

TRANS WORLD AIRLINES FLIGHT CENTER  
(TWA Terminal 5)  
John F. Kennedy International Airport, Jamaica Bay  
Queens (subdivision)  
Queens County  
New York

HABS NY-6371  
*NY-6371*

FIELD RECORDS

HISTORIC AMERICAN BUILDINGS SURVEY  
National Park Service  
U.S. Department of the Interior  
1849 C Street NW  
Washington, DC 20240-0001

ADDENDUM TO:  
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REDUCED COPIES OF MEASURED DRAWINGS

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PHOTOGRAPHS

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

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HISTORIC AMERICAN BUILDINGS SURVEY

TRANS WORLD AIRLINES FLIGHT CENTER

(TWA Terminal 5)

HABS NO. NY-6371

**Location:** John F. Kennedy International Airport, Jamaica Bay, Queens, Queens County, New York

U.S.G.S. Jamaica Quadrangle Universal Transverse Mercator  
Coordinates 18 603350 4500150

**Present Owner:** The Port Authority of New York and New Jersey

**Present Occupant:** The Trans World Airline Flight Center (TWA Terminal 5) is not currently occupied

**Present Use:** The Trans World Airline Flight Center (TWA Terminal 5) is not currently in use.

**Significance:** The Trans World Airline Flight Center (TWA Terminal 5) at John F. Kennedy Airport is a significant example of 20<sup>th</sup>-Century modern architecture and engineering. 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 of 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.

## **PART I: HISTORICAL INFORMATION**

### **A. HISTORICAL CONTEXT**

#### **1. 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 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 1950s 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 million passengers a year. Five years later it was at nearly 20 million.<sup>1</sup> In 2002, the number was at 30 million per year.<sup>2</sup> 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 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 11<sup>th</sup>, 2001, when airplanes were hijacked and used as weapons, all airports have had 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

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<sup>1</sup> *The TWA Terminal: Photographs by Ezra Stoller*. (New York: Princeton Architectural Press, 1999) 3.

<sup>2</sup> *JFK Facts Page of Web Site*: <http://www.panynj.gov/aviation/jhisfram.htm>

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.

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 thirty, 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 thirty five 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 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. 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.

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 in the mid 1980's, 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 seventy-five 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.<sup>3</sup>

## **2. 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. 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

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<sup>3</sup> This section is based on Betsy Bradley, *New York City Designation Application for the Trans World Airlines Flight Center*, July 19 1994. Note 9

continually tried to keep pace with technological innovations and the explosive increase in air passenger travel.

### **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<sup>4</sup>. 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<sup>5</sup>. 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<sup>6</sup>.

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<sup>7</sup>. 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<sup>8</sup>. 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<sup>9</sup>. 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<sup>10</sup>.

New York International Airport (NYIA – it was never called Idlewild) 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

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<sup>4</sup> "New marine airport for post-war needs", *New York Times* (April 1, 1943): 11

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

<sup>6</sup> Fiorello LaGuardia, "Finest Airport in the World", *New York Times* (January 21, 1945): VI:10

<sup>7</sup> "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

<sup>8</sup> Paul Crowell, "Idlewild Plan Cut to Save \$25 Million", *New York Times* (August 23, 1946): 21

<sup>9</sup> Paul Crowell, "Experts Submit New Airport Plan", *New York Times* December 23, 1946: 1

<sup>10</sup> *New York Times*. January 11, 1947

temporary facilities, the PA 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 PA 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<sup>11</sup>. 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”<sup>12</sup>. 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 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 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

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<sup>11</sup> Joseph C. Ingraham, “Vast Airport City Set for Idlewild within Five Years”, *New York Times* (February 21, 1955): 1

<sup>12</sup> Ingraham (February 21, 1955): 1

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<sup>13</sup>. 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<sup>14</sup>. 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<sup>15</sup>. 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 Jet Blue 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 and Jamaica Station.

### **B. Eero Saarinen Biographical Sketch**

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

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<sup>13</sup> *New York Times*, December 5, 1963: page 35

<sup>14</sup> Joseph C. Ingraham, *Kennedy Will Expand 25%*, *New York Times* September 9, 1966: 1

<sup>15</sup> *Notes from the Field of Travel: Flight Wing One at Kennedy*, *New York Times* (June 4, 1967): 88

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 selected 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, Ill. 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).

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 certain 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."<sup>16</sup> 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.

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); the Jefferson National Expansion Memorial in St. Louis, Missouri (a.k.a., the Gateway Arch, 1948-64); 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.

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

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<sup>16</sup> Walter McQuade, "Eero Saarinen, A Complete Architect," *Architectural Forum* 116 (April 1962), 102-107

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.<sup>17</sup>

### C. TWA Terminal History

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"<sup>18</sup>. 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."<sup>19</sup> 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<sup>20</sup>. 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)<sup>21</sup>.

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. 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

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<sup>17</sup> Betsy Bradley, "Transworld Airlines Flight Center at New York International Airport", in Application to the New York Landmarks Preservation Commission (July 19, 1994): 5

<sup>18</sup> *Progressive Architecture*, September, 1961. Page 162

<sup>19</sup> Christopher Hart Leubkeman, "Form Swallows Function", *Progressive Architecture* (May, 1992): 106

<sup>20</sup> *The TWA Terminal: Photographs by Ezra Stoller*. (New York: Princeton Architectural Press, 1999): 9

<sup>21</sup> Leubkeman: 108

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<sup>22</sup>. 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. Connected to this central terminal building would be two "violin-shaped" 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.<sup>23</sup>

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.<sup>24</sup>

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

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<sup>22</sup> *Dream of Eero Saarinen a Tribute to His Memory*. *Aviation News*. May 25, 1962, page 2

<sup>23</sup> Edward Hudson, *Bold Design is Set for Airport Terminal*, *New York Times* (November 13, 1957): 37

<sup>24</sup> Brodherson, David. 2001: *Building for Space Travel*. New York: Harry N. Abrams. 2001: 84

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 “star-shaped<sup>25</sup>” 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 final design of the 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; these jet ways were not part of the original design. Introduction of these jet ways (first proposed at JFK in Kahn & Jacobs 1960 American Airlines terminal) may have resulted in the final form of Flight Wing Two – an even more decentralized plan form, consisting of a central pavilion with two satellite lounge areas attached.

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 and the TWA-portion of the temporary terminal structure (1948) could be demolished<sup>26</sup>. In March, 1962, TWA opened the south Flight Wing for passenger boarding (even though the terminal itself was still under construction). By this time, TWA’s plans for the second flight wing had changed, and the airline announced that it would construct a temporary wing with only six gates; a permanent wing would be completed “several years” later<sup>27</sup>.

### **Critical Response to the TWA Terminal**

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<sup>28</sup>.

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

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<sup>25</sup> T.W.A.’s Terminal Standing on Own, *New York Times* (December 8, 1960): 70

<sup>26</sup> T.W.A.’s Terminal Standing on Own: 70

<sup>27</sup> *New Terminal at Idlewild: A Feeling of Movement*, *New York Times* (May 18, 1962): 33

<sup>28</sup> *Progressive Architecture*, July, 1962: page 72

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<sup>29</sup>.

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”<sup>30</sup>. 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.”<sup>31</sup> Architect Remmert Huygens also found the building itself to “sit low, flat and heavy on the ground.”<sup>32</sup> 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*.”<sup>33</sup> 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.”<sup>34</sup>

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.”<sup>35</sup> 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.”<sup>36</sup>

### 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

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<sup>29</sup> Ada Louise Huxtable, “Idlewild: Distressing Monument to Air Age”, *New York Times* (November 25, 1962): section 2, 25

<sup>30</sup> Huxtable: section II, 25

<sup>31</sup> *Progressive Architecture*.. July, 1962: page 72

<sup>32</sup> Remmert W. Huygens, “Coventry and TWA”, letter to the editor, *Architectural Forum* (November 1962): 19

<sup>33</sup> Edgar Kaufmann, Jr., “Inside Eero Saarinen’s TWA Building”, *Interiors*, (July 1961): 86

<sup>34</sup> John Morris Dixon, “Inside Architecture”, editorial, *Progressive Architecture* (November 1973): 83

<sup>35</sup> Thomas Fisher, “Landmarks: TWA Terminal”, *Progressive Architecture* (May, 1992) 93

<sup>36</sup> Herbert Muschamp, “Stay of Execution for a Dazzling Airline Terminal”, *New York Times* (November 6, 1994): section H, 31

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<sup>37</sup>, 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 Wing, 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 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<sup>38</sup>.

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."<sup>39</sup> 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 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

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<sup>37</sup> 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

<sup>38</sup> Edward Hudson, *T.W.A. Dedicates Huge Terminal at Kennedy*, *New York Times* (March 20, 1970): 93

<sup>39</sup> Edward Hudson, *Mishap on T.W.A. Inaugural: Film Projector Fails*, *New York Times* (February 26, 1970): 78

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”<sup>40</sup>. 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.

#### **D. JFK International Airport / TWA Terminal Chronology**

<b>1941</b>	NYC announces new airport at Idlewild; to occupy 1,100 acres.
December 1941	First properties on site acquired.
January 1942	LaGuardia formally announces Idlewild plan.
August 1944	New runway plan introduced; “double tomahawk” pattern incorporates 6 runways.
September 1944	Final site acquisition (takings) completed. In addition to the Idlewild golf course and marsh land, takings include 322 dwellings, 5 stores, 2 factories and 247 vacant lots.
January 1945	Formal plan submitted for \$10 million administration building. Building will have a semi-circular Classically-styled arcade (designed by Delano & Aldrich) with 7 protruding loading decks. Terminal will handle 90 planes at one time. Permanent building to be completed by 1947. New pinwheel runway pattern proposed.
January 1946	New York City Airport Authority created to construct and operate Idlewild. Will also operate LaGuardia.
February 1946	NYCAA proposes new plans for a 3-mile-long figure-8 terminal arcade.

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<sup>40</sup> Fisher: 96

- August 1946 NYC reduces scope of project in a cost-saving move. Delano & Aldrich contract is pulled and three smaller contracts are assigned to Downer, Green & Carillo; Clarke, Rapuano & Holleran; and, Harrison & Abramowitz. Full operational use is projected by 1948.
- September 1946 At request of NYC Mayor O'Dwyer, Port of New York Authority (PA) studies takeover of three area airports. Predict 32 million passengers at NYC-area airports by 1960.
- December 1946 NYC submits new terminal plan, eliminating 3-mile-long arcaded terminal. New design proposed by 3 firms hired by City. Plan retains a single central terminal building, with smaller plane-loading terminals connected to the main terminal via covered walkways. A total of 86 ramp locations planned. Proposal will be compared with PA proposal and NYCAA plans as City decides how to operate the airport.
- June 1947 PA signs 50-year lease with NYC to operate Idlewild and LaGuardia airports. Signs separate lease to operate Newark.
- July 1948 New York International Airport (NYIA) officially opens to commercial traffic. All facilities are temporary, Quonset-hut-like structures. Actual completion of permanent terminal facilities projected in 1954. Airport now occupies 4,000 acres, including areas of landfill, which have had 61 million cubic yards of sand pumped in.
- January 1949 First anniversary of Airport; 141,000 passengers handled.
- September 1949 TWA agrees to move operations from LaGuardia to Idlewild; last of the three major US transatlantic lines to do so.
- January 1950 NYIA project "at halfway mark". Temporary administration building being enlarged from 80,000 sq. ft. to 215,000 sq. ft.; hangars are the only permanent buildings constructed to date.
- April 1951 TWA is last of transatlantic carriers to move from LaGuardia to Idlewild; last transatlantic flight from LaGuardia.
- 1951** PA bans jets at NYC-area airports over noise concerns.
- February 1952 Three crashes at Newark result in closing of airport; emergency expansion of NYIA undertaken to compensate. Temporary terminal further expanded.
- July 1953 Fifth anniversary of NYIA. 11-story control tower is first (and only) permanent structure in terminal area. Temporary terminal has been expanded five times to date.

- February 1955 PA announces Terminal City plan – dispersal of individual airline terminals around a 655–acre landscaped oval. Area encompassed is almost equivalent in size to Central Park. Single terminal plan abandoned. Terminal City will accommodate 140 airplanes at one time (current capacity is 29 airplanes). A three-story International Arrivals Building with two flanking wings for foreign-flag carriers (all designed by SOM) is centerpiece of plan. All incoming passengers requiring Customs clearance will go through new Arrivals Building. Seven smaller terminals for American flag carriers, costing \$5 million each, arrayed on either side of IAB. Exterior architecture of the terminals to “blend with over–all pattern” devised by Wallace Harrison, design consultant and coordinator.  
All buildings will face a 160–acre plaza with a great reflecting pool.  
TWA objects to its location on the far side of IAB.  
City officials complain that PA is neglecting NYIA and LaGuardia in favor of Newark and Teterboro. Terminal City plan is partially a response to these complaints. PA claims new facilities will be “adequate and useful for at least 25 years” and will provide “flexibility, versatility, expandability and adaptability.”  
2.9 million passengers at Idlewild in 1954; PA predicts 7 million passengers by 1960; 8.5 million by 1965.  
Control remains only permanent facility in terminal area; will be incorporated into Terminal City plan.
- October 1955 Construction begins on Terminal City project; IAB first building to be constructed.
- 1955** First year in which number of foreign passengers travelling by air surpass those by sea at NYC facilities.  
3.7 million passengers at NYIA.
- Jan 1956 Mayor Wagner criticizes PA operations at NYIA; calls airport a “disgrace” and “inadequate”
- July 1956 PA raises Terminal City budget from \$60 million to \$90 million. Design of wings at IAB expanded.
- 1956** 4.5 million passengers at NYIA.
- April 1957 Pan Am terminal design incorporates raised gangplanks and overhanging roof for weather protection.  
PA raises cost estimate for Terminal City to \$120 million.
- May 1957 First commercial jet lands at NYIA. French–made Caravelle is first jet to win approval for regular service at NYC airports (although plane is never used for NYC routes); ban on other jets continues until 1959.
- September 1957 Fountain of Peace completed.

- November 1957 TWA announces “bold and futuristic design” for a new terminal. Eero Saarinen & Associates design will cost \$12 million. Original design shows large side wing extensions and two “violin-shaped” Flight Wings. Configuration of Flight Wings is larger than actually built (more closely resemble the 1970 Flight Wing One design). Terminal will accommodate 14 jets at the two Flight Wings. Cost of Terminal City raised to \$150 million
- December 1957 IAB dedicated and officially opens. Temporary facilities remain in use. American Airlines announces \$14 million terminal designed by Kahn & Jacobs. Design includes telescopic boom jet ways which will swing out from terminal. Semi-circular building with two finger structures containing 10 lounge areas; capacity is 10 jets, with room to expand to 16.
- 1957** 5.4 million passengers at NYIA.  
11 million passengers predicted in 1965.
- April 1958 Enclosed observation deck opens on 10<sup>th</sup> floor of Control Tower.
- September 1958 Electronic remote-control information board tracks flight arrivals at IAB; replaces information counters.
- October 1958 Limited jet use is allowed on a full-time basis.
- October 1958 TWA “restudying terminal design” – may abandon Saarinen design as too costly. Slated to begin construction in April 1958, the project is still on the drawing boards.
- December 1958 PA receives MAS award for IAB; Society praises “combination of practicality and beauty”.  
Donald V. Lowe, PA Chairman, “looks to the day when this airport will be recognized as one of the finest centers of modern architecture in the world.”  
1.2 million passengers handled at IAB in first year of operation; an additional 1.8 million people visited the airport’s observation decks.
- January 1959 American announces Robert Sowers’ design of 317’-long stained glass window to front new terminal building.
- June 1959 TWA breaks ground for new terminal.  
PA introduces sightseeing train at Idlewild.  
PA postpones projected completion date of Terminal City to 1963 or 1964.
- October 1959 Eastern opens new terminal. First of the satellite terminals to be completed.
- May 1960 American, United and Pan Am each open their new terminals.

- July 1960 Delta opens jet terminal.
- August 1960 Scaffolding and form work in place at TWA terminal.  
I. M. Pei named architect of new multi-airline terminal, to be constructed in location of temporary terminal building.
- November 1960 Workers finish pouring concrete shell of TWA building.  
Hundreds of people visit Idlewild each week to marvel at the “architectural showpieces” of the four new terminal buildings (Pan Am, United, Eastern, American).
- December 1960 Form work and supports removed at TWA; terminal building stands on its own. One “star-shaped” flight wing, with 7 gates, is under construction. TWA plans to erect a second “loading & unloading building” with 7 more gates. Second flight wing will be constructed in the area presently occupied by the temporary terminal; when TWA moves out, that portion of the temporary building will be torn down.
- March 1961 Braniff, Northwest and Northeast open joint terminal.
- August 1961 TWA will incorporate snow melting pits to keep aircraft gates clear of snow.
- September 1961 Eero Saarinen dies at age 51 after surgery to remove a brain tumor.  
Ada Louise Huxtable – TWA roof is a “definitive and awesome statement of the almost anarchic release of architecture from familiar forms and techniques.”
- March 1962 TWA opens Flight Wing for boarding passengers. Passengers must pass through main terminal building, still under construction.  
Flight Wing incorporates two telescopic jetways for each plane – one for first class, the second for tourist class.  
TWA announces plans for a temporary wing to be constructed in area now occupied by the temporary terminal. Temporary wing will handle 6 planes until a permanent wing is completed “several years from now”.  
Design for chapels, to occupy center of landscaped oval, are approved.
- May 1962 TWA terminal officially opens.
- November 1962 Ada Louise Huxtable on Idlewild: “a strange mix of World’s Fair flash and pedestrian bad taste;” a “curious exercise in architectural anarchy.” The terminal buildings “wage incessant war on one another through their aggressively individualistic and unrelated design.”  
Pan Am terminal – “best architectural idea ... one of the worst buildings.”  
TWA terminal – “the most dubious idea, which ... has produced by far the best building.” Not a “revolutionary breakthrough in airport design.” A “subjective demonstration of structural form.”  
American terminal – a “rude jolt back to banality.”

Braniff, Northwest and Northeast terminal – “new building adds little but further confusion to the general airport picture.”  
Eastern Terminal – the “most ambitious failure in the group”  
United and Delta terminals – “inoffensive, routine version of airport architecture everywhere.”

Letter in response to Huxtable calls TWA terminal a “dismal failure” for its lack of signage directing passengers.

- December 1963      New York International Airport changes name to John F. Kennedy International Airport.
- February 1964      Air India dedicates new terminal.
- 1965**                      16.2 million passengers at JFK.
- January 1966        PA announces \$21 million improvements, including additions to 2 terminals. Pan Am will expand terminal 300%.
- September 1966    PA announces 10–year \$150 million expansion program. Will include facilities for jumbo jets slated for introduction in 1969 and later supersonic transport. Runways will be relocated in order to expand Terminal City from 655 to 837 acres.
- November 1966     Roman Catholic chapel dedicated.
- December 1966     Vice President Humphrey dedicates Tri–Faith Chapels Plaza.
- June 1967            TWA announces plans for a new \$19.8 million Flight Wing to be added to terminal. Flight Wing One will open in early 1970 and accommodate ten 707s or up to five 747s as well as future supersonic aircraft. Will be “first airline terminal tailored to handle the big Boeing 747 jumbo jet.”  
Shaped like a “bass viol”, Flight Wing One will be larger than main TWA terminal.  
Helicopter pad to be housed on roof of Flight Wing One.  
200’ tube–like bridge will connect Flight Wing One with Main Terminal.  
Original Flight Wing will be called Flight Wing Two.  
British Overseas Airways Corporation (BOAC), National have new terminals under construction.
- September 1967    International Synagogue dedicated.
- December 1968     Concrete shell of Flight Wing One completed.
- January 1969        \$26 million expansion of IAB announced.

November 1969	National Airlines terminal opens.
January 1970	Pan Am inaugurates 747 service.
February 1970	TWA inaugurates Flight Wing One and jumbo jet service with 747 arrival at JFK. Becomes second airline to place 747 in service. Pan Am opens second passenger terminal.
March 1970	TWA dedicates Flight Wing One, opens Federal inspection area in Wing. Becomes the first airline-owned terminal with its own Federal inspection area. Plans announced to double size of IAB.
September 1970	British Overseas Airways Corporation (BOAC) opens terminal.
November 1, 1970	TWA introduces new Business Class Ambassador Service providing a "whole new way to fly," and featuring "twin seat" accommodations on transcontinental routes.
June, 1972	TWA inaugurates Lockheed 1011 service. The first flight, operating from St. Louis to Los Angeles, is flown on autopilot from takeoff to landing.
January, 1979	Trans World Corporation is formed. Subsidiary companies will include Trans World Airlines, Canteen Corporation, Hilton International, Spartan Food Service and Century 21 Real Estate.
December, 1982	TWA operates its first Boeing 767 flight, from Los Angeles to Washington's Dulles airport.
November, 1983	TWA is spun off from Trans World Corporation as a new public company.
1985	TWA launches its first transatlantic service with the Boeing 767 wide-body, the industry's first ETOPS (extended-range twin-engine operations) service.
September 26, 1985	Carl Icahn acquires control of TWA.
October 26, 1986	TWA acquires Ozark Airlines and merges Ozark into TWA's operations.
September 7, 1988	At a special meeting, TWA stockholders approve Carl Icahn's proposal to take the company private. The privatization takes \$610.3 million out of TWA -- of which \$469 million goes to Icahn -- and adds \$539.7 million to TWA's debt.
1989	Carl Icahn moves TWA headquarters from 605 Third Avenue to his own building in Mt. Kisco, New York.

July 1, 1991	Carl Icahn sells TWA's route authorities from New York, Los Angeles, Boston and Chicago to London to American Airlines for \$445 million.
January 31, 1992	TWA files a petition for reorganization under Chapter 11 of the Federal Bankruptcy Code.
May 1, 1992	Carl Icahn sells TWA's route authorities from Philadelphia and Baltimore to London to USAir for \$50 million. TWA retains St. Louis-London route.
May 1, 1992	TWA opens the Constellation Club the TWA Terminal as a luxury lounge for full fare Ambassador and First Class Transatlantic passengers.
August 24, 1992	TWA and the TWA Creditors' Committee announce the signing of agreements in principle with TWA's three major unions for concessions in exchange for a 45% equity stake in the airline.
January 8, 1993	Carl Icahn resigns as chairman of TWA, relinquishing all control and interest. The direction of TWA is placed in the hands of a two-man Management Committee (Co-Chief Executives) appointed by TWA employees, unions and creditors.
January 14, 1993	TWA inaugurates "Comfort Class" service, "the most comfortable way to fly," with extra leg room in the main cabin.
November 3, 1993	TWA completes Chapter 11 reorganization. The employees of TWA own 45 % of the airline upon emergence; creditors own the remaining 55 %. William R. Howard assumes the title of chairman of the board and CEO.
November 23, 1993	TWA receives the 1994 J.D. Power & Associates award as the #1 U.S. airline for customer satisfaction on long flights.
February, 1994	TWA relocates its corporate headquarters from Mt. Kisco, New York, to St. Louis.
April, 1994	Jeffrey H. Erickson is named president and chief operating officer (later named chief executive officer).
March 15, 1995	TWA introduces Trans World One, its enhanced international business class.
June-August, 1995	TWA successfully completes a second financial reorganization.
August 31, 1995	TWA becomes the name sponsor of St. Louis' new NFL stadium, the Trans World Dome.

February 12, 1996 TWA announces plans to acquire 20 new 757-200 aircraft, the airline's first major new aircraft acquisition program since before the Icahn era.

June 24, 1996 TWA opens a new state-of-the art reservations center in Norfolk, Virginia. The facility utilizes object-based PC reservations format for computer systems.

July 16, 1996 TWA announces an order for 15 new MD- 83 series aircraft from McDonnell Douglas.

Feb. 12, 1997 Gerald L. Gitner is named Chairman and Chief Executive Officer

May 14, 1997 TWA announces second daily round-trip flight between St. Louis and London.

November, 1997 Royal Jordanian Airline and TWA begin code-share service between the U.S., the Netherlands and Jordan. TWA is the first U.S. airline to offer direct service to Amman.

December 31, 1997 TWA finishes the year ranked #2 for domestic on-time arrivals as reported to the U.S. Department of Transportation for the year, up from #10 in 1996.

January, 1998 TWA introduces Trans World First, its new domestic first class service, featuring a 60% expansion of the number of first class seats in the narrow-body fleet.

February, 1998 TWA introduces TWQ, its new high- frequency business market service.

February 20, 1998 TWA retires the last of its Boeing 747 "jumbo jets" The newer and more efficient Boeing 767 wide-body is now the airline's main intercontinental aircraft.

April 22, 1998 TWA announces an order for 24 MD-83 twinjets, all to be delivered during 1999.

May 1, 1998 TWA launches AviatorsSM, its new frequent traveler program.

May 12, 1998 TWA receives the 1998 J.D. Power & Associates/ Frequent FlyerMagazine award as the #1 U.S. airline for customer satisfaction on flights of more than 500 miles.

October 21, 1998 TWA announces the acquisition of four Boeing 757s and one Boeing 767-300ER, giving TWA a fleet of 27 757-200s and 5 767-300ERs by January 2000.

December 9, 1998 TWA announces the largest aircraft order in company history for 125 B717s, A328s and A320 family aircraft plus options on 125 additional aircraft.

May 11, 1999 TWA receives the 1999 J.D.Power & Associates/Frequent Flyer Magazine award as the #1 U.S. airline for customer satisfaction on flights of less than 500 miles.

- May 25, 1999 Captain William F. Compton becomes Chief Executive Officer. Gerald Gitner remains Chairman.
- July 28, 1999 TWA and Trans States Airlines renew their marketing and code-sharing alliance which provides Trans World Express regional service at TWA's St. Louis hub.
- October 11, 1999 TWA records its 50th day of 100 percent completion of schedule for 1999, far above previous annual records set in 1997 and 1998.
- November 1, 1999 TWA makes San Juan, Puerto Rico the airline's first "focus city." Operations from San Juan are increased to fifteen flights per day to eight destinations, plus Trans World Connection turboprop service (operated by Gulfstream International Airlines) to six Caribbean points beyond San Juan.
- November 3, 1999 TWA announces plans to launch regional jet service by the summer of 2000 with a new marketing agreement with Indianapolis-based Chautauqua Airlines, which will provide Trans World Express RJ service.
- November 18, 1999 TWA announces a major service expansion, adding 46 roundtrip flights per week including new or increased service on routes to the Caribbean, Mexico, Hawaii and the Middle East.
- December 1, 1999 TWA and Kuwait Airways begin code-share service on Kuwait flights between Chicago, JFK and Kuwait City; and on TWA flights beyond JFK and Chicago.
- December 21, 1999 TWA and Boeing close out a 67-year era of partnership as the airline takes delivery of the last twin-engine transport to bear the Douglas name, an MD-83 christened "Spirit of Long Beach." TWA placed the initial order for a Douglas twin – the DC-1, built to order for TWA – in 1932.
- February, 2000 TWA takes delivery of the first of a new breed of twin-engine airliner, the Boeing 717-200. TWA has orders for 50 717-200s with options for 50 more.
- January 10, 2001 Trans World Airlines, Inc. announced that it had reached an agreement with American Airlines, Inc., a subsidiary of AMR Corporation, in which American would acquire substantially all of TWA's assets. The asset purchase agreement included TWA's jet aircraft as well as numerous routes and gates throughout the TWA system and significant maintenance facilities. The agreement protected air service in St. Louis and maintain St. Louis's role as a major transportation center. The agreement also called for American to offer employment to almost all of TWA's 20,000 employees.
- October 2001 TWA Terminal is officially closed.

## **PART II: DESCRIPTIVE INFORMATION**

### **A. Site**

The TWA Terminal is located adjacent to the International Arrivals Building and Airlines Wings, at the apex of a curve in the airport service road. It is fronted by two roads and a canopy structure built in 2000 to shelter waiting passengers. The elevated tracks of the Sky Train wind in front of the Terminal without a connection; the nearest stop is the one at Jet Blue Terminal 6.

### **B. Main Terminal**

#### **1. Exterior**

The TWA Terminal 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”. The 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.<sup>41</sup>

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.

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<sup>41</sup> Christopher Hart Leubkeman, *Form Swallows Function*, Progressive Architecture (May, 1992): 106-108

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 become the floor of the mezzanines inside. White elastomeric coating was applied to the roof in 1999 to prevent 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.

## **2. Interior**

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 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 south and the ticketing areas (once baggage claim) to the west. The new baggage claim and other baggage handling equipment are in a subsequent addition at the far west end of

the building. The 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 south and north 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 north 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 south 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.

**C. Connector Tubes**

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 carpet floor. The newer, north tube is slightly wider in section and shorter (232 feet), than the south tube (272 feet).

**D. Flight Wings and Departure Lounges**

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 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 they 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 the Flightwing 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.

### **PART III: SOURCES OF INFORMATION**

#### **A. Historic Architectural Drawings**

Saarinen Construction Documents  
Source: Avery Library  
Location: Columbia University

Saarinen Construction Documents  
Source: Roche-Dinkeloo Archives  
Location: Yale University

Saarinen Construction Documents  
Source: Port Authority of New York and New Jersey  
Location: Hangar 12 at JFK Airport

Site Plan  
Source: Bodouva Architects  
Location: New York, NY

#### **B. Interviews**

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#### **PART IV: PROJECT INFORMATION**

The proposed Terminal 5/6 Redevelopment Project at John F. Kennedy Airport is part of the proposed John F. Kennedy Airport Redevelopment Project undertaken by the Port Authority and its airline and airport partners. The Terminal 5/6 Redevelopment Project will involve the restoration, rehabilitation and adaptive reuse of the historic TWA Terminal. The scope of the redevelopment will involve the probable demolition of the west tube, the west flight wing, and the east flight wing. Construction of the new 625,000-square-foot terminal designed by Gensler architects is slated to begin in 2005, and projected to open in 2008. It will be occupied by Jet Blue Airways. The exact scope of the restoration and the exact time frame of the restoration is not known at the time of issuance of this report.

The HABS documentation was undertaken by Beyer Blinder Belle Architects as one of the stipulations of the Memorandum of Agreement among the Port Authority of New York and New Jersey, the New York State Historic Preservation Office, the Federal Aviation Administration, and the Advisory Council on Historic Preservation, pursuant to 36 C.F.R. Part 800, regulations implementing Section 106 of the National Historic Preservation Act.

Richard Southwick was the principal in charge of the HABS Documentation.

Historical Documentation, **Part I:**

- A.1** Prepared by: Maya Foty  
Affiliation: Beyer Blinder Belle Architects  
Date: November 2004
- A.2** Prepared by: Ward Dennis  
Affiliation: Higgins Quaisebarth Historic Consultants  
Date: June 2000
- B** Prepared by: Maya Foty  
Affiliation: Beyer Blinder Belle Architects  
Date: November 2004
- C** Prepared by: Ward Dennis  
Affiliation: Higgins Quaisebarth Historic Consultants  
Date: June 2000
- E** Prepared by: Ward Dennis  
Affiliation: Higgins Quaisebarth Historic Consultants  
Date: June 2000

Historical Documentation, **Part II:**

Prepared by: Maya Foty  
Affiliation: Beyer Blinder Belle Architects  
Date: November 2004

Measured Drawings:

Prepared by: Maya Foty and William Haskas  
Affiliation: Beyer Blinder Belle Architects  
Date: October 2004 –February 2005

Photographs:

Prepared by: Peter Brandt  
Affiliation: Architectural Imaging  
Date: October and November 2004, January and April 20