts ideal of collaboration between the fine and applied arts: while Eliel oversaw all aspects of design, Loja designed and wove fabrics (in association with the Cranbrook Looms), Eero designed furniture, and his sister, Eva-Lisa, assisted with selecting wall and ceiling treatments.

During the early 1930s Eero studied sculpture at the Parisian Académie de la Grand Chaumière, completed a Bachelor of Fine Arts in the Beaux-Arts-oriented architecture program at Yale University, toured Europe and Egypt on a travel fellowship, during which time he was influenced by the architecture of Erich Mendelsohn and Alvar Aalto – before joining his father's firm in 1936. Together, the Saarinens produced the much-praised Crow Island School (1939-40, with Perkins, Wheeler & Will) in Winnetka, Illinois. Eero entered many design competitions, and won several prizes. He

collaborated with designer Charles O. Eames on the scheme for a molded plywood chair which won the Organic Design in Home Furnishings competition (1940-41), sponsored by the Museum of Modern Art. Recognized from that point on as an important furniture designer, Saarinen produced many designs for the Knoll furniture company, best represented by his Womb chair (1946-48) and Nos. 71 and 72 chair series (c.1956).

Saarinen has been credited with developing the innovative "systems approach" to design; he carefully analyzed each problem, and usually relied on modern technology, in order to find a unique form and structure to express a concept architecturally. As a result, each of his designs has a certain wholeness about it; he claimed to be concerned with the "esthetics of the whole organism" and sought an "expressive architecture, an antiassembly-line architecture," stating "each building should be as distinctive as each person should."¹⁰ The commission which firmly established his architectural career was the General Motors Technical Center (1945-56, with Smith, Hinchman & Grylls) in Warren, Michigan. Though its initial designs were begun in association with his father, the final scheme was largely due to Eero. The complex is ruled by its strictly modular design (structure, partitions, and mechanical systems are fully integrated) and features such technological innovations as neoprene window gaskets and walls of thin insulated panels sheathed in porcelainized sheet metal; yet the architect also added brightly colored brick surfaces and his signature element, a reflecting pool. During the GM project, the elder Saarinen died and Eero formed a successor firm, Eero Saarinen & Associates. An intensely devoted and methodical worker – he worked 365 days a year, according to his chief of design, Kevin Roche – Eero produced a number of buildings which have become American landmarks. Aside from his Jefferson National Expansion Memorial (designed 1948, completed 1964) – the famous parabolic arch in St. Louis, Missouri, in which the interior is of little relevance – each of his most famous designs is defined by its unusually configured envelope which characterizes both exterior and interior and unites them as complementary parts of a whole. These projects include the Kresge Auditorium and Chapel (1953-56, with Anderson & Beckwith) at the Massachusetts Institute of Technology in Cambridge, the David S. Ingalls Hockey Rink (1956-59) at Yale University in New Haven, and two soaring reinforced concrete masterpieces associated with flight: the Trans World Airlines Flight Center (1956-62) at New York (now

J.F.K.) International Airport – probably his most renowned design – and Dulles Airport (1958-62, with Ammann & Whitney) in Chantilly, Virginia. The last three commissions were completed after Saarinen's death in 1961 as was his other prominent New York project, the somber granite-clad Columbia Broadcasting System (CBS) Headquarters (1960-64) on Sixth Avenue between West 52nd and 53rd streets.

Saarinen's buildings received extensive publicity in the press, and he was given several prestigious awards. Though many architects and architectural writers sympathetic to the International style criticized Saarinen's work as lacking consistency (a necessary by-product of his design method), his *oeuvre* has withstood the test of time: by 1993 six of his designs had received the American Institute of Architects' 25-Year Award for "exemplify[ing] design of enduring significance." These include the Crow Island School, GM Technical Center, and Dulles Airport.¹¹ Saarinen's successor firm, Kevin Roche and John Dinkeloo, founded by his colleagues, has been a significant force in American architecture during the second half of this century. Other architects influenced by his design philosophy are Cesar Pelli, Gunnar Birkerts, and Robert Venturi.

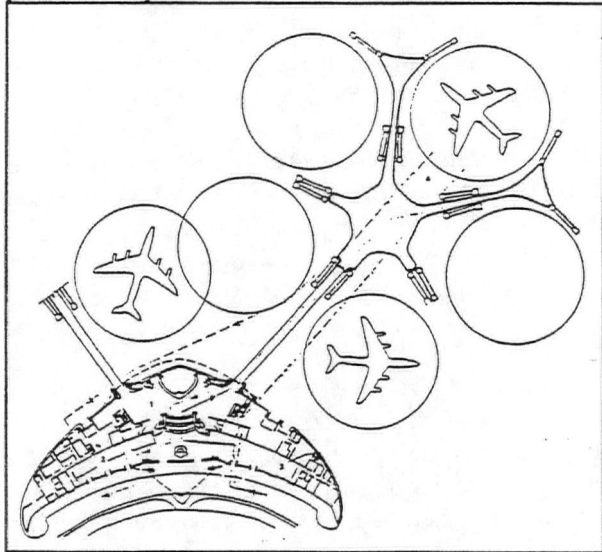
A Terminal To Catch the Excitement of the Trip¹²

Saarinen's design for the TWA Flight Center is the exemplar of expressionistic architectural trends of the late 1950s and 1960s. Saarinen and his like-minded peers expressed their dissatisfaction with the restrictive minimalism of the International Style, as it had been interpreted in America, through attempts to imbue modern architecture with a monumentalism appropriate to public structures.

To paraphrase Saarinen, the design intent of the Trans World Airlines terminal was to create, within the complex of terminals that makes up Idlewild, a building for TWA which would be distinctive and memorable, in which the architecture itself would express the drama, specialness, and excitement of travel, and which would be experienced as a place of movement and of transition. Saarinen, particularly when discussing the interior of the terminal, placed great emphasis on his total approach to design, noting that the architectural team members had committed themselves to a "family of forms" that they felt had to be used throughout the entire building; the goal was that "all the curvatures, all the spaces and elements, down to the shapes of signs, information boards, railing, counters, would have to have one consistent character."¹³ Only through such consistency and

consequent development could the building make its fullest impact and achieve its highest expression, as Saarinen put it, "Wherever you are, inside or outside, the building sings with the same message."¹⁴

According to co-designer Kevin Roche, the first design for the terminal was an oval shell resting on four points, a form that Saarinen found awkward, but which incorporated an interior layout that remained largely set and only refined during the design revision process. Obviously, the practical issues of the terminal design were dealt with early; one observer has described the interior as a "built circulation diagram."¹⁵ A series of clay models and then larger cardboard forms were used in a three-dimensional design process, especially to perfect the exterior forms that enclose the terminal as both roof and ceiling. The interior was similarly designed through a series of models and the area around the central stairway was remodeled numerous times as the architects developed a more flowing line for the bridge connecting the balconies. All parts of the building were studied like parts of a giant, unified piece of sculpture.¹⁶



Plan of Terminal

When Saarinen's design for the terminal was presented to the public in November 1957, the shape of the structure was described as bold and futuristic. Edward Hudson, aviation columnist for the *New York Times*, assuming that the airline had some misgivings about spending a projected \$12 million on such an unusual plan, thought that TWA was counting on winning public acceptance for the terminal.¹⁷ Attention was focused on the functional aspects of the terminal, both when the design was presented and

upon its completion. It would be the airline's solution to three problems of air travel: quick and efficient service at check-in; up-to-the-minute information on arrivals and departures; and rapid baggage delivery. The placement of the long ticketing counter and the baggage claim area in the two low wings, at street level opposite curb areas protected by the projecting roof, was an attempt to increase passenger convenience. Recent advances in technology were employed in the electronically-controlled doors at the drop-off and pick-up points, large electronic signs – huge Solari (the Swiss watch manufacturer) Datavision boards where flight information could be kept up-to-date – and the transfer of that information throughout the terminal via closed-circuit television monitors. Originally, it was thought that passengers would have to walk to aircraft parked around a one-story structure on the ramp, the "Flight Wing." The use of "Jetways" was under study by late 1957, and the delay in the beginning of construction of the terminal allowed for the evaluation and adoption of this newly-available equipment. The use of jetways raised the height of the ramp structure to two stories, and determined its final form – a more compact "star-shaped" variation of the violin-shaped structure that appears in early images of the design. The projections from the main volume of the building are connections for the jetways, one at the front and one near the rear of each aircraft (for the segregation of first class and coach passengers).¹⁸ The structure has two remote gate lounges in order to accommodate seven aircraft; perched on the roof of the gate near the center of TWA's ramp area is the carrier's control tower, from which personnel direct ground traffic and control the flight information system. The use of baggage carousels in the main terminal area was an addition to the original plan for baggage-handling automation.¹⁹

The architectural critic Edgar Kaufmann, Jr., described Saarinen's interior as "one of the few major works of American architecture in recent years that reaches its full stature as an interior." He praised the vaulted forms with their leaping, glass-linked curves, and the freely imaginative sculptural play of surfaces and details that were gracefully and firmly coordinated in a unified total impact.²⁰ The vaults, four sections of the roof shell, meet to enclose an open central space, – a modern crossroads – divided into three levels and joined by a prominent central staircase at the lower two levels, and, at the upper levels, by pairs of more staircases placed at the perimeter of the central space. The continuous curve of the balustrade at the stairs to the main and balcony

levels and edging the balcony echoes the forms of the enveloping ceiling vaults. The levels are linked by the interpenetration of modeled piers that frame the space under the balconies and extend through the balcony floors to articulate the forms of service core areas at the upper level. Monolithic sculpted forms such as the arched entryways to the ticketing and baggage areas of the lower level, the piers and walls of the service areas for the restaurants at the balcony level, and smaller elements, such as the main information desk, piers supporting the balcony, and ventilation ducts (called "air fountains" by Saarinen) articulate the space. The uniformity and small-scale pattern of the circular, gray-flecked "oyster" marble tiles on most of the vertical surfaces, as well as the floors, accentuate the terminal's spatial volumes. Light floods into the interior through window-walls, bands of narrow skylights, and the odd-shaped windows in the piers; lighting fixtures provide continuity between daytime and after-dark illumination.

The balcony areas of the terminal – a partial third floor – provide an open, outdoor-like setting for restaurants and clubs that are, in effect, turned inside-out with unenclosed seating areas arranged around small service cores that rise like sculpted mesas under the roof vaults. The introduction of small-scale elements in these areas presented a challenge in interior design. Saarinen's firm was responsible for the TWA's private Ambassador Club on the west half of the balcony (closed off from general view and access). The office of Raymond Loewy/William Snaith, Inc. provided furnishing schemes for the other three establishments on the balcony: the Lisbon Lounge, the Paris Cafe, and the London Club. Designers attempted to subordinate the decor to the architecture and the view, but critics found the original schemes only somewhat successful.²¹ Though the furnishings of these areas have been replaced, patrons continue to occupy the elevated spaces framed by the canted window walls, ceiling vaults, and balcony railings – aeries from which to watch the activity on the aircraft ramps and passenger traffic in the "main crossroads" of the terminal.

The walkways to the gate structures are dramatic and unexpected elements of the terminal. Instead of the more usual glazed airport concourses, Saarinen's team chose to use tunnels that provide an enclosed environment quite different from the lofty grandeur of the main terminal and the transparent upper level of the gate structure. The gentle rise of the tunnel floors, noted Ken Macrorie, writing for *The Reporter*, draws one into what are really elongated caves that

beckon to the wondering child in all of us. The concave walls rise to meet a broad, flat ceiling that emphasizes the low height of the walkways; the walls are washed from above by indirect lighting in a *chiaroscuro* manner.²²

The interior of the east gate structure is related to that of the main terminal with its glazed walls, and curved and irregular forms, though it is obviously a separate space where the need for efficient passenger service dominates. Service functions are grouped in a central core, a plan that has remained in use in modern airport satellite boarding areas. The glazed passageways to two remote lounge areas are more characteristic of airport concourses than the solid tunnels that provide access to the structure itself. The aesthetic and the materials used in the main terminal appear in the two separate triangular gate lounges (now Gates 39 and 42), where the original tile surfaces, built-in seating, and the red- and oyster-color scheme remain. The interior elements of the gate areas and glazed walkways were multi-purpose, establishing traffic patterns, defining waiting areas, and providing seating; originally, the open space of the main gate had built-in elements similar to those that remain in the remote gate lounges.

Aline Saarinen noted her husband's familiarity with the acclaimed Helsinki Railroad Station and his interest in providing terminals "as great and appropriate" for the age of air travel.²³ The grandeur of older railroad terminals is recalled in the TWA Flight Center with the procession through a series of spaces that is reminiscent of the movement through passageways and large ticketing and waiting rooms. The unusual waiting area in the main level of the terminal (no longer extant), which had built-in seating in a depressed area in a theater-like setting facing the aircraft ramp, was a modern re-interpretation of the main railroad station waiting room that celebrated the act of waiting. Ken Macrorie noted the similarities between the building types and suggested that 1962 may be remembered as the year New York City lost Pennsylvania Station and gained the TWA terminal. To him, these two buildings, with their different ways of enclosing space for waiting and departing, were both exceptional achievements in architecture.²⁴

The interior of the Flight Center engendered much discussion and was not without its critics. Ada Louise Huxtable praised the notably successful interior of "Eero Saarinen's magnificently detailed and executed *tour de force*" for TWA as the part of the structure that took flight with its stunning manipulation of reinforced concrete into

unconventional forms of arbitrary but dazzling grace. She found that the carefully engineered forms of the interior produced a gem where every line and finish was carried out with a fine consistency and consummate elegance.²⁵

Description*

The Main Terminal. Four sections of the roof shells (painted light brown), which are separated by narrow bands of skylights, meet at the solid central plate to enclose the open central space of the terminal. The interior is divided into three levels, where different functions are located, joined by staircases. At the ground level, a wedge-shaped entry area open to the vaults above is dominated by the sculpted information desk. The desk, which faces the central space rather than the doors, is sheathed with tiles and has a marble counter surface; the unusually-shaped sign above and behind the counter is currently not in use. The desk is now flanked by security equipment related to two entrance vestibules that extend into the space. The entrances to the flanking wings of the terminal are framed by irregular modeled archways that are tile-clad as they terminate at the ceiling and piers, and extend as low walls, above which counters have been installed. The wide central flight of stairs (joining the ground and main levels) is divided by two landings and separated into thirds by freestanding curved aluminum pipe railings. On the main level, the stairs are flanked by flights of stairs to the balcony which curve around low horizontal openings for the air circulation system covered by aluminum grilles. Adjacent to the stairs to the balcony are service areas which include telephone alcoves; open, staggered booths have shallow dividing walls (perforated sheet metal), which have been extended with solid wall sections. The telephones are wall-mounted on panels of polished aluminum and a canister light-fixture hangs in each booth. Aluminum drinking fountains, framed by recessed rectangular surrounds, are set in walls near both telephone alcoves and also in a pier opposite the entrance to the west walkway. The central portion of the main level was the location, originally, of the theater-like waiting area; the floor level has been raised and a low, arrow-head-shaped bench (that was part of the wall enclosing the seating area) and carpeting indicate the original extent of the area.²⁶ Low, sculpted walls (with a textured stucco

*For the sake of convenience, north is used in the description rather than northeast, and so on.

finish) now enclose the area behind a ticketing counter which stands in front of the window wall. A second pair of stairs near the window wall join the main and balcony levels; attached to the bases of these stairs are built-in marble bench seats and nearby stand tall, flaring ventilation ducts with sheet-metal flared top elements (like overscaled newel posts).

A bridge links the two halves of the balcony and separates the entrance lobby from the waiting room on the ramp side. The curving balustrade railing continues in long, unbroken expanses along the stairs and edges of the balcony; the railings have alternating large and small diameter verticals (which appear to be replacement elements). The restaurant areas on the balcony surround central service cores which are sculpted shapes with tile-clad and smooth wall surfaces. The east half of the balcony area is fully accessible to the public. The modeled form of the central core, upholstered curved bench seats in front of the windows, and the pedestal of a "finial" sign remain in their original form. On the south side (now a cafeteria), a tile-clad pier defines a corner of the service core near the top of the stairs; the central area is open on this side and the ceiling is supported by columns. On the west side of the balcony, the central service core appears little altered, although walls extend from it to enclose the Ambassador Club. On the side above the entry area, a wall at the height of the tile-clad pier near the top of the stairs encloses the space, while on the ramp side, a translucent screen spans the opening behind a tile-clad planter adjacent to the low seat in front of the window in the buttress.²⁷ The window walls at the east and west ends of the balcony have two tiers of light-gray perforated plastic vertical blinds which appear similar to the original ones.

Originally, the interior reflected TWA's color scheme of red and oyster (gray-white). In addition to the gray-flecked tiled surfaces, white was used as the background of oval signs (now removed). A carmine red was used sparingly for carpeting and other accent elements. This scheme, with the addition of gray, remains with the extensive marble tile and elements such as the TWA sign now mounted in the ramp-facing window wall (where originally Solari Datavision boards with flight information were mounted). Closed-circuit television monitors were relatively new at the time the terminal was under construction and were set at various locations (including on ledges in the restaurant and bar areas). Monitors are now hung in a row from a red structure above the bench at the main level. The aluminum "enclosure of futuristic design" hanging from the

apex of the ceiling was a public address system speaker; a clock with three faces now hangs from it.²⁸

The lighting of the central portion of the terminal is striking and controlled. Daylight enters the central portion through the window walls (with braced vertical muntins), narrow skylights, and windows in the Y-shaped piers. Canister lighting fixtures hanging from the skylights provide a continuity between daytime and after-dark illumination. Fluorescent fixtures, aimed upward, that lie concealed on the tops of the service areas of the balcony provide a general ceiling-wash. Grouped spherical spotlights, hung close to the ceiling, direct light on signage, while recessed spotlights are used under the edges of the balcony and service core soffits.²⁹

Walkways to the Gate Structures. The tunnels leading to the gate structures are windowless concrete tubes with carpeted floors (dark gray and red) and light-colored walls. Modeled edges mark the slight widening at the central portion. The concave walls rise from a low curb to meet the broad, flat acoustical-tile-clad ceiling; side openings are fitted with diffusers in front of the fluorescent light fixtures.

The East Gate Structure. In the main area of the gate structure, the central service core is organized by the segments of a many-sided polygon. The sheet-metal-clad segments serve as doors, telephone alcoves, a fountain alcove, and vents; an aluminum letter box is mounted in one of the segments. The central space has an open plan, interrupted only by a small number of square white piers which are also used in the concourses and triangular lounges. Tiles (into which vents are set) mark the perimeter of the spaces. The floor-to-ceiling window walls have dark gray aluminum-framed sash with waist-high horizontal muntins. Light fixtures with glazed diffusers are recessed in the acoustical-tile-clad ceiling. Projections from the central space have stairs descending to the ramp flanked by approaches to jetway entrances. Glazed concourses lead to triangular departure lounges (Gates 39 and 42); white square piers rise from the red carpeted floor to support flat ceilings which have two rows of recessed light fixtures. Adjacent to the main gate structure, tile-clad waist-high walls (in two straight sections and a curved one near the jetway door) divide the walkway into thirds. At the gate lounges, walkways at the perimeter of the space are set off by chest-high, tile-clad walls to which seating is attached; these walls connect with counters (above baggage conveyors) and walls flanking stairs to the

ramp (and to the control tower above Gate 39). The upholstery for built-in rectangular and circular bench seating and the seats attached to the perimeter wall, and the carpeting, are carmine red.

except for the replacement of the depressed waiting area on the main level with ticket counters. Currently, security equipment is located near entrance vestibules that have been added to the entry area.

Subsequent History

The interior of the Flight Center – now shared with America West – remains essentially intact,

Report prepared by Betsy Bradley,
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NOTES

1. This section is based on George Scullin, *International Airport* (Boston & Toronto: Little, Brown & Co., 1968); Thomas M. Sullivan, "Planning Airport Terminal buildings," *Civil Engineering* 29 (May 1959), 334-38; Dudley Hunt, Jr., "How Idlewild Was Planned for the Jet Age," *Architectural Record* 130 (Sept. 1961), 152-154 and Arnold W. Thompson, "Evolution and Future of Airport Passenger Terminals," *Journal of the Aero-Space Transport Division, Proceedings of the American Society of Civil Engineers* 90 (Oct. 1964), 127-134.
2. In 1943 the airfield was named Major General Alexander E. Anderson Airport, in honor of a decorated veteran of two world wars. In March 1948, the City Council changed the name of the facility to New York International Airport, Anderson Field. In December 1963, during the month following the president's assassination, the airport was named the John F. Kennedy International Airport.
3. Edward Hudson, "New Structures Rise at Idlewild," *NYT*, Dec. 6, 1955, p. 39.
4. All structures at the airport are on property that belongs to the City of New York, which was leased to the Port of New York Authority for fifty years; the Authority subleases terminal sites to various occupants. The construction bills for the terminals and other structures were largely the responsibility of the Port Authority which has been repaid through the subleases.
5. Howard S. Cullman, "Tomorrow's Airport -- A World Fair," *NYT*, June 8, 1947, VI, p. 12.
6. United Airlines tested an "Aero-Gangplank" during the summer of 1958; by 1959 United had ordered "Jetways" for use at its terminals at New York International, LaGuardia, and several other major airports. "Jetway" appears to have been a proprietary name that has become a generic term. *Airports and Airport Engineering* 12 (July-August 1958), 75 and 13 (May-June 1959), 42-43.
7. Information on TWA was compiled from Geoffrey Arend, *Air World's Great Airports, LaGuardia* (New York: Air Cargo News, Inc., 1979), 84-91; Arch Whitehouse, *The Sky's the Limit* (New York: Macmillan Co., 1971); and Robert J. Serling, *Howard Hughes' Airline: an informal history of TWA* (New York: St. Martin's Press, 1983).
8. Scullin, 154. Ralph S. Damon, the airline's long-term leader during the post-war rebuilding period for the carrier, assumed the presidency of TWA in 1949 and remained in that position until his death in January 1956. Damon was succeeded as president by Carter L. Burgess, who served a brief term of only eleven months. Charles S. Thomas' two-year term as president, from July 1958 to July 1960, preceded that of Charles C. Tillinghast, Jr., who assumed the position in March 1961, presided at the opening of the TWA Flight Center, and continued to lead the airline for a number of years. Edgar Kaufmann, Jr., noted in "Inside Eero Saarinen's TWA Building," *Interiors* 121 (July 1962), 87 the vision and confidence of the airline as a client and the turnover of responsible officials at TWA after 1956; he cited George Clay (an attorney from Missouri who held several positions at TWA prior to becoming a Vice-President for Administration in 1954 and a Director in 1956) and later Byron Rathbun (about whom little is known) as two men played leading roles in the terminal project. Donald Keogh was the TWA project engineer at the

time the terminal was nearing completion, according to the *NYT*, April 22, 1962, p. 14.

9. This section is based on: Alan Temko, *Eero Saarinen* (New York: George Braziller, 1962); Walter McQuade, "Eero Saarinen, A Complete Architect," *Architectural Forum* 116 (April 1962), 102-107; Rupert Spade, introduction to *Eero Saarinen*, Library of Contemporary Architects (New York: Simon & Schuster, 1971); "Slouching towards Barcelona," *Progressive Architecture* 56 (Feb. 1975), 78-85; Andrea O. Dean, "Eero Saarinen in Perspective," *A.I.A. Journal* 70 (Nov. 1981), 36-[51]; R. Craig Miller, "Saarinen, Eliel, and Saarinen, Eero," *Macmillan Encyclopedia of Architects* (New York: Macmillan-The Free Press, 1982), vol. 3, 625-633; *Design in America. The Cranbrook Vision, 1925-1950* (New York: Harry N. Abrams, 1983); "Eero Saarinen," *Architecture and Urbanism* extra edition (1984); and Peter Papademetriou, "Coming of Age. Eero Saarinen and Modern American Architecture," *Perspecta* 21 (1984), 116-141.
10. Quoted in McQuade, 107.
11. "Saarinen's GM Technical Center Receives AIA's 25-Year Award," *Architecture: the AIA Journal* 74 (Apr. 1985), 11, 15; "Eero Saarinen's Dulles Airport Wins AIA 25-Year Award," *Architecture: the AIA Journal* 77 (May 1988), 38, 43; "Deere HQ Wins Saarinen a Sixth 25-Year Award," *Progressive Architecture* 74 (Feb. 1993), 18.
12. This section draws upon criticism of the TWA terminal in Peter Papademetriou and Thomas Fisher, "TWA's Influence," *Progressive Architecture* 73 (May 1992), 102-104; *Eero Saarinen on His Work*, ed. Aline B. Saarinen (New Haven & London: Yale University Press, 1962); Michael Brawne, Airport Passenger Buildings, "Architectural Review 132 (Nov. 1962), 341-348; "Dream of Eero Saarinen a Tribute to His Memory" *Aviation News* 4 (May 25, 1962), 2; "One Family of Forms," *Progressive Architecture* 43 (Oct. 1962), 158-165; "Air Terminal Design," *Industrial Design* 10 (), 68-70; "Recent Work of Eero Saarinen," *Zodiac* 4 (1959), 54-57; and "Saarinen's TWA Center," *Industrial Design* 9 (Sept. 1962), 14; "Trans World Airlines," *Architectural Record* 130 (Sept. 1961), 162-162; "TWA Flight Center, Idlewild," *Architectural Record* 132 (July 1962), 129-130; "I Want to Catch the Excitement of the Trip," *Architectural Forum* 117 (July, 1962), 72-75; and other sources individually cited.
13. *Eero Saarinen on his Work*, 60 (from a *Horizon* interview, June 19, 1959). Kaufmann suggested that Saarinen's use of unusual forms may have been influenced by the work of Antonio Gaudí and by Erich Mendelsohn's Einstein Tower, "Inside Eero Saarinen's TWA Building," 92.
14. Quoted in Papademetriou, "Coming of Age," 134.
15. Roche's description appeared in "TWA's Graceful New Terminal," *Architectural Forum* 108 (Jan. 1958), 79-83; Thomas Fisher's comment appeared in "TWA's Influence," 103.
16. "TWA's Graceful New Terminal," 79-83 and "Saarinen's TWA Center," *Industrial Design* 9 (Sept. 1962), 14.
17. *NYT*, Edward Hudson, "Aviation: Unusual Terminal for Idlewild," Nov. 17, 1957, p. 37. The *NYT*, Oct., 11, 1958, p. 45, reported that engineers were reworking the plans for the terminal because it was too costly to build as originally designed; what changes were made as a result of this study are undetermined.
18. Several airlines at Idlewild used two jetways to access aircraft parked parallel to terminal structures, but the use of the nose-in parking position and one jetway became favored for economic reasons. According to Glenn Garrison, "TWA Picks Futuristic Terminal Design," *Aviation Week* 67 (Nov. 18, 1957), 40-41, the traveler would have a choice of using a moving sidewalk or walking through the long passageway linking the main terminal with the ramp gate structures. The design of these walkways changed from glass-enclosed structures with moving sidewalks to the enclosed tunnels and the use of the moving sidewalks was abandoned. The functional aspects of the TWA terminal were described in "TWA: Wing-Like Roof, Theater-Type Lounge," *Airlift* (Sept. 1959), New York City Airports Clipping file, Municipal Reference Library.

19. According to Bruno H. Hake, "Baggage Handling: Passenger and Baggage Processing at Air Terminals," in *Journal of the Aero-Space Transport Division, Proceedings of the American Society of Civil Engineers* 39 (Oct. 1963), 42, baggage carousels had been in operation for some time at terminals in Montreal and San Francisco. TWA may have been the first airline to install carousels at New York International Airport; they were located in the ground level of the west wing, not in their present location (neither space is included in this designation).
20. "Inside Eero Saarinen's TWA Building," 86-93.
21. "A Problem in Adaptation at Saarinen's TWA Terminal," *Interiors* 122 (Nov. 1962), 128-133 and "Inside the Bird," *Architectural Review* 132 (Mar 1963), 160.
22. "Arriving and Departing," *The Reporter* 27 (Sept. 13, 1962), 52-55.
23. "Dream of Eero Saarinen a Tribute to His Memory" *Aviation News* 4 (May 25, 1962), 2.
24. "Arriving and Departing," 52-55.
25. Ada Louise Huxtable, "Idlewild: Distressing Monument to Air Age," *NYT*, Nov. 25, 1962, II, p. 25. "Forget the Bird," *Architectural Review* 132 (Nov. 1962), 306-07. acknowledged the artistry of the space-modelling and the magisterial clarity of the composition, but noted that some observers would not agree that the detailing was either "vigorous or inevitable," and that the scale of some elements was "toy-like." "TWA Spreads Its Wings," *Progressive Architecture* 43 (July 1962), 68-69 presented the full spectrum of comments, including a description of the space as a "powerful spatial symphony played without compromise, a sequence of spaces within spaces." It reported that others found the curved bridge balcony, winding stairs, the upturning volutes at the bases of the stairs, the sculptured eyes that tell flight times (the Solari boards above the information desk), the bracketed ceilings leading to the ticketing and baggage-receiving areas – the elements usually considered so successful – as obscuring Saarinen's bold, poised space conception, and that the strongly sinuous elements, the dark-ceilinged tunnels, and even the delicately small-scaled tile floor material, gave a surrealist impression.
26. An oval dedication plaque is set into the bench is inscribed: "Trans World Flight Center – Dedicated May the twenty-eighth, 1962 – Eero Saarinen, Architect." The circular marble seats that surround pedestal signs are additions to this space.
27. It appears that the planter was created from bench seating. Currently, show-cases for the duty-free shop are mounted on the main balcony side of the service core.
28. A triangular sign has been hung under the center of the balcony bridge.
29. Spotlights aimed at the ceiling are located at the top of the two "air-fountains" on the main level and the top of the sign behind the information desk. The lighting for the terminal was designed by Jaras, Baume, & Bolles, Engineers, New York, with Frink Corp., Brooklyn, according to "TWA's Lighting Technique," *Illuminating Engineering* 59 (June 1964), 422-424; Stanley McCandless served as a lighting consultant, and Bolt, Beranek & Newman, were acoustical consultants.

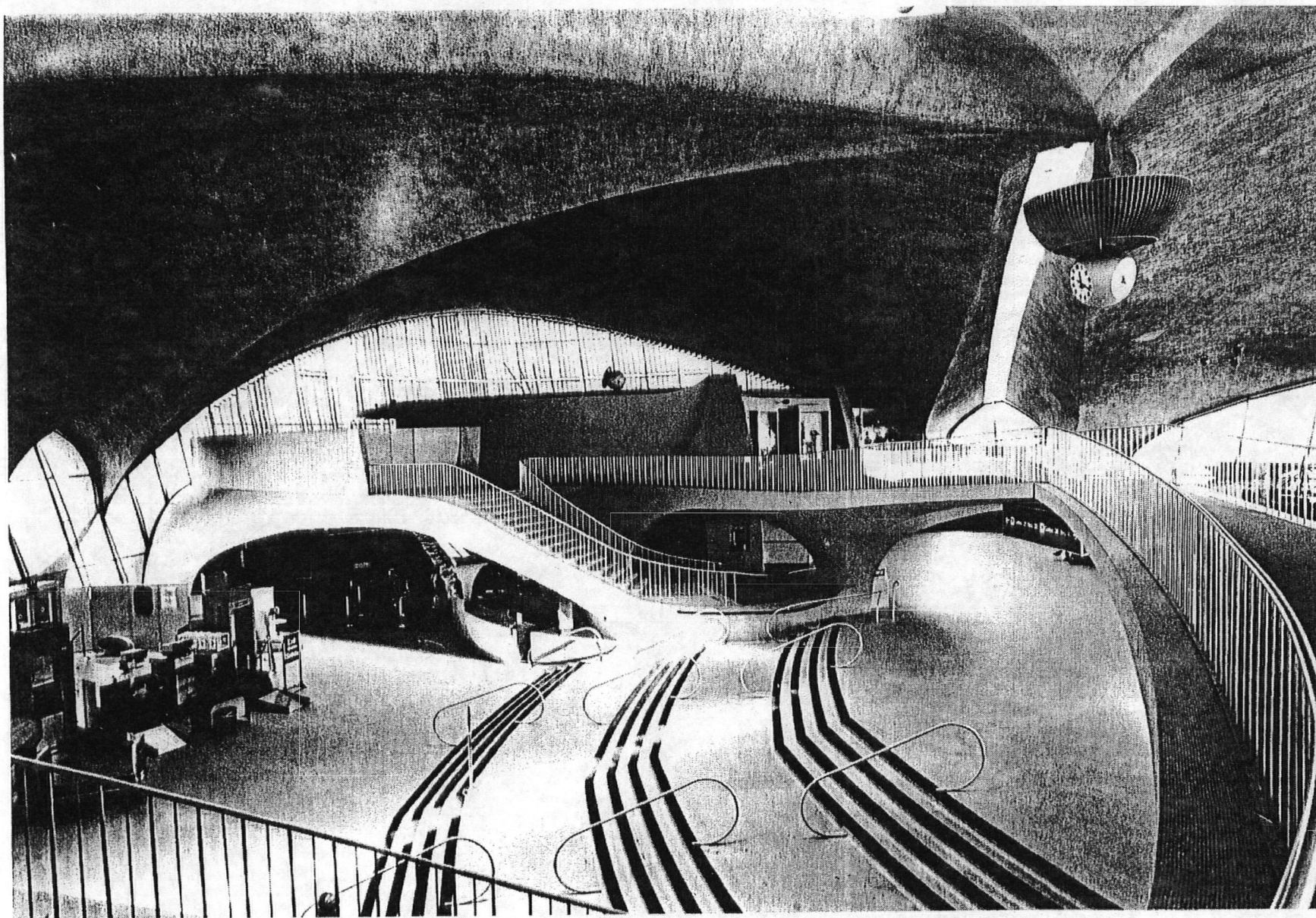
FINDINGS

On the basis of a careful consideration of the history, the architecture, and other features of this building, the Landmarks Preservation Commission finds that the Trans World Airlines Flight Center (now TWA Terminal A) at New York International Airport ground level interior, consisting of the entrance lobby, the information desk, the sculpted piers and archways at the juncture of the side wings, and the stairway leading to the main level; the main level interior, consisting of the ticketing area, telephone alcoves, the stairways leading to the balcony level and the adjacent "air fountains" (sculptural ventilation ducts), the elevated walkways leading to the gate structures, and the southern gate structure interior, including the central area, glazed walkways, and two triangular lounge areas; and the balcony level interior, consisting of the balconies and bridge between the balconies, the restaurant and club areas and their sculpted central service cores (excluding the interiors of the service areas), window seats, and the upper portion of the balcony area; and the fixtures and interior components of these spaces, including but not limited to, wall and ceiling surfaces; floor surfaces; windows; skylights; vertical window blinds; doors; balustrades; stairway railings; piers; water fountains; telephone booth dividers; lighting fixtures; signage, including the TWA sign mounted on the window-wall facing the runway; ventilation elements; built-in seating and counter units; and attached decorative and sculptural elements, has a special character, special historical and aesthetic interest and value as part of the development, heritage and cultural characteristics of New York City, and the Interior is one which is customarily open and accessible to the public, and to which the public is customarily invited.

The Commission further finds that, among its important qualities, the interior of the TWA Flight Center, designed by Eero Saarinen & Associates (Eero Saarinen and Kevin Roche), is among the chief works of one of the most highly-regarded architectural firms of the modern era; that Saarinen's firm revolutionized air terminals through an expressive approach to design that extended to the interior and the incorporation of technological advances, producing a distinctive and highly-acclaimed work of modern interior design with the TWA Terminal (1956-62); that the design of the building interior expressed Saarinen's intentions "to interpret the sensation of flying" and "be experienced as a place of movement and transition;" that the design concept was carried throughout the entire building with a "family of forms," so that "all the curvatures, all the spaces, and all the elements – down to the shapes of signs, railings, counters, and other elements – ... have one consistent character;" that the expressive interior, which remains largely intact, was modeled to provide a succession of differentiated spaces in which all elements are integral to the building; that among the elements integrating and articulating the spaces are the circular white marble tile cladding the floor and most of the vertical surfaces, which accentuates the monolithic quality of the smaller elements as well as spatial volumes; window walls, narrow skylights, and fixtures which provide striking and controlled lighting in the main portion of the terminal; and a variety of unconventional forms including walls, piers, and smaller elements such as the information desk; that the open central space, enclosed by roof vaults and divided into three levels and joined by curving staircases functions as a modern crossroads below the aerie-like balcony space open to the enclosing roof forms and the lower levels; that the design of the enclosed walkways to the gate structures creates a feeling of expectancy and transition which is heightened by the rise of the floor surface and the indirect lighting on the upper portion of the concave walls; and that the main gate structure, with services grouped in a central core and projecting jetway access arms, incorporates some of the first solutions for satellite gate structures for jet aircraft and its interior elements relate to the aesthetic and materials of the main terminal area.

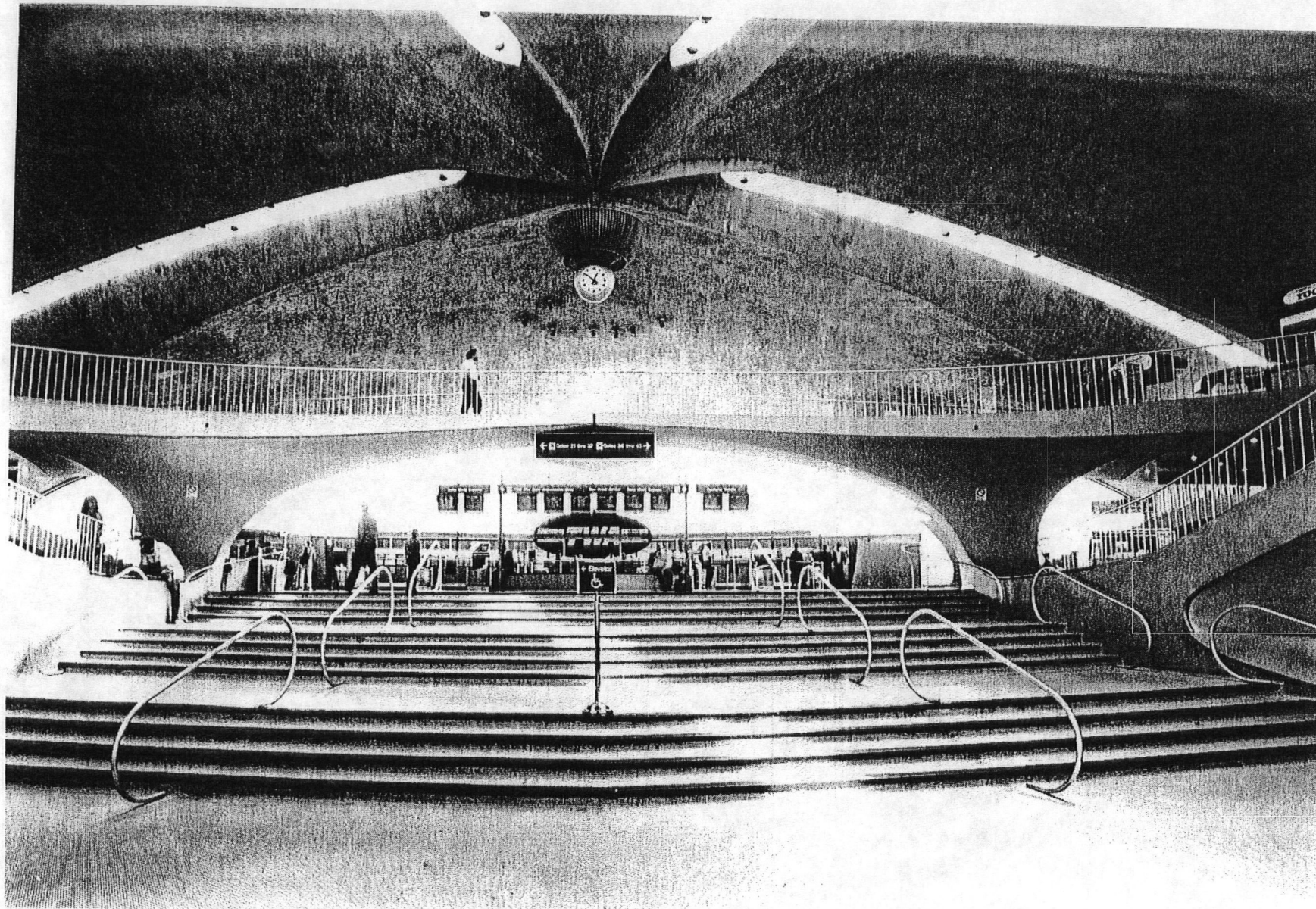
Accordingly, pursuant to the provisions of Chapter 74, Section 3020 of the Charter of the City of New York and Chapter 3 of Title 25 of the Administrative Code of the City of New York, the Landmarks Preservation Commission designates as an Interior Landmark the Trans World Airlines Flight Center (now TWA Terminal A) at New York International Airport ground level interior, consisting of

the entrance lobby, the information desk, the sculpted piers and archways at the juncture of the side wings, and the stairway leading to the main level; the main level interior, consisting of the ticketing area, telephone alcoves, the stairways leading to the balcony level and the adjacent "air fountains" (sculptural ventilation ducts), the elevated walkways leading to the gate structures, and the southern gate structure interior, including the central area, glazed walkways, and two triangular lounge areas; and the balcony level interior, consisting of the balconies and bridge between the balconies, the restaurant and club areas and their sculpted central service cores (excluding the interiors of the service areas), window seats, and the upper portion of the balcony area; and the fixtures and interior components of these spaces, including but not limited to, wall and ceiling surfaces; floor surfaces; windows; skylights; vertical window blinds; doors; balustrades; stairway railings; piers; water fountains; telephone booth dividers; lighting fixtures; signage, including the TWA sign mounted on the window-wall facing the runway; ventilation elements; built-in seating and counter units; and attached decorative and sculptural elements, John F. Kennedy International Airport, Queens and designates Borough of Queens, Tax Map Block 14260, Lot 1 in part, consisting of a site encompassed by a continuous line beginning at a point at the southernmost end of the terminal building, extending northeasterly and northerly along the outermost edge of the terminal building, easterly along the southernmost edge of the elevated walkway between the terminal building and the southern gate structure, extending around the outermost contours of the southern gate structure, westerly along the northernmost edge of the elevated walkway between the terminal building and the southern gate structure, northerly and northwesterly along the outermost edge of the terminal building between the elevated walkways, northerly along the easternmost edge of the elevated walkway between the terminal building and the northern gate structure, westerly along the line of connection between the elevated walkway and the northern gate structure, southerly along the westernmost edge of the elevated walkway between the terminal building and the northern gate structure, westerly and southwesterly along the outermost edges of the terminal building to its westernmost end, southerly from the western end of the terminal building to the curblin of the service road, southeasterly along the western edge of the curblin of the service road, southerly and easterly along a line corresponding to the outermost edge of the overhanging canopy of the terminal building, southerly along the western edge of the curblin of the service road to a point opposite the southernmost end of the terminal building and easterly to the point of beginning, as its Landmark Site.



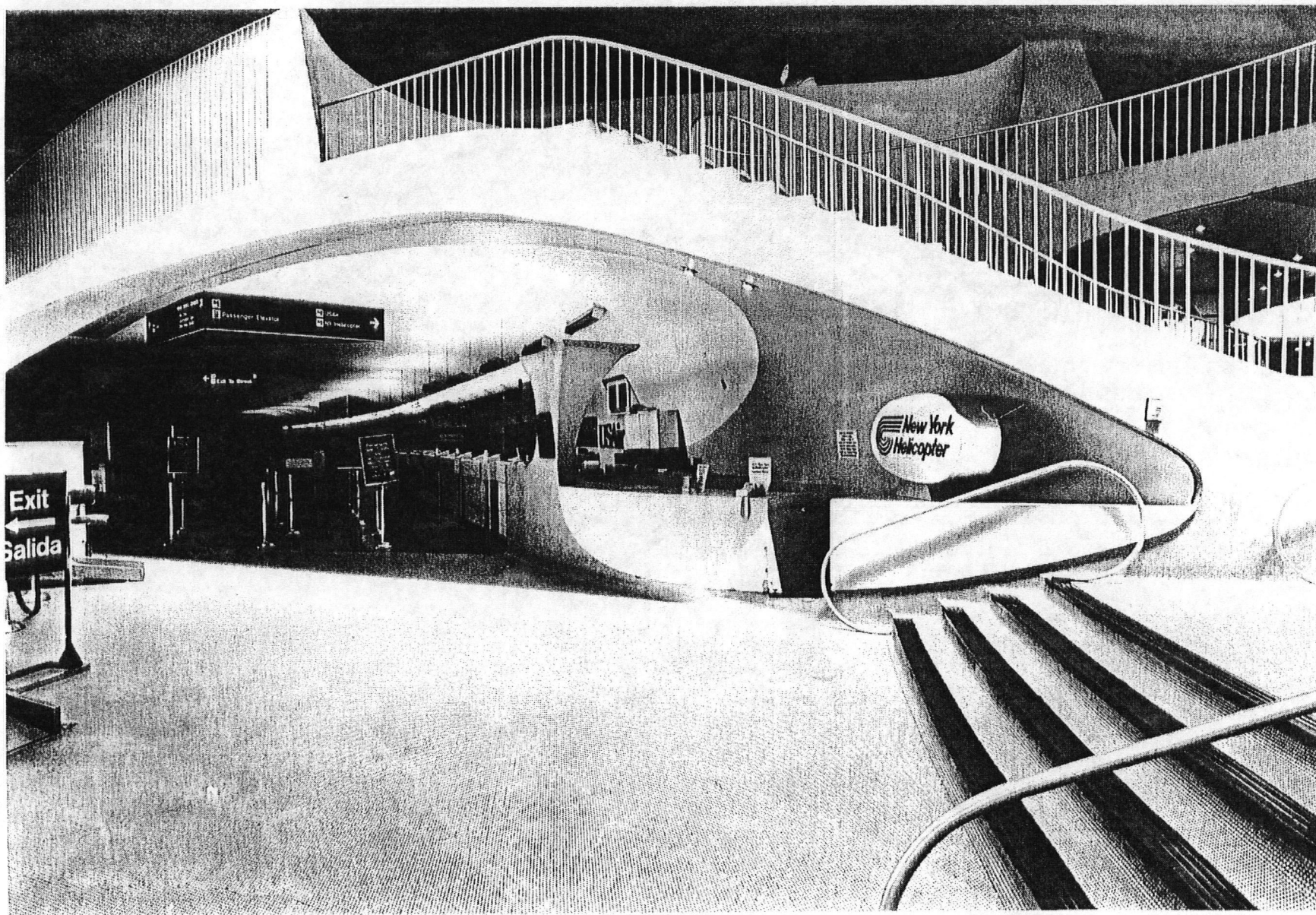
Trans World Airlines Flight Center at New York International Airport Interior.
John F. Kennedy International Airport Queens.
Central area of main terminal.

Photo credit: Carl Forster



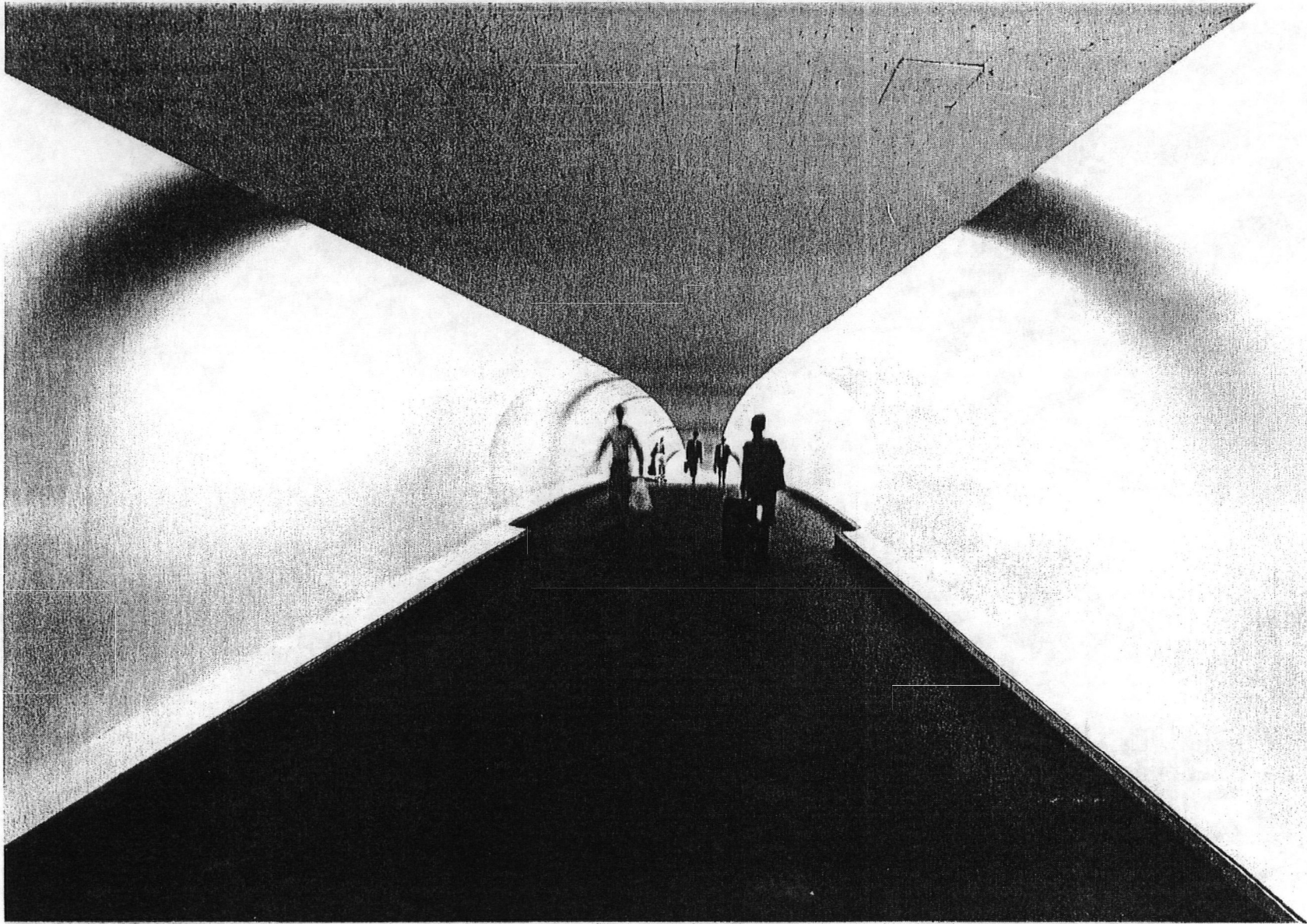
Trans World Airlines Flight Center at New York International Airport Interior.
TWA Flight Center Interior, John F. Kennedy International Airport, Queens
Central area of main terminal.

Photo credit: Carl Forster



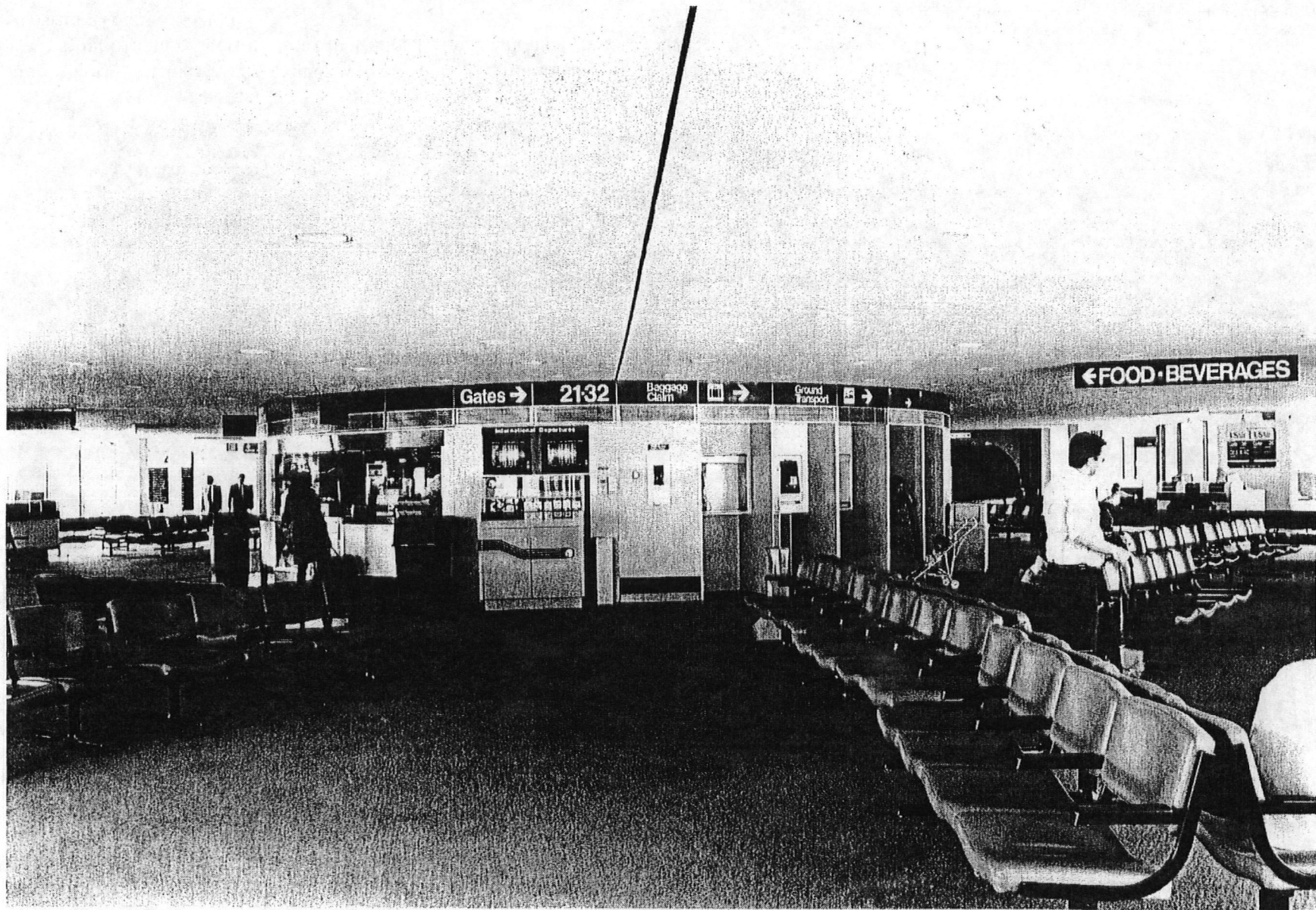
Trans World Airlines Flight Center at New York International Airport Interior.
TWA Flight Center Interior, John F. Kennedy International Airport, Queens.
Entry area, archway framing side wings.

Photo credit: Carl Forster



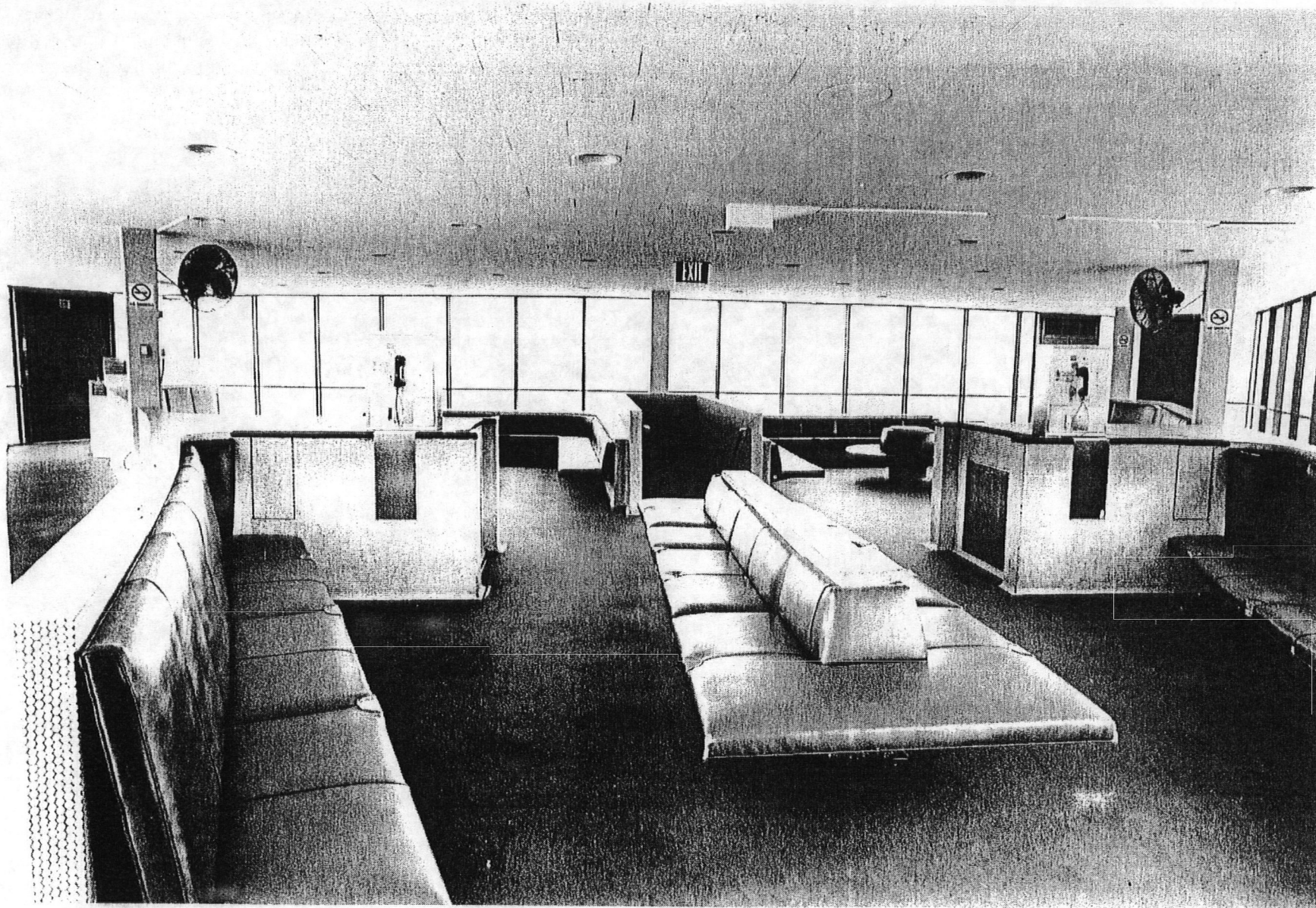
Trans World Airlines Flight Center at New York International Airport Interior.
TWA Flight Center Interior, John F. Kennedy International Airport, Queens.
Walkway to gate structure.

Photo credit: Carl Forster



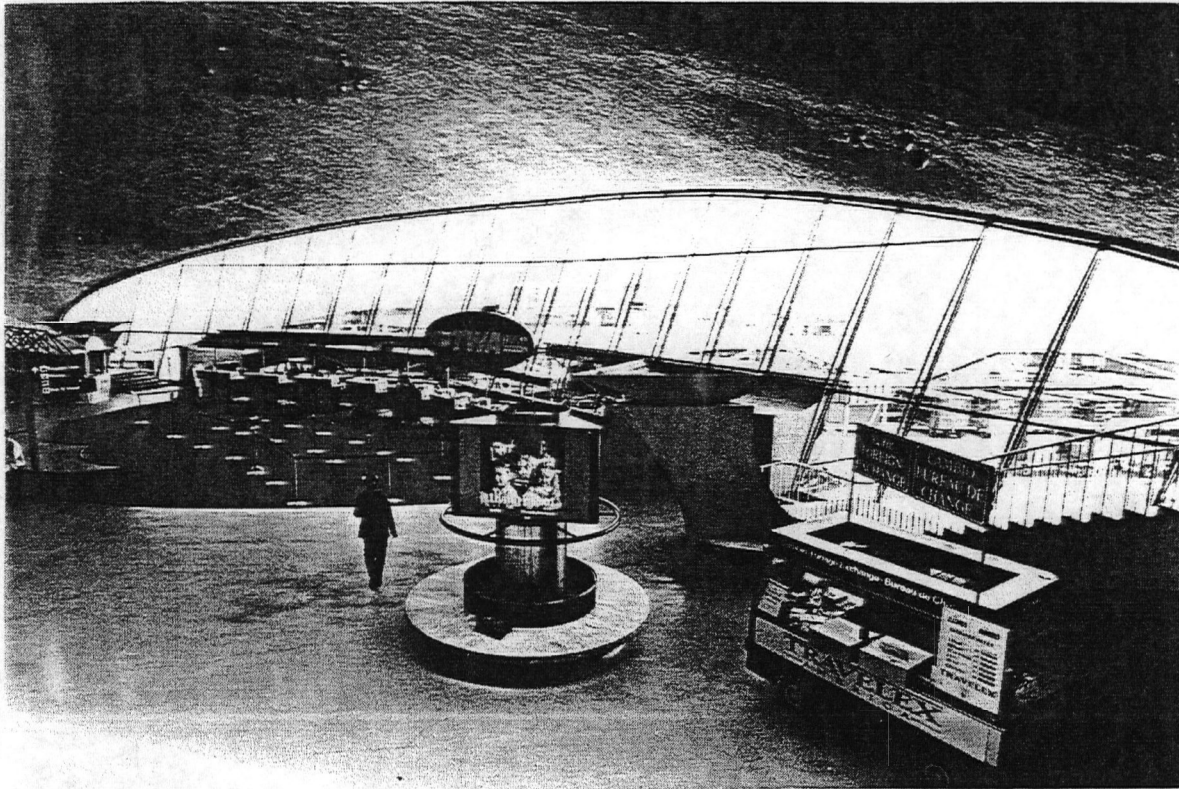
Trans World Airlines Flight Center at New York International Airport Interior.
TWA Flight Center Interior, John F. Kennedy International Airport, Queens.
East gate structure.

Photo credit: Carl Forster



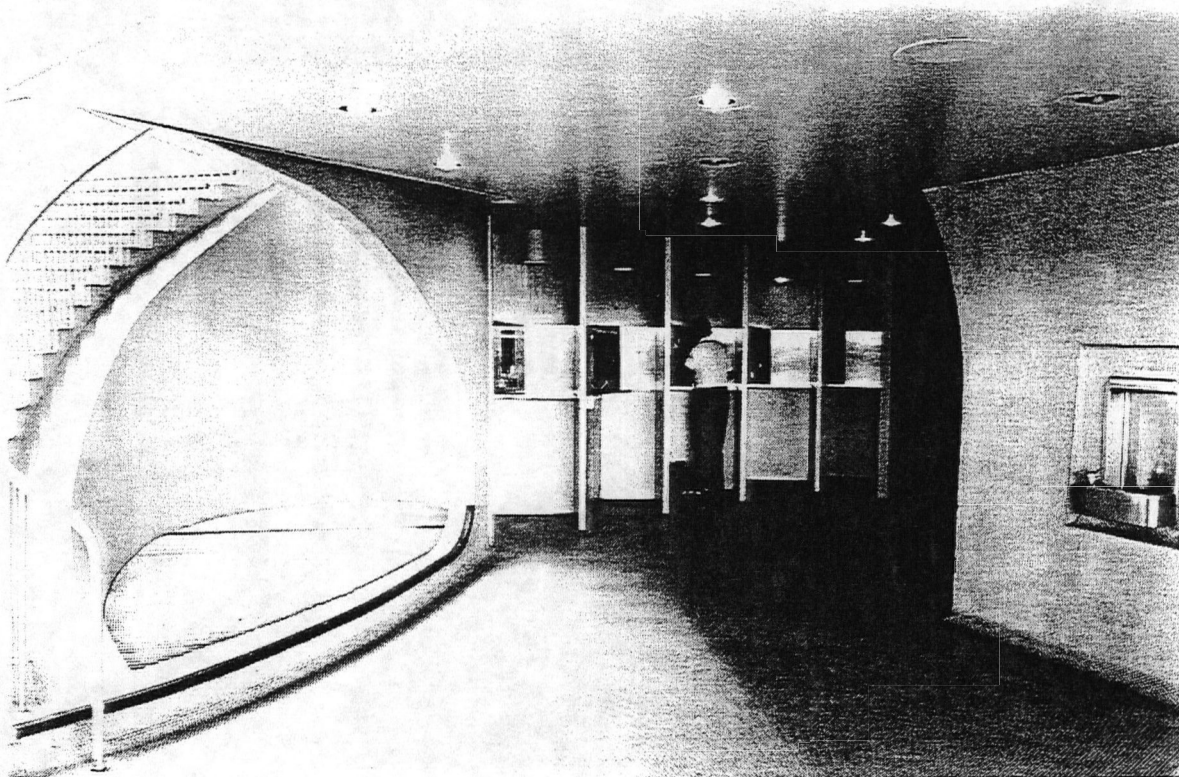
Trans World Airlines Flight Center at New York International Airport Interior.
TWA Flight Center Interior, John F. Kennedy International Airport, Queens.
Departure Lounge, Gate 42.

Photo credit: Carl Forster



Trans World Airlines Flight Center at New York International Airport Interior.
John F. Kennedy International Airport, Queens.
Main level of the terminal.

Photo credit: Carl Forster



Trans World Airlines Flight Center at New York International Airport Interior.
John F. Kennedy International Airport, Queens.
Telephone alcove, main level.

Photo credit: Carl Forster



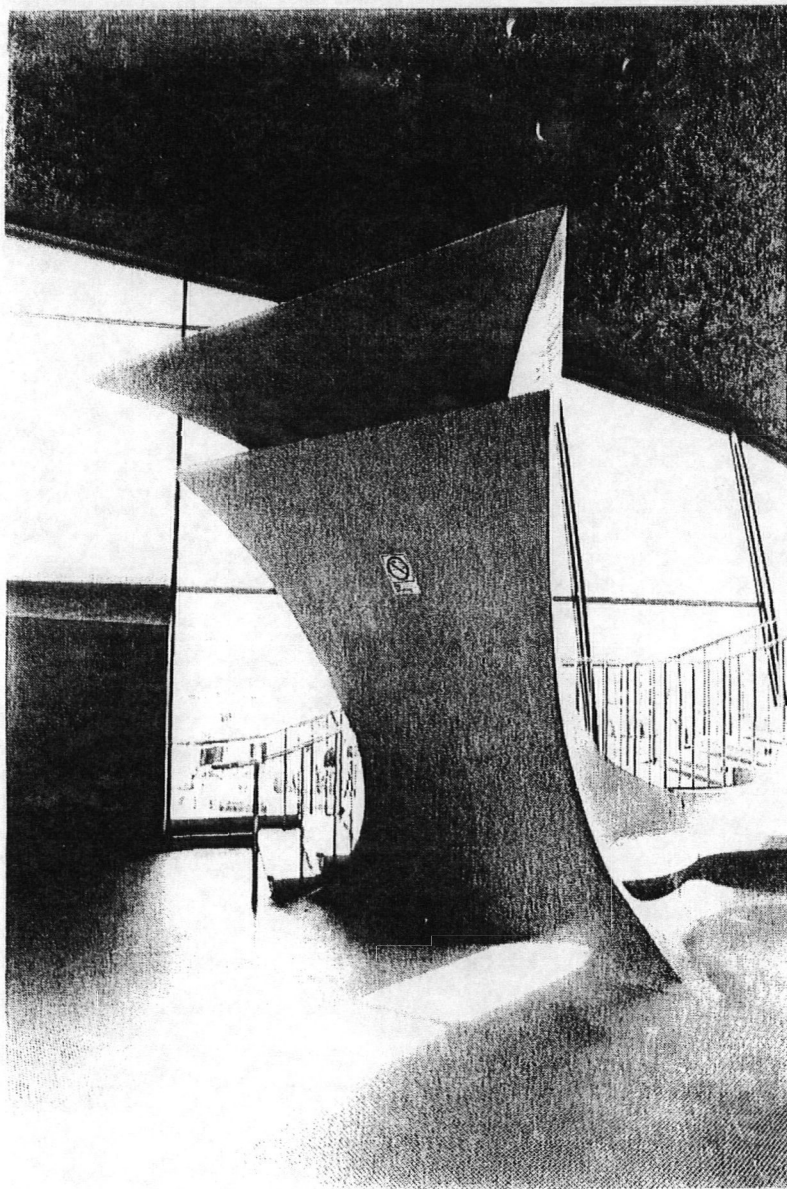
Trans World Airlines Flight Center at New York International Airport Interior.
John F. Kennedy International Airport, Queens.
Balcony level of the terminal.

Photo credit: Carl Forster

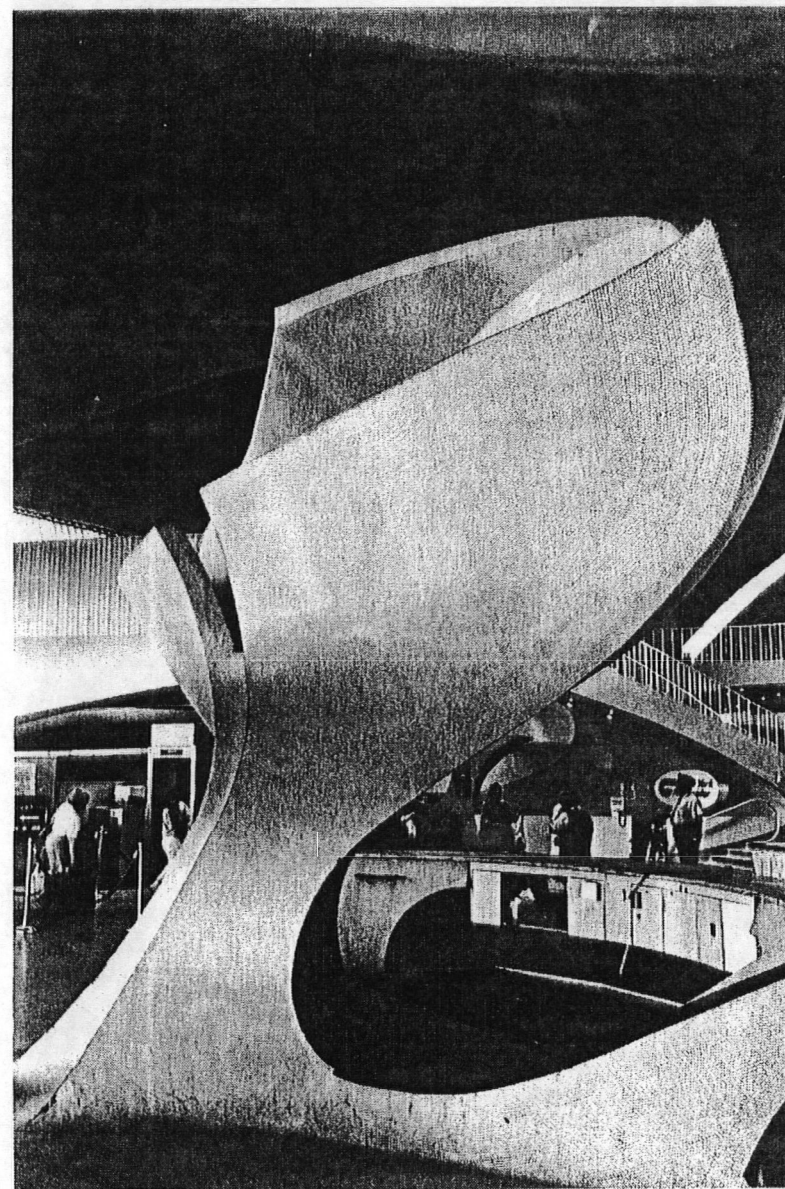


Trans World Airlines Flight Center at New York International Airport Interior.
John F. Kennedy International Airport, Queens.
Walkway to Gate 42.

Photo credit: Carl Forster



"Air Fountain" ventilation duct.
Trans World Airlines Flight Center at New York International Airport Interior.
TWA Flight Center Interior, John F. Kennedy International Airport, Queens.



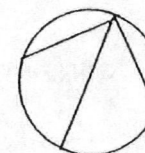
Information desk.

Photo credit: Carl Forster

TRANS WORLD AIRLINES FLIGHT CENTER
(now TWA Terminal A)
AT
NEW YORK INTERNATIONAL AIRPORT
John F. Kennedy International Airport
QUEENS

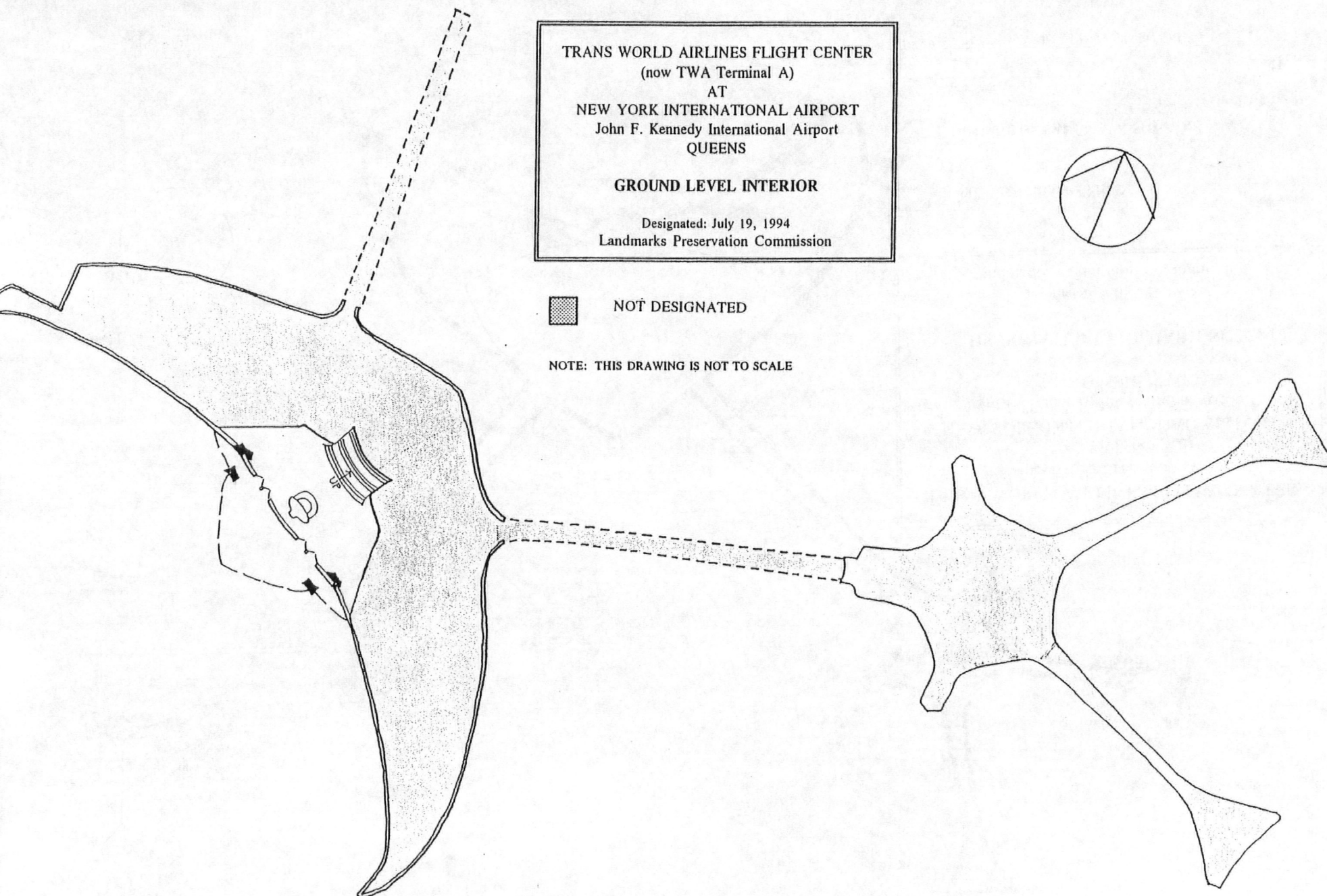
GROUND LEVEL INTERIOR

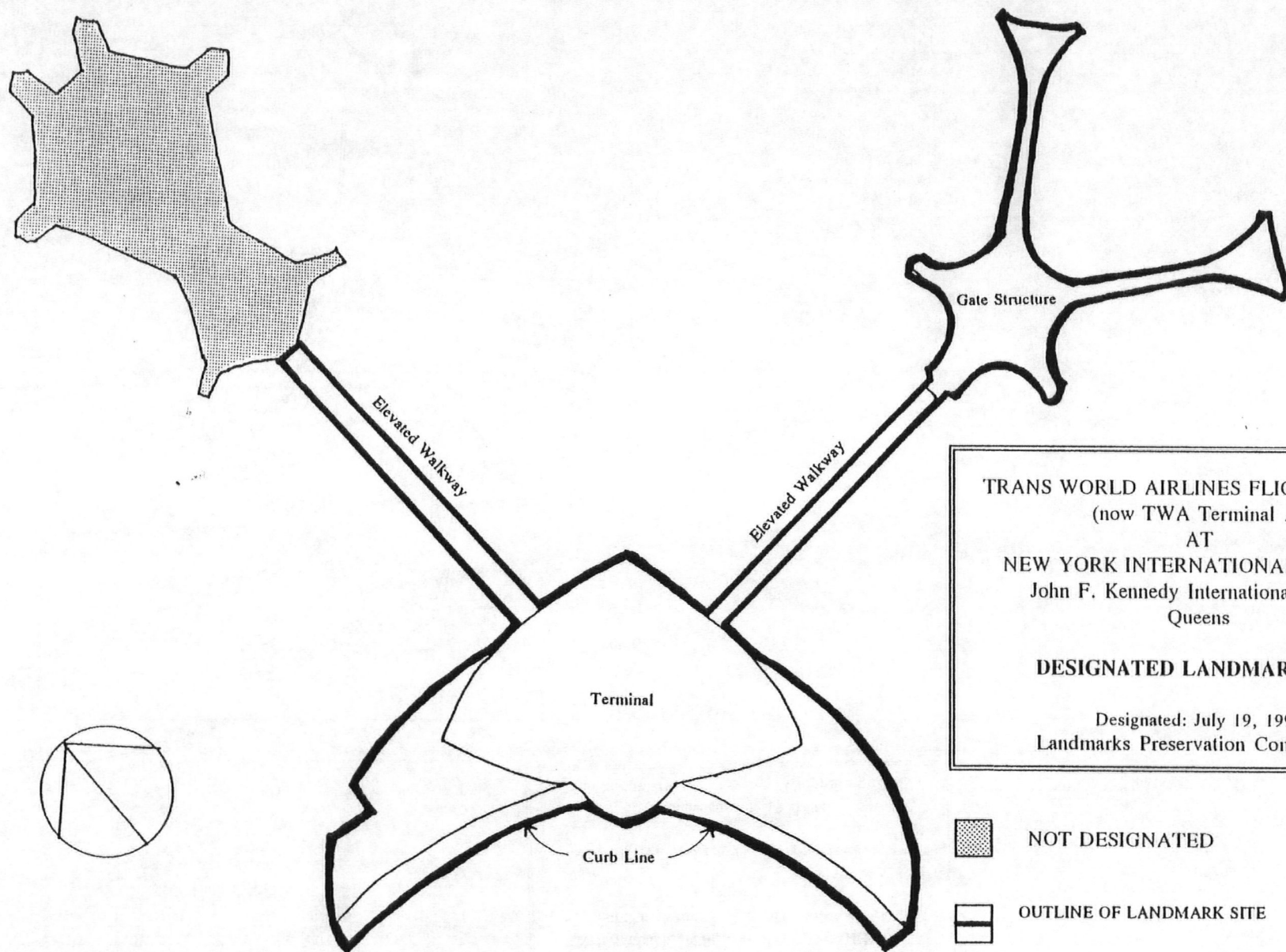
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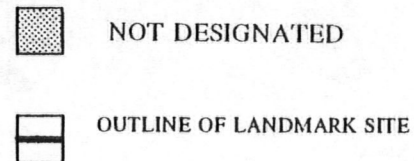




TRANS WORLD AIRLINES FLIGHT CENTER
(now TWA Terminal A)
AT
NEW YORK INTERNATIONAL AIRPORT
John F. Kennedy International Airport
Queens

DESIGNATED LANDMARK SITE

Designated: July 19, 1994
Landmarks Preservation Commission

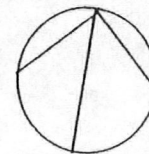


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TRANS WORLD AIRLINES FLIGHT CENTER
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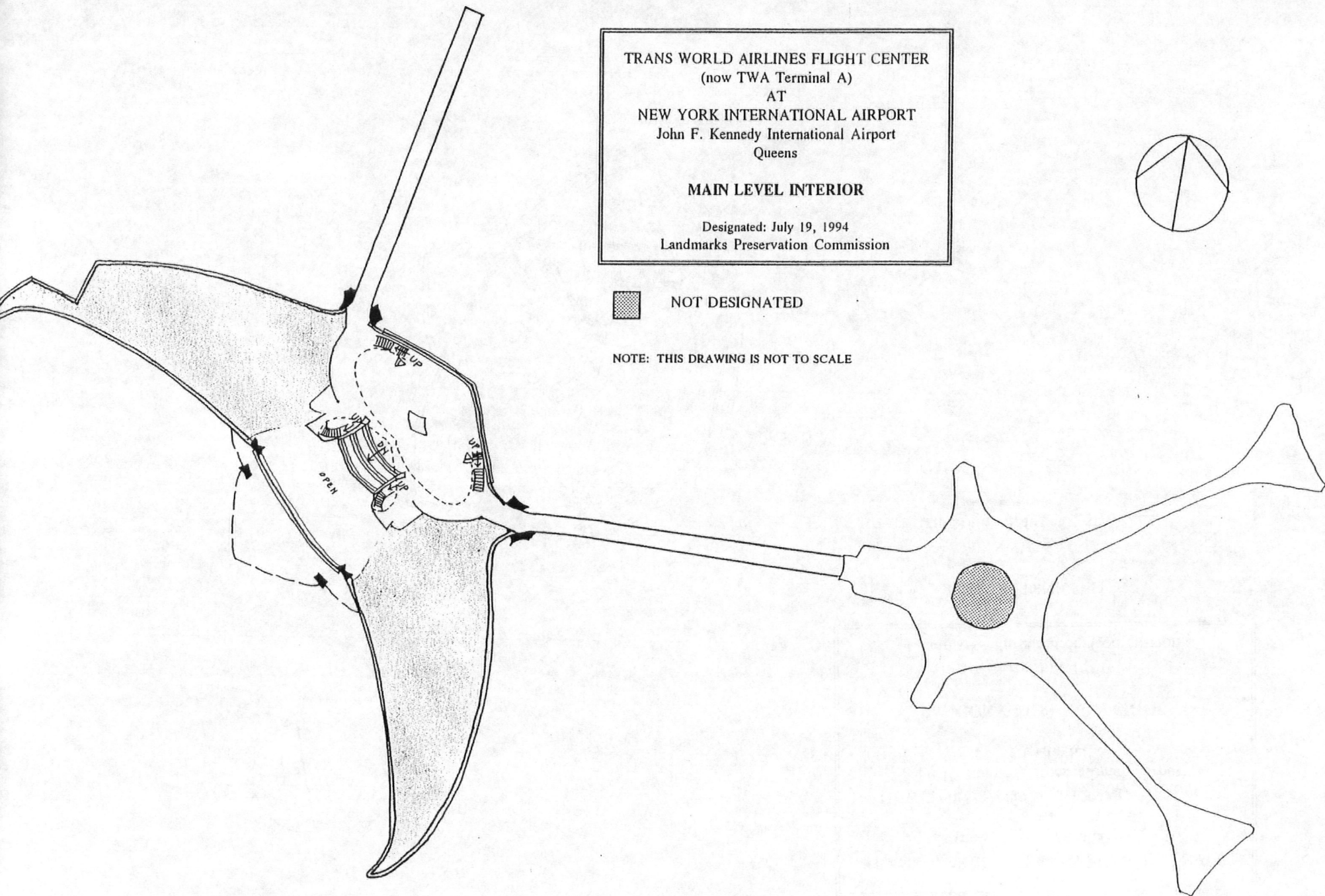
MAIN LEVEL INTERIOR

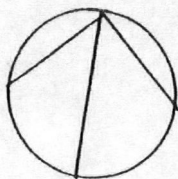
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TRANS WORLD AIRLINES FLIGHT CENTER
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QUEENS

BALCONY LEVEL INTERIOR

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