An Image With Which To Travel

John P. Voigt
An Image With Which To Travel

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This Thesis Document is submitted in partial fulfillment of the course requirements for Architectural Thesis ARCH 406 and the requirements for the degree Bachelor of Architecture.

Building Type: Airport Terminal
Building Location: Islip Township, Suffolk County, New York.

Thesis Committee Chair: Prof. Alfredo Niemey
Thesis Committee Member: Prof. Henry Engels
Thesis Committee Consultant: Dr. Arno Well

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Architectural image plays an important role in how we relate to buildings, guiding us to the purpose of the structure as well as how we should react to it (i.e., formal vs. informal, serious vs. joyous, quiet vs. loud, etc.). Image, through the architectural language of scale, form, texture, material, color, etc., provides us with guidelines to the use of a building, much like a set of visual instructions. It gives us a clue as to where we are, where we should and should not go, all without the use of verbal communication.

The airport terminal is exactly the place where such non-verbal communication must occur. The typical terminal does not recognize the play of drama and emotion that is a byproduct of the act of travel in general and flying in particular. These dramatic qualities can serve as the groundsman of an image for the airport, one that will allow the traveler to enjoy the event of travel, rather than shy away from the act merely because the airport is a confusing and outlandish place.

The difficulty of interpreting image and function in the airport perhaps explains why airports are typically so awful. The pragmatic safety concerns of hurling hundreds of people through the air at four hundred miles per hour in large metal tubes often seem to be at exact odds with the architectural qualities that the designer is trying to achieve. The object, then, is to create an appropriate image for the airport, define the pragmatic concerns that are absolute, and integrate the two areas in an intelligent and coherent way.
As the reader wades through this work it should be realized that this book is more a collection of thoughts and inspirations than a coherent whole. Within its confines I have endeavored to note all the issues and images that I found of consequence in the course of my studies. Through my research into the history of the railway station and the airport terminal, as well as the design of two very different airport terminals, I have found certain items to be of help, and these are presented, to one degree or another, within this book. Ultimately this work is intended as a resource rather than the last word on the topic of image and its generation.
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The image created by a particular building is important in that the image is what helps us to identify the function and character of a place. Without an image, a building is no different from its neighbors; the likely result being a building with character, feeling, or a sense of purpose. Civic structures, more so than other buildings, require an image, if only to help orient the stranger. Such civic buildings include various governmental institutions, structures of trade and commerce, places of recreation and entertainment, and transportation facilities. Under the heading of transport facilities, no building is more lacking in imagery than the airport terminal. This is not the result of a difficulty in conveying an image to transportation facilities; witness the great rail terminals of the nineteenth and early twentieth centuries. Obviously, it is possible to convey an image of, and a symbolic meaning to travel through the medium of architecture. The architecture of the railway terminal is, however, of a different era than that of the airport terminal.

The airport terminal did not attain maturity as a building type until after World War II, at the peak of the International Style. Contrast this situation with that of the railway terminal, which came into being at a time when massive changes were taking place in materials, manufacturing processes, and daily life in general. The result is that, while the railway terminals are far more expressive in nature, the airport terminal exhibits only the bland, unchanging facade of too many poorly executed International Style buildings. While the railway station is identifiable for what it is, the airport, with few exceptions, is an anonymous structure.

Around 1930 commercial air transport was just coming into being. The first commercial carriage of mail had occurred just a decade earlier in 1918. Not three decades had passed since the Wright brothers flew the first heavier-than-air powered aircraft in 1903. Lindbergh's Atlantic crossing was only three years old, although since that historic event many others had accomplished the crossing and commercial flights were being seriously considered. Such was the situation when in 1930 the Lehigh Portland Cement Company ran an open competition in order to generate ideas on the design of a new building type, the airport terminal.

The Lehigh competitors looked to historical precedents for inspiration in their entries. In many of the designs, the architects dealt with the airplane not as an object that was able to leave the ground but instead as a "flying train." Elements that were normally found only in railroad terminal design are found again and again in the Lehigh Competition submissions. Platforms, sheds, grand concourses, all wrapped in the guise of the railroad station. Rather than approaching the problem as the earlier railway architects had, i.e. in terms of the materials and associated techniques that were used throughout the railroad, the designers of these early airports simply translated the form, arrangement, and detail of the railroad station onto the airfield. Even the engineering of the airfield, the runways and taxiways (in a sense, the airplanes equivalent of tracks), were designed not in terms of utility but rather with an eye toward pattern and geometry. True, these early airport designs had an image; but it was an image borrowed from another building type, one with different criteria and problems.
This state of affairs continued for a decade. Air travel was in its infancy, something that only the very wealthy or businessmen participated in. Airfields were the appropriate term in most cases, the runways and taxiways often being little more than clearings and open, sparsely wooded areas. Flying was still an adventure.

With the passing of World War II an architectural movement that had begun in Europe before the hostilities found itself transplanted to the United States. The movement came to be known as the International Style. The masters of the style created masterworks of art. Unfortunately there were far too many poor imitators of the International Style. The result of this situation was that the airport, as a building type, became a victim of a series of poorly designed "International Style" buildings.

After the war came to an end, air travel began its blooming. Great advances had been made in aviation during the course of the war, and now these innovations were being applied to the burgeoning civilian/commercial air industry. Suddenly there was an influx of people using the airplane as a prime means of travel. It was still primarily the upper classes that were flying, but commercial aviation was growing. Airports were becoming larger and more numerous. Since the International Style was in vogue at the time of their growth, this is the style that was most used in the design of the new airports. The result was structures that resembled anything but an airport. While the railway stations of fifty years earlier expressed something about what was occurring within themselves, the new airports expressed only a sameness of architecture with department stores, sporting goods and, ironically, railroad stations of the period.
There came a time (in Europe it was slightly before the war, just after in the United States), when the railroads, presumably following the lead of the airports and the International Style in general, began to turn away from the design concepts they had utilized for so long. The result was railroad stations that resembled airports, which resembled nothing in particular. This was the beginning of a period of cliché in airport design.

The era of the cliché stretches from the first International Style airport terminal until the present day. In the nearly fifty years that have passed since the start of the cliché, sweeping changes have occurred in aviation: from piston powered airplanes to the development of the jet in the 1950s, the advent of jet powered flight, and ultimately, supersonic flight. The capacity of airplanes has grown from thirty to six hundred. In that same period of time the design of the airport terminal, with few exceptions, has remained nearly unchanged.

It seems that in search of an appropriate architecture for airports, the response taken by the railway engineers and architects at the height of the railway station would be the most appealing. That involves researching the materials, geometry and operating characteristics of the mode of transportation involved, and using these elements for the design of the terminal. It is these materials and their attendant characteristics and construction techniques that will result in a difference between the railway terminal and its counterpart at the airport.

The railway is made of brick, stone, concrete, cast iron and steel. It travels along a set path, with little variation...
from the straight and level, if at all possible. Time is an absolute where it concerns the railway; it was the railroads that created standardized time. Although the train is capable of great speed, the passenger never loses contact with the environment outside; the passing of time and distance, while perhaps it is quickly happening, still occurs slowly enough to allow the perception of actual progress to occur. The geometry of the railway is that of a continuous tube through which the traveler proceeds, with any stops or diversions located along that tube. It is not possible to leave the tube without leaving the railway system. This situation is quite different from that of the airplane.

The airplane is made of aluminum, stainless steel, rubber, and plastic. It is light and seemingly fragile. Its path is limited only by the capacities of the aircraft. Time is a relative quantity aboard an airplane; it is rarely an absolute. Flights are more often referred to by their number than by the time of their departure. The process of using the plane is not defined by actual time but rather by the listing of events: "now boarding, arriving, delayed, departing." The traveler may lose track of time when flying from A to B. The door is closed and the craft rises into the sky where, above the clouds, there are no obvious scales of distance and time. Even if there are no clocks, the traveler is so far removed from the ground below as to be, for all intents and purposes, cleanly and totally separated from the earth. The geometry is one of points connected by a moving piece of tubing; the traveler is loaded into the tube, sealed within it, the lifted to his destination.

There are common attributes. Both are somewhat mysterious in their highly technical machinations. There are ceremonies that accompany each, some remarkably similar. There are sensory perceptions which in many ways are common to both; lights, motion, smell, and sound. Each of these qualities is in some way applicable to the development of an architectural vocabulary.
In looking for inspiration in the design of the airport, the forms, shapes, materials, textures, colors, etc. of the airplane may be examined. As the designer of the railroad station made use of the materials and techniques of construction that the engineer of the railroad used—cast iron, brick, and steel, so can the architect of the airport terminal turn to the materials and technology of flight: aluminum, plastic, rubber, glass. With the stick, lightweight materials came lazy but strong frameworks, large voids sheathed with skins of metal and glass. The forms of fluid motion are mingled with rigid structure, a harmonious joining of two seemingly divergent natures.
The aircraft is an important part of the appearance of the airport. Just as the sweeping expanse of wing area, the bulbous forms of fuselage and engine nacelle, or the soaring tails provide color and dynamic interest to the airport terminal, the activities surrounding the airplane during its brief stay on the ground provide a show for the occupants of the terminal. Visibility is a key issue in the airport. Watching is a prime activity, whether people or planes is the object of interest. Essentially the airport is a giant theater, with all of its parts being the players as well as the audience.
Visually the airport begins long before the traveler steps within the terminal. As he nears the airport, the topography changes to become the flat plain common to all airfields. Buildings of all types grow nearer, crouching to the ground to avoid the sweeping machines in the sky above. The structures become aviation related: aircraft hangars, radar and radio installations, air traffic control facilities, buildings associated with general aviation. All of this serves as the visual transition from the surrounding environment to the airport. It helps in the orientation of the traveler, provides part of the atmosphere and interest of the airport, and presents a series of aviation related images that may be used in the design of the airport terminal as well as the immediate surroundings. The forms and shapes that are used in the control and directing of aircraft can serve as another related source of architectural inspiration. Lighting, signage and circulation patterns could be based upon the same systems used in the design of the actual airfield.
There are differences between the approaches to larger airports and those to smaller airports:

**Large Airport:**
- Speed
- Separation
- Sterilization
- Sprawl

**Small Airport:**
- Intimacy
- Compactness
- Simplicity
- Familiarity
- "User Friendly"

The characteristics that are normally associated with the smaller airports help to orient the traveler and provide a stronger, more positive image to the airport.
Other elements that can be designed using aviation themes and equipment are:

- signage
- lighting
- landscaping
- site design
- traffic patterns
- utility structures
The structure of the aircraft is similar to that of a ship; ribs, frames, struts, flanges, bulkheads. Around the structure be a thin skin; aluminum, stainless steel, canvas, plastic.

There are certain assembly techniques that are unique to the airplane, as well as certain geometric forms that are frequently found in aircraft. The juxtaposition of linear and circular elements is see not found to the same extent in any other construction.

These are all clues for the architect.
The airport is a place of juncture. Many elements come together here, connecting in one manner or another.

earth - alley
plane - building
plane - ground
ground - building
As an airplane requires landing gear for it to sit on the ground, so a building needs a series of foundations and other supporting structures. Airplanes are awkward on the ground, standing high upon the spineless stalks that support them. And while the landing gear of aircraft are small in comparison to the bulk of the plane, it is perhaps their crude, structural nature as they jut from within the streamlined fuselage that makes them seem so discordant.
The issue of scale is an important one in any architectural problem. In the design of airports, it is particularly difficult given the vast differences in size between the various elements that interface with the airport terminal. The range of scale starts at a person, six feet tall and one hundred and sixty pounds and goes to a Boeing 747, sixty-three feet high, two hundred thirty-one feet long, one hundred ninety-six feet wide, three hundred sixty-eight thousand pounds empty. Between these two extremes are an infinite range of intermediate sizes and scales.
The scale difference also affects the building in terms of the floor height. Aircraft floor levels range from eighteen inches for some of the smaller commuter craft to fifteen feet eight inches for the Boeing 747. The way in which the passenger proceeds from automobile to aircraft will affect the height at which the building must stand in order to allow the jetway, mobile lounge, etc. to adequately adjust for the various aircraft sill heights.
Mode of Aircraft Access

1. Level: used at many smaller airports and occasionally at larger facilities. Requires the use of either mobile stairs or mobile stairway units supplied by the airline/airport or use of the airplane, that many smaller aircraft are equipped with.

1½ Level: the compromise between the one level and the two level terminal. The added height of the half level allows the use of jetways. The one and one-half level terminal often results when an existing one level airport expands.

2. Level: usually found only at larger airports. The upper and lower levels allow for the separation of traffic flow on the landside of the terminal; typically upper level is for departing passengers while the lower level is for arrivals.

Mobile Lounge/Bus: the mobile lounge/airport is based upon the European system of using buses to transport passengers to aircraft that are parked remotely from the terminal. This concept, while it may be used with any number of levels in the terminal, is considered to be too idealistic.
While the jetway has become the most common method of gaining entry to the aircraft, it does not address a sector of the air transport fleet that has grown rapidly in the past decade, the feeder-commuter airlines. Operating between small cities or regional airports and the large airline hubs, these airlines use aircraft that typically hold thirty passengers and that are very low to the ground, making use of the jetway impossible. The result is a walk across the aircraft ramp, a dangerous and sometimes unpleasant walk through the elements.

In the past, terminals have been designed that shelter the passengers from the elements as they board into flight. Tempelhof Airport in Berlin, built in 1934, is an example of such a configuration. With larger aircraft tail heights made these forms unnecessary to construct. Hence the use of the jetway. With the occurrence of smaller aircraft, however, perhaps this form should be reexamined as a potential solution to the commuter airline terminal.
- Power out -  
- Power out -  
- Powerback / Push back -  
- Power out -  

**Angled In**  
Requires slightly more area than the nose-in configuration, but allows the airplane to maneuver without the use of a tug. Position allows access to aircraft by jetway.

**Angled Out**  
This configuration requires somewhat less area than the angled in, but there are problems with noise, blast and access to the airplane by the jetway.

**Nose In**  
This method requires the least amount of area, but either the use of a tug to push back or the reversing of the engines is required to allow the aircraft to leave.

**Parallel Park**  
The parallel park is the easiest for the airplane to negotiate, as well as minimizing jet blast and noise. It also requires by far the largest amount of area.
Given all these issues, the task of designing an airport is obviously a large and difficult one. Each of the issues discussed has been dealt with to one extent or another at airports around the world. The images on this page and the one opposite correspond with the analysis that follows.
The busiest airport in the country, Chicago O'Hare, utilizes long fingers with aircraft being pulled back by tugs. This sort of operation is almost required given the size of the airport.

Houston makes use of satellites, each capable of serving five aircraft. The entire airport has also been split into "satellites," thus allowing expansion to occur.

Raleigh/Durham begins to address the function and circulation of the airport as a design element. The curve of the terminal reduces the proportion of the auto to the airplane, while the circular satellites begin to "circulate" the aircraft.

Here, the circulation of the aircraft is being used as a design guide, unlike Raleigh/Durham, which remains close. Again, the terminal addresses the car/airport scale difference, while the satellites deal with the airplanes.

An example of what happens when a small airport is enlarged; generally it becomes a mess.
Lubbock, Texas

Lincoln, Nebraska

Fort Wayne, Indiana

Rockford, Illinois

Long Island, New York (Proposed)

6 Gates

4 Gates

4 Gates

4 Gates

10 Gates, Apr.

This example is the most responsive to the functions that occur around and within the airport terminal. Unfortunately, the architectural realization of this function does not respond to the imagery of flight.

Lincoln's airport tries to respond to various constraints placed upon it, but it is a very straight-forward solution. Not good, not bad, just there.

Fort Wayne, like Rockford, is trying to make more of the airport than is really there. At Fort Wayne, a vast portion of the airport demand is taken up with unnecessary bridges and stairways, only to have the passenger walk back down to the small aircraft that serve Fort Wayne.

Rockford is as if a small piece were removed from a larger airport and set down as a small regional airfield. Like Fort Wayne, an awful lot of noise about nothing much in particular.

Have the circulation of aircraft, automobiles, and people, as well as the interface between these three elements, been addressed. Also, unlike other airports, the problem of the small commuter aircraft has been examined.
Given the amount of information and constraints that have been discussed already, it is difficult to comprehend that there is a great deal more that impacts upon the design of the airport. These issues, many of them highly technical and pragmatic in their justification, present the greatest challenge to the architect, not for the opportunities but rather the obstacles that they represent. The designer must strive to fully integrate good design while at the same time responding to the practical problems of airport planning.
Image is more than a skin deep layer. All of the topics discussed herein are just a small fraction of those that are in some way, shape or form related to the air terminal. It is important to note that while some of these issues are quite tangible in their nature, others are much more atmospheric (the image at left, for example). Image is not a thing that can be created out of thin air. Rather, it is a product of vision. One cannot simply fabricate an image without examining the object or event to which it belongs. With the airport terminal this implies examining flight, aircraft and airport materials, structure and function, the emotional qualities of travel, and much more. Without this study one risks following a false pathway.
The information contained within this appendix, though highly pragmatic and technical, nonethe less has a profound effect upon the design of the airport terminal. It is important to note that this information is equally as important as the other issues presented in this work in the creation of an imagery for the airport terminal. It is hoped that this information will one day save someone countless hours of research searching for it.
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