Edition Axel Menges GmbH
Esslinger Straße 24
D-70736 Stuttgart-Fellbach
tel. +49-711-574759
fax +49-711-574784

Opus 64

Skidmore, Owings & Merrill, International Terminal, San Francisco International Airport

With an introduction by Anne-Catrin Schultz and photographs by Timothy Joseph Hursley. 60 pp. with 60 ill., 280 x 300 mm, hard-cover, English

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Distributors

Brockhaus Commission
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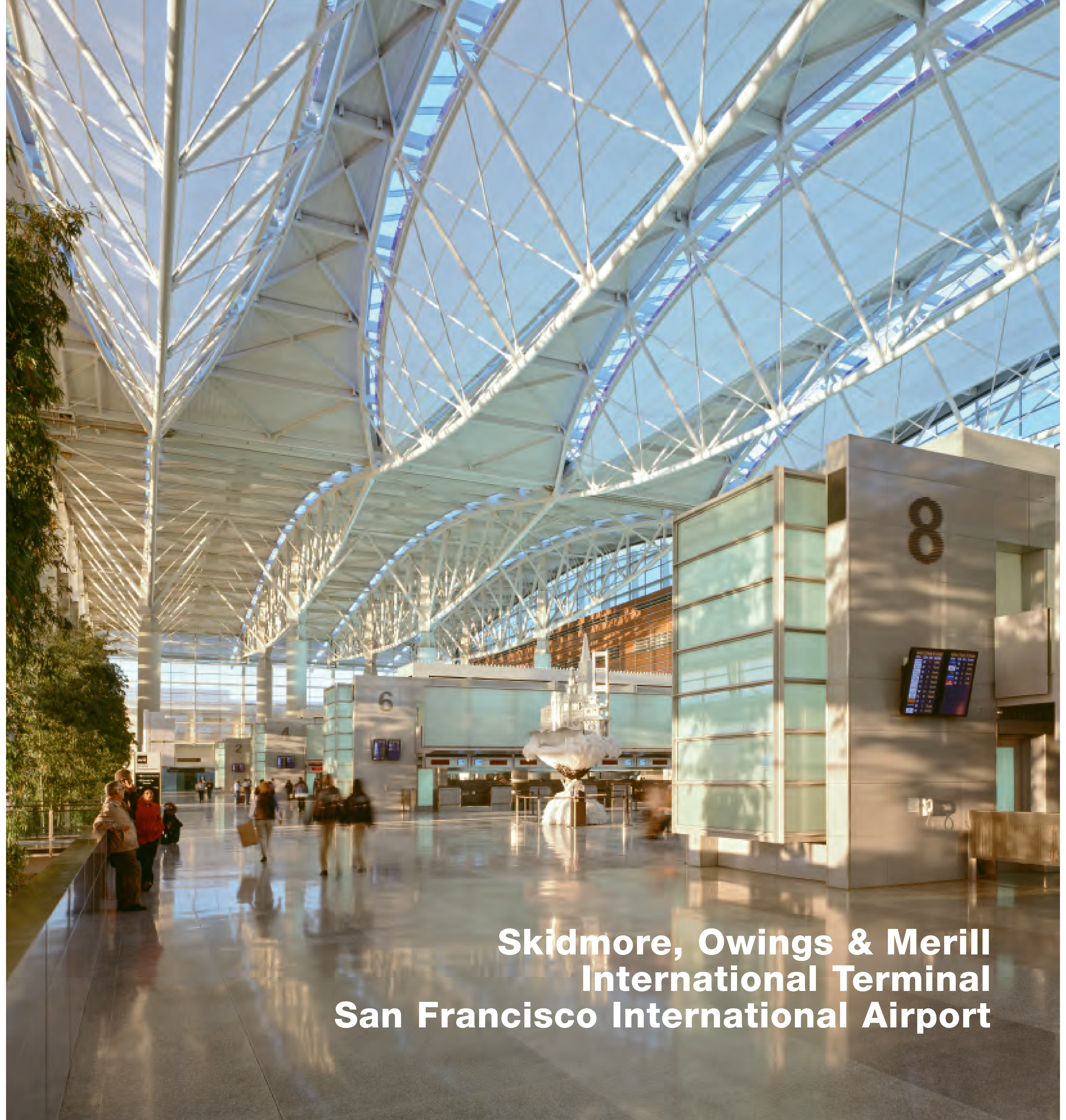

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International Terminal
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Space, structure and light

Skidmore, Owings & Merrill – a brief history

In 1936, after founding the architecture firm in Chicago, Louis Skidmore and Nathaniel Owings added John Merrill in 1939, embarking on a tradition of interdisciplinary collaboration. By then, the New York office had begun operations and the firm was catering to corporate clients with an emphasis on clean lines and functionality. Skidmore, Owings, and Merrill's portfolio of built projects, with its diverse formal language that specifically addresses each building designed, illustrates that the firm has always embraced modernism. Henry-Russell Hitchcock writes in 1961 »that SOM's architecture, beginning particularly with Lever House, is generically Miesian, is a widely accepted but by no means accurate position. They were certainly not especially Miesian in their earliest years of production; before 1950, their approach to design was closer, perhaps to that of Gropius«.[1] The Museum of Modern Art exhibition of 1950 attributed to SOM »the discipline of modern architecture and the discipline of American organizational methods«.[2] Myron Goldsmith who, after having studied and worked with Mies van der Rohe, became partner in 1955, coined the term structural architecture and states:

»To the true structural architect, moreover, a building should be built with economy, efficiency, discipline, and order. The resulting architectural form should reflect these requirements. Thus a building should be a coherent work of structural art in which the detail suggests the whole and the whole suggests the detail.«[3]

Over the years, innumerable designers, architects and engineers contributed to a complex SOM style that has evolved as 20th-century architectural history has unfolded. Nathaniel Owings interests were based on the search for an American aesthetic; his concerns seem more valid than ever:

»Primitive man could do little to change the broad world that surrounded him. Modern man has imposed the products of his system upon nature in the form of buildings, roads, pollutants. He has extinguished plant and animal species. He has altered nearly every facet of his surroundings. He cannot help but continue to do so – and in doing so, he will continue to alter himself. The question is not whether he should alter his environment, but whether he is going to alter it for good or for ill. I have the conviction that whatever his other needs may be, man in order to be happy, is compelled to express his love of beauty. Man's special need is to find and proclaim beauty in the manner in which he orders his surroundings.«[4]

While studying architecture in Paris in the 1920s, Louis Skidmore became involved in planning the »Century of Progress« exposition scheduled for 1933 in Chicago. Upon his eventual appointment as the chief architect for the exposition, he hired his brother-in-law, Nathaniel Owings, to help him with the design. This project established long-term client relationships which subsequently led to numerous projects. Their work on the Chicago exposition also led Skidmore and Owings to win the contract to design the 1939/40 New York's World Fair. By the early 1940's the firm had established guiding functional and qualitative principles for the architectural designs they produced. By 1950, the firm had seven partners including Gordon Bunshaft who assumed leadership of the New York office with a staff of approximately 40 designers and architects. Myron Goldsmith joined SOM's San Francisco office in 1955 and transferred to Chicago in 1958. In the 1940s and 1950s SOM established its role as America's representative for modern architecture. In addition to architecture, SOM offered engineering services and often included interior design in its contracts, allowing control over the entirety of buildings from designing the structure and the skin to selecting furniture and artwork for corporate clients.

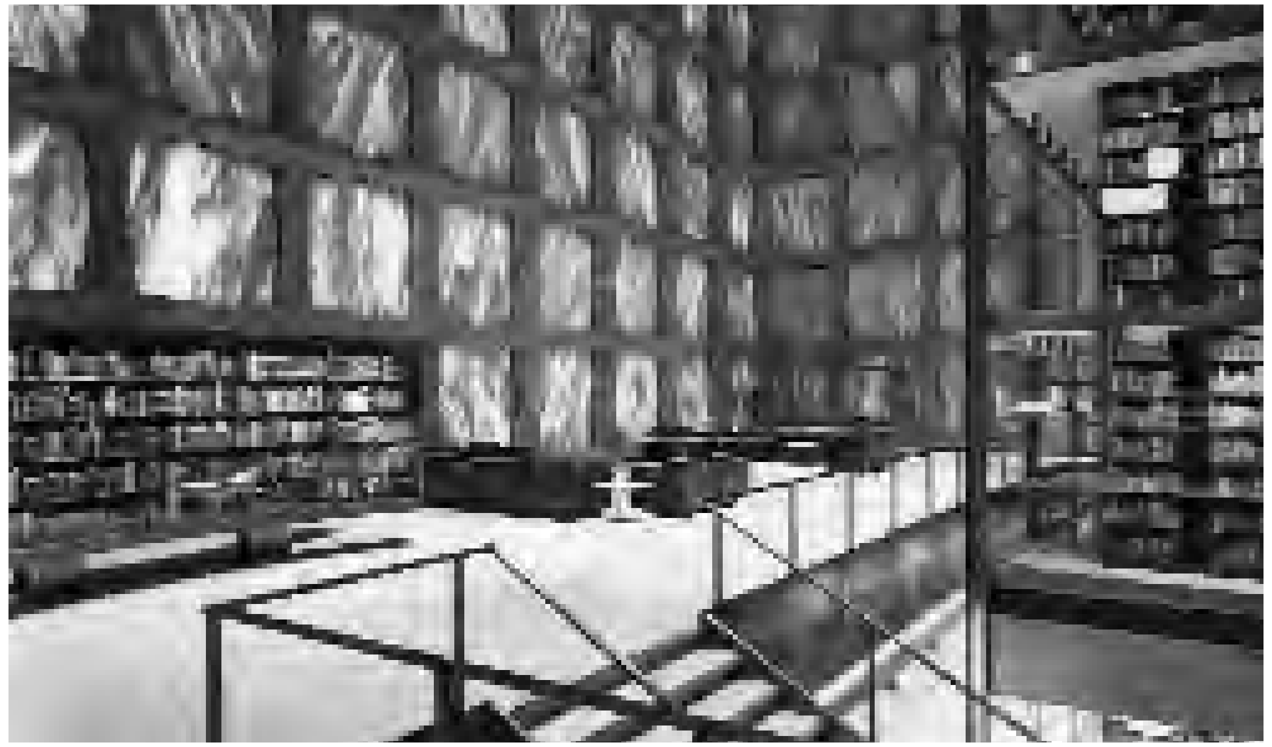
While the firm's philosophy fosters a collaborative approach within the office, single architect's names have become connected to several landmark buildings. One of SOM's best known projects, the Lever House in New York (1951/52), embodies the values of the 1950s with a street-level plaza inviting the public into the building and composed of two intersecting volumes arranged to form an open court bringing light into lower levels. Lever House is attributed to Gordon Bunshaft's design leadership and served as a prototype for many curtain-walled slab skyscrapers to emerge in the west.[5] Bunshaft was working on developing an American response based on the formal innovations of Le Corbusier and Mies van der Rohe.[6] The Chase Manhattan Bank in New York (1957 to 1961), also known as a work of Gordon Bunshaft, is referred to as one of the highpoints of center city urban transformation during the 1960s, it includes a public plaza on the first level featuring a sunken pool and a sculpture by Isamu Noguchi introducing the concept of including an art collection as part of the interior design. Walter Netsch's name is connected to the large complex of the US Air Force Academy in Colorado Springs, Colorado (1954–62). The design for an entirely new city, Oak Ridge in Tennessee for the Manhattan Project, started in 1942, caused the office to expand in size and capacity (450 men) and laid an organizational foundation for complex and extensive commissions. Commissioned by the Army Corps of Engineers, the Oak Ridge project included the town plan, housing for 3 000 families and public facilities. The broad range of projects in the first decades of SOM's practice illustrates an early diversification and capability to apply rigorous design principles to complex multifunctional projects.

The Istanbul Hilton Hotel (1952–55), designed and executed in association with a Turkish firm, Sedat Eldem, combines modern architecture with traditional and regional references. In 1965 SOM designed the Brunswick Building in Chicago, the entire campus at the University of Illinois at Chicago, and the library and museum at the Lincoln Center for the Performing Arts in New York.

The range of work executed by SOM also includes Yale's Beinecke Rare Book and Manuscript Library in New Haven, Connecticut (1960–63). The firm created a space of almost spiritual quality for rare books. With its gray and rust-veined marble slabs imbedded in a concrete framework, it is the built metaphor of a jewel chest for books.[7]

The 1970s and 1980s brought years of great success for the firm as it extended its reach overseas. These were the decades of the developer-built urban office tower, often featuring mixed-use functions on irregular urban sites. Instead of corporate, representative headquarters filled with contemporary art, the goal became supplying maximum rental space at low cost. »Still, SOM's buildings continue SOM's commitment to originate beautiful form from technology and to perfect each building's total performance.«[8]

1. Lever House, New York, 1951/52. (Photo: Ezra Stoller, Esto.)
2. Chase Manhattan Bank, 1957–61. (Photo: Ezra Stoller, Esto.)
3. John Hancock Center, Chicago, Illinois, 1965–70. (Photo: Ezra Stoller, Esto.)
4. Hajj Terminal, King Abdul Aziz International Airport, Jeddah, Saudi Arabia, 1975–83. (Photo: Jay Langlois.)
5. Beinecke Rare Book and Manuscript Library, Yale University, New Haven, Connecticut, 1960–63. (Photo: Ezra Stoller, Esto.)



While SOM might be best known for corporate signature urban buildings in cities' downtowns, the firm's repertoire includes several projects that integrate preservation efforts into the architectural work. The Art Institute of Chicago[9] (1970) offers a good example in which Louis Sullivan's trading room has been relocated, conserved and reconstructed as part of the expansion that was designed by Walter Netsch in the early 1970s.

Also in Chicago, SOM designed the John Hancock Center (1965–70), a mixed-use complex tapered from bottom to top (with structural-engineering partner Fazlur Khan under the lead of architectural design partner Bruce Graham) and the 110-story Sears Roebuck Tower (1968–74). Economic conditions in the early 1970s, led the firm to work outside of America, which helped bridge the years between 1975 and 1977, years of economic downturn in America. In 1975, Saudi Arabia commissioned the firm to design Jeddah's International Airport and Hajj Terminal, a project that integrated foreign cultural context with the firm's rational approach. »The Hajj Terminal drew upon both SOM's New York and Chicago offices in a search of a cultural metaphor, assisted by new technology and computer analysis.«[10] The many international commissions begged the question of a globalized formal language. Corporate clients' interests often suggested a symbolic representation for their buildings combined with a request for maximum flexibility, while the architect's responsibility remained to produce designs integrating the economic and political interests with the regional culture of a site.

The National Commercial Bank in Jeddah, Saudi Arabia (1977–84), demonstrates a regional response to context. Instead of a glass-curtain wall, the building exhibits three solid façades that protect the interior from the intense sunlight. In addition, these façades are broken up by multi-story openings. »The building's pure triangular volume, a minimalist sculpture rising from the flat landscape, comments on the transparent modernist prism, but now translated into the taut planarity of travertine. At the same time, the triangle's reiteration at the scale of the paving patterns and the opulent materiality recall motifs of Arabic culture in a nonliteral way.«[11]

Clientele transformed from owner occupants who commissioned a design »from master plan to ashtray«[12] to investor clients whose buildings became increasingly defined by the skin, crown and lobby design. SOM retained its high standards for execution in a multi-disciplinary collaborative practice. In addition to corporate headquarters and transportation projects, the research and design of urban regeneration and renewal areas played an increasing role in SOM's projects. Its offices were early adopters of computerization for drawings, the analysis of structural performance data, and the administration of the construction process.

By the mid-1980s, SOM offered a wide range of services and opened an office in London. The firm had built the AT&T Corporate Center[13] – a granite-clad high rise in Chicago; the Rowes Wharf in Boston[14] – a complex of offices, condominiums, restaurants, shops, parking, a hotel and health club; and among other projects the Canary Wharf complex in London.[15] The formal language subscribed to, especially in the Chicago, Washington and New York offices, speaks the post-modern dialect of their times, often with »punched« stone and glass façades having replaced the metal and glass curtain walls from earlier times. In San Francisco SOM built the Crocker Center, the Federal Reserve Bank, and 388 Market Street, all representing the same formal tendencies but making important statements about the relationship between building and city.

At the end of the 1980s, a spike in interest rates and a vast oversupply of commercial office space in the United States caused declining commissions and considerable downsizing of SOM's operations. Concurrently, a new generation of SOM partners came into power and with them an intellectual and artistic shift in the firm's practice. Then, in the mid 1990s a rejuvenated SOM had begun building upon diversity of geography and building typology. The firm particularly focused on the design of high-density urban mixed-use complexes, university campuses, cultural/civic buildings and transportation facilities. Throughout its history, SOM has retained a flexible approach to design and an office structure combining capabilities of diverse team members. After the millennium, SOM finds itself at the forefront of contemporary building with its high-profile involvement in many landmark urban projects, including 7 World Trade Center in New York and One World Trace Center, the Freedom Tower, on the World Trade Center site in New York. The booming economy in Asia has resulted in tremendous construction activities, with a seemingly endless demand for office towers, transportation structures and multi-use complexes. In the Middle East, Burj Dubai, the tallest building in the world, is under construction, to be completed in 2009.

While this brief look into examples from SOM's long history can by no means be complete, it lays the groundwork for understanding the project this monograph is featuring, the 2001 International Terminal at San Francisco International Airport, designed by Craig Hartman from the San Francisco office.

The San Francisco office was started by Nathaniel Alexander Owings in 1947 as a third office after the offices in Chicago and New York. Today the office features open studio spaces on the 24th and 25th floors of a SOM high-rise completed in 1980 (formerly 444 Market Street, now 1 Front Street), in the center of the city's financial district. The office organizes its jobs according to an internal principle that is true to all SOM offices: the development of every project, from concept through construction, is led by the design partner and a managing partner. The projects are coordinated and developed by three senior leaders: a project designer works with the design partner and studio design teams in the development of the overall design strategy and aesthetic details, a project manager takes care of the business considerations working with the managing partner and a technical designer is in charge of the project's technical development.

The office had a strong hand in shaping the city of San Francisco. The office building for the Crown Zellerbach Corporation[16] (1957–59) built on a triangular site downtown, is a piece that marries urban-landscape design, tying together a low-rise pavilion and a mid-rise office structure in a park-like setting. Built in 1969, The Bank of America headquarters[17] with its granite façade remains a dominant player in the San Francisco skyline. Many more buildings of lesser profile but fine quality in San Francisco are products of this office such as the Bechtel Building on 45 Fremont Street[18]; Five Fremont Center[19]; The Federal Reserve Bank of San Francisco[20]; the Crocker Center and Galleria[21]; and the Louise M. Davies Symphony Hall[22].

Most of SOM's recent contributions to San Francisco's cityscape are in the South of Market and Mission Bay area. This previously industrial landscape is undergoing a transformation into mixed use, high-density cultural, residential and institutional neighborhoods. SOM's first intervention here, in the mid 1990's, was the restoration, adaptive reuse and addition to the US Court of Appeals[23], a national historic landmark structure.

More recent is the office tower on Second and Mission Streets[24] (1998–2000), with its light sandstone façade, white mullions, and simple lines in its fenestration and canopies. In the same area south of Market, the St. Regis Museum tower[25] was completed in 2004. At a prominent street corner on 3rd and Mission, adjacent to the San Francisco MOMA and Yerba Buena Gardens, the St. Regis incorporates the historic Williams Building's brick façade into its design. The mixed-use tower houses MoAD, the Museum of the African Diaspora, the St. Regis Hotel and is topped with condominiums. The tower is wrapped in a precast concrete cloak, variegated in color and reminiscent of a woven textile, draped over the building and pulled back to reveal the glass corners of its center. The center glass shaft is expressed fully at the skyline where it culminates in layered translucent veils, capturing San Francisco's dramatic light.

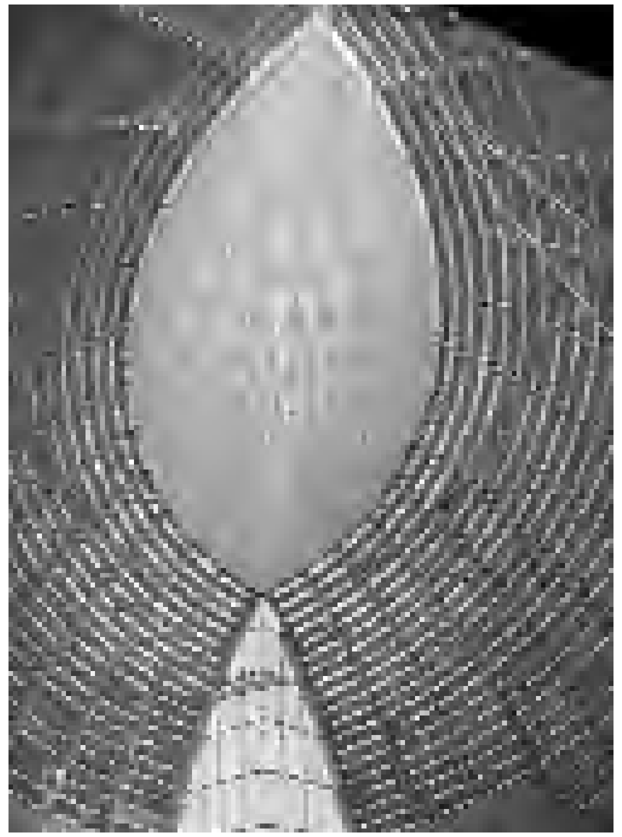
With the Beacon housing complex[26] (2003) in Mission Bay, and the UCSF Mission Bay Campus housing complex[27] (2005), SOM made its mark on large-scale housing development in San Francisco. The Beacon covers two city blocks of formerly industrial city fabric. On the first floor, retail fronts the street and wraps parking while the interior courtyard on the podium level features a social hall, a swimming pool with gym, and communal spaces. The housing at UCSF is comprised of slender, light-filled residential bars which knit the new campus together with a series of courtyards and retail at the base. Across the Bay in Oakland, the iconic Cathedral of Christ the Light[28] is under construction at the shore of Lake Merritt. In this ambitious structure, a veil of glass contains a large inner wooden vessel as a place of worship and serves as a beacon for the surrounding neighborhoods and a new civic precinct for the City of Oakland.

SOM had an early start in designing airport passenger terminals, an example being the International Arrivals Terminal at John F. Kennedy International Airport in New York, starting construction in 1955[29] (now demolished). The wide open space of the terminal building could be seen as the inspiration for the great hall in the San Francisco International Terminal; the SFO terminal, while even more open and vast, expresses the same aesthetic rational. SOM has remained involved in the development of JFK International Airport, completing Terminal Four[30] in 2001. In 1998 the New York office began planning the expansion for Ben Gurion Airport[31] in Tel Aviv with a new international terminal (together with Karmi Architects of Jerusalem and Moshe Safdie and Associates), creating a gateway that reflects the country's cultural heritage. The Hajj Terminal in Jeddah[32], provided another version of a large, unencumbered space, in this case covered by a tensile fabric-roof structure.

San Francisco International Airport history

The Mills Field Municipal Airport of San Francisco dedicated in May 1927, was the site selected over nine other locations in and around the city. Studies later confirmed that it was an adequate location for its weather conditions. At the time the lease was signed for the 150-acre parcel on the Mills Estate, most of the San Francisco Peninsula was still pastureland. One other detail deserves mentioning: there had been a vision to construct an airfield on top of high-rise buildings along the Embarcadero in downtown San Francisco, an idea that was spun in many other cities at the time.[33] The need for an airport for the city had been discussed for years, but the passing of the Air Mail Act in 1925 added urgency. Under the Air Mail Act US Mail service was transferred from the federal government to private operations, and many cities saw the opportunity to assume contracts for the

6. National Commercial Bank, Jeddah, Saudi Arabia, 1977 to 1984. (Photo: Wolfgang Hoyt, Esto.)
7. Crown Zellerbach Building, San Francisco, California, 1957–59. (Photo: Morley Baer.)
8. Cathedral of Christ the Light, Oakland, California, 2000 to 2008.
9. International Arrivals Terminal, John F. Kennedy International Airport, New York, 1955–58. (Photo: Ezra Stoller, Esto.)



mail service, but they needed to provide the necessary facilities.

»The Airport owes its location to the son of one of the Peninsula's wealthiest and most land-rich residents, Daris Ogden Mills. His son, Ogden, leased the City the land for the first airport at a price amounting to a gift. Through Mills, San Francisco Airport connected with the Gold Rush.«[34]

Construction on the site began with grading for the airfield and its three runways. In 1927, the first administration building – considered a temporary structure – was built in residential style with red cedar shingles and re-sawn redwood siding painted white. The building was moved 10 years later to make space for a new administration building. The first building initially served as sleeping quarters for incoming pilots and staff and housed office space, a telegraph room, a radio room, a public waiting room and a meteorological room, all on a single floor. The building's residential double-hung windows did not necessarily indicate a relationship to the runway nor evoke far flung destinations. Also in 1927, hangar one was erected to the south, using a steel frame fastened with nuts and bolts to allow for disassembly and relocation (hangars two, three, and four followed in the same manner). The airport's early days were celebrated by events like the one on April 19, 1930, when the US Army Air Corps held an »air circus« that attracted a large number of visitors. The airport's dedication on May 7, 1927 was followed by the airport's first historic moment that same year, on Sept. 16, 1927, when Charles A. Lindbergh landed in his plane, the *Spirit of St. Louis*, the first of many visits he made to San Francisco to promote the future of aviation. During its first month of operations, the airport counted 15 passengers.

In 1930, the airport became a permanent city utility when San Francisco purchased the property from Ogden Mills. Commercial service began in earnest in 1931 when Century Pacific Lines announced a new Pacific Coast air service making San Francisco the northern terminal. »Ten airplanes began flying an almost hourly schedule on July 3, 1931.«[35] Despite the commercial undertakings, the airport continuously struggled for financial survival. In 1931, administrative responsibilities were placed under the authority of a new Public Utilities Commission. The name was changed to »San Francisco Airport«. By the 1930s flying had surpassed rail service in speed and had become a popular means of traveling; it was in this decade that commercial aviation took off and San Francisco saw nearly 30 000 passengers in 1933.

1935, large four-engine seaplanes had begun commercial air service across the Pacific to Asia, which started global international flight. San Francisco responded with improvement projects in the mid 1930s: 38 acres reclaimed from tidelands for better wind orientation.

In 1936, a first industrial tenant moved in, a manufacturing plant for »fivvers« – two seater planes designed for the private market, but the business failed after one year.

Begun in 1936, a new administration building opened in 1937. The building was designed in the Spanish colonial style by H. G. Chipier (construction overseen by George D. Buir of the SF Public Utilities Commission). The terminal was intended to serve both flying boats and land-based aircraft and offered services very similar to those of a railroad station.[36] The building housed a four-storey control tower, a meteorological observation platform, weather department offices and a main passenger waiting room next to ticket counters, a restaurant, a cocktail lounge, a cigar counter and telegraph and telephone offices.[37] »Large airy arcades and vestibules defined the entrances, and a grand staircase led to the mezzanine. The stair and balcony railings were done in antique wrought iron that matched the lighting fixtures, and two chandeliers hung from the stenciled ceiling. The woodwork was oak, the countertops were of Belgian black marble travertine, and the floor was patterned in four-color terrazzo.«[38] In the 1940s modifications were made to the passenger lobby to accommodate increasing demand.

A freely interpreted replica of the space can be seen in the San Francisco Airport Commission Aviation Library & Louis A. Turpen Aviation Museum within the 2001 International Terminal, designed by Fong & Chan architects of San Francisco.

From 1939 to 1940 Goat Island, later named Treasure Island, housed the San Francisco World's Fair and also served as a seaplane base for Pan American Airways' trans-Pacific service. This manmade island later became a Navy base and is now being converted to one of the nation's most ambitious environmentally sustainable communities in a plan led by SOM.[39] A similar seaplane harbor had been considered for the San Francisco Airport but was abandoned due to cost. The idea was revitalized in 1940 at SFO, along with a Coast Guard Air Station; a seaplane harbor and channel was constructed while the second phase of runway extension took place. These additions required 300 acres of additional fill.

With the bombing of Pearl Harbor in 1941 and the United States entering World War II, San Francisco became an important strategic airport. After the war, more carriers established services to and from San Francisco. Demand for increased capacity intensified, flying having been embraced by business and leisure markets, thereby involving a larger sector of the population. Increased financial support for the airport attracted foreign airlines and in 1945 the airport's name was changed to »San Francisco International Airport«.

When the passenger volume exceeded one million between 1947 and 1948, it was time for another large expansion. In 1954, another new terminal building was dedicated, a two-level structure with the upper level for departures and the lower level for arrivals, separate roadways at each level. Extended program functions including immigration, public health services and custom areas were integrated into the structure. The restaurant »International Room« celebrated views of the airfield and retail entered the airport experience. A couple of years later, jet engine technology and the growth of passenger volume demanded new spatial needs which was met by adding the South Terminal to the 1954 structure. In 1958 SOM entered the airport's building history by executing the United Airlines maintenance hangar, a hangar built to house four DC-8 jet planes. During the same year, the United Airlines Wash Hangar was built (since demolished) to shelter one DC-8 jet plane from weather as it is washed. Myron Goldsmith was SOM's chief architect and chief structural engineer for these two buildings.[40] By 1962 SFO was the fourth busiest airport in America and had been extended continuously since it was first inaugurated. Airline and postal facilities as well as parking garages were added. In 1973, the Public Utilities Commission adopted a master plan proposal and in the following years several boarding areas were added. Eventually, the authority for the airport was transferred to the newly created Airport Commission appointed by the mayor of San Francisco. The airport continued to expand its services and to update its facilities, including extensive renovations to the central terminal, the additional boarding area »D« and the expansion of the parking garages in 1983.

Airport terminals have no direct precedent in the history of transportation architecture. After humble beginnings as clubroom-like sheds, airport terminals often adopted the formal language of railroad stations. As a gateway building the terminal functions as a physical network, a »placeless city«.[41] Terminal buildings accommodate the feeling of homecoming as well as exploration of far away destinations by offering a visual landmark. The building itself remains a non-place, »being in transit«. The contemporary traveler is proud to feel at ease everywhere in the world, neutralizing the connection of place to the local community. The time spent in an airport terminal combines hurried anxiety to meet a fixed schedule with extended periods of waiting. Necessities include easy access to food and drinks, magazines and books, internationally legible way finding and as much connection to daylight as possible. With the airplane having become a commonplace means of mass transportation, the distinct exclusivity of the early days has vanished. Intensified security measures conflict with the requirements for large spaces for waiting, boarding, and deboarding. A typology that could be called an organizational bottleneck has become ever more extreme and time spent in airport terminals has adopted an official, serious atmosphere. Still, for many travelers, the sense of flying holds the promise of going to an unknown land and offers a sense of adventure and exploration, while for others, maybe frequent business travelers it is just an extension of their office.

Besides the obvious essentials, services offered by the terminal might become less crucial, since travelers increasingly carry their own virtual world – their work and entertainment in their cell phones and laptops. These virtual spaces are their home and a formally »foreign« place of an airport terminal in any city of the world becomes a container for these individual worlds.

Koos Bosma developed classifications[42] for airport typologies as they developed over time. While he concentrated his study on European airports, his findings can be applied to the San Francisco International Airport as well. His first generation airports are generic shacks along the airfield, and the second and third generation are called the »green marinas« which introduce a monumental approach to the buildings receiving planes from the water and the air. Increasing separation of the building and the runway made passengers walk longer and longer distances, prompting the introduction of transportation systems between terminal and aircraft in the fourth generation terminals. Fifth generation terminals developed more and more into a showcase striving to minimize the distance between the car and the plane. The new San Francisco terminal clearly belongs to the sixth generation of airports which includes such recent icons as Stanstead Airport north of London and the new Kansai International Airport in Japan. Both fifth and sixth generation terminals are designed as vast open spaces. Koos Bosma writes:

»... these are spaces to pass through, with ambiguous social connotations, in that they are collective spaces without a feeling of communality. The space itself calls forth associations with a transparent tube or station concourse: a mixture of street and interior. Architects strive to show the construction as a universal structure, but that structure has also to be unique for the location. The spaces are bathed in brilliant light, filtered through the transparent walls. The terminal roof, often easier for passengers to observe than other elevations, becomes a fifth façade, and such is an essential part of the spatial composition.«[43]

10. Aerial view of the airport site in 1929. (Photo: San Francisco Airport Museums Collection.)
11. Aerial view of the airport site in 1938. (Photo: San Francisco Airport Museums Collection.)
12. Aerial view of the airport site in 1961. (Photo: San Francisco Airport Museums Collection.)
13. The first administration building of the airport from 1927. (Photo: San Francisco Airport Museums Collection.)
14. The administration building of the airport from 1937.
15. Aerial view of the airport in 1961. (Photo: San Francisco Airport Museums Collection.)

San Francisco International Terminal – gateway to the Pacific

In 1993, the process was initiated for another series of improvements and expansions to the airport. A competition was launched for numerous projects for the San Francisco International Airport. An existing master plan was given, lacking the architectural design of the centerpiece – the new International Terminal, an icon for the arrival in San Francisco and a gateway both to the airport itself and the Pacific. The site foreseen for the building suggested flight itself, an air site extending over a 360-foot-wide airport access road. The new terminal was expected to act as a transfer point for multiple modes of ground transportation, including BART (Bay Area Rapid Transit), a light rail connecting to the domestic terminals and Cal Train as well as parking facilities and car and bus traffic. The light-rail system was intended to pass through the center of the new terminal building, a structure flanked by parking structures. A complex set of program requirements included the separation of ground level security, baggage and service vehicles; organized flow and interconnection of custom Federal Inspection Services at arrival and departure levels; organized flow of passenger access on the departure and arrival level, all integrated with curb-site requirements. One of the most demanding constraints was to keep the existing roadways, which pass through the center of the site, functioning for the duration of construction. While the design task carried a strong symbolic burden, it also had to address serious practical concerns posed by the site. Located on fill, the site geology posed challenges for seismic design. The ground consisted of bay mud laying over sand, silt, clay and soft rock with bedrock located at 90'–150' below grade. Located in the most severe earthquake zone in the United States, the building is expected to continue operations after an earthquake of a magnitude 8 on the Richter scale suffering no structural damage and only minor architectural damage.

Skidmore, Owings & Merrill, LLP (SOM), in joint venture with Del Campo & Maru and Michael Willis and Associates won the 1993 competition for the most visible piece of the improvements planned, the international terminal. The scope and program required uniting not only multiple disciplines but also different firms into one team.

The master plan and the terminal's organization were significantly adjusted by SOM during schematic design process including the relocation of the light rail to the side of the terminal instead of cutting through the center. A stop of the Bay Area Rapid Transit (BART) system was integrated later in the process and links with the building on its north side. The parking garages (that in the competition block the view of the terminal) were relocated to the sides of the new hall as well. Both actions improved the clarity and simplicity of the complex from both an aesthetic and organizational standpoint.

The new terminal design is characterized by a large glass-enclosed volume, the »great hall« – 215 m (705 feet) long, 64 m (210 feet) wide and up to 25.3 m (83 feet) high. The volume is covered by a 262 m (860 feet) long wing-like roof structure oriented north–south and a 213.4 m (700 feet) long and 24.4 m (80 feet) tall glass wall. In addition to visual allusions to a wing shape, the building lifts off the ground and bridges the roadway; it seems to be flying itself.

The 180 000 m^2 terminal is organized into five levels, making it America's first mid-rise terminal. Its form is determined by its structural system, a design paradigm that defines many successful terminals of the last decades. The lowest level (level 1) is divided by the pass-through of the access roadways beneath the terminal and houses airside operations, baggage facilities (boarding gates A and G) as well as ground transportation pick-up areas. This level also provides a drop-off zone for tour buses and a lobby for check-in by tour groups with their baggage.

On level 2, incoming passengers claim luggage at twelve baggage carousels positioned within the secured customs facility. A transit corridor along the east of the building leads to the domestic terminals. Passengers arriving at the International Terminal proceed without changing level to domestic terminals. On the west side

16. Aerial view of the airport site in 1999. (Photo: San Francisco Airport Museums Collection.)

of the floor plan, passengers exit the baggage and immigration area and are offered a glimpse of the light-filtering roof trusses above as they exit into the arrivals lobby.

Level 3 includes the great hall with double-sided ticket islands, retail areas, and the BART station connecting to local transit. After check-in, passengers proceed through security to new concourse boarding areas. Level 4 gives access to ART, the Automated Rail Transit system ferrying passengers to the domestic terminal, rental car facilities and parking garages. One of the lines of ART, the red line, runs in a closed loop through all terminals and illustrates the circular organization of the airport. The ART stations adjacent to the International Terminal on both sides tuck under the wing tips of the large roof overhang and occupy the joint to the adjacent building components of the airport. Level 5, the highest occupied floor, is the top floor of the two-story wood-clad office block that is located above the main north-south passenger concourse.

The prime objective of a contemporary airport terminal has been met with precise clarity: All modes of transportation are interacting seamlessly and offer efficient points of exchange. The separation of arrival and departure effectively manages the cross flow of passenger with the dedication of adequate space for linear circulation. Arranging parking and rail systems to tangential points leaves the main volume undisturbed and open for pedestrian organization. The BART station that connects to the Bay Area provides direct pedestrian connection to the ticket counter hall and is accessed through elevators and escalators from the arrivals lobby. Well-lit linear circulation zones and escalators with numerous view connections to the vertical organization of the building allow intuitive orientation. The architects were involved in the design at all scales including spaces, surfaces, fixtures and the signage creating a consistent impression of visual continuity for a space that could easily have expressed visual chaos and discontinuity.

The collaborative approach for which SOM is known throughout its history was an excellent solution for a project this size with its integration of several firms into one team.

The great hall – space, structure, and light

The great hall on level 3 itself differs from typical terminal arrangements in which ticket counters line every available length of wall. Here, the ticket counters are arranged in parallel islands, allowing circulation to flow around them. This allows for a comb-like flow from the check-in to security check points at both ends of the building. Retail along the back wall leaves the center free for a passenger lounge. The ticket counter islands are designed with the airline offices on the second floor, an arrangement that forms thin elegant buildings within the great hall. These structures ingeniously include an efficient HVAC system that pulls in air from the back of the building and conditions the spatial layer, which is populated by people. The upper office level appears like a lantern with its opaque hallway façades that reveal the shadows of activities rushing through. These offices connect into a larger office area behind the wood wall that clads the »back« wall of the great hall volume. Natural light streaming generously through the roof reduces the need for artificial light sources during the day.

Lighting elements on the top of these ticketing bars illuminate the truss ceiling and the wood clad back wall. Behind the warm wood cladding are the administrative offices for the airport, tucked away as if they were invisibly directing operations. In order to manage a team of over 60 architects the plan was divided into a grid of 10-foot intervals which in turn could be divided into 1/8 of the overall axis width and guaranteed that corner situations lead to alignments. A system of vertical datum lines ensured matching height lines and a compositional balance in elevation as well. With this system, the architecture displays the successful creative management of a plan grid crowned by curved trusses displaying ever minimized stick work.

The roof, characterized by large lense-shaped skylights spanning between the exposed trusses, also features paired sets of double-cantilevered roof trusses.

Free of a maze of HVAC lines needing maintenance, the trusses interact only with the light entering in from above and their column supports receiving the loads. At its essence, the roof remains a simple watertight skin on top of the building.

The exterior glass wall – a direct connection to the outside at all times – features the large letters »San Francisco International« labeling the iconic structure above with a rational sign that symbolizes the clarity of everything else within the building. Fritted glass patterns prevent glare on the inside of the building and divide the façade into layers of white and gray, a play with the reflection of the sky within the picture created. Incoming sunlight bounces off sunscreens on the façade to softly light the underside of the roof structure. A large roof overhang on the south side shades the interior from direct sunlight.

In the International Terminal, structure and architecture form an inseparable entity. The main roof structure bridges the entry road with five sets of trusses, each spanning a total of 250 m (820 feet) north to south. The westernmost truss projects beyond the window wall, expressing the signature form of the building. Each set of trusses consists of two double cantilevered one-way trusses with a 24.4 m (80 feet) back span, an outside cantilever of 42.7 m (140 feet) and an inside cantilever of 30.5 (100 feet). These are linked by a center span of 54.9 m (180 feet), colloquially referred to as the »football« truss. The linkage at the truss nodes are made of a two-piece cast steel pin-joint with 152 mm (6 inch) diameter pins. The truss cord sections vary from 305 to 508 mm (12 to 20 inches) diameter with a 21 to 51 mm (0.84 to 2.0 inch) wall thickness. The trusses are made of steel tubes with T-Y-K joints connections and are made by full penetration welds. The roof trusses were assembled in the fabricator's shop and then disassembled into 35 pieces to minimize field connections.

The truss elements were shipped by barge directly to the site from the manufacturing site, the converted Naval Shipyard facility at Mare Island at the north end of San Francisco Bay. At night pieces were transported across runways in coordination with the airport operations. The five main center trusses were hoisted into their position and set below the final locations at the level 3 departures floor. Once the steel frame and main roof box columns were complete, the center trusses were hydraulically jacked into position.

Two sets of 10 columns each rise above the departure level floor creating a vast open interior space. The airport's seismic performance was achieved by isolating the structure from the foundation using seismic isolation from 267 friction pendulum-base isolators inserted at the foot of each column. The building itself offers the dampening force and inertial mass against movement generated by an earthquake. The Northridge earthquake in 1994 prompted the adoption of more stringent performance criteria while the project was in construction document phase. Friction-pendulum-base isolators consist of a five-inch diameter, polished stainless steel, concave base unit connected to the column pile cap. A Teflon-coated slider is bolted to the bottom of each column and rests in the middle of the base unit's surface. In an event of an earthquake, the mass of the building will keep the column in place while the slider is free to move across the stainless steel surface. With over 1.2 million square feet of floor area, the International Terminal is the largest base isolated building in the world. While its structural features clearly define the building functionally within the structural system and formally in all its visible elements, the program allows for purposes beyond functionality:

As visitors circulate the building, unexpected objects and displays catch the eye, testimony to a public art program that integrates permanent art pieces and also offers changing themed displays positioned in glass cubes. The skylights on the ceiling of the great hall are complemented by James Carpenter's *Four Sculptural Light Reflectors*, light diffusing tensile sculptures that interact with the incoming light and allude to the clouds above. Vito Acconci installed the *Light Beams for the Sky of a Transfer Corridor*, creating lit moments for passengers rushing to connecting flights in different terminals. The »back« of the main hall hosts a lounge in front of a mosaic of tiny canvas paintings – Ik-Joon Kangs' *Gateway*.

Numerous other works mark important points of the itinerary through the airport and ground the traveler to a community beyond.

Aesthetically, SOM has strived for perfection in structural, programmatic and functional performance. The structural members express the beauty of a well-made object. The building is dedicated to transparency not only in physical form but also in the user's perception allowing orientation during a journey that denies place rather than emphasizing it. The light and atmosphere of the Bay Area guides the traveler along their passage through the building. Openness of vernacular forms connects people to the location, as views to the bay and the surrounding hills erase any doubt that you are in San Francisco.

The San Francisco International Terminal holds true to Nathaniel Alexander Owing's statement: »I feel that if we can satisfy the need for personal expression by building a habitat in cooperation with nature – not against it – then our philosophy in SOM can have long-term relevance. We can continue to renew creative ideas which may flower in structure and habitat.«[44]

[1] Henry-Russell Hitchcock, in: *Architecture of Skidmore, Owings & Merrill, 1950–1962*, New York, 1962.
[2] Nicholas Adams, *Skidmore, Owings & Merrill, SOM since 1936*, Milan, 2006, p. 27, note 69.
[3] Werner Blaser (ed.), *Myron Goldsmith. Buildings and Concepts*, New York, 1987.
[4] Nathaniel Alexander Owings, *The American Aesthetic*, New York, Evanston and London, 1969.
[5] Henry-Russell Hitchcock, loc. cit. (note 1).
[6] Carol Herselle Krinsky, *Gordon Bunshaft of Skidmore, Owings & Merrill*, New York, 1988.
[7] Nicholas Adams, loc. cit. (note 2), p.184.
[8] *Skidmore Owings & Merrill, Architecture and Urbanism 1973–1983*, New York, 1984.
[9] Ibid. For more information see page 122.
[10] Ibid.
[11] Stephen Dobney (ed.), *Skidmore, Owings & Merrill LLP. SOM: Selected and Current Works*, Mulgrave, Victoria, Australia, 1995.
[12] Ibid.
[13] Adrian Smith, design partner.
[14] Adrian Smith, design partner.
[15] Bruce Graham, design partner (master plan).
[16] Walter Netsch, design partner, with Charles Bassett.
[17] Charles Bassett, design partner, with Marc Goldstein.
[18] Marc Goldstein, design partner.
[19] Marc Goldstein, design partner.
[20] Charles Bassett, design partner.
[21] Charles Bassett, design partner.
[22] Charles Bassett, design partner
[23] Craig Hartman, design partner.
[24] Craig Hartman, design partner.
[25] Craig Hartman, design partner.
[26] Brian Lee, design partner.
[27] Craig Hartman, design partner.
[28] Craig Hartman, design partner.
[29] David Brodherson, »›An Airport in Every City‹: The History of American Airport Design«, in John Zukowsky (ed.), *Building for Air Travel, Architecture and Design for Commercial Aviation*, Munich and New York, 1992, p. 88.
[30] David Childs, design partner.
[31] David Childs, design partner, with Roger Duffy.
[32] Gordon Bunshaft, design partner, with Fazlur Kahn.
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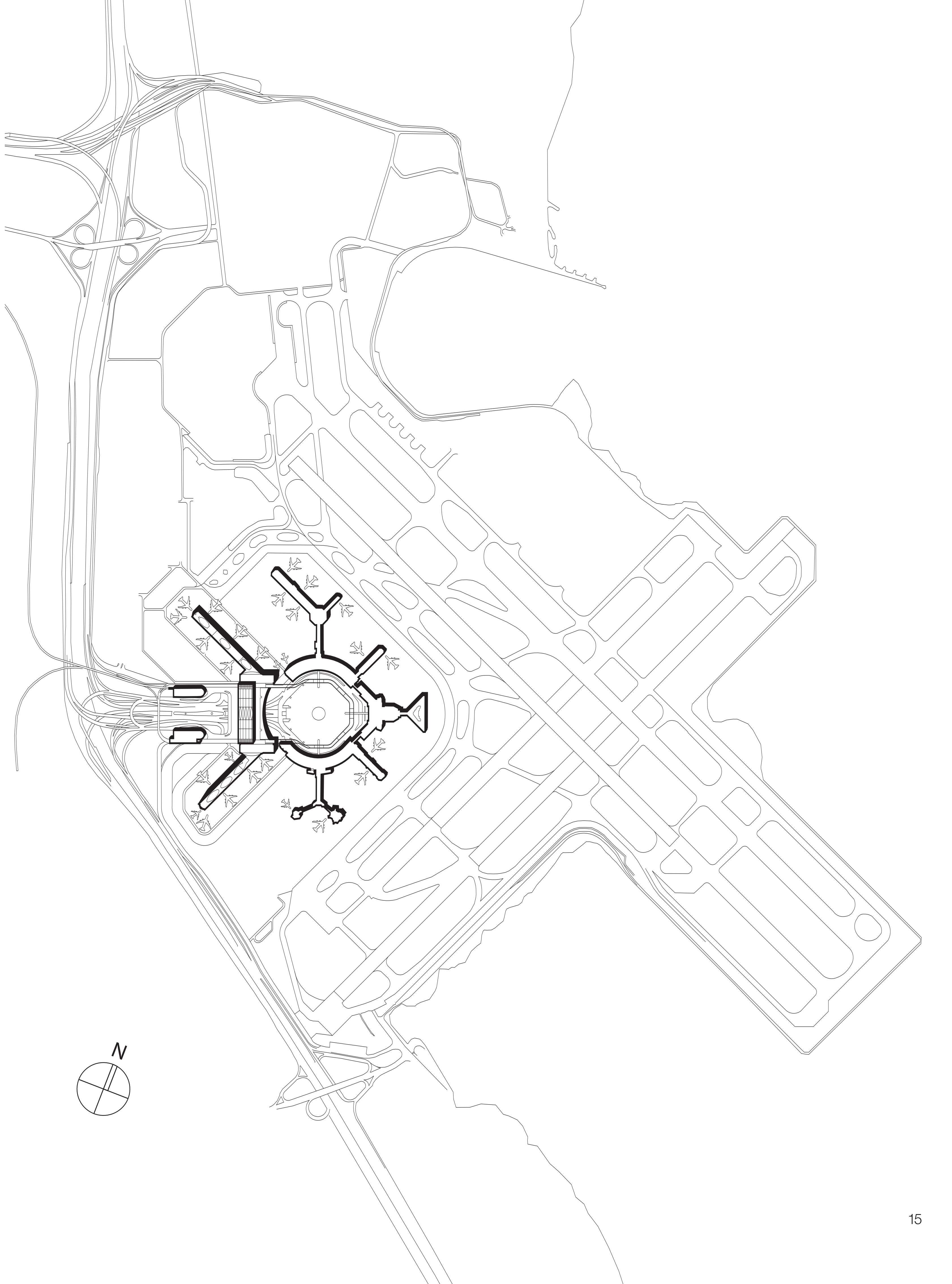
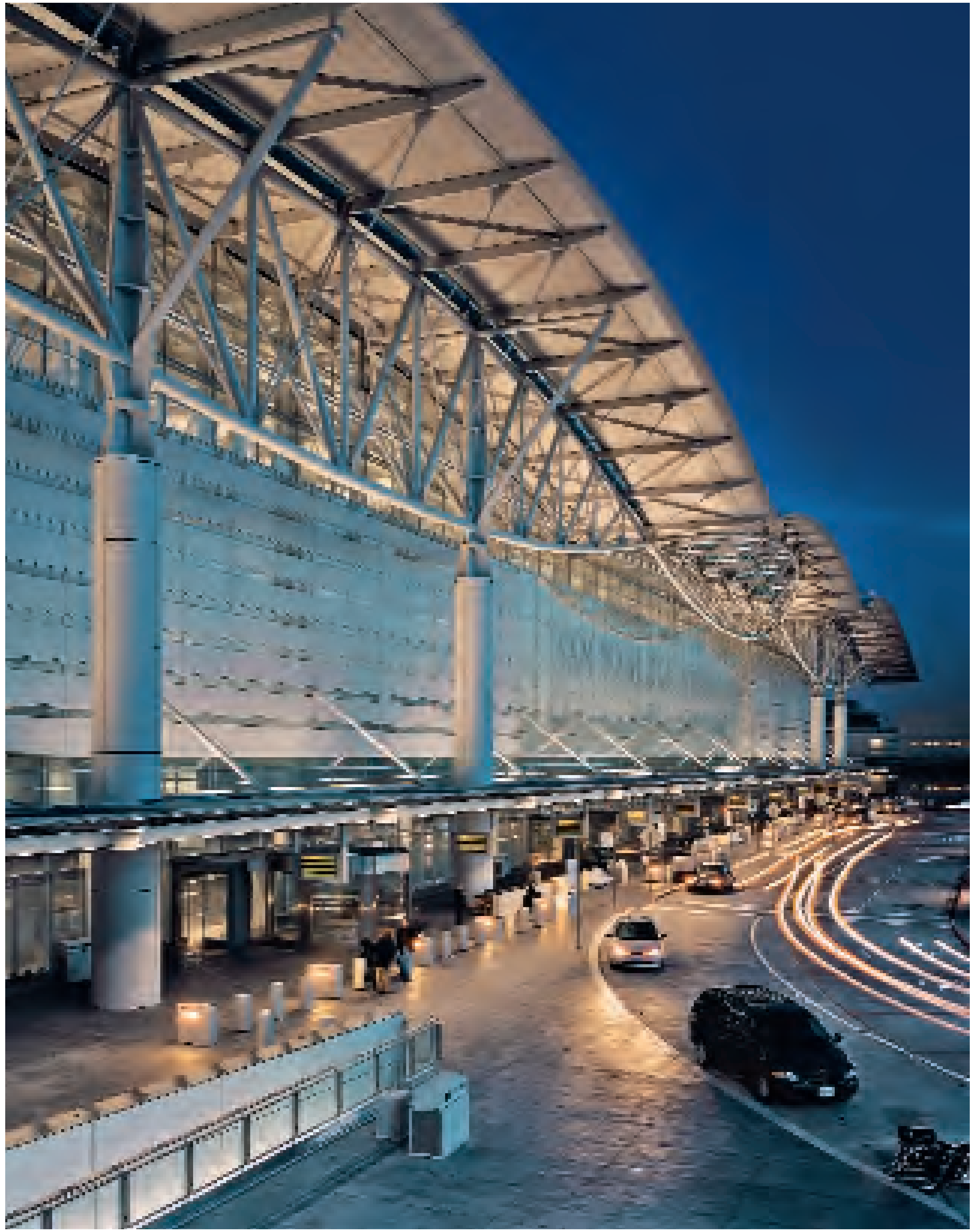
[34] Don Shoecraft, *Wings of the Phoenix. The History of San Francisco International Airport*, San Francisco, 2000.
[35] For more information see: John H. Hill with Dan Seaver and Jane Sullivan, *1956– SFO: A Pictorial History of the Airport*, San Francisco, 2000, p. 20.
[36] David Brodherson, loc. cit. (note 29).
[37] John H. Hill with Dan Seaver and Jane Sullivan, loc. cit. (note 35).
[38] Ibid.
[39] Craig Hartman, design partner.
[40] For more information see: Werner Blaser (ed.), loc. cit. (note 3).
[41] Brian Edwards, *The Modern Airport Terminal. New Approaches to Airport Architecture*, London and New York, 2005.
[42] Koos Bosma, »European airports, 1945–1995: typology, psychology and infrastructure«, in: John Zukowsky (ed.), loc. cit. (note 29).
[43] Ibid.
[44] Nathaniel Alexander Owings, *The Spaces In Between*, Boston, 1973.

1. Model of the existing terminals, the new International Terminal and the connecting roads and rail systems.
2. Site plan including US Highway 101.





4. Detailed view of the west side of the building with the departures entry on level 3. The double-cantilever roof spans 705 feet.
5. General view of the west side of the building from the airfield.

17. General view of tthe dapartures level. As all mechanical equipment is located on top of the airline offices situated above the ticket counters the visitor has an unobstructed view of the roof trusses.
18. View of an escalator connecting the departures level with the arrivals level below.

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19. View of the walkway along the west side of the arrivals level with bamboo plants. The light comes in from the glass wall of the departures level above.
20. View from the walkway along the west side of the arrivals level