W. I. A.

Washington International Airport

A New Concept in Airport Design

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To my parents,
who taught me the values of life.
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The National Air and Space Museum
Ridgway's
W. I. A.
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In the past two decades the increase in passengers and frequency of flights has caused commercial air transportation to suffer. The system in current use was designed to satisfy different needs than the contemporary ones. Airports have failed to keep up with increased demands. Movement of passengers and aircraft have not kept pace with advances in technology. Many aircraft arriving and departing simultaneously create unnecessary delays and monetary loss to commercial airlines. The present solutions were based on new additions to existing airports as well as the creation of new airports so that metropolitan flights could arrive to different locations, e.g. JFK, La Guardia and Newark in the New York area; National and Dulles in the Washington D.C. area.

The concept of the traditional airport is obsolete and needs to be completely rethought, not modified.
An Architecture of Flight

From man's first upward gaze that glimpsed a bird profiled against a luminous sky, the world of flight has captivated our most fertile imagination. Science and technology have together served this imagination well, as both sky and space have succumbed to the earliest desire to fly. Victories of spirit and invention, our means of flight—from Leonardo da Vinci's remarkable flying apparatus to today's 747s—have been creative testaments to human will—a will that continues to refine, transform, and invent anew.

The design of airports, on the other hand, has not equaled the inventiveness and imagination of the design of the aircraft that are called upon to serve. With few exceptions (Dulles International Airport among them), these designs constitute an "airport architecture" that has produced a remarkably prosaic array of efficiently-planned but generally uninspired works. Conceptually bereft of any larger ideas, these often highly serviceable complexes, used by staggeringly large numbers of passengers and visitors, are but architecturally mute responses to the exhilaration and beauty of the act of flight.

Grounded in extensive research dealing with the movement of people, planes, and goods, the proposed design postulates an innovative circulation system for the planes, multi-level terminals that promise a spatial sequence of architectural richness, and a scale of building that truly recognizes an appropriate reciprocity with the scale of contemporary airplanes.

From its reconsideration of these important aspects of airport design to its mega-structural form language, this project offers us some intriguing new possibilities for an Architecture of Flight.

G.K.H.
August, 1992

Computer-Aided Design

The use of the computer in the design and material allocation of any architectural project will offer a potentially new reality. Because the computer can locate large numbers of points in space coherently and without error or memory faults, it becomes possible to seek shapes and compositions far too difficult to control or build without this tool. This extension of the control scale has already altered flight in new planes, and is altering the very shape of planes possible to fly. The same extended reality will occur in the field of architecture.

An architecture utilizing computer methods will become as easily recognizable and differentiated as the architecture of modern mass production was recognizable from its craft antecedent.

Nevertheless, the necessity of achieving meaningful human significance in an architecturally poetic sense will remain the same.

J.H.
August, 1992
As time goes by, constant changes are required to fulfill the necessities and infrastructures of today's airports. The systems currently used have not changed in their essence since the beginning of Air Commercial Transportation, except in capacity and flight frequencies. The results of these transformations to the system (usually additions) are only producing temporary solutions. In the standard system, aircraft, while in the ground, are dependent on auxiliary ground transportation sub-systems. The double directional taxi line system (DDS), used since the beginning of the air transportation, produces high monetary losses to the air companies which are reflected in fuel expenses and ground delays. When the air traffic of an airport with a conventional DDS system runs under air rush hours, its functionality and efficiency begin to collapse creating unnecessary and unexpected delays. These delays are produced by the density of passengers accumulated in the Main terminals and Gates, and the inefficient and obsolete movement of the aircraft through the bidirectional taxi lines. The airplanes suffer from the implementation of a system where they need to be pulled back by an external ground sub-system that moves the aircraft to the bi-directional taxi lanes where they can finally move on their own. On the other hand, the arriving aircraft need to delay their access to the gates while waiting for the leaving airplanes to reach the main taxi drives, producing conflicts to the flight programs of arrivals, departures and flight connections schedules. All these variables are essential components of a non-efficient system that, if it is not abruptly changed in the upcoming years, with the growing evolution of air traffic, will end up in an air industry collapse.
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W.I.A. and OFS

W.I.A represents a possible solution to the needs of future airports. The project's site is the present Andrew's Air Force Base. This Military Base is located next to Interstate 95 between Washington D.C. and Baltimore, Md. within a 12 miles radius of the Capitol. This site offers the proper dimensions to install a new International Airport using the innovative OFS (Only Forward System) in replacement of the DDS (Double Directional Taxi lane System) used since the beginning of Commercial Air Transportation. W.I.A. is conceived as a suspended mega structure, where the planes can freely move forward using their own propulsion power, not being restricted by the use of secondary ground sub-systems. The OFS uses a new concept of unidirectional taxi lanes instead of the old and inefficient bidirectional concept. This system allows the planes to reach the gates from the taxi lanes and to leave them without running into unnecessary double-crossing delays.

The system is conceived under the standardization of suspended gates, ready to hold planes from a DC9 to a 747-400. The gates were designed with flexible dimensional margins, to accommodate future aircraft under development, such as the Boeing project for a 800 person airplane.

W.I.A was designed to hold up to 96 gates with a primary stage of 56 gates. Responding to the functional needs of contemporary airports, the infrastructure was divided into 4 Main Terminals, each one holding up to 12 OFS gates in a primary stage, upgradeable to 96 Gates with the implementation of 4 additional Main Terminals. The OFS Gates are interconnected to each other and to the Main Terminals by linear connectors 29 meters above the ground, leaving 10 additional meters of space between the top of the back wing of a Boeing 747-400 and the connectors base, in order to hold future larger aircraft, like the Boeing previously mentioned. Also the wing separation holds an extra margin of 15 meters on each side, between the wing of the 747-400 and the 6 super columns supporting each of the OFS Gates.
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