F. R. Meisch Papers.

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Perspectives:

The Earnest Young Man with the Flying Parti:
Francis R. Meisch

Although Francis Meisch has just celebrated his twenty-ninth birthday, he has a pretty good idea of the place to which he'd eventually like to retire. He was reasonably sure of the kind of higher education he wanted quite a while before it was time for him to start it. He looked around, during the early stages of the current war, for a job which would help prosecute it and, at the same time, had a rosy future. He satisfied himself that the aviation industry fulfilled these two requirements, and he got an architectural job with an airline. He's done pretty well at it.

He is not smug in being so sure of himself; far from it. He is only deadly serious about his work. Meisch's ideals are pretty strongly with him, at work or at play.

As long as he can remember, Francis R. Meisch has been interested—as he deprecatingly puts it—in drawing and painting. We aren't sure how far back his memory carries, so we can't tell you about his being born with a brush in his hand; but we can state that he was born, and where: in St. Paul, Minnesota, on October 9, 1915. That is a matter of record. Furthermore he lived in St. Paul until he finished his formal education, and St. Paul is the site of his present home office. Chronologically, the story goes something like this:

Meisch acquired some facility in sketching, together with an appreciation of nature, during summer vacations from high school. He spent most of these working on his grandmother's farm in the hilly country of southeastern Minnesota. The facility developed into a certain ability and led, before high school days were over, to an intense interest in architecture. By the time college days came along, he was sure that architecture was to be his profession, even though those were also the days immediately after the New York stock market hit bottom, when architects were selling their share of apples on city street corners.

When he entered college, Meisch had already read both Louis Sullivan's "Autobiography of an Idea" and Wright's "Autobiography." He expected to find the study of architecture a logical, exciting adventure. He says he was disappointed to find that the best "philosophy of design" available involved considerable cold cribbing. It was rather an unpleasant experience, that freshman year; faculty and students alike were confused over what architecture really was. Meisch began to wonder if his reading had misled him. He felt pretty bad over it at times, and after one year he quit to go to work for an architect—any architect—to find out for himself whether architecture *was* the glamorously idealistic profession he had envisioned, or just another business, albeit one in which facility with a pencil helped.

By the time he re-entered the University of Minnesota he had a feeling that he knew what he wanted out of a formal education. He worked his way through a five-year course in four and a quarter years and got his degree in March, 1939. His earlier practice at landscape sketching helped mightily, enabling him to do renderings and other free lance work part time during the academic year and full time during vacations. Working his way through college meant no janitorial jobs; it meant furthering himself in his chosen profession. Everything he did he turned to that same account.

This practical experience was gained in offices fairly close to home—in Minneapolis, St. Paul, and Eveleth, Minnesota; and in the St. Anthony Falls Hydraulic Laboratory at his University. It varied in kind from small homes to municipal buildings, from hospitals to power plants; and a good half of it was what even he calls engineering, rather than architectural, in nature.

In 1939, with a graduate scholarship to his credit, he entered Massachusetts Institute of Technology. After getting his Master's in 1940 at Cambridge he went back west again, but not home. For a year he instructed in the Department of Architecture at North Dakota Agricultural College, where he taught Sophomore Design, assisted in the other design courses, and had classes in freehand drawing, water color, history of furniture and interior decoration, and history of painting and sculpture. The architectural department was quite small. An instructor had to double in brass as well as possess lots of it.

Defense was the cry in 1940. Anybody who had his eyes and ears open knew we were in for a war ourselves. Besides, "defense" entailed lots of construction jobs if not lots of architecture. The combined appeal of patriotism and practicality was not lost on Francis Meisch. At the end of the school year he returned to St. Paul and went to work again at the drafting board, and debated with himself on the advisability of continuing teaching.

When a defense job in a part of the country he had never seen presented itself, Meisch decided to take it. As a draftsman for the firm of Shanley, Van Teylingen and Henningson, he went to Great Falls and West Yellowstone, Montana, and to Idaho Falls, Idaho. The job was concerned with the U. S. Army Winter Training Camp program, and, like many war projects, was terminated before it reached the construction stage. Next he went to work in Las Vegas, Nevada, for the McNeil Construction Company of Los Angeles, as a draftsman in their engineering unit. The job here was the design of contractor's facilities for a magnesium plant.

By this time 1942 had rolled along, Meisch began to feel the need of some permanent connection. He remembered the boost the first world war gave the automobile industry, and he looked around for a field which could expect the same stimulus from World War II, one whose ground-floor doors were still open. Aviation was, of

course, the answer. But Meisch wasn't satisfied with "aviation" in general; he took a long, hard look at aviation manufacturing and decided it was by no means as attractive as the business of commercial airline operation. Air transport had scraped along for years, with most airlines running on financial shoestrings. The war boomed them. He didn't see how their business could decrease after the war; by all the signs it should expand as only a few had previously dreamed it could. Manufacture of aircraft, on the other hand, would probably be a rather tough business once military contracts ceased. So, on the score of prospects, air transport was his choice.

What about the need for architectural services? Could he justify being an architect for an airline? He rather thought he could. He got a job in the engineering department of Northwest Airlines, whose home offices are in St. Paul. That was in February, 1942, and he has been plugging away excitedly at buildings and facilities for airlines ever since.

Ton-mile costs now roll glibly off the end of his tongue, to be translated, by the time they become pencil scratches on a luncheon tablecloth, into more efficient buildings—offices, terminals, overhaul shops, etc.—or airports, or headquarters, or any phase of aviation construction to which design talent can be applied. In ordinary times, "ever since 1942" would not be a very long period, but during an air war and in the aviation industry it is the equivalent of a normal decade. Meisch did not come by his familiarity with ton-mile rates without an intense apprenticeship.

In the course of his work for the airline he had as his first project the completion of, and installation of machinery and equipment in, a shop addition to Northwest's main overhaul hangar. There followed one project after another related to war contract construction: more shops, offices, restaurant facilities, and other work. A major job was the design and setting up of a large outdoor bomber modification center, complete even to utilities and equipment. This was in a terrific rush, and was handled by the Army's Corps of Engineers after development of the basic scheme. There was another, more complex modification center, set up by the airline, and there were hangars for the Air Transport Command.

Meisch's guess about the future of air transport seems confirmed by one phase of his current activities. Soon after the tremendous importance of military aviation was recognized, and larger, faster, more powerful planes were designed and built, all kinds of municipalities, from the largest to the smallest, began thinking and asking questions about expanding airports, building new airports, providing new administration buildings and the like, and getting and sustaining airline service. The Engineering Division of Northwest Airlines was flooded with requests for advice, opinions, information.

The Engineering Division began to get uncomfortable about the situation. They did not customarily wear turbans, nor did they peer into crystal balls. Their company was far too occupied with the day-to-day problems of running the business to give such requests the serious attention everybody realized they deserved. It became apparent that somebody had to do some research, and consequently the Engineering Department, in addition to being concerned with design and construction, found itself studying, analyzing, collating, drawing conclusions on postwar airport and airport building design problems. It had to be 'way ahead of the rest of its company's departments. Not only did it have to solve existing problems, it had also to anticipate the problems of the next few years, and find solutions for them.

That is progressive architecture indeed! Is it any wonder that Meisch is excited over it? Only twenty-nine, and with a bear by the tail—if he weren't a phlegmatic Minnesotan, the mere prospect would be his ruination. At times it must exasperate him to have to deal in today's stodgy realities. As it is, he works with a Plant Engineering Section to which he gives much credit, under a Chief Engineer and Chief Plant Engineer who apparently have high regard for his abilities. The majority of his company's airport and airport building problems and design are routed to Meisch.

In 1942, the same year that he went to work for Northwest, Meisch married Elaine Hanson, interior decorator, whom he met working over a drafting table. His year-old son exhibits talents more destructive than constructive—a common enough failing at that age. As is common, too, in these days, his job cuts deeply into his personal life; in truth, he is more subject than most of us to absences from home. Expected and unexpected travel, much of it by air, often takes him away for days on end. If he finds spare time, he reads, paints, or sketches in water color, but he has to forego etching, an old love, because he has neither the time nor an etching press.

Francis Meisch's grandfather settled the family homestead, the four quarter-sections in southeast Minnesota where a younger Meisch spent his high school vacations. The original farmhouse and outbuildings stood in a river valley from which spread small wild canyons whose sides were steep, eroded bluffs. The stand of buildings has since been replaced by one farther back from the principal valley, closer to the more profitable farmland which the family accumulated as it prospered.

Some day Meisch hopes to build his own family a home on the fairly level top of one of the spurs between the finger-like ravines, above the site of the old homestead. The view up and down the valley is superb, he says; and the sunsets are gorgeous. He hopes he won't be so busy, so he can sit outdoors and paint, and smoke the pipe he prefers to the more convenient cigarette, while, perhaps, he discourses with a friend pleasantly, if rather earnestly, about the merits as students of young men from Middlewestern farms, young men to whom springhouses and barns and silos are architecture, to whom a ten-story building is a novel sight, to whom eggs and darts are henfruit and arrows. He found them pretty good material when he was teaching, 'way back before he got into that air transport game.

Meisch, Vernon Lundquist, Northwest's Chief Plant Engineer, and Richard Frahm, architectural designer, discuss an airport planning problem.

Architecture and Air Transportation

What the Development of Postwar Aviation Means to the Architect

By Francis R. Meisch, Architect, Plant Engineer, Northwest Airlines

Reprinted from November, 1943, New Pencil Points

Aviation Is a Client

No man can doubt today that the postwar growth of air travel and air transport will provide useful and constructive work for perhaps millions of people for years to come. War has so speeded the development of aeronautic science that we may fairly look to the air and its future conquest as the source of the great new industry that will provide the added large scale employment needed by expanding modern industrial civilization.

Plane production capacity, which has reached astronomical heights* during the war, will not, of course, continue at anywhere near the same level. But we shall have, according to conservative estimates, a sustained capacity to turn out civilian planes by the thousands and at least three hundred thousand such planes in use within three years of the war's end. We already have eight hundred and sixty-five major airfields in this country as against only seventy-six two years ago. As for the smaller airports with shorter runways there are now over twenty-one hundred with indications that many more will be needed as time goes on.

Architects and planners should not be slow to catch the implications of these figures and others that are available from the Civil Aeronautics Authority. A vast amount of ground facilities of all types will be necessary; first, to replace the obsolete and obsolescent buildings that now serve existing fields, and, second, to provide for the needs of hundreds of new small fields. All of these airports will have to be related to existing communities with improved facilities for surface transportation. It will take at least fifty years to satisfy the ultimate physical requirements of the complete national system of airways.

Leaving entirely out of consideration the needs of the military, there remain two main divisions of future air activity; (a) the commercial air carriers handling passengers, mail, express, and special kinds of freight on scheduled flights and (b) the operation of thousands of small planes on unscheduled flights by individual owners. In a comprehensive article which follows, Mr. F. R. Meisch of Northwest Airlines has gone into great detail about the architectural needs of the first of these divisions and has by implication suggested something of the facilities that will have to be provided for the second.

A question immediately arises as to how this tremendous expansion of ground facilities for flying is to be paid for. The answer is that it will be done by a combination of public and private investment which will be amortized through the years out of the earnings of the growing industry. The prospective benefits to society at large through the development of a complete and adequate system of air transportation are sufficient justification for the public contribution. The opportunity for profitable enterprise is obvious enough, we believe, to attract the necessary private capital. The automobile industry has demonstrated within our lifetime that constructive progress pays for itself.

The architect has an important place to make for himself in the total picture of aviation. In so far as he acquaints himself with the problems involved in the design of air facilities properly related to the cities and towns they serve he will be called upon to make his contribution. The aviation industry is a client worth cultivating.

Kenneth Reid

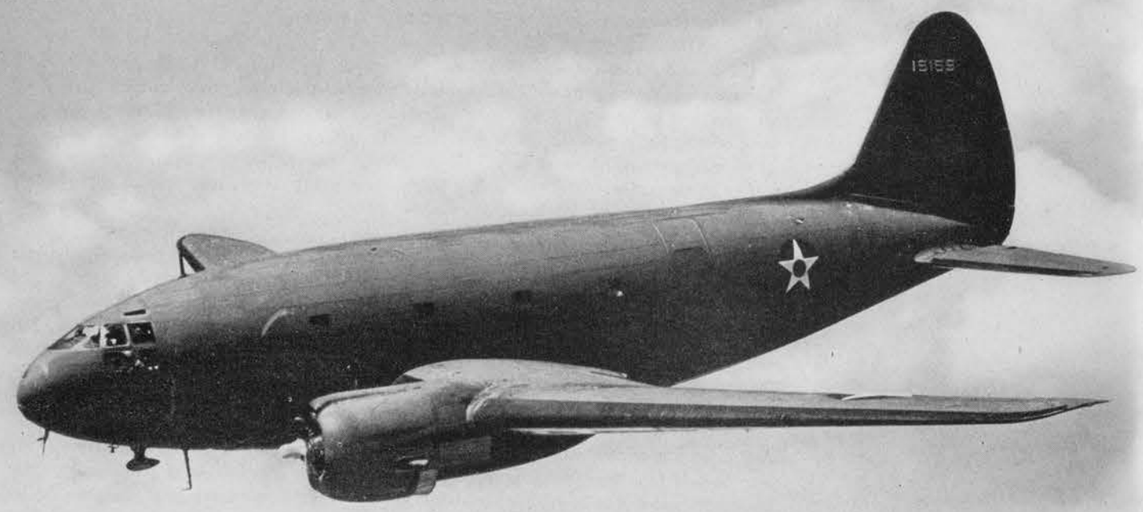
** 20 billion dollars in 1943, 30 billion dollars in 1944. Compare with 3.7 billion as all-time peak for automobile industry in 1941.*

Francis R. Meisch, Architect, of Minneapolis, Minnesota, is Plant Engineer for Northwest Airlines, Inc., and in this capacity has had much to do with new construction, remodeling, and postwar planning for air transportation. The plant engineering section of Northwest Airlines functions, to a certain degree, as does an architect-engineer firm. In this article Mr. Meisch supplies basic information on the background of aviation progress and the architectural and city-planning developments which are seriously affected by the growth of air transportation.

Francis R. Meisch
Plant Engineer, Northwest Airlines

Architecture and Air Transportation

Part I — Status of Aviation Design: Types of Aircraft and Pattern of Development



The plane above at right is a Consolidated Liberator Bomber. That at the left a Curtis C-46 Commando troop transport. Both are military prototypes of commercial planes to come.

Americans have for years prided themselves on being the most modern and progressive nation on the face of the earth. This was especially true in the fields of science and technology, but was sadly lacking in the fields of architecture and city planning. True, individual American architects provided exceptions, but by and large the basic principles of architecture and city planning and the revolution in architectural thinking were not manifest in America until the last decade. Architects and city planners had just reached the point where they took the automobile for granted and planned for it as a routine part of American life when suddenly a new world conflict produced a new age—the Air Age—and with it a multitude of architectural and city planning problems. History may well record World War II as the beginning of the Air Age—for not since the invention of the steam engine has mankind been faced with a machine that could so change the course of civilization and the living habits of millions of people.* This the airplane has amply demonstrated it could do and has indicated it will do. Aviation, premature in World War I, has today grown to such proportions and in such a rapid manner that not only has the American public been caught off guard, but the architect and city planner as well have failed to comprehend it, or to plan and think in aviation terms as a part of life today.

*Assuming, of course, that internal combustion engines and self-propelled, earth-bound vehicles are essentially extensions or applications of principles embodied in the steam engine.—Editor.

The greatest problem now facing aviation is the obsolescence of practically all of its ground equipment, as represented by airports, hangars, shops, terminals, etc. But the most dangerous form of obsolescence that faces the professional planner and all Americans is their thinking both general and architectural, with respect to aviation. Fundamentally, the trouble might be credited to an educational system which has taught rowboat geography and has failed to teach basic international economics.

In order to plan for anything as gigantic as aviation, it is necessary to know something about the principles upon which it operates and the factors which influence its growth. Such questions as follow are very pertinent. What will the future of aviation be? What will influence its growth? Will this growth be sporadic or constant? Will this growth be unlimited? And will this growth be permanent? The answers to these questions are many, but out of the conflicting mass of available information, certain facts are beginning to stand out clearly.

Airplane and Airport Design

Technologically, aircraft design has now achieved a state wherein the physical size of the plane is limited by external factors such as the size of existing airports, the thickness of runways, the size of available hangars, the economics of operation, and the efficiency with which such planes can be utilized. This is comparable to skyscraper design, wherein limiting factors are land available, zoning and setback laws, economics of cost and operation, and efficient utilization of such a structure—not the physical height of the structure. To date, aircraft designers have not regarded colossal investment in airports and ground equipment as limiting factors but have gone ahead designing bigger, better, faster, safer planes. Limits in physical size of airplanes will be reached when operators find that they cannot economically or safely operate planes larger than a certain size, or that cost of airport construction or physical limitations on airport size are the ruling factors. Some technical variations in aircraft design may very likely change the existing pattern of aviation. Such developments are the helicopter and the flying wing. The helicopter bids fair to revolutionize aviation since its safety features, as compared with the "cub" plane, cannot be equaled for private use, as well as a wide variety of commercial uses. Then, too, there is the glider, towed singly or in trains by a locomotive plane. If operations of this sort can become both physically and economically possible in all kinds of weather, commercial aviation will have a way of circumventing the limitations bound to be imposed on the physical size of aircraft. It is not the purpose of this discussion to describe in detail technological advances in aircraft design—there are plenty of books on such subjects—but technological advances in other fields will be mentioned as they pertain to some phase of aviation.

The present-day pattern for aviation is divided into three phases: (1) Military Aviation, (2) Private Aviation, (3) Commercial Aviation. There is no reason to believe that this pattern will differ in the post-war world, although its component parts will necessarily assume varying degrees of importance. Military aviation is having its heyday during the present conflict and is shaping history. It is questionable how important it will be as a single factor in relation to future city planning, especially the decentralization of key industrial areas and their attendant living spaces.

Private aviation will again come into its own with peace, and will undoubtedly contribute more toward decentralization than military aviation. This will be especially true if the helicopter is placed upon the market as the "flivver plane" for every man. The attendant change in the pattern of individual life and community planning will be colossal and chaotic if not closely controlled and intelligently planned for. Such a change need not be feared, since when and if it comes it will be a gradual process severely regulated by the supply and demand for the helicopter and the ability of the public both to economically possess and to operate such a plane.

Commercial Aviation

Commercial aviation (the operation of scheduled air transports on an intranational and international basis) will also have its period in the postwar world, and will be a powerful factor in preserving peace and in bringing all nations closer together. Today it is being expanded to aid in prosecuting the war by supplementing military aviation in the transport of personnel and cargo. Commercial aviation will influence architecture and city planning because it will assume prime importance in the transportation of passengers, express, mail, and certain types of freight. Its coordination into the physical pattern of the community, and the community's support or lack of support for it, will have a decided effect upon the private and business life of the community. Previous to the Air Age cities grew great because they had good harbors or were situated where several railroads met. In the Air Age, the airport becomes the city's world harbor, and great cities will grow where the terminals of great circle air routes are located.

Consider the future of aviation and of commercial aviation in particular, for commercial aviation bids fair to assume the greatest immediate importance in the postwar world. Present-day airports, in which are now combined the three phases of aviation activity, will become specialized airports handling only one phase such as military, private, or commercial. As aviation grows, there will be additional subdivisions of airports for still more specialized functions. Military aviation will have special fields for flight training, advanced training, bomber training, pursuit bases, bomber bases, military cargo, etc. Private aviation will have separate fields for flight training, local pleasure flying, public itinerant traffic, and of course, special airports for private flying clubs. Commercial aviation will require separate fields for passenger and cargo traffic, with a possible subdivision to provide separate fields of each type for intranational and international air traffic. This specialized subdivision of airports will be true of all large communities (1,000,000 population or over) but will vary with small communities in proportion to their population and specialized demands. Commercial airports serving the same community will have to be planned in *(Continued on Page 39)*

relation to one another so that passengers or cargo requiring transfer to another plane at another port will not be delayed too long.

The number of fields necessary for any specialized activity will be determined by the demand and the number of flight operations that can be accommodated on a type of airport standard for such an activity. There exists today at every airport a certain operational limit for peak traffic periods, which is a function of the runway and taxiway pattern, the number of parallel runways, and the time required to conduct a landing or takeoff operation. When operations reach the limit for peak periods, either an addition must be made to the existing runway system or an additional airport must be constructed. A number of airports within the United States have already reached their operational limits—a condition largely due to increased activity as a result of the war, but considering existing bans on private flying, the postwar picture for these fields still appears to be one of over-congestion.

From the standpoint of present-day airport traffic control, the relation in any community of one field to another is as important as the relation of all of them to the central community pattern. There is a limit to the allowable density (nearness of airports to one another) so that air traffic, circulating around each airport preparatory to landing, will not collide. The allowable density pattern will change only if new technological advances are made in traffic control or if aircraft types change radically in their performance ability as evidenced by the helicopter. Little thought has as yet been given to zoning community areas with respect to specialized aviation activities. For example, it appears obvious that a flight training field should not be located next to a commercial airport, nor should a flight training field be located in a densely populated neighborhood; yet such errors in planning will result unless regulations are formulated and enforced far enough in advance of a surge of new airport development.

Effect of Mass Production of Aircraft

At the outset of the present world conflict, the United States had the finest system of commercial air transport lines in the world. A startling fact, often overlooked, is that the entire prewar commercial air transport operation in the United States was carried on with only 350 planes. Consider the effect on airport planning and development in the postwar period if, as experts predict, the staggering sum of 25,000 planes for passenger travel and still another 25,000 planes for cargo transportation will be necessary for domestic use alone. This is a long-range viewpoint; such growth will not happen overnight. However, with aircraft manufacturers all set up for mass production, the number of commercial aircraft in use can be multiplied many times, amazingly quickly. Such growth will necessarily depend upon demand for commercial aircraft. It must be carefully controlled, or chaos will result.

The growth of commercial aviation hinges largely upon political and governmental action, both national and international. The action of the Civil Aeronautics Board in awarding feeder lines, new routes, and route extensions to existing and new airlines will be very important intranationally. So also will be the awarding of mail and express contracts. Internationally, commercial aviation will be dependent upon peace terms at the end of this war, and upon the action, both individually and collectively, of the governments of international powers who bid for air commerce.

The new field of international air law is a potential bone of contention. There must be established a unified international air traffic control panel of some sort, with power to regulate traffic, to set standards, to determine who will engage in international air traffic, and to decide to what extent international air agreements will be reciprocal. Just who will establish a policy of freedom of the air and its limitations is a moot question. The establishment of an open port system for planes and the question of restricted areas will also have to be settled.

Four New Ideas:

There exists today a potential demand for a gigantic commercial aviation system. The realization of such a system will be based upon entirely new concepts, understanding of which is essential. These are mainly as follows: the relation of space and time, the re-study of physical geography, the re-analysis of commercial geography, and the capabilities of the airplane.

1—Airline Space-Time

First, a person must understand that the invisible merchandise of an airline is time, and that this special *Airline Time* makes a number of things economically and physically possible that are impossible for ordinary land or water carriers. Airline Time represents a conquest of space heretofore unequaled. In integrating time and space the airplane has made Airline Time, rather than land miles, the measure of distance. It is necessary to realize that this earth is fast shrinking in size. No spot on earth is more than sixty hours from any airport. By air, the Minneapolis-St. Paul area is only 13 hours from London, 16 hours from Moscow, or 26 hours from Chungking. Similar schedules can be created for any locality. Such conquests of space are usually put aside as achievements for the future. It is difficult to comprehend that such travel is possible today and that only the world-wide conflict prevents the global establishment of commercial runs to serve far distant points. Consider that these airline time-distances are computed on the basis of an average speed of only 300 miles per hour. Add to this the fact that 400 miles per hour on long flights will more likely be the cruising speed of the near future. The skeptics will have to be convinced if communities are to be well planned and capital wisely invested for today's Air Age.

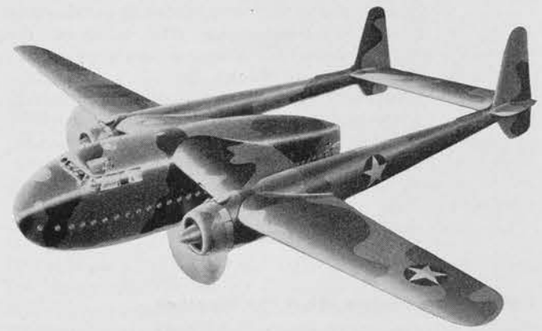
2—The Bird's Eye View

Secondly, a person must acquire a new concept—the Air Age concept—of physical geography. For aircraft there is no difference between land and water, desert or mountain, county line or international boundary. Physical barriers are set aside while in flight and must only be considered seriously when landing or taking off, or when trouble develops. Physical geography will be subordinated to commercial geography in determining the air routes of the future. The main exception to this would be the location of refueling bases as established in conformity to physical and geographical conditions. The airplane can take advantage of the shortest distance between two points—the great circle courses over the surface of the earth—and follow these courses by celestial navigation. Add to this an examination of the earth in the form of a globe. Of prime importance to Americans today is the fact that the land masses of practically all the important world areas are concentrated in the northern hemisphere, and are extremely close to one another by aerial navigation over the polar regions. Polar routes offer the possibility of providing refueling bases for the land plane, which, up to a certain gross tonnage, is far more economical to operate than the seaplane.

3—Payload Geography

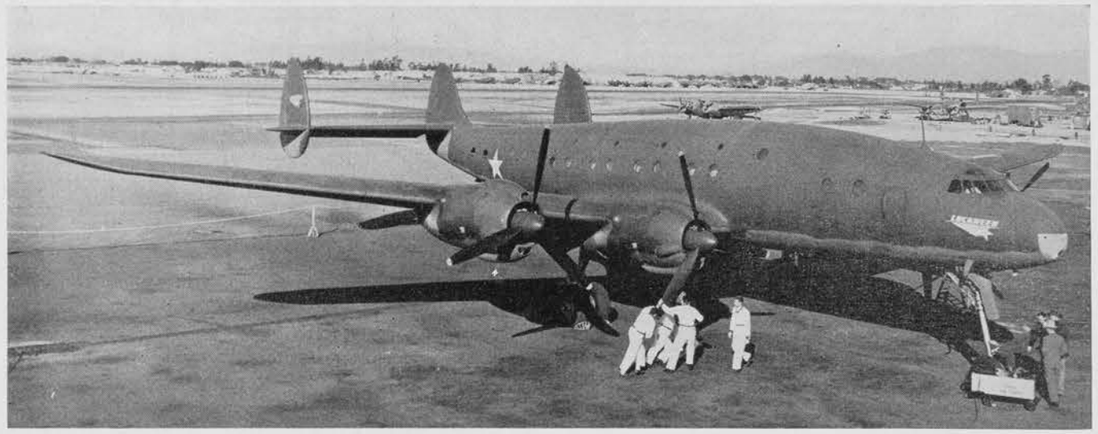
Thirdly, a new concept of commercial geography must be understood. It is necessary for any commercial air route to be economically successful if it is to remain in existence. The economics of air line operation using land planes is based upon the fact that the shorter the distances between refueling bases the greater the payload. Then, note that these short-hop refueling bases can be adequately provided on polar routes and the fact that 90 per cent of the earth's population is concentrated in the northern hemisphere. In this concentration of population the supply and demand for air travel will be found, and a means for a quick, eco-

NEW PENCIL POINTS *is indebted to Mr. F. R. Meisch for the drawings used within the text; to the Civil Aeronautics Authority for the diagrams of airport growth; and to the Institute of the Aeronautical Sciences for the Cruikshank and Hoboken cartoons. Photographs reproduced by courtesy of U. S. Navy, Acme, United Airlines, Skyways Magazine, Curtiss-Wright, Lockheed, Fairchild, Douglas Aircraft, American Airlines, Pan-American Airlines, Crouse-Hinds, Portland Cement Association, Vought-Sikorsky, Sigurd Fischer, Rocky Mountain, Hedrich-Blessing, Byrne, Peele, George Jervas, Robert Damora. Many of these sources contributed valuable editorial suggestions.*



Continuing the sequence of photographs of transport planes, past, present, and future: Below, Douglas DC-3, the standard airliner prior to the war. Below, right Naval transport C-54, one of the military planes which is even now threatening the DC-3 with obsolescence.

Below, Lockheed's mighty Constellation, another high-speed, long-range plane with great cargo capacity. Now used for military purposes only, exact performance data are not available; but in civilian use it can carry 55 passengers and a crew of 9 nonstop from Los Angeles to New York in record time. Above is a new all-steel cargo plane designed by Fairchild for military transport. Performance data are secret; the plane is apparently not yet in production.



nomical exchange of goods will be desired. A study of the location of existing key cities and the nation's economy will still further determine air routes.

4—What Planes Can Do

And lastly, an understanding of the capabilities of the airplane is necessary to complete the Air Age picture. Aircraft have been increasing in size, efficiency, and cargo- or passenger-carrying capacity ever since man first flew a heavier-than-air machine; but developments of the last few years have truly made the Air Age possible. The standard, reliable DC-3 of the airlines faces relegation to the feeder line routes of the future. Already a number of aircraft types, expressly designed to perform air carrier functions on an economic basis, which are either in existence, in production, or on the drafting table, supersede it. Characteristics and performance data vary but all have several things in common. Physically they are bigger ships than the airlines operated in prewar days; they are designed for greater payloads; they operate at higher speeds, with greater efficiency, forecasting reductions in the cost of air travel and transportation. They incorporate the latest technological developments and operate with a greater factor of safety. The skyliners of the Air Age will be real luxury liners, with conveniences previously unthought-of for aircraft. Some will be multi-engined planes operating in the stratosphere, at speeds of 400 miles per hour or better, on nonstop transcontinental or international flights. The payload-versus-range characteristics of many cargo ships must necessarily remain a military secret until after the war, a fact which makes it difficult accurately to forecast air cargo developments.

C.A.V.U. No Matter What the Weather

Aviation in the Air Age will no longer be subject to the vagaries of the weather. Airlines will be able to maintain more accurate time schedules than surface carriers (railroads and buses) by means of technological developments. Stratospheric planes will fly great-circle courses, above weather, and will land and take off through any kind of weather via the radio beam and radar. Dense fog and blinding snow will not ground planes large enough to be equipped with all the latest instruments and safety devices. This inability of the small cub type of aircraft to carry all the necessary safety instruments will finally render it obsolete except for military and commercial aviation training purposes; presupposing, of course, that the helicopter will be the plane for all general-purpose flying.

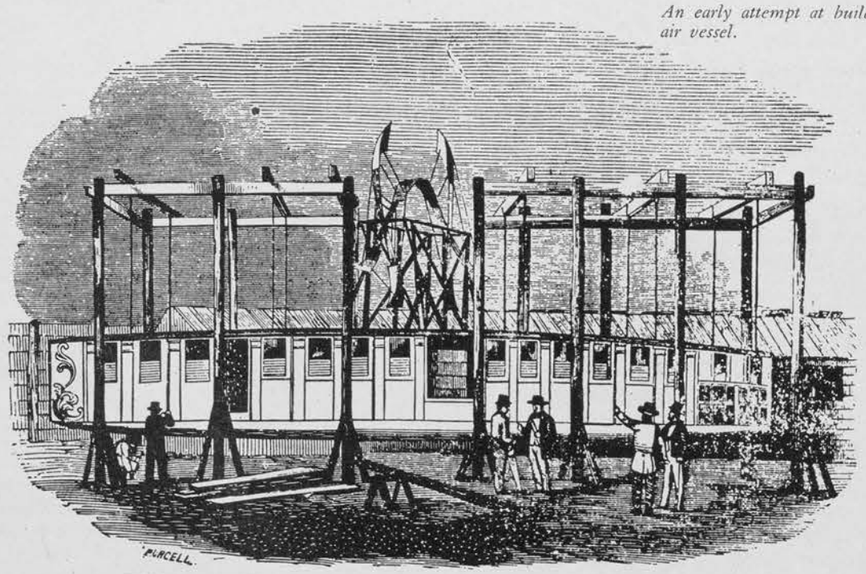
Airway and airport traffic control has anticipated these new technological developments, which will allow aircraft to be "stacked" in layers or spaced in "trains" for blind flying. Such safety devices will simplify traffic control problems and will allow a greater density of aircraft per unit of space, during bad weather, than has previously been possible. The use of radar, however, will not allow a greater traffic density than can be handled under C.A.V.U. (clear and visibility unlimited) conditions. The problem of increased numbers of aircraft and greater densities per unit of space has already received considerable study by traffic-control experts, who have proposed methods of handling it.

Rates Down, Demand Up

Increased operating efficiencies will permit changes in rate structures, which will in turn increase the demand for air travel and transportation. Reasonable estimates indicate that current passenger rates (about 5 cents per mile) will be reduced to 3 or even 2½ cents per mile. Present cargo rates of 80 to 90 cents a ton mile will be reduced to 15 or even 10 cents, comparing favorably with existing rail express rates which average 11 to 18 cents per ton mile. Motor freight, at 5 to 7 cents per ton mile, will be relatively safe from competition.

Such rates suggest basic shifts in methods of travel and transportation. It is reasonable to anticipate that all first class mail going more than 100 miles will be transported by air. The majority of first class rail and Pullman passengers will also travel by air. Much cargo now moving by rail express in excess of 150 miles will probably be carried by air. It is also possible that some high-grade cargo now moved by LCL freight will be diverted to air transportation. It is not difficult to foresee the passing of the ocean liner in favor of hourly transoceanic air service. Already foreseen are operations involving the establishment of non-stop transcontinental flights, local runs and express flights between major terminals serving minor ports, and feeder line systems serving the main transcontinental trunk line. The increased use of air travel and transportation is not expected to supplant wholly, but rather to supplement, other forms of transportation; in fact, it will create new traffic problems and stimulate other forms of transportation. Changes that will necessarily accompany this shift in transportation medium will have profound effects upon city planning and will provide additional realms for architectural activity.

An early attempt at building a cargo air vessel.



VIEW OF THE NEW FLYING SHIP NOW BUILDING AT HOBOKEN.

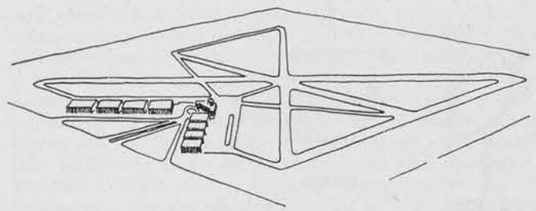
Part 2—AVIATION AS A STIMULUS TO ARCHITECTURE: Basic Requirements for Ground Facilities

This architectural activity will be centered principally at airports. There will be administration buildings and control centers to design, office buildings, passenger terminals, possibly small hotels, newsreel theatres, cafes, restaurants, recreational facilities, clubs, schools, service stations, bus stations, garages (especially heated public garages for colder climates), hangars, shop facilities, overhaul bases, manufacturing plants, fire stations, and power plants. For cargo ports there will be warehouses with heated and refrigerated sections, sheltered plane and truck loading docks in colder climates, receiving and shipping facilities, possibly markets, and the usual collection of hangars, shops, offices, administration and control buildings. In the city proper there will be ticket offices, travel agencies, and terminals with limousine service to airports. The problem of handling a large percentage of mail by air will result in specialized post office facilities at many ports. Additional thought will reveal even more opportunities for the architect.

Airports

The primary center of all this activity being the airport, it is reasonable to assume that airport location and plan deserve primary attention. Factors roughly governing the selection of site, eliminating politics, are as follows: type of airport, anticipated development, relation to city or services it will perform, relation to existing airports, altitude, topography, soil conditions, adequate drainage, man-made and natural obstructions, relation to, and condition of, existing traffic arteries, public transportation services, railroad facilties, weather conditions such as fog, wind, etc., the nearness to, or cost of, adequate water supply, sewage disposal, electric power, fire protection, telephone and telegraph lines, land costs, construction costs, existing rules on runway clearance lines, glide angles and air traffic control, and most important, the possibility of future expansion.

First consideration should be given to development of a master plan and to acquiring enough land to provide adequately for expansion for a considerable period of time. Failure to proceed in this manner, a weakness of many an airport plan, has caused waste of much municipal money. Secondly, consideration should be given to locating buildings, with respect to each other and to clearance lines, so they can be expanded to meet growing needs. This is especially true of administration buildings with loading ramp positions, of commercial airline hangars, and of manufacturing plant hangars.



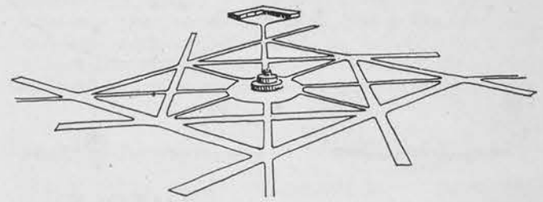
CAA Standards

A number of basic airport types have been proposed and are in existence, and many theories of airport design. The *standard design* is that proposed by the CAA, with variations by stages.

This plan, which has previously been declared quite adequate, can have its operational limits increased only by using dual, possibly triple, runways. Its great fault is that the usual number of loading ramp positions which can be accommodated is insufficient for more than dual-runway traffic. Furthermore, operational conflicts occur at the ends of the runways and taxi distances vary, becoming extremely great as the number of parallel runways is increased. This type of airport plan has runway clearances now considered below minimum, as well as runways of non-uniform length. This criticism is all from the theoretical standpoint. In actual practice a still greater picture of inadequacy emerges when additional physical limitations of site, terrain, obstructions, ill advised expansion, etc. are taken into consideration. This, the common pattern of many existing airports, renders them obsolete and impractical. The standard CAA field can accommodate only 60 to 75 operations per hour, usually much less under adverse weather conditions.

The "Central Design"

One of the most interesting designs from a theoretical standpoint, and possibly relative to immediate future developments and potential variation, is the *central design* proposed by Hans S. Lubig of the CAA. This scheme cuts taxiing of aircraft to a minimum. and permits many landings and takeoffs in a relatively short period of time.

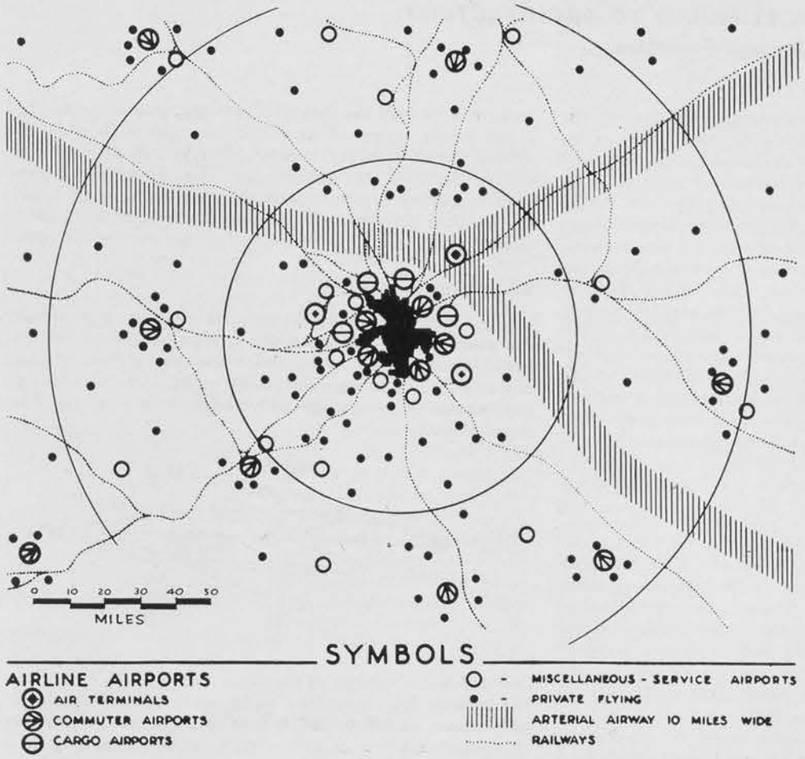


The principal advantages of the central design are its lack of conflict between flight operations, uniformity and small variance in taxi distance, uniformity in length of runways and the possibility of runway expansion, as well as the separation of runways by a distance of 1000 feet or more. By providing for central design variations such as the use of island stations around the central control building, it is possible to set up 20 to 60 loading ramp positions. The distance from hangar areas to the central terminal is a minimum from all parts of the field—though it is much greater than is common in the operation of most commercial airlines today. In the future, major overhaul facilities (at bases requiring them) may have to be located well away from the terminal as a means of providing for expansion of all buildings and grounds facilities. Cost studies have indicated that the necessary underground access to the field's center would soon be paid for by savings resulting from smaller taxi distances and increased operating efficiency.

International Airports

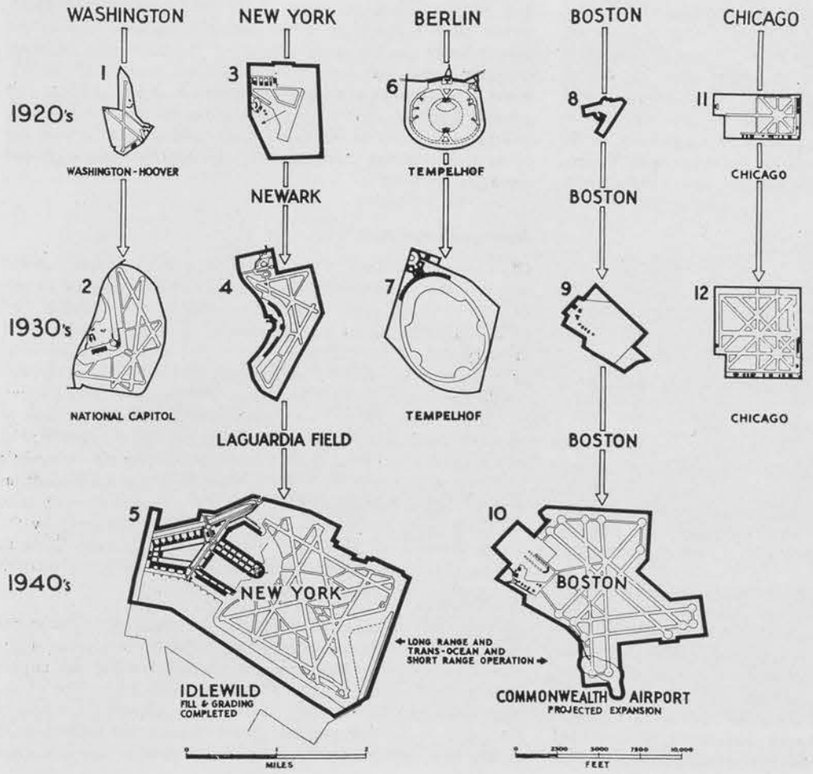
Of unusual interest will be the development of special international airports. For the immediate postwar period it is safe to assume that international traffic will utilize existing major commercial fields. As traffic volume increases, special fields designated as ports of entry and departure will necessarily be created to serve areas or regions rather than a single municipality. Such ports will usually be developed near great metropolitan areas because supply and demand factors are concentrated there. Problems of adequate customs and immigration control will be simplified if international traffic is segregated from domestic traffic. Linguistic problems of airport traffic control in handling foreign aircraft, as well as the necessary radio facilities and mechanical equipment, are likely to be too numerous to be supplied adequately by the average commercial field. The great variety of aircraft likely to be engaged in international traffic may impose a special pattern or require a larger-than-average airport.

Up to the present the aircraft designer has continuously challenged the airport designer to plan for new aircraft with varied operating characteristics. Conversely, it appears fair for the airport designer to challenge the aircraft designer with a new type of airport which would eliminate many of the planning bottlenecks that occur at existing airports. Some thought has been devoted to this new airport as a single system of parallel runways three



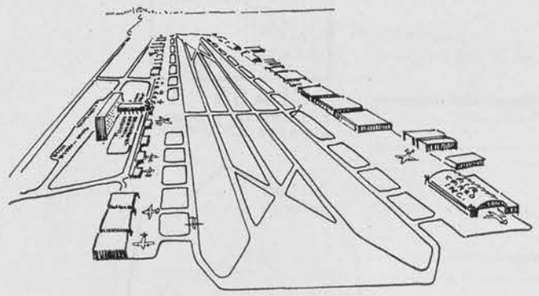
Airport System for a City of 1,000,000 Population

Chart above shows possible distribution of various types of airports about a future metropolitan center. Note terminals and cargo airports close in; outlying and close-in commuter airports; private fields interspersed between. Below, size of metropolitan airports by decades, all drawn to same scale. Both charts from Civil Aeronautics Authority.



Increasing Size of Major Commercial Airports

to ten miles in length, each separated by a thousand or more feet. Parallel to these runways would be the taxiway or ways, and still more distant the aircraft-parking and building lines. Such an airport is predicated upon the theory that the higher the range of aircraft cruising speeds, the higher the landing and take-off speeds and so the greater the length of the runways needed as a safety factor for normal operations and instrument landings. Cross runways, which eliminate so much valuable airport area from the buildable class because of clearance lines, are omitted. In their place a V-shaped paved area is provided at each end of the parallel runway system to allow for landing and take-off with reference to wind direction and velocity. This "funneling in" of flight operations challenges the aircraft designer to design a plane little affected by cross winds and provided with landing gear capable of maximum directional control at ground speeds.



An airport of this pattern would require glide angles and clearances only at the two ends of the field, and room for runway lengthening, if any, only in those same directions. Expansion in the number of runways could be anticipated by limiting buildings to one side of the field, or by planning initially for a definite number of future runways before starting construction on both sides of the field. Furthermore, it would be possible to provide adequate areas for terminal and hangar developments—even allowing for both cargo and passengers to be handled at the same port on opposite sides of the field. Additional advantages would be the minimum taxi distances and the quality of runway lengths.

Terminal Buildings

Next to airport design, terminal building (or station design) seems to be the biggest problem. There will be as many airport administration buildings or terminal designs and types as there are airports if present trends continue. Already there exist some basic administration buildings patterns, created by the CAA and influenced by structures at La Guardia Field and at Washington National Airport. The latter buildings have some admirable features, but none can be considered the ultimate in terminal design. Administration buildings may very likely become "typed" in plan, but with minor variations according to type or function of the airport, and size of community or volume of air traffic served. Here again, as in airport design, many factors enter the picture. The basic problem seems to lie in developing for the terminal building a master plan which will permit inexpensive alteration and expansion, as a means of allowing financial investment in the building to be limited initially and then increased at intervals to parallel traffic growth at the port. Terminal buildings will have to continue to accommodate increasing passenger, mail, and cargo traffic until each type of traffic has increased sufficiently in volume to justify separate terminal or port facilities. For small feeder line airports this may never occur—at least in the normal life of any station facilities erected immediately after the war. At large airports this break will occur sooner; some cities will be ready for separate passenger and cargo terminals at the end of the war.

Eliminating cargo terminals for the moment, let us consider passenger terminals and the factors influencing their design. Here exists the greatest problem in dealing with variables that has come before architects in a long time. The basic factors influencing passenger terminal design are as follows: the aircraft, the passenger, his friends, his baggage, the spectator, mail and express, the automobile, and the employee. The question of terminal building location and views of the field is usually predetermined by the airport plan. The obvious relation of such a structure to soil conditions, utilities, highways, etc. will be neglected here as this is also predetermined to a degree by the airport plan. Analyze the basic factors and one common characteristic is apparent: they are all *mobile, variable* factors, changing in size and quantity or both, and all act as integrated parts of the entire scheme.

To consider them in detail, aircraft are increasing in physical size, in carrying capacity, in number, and in requiring greater area for manoeuvering. But *the rate of these increases is indeterminate.* The day is past when commercial airlines will standardize on one type of plane, as almost occurred when the DC-3 was commercially accepted. However, the number of aircraft manufacturers now operating with gigantic production setups indicates that a great number of types and sizes of commercial planes will be available. Competition between airlines foreshadows the use of different types of planes by each line in its effort to fly more functional ships than competitors. The problem of operating feeder lines, local short-stop flights (milk runs), non-stop transcontinental and trans-oceanic routes points to the use of different types of aircraft for specialized uses within a single air carrier company.

Facilities for Passengers

Greater carrying capacity and increased demand for air travel leads inevitably to an increase in number of passengers, possibly to increased acceptance of baggage at minimum charges over and above the 40-lb. free limit. The passenger is a particular problem in that his demands for service at terminals are bound to become more varied and complex as air travel expands. The basic passenger demand is for toilet facilities, communications, and food. Toilet facilities must be ample; adjacent lounges are essential. Communications are of three varieties: telephone, telegraph, and mail. The telephone booth is easily located at focal points in numbers sufficient for all needs. Telegraph offices are not as flexible; it is not profitable to provide them in quantity. Telegrams must usually be sent from telephone booths or ticket counters. Airport post offices, for air mail, can be enlarged by adding public service windows, general delivery facilities, even post office boxes. The mail pick-up box can be strategically located to serve widely separated parts of the terminal. As for food and refreshment, it is reasonable to assume that large airports will have diversified developments such as cafeterias, restaurants, public and private dining rooms, lunch counters, soda bars, sandwich bars, tap rooms, "sky rooms," grills, clubs, etc.

Secondary facilities for passenger service are also multiple and still more diversified, although these will be essential only at major airports. Baggage check rooms or mechanical lockers, separate and distinct from the airlines baggage room, are desirable. The demand for candy, cigars, news, magazines, souvenirs, drugs, etc., must be satisfied. Newsreel theatres, billiards, bowling, and other amusements may be demanded by the passenger who has time on his hands. Short-duration, round-trip passengers will desire protected parking lot facilities. In colder climates, heated parking garages and service facilities may be profitable. Barber and beauty shops, as well as many hotel accommodations (sleeping rooms, showers and dressing rooms, conference or exhibition rooms, laundry and tailor services, etc.) will also be desired. Many demands of a minor nature, but extremely important to the passenger, such as the procurement of cigarettes, candy, and soft drinks, can be satisfied by installing automatic vending machines. The passenger, a mobile unit, must be controlled and guided for safety and operating efficiency, in his own interest. The rate of passenger growth is also indeterminate. Passenger travel has been seasonal, but the war has temporarily, perhaps permanently, ended seasonal fluctuations.

Attendant upon many air travelers are friends and relatives, to see them off or welcome them. These well wishers alone can

create a serious problem, (aside from that of the idle curiosity-led spectator) since they will do anything to remain with or meet passengers. It is questionable whether present methods of ticket-taking and gate-control can survive unchanged.

Next consider the spectator, who usually pays the taxes which finance the airport and its terminal building, and consequently feels that he has a right to use it as a place for sight-seeing, entertainment, and dining. The old fashioned habit of going down to the railroad station to watch the trains come in has now been replaced by a kindred mass movement to the airport. Surveys vary, but the majority indicate that spectators now outnumber passengers in the ratio of 6 or 8 to 1. Charging admission to the field has not curbed spectators; and though it has added another source of revenue, it has sometimes greatly irked the taxpayer-spectator. How long the airport will remain a novelty and thus have a spectator problem is also indeterminate and must be considered in terminal design. It is essential to segregate the spectator from all operations, and from passenger services and activities, to as great a degree as possible.

Separation of Mail and Passenger Traffic

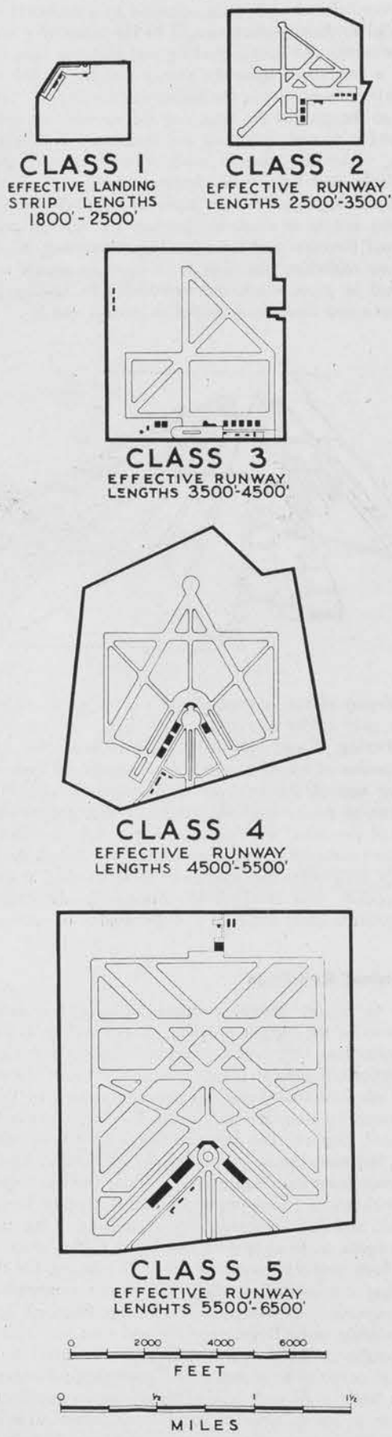
Mail and express, on the increase at an indeterminate rate, depend greatly upon a proper circulation system to expedite their movement and handling. They also require adequate, efficient equipment, plus readily expansible space for their handling. The airmail post office, already mentioned, will have much greater importance if volume of air mail continues to increase until all first class mail going more than 150 or 200 miles is handled by air. Under such conditions it is not unlikely that independent post office structures will be required at major airports and terminals to handle and sort mail. Since feeder line operations are likely to involve a combination of mail and passenger traffic, it appears extremely doubtful that air mail and passenger operations will be carried on at separate fields, even at major terminals. It does seem logical that as cargo traffic develops, air express will be divorced from passenger operations, especially on transcontinental trunk lines, and will need separate fields.

The automobile, increasing in numbers at the airport, will very likely remain the most mobile method of transportation to and from the airport and will require adequate circulation and parking facilities. Parking areas may require subdivision or segregation as to user; moreover, if parking space is limited, other solutions to the transportation problem (buses, trams, surface cars, subways) should be analyzed and, if necessary, incorporated into the local transportation system.

As the number of airport employees increases with the general development, their problems will become correspondingly magnified. Efficient terminal operation demands a constant minimum number of personnel on hand at all times. They will want the usual services (food, refreshment, toilet facilities, locker rooms, rest rooms) separate in many instances from those of the airline passenger. With respect to office space, there is every reason to recommend that the administrative function as represented by offices (*not* airport control functions) be removed as a wing or even a distinct building away from the aircraft ramp positions; thus providing for expansion, reducing noise created by aircraft, and eliminating the confusion which results when administration and passenger and spectator services are combined. All these point to a definite need for flexibility, and for planning for future expansion, in the design of passenger terminal buildings.

Efficient Operation of Air Terminals

The great extent of operational activities in the new air terminals will require just as efficient an operational setup as was previously achieved by personal contact systems. Use of public address systems, intercommunication systems, private lines, pneumatic tubes, conveyor belt systems, elevators, lifts, escalators, television, etc., make this possible. These will be the solutions to the handling of mail, express, baggage, weather reports, flight plans, orders, and



Size of Typical Class 1-2-3-4-5 Airports

Diagrams above and at top of page 45 are from the Civil Aeronautics Authority. The above diagrams and the published proposal for New York's gigantic Idlewild Airport, across page, are based on rectangular and diagonal runways laid out in accordance with prevailing winds.

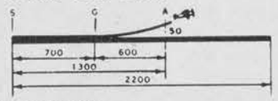
Takeoff Distances to Clear 50-foot Obstacle

SG—IS DISTANCE FROM START TO POINT OF TAKE-OFF

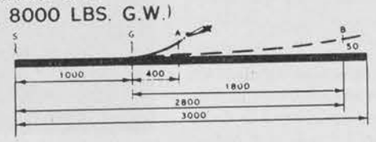
SA—IS DISTANCE FROM START TO CLEAR 50 FT. . . . ALL ENGINES OPERATING

SB—IS DISTANCE FROM START TO CLEAR 50 FT. . . . ONE ENGINE INOPERATIVE AT POINT G

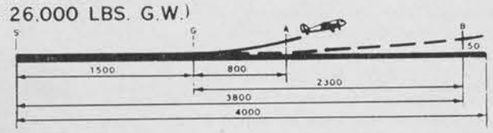
LIGHT AIRPLANE (APPROX. 2000 LBS. G.W.) — CLASS I AIRPORT 2200 FT. RUNWAY



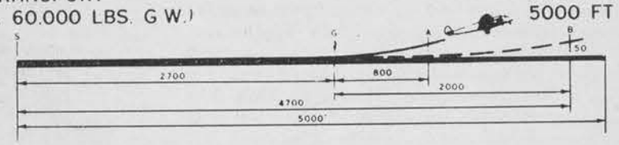
SMALL TRANSPORT (APPROX. 8000 LBS. G.W.) — CLASS II AIRPORT 3000 FT. RUNWAY



MEDIUM TRANSPORT (APPROX. 26,000 LBS. G.W.) — CLASS III AIRPORT 4000 FT. RUNWAY

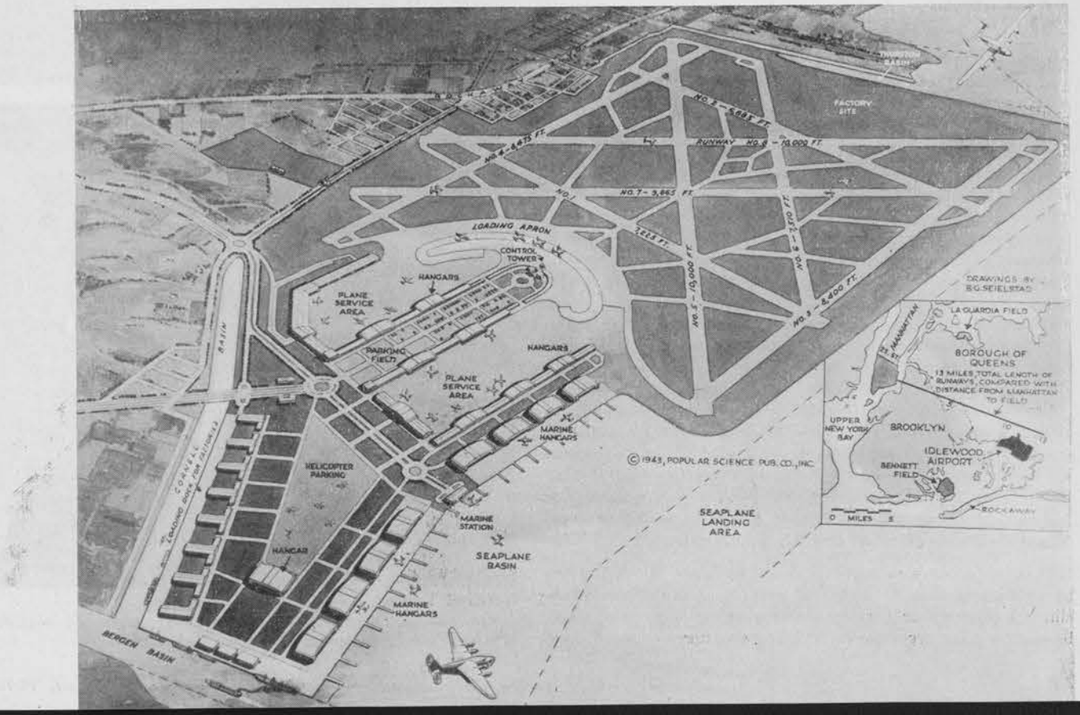


LARGE TRANSPORT (APPROX. 60,000 LBS. G.W.) — CLASS IV AIRPORT 5000 FT. RUNWAY



Proposals for Idlewild Airport, New York City

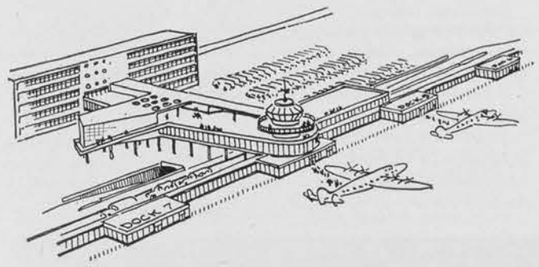
The scheme for New York's future transcontinental and transoceanic air terminal, at Idlewild on Long Island, may be superseded by a more advanced design. Below is the published scheme, the familiar rectangle-and-diagonal layout greatly enlarged to provide 13 miles of runways, some of them 10,000 ft. long, 200 ft. wide. Recently American Aviation *revealed that at least one airline questions this layout, proposing instead a "tangent runway" pattern, which is pinwheel-like, with terminal building and ramps forming the hub, and runways, the tangential "spokes." Landings, made within 45° of wind direction, point toward the hub; takeoffs are made similarly but away from the center. Taxi distance is much reduced. Access to central buildings is by tunnel under runways. Studies reportedly show that the rectangular scheme will permit only 80 takeoffs and landings per hour (at this rate, estimates indicate, New York will need 3 Idlewilds plus LaGuardia Field within 9 years after the war) while a single tangential layout at Idlewild could permit 375 plane movements per hour. Among other claimed advantages this would reduce land area needed for the total volume of air traffic from 12,834 to 5612 acres.*



tickets, from centralized offices to decentralized loading stations, ports, docks or ramps.

Based upon this kind of analysis, Northwest Airlines has been studying the passenger terminal problem and is in the process of designing several theoretically ideal terminals. Plans have been conceived with a view to having answers ready for the questions that have and will come from municipalities when they plan new passenger terminals. The position of the airlines as advisors to the municipalities they serve is a serious one inasmuch as both must plan their air age future together. What either does will have a decided effect upon the others; future efforts must be even more cooperative than they have been in the past.

The important principle upon which one terminal solution was based may be stated as follows. It has been estimated that in some cities 80 to 90 percent of all airline tickets are purchased at downtown ticket offices, because the airport ticket office is remote. The airport passenger is presumably interested in buying *airline time*; such time should be carried over into ground operations as far as possible. It should not take the passenger an hour to reach the airport, nor should we have to be there half an hour ahead of scheduled departure for a flight of perhaps only an hour's duration. Travel time to the airport is regulated principally by distance and existing speed laws, so that once an airport site is selected this factor is fixed. However, the passenger who arrives at the airport by private car, cab, airline limousine, or bus is primarily interested in a direct effortless transfer from his automotive conveyance through the airport barrier to the plane, with his ticket being checked and his baggage cared for en route. The reverse process is true for "terminating" passengers. Only those who are changing planes or are held over at the airport will make the most of the services provided in the terminal building.



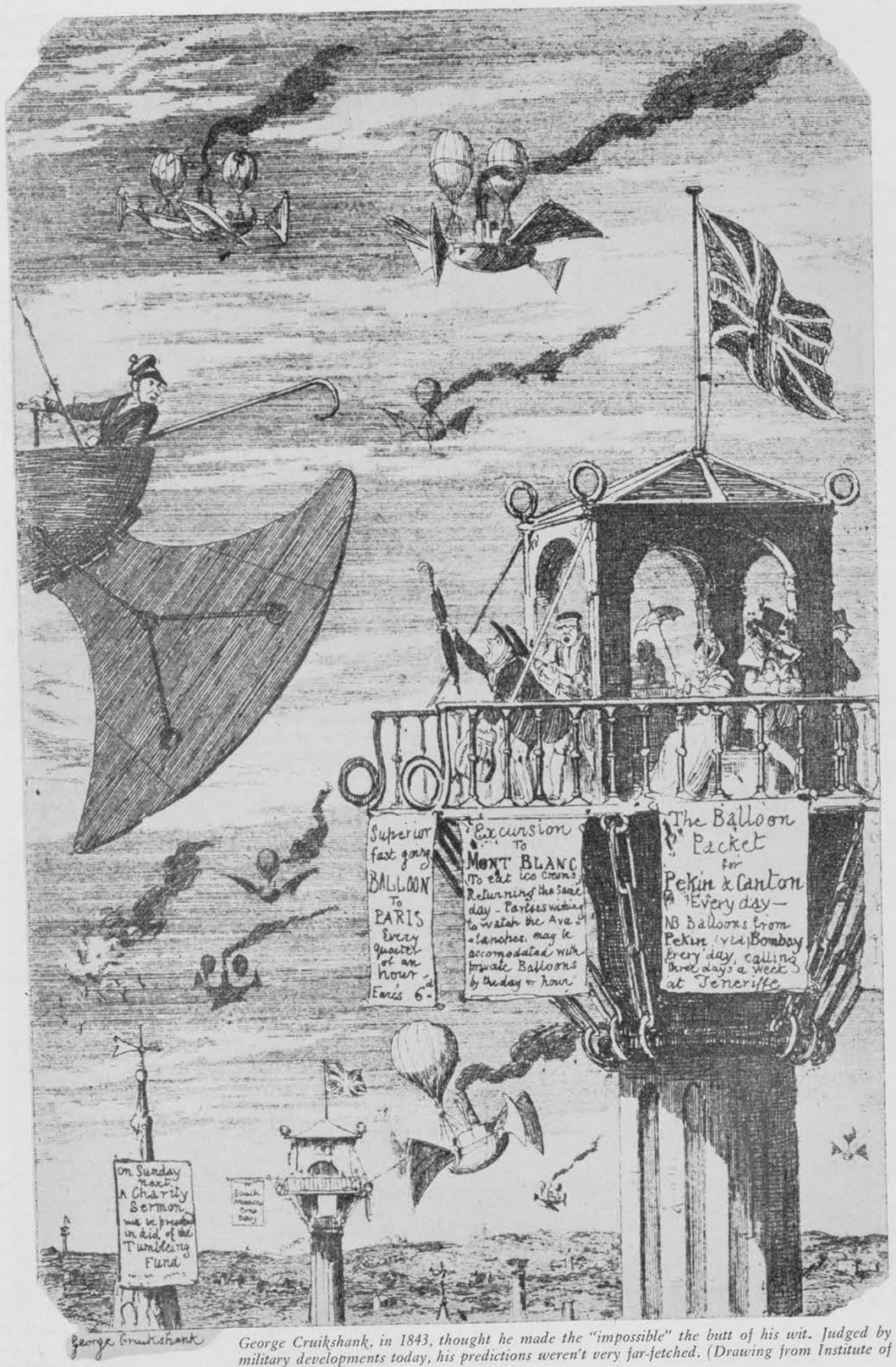
The solution referred to provides a number of individual docks or passenger stations, connected by covered passageways and underground service tunnels for utilities, mail, and express. These docks are flexible entities in that they can be added one after another as the demand arises. They are centered so as to provide between them the minimum space required for aircraft to manoeuver into ramp position. They are flexible in that they can be respaced if larger aircraft are operated, or their waiting rooms and services can be expanded to meet the needs of aircraft with greater passenger capacity. Several docks can be set aside for international traffic, and additional facilities for customs and immigration can be provided. If time tables are accurately maintained there is no reason why every hour, on the hour, a plane should not leave from Dock 5 for Seattle just as the westbound express always is to be found on Track 5 at 6 A.M. Furthermore, the entire terminal could be operated by the municipality and the airlines as a joint project, or separate docks could be rented to separate airlines in proportion to their schedule of operations. This latter system would allow the airlines exterior advertising by means of controlled signs on each dock.

Weather Protection at the Air Terminal

Still more problems of terminal design have not as yet reached an ultimate solution. In inclement weather, particularly in colder climates, protected en-planeing and de-planeing of passengers and baggage is a big problem. In designing the aforementioned dock

Official U. S. Navy Photo

Control Towers
Top to bottom, La Guardia Field, New York; a military airport; El Paso, Texas, commercial airport; a Naval Air Station.



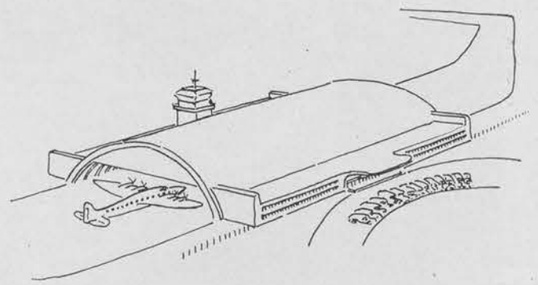
George Cruikshank, in 1843, thought he made the "impossible" the butt of his wit. Judged by military developments today, his predictions weren't very far-fetched. (Drawing from Institute of Aeronautical Science.)

Official U. S. Navy Photo, courtey Skyways

Above, a Beechcraft Transport, typical of the smaller plane which may serve feeder lines and the wealthier private fliers. Below, the much-publicized helicopter, projected by some as the future air-flivver, everyman's plane, etc.

system, telescoping passageways from dock to plane were envisioned, but these were not regarded as final. Mail and express in such a dock system could be handled underground, with lifts up to planes on ramps. This system will eliminate the enormous cost of attempting to enclose the entire plane, a difficult problem because aircraft are still increasing in size. However, if aircraft become larger, some ships may load from second- or third-story levels, a scheme which requires bridges, cantilevered platforms, or special nose docks for head-on loading. Such planes may revolutionize air terminal design by distributing different kinds of traffic to different levels: mail, express, and baggage at ground level, passengers and friends on an intermediate level, spectators on the top level.

Another solution to loading under cover is the use of tunnel shelters much like some of the wood, laminated-arch hangars now in use. Such shelters would be open at both ends and would "process" planes through in train fashion. In cold climates, quick-operating doors could be provided at each end.



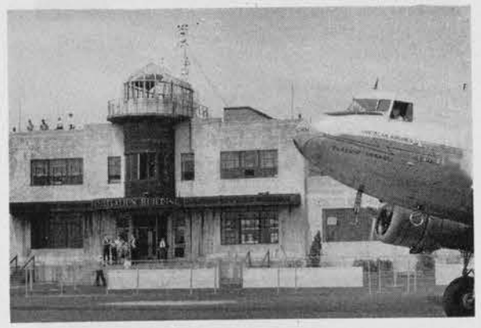
This type of passenger station is suitable for line station operations only. It would not be desirable for a terminal, where the lead plane could delay other flights. Such facilities, though, may be suitable for cargo terminals where maintenance of accurate time tables is not imperative, but saving perishable cargo from damage is important.

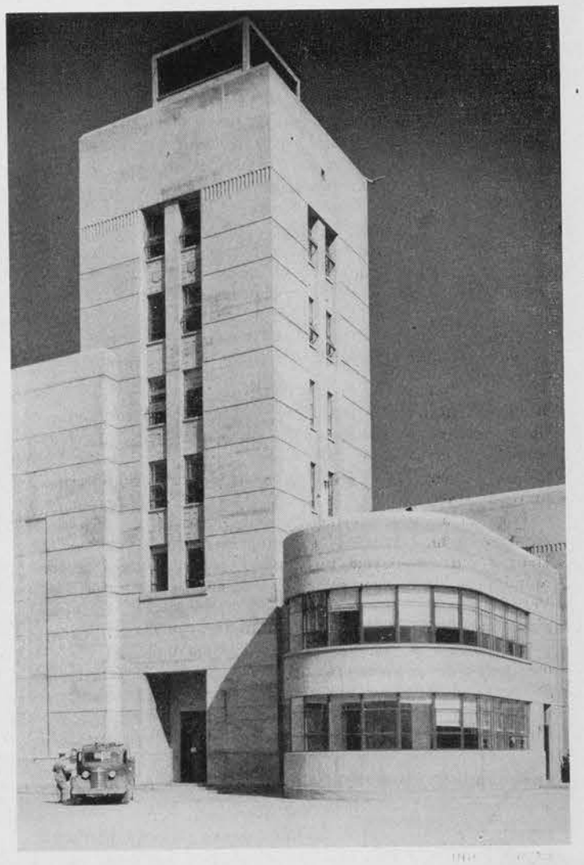
Nose loading of passenger or cargo ships makes it necessary to use cantilevered roofs over nose docks. This method, unless the design incorporates hangar facilities, appears to be too costly and clumsy an expedient except for warm climates, due to the difficulties involved if anything more than the nose of the ship is enclosed. Northwest Airlines has already successfully used "nose hangars" for aircraft repair and maintenance work, and for removing engine and propellers for overhaul in very cold temperatures. In these cases, aircraft remain in the hangars for a long time. There is also the possibility of approaching aircraft underground, utilizing lifts to emplane or deplane passengers. This is excellent in theory, in that it keeps passengers off the ramp areas, but might keep a crew of men busy operating the lifts to gratify passengers' whims. Cargo which has no mind of its own could be more easily and expediently handled in this manner. Elevators may be unsatisfactory because only limited amounts of passengers can be handled per trip, leaving others waiting.

Problems In Handling Air Cargo

Cargo handling via aircraft presents a multitude of problems, from education of shippers to design of warehouses, docks, and cargo handling equipment and systems. This subject has been treated in great detail by Karl O. Larson, Chief Engineer for Northwest Airlines, in a paper entitled "Terminal Handling of Air Cargo," which was presented in Chicago on December 9, 1942, at a meeting of the Society of Automotive Engineers. It is sufficient to say that here again the design of the airplane itself, and its method of loading (through top hatches, side doors, nose, or up through the bottom) will in a great measure determine the type of handling equipment to be used, and will affect the design of related structures. It is hoped that ideal solutions will be

Administration Buildings





Upper left, administration buildings at Baltimore and Newark Airports. Top right, administration and control unit at a military field. Left, Airlines Terminal, on Forty Second Street in New York City, best known in-city terminal building. Directly above, Syracuse Airport building suggests the possible country-club airport of the future. These indicate the range of building types now in existence; few of them are really adequate. It is up to designers to make them function according to the demands of the planes they serve.

found more quickly for cargo terminals where there exists no predetermined pattern to mislead designers, than for passenger terminals.

Design of hangars and adjacent shops is another pertinent problem, intricately involved with the planning of an airport. Completely enclosed hangars are a necessity in cold climates; some shelter is necessary for ground crews and mechanics in all climates. With the physical size of aircraft still increasing, there exists an unpublicized competition between structural engineers and aircraft designers, defined as "bigger plane versus bigger hangar." Thoughts differ on hangar design but here again a few factors are outstanding. The numbers of commercial aircraft are likely to be such that it will be financially impossible to provide complete hangar coverage for all ships not in operation. Aircraft now designed to fly through all kinds of weather can be parked outdoors, in those same kinds of weather, without adverse results.

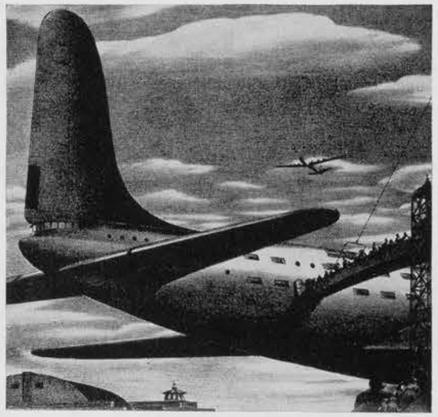
The analysis of aircraft hangar design problems, as to basic types and plans, structural types and variations, as well as a survey of the advantages and limitations of each type, is a task as complex and difficult as that of terminal design, if not more lengthy. Even greater complexities are encountered in the design of specialized overhaul and repair shops necessary for the maintenance of a commercial airline. Functions and requirements of such shops are complex to the point of requiring specialists for their design. Hangar and shop layout for a major overhaul base is another complex problem, comparable to designing an industrial plant. Very important is the external relation of such a base to the airport plan as a whole. As has been previously pointed out, there are usually both a premium and limitations on buildable area immediately adjacent to ramps and taxiways. It is therefore rapidly becoming obvious that only small routine service hangars and facilities can be located near the terminal building. This gives planning and location of major overhaul bases a new aspect.

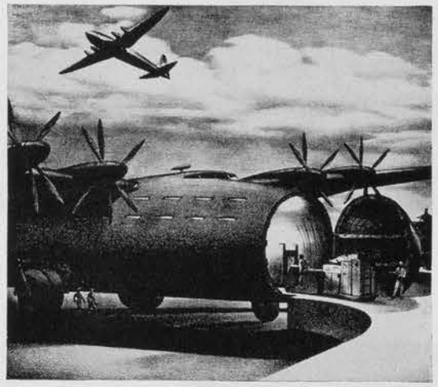
Independent Power Plants for Municipal Airports

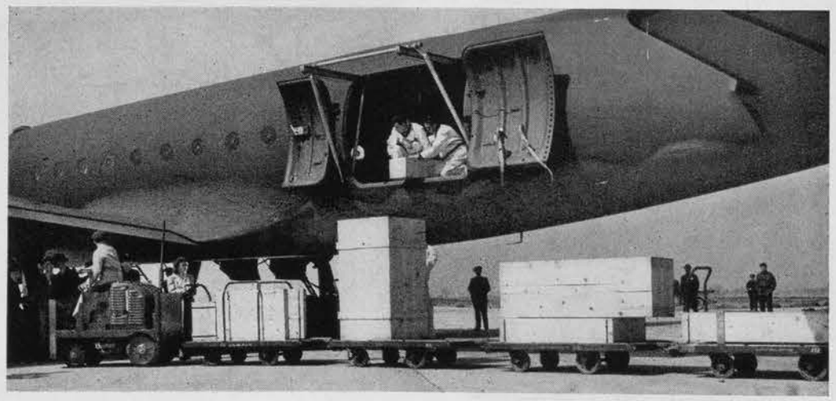
A service that seems to have been overlooked at many municipal airports is establishment of a central power plant for heating all airport buildings. This could be a source of municipal revenue and would limit chimney obstructions to one adjacent location. Such a power plant could provide the essential auxiliary power service necessary in case of a power failure by the normal supplier. Failure of radio facilities or field lighting is a dangerous situation, especially when weather conditions are adverse.

This discussion is in essence but a mere skimming over the surface, an outline of many items requiring deeper study and analysis. It has dealt mainly with some of the architectural and airport problems of commercial airline operation. The effect of aviation upon architectural practices and methods is still another story, for aviation has helped to develop the use of plastics, the light metals, stressed skin construction, and many other items that will not remain the sole property of aviation when the present conflict is over.

Airport Ground Traffic Problems

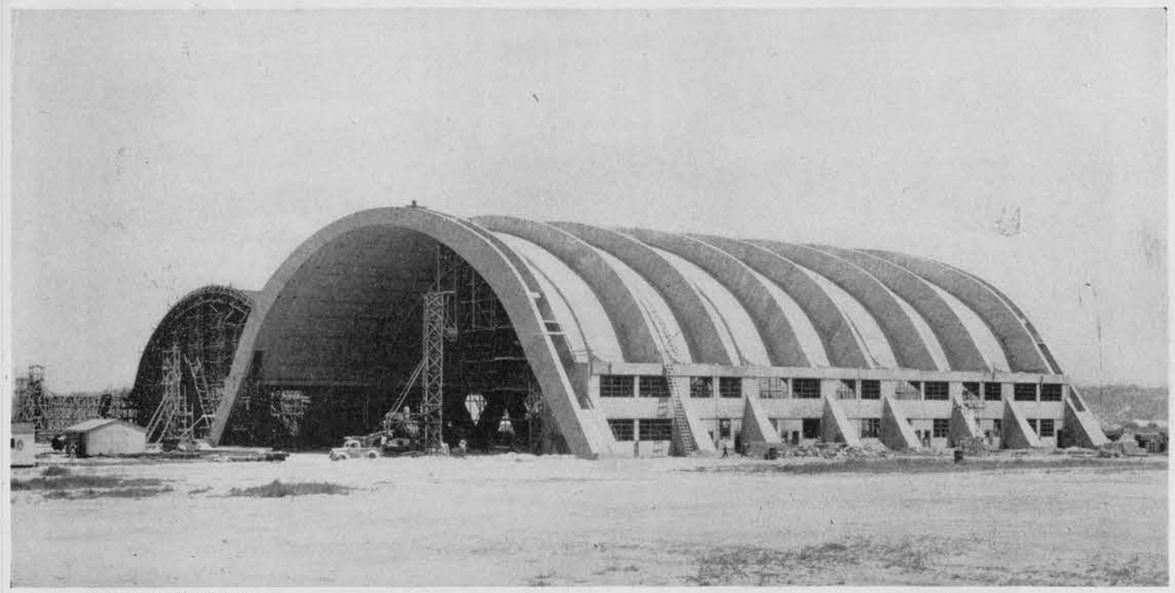




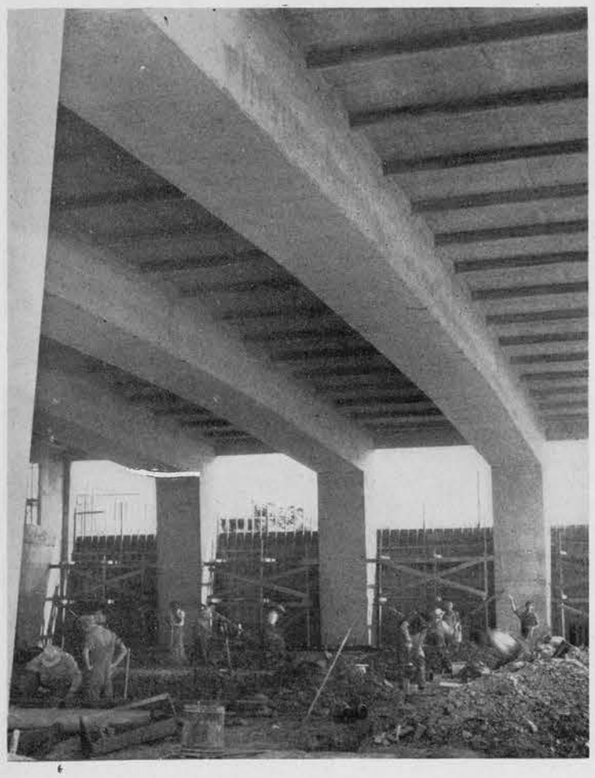


Handling of cargo, passengers, sight-seers, express, and mail demand a thorough integration of different kinds of traffic facilities and equipment. Indeed, expediting various kinds of payloads is the crucial problem in terminal building design; to separate the different kinds of users from one another and from the merely curious requires all the ingenuity the planner can command. At left, bottom, freight is lifted into a cargo plane on booms designed as part of the plane. Trucks with elevator bodies are another approach. At left, above, are two suggestions for loading future aerial mammoths: Center, nose-loading of cargo, which Mr. Meisch suggests might further benefit from installation of some sort of canopy which would provide shelter from weather; and, top, a passenger gangplank. On this page, above, two views of La Guardia Field terminal building, showing automobile entrance over the mail and express entrance; and an elevated walkway, one means of segregating traffic. At right, automobile entrance at a commercial airport.

Types of Hangar Buildings



Official U. S. Navy Photo



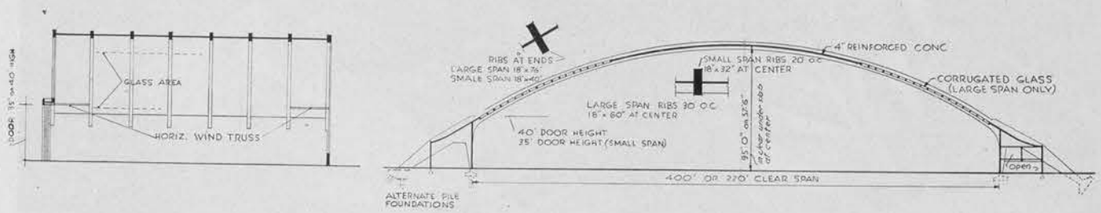
Strictly speaking, it is difficult to segregate different kinds of hangar buildings by "types", except as some house lighter-than-air ships and others heavier-than-air planes. In the former case, the necessity for economizing on structure and materials (a war need now, potentially a peacetime necessity to reduce costs) has led to interesting design solutions. Most of the familiar examples of this kind have been executed in concrete or wood; when steel is available, it should be at least equally suitable. Indeed, one steel-framed example is shown on page 55.

Above is a Naval hangar of thin-shell concrete construction, with exterior arch ribs (Architecturally, this is reminiscent of the famous hangar at Orleans, France.) Here, the span is 294 ft., the rise, 84 feet. Roberts and Schaefer were the consulting engineers, Joe H. Lapish was the associate architect.

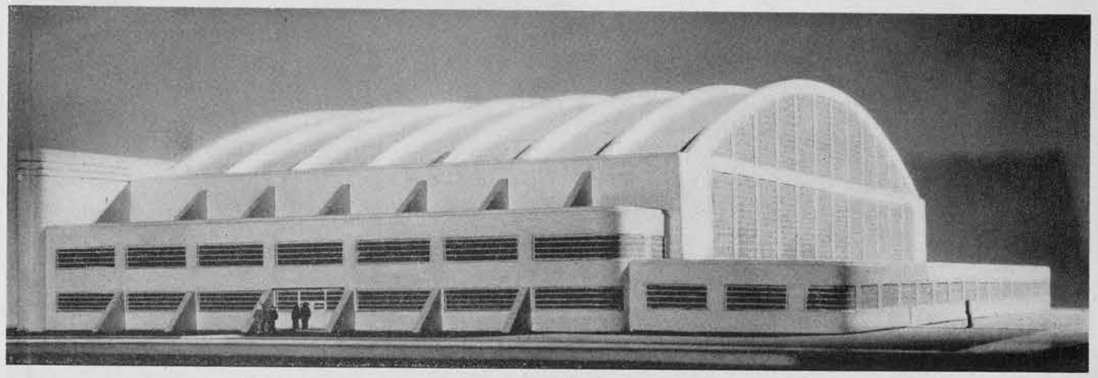
At left is a National Guard hangar in Iowa, with a concrete roof slab spanning 150 ft., supported by hollow box-girders of reinforced concrete. The roof slab is 3 inches thick. William N. Nielson was the architect and engineer; Les Forsyth was the structural engineer.

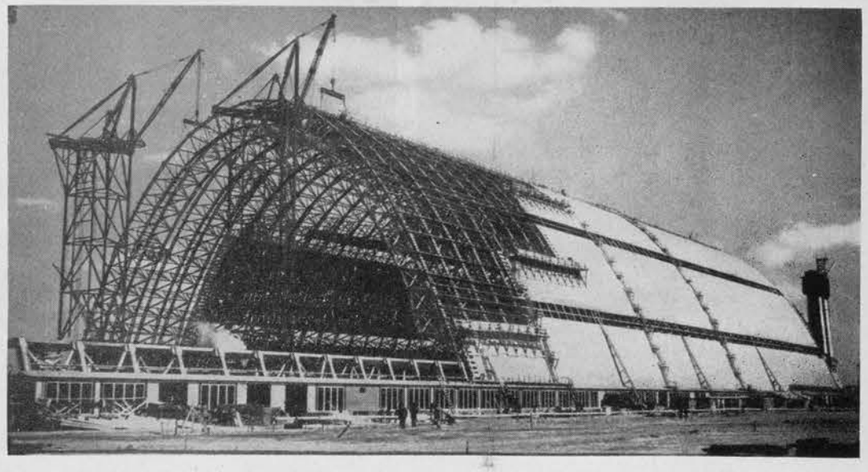
On the facing page, in the center, is a typical commercial hangar for United Air Lines at the Denver Airport. It is chiefly of metal construction, and has an office building annex at the rear. Albert Kahn Associated Architects and Engineers, Inc.

At the bottom of page 53 is a huge Naval dirigible hangar constructed of wood. Its design and construction were made possible by the development of timber connectors. To assure permanence, the wood is pressure-treated against decay or attack by insects.



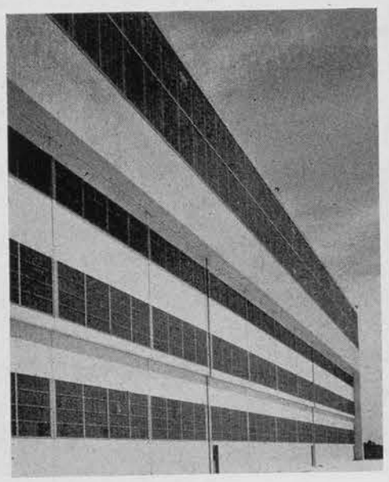
Above, sections; below, photograph of model, of a type of concrete hangar designed by Charles S. Whitney, consulting engineer, of Milwaukee, Wis. It consists of a 4-inch-thick reinforced concrete shell stiffened by integrally cast ribs spaced 20 to 30 feet on centers. Part of the roof slab may be replaced with structural glass when the size of the hangar is so great that additional natural light is advisable. Even longer spans are feasible.

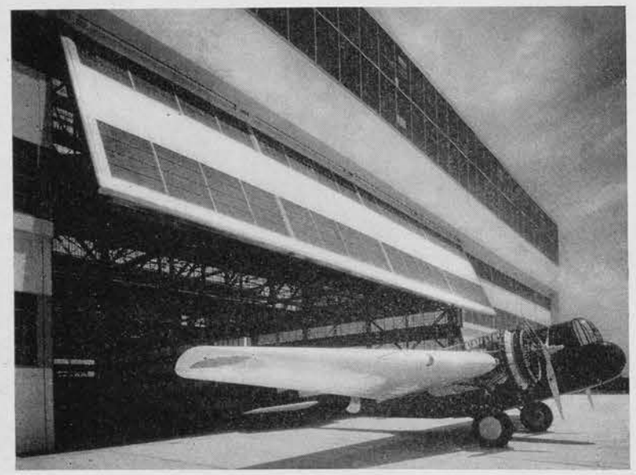


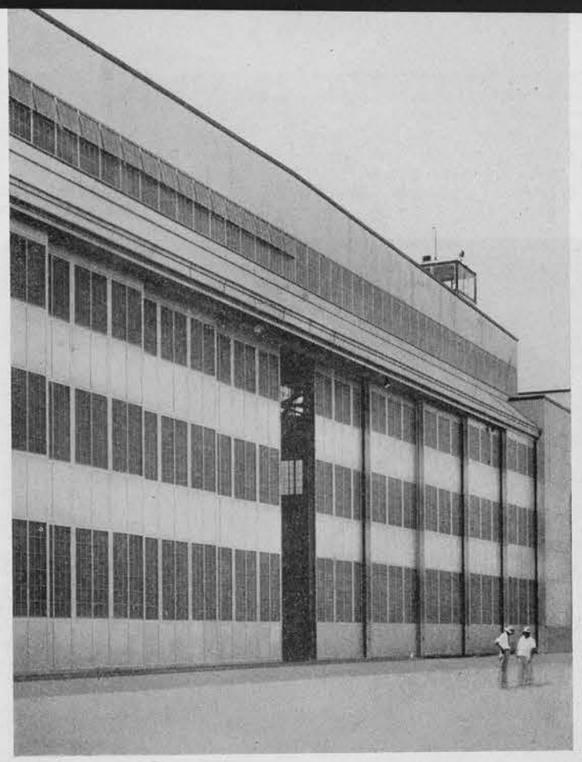


Hangar Doors

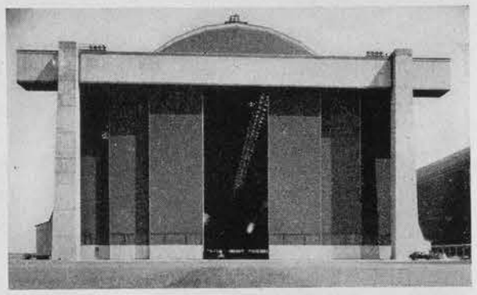
For the average case, there are two principal types of hangar doors: canopy and horizontal sliding types. Advantages are claimed for both kinds; the designer has to select the one which meets all his requirements best. Above is an excellent example of the canopy door, demonstrating how the door, when open, offers additional weather protection at the hangar entrance, and how the entire opening, jamb-to-jamb, is cleared for use. Below is a double canopy door, shown in two views, at the Glenn L. Martin plant, designed by Albert Kahn Associated Architects and Engineers, Inc. Here the bottom leaf slides up behind the upper, and both then lift together.

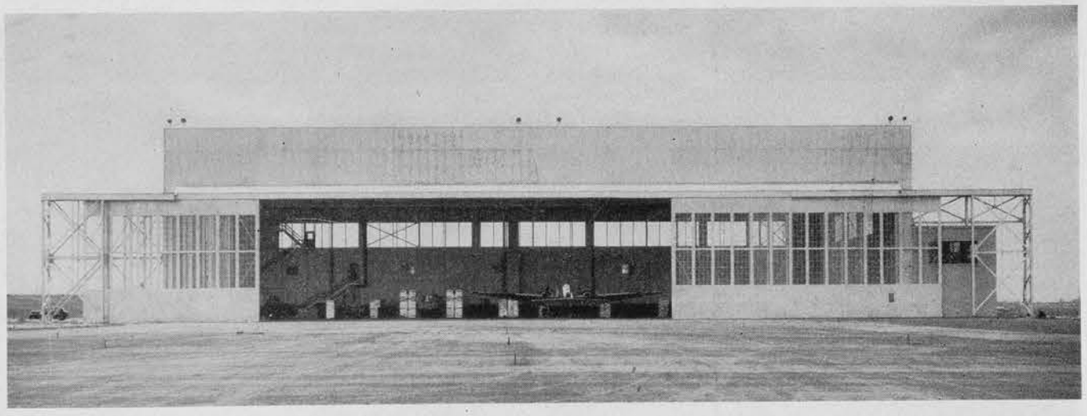






Various types of sliding hangar doors appear on this page. At left is a motor-driven type for a 250 by 48-ft. opening. Leaves move at different rates of speed so that all arrive simultaneously at open or closed position. Below is a similar door for a Navy lighter-than-air hangar. Difference between the two is that in one case leaves are housed within the structure (which prevents use of the full width of the hangar as an openable door) and in the other, leaves are housed outside the structure (and entire wall width can become clear opening.)

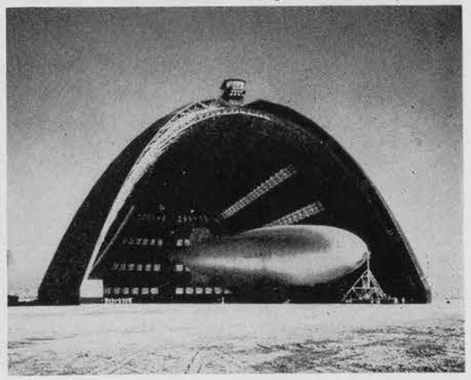




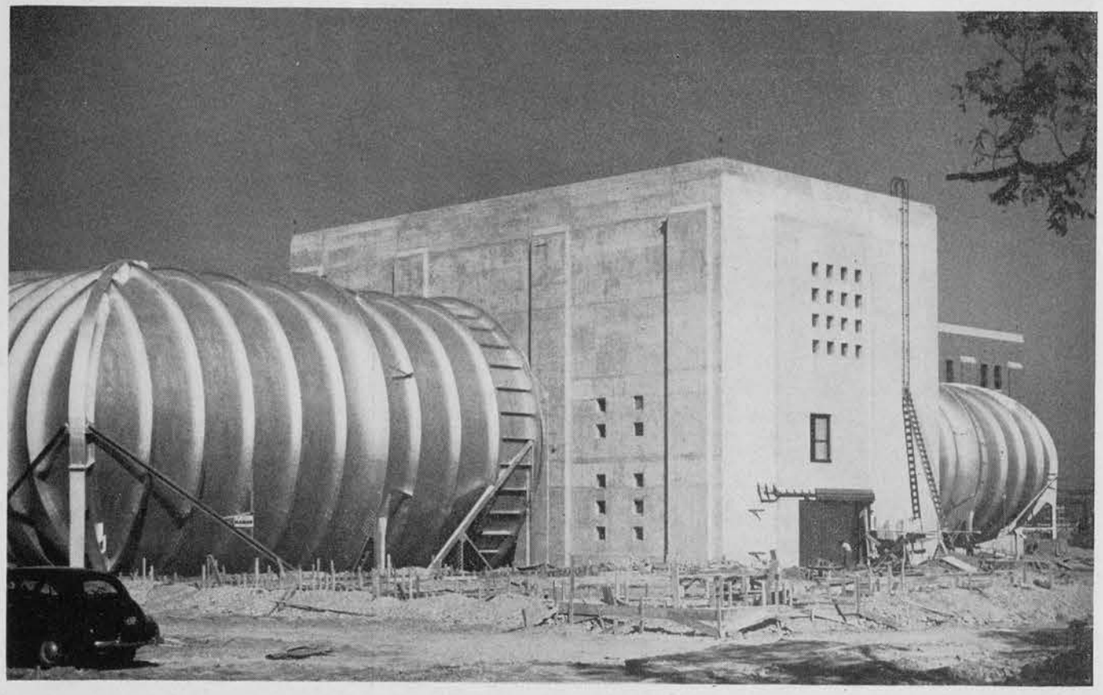
Official U. S. Navy Photos

Above is the United Air Lines hangar at the Denver, Colorado, Airport, designed by Albert Kahn Associated Architects and Engineers, Inc. It is another development of principles demonstrated in the photograph at top right.

The lighter-than-air hangar at the immediate right is equipped with "orange-peel" doors—basically a horizontal sliding door, but with leaves pivoted at the top center.

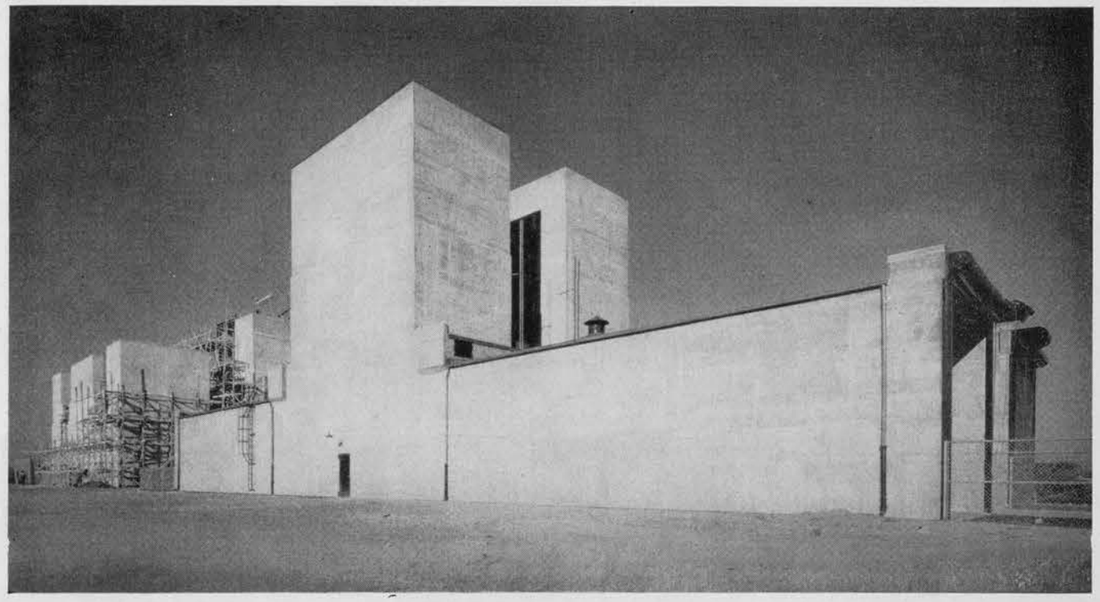


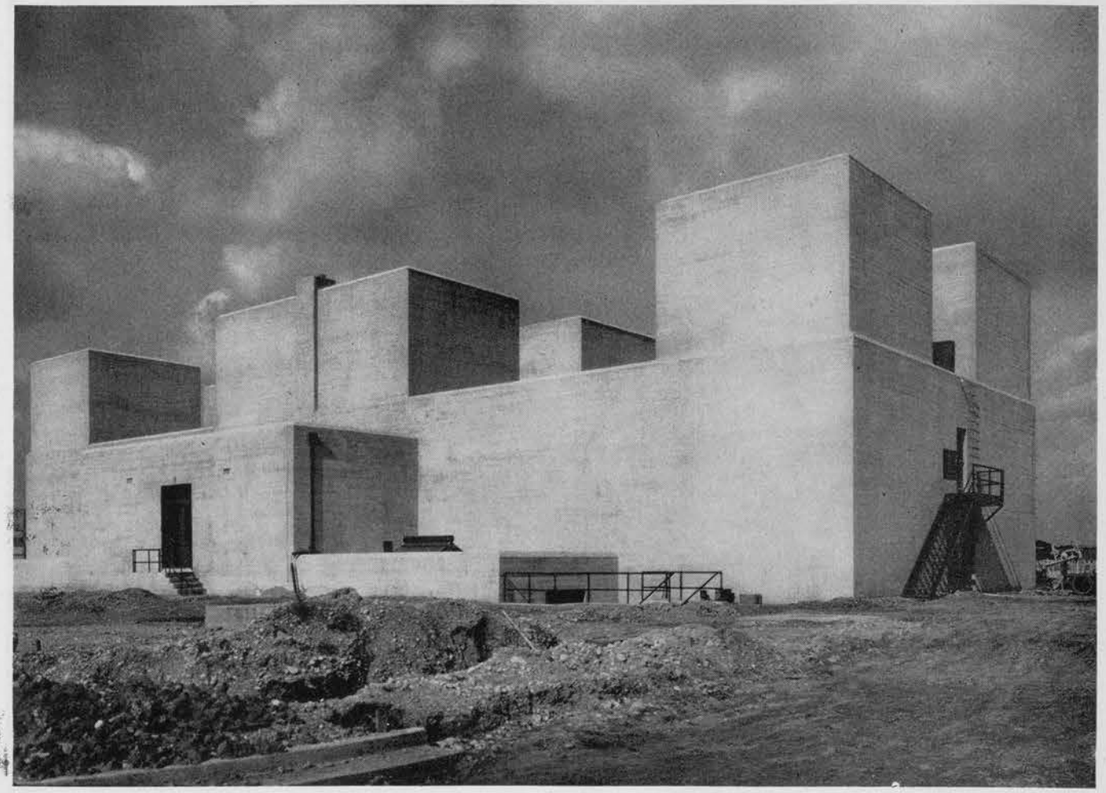
Laboratories and Test Buildings



Top of page, an early wind tunnel at an Army air field, designed by the Constructing Quartermaster Corps. Lower picture shows the cold chamber for a wind tunnel; here are included a large testing area, office and control room space, and a refrigerating unit. This unit was designed by J. Gordon Turnbull, Inc., and Sverdrup and Parcel, consulting engineers. (Official U. S. Army Air Corps Photos.)

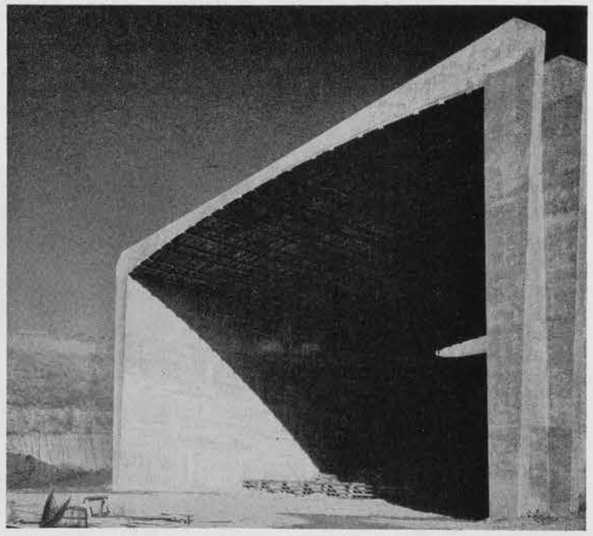
On this page are two groups of engine test blocks. In general, this type of structure requires one or more test cells, each with an exhaust stack equipped with baffles or otherwise treated to reduce the volume of escaping sound; and control rooms from which motors can be safely observed in operation. Cells may be paired or arranged around a single stack for economy. The steel roll-up doors in the upper example are noteworthy. Both these units were designed for United Aircraft Corp. by Albert Kahn Associated Architects and Engineers, Inc. Details of similar units were presented in an earlier issue of New Pencil Points *(August, 1943, pages 75-76.)*

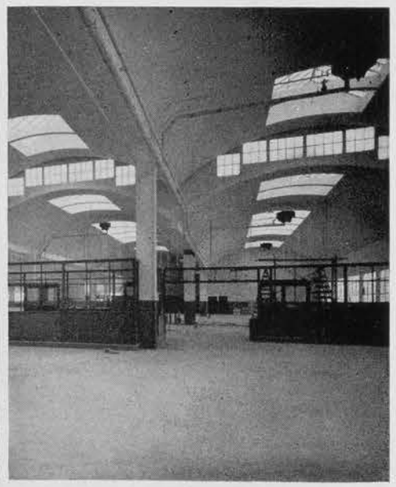




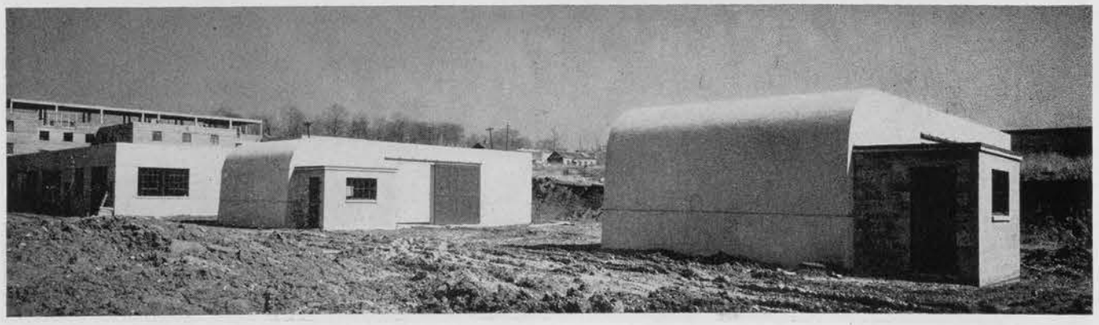
Subsidiary Buildings for War Indicate Peacetime Requirements

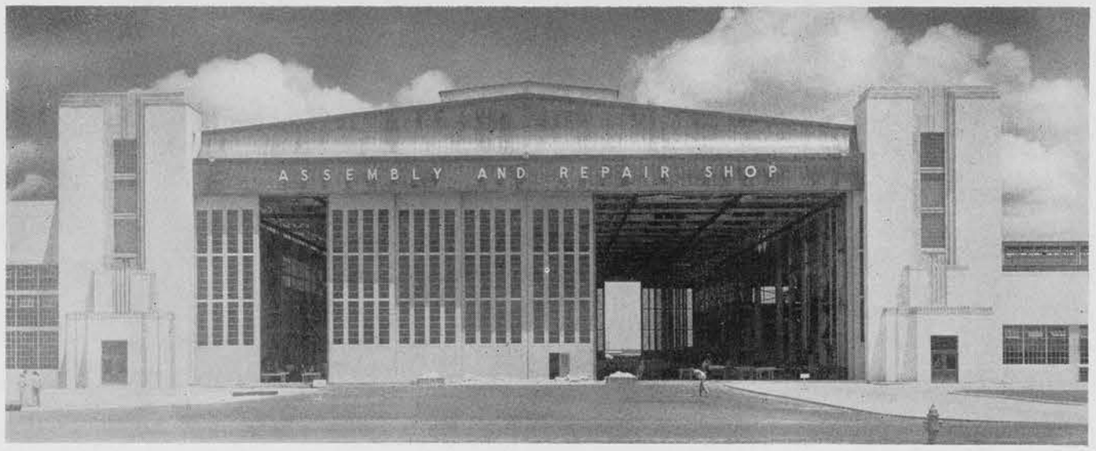
Buildings on these two pages are all at large Army and Navy fields; though not all will have their counterparts in a peacetime establishment, they embody some design and construction principles which will prove valuable. The firing-range cover, at right, was designed by the U. S. Engineers for an armament laboratory group. It is a rigid-frame concrete structure, with ribs on the outside to preserve a required smooth interior surface. Below is an Army test laboratory group consisting of hangars, tower and operations unit, and engineering shops. It was designed by the U. S. Engineers, with Roberts and Schaefer as consultants on the shops building, of which an interior is shown at the right.





Below is another experimental group, the propulsion laboratory, at an Army field. There are a one story laboratory and two test cells with parabolic ends. Cell control rooms are of lightweight concrete masonry. Rial T. Parrish was architect for this group. All structures on this page are of concrete (official U. S. Air Corps photos).

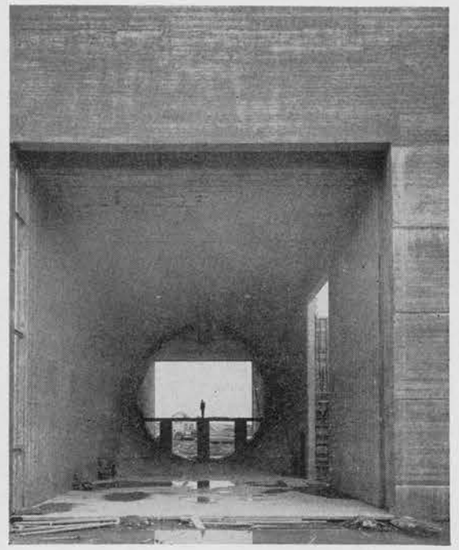




Official U. S. Navy Photo.

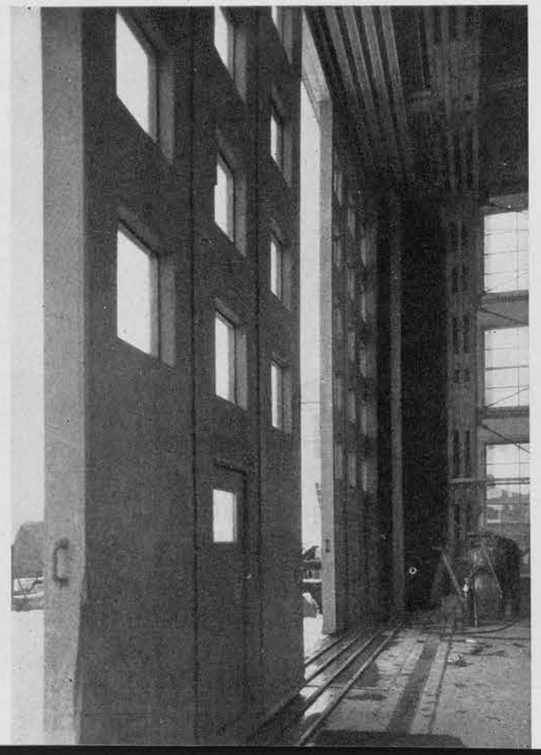
Top of page, the municipally-owned Chicago and Southern Airlines hanger and office building. Leased to the airline, the structures were designed by the engineering staff, Public Works Department, Memphis, Tennessee. It is an example of a "service" airport for a large metropolitan center. Above is huge assembly and repair shop of a Southern Naval air station; architects, Robert & Co.

Below, views of U. S. Army field propellor torque stands. Essentially they are enormous Venturi sections grouped in 2-cell units. Problems were need for vibration-protection for control room, for smooth cell-interiors, and an interior shape changing from a 45-ft. square to a 42-ft. circle, and back to the square again. All-concrete structure. Test-blocks on independent foundations, to solid rock, pass through Venturi structure, are cushioned with cork, mastic, and sand. An exhaust tunnel runs under the full length of the stands. U. S. Army Engineers designed the units. (Official U. S. Army Air Corps photos.)



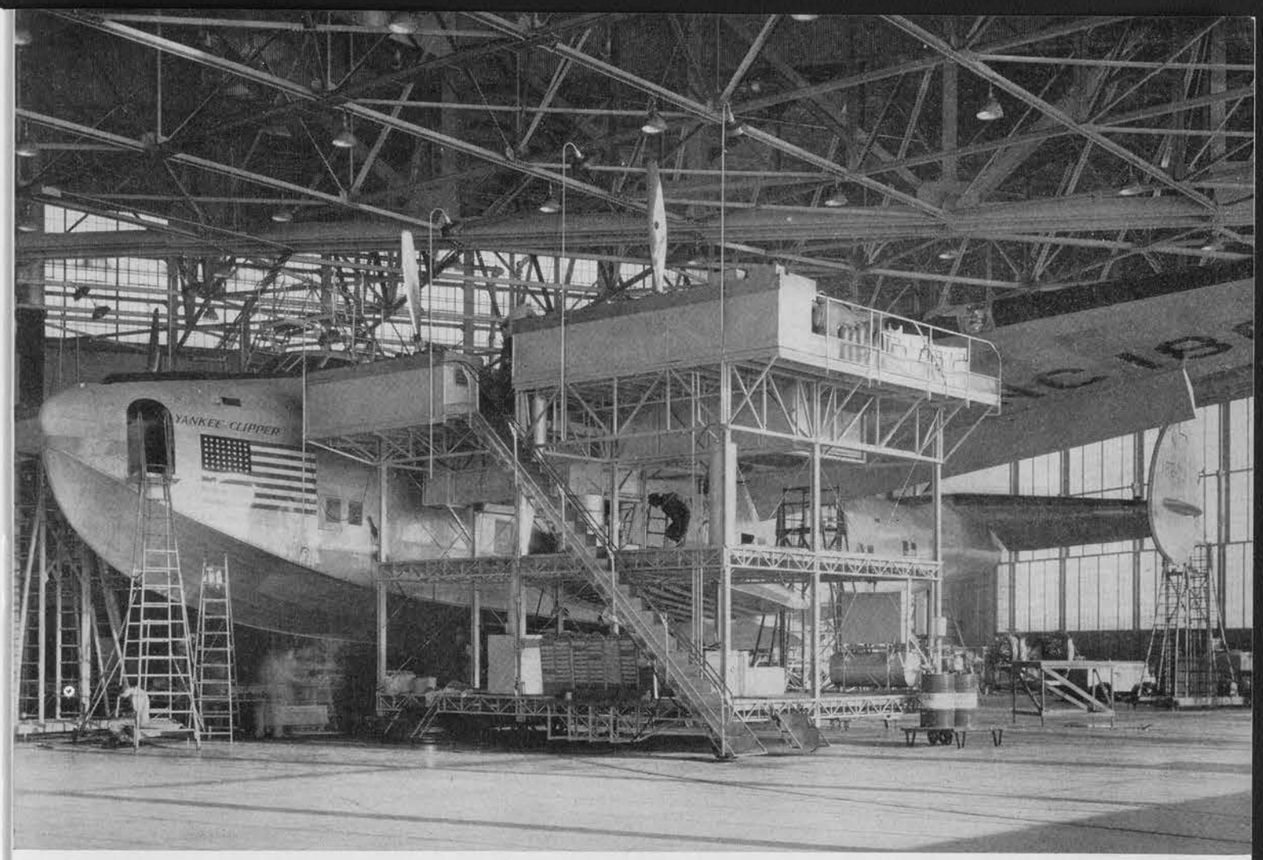
Hedrich-Blessing

Building Equipment: Heating, Lighting, Power, Service Outlets



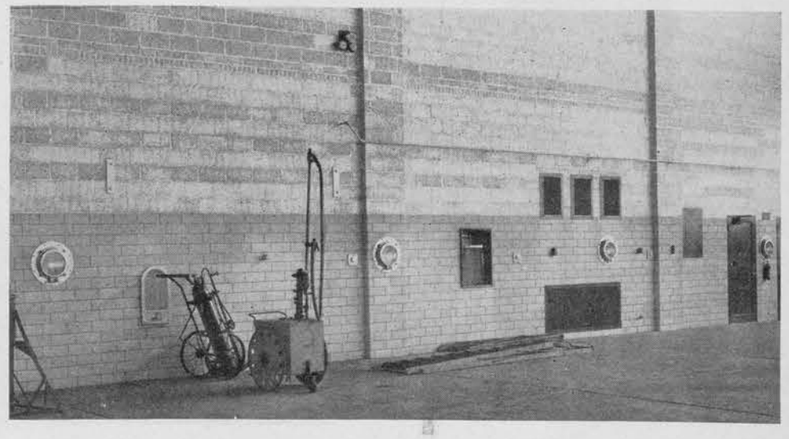
Perhaps the most complex part of designing buildings for the aviation industry has to do with providing the necessary services. Not only is the airplane the most up-to-the-minute symptom of technological advance—and hence, one which requires the newest and best for service, maintenance, construction, and repair. Such a building as a modern hangar or assembly plant, necessary because of the size and unique function of the airplane, complicates the problem. Heating an assembly building, for instance, is a difficult job.

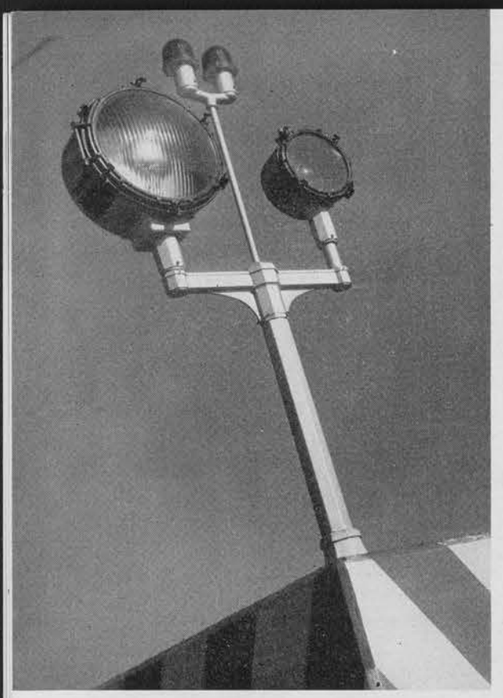
At the top of this page is a view of a Curtiss-Wright assembly building designed by Albert Kahn Associated Architects and Engineers, Inc.: at right is an Army hangar. Both are huge structures with tremendous doors which increase heating difficulties. Various methods have been used in different cases: one interesting means consists of a series of floor outlets, running full door width, from which blasts of warmed air are directed upward across the opening.



Lighting has several unusual jobs to do, particularly in as assembly or reconditioning building. Above is Pan American Airways' Clipper hangar at La Guardia Field, New York. Light in such structures must illuminate under sides and vertical surfaces of planes, as well as top surfaces, well enough to permit fast, accurate work. (It takes 141 mechanics, working three 8-hour shifts, to perform in two days the complete inspection of servicing routine which must be carried out before a Clipper just in from Europe can be sent on the return trip.) Parts of the building can be used as reflectors: White floors have been found to reflect much light to the bottoms of planes. And below is a hangar in which the lower portions of walls are highly light-reflective, and porthole-like lighting fixtures have been installed slightly below normal eye level to provide supplemental illumination.

To provide power and service outlets needed seems a more complicated problem in a plane factory than in a commercial hangar. At times this has been done by using an underfloor grid of service lines, similar in principle to sub-floor duct systems used in office buildings, with outlets at specified intervals. Removable plates cover the outlets when they are not in use.

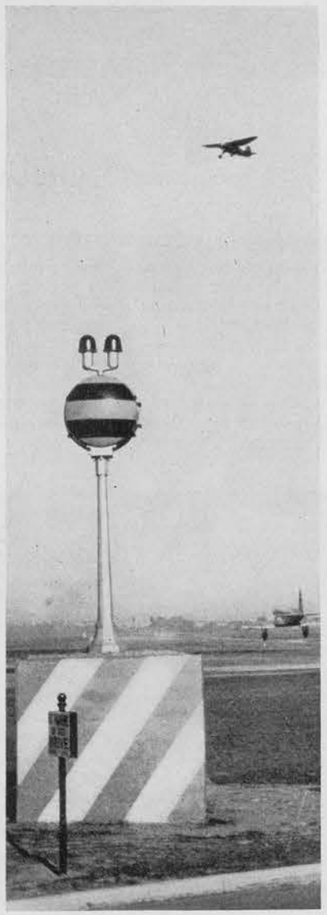


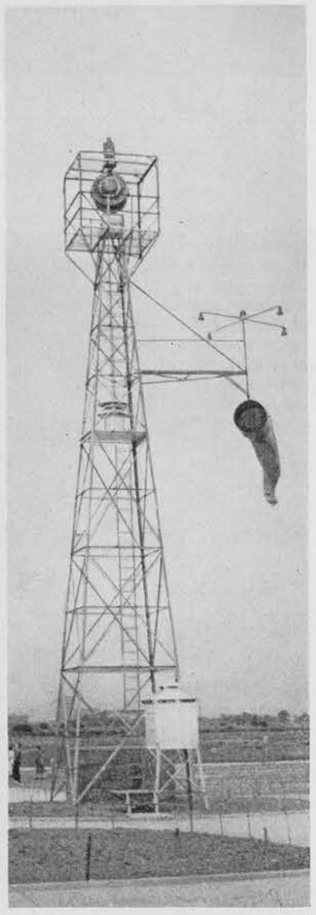


Field Lighting

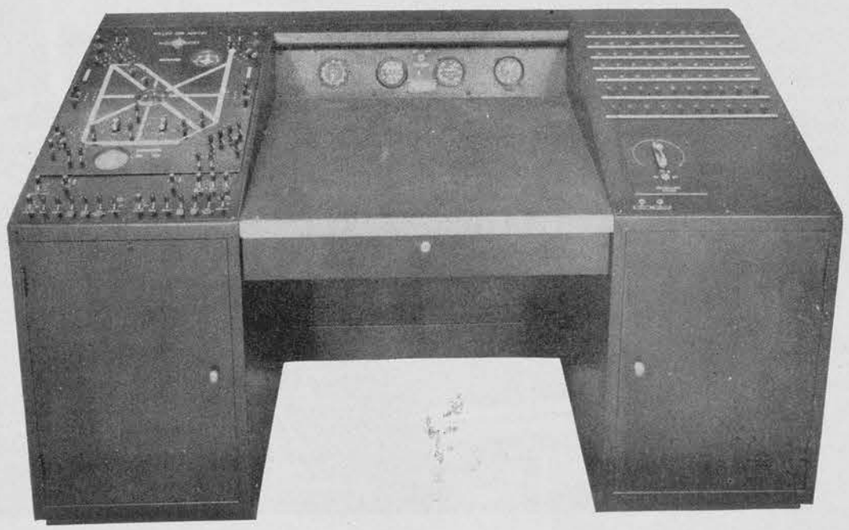
Airport lighting is such a specialized part of design for aviation that expert advice should be sought in all cases. It is necessary to indicate the limits of the field and location of runways, which have also to be illuminated. In addition, air traffic control is facilitated by portable and fixed traffic lights as aids to radio control. The whole system of lighting is unified and controlled from the operations suite. There all the aids to flight control are coordinated. It can be seen from even this abbreviated description that airport lighting is one of the most important factors to be considered in design of modern airports. With multiplication not only of the number of planes, but also of the types of air traffic —private, cargo, passenger, and military conventional plane and helicopter—problems of air traffic become even more involved, and lighting's part even more important.

Above, range and flood lights at North Beach Airport, New York, one of the earlier installations. Below, portable traffic signal as used at Syracuse (N. Y.) Airport. At right, floodlight at end of runway, with transformer housed in base, North Beach Airport; and beacon tower with illuminated wind sock, Philadelphia Airport.



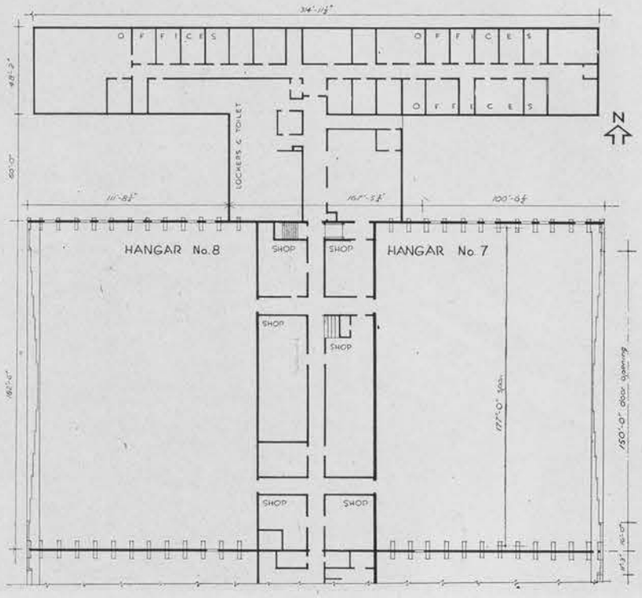


Above, floodlights installed on hangar piers, where they help illuminate the hanger apron as well as runways; Rochester, (N. Y.) Airport. Below, typical control desk for lighting equipment, showing the complexity of the system; Ford Airport.

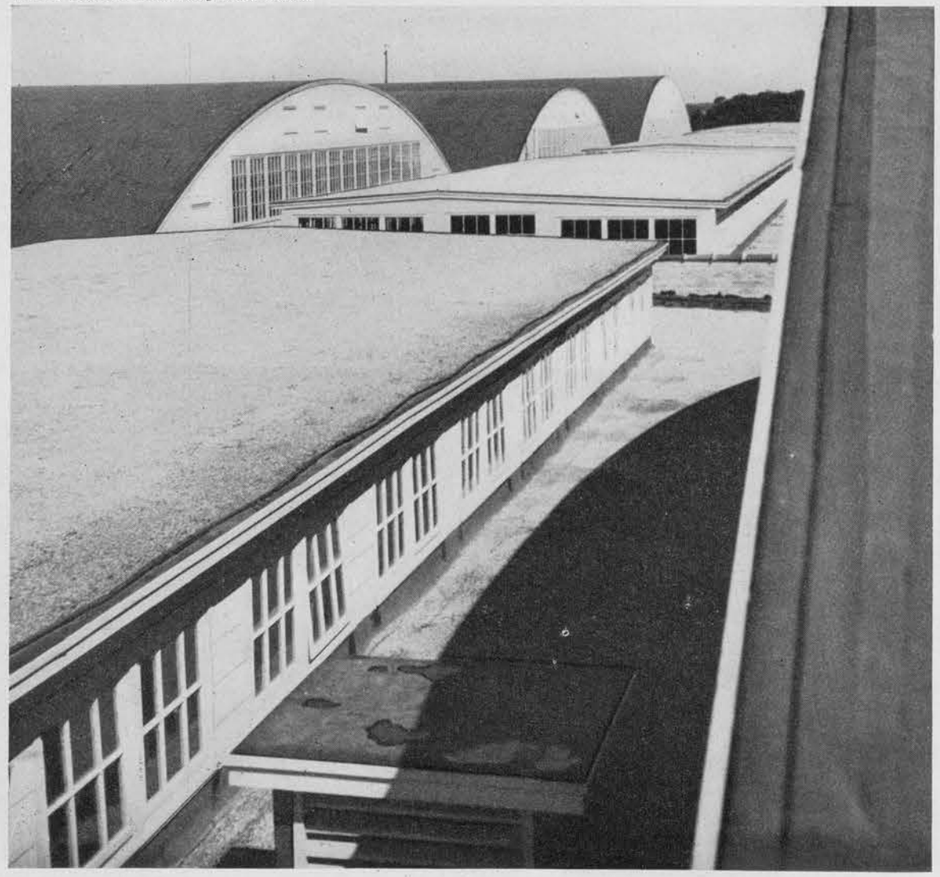


Wood Hangars for Modification Center

U. S. Army Engineers



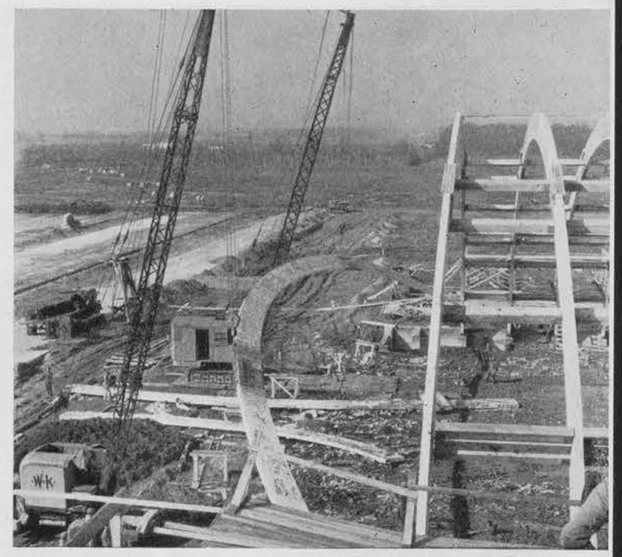
Photos, Courtesy Engineering News Record

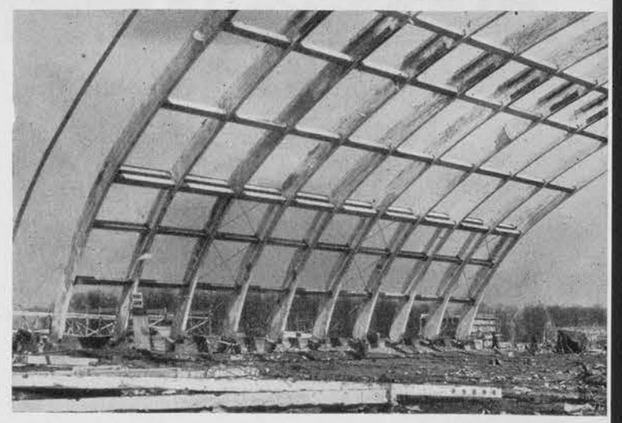


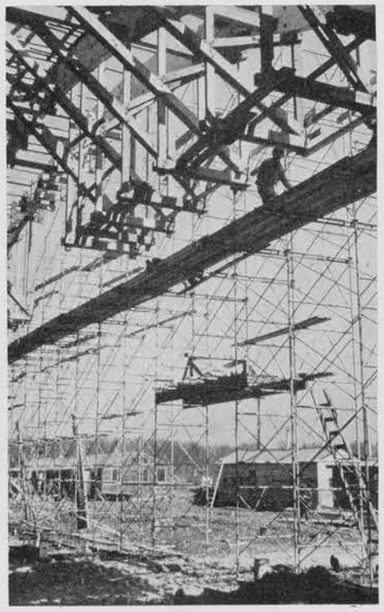
One of the new architectural problems created by the growth of aviation—the provision of facilities for large-scale repair operations—was solved by the U. S. Army Engineers according to the plan illustrated on the opposite page. This midwest modification center, intended for large military aircraft, consists of eight hangars in two north-south rows of four each. The illustration shows two of these hangars of 177-foot span each. The other six, although of but 160-foot span, are similar to the two shown. The two rows of hangars are separated by two-story timber-frame shops; about sixty feet from the hangars, both to the north and south, are timber-frame office-administration buildings; one of these includes a control tower.

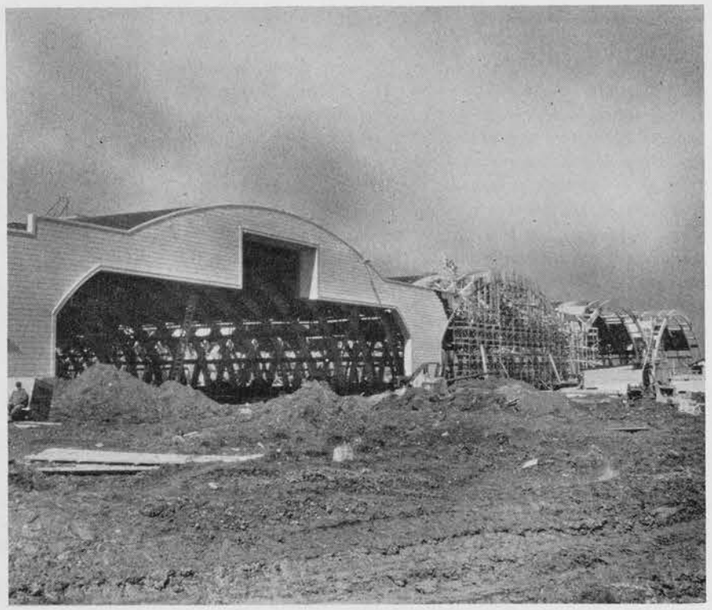
Controlling factors in the design were the necessity for elasticity in the use of the hangars, and the need for a convenient placement of shops and offices. According to the layout, shops are within easy reach of the hangars, and office buildings are placed where shop noises cannot disturb the office personnel. The hangar doors open out on areas free from obstruction from either shop or office buildings. Because of their location between the hangars, the shops are easy to heat. The photograph on the opposite page shows the front of an administration building and the arches of the hangar beyond.

Supported by long-span laminated timber arches, the project makes minimum use of critical materials. Photographs at the right show the arches being raised, and in position. The two largest hangars required arches of 177-foot span, probably the longest timber arches ever erected.









Photos on this page courtesy Engineering News Record

The hangar doors illustrate the flexibility characteristic of the whole plan. For the larger hangars, sliding doors of steel construction supported on a steel rail were used to provide an opening 150 feet wide and 24 feet high. Reinforced-concrete counterweights suspended on each side help to operate them. To provide additional vertical clearance for the tail pieces of the larger planes, a 13 by 24-foot steel roll-up door was installed; a small electric motor placed within the arch-ribs supplies the motive power. Thus smaller planes can be accomodated without using door-space or motive power needed for the larger planes.

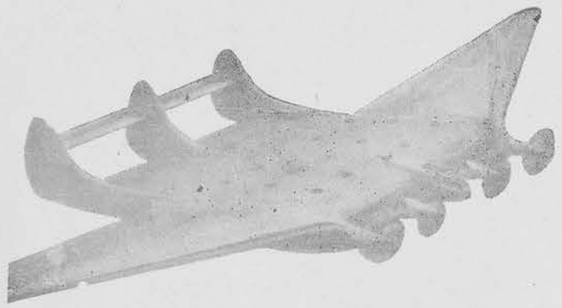
Photographs on this page show a detail of the arch-bracing; a hangar door in construction; and a completed hangar door with the tail-gate open.

Air Terminals for Mass Air Travel

by Francis R. Meisch
Architect and Plant Engineer, Northwest Airlines

Reprinted from PENCIL POINTS, November, 1944

AIR TERMINALS FOR MASS AIR TRAVEL



Francis Meisch has probably had a better chance to study the design of airport structures "from the inside" than most American architects. In his capacity as Architect and Plant Engineer for Northwest Airlines, he has had many an occasion to develop schemes designed to indicate to municipalities along the airline's route what type and size of buildings his company needed; and he has spent much time on the problem of the air terminal building.

Photographs of the Burnelli Flying Wing, above, and the British "Miles X," appear through the courtesy of Skyways. *Most of the drawings in and following this article were prepared by Mr. Meisch; the remainder were redrawn from his originals.*

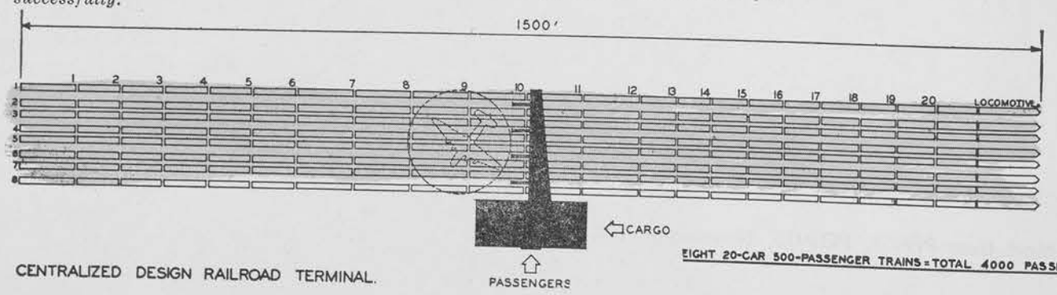
The Past

Up to now, airport administration buildings have been erected with little regard for function or changing conditions. The buildings were planned for smaller planes and plane loads than are now being handled or anticipated. Both administrative and terminal functions were combined within one structure, together with any number of related and unrelated minor activities. Too many of these functions, subject to expansion, were crowded into symmetrical structures built in too permanent a manner. The buildings were either low-cost structures which, through poor maintenance, soon deteriorated into veritable slums, or expensive municipal monuments, show places for the general public. The monumental stone or concrete edifices defied all attempts at economic remodeling or expansion to keep pace with the fast-growing air transport industry. Consequently, their useful life was terminated far ahead of their previously estimated economic life or amortization period.

The buildings had other faults. Often there were too little space and too few facilities for the airline passenger and the airline operational functions, in contrast to public areas. In addition, little thought was given to developing service and revenue-producing facilities of a high standard for the convenience of passengers, the public, and employees. The result was that the airlines were expected to pay the lion's share of the operating costs of these monuments. The buildings themselves were often poorly placed in relation to apron and apron expansion, runways and proposed runways, access roads and drives, parking areas, and other fixed construction such as hangars. This placement, in most instances, excluded any possibility of expansion.

In many cases there was a lack of balance in the various types of traffic flow; consequently, bottlenecks developed. The various types of traffic flow—plane, passenger, cargo, general public, and automotive—are governed

The two drawings below compare, for a railroad and an airline terminal, the maximum number of passengers which each can serve from a centralized terminal building. The author believes the analogy between rail and air travel cannot be carried this far successfully.



CENTRALIZED DESIGN RAILROAD TERMINAL.

by Francis R. Meisch

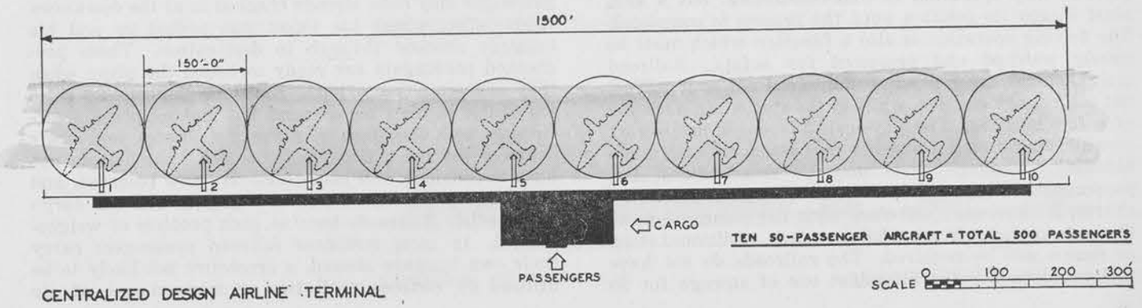
Architect and Plant Engineer, Northwest Airlines

by many factors. These factors, in the main, are air traffic circle capacity, runway configuration capacity, taxi-way pattern capacity, apron or gate capacity, terminal building capacity (for adequate handling of passengers, baggage, air cargo, the general public, and spectators), parking lot capacity, capacity of access drives and roads, and capacity of the highway between the airport and the city for volume or high-speed traffic. In terminal design, the building, the apron, the parking lot, and the access drives are of primary concern. The other considerations fall into the realm of airport planning or city planning. Balancing all the factors to provide uniform traffic flow is very essential.

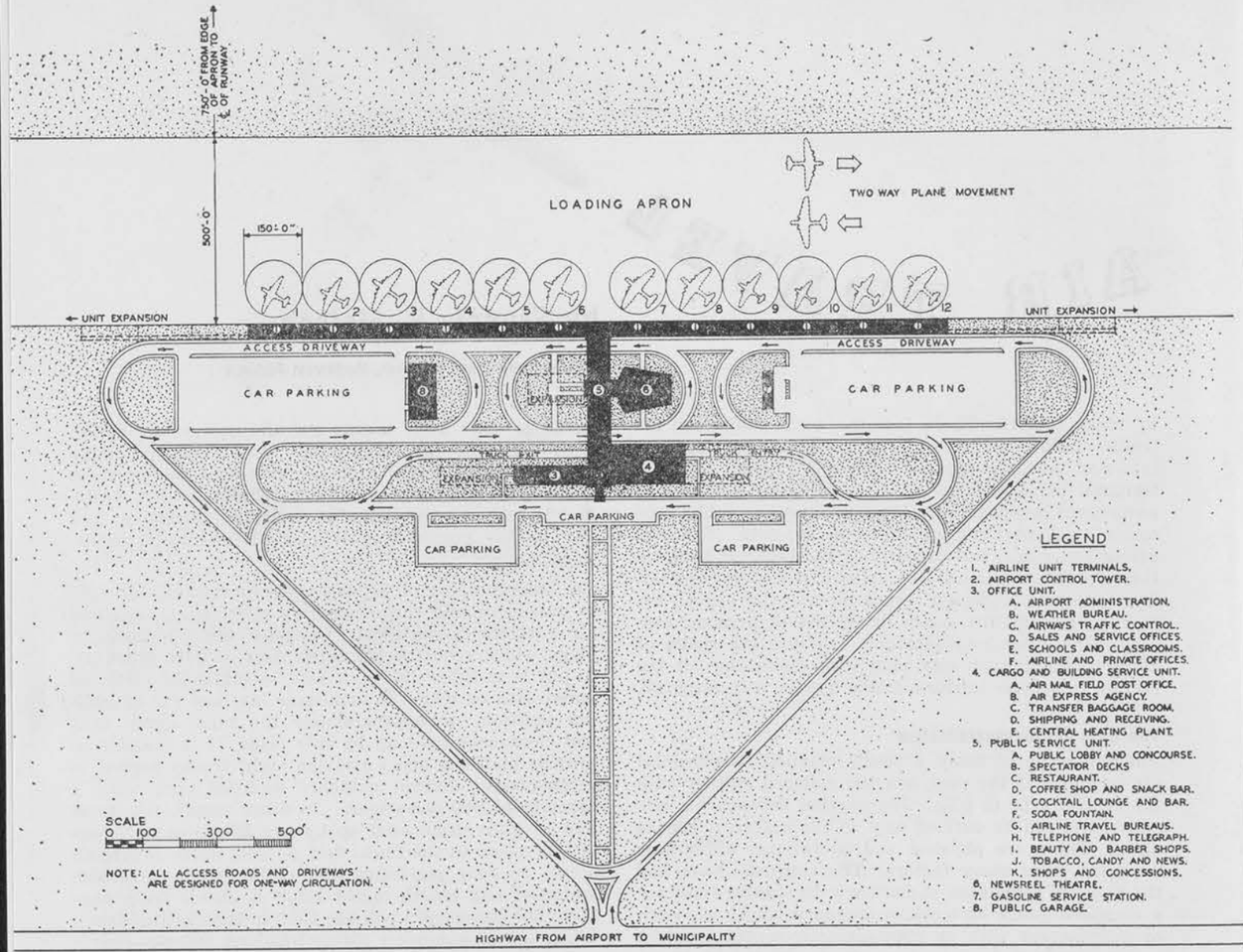
The Case for Decentralization

The prototype of many a poorly planned, monumental air terminal of the past was the railroad station with the central type of plan. The parallel between air and rail travel can be carried only so far before it breaks down. There are physical and operational differences resulting from many factors. The railroads have had the physical advantage of dealing with standard units—a standard gauge of track, a standard length of coach or pullman car with an approximately uniform height and a standard floor level at which all loading is accomplished. The airlines, on the other hand, have had and will continue to have equipment which, even within a single company, varies as to physical standards. Great variations exist in the length, height, and wingspread of aircraft, and the floor levels to which loads must be raised; in some instances the floor or deck to be loaded is in a sloping position when the aircraft is on the ground. This means that aircraft gate positions with fixed facilities for fueling, air conditioning, sewage disposal, water, power, turntables, etc., must be designed and spaced to accommodate the largest reasonably anticipated aircraft. When such positions are occupied by smaller aircraft, an operational waste of apron or gate area occurs, yet the cost of providing fixed facilities for fueling, air conditioning, sewage within a given apron area is at present too great to make it economically possible to eliminate this waste. Mobile services are possible but also expensive, and the number required constitutes an additional operational hazard.

An understanding of the physical-numerical differences in passenger and cargo handling problems of rail and air carriers is essential. Consider the 50-passenger plane which requires 150 lineal feet of gate space or, to put it in other terms, a 150-foot-diameter circle of apron area on which to maneuver into and out of loading position. In approximately the same apron area and clearances used up by this plane, it is possible to provide platform space and the eight tracks needed to accommodate sixteen standard railroad cars with a capacity of 900 passengers. In other words, the lineal feet of gate space used up by one 50-passenger plane is equivalent to the lineal feet of gate space providing access to four platforms and eight tracks on which trains of any length might load. A 20-car train handling 500 passengers will use 1500 to 1650 feet of track. While ten 50-passenger planes handling 500 passengers will require 1500 lineal feet of apron, actually, the apron area which they use could contain track and platform area for eight 20-car trains with a total capacity of 4000 persons. The amount of apron space required per person in air travel (based on 50-passenger aircraft) is roughly eight times the track and platform space required per person in rail travel. The amount of plane gate space per person is eighteen times the gate space required in rail travel. This physical difference is one of the great factors pointing toward the decentralization of air terminal facilities, as unusually great areas and distances are involved in the terminal mass handling of air passengers. It is these same physical factors which have made the solution to the



CENTRALIZED DESIGN AIRLINE TERMINAL



problem of loading air passengers and cargo under cover so difficult and so extremely expensive.

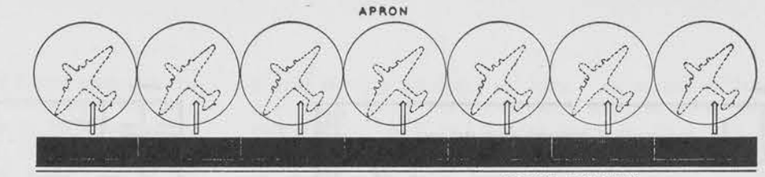
The time factor has a definite relation to the physical factors in both rail and air terminal design, but is more difficult to analyze. In air travel the passenger who is forced to enplane through a central building may have to walk several thousand feet to the plane, necessitating the "calling" of the flight a number of minutes ahead of scheduled departure. Railroad cars have several entrances; planes at the present time have only one, but the industry is looking forward to the installation of several doors in larger aircraft as a means of reducing terminal time. Aircraft must fuel at their gate position, except for some originating flights which may fuel at the hangar.

This fueling operation is time-consuming, but a ship must occupy its position until the process is completed. The fueling operation is also a function which must be closely watched and protected for safety. Railroad trains, on the other hand, usually need not wait to fuel but can change engines, while in the station, in a matter of a few minutes. The physical differences in aircraft present operational problems in passenger and cargo handling. Baggage carts may be standardized, but passenger loading steps and ramps, cargo loaders and chutes, ladders, etc., will vary with the plane. If more than one entrance is provided per plane, additional steps or ramps will be required. The railroads do not have this problem, nor the attendant one of storage for so much varied equipment. Due to the weight factor, it is very unlikely that planes will carry their access steps, etc., from place to place as an integral part of the plane.

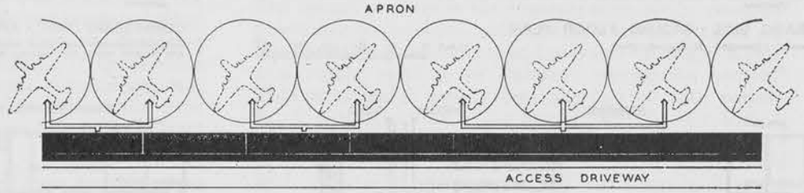
Rail travel is mass handling of people and baggage. Air travel is still personalized service, the individual handling of passengers. Air travel expects soon to be mass travel, and the airlines are looking for ways and means of expediting mass handling of passengers without eliminating the personalized service for which they are noted. Airports, in contrast to railroad stations, are usually situated some distance from the heart of the city. This location difference means that airline passengers arrive at the airport either in a private car, a taxi, an airline limousine, or a bus; and are often pre-ticketed. In the case of the airline limousine, the passenger may have already checked in at the downtown ticket office, where his ticket was picked up and his baggage checked through to destination. These pre-checked passengers are ready to board the plane when they arrive at the airport. Rail and plane ticket sales vary little in the time element, but making plane reservations and checking in plane passengers and their baggage involve a time factor which railroads do not have to consider. All plane seats are now reserved, and weight-control of passengers, baggage, and air cargo is essential. Railroads have no such problem of weight-control. In most instances railroad passengers carry their own baggage aboard, a procedure not likely to be utilized by airlines until two or more classes of air

AIR TERMINALS

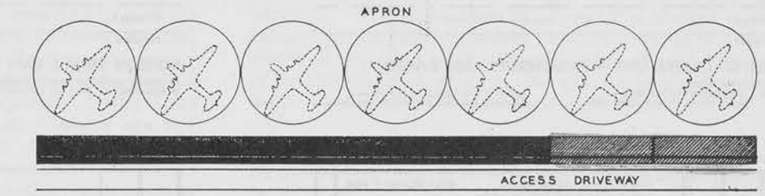
The larger air terminal might well have an "airport community center" containing necessary services and public facilities, with a small unit terminal at each gate position. Such a development permits building expansion or change in accordance with actual need.



TYPICAL UNIT PLAN.



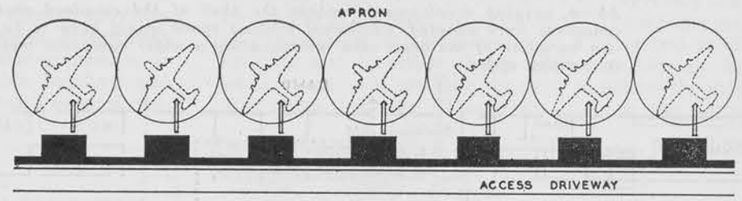
VARIATIONS IN UNIT PLAN.



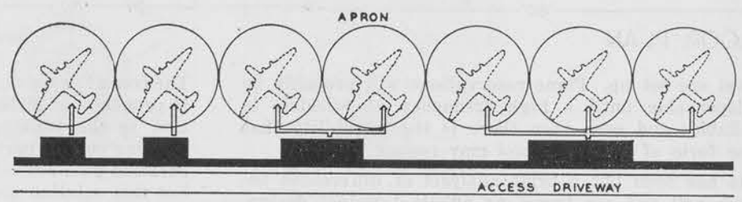
EXPANSION OF UNIT PLAN.

SCALE 0 50 100 200 300

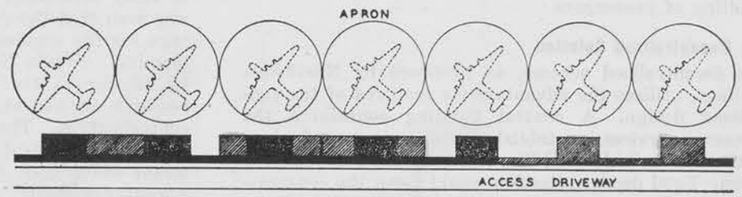
Northwest Airlines and United Airlines, at work simultaneously on the problem, arrived at very similar results. Above, United's unit scheme permits of extension only at the end of the row of continuous units. Below, Northwest's discontinuous dock scheme reduces initial building cubage and permits expansion between docks as well as at the end of the row.



TYPICAL DOCK PLAN.

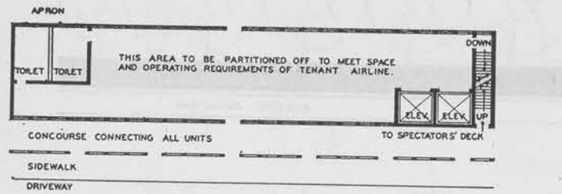


VARIATIONS IN DOCK PLAN.



EXPANSION OF DOCK PLAN.

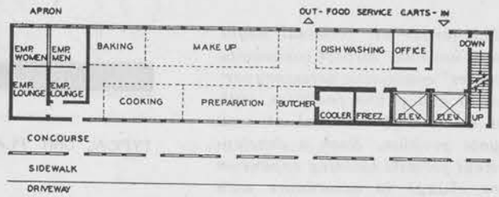
SCALE 0 50 100 200 300



BASIC UNIT - GROUND FLOOR PLAN.

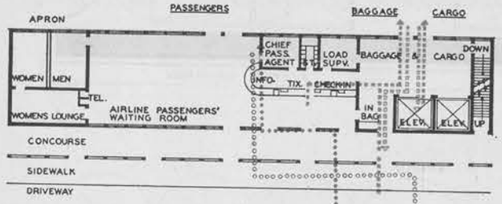
MINUS SUBDIVISION OF AIRLINE SPACE.

SCALE 0 10 20 30 40 50'



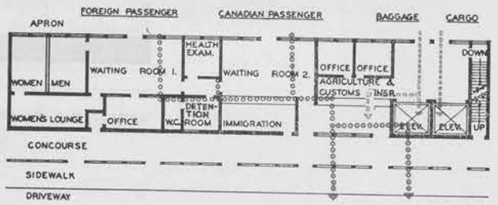
COMMISSARY UNIT - AIRCRAFT FOOD SERVICE PREPARATION.

BASEMENT PROVIDES BULK FOOD, FROZEN FOOD, AND ACCESSORIES STORAGE AS WELL AS LOCKER AND SHOWER ROOMS FOR COMMISSARY EMPLOYEES.



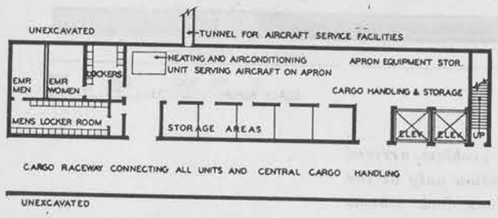
DOMESTIC TRAVEL UNIT - PASSENGERS AND CARGO.

SEE BASEMENT PLAN.
LEGEND: PASSENGERS TO PLANES ●●●, PASSENGERS FROM PLANES ○○○.
BAGGAGE AND CARGO TO PLANES ■■■, BAGGAGE AND CARGO FROM PLANES □□□.



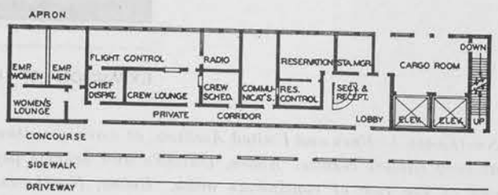
FOREIGN TRAVEL UNIT - CUSTOMS AND IMMIGRATION FACILITIES.

BASEMENT PROVIDES BOND ROOMS FOR CUSTOMS STORAGE AND ROOMS FOR AGRICULTURE QUARANTINE AS WELL AS EMPLOYEES' LOCKER ROOMS.



DOMESTIC TRAVEL UNIT - BASEMENT FLOOR PLAN.

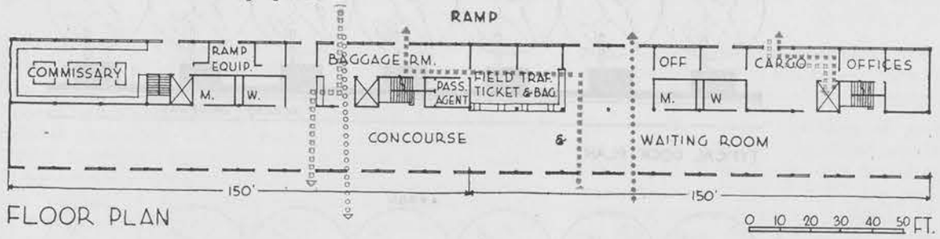
GROUND FLOOR ALL-CARGO UNIT SIMILAR IN PLAN EXCEPT FOR RACEWAY.



AIRLINE OPERATIONS AND RESERVATIONS UNIT.

SPACE LAYOUT VARIES WITH EACH TENANT AIRLINE.

Above, varying developments within the shell of the standard unit. If the narrow concourse were adopted, additional waiting space would have to be provided. Below is a variation of the basic idea incorporating a wider concourse which can also serve as waiting space.



FLOOR PLAN

travel are set up. Plane reservations will probably be indispensable until a high frequency of schedule is available; and even then there is the possibility that some form of weight-control may remain.

This has been but a brief analysis of differences between rail and air travel as affects terminal design, but it illustrates the impossibility of planning air terminals on railroad standards for the centralized mass handling of passengers.

The Decentralized Solution

The decentralized scheme, as proposed by Northwest Airlines, utilizes the advantageous features of the centralized design. A central building containing the necessary services is established with a number of minor stations or units located like satellites along the loading apron. Total decentralization would mean the construction of entirely separate and wholly self-sufficient airline stations around the perimeter of the airport.

The trend toward decentralization has so far been limited to proposals of airlines which were searching for a solution to the terminal building problem. The nearest existing counterpart to the decentralized solution is the enclosed gate concourse at LaGuardia Field, New York; but this solution stops far short of the goals proposed by airlines. It was the major terminal, with its widely separated plane positions, that led Northwest Airlines to study decentralized designs. After close analysis it was seen that the decentralized solution had an advantage for the smallest station as well as for the largest terminal. While Northwest Airlines was arriving at its answer to the problem, United Air Lines in its research arrived at the same conclusion concerning decentralization. The basic scheme and underlying principles are identical in both airline solutions, although minor differences, with attendant advantages and disadvantages, occur.

Northwest Airlines proposed the discontinuous "unit" or "dock" solution, and United Air Lines proposed the continuous "unit" solution. The Northwest Airlines' scheme allows the individual docks to be expanded to the full length of the gate position, or additional docks and gate positions can be added at either end of the apron. This is done only when needs dictate, thus keeping the original investment small until economic justification for expansion exists. The dock scheme was proposed for large terminals where it was found that the airline functions for passenger traffic and cargo handling did not at the present time require terminal facilities the entire length of the gate position. If space were desired for airline field operations, communications, offices, commissary, etc., along the length of the gate position as well, then the continuous "dock" or "unit" was required.

United Air Lines' scheme was based upon housing some of these additional functions at the apron; hence, the continuous unit. This scheme presents internal expansion difficulties where several airlines are concerned. "Cushion" functions, which can be removed to provide for expansion, must be located in units between airlines. If this is not done, the airline or lines in the center push those airlines on the ends out into new units as more gate and terminal space is required. Using light demountable partitions, the physical changes are not difficult to make; but the resulting disruption in terminal activities for the airlines required to move is not at all desirable. Since their inception, various ideas from the two solutions have been interchanged and combined so as to provide a common solution to the industry's problem.

The basic premise of the decentralized scheme is the localization of the individual airline functions adjacent to the apron or gate positions, with a driveway on the off-field side so as to simplify and expedite the transition of passengers from automotive conveyances to aircraft. This permits a clear-cut separation of airline functions, from one another and from all other airport activities such as airport administration, concessions, government offices, fixed base operators, etc. Inter-connection is maintained between airlines, main public building, and administrative offices through the use of a covered concourse serving all docks or units. At terminals large enough to make the investment economical, a cargo raceway for handling transfer baggage, mail, and express should connect all airlines with one another, with the airmail field post office, and with the air express agency. This raceway can also provide space in which to run all building utilities from a central plant or control point.

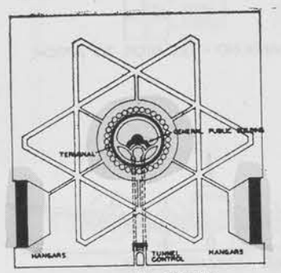
The second premise is the concentration of the revenue-producing concessions, public service areas, airport administration, government, and private offices into a general public building or "airport community center." This structure is usually centrally located with respect to all gate positions. The list of facilities for such a building or buildings is long and varied. The number of facilities for an airport community center will vary with the size of the terminal and the municipality. In larger terminals it is possible to locate mail and express facilities in the general public building, or to provide smaller separate buildings (which are more easily expanded). The only airline function to be located in the general public building would be a common information center or separate airline travel bureau offices. The use of additional office space in the central public building would be a matter of individual airline policy.

Advantages of Decentralization

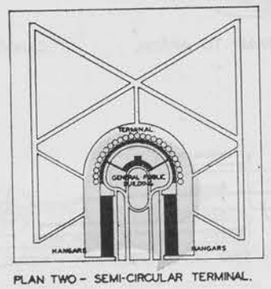
Expandability has been discussed. Besides expansion in a horizontal plane, vertical expansion is possible, especially in the "units." The units should be structurally designed in the beginning to support an enclosed second story from which the large planes of the future may eventually be loaded by gangplanks. An elevated passenger drive might follow, with the old passenger drive at ground level becoming available for cargo truck operators.

Flexibility is another advantage. The over-all scheme is adaptable to any shape of terminal area, providing sufficient room is available for expansion. The scheme may be symmetrical or unsymmetrical. The central public building may be either at the apron edge between the units, or set back, allowing the units to occupy the valuable apron frontage. Flexibility exists in the design

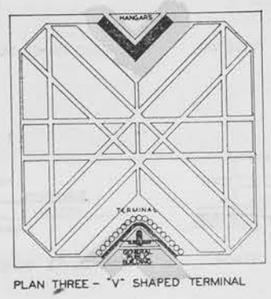
AIR TERMINALS



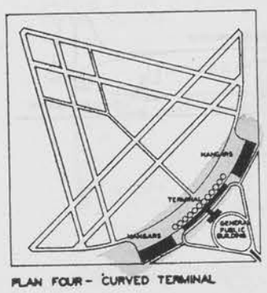
PLAN ONE - CIRCULAR TERMINAL.



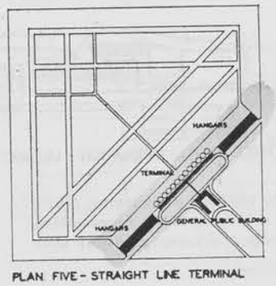
PLAN TWO - SEMI-CIRCULAR TERMINAL.



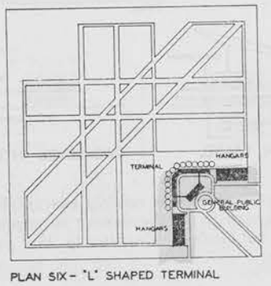
PLAN THREE - "V" SHAPED TERMINAL



PLAN FOUR - CURVED TERMINAL



PLAN FIVE - STRAIGHT LINE TERMINAL



PLAN SIX - "L" SHAPED TERMINAL

The decentralized dock scheme is adaptable to any shape or location of terminal buildings on the field.

of the units. Once a basic unit is established (width, length, cross section, fixed facilities such as ramps, stairs, toilets, lifts, etc.), each airline can arrange its partitions, counters, exits, and entrances to suit its own particular operating methods. Flexibility exists in the use of the units. Units may be designed for domestic operations, for foreign operations complete with customs and immigration facilities, for cargo warehouses, for airline commissaries, or for airline offices; or they may be converted from one function to another. To this end a standard cross section, free of columns, with exterior walls constructed of uniform structural bays, is desirable, in order to allow an interchange of door and window panels to provide freedom in planning.

Segregation is another advantage. Each airline has control of its own operations and can render more personalized service to its patrons. The airline passenger is separated from the general public and from cargo operations, thus simplifying passenger handling by airline personnel. Fewer opportunities will exist for mishandling cargo and passenger baggage. The spectator is given an observation deck from which he can watch apron loading activities without interference with the operations. This all helps to avoid congestion and to facilitate the mass handling of passengers.

Economy is still another advantage. The decentralized terminal can be developed by stages to parallel the economic demand and justification for facilities. Thus there can be no over-expansion. The investment in decentralized terminals can be amortized over a long period without fear of obsolescence and inadequacy, which have made so many terminals economic liabilities in the past.

Passenger convenience is a great advantage. The decentralized terminal is planned primarily to expedite passenger handling and to bridge the gap between air and ground travel in the most convenient, effortless way. The passenger is no longer forced, together with the general public, through a central building where delays occur and congestion abounds. The concessions and services of the central building are still available, ready to serve the passenger who has time to spend at the terminal. The airline passenger purchases air travel because it means time and convenience to him. For this reason it is to the best interests of the industry to cut passenger time at the terminal to a minimum. Immediate passenger requirements such as toilet facilities, telephones, telegrams, vending machines for bottled drinks, candy, cigarettes, etc., can be provided in each unit terminal, thus eliminating the necessity for the hurried passenger to rush to the main building.

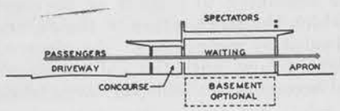
Safety and *efficiency* are still other advantages which result from segregation and localization of operations.

Unlimited Possibilities

The patterns and schemes which result from a decentralized solution are unlimited. The fundamental governing item is the size of the aircraft, which determines the unit terminal length or gate position size. Major terminals are now being designed with gate positions 150 feet on centers, but 175 feet is considered ideal. Minor stations serving one or two airlines can get by with units (not gate positions) as short as 75 to 100 feet in length. Unit terminals can be designed to any width, but a 30-foot unit, plus a 10-foot combination vestibule and concourse, has been regarded as the minimum.

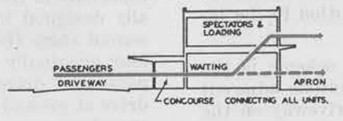
The use of mechanical and electronic aids will offset the strain on communications caused by decentralization. The major terminal will require, for passenger and employee use, an intra-airport system of ground transportation connecting all unit terminals with the general public building. Conveyor belts or cargo trains will connect the unit terminals with the central cargo functions. Impressive, though not monumental, architectural solutions can result through establishment of a basic "appearance" scheme for the over-all terminal development. Adequate airline publicity and directional assistance can be obtained through the use of controlled signs on each unit without marring the architectural effect. Above all, it is important to locate the decentralized scheme on the airport so as to provide space for the maximum anticipated expansion without interfering with runway clearances or fixed construction, as well as to provide for adequate vehicular circulation and parking. The decentralized scheme should not result in stereotyped solutions; fundamentally, it is a planning principle which serves as a guide, not a limit.

In the remainder of this article numerous applications of the unit idea, as well as several examples of possible specialized developments, are presented. All are schemes developed by the architectural department of Northwest Airlines under the supervision of Francis R. Meisch.



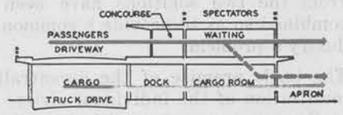
SINGLE LEVEL OPERATION—INITIAL STAGE.

CARGO HANDLING ON APRON PASSING IN FRONT OF EACH UNIT OR FROM PASSENGERS DRIVEWAY THROUGH UNIT TO APRON.

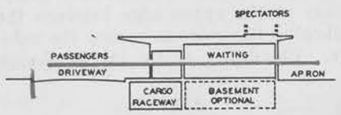


EXPANSION: PARTIAL TWO LEVEL OPERATION.

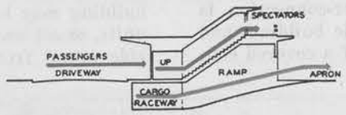
CARGO HANDLING STILL ALONG APRON OR THROUGH UNIT TO APRON.



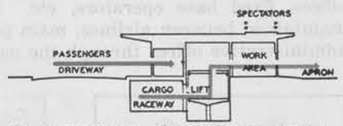
EXPANSION: FULL TWO LEVEL OPERATION.



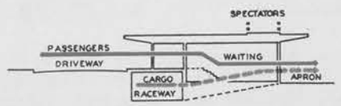
CARGO HANDLING - BASEMENT RACEWAY.



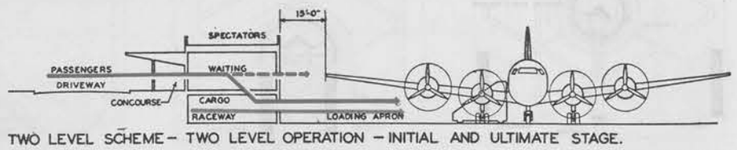
CARGO HANDLING - RAMP TO APRON.



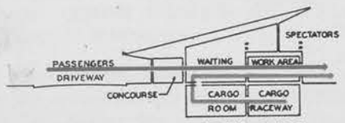
CARGO HANDLING - ELEVATOR TO APRON.



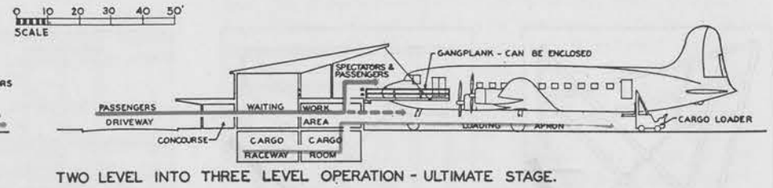
SPLIT LEVEL SCHEME - INITIAL STAGE.



TWO LEVEL SCHEME - TWO LEVEL OPERATION - INITIAL AND ULTIMATE STAGE.

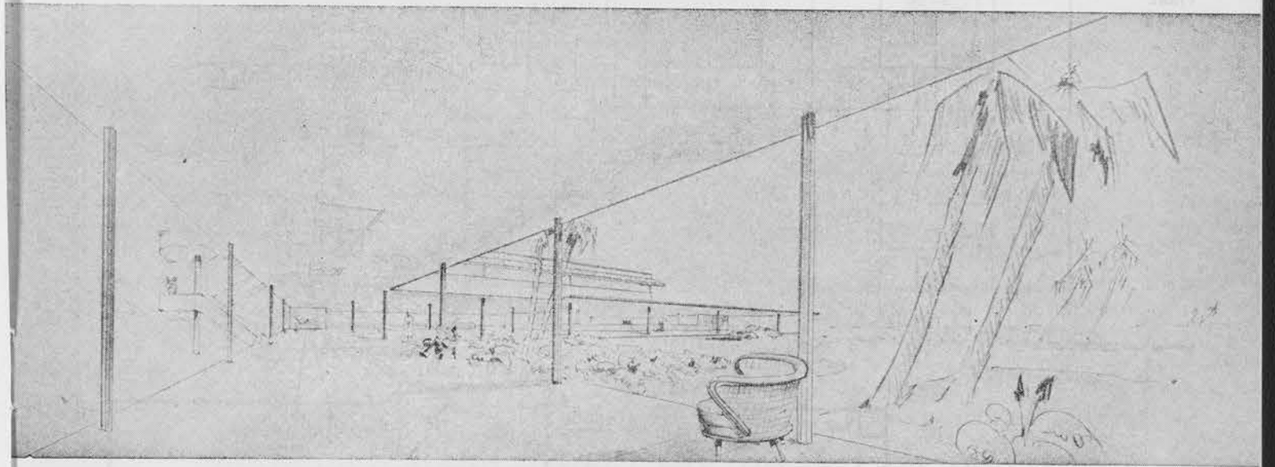


TWO LEVEL OPERATION - INITIAL STAGE.



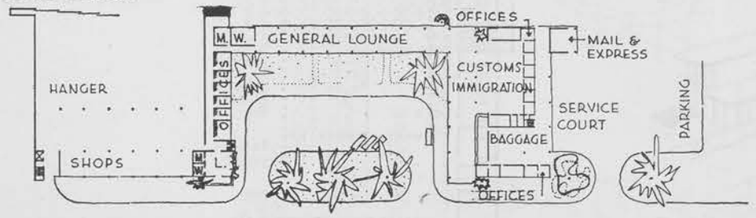
TWO LEVEL INTO THREE LEVEL OPERATION - ULTIMATE STAGE.

Northwest Airline's dock unit scheme is readily susceptible to vertical expansion. Units should be structurally designed in the beginning to support a second story from which future large planes may be loaded. Eventually the passenger driveway might also be elevated.



TERMINAL BUILDING FOR A SITE IN HAWAII

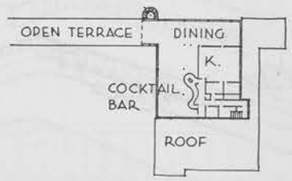
This design was prepared to indicate the type and extent of facilities which the airline would require if it should extend its service to Honolulu. Though not a "unit" development, the same principles of traffic flow govern its arrangement. The general lounge, glazed on both walls and having above it a promenade deck for sightseers, takes full advantage of the scenery.



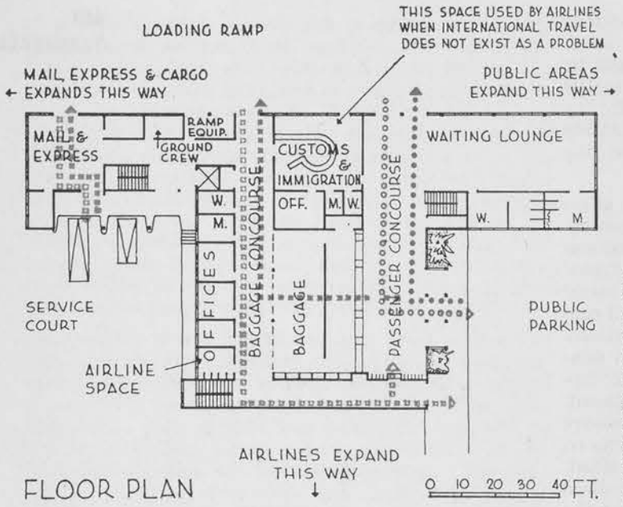
GROUND FLOOR

0 20 40 60 80 100 FT.

THIRD FLOOR



SECOND FLOOR 0 20 40 FT.

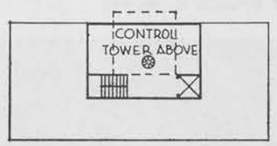


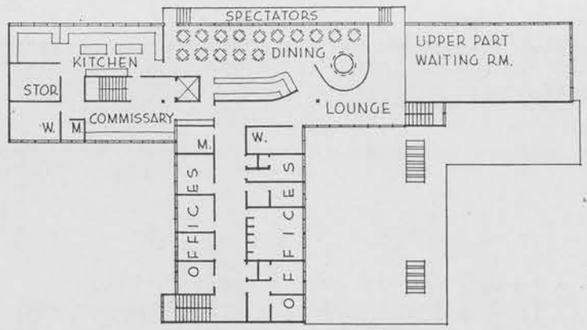
This small, combined administration building and airline terminal, adaptable to many a proposed postwar airfield, can be expanded both horizontally and vertically. Originally only one story high, it can have its wings extended, or stories added, or both—piecemeal or all at once. It might conceivably be so altered as to interior arrangements that unit docks could be added along the loading apron. In the ground floor plan of the final stage, the original extent is indicated by colored shading.

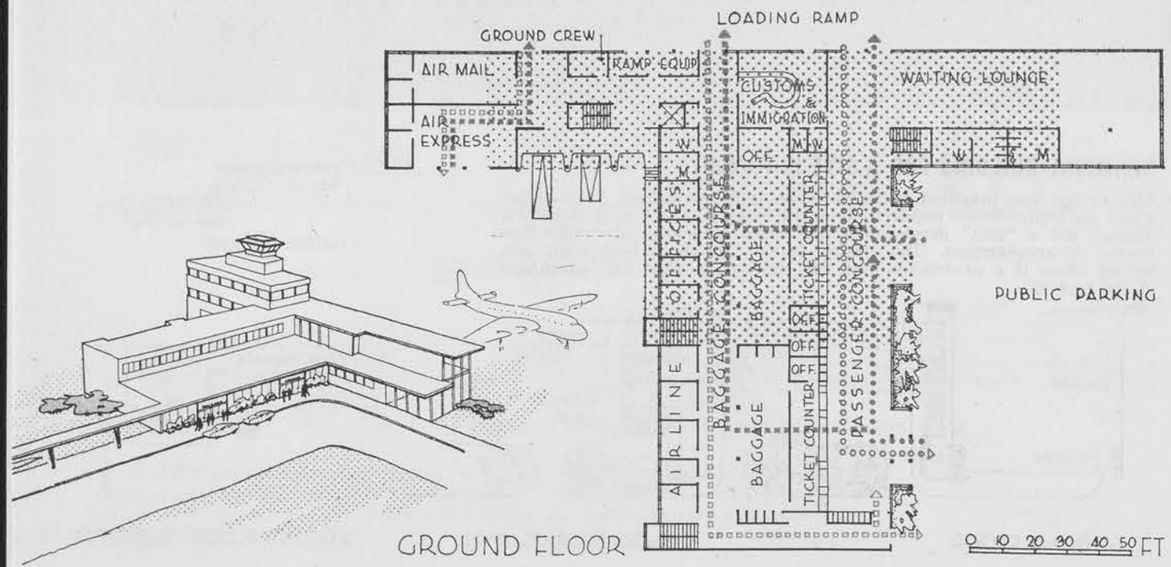
INITIAL STAGE

ADMINISTRATION BUILDING DESIGNED TO EXPAND AS NEED ARISES

FINAL STAGE

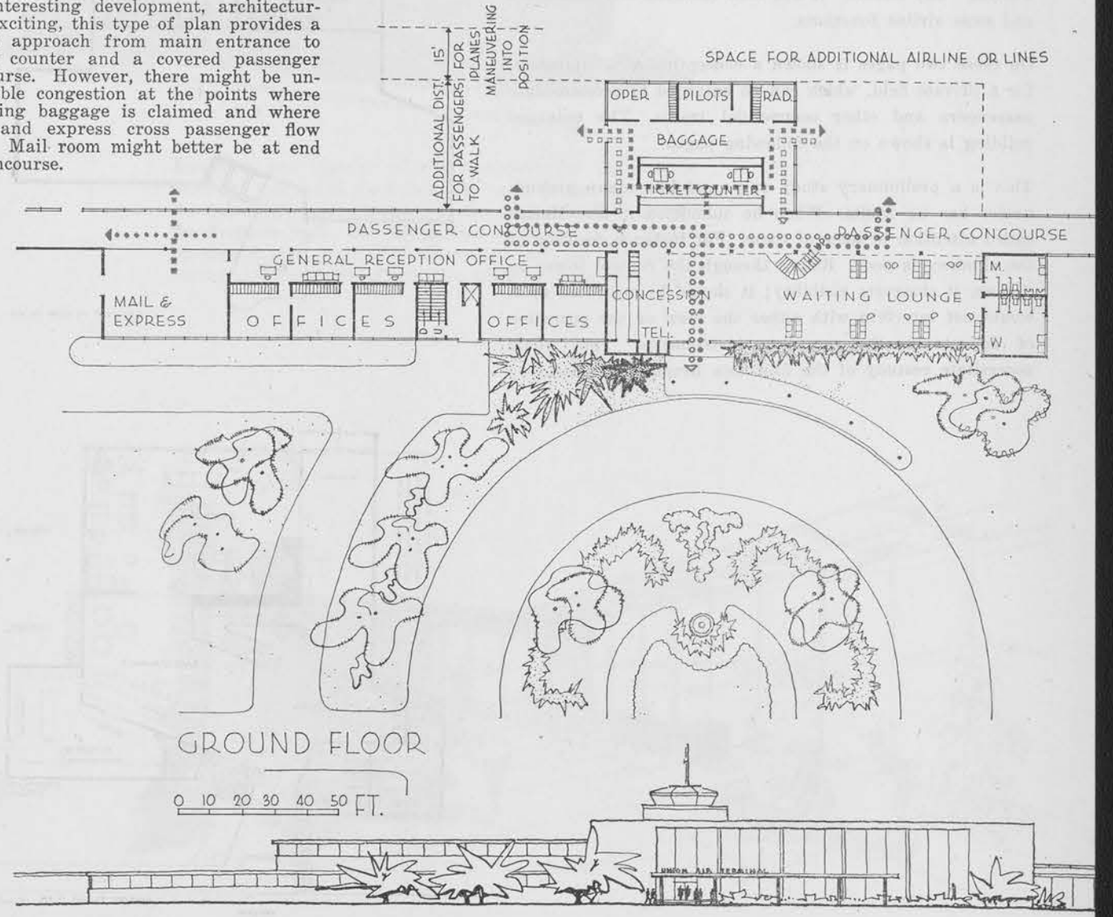


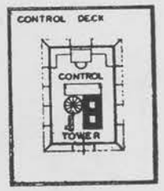




ADMINISTRATION BUILDING FOR A LARGER AIRPORT

An interesting development, architecturally exciting, this type of plan provides a direct approach from main entrance to ticket counter and a covered passenger concourse. However, there might be undesirable congestion at the points where incoming baggage is claimed and where mail and express cross passenger flow lines. Mail room might better be at end of concourse.





CONTROL TOWER FLOOR PLAN

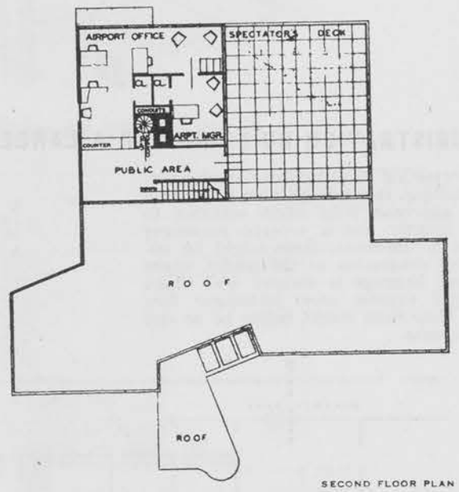
THE COUNTRY CLUB TYPE OF AIRPORT

REQUIRES AN EXPANDABLE BUILDING FOR POSSIBLE COMMERCIAL DEVELOPMENTS

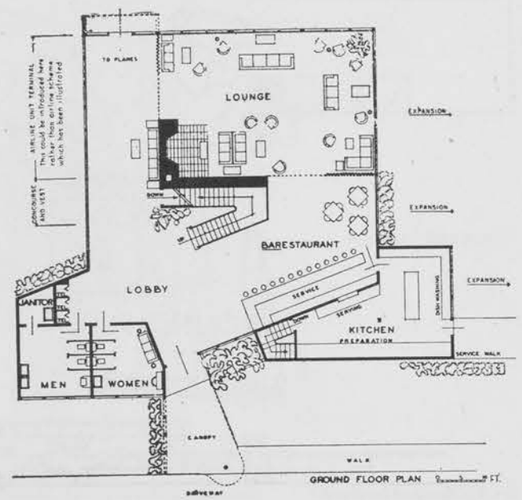
If private flying is to increase rapidly in volume after this war (and many people are doing more than guessing that it will) then private flying fields will become a necessity. But it would be folly to design the buildings which they will require without thought for potential commercial development. Even if the private field eventually becomes only a minor "way station," it will need facilities for passengers and some airline functions.

On these two pages is shown a conception of a clubhouse, for a private field, which can be enlarged to accommodate passengers and other commercial traffic. The enlarged building is shown on the following pages.

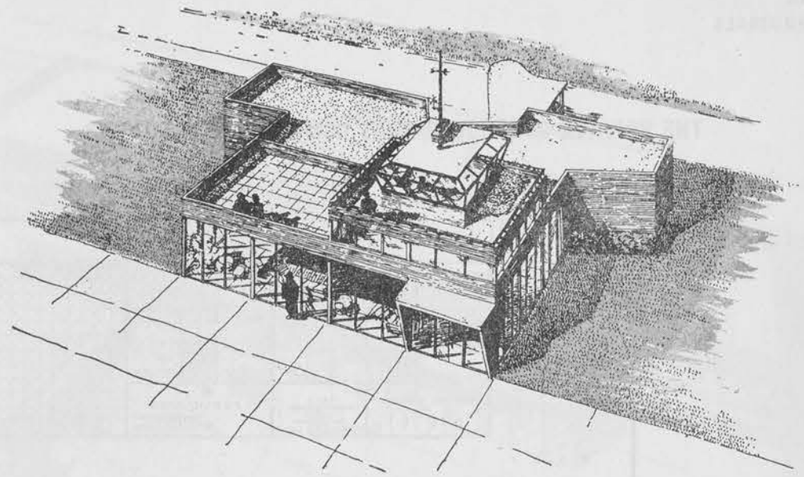
This is a preliminary study only, and like many preliminaries has its faults. When he submitted it Mr. Meisch called attention to some of these. For instance, location of the chimney is poor. Rising through the control tower as it does, it obstructs visibility; it should be relocated so it would not interfere with either the view or the operation of delicate weather-recording instruments. This would necessitate restudy of the first-floor fireplace location.

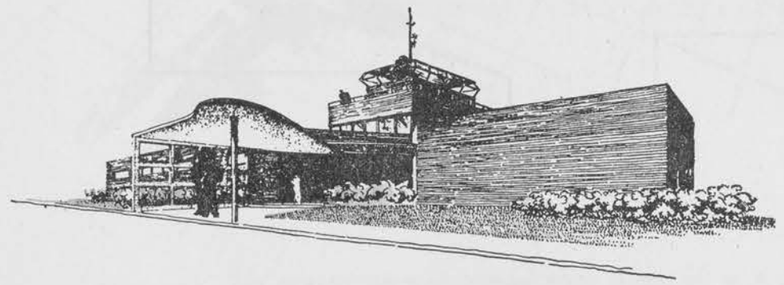


SECOND FLOOR PLAN

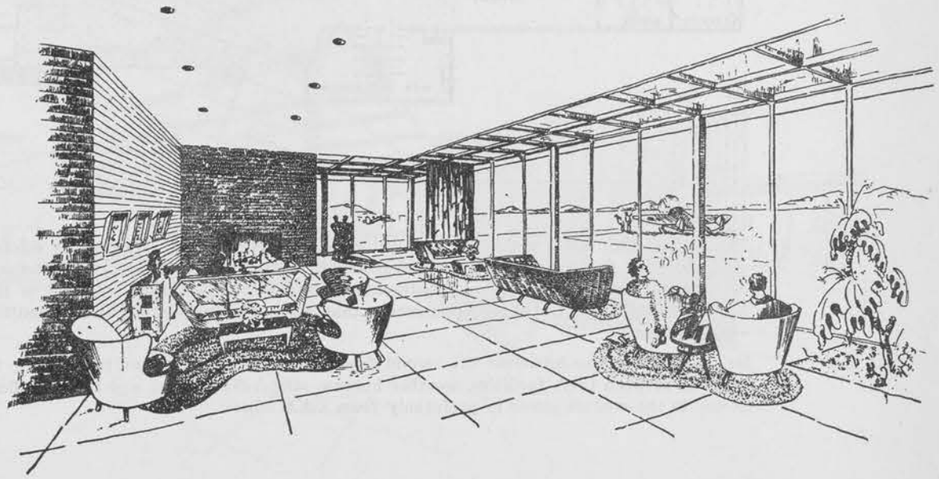


GROUND FLOOR PLAN

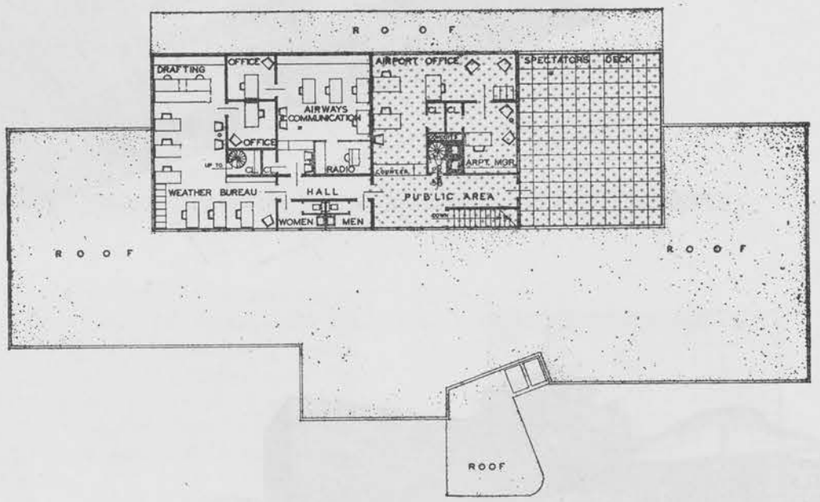


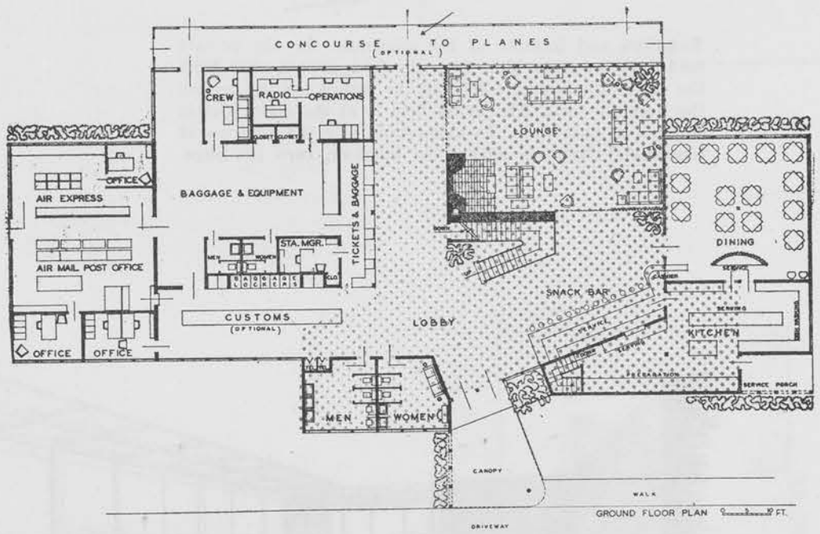


Exteriors and interior of the clubhouse for the private field. At top, aerial view from the field; center, view from the driveway; below, interior of the lounge looking toward the fireplace wall. The flying field is at the right, visible through a glass wall. To understand how the addition of commercial facilities affects the building, turn the page.



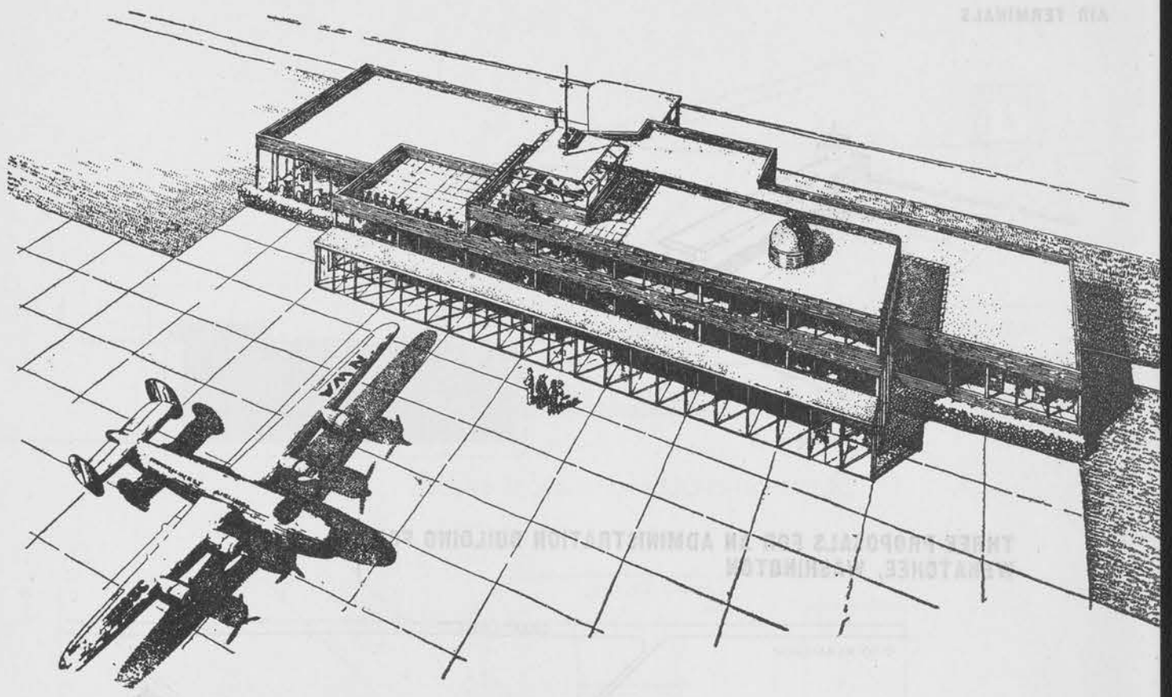
THE PRIVATE CLUBHOUSE ADDS COMMERCIAL FACILITIES



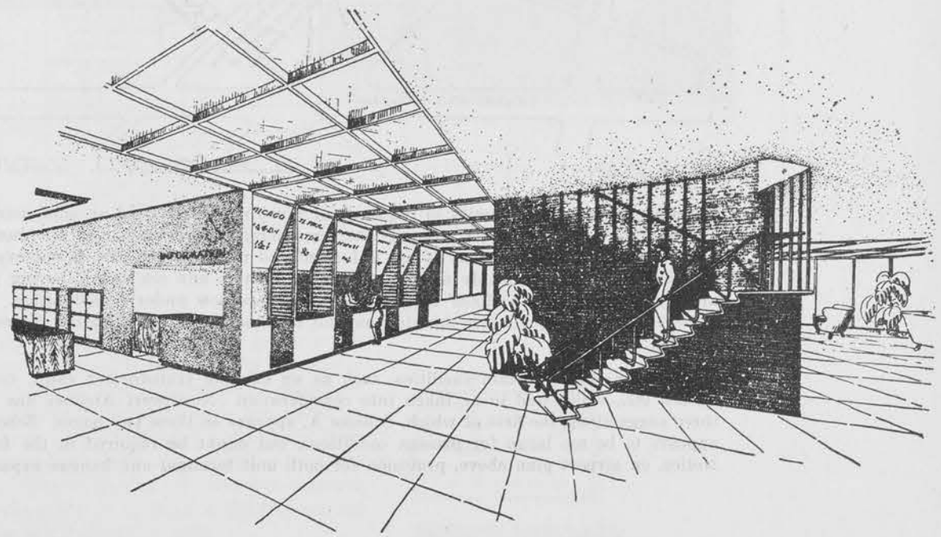


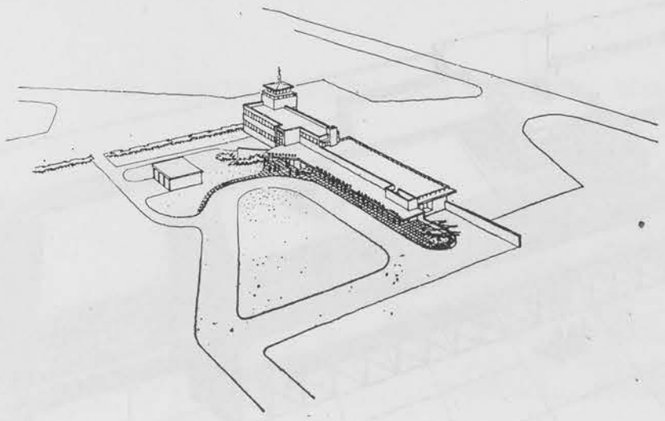
The area of the former clubhouse, detailed on the preceding page, is shown by colored shading. This project was an early development in Northwest Airlines' architectural department; currently they would advocate adding a standard unit terminal to the left-hand side of the clubhouse area, rather than the specialized—and possibly limiting —plan shown.

Mr. Meisch has also criticized the second floor layout in that a better relationship is required between CAA facilities, weather bureau, pilots' chart room, and airport office. Access to the control tower is preferably from CAA offices.

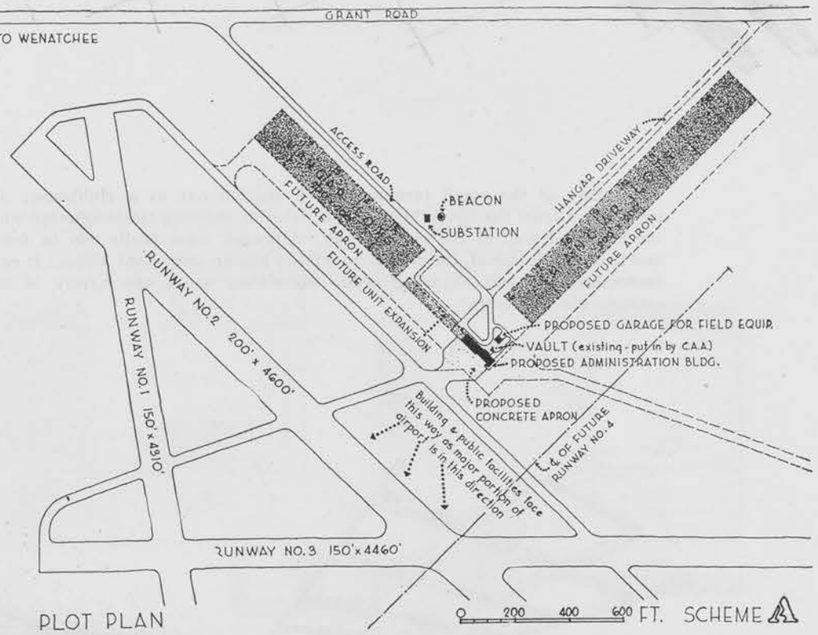


Two views of the small terminal which started out as a clubhouse; above, aerial perspective from the flying field; below, interior showing ticket counter which replaced the left-hand wall of the old building. Although some faults can be found with the building as a terminal, the whole conception has an important virtue: it can be altered economically to suit changing needs—something which can hardly be said of most existing air terminals.





THREE PROPOSALS FOR AN ADMINISTRATION BUILDING FOR WENATCHEE, WASHINGTON

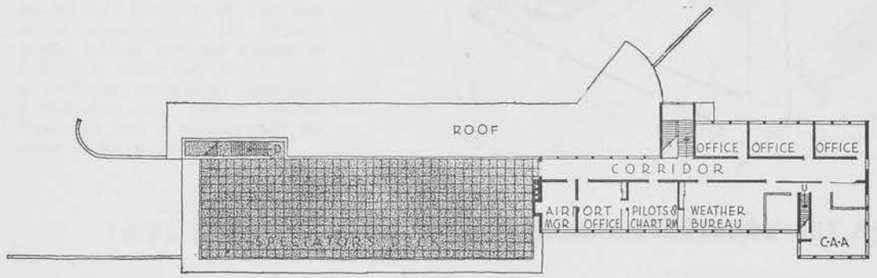


PLOT PLAN

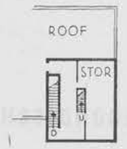
Wenatchee, a small community in the State of Washington, required an administration and terminal building for its airport. The community receives scheduled air transport service, but the present extent of use is limited and traffic at the port is not expected to grow beyond a reasonably modest maximum. In this and the two following pages are shown Northwest Airlines' suggestions, which are now under consideration. They embody the company's latest thinking on unit terminal design in a rather interesting fashion.

CAA had provided certain facilities, such as an existing transformer vault, runway layout, etc., which had to be taken into consideration. Northwest Airlines has made three suggestions, the first of which, Scheme A, appears on these two pages. Scheme A appears to be too large for present conditions, but might be required in the future. Notice, on airport plan above, provision for both unit terminal and hangar expansion.

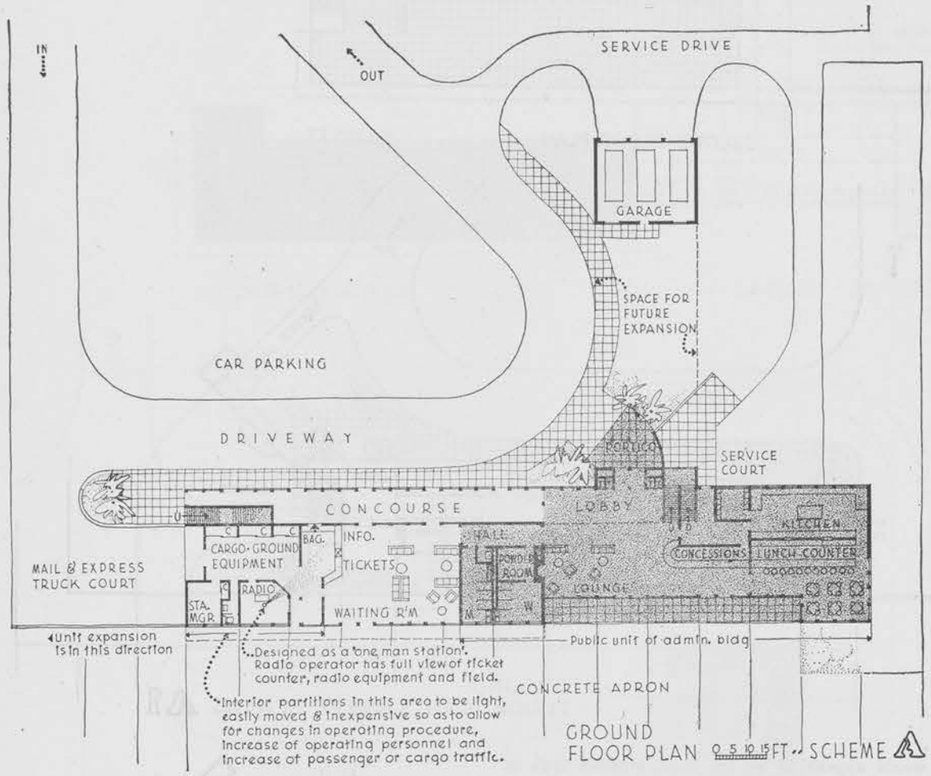
TOWER PLAN 0 5 10 15 20 25 FT



SECOND FLOOR PLAN 0 5 10 15 FT. SCHEME A

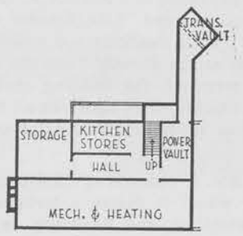


ROOF LEVEL PLAN 0 5 10 FT

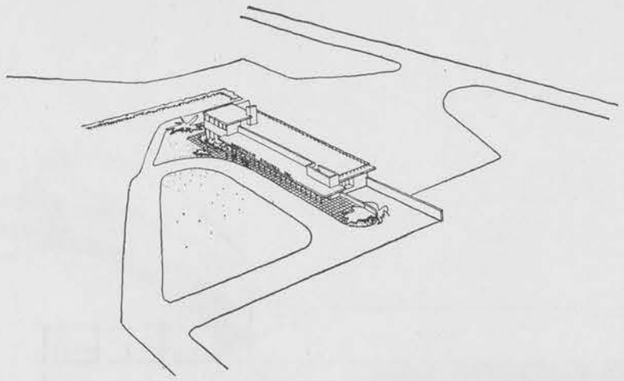


GROUND FLOOR PLAN 0 5 10 15 FT. SCHEME A

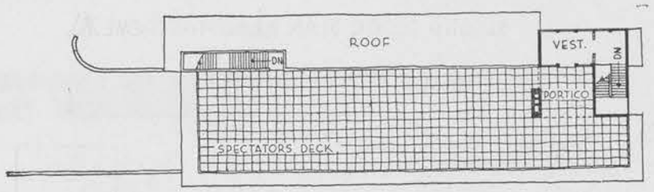
Gray areas in plans above show extent of public areas. In some cases, the concourse is considered to be entirely public space; but it might also be considered a passenger concourse, particularly if terminal units are added as indicated, and hence is here included in the area from which the general public might be excluded. Again, the toilets might be considered part of the unit terminal rather than public space; in so small a building one set of such facilities can serve both parts.



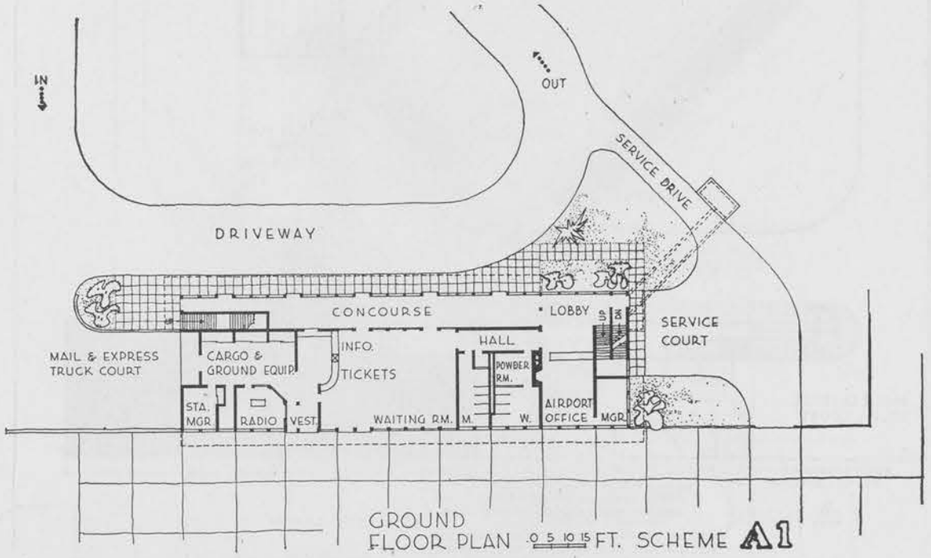
BASEMENT PLAN 0 5 10 FT



SECOND SCHEME FOR THE WENATCHEE ADMINISTRATION BUILDING



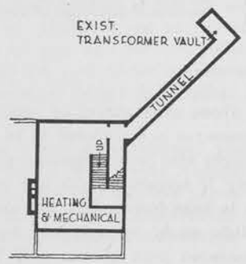
SECOND FLOOR PLAN 0 5 10 15 FT.



GROUND FLOOR PLAN 0 5 10 15 FT. SCHEME A1

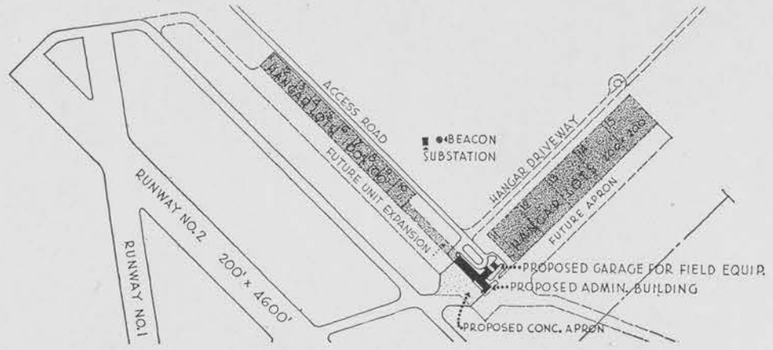
This second scheme would appear to be the most sensible type of solution for current needs, and can be expanded into Scheme A, shown on the preceding page, when conditions warrant. Like Scheme A, it is designed for "one-man" operation. Public facilities are limited to a deck for spectators, to which there is access directly from the walk and driveway. Aside from the unit terminal, the building contains only an office for the airport manager and his small staff. In all these schemes the amount of concrete paving necessary for initial traffic is held to a minimum.

According to the author, the V-shaped site, so common at CAA-planned ports, is one of the most difficult for which to design a terminal if proper automotive circulation, expandability, and flexibility in use are to receive due consideration.

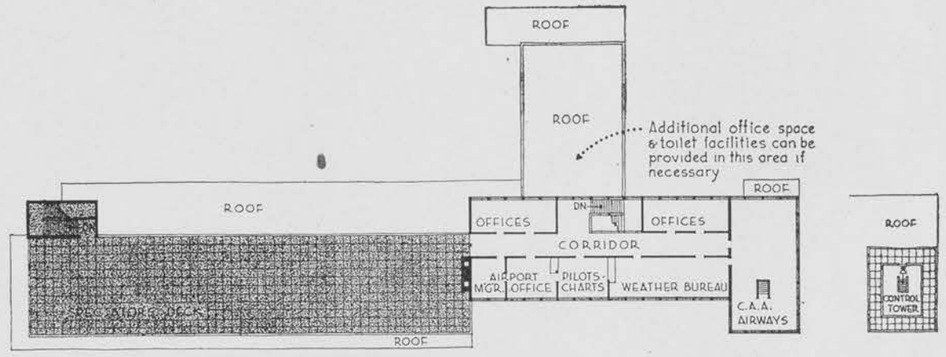


BASEMENT PLAN 0 5 10 15 FT.

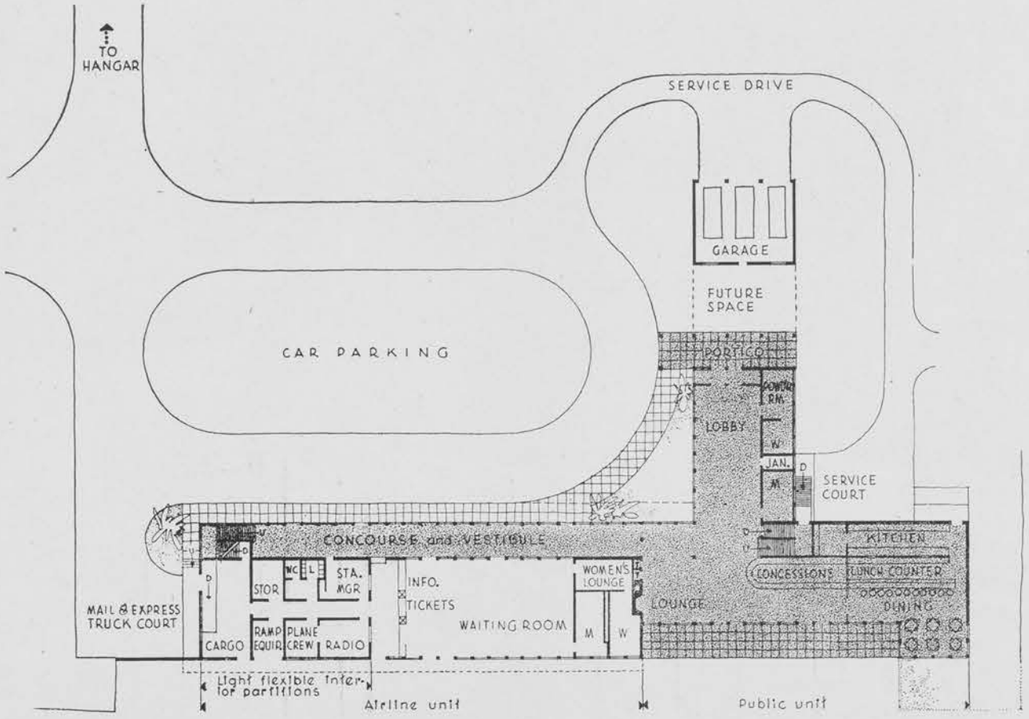
Plot plan for Scheme B, substantially similar to that for Scheme A, has provisions for two different kinds of hangars: small, for individual planes; large, to house several planes each. Only one access road is needed at present, although another can be added if needed. A building of this size seems unwarranted for present traffic volume and the forseeable future; it would require too large a staff for economical operation, particularly in airline offices. Basement plan is substantially the same as for previous schemes.



THIRD SCHEME FOR WENATCHEE SEEMS TOO AMBITIOUS



SECOND FLOOR PLAN 0 5 10 15 FT. SCHEME B TOWER



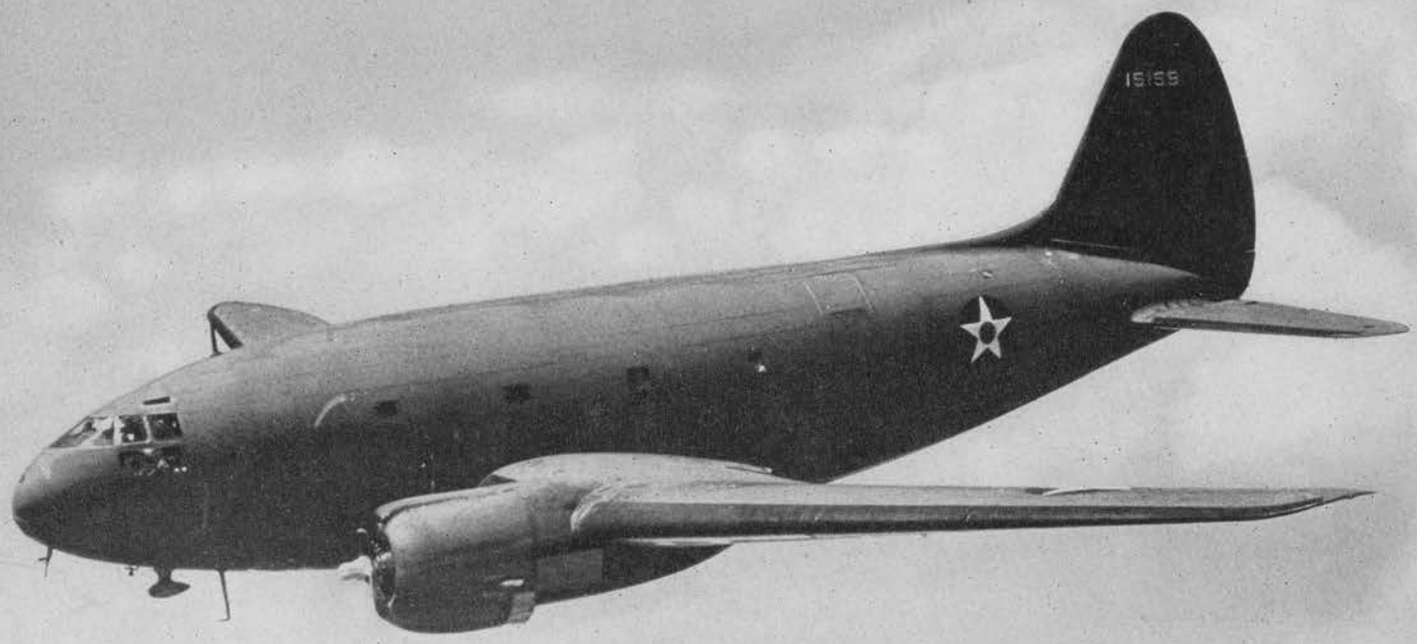
GROUND FLOOR PLAN 0 5 10 15 FT SCHEME B

Francis R. Meisch, Architect, of Minneapolis, Minnesota, is Plant Engineer for Northwest Airlines, Inc., and in this capacity has had much to do with new construction, remodeling, and postwar planning for air transportation. The plant engineering section of Northwest Airlines functions, to a certain degree, as does an architect-engineer firm. In this article Mr. Meisch supplies basic information on the background of aviation progress and the architectural and city-planning developments which are seriously affected by the growth of air transportation.

Francis R. Meisch
Plant Engineer, Northwest Airlines

Architecture and Air

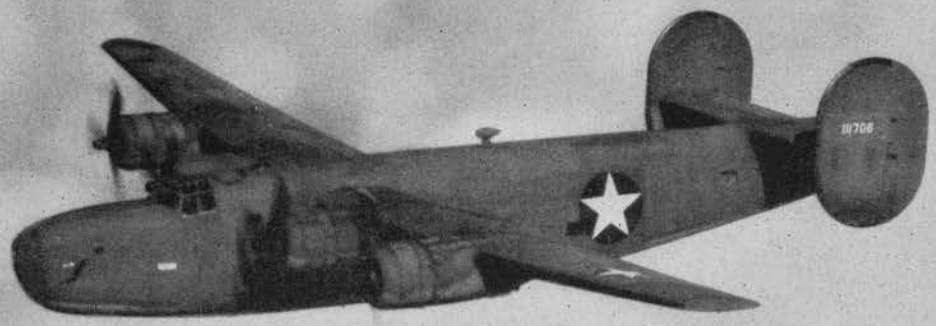
Part I — Status of Aviation Design: Types of Aircraft and Pattern of Development



The plane above at right is a Consolidated Liberator Bomber. That at the left a Curtis C-46 Commando troop transport. Both are military prototypes of commercial planes to come.

Americans have for years prided themselves on being the most modern and progressive nation on the face of the earth. This was especially true in the fields of science and technology, but was sadly lacking in the fields of architecture and city planning. True, individual American architects provided exceptions, but by and large the basic principles of architecture and city planning and the revolution in architectural thinking were not manifest in America until the last decade. Architects and city planners had just reached the point where they took the automobile for granted and planned for it as a routine part of American life when suddenly a new world conflict produced a new age—the Air Age—and with it a multitude of architectural and city planning problems. History may well record World War II as the beginning of the Air Age—for not since the invention of the steam engine has mankind been faced with a machine that could so change the course of civilization and the living habits of millions of people.* This the airplane has amply demonstrated it could do and has indicated it will do. Aviation, premature in World War I, has today grown to such proportions and in such a rapid manner that not only has the American public been caught off guard, but the architect and city planner as well have failed to comprehend it, or to plan and think in aviation terms as a part of life today.

*Assuming, of course, that internal combustion engines and self-propelled, earth-bound vehicles are essentially extensions or applications of principles embodied in the steam engine.—Editor.



Transportation

The greatest problem now facing aviation is the obsolescence of practically all of its ground equipment, as represented by airports, hangars, shops, terminals, etc. But the most dangerous form of obsolescence that faces the professional planner and all Americans is their thinking both general and architectural, with respect to aviation. Fundamentally, the trouble might be credited to an educational system which has taught rowboat geography and has failed to teach basic international economics.

In order to plan for anything as gigantic as aviation, it is necessary to know something about the principles upon which it operates and the factors which influence its growth. Such questions as follow are very pertinent. What will the future of aviation be? What will influence its growth? Will this growth be sporadic or constant? Will this growth be unlimited? And will this growth be permanent? The answers to these questions are many, but out of the conflicting mass of available information, certain facts are beginning to stand out clearly.

Airplane and Airport Design

Technologically, aircraft design has now achieved a state wherein the physical size of the plane is limited by external factors such as the size of existing airports, the thickness of runways, the size of available hangars, the economics of operation, and the efficiency with which such planes can be utilized. This is comparable to skyscraper design, wherein limiting factors are land available, zoning and setback laws, economics of cost and operation, and efficient utilization of such a structure—not the physical height of the structure. To date, aircraft designers have not regarded colossal investment in airports and ground equipment as limiting factors but have gone ahead designing bigger, better, faster, safer planes. Limits in physical size of airplanes will be reached when operators find that they cannot economically or safely operate planes larger than a certain size, or that cost of airport construction or physical limitations on airport size are the ruling factors. Some technical variations in aircraft design may very likely change the existing pattern of aviation. Such developments are the helicopter and the flying wing. The helicopter bids fair to revolutionize aviation since its safety features, as compared with the "cub" plane, cannot be equaled for private use, as well as a wide variety of commercial uses. Then, too, there is the glider, towed singly or in trains by a locomotive plane. If operations of this sort can become both physically and economically possible in all kinds of weather, commercial aviation will have a way of circumventing the limitations bound to be imposed on the physical size of aircraft. It is not the purpose of this discussion to describe in detail technological advances in aircraft design—there are plenty of books on such subjects—but technological advances in other fields will be mentioned as they pertain to some phase of aviation.

The present-day pattern for aviation is divided into three phases: (1) Military Aviation, (2) Private Aviation, (3) Commercial Aviation. There is no reason to believe that this pattern will differ in the post-war world, although its component parts will necessarily assume varying degrees of importance. Military aviation is having its heyday during the present conflict and is shaping history. It is questionable how important it will be as a single factor in relation to future city planning, especially the decentralization of key industrial areas and their attendant living spaces.

Private aviation will again come into its own with peace, and will undoubtedly contribute more toward decentralization than military aviation. This will be especially true if the helicopter is placed upon the market as the "flivver plane" for every man. The attendant change in the pattern of individual life and community planning will be colossal and chaotic if not closely controlled and intelligently planned for. Such a change need not be feared, since when and if it comes it will be a gradual process severely regulated by the supply and demand for the helicopter and the ability of the public both to economically possess and to operate such a plane.

Commercial Aviation

Commercial aviation (the operation of scheduled air transports on an intranational and international basis) will also have its period in the postwar world, and will be a powerful factor in preserving peace and in bringing all nations closer together. Today it is being expanded to aid in prosecuting the war by supplementing military aviation in the transport of personnel and cargo. Commercial aviation will influence architecture and city planning because it will assume prime importance in the transportation of passengers, express, mail, and certain types of freight. Its coordination into the physical pattern of the community, and the community's support or lack of support for it, will have a decided effect upon the private and business life of the community. Previous to the Air Age cities grew great because they had good harbors or were situated where several railroads met. In the Air Age, the airport becomes the city's world harbor, and great cities will grow where the terminals of great circle air routes are located.

Consider the future of aviation and of commercial aviation in particular, for commercial aviation bids fair to assume the greatest immediate importance in the postwar world. Present-day airports, in which are now combined the three phases of aviation activity, will become specialized airports handling only one phase such as military, private, or commercial. As aviation grows, there will be additional subdivisions of airports for still more specialized functions. Military aviation will have special fields for flight training, advanced training, bomber training, pursuit bases, bomber bases, military cargo, etc. Private aviation will have separate fields for flight training, local pleasure flying, public itinerant traffic, and of course, special airports for private flying clubs. Commercial aviation will require separate fields for passenger and cargo traffic, with a possible subdivision to provide separate fields of each type for intranational and international air traffic. This specialized subdivision of airports will be true of all large communities (1,000,000 population or over) but will vary with small communities in proportion to their population and specialized demands. Commercial airports serving the same community will have to be planned in *(Continued on Page 39)*

relation to one another so that passengers or cargo requiring transfer to another plane at another port will not be delayed too long.

The number of fields necessary for any specialized activity will be determined by the demand and the number of flight operations that can be accommodated on a type of airport standard for such an activity. There exists today at every airport a certain operational limit for peak traffic periods, which is a function of the runway and taxiway pattern, the number of parallel runways, and the time required to conduct a landing or takeoff operation. When operations reach the limit for peak periods, either an addition must be made to the existing runway system or an additional airport must be constructed. A number of airports within the United States have already reached their operational limits—a condition largely due to increased activity as a result of the war, but considering existing bans on private flying, the postwar picture for these fields still appears to be one of over-congestion.

From the standpoint of present-day airport traffic control, the relation in any community of one field to another is as important as the relation of all of them to the central community pattern. There is a limit to the allowable density (nearness of airports to one another) so that air traffic, circulating around each airport preparatory to landing, will not collide. The allowable density pattern will change only if new technological advances are made in traffic control or if aircraft types change radically in their performance ability as evidenced by the helicopter. Little thought has as yet been given to zoning community areas with respect to specialized aviation activities. For example, it appears obvious that a flight training field should not be located next to a commercial airport, nor should a flight training field be located in a densely populated neighborhood; yet such errors in planning will result unless regulations are formulated and enforced far enough in advance of a surge of new airport development.

Effect of Mass Production of Aircraft

At the outset of the present world conflict, the United States had the finest system of commercial air transport lines in the world. A startling fact, often overlooked, is that the entire prewar commercial air transport operation in the United States was carried on with only 350 planes. Consider the effect on airport planning and development in the postwar period if, as experts predict, the staggering sum of 25,000 planes for passenger travel and still another 25,000 planes for cargo transportation will be necessary for domestic use alone. This is a long-range viewpoint; such growth will not happen overnight. However, with aircraft manufacturers all set up for mass production, the number of commercial aircraft in use can be multiplied many times, amazingly quickly. Such growth will necessarily depend upon demand for commercial aircraft. It must be carefully controlled, or chaos will result.

The growth of commercial aviation hinges largely upon political and governmental action, both national and international. The action of the Civil Aeronautics Board in awarding feeder lines, new routes, and route extensions to existing and new airlines will be very important intranationally. So also will be the awarding of mail and express contracts. Internationally, commercial aviation will be dependent upon peace terms at the end of this war, and upon the action, both individually and collectively, of the governments of international powers who bid for air commerce.

The new field of international air law is a potential bone of contention. There must be established a unified international air traffic control panel of some sort, with power to regulate traffic, to set standards, to determine who will engage in international air traffic, and to decide to what extent international air agreements will be reciprocal. Just who will establish a policy of freedom of the air and its limitations is a moot question. The establishment of an open port system for planes and the question of restricted areas will also have to be settled.

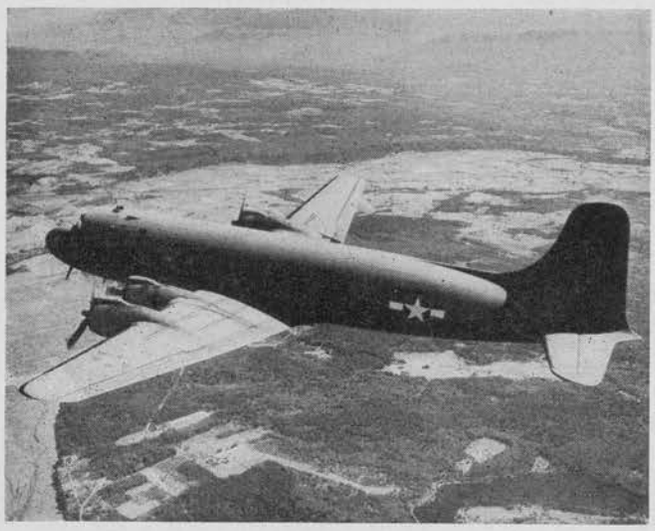
Four New Ideas:

There exists today a potential demand for a gigantic commercial aviation system. The realization of such a system will be based upon entirely new concepts, understanding of which is essential. These are mainly as follows: the relation of space and time, the re-study of physical geography, the re-analysis of commercial geography, and the capabilities of the airplane.

1—Airline Space-Time

First, a person must understand that the invisible merchandise of an airline is time, and that this special *Airline Time* makes a number of things economically and physically possible that are impossible for ordinary land or water carriers. Airline Time represents a conquest of space heretofore unequaled. In integrating time and space the airplane has made Airline Time, rather than land miles, the measure of distance. It is necessary to realize that this earth is fast shrinking in size. No spot on earth is more than sixty hours from any airport. By air, the Minneapolis-St. Paul area is only 13 hours from London, 16 hours from Moscow, or 26 hours from Chungking. Similar schedules can be created for any

Continuing the sequence of photographs of transport planes, past, present, and future: The cover of this issue shows an air transport designed in 1856 by one B. Chauvelot (drawing from Institute of the Aeronautical Sciences) and a DC-4 commercial plane, the workhorse of tomorrow's airlines (TWA photo.) Below, Douglas DC-3, the standard airliner prior to the war. Below, right, Naval transport C-54, one of the military planes which is even now threatening the DC-3 with obsolescence.



locality. Such conquests of space are usually put aside as achievements for the future. It is difficult to comprehend that such travel is possible today and that only the world-wide conflict prevents the global establishment of commercial runs to serve far distant points. Consider that these airline time-distances are computed on the basis of an average speed of only 300 miles per hour. Add to this the fact that 400 miles per hour on long flights will more likely be the cruising speed of the near future. The skeptics will have to be convinced if communities are to be well planned and capital wisely invested for today's Air Age.

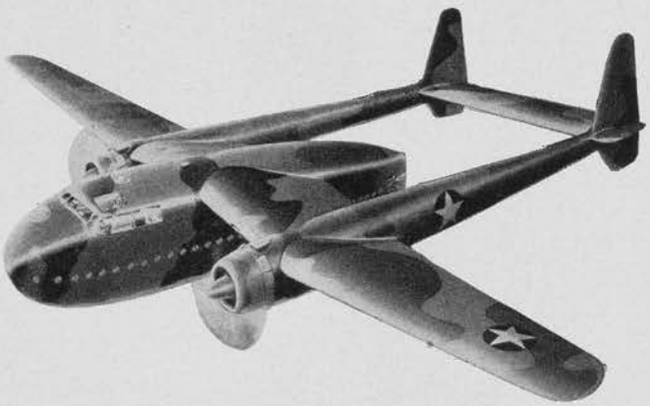
2—The Bird's Eye View

Secondly, a person must acquire a new concept—the Air Age concept—of physical geography. For aircraft there is no difference between land and water, desert or mountain, county line or international boundary. Physical barriers are set aside while in flight and must only be considered seriously when landing or taking off, or when trouble develops. Physical geography will be subordinated to commercial geography in determining the air routes of the future. The main exception to this would be the location of refueling bases as established in conformity to physical and geographical conditions. The airplane can take advantage of the shortest distance between two points—the great circle courses over the surface of the earth—and follow these courses by celestial navigation. Add to this an examination of the earth in the form of a globe. Of prime importance to Americans today is the fact that the land masses of practically all the important world areas are concentrated in the northern hemisphere, and are extremely close to one another by aerial navigation over the polar regions. Polar routes offer the possibility of providing refueling bases for the land plane, which, up to a certain gross tonnage, is far more economical to operate than the seaplane.

3—Payload Geography

Thirdly, a new concept of commercial geography must be understood. It is necessary for any commercial air route to be economically successful if it is to remain in existence. The economics of air line operation using land planes is based upon the fact that the shorter the distances between refueling bases the greater the payload. Then, note that these short-hop refueling bases can be adequately provided on polar routes and the fact that 90 per cent of the earth's population is concentrated in the northern hemisphere. In this concentration of population the supply and demand for air travel will be found, and a means for a quick, eco-

NEW PENCIL POINTS *is indebted to Mr. F. R. Meisch for the drawings used within the text; to the Civil Aeronautics Authority for the diagrams of airport growth; and to the Institute of the Aeronautical Sciences for the Cruikshank and Hoboken cartoons. Photographs reproduced by courtesy of U. S. Navy, Acme, United Airlines, Skyways Magazine, Curtiss-Wright, Lockheed, Fairchild, Douglas Aircraft, American Airlines, Pan-American Airlines, Crouse-Hinds, Portland Cement Association, Vought-Sikorsky, Sigurd Fischer, Rocky Mountain, Hedrich-Blessing, Byrne, Peele, George Jervas, Robert Damora. Many of these sources contributed valuable editorial suggestions.*



Below, Lockheed's mighty Constellation, another high-speed, long-range plane with great cargo capacity. Now used for military purposes only, exact performance data are not available; but in civilian use it can carry 55 passengers and a crew of 9 nonstop from Los Angeles to New York in record time. Above is a new all-steel cargo plane designed by Fairchild for military transport. Performance data are secret; the plane is apparently not yet in production.

nomical exchange of goods will be desired. A study of the location of existing key cities and the nation's economy will still further determine air routes.

4—What Planes Can Do

And lastly, an understanding of the capabilities of the airplane is necessary to complete the Air Age picture. Aircraft have been increasing in size, efficiency, and cargo- or passenger-carrying capacity ever since man first flew a heavier-than-air machine; but developments of the last few years have truly made the Air Age possible. The standard, reliable DC-3 of the airlines faces relegation to the feeder line routes of the future. Already a number of aircraft types, expressly designed to perform air carrier functions on an economic basis, which are either in existence, in production, or on the drafting table, supersede it. Characteristics and performance data vary but all have several things in common. Physically they are bigger ships than the airlines operated in prewar days; they are designed for greater payloads; they operate at higher speeds, with greater efficiency, forecasting reductions in the cost of air travel and transportation. They incorporate the latest technological developments and operate with a greater factor of safety. The skyliners of the Air Age will be real luxury liners, with conveniences previously unthought-of for aircraft. Some will be multi-engined planes operating in the stratosphere, at speeds of 400 miles per hour or better, on nonstop transcontinental or international flights. The payload-versus-range characteristics of many cargo ships must necessarily remain a military secret until after the war, a fact which makes it difficult accurately to forecast air cargo developments.

C.A.V.U. No Matter What the Weather

Aviation in the Air Age will no longer be subject to the vagaries of the weather. Airlines will be able to maintain more accurate time schedules than surface carriers (railroads and buses) by means of technological developments. Stratospheric planes will fly great-circle courses, above weather, and will land and take off through any kind of weather via the radio beam and radar. Dense fog and blinding snow will not ground planes large enough to be equipped with all the latest instruments and safety devices. This inability of the small cub type of aircraft to carry all the necessary safety instruments will finally render it obsolete except for military and commercial aviation training purposes; presupposing, of course, that the helicopter will be the plane for all general-purpose flying.

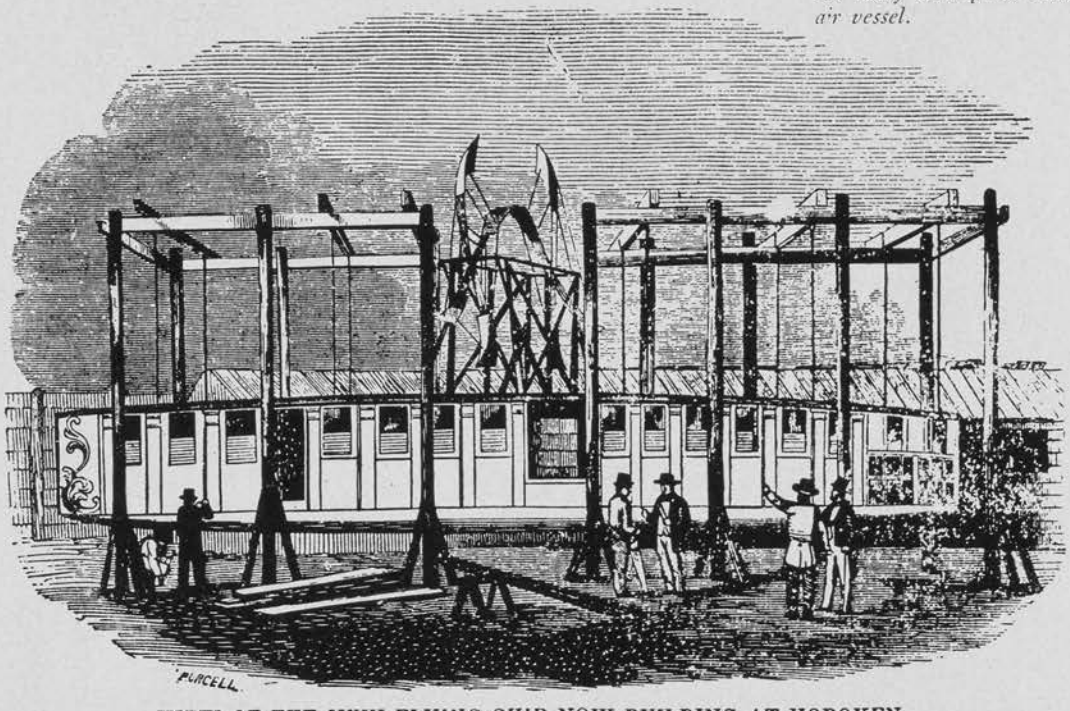
Airway and airport traffic control has anticipated these new technological developments, which will allow aircraft to be "stacked" in layers or spaced in "trains" for blind flying. Such safety devices will simplify traffic control problems and will allow a greater density of aircraft per unit of space, during bad weather, than has previously been possible. The use of radar, however, will not allow a greater traffic density than can be handled under C.A.V.U. (clear and visibility unlimited) conditions. The problem of increased numbers of aircraft and greater densities per unit of space has already received considerable study by traffic-control experts, who have proposed methods of handling it.

Rates Down, Demand Up

Increased operating efficiencies will permit changes in rate structures, which will in turn increase the demand for air travel and transportation. Reasonable estimates indicate that current passenger rates (about 5 cents per mile) will be reduced to 3 or even 2½ cents per mile. Present cargo rates of 80 to 90 cents a ton mile will be reduced to 15 or even 10 cents, comparing favorably with existing rail express rates which average 11 to 18 cents per ton mile. Motor freight, at 5 to 7 cents per ton mile, will be relatively safe from competition.

Such rates suggest basic shifts in methods of travel and transportation. It is reasonable to anticipate that all first class mail going more than 100 miles will be transported by air. The majority of first class rail and Pullman passengers will also travel by air. Much cargo now moving by rail express in excess of 150 miles will probably be carried by air. It is also possible that some high-grade cargo now moved by LCL freight will be diverted to air transportation. It is not difficult to foresee the passing of the ocean liner in favor of hourly transoceanic air service. Already foreseen are operations involving the establishment of non-stop transcontinental flights, local runs and express flights between major terminals serving minor ports, and feeder line systems serving the main transcontinental trunk line. The increased use of air travel and transportation is not expected to supplant wholly, but rather to supplement, other forms of transportation; in fact, it will create new traffic problems and stimulate other forms of transportation. Changes that will necessarily accompany this shift in transportation medium will have profound effects upon city planning and will provide additional realms for architectural activity.

An early attempt at building a cargo air vessel.



VIEW OF THE NEW FLYING SHIP NOW BUILDING AT HOBOKEN.

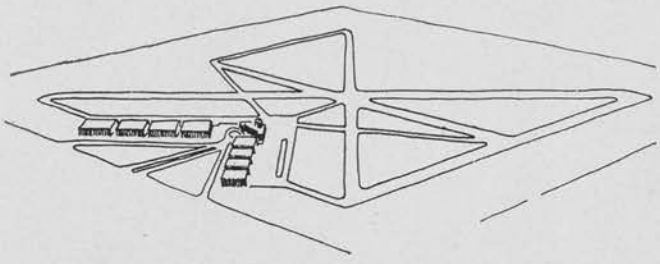
Part 2—AVIATION AS A STIMULUS TO ARCHITECTURE:
Basic Requirements for Ground Facilities

This architectural activity will be centered principally at airports. There will be administration buildings and control centers to design, office buildings, passenger terminals, possibly small hotels, newsreel theatres, cafes, restaurants, recreational facilities, clubs, schools, service stations, bus stations, garages (especially heated public garages for colder climates), hangars, shop facilities, overhaul bases, manufacturing plants, fire stations, and power plants. For cargo ports there will be warehouses with heated and refrigerated sections, sheltered plane and truck loading docks in colder climates, receiving and shipping facilities, possibly markets, and the usual collection of hangars, shops, offices, administration and control buildings. In the city proper there will be ticket offices, travel agencies, and terminals with limousine service to airports. The problem of handling a large percentage of mail by air will result in specialized post office facilities at many ports. Additional thought will reveal even more opportunities for the architect.

Airports

The primary center of all this activity being the airport, it is reasonable to assume that airport location and plan deserve primary attention. Factors roughly governing the selection of site, eliminating politics, are as follows: type of airport, anticipated development, relation to city or services it will perform, relation to existing airports, altitude, topography, soil conditions, adequate drainage, man-made and natural obstructions, relation to, and condition of, existing traffic arteries, public transportation services, railroad facilties, weather conditions such as fog, wind, etc., the nearness to, or cost of, adequate water supply, sewage disposal, electric power, fire protection, telephone and telegraph lines, land costs, construction costs, existing rules on runway clearance lines, glide angles and air traffic control, and most important, the possibility of future expansion.

First consideration should be given to development of a master plan and to acquiring enough land to provide adequately for expansion for a considerable period of time. Failure to proceed in this manner, a weakness of many an airport plan, has caused waste of much municipal money. Secondly, consideration should be given to locating buildings, with respect to each other and to clearance lines, so they can be expanded to meet growing needs. This is especially true of administration buildings with loading ramp positions, of commercial airline hangars, and of manufacturing plant hangars.



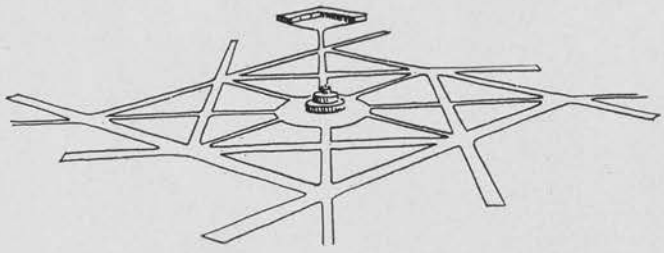
CAA Standards

A number of basic airport types have been proposed and are in existence, and many theories of airport design. The *standard design* is that proposed by the CAA, with variations by stages.

This plan, which has previously been declared quite adequate, can have its operational limits increased only by using dual, possibly triple, runways. Its great fault is that the usual number of loading ramp positions which can be accommodated is insufficient for more than dual-runway traffic. Furthermore, operational conflicts occur at the ends of the runways and taxi distances vary, becoming extremely great as the number of parallel runways is increased. This type of airport plan has runway clearances now considered below minimum, as well as runways of non-uniform length. This criticism is all from the theoretical standpoint. In actual practice a still greater picture of inadequacy emerges when additional physical limitations of site, terrain, obstructions, ill advised expansion, etc. are taken into consideration. This, the common pattern of many existing airports, renders them obsolete and impractical. The standard CAA field can accommodate only 60 to 75 operations per hour, usually much less under adverse weather conditions.

The "Central Design"

One of the most interesting designs from a theoretical standpoint, and possibly relative to immediate future developments and potential variation, is the *central design* proposed by Hans S. Lubig of the CAA. This scheme cuts taxiing of aircraft to a minimum, and permits many landings and takeoffs in a relatively short period of time.



The principal advantages of the central design are its lack of conflict between flight operations, uniformity and small variance in taxi distance, uniformity in length of runways and the possibility of runway expansion, as well as the separation of runways by a distance of 1000 feet or more. By providing for central design variations such as the use of island stations around the central control building, it is possible to set up 20 to 60 loading ramp positions. The distance from hangar areas to the central terminal is a minimum from all parts of the field—though it is much greater than is common in the operation of most commercial airlines today. In the future, major overhaul facilities (at bases requiring them) may have to be located well away from the terminal as a means of providing for expansion of all buildings and grounds facilities. Cost studies have indicated that the necessary underground access to the field's center would soon be paid for by savings resulting from smaller taxi distances and increased operating efficiency.

International Airports

Of unusual interest will be the development of special international airports. For the immediate postwar period it is safe to assume that international traffic will utilize existing major commercial fields. As traffic volume increases, special fields designated as ports of entry and departure will necessarily be created to serve areas or regions rather than a single municipality. Such ports will usually be developed near great metropolitan areas because supply and demand factors are concentrated there. Problems of adequate customs and immigration control will be simplified if international traffic is segregated from domestic traffic. Linguistic problems of airport traffic control in handling foreign aircraft, as well as the necessary radio facilities and mechanical equipment, are likely to be too numerous to be supplied adequately by the average commercial field. The great variety of aircraft likely to be engaged in international traffic may impose a special pattern or require a larger-than-average airport.

Up to the present the aircraft designer has continuously challenged the airport designer to plan for new aircraft with varied operating characteristics. Conversely, it appears fair for the airport designer to challenge the aircraft designer with a new type of airport which would eliminate many of the planning bottlenecks that occur at existing airports. Some thought has been devoted to this new airport as a single system of parallel runways three

Airport System for a City of 1,000,000 Population

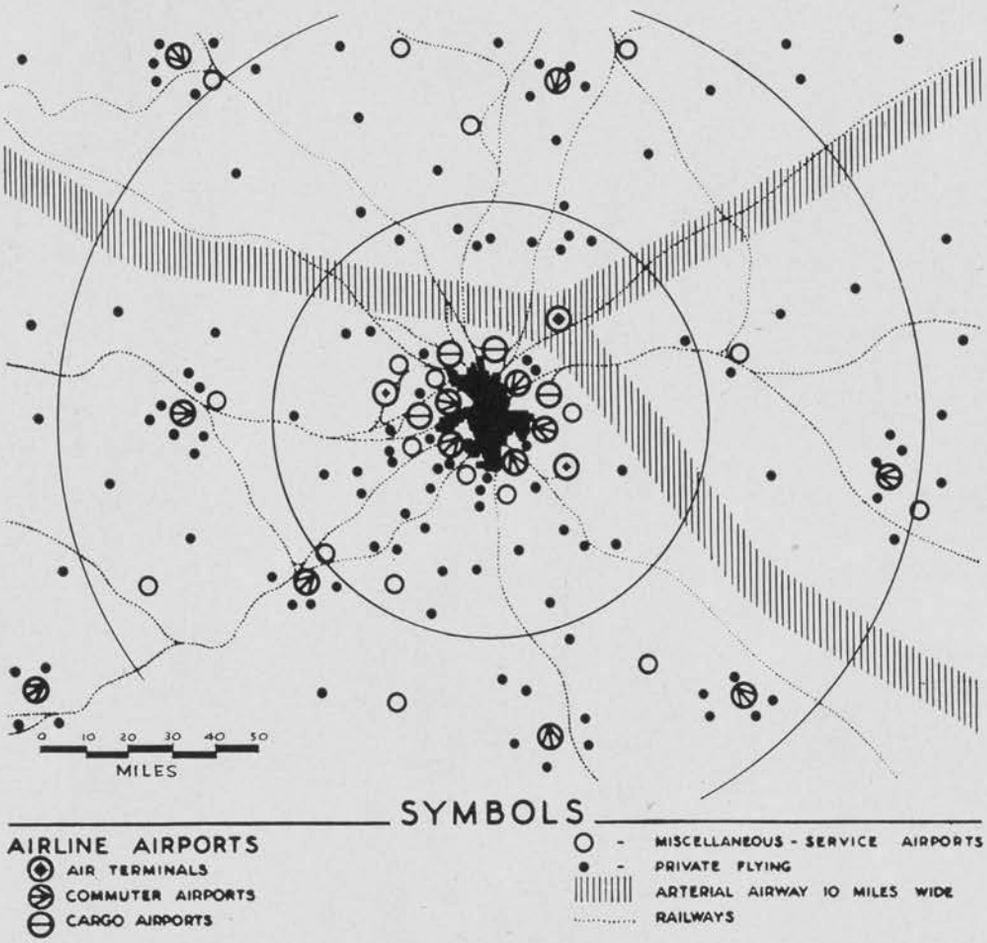
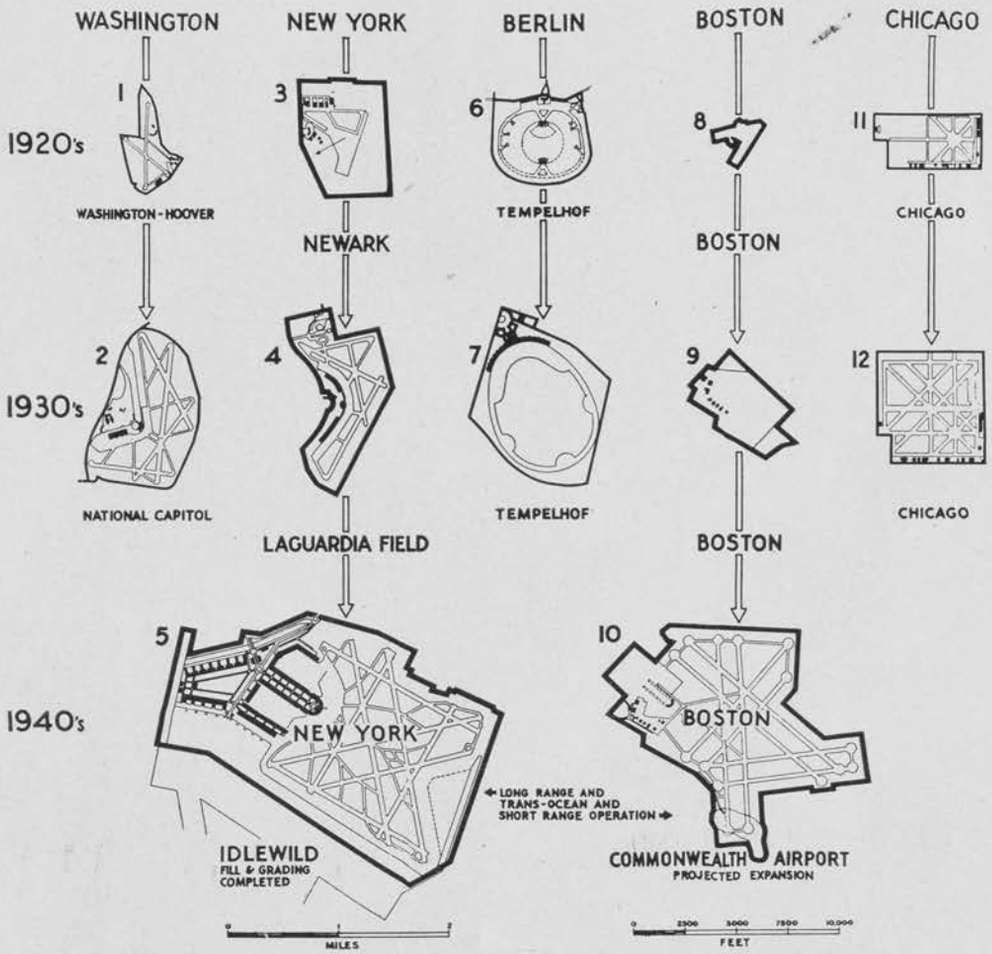
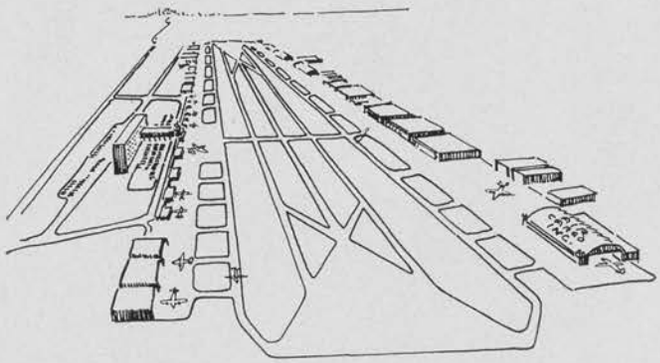


Chart above shows possible distribution of various types of airports about a future metropolitan center. Note terminals and cargo airports close in; outlying and close-in commuter airports; private fields interspersed between. Below, size of metropolitan airports by decades, all drawn to same scale. Both charts from Civil Aeronautics Authority.

Increasing Size of Major Commercial Airports



to ten miles in length, each separated by a thousand or more feet. Parallel to these runways would be the taxiway or ways, and still more distant the aircraft-parking and building lines. Such an airport is predicated upon the theory that the higher the range of aircraft cruising speeds, the higher the landing and take-off speeds and so the greater the length of the runways needed as a safety factor for normal operations and instrument landings. Cross runways, which eliminate so much valuable airport area from the buildable class because of clearance lines, are omitted. In their place a V-shaped paved area is provided at each end of the parallel runway system to allow for landing and take-off with reference to wind direction and velocity. This "funneling in" of flight operations challenges the aircraft designer to design a plane little affected by cross winds and provided with landing gear capable of maximum directional control at ground speeds.



An airport of this pattern would require glide angles and clearances only at the two ends of the field, and room for runway lengthening, if any, only in those same directions. Expansion in the number of runways could be anticipated by limiting buildings to one side of the field, or by planning initially for a definite number of future runways before starting construction on both sides of the field. Furthermore, it would be possible to provide adequate areas for terminal and hangar developments—even allowing for both cargo and passengers to be handled at the same port on opposite sides of the field. Additional advantages would be the minimum taxi distances and the quality of runway lengths.

Terminal Buildings

Next to airport design, terminal building (or station design) seems to be the biggest problem. There will be as many airport administration buildings or terminal designs and types as there are airports if present trends continue. Already there exist some basic administration buildings patterns, created by the CAA and influenced by structures at La Guardia Field and at Washington National Airport. The latter buildings have some admirable features, but none can be considered the ultimate in terminal design. Administration buildings may very likely become "typed" in plan, but with minor variations according to type or function of the airport, and size of community or volume of air traffic served. Here again, as in airport design, many factors enter the picture. The basic problem seems to lie in developing for the terminal building a master plan which will permit inexpensive alteration and expansion, as a means of allowing financial investment in the building to be limited initially and then increased at intervals to parallel traffic growth at the port. Terminal buildings will have to continue to accommodate increasing passenger, mail, and cargo traffic until each type of traffic has increased sufficiently in volume to justify separate terminal or port facilities. For small feeder line airports this may never occur—at least in the normal life of any station facilities erected immediately after the war. At large airports this break will occur sooner; some cities will be ready for separate passenger and cargo terminals at the end of the war.

Eliminating cargo terminals for the moment, let us consider passenger terminals and the factors influencing their design. Here exists the greatest problem in dealing with variables that has come before architects in a long time. The basic factors influencing passenger terminal design are as follows: the aircraft, the passenger, his friends, his baggage, the spectator, mail and express, the automobile, and the employee. The question of terminal building location and views of the field is usually predetermined by the airport plan. The obvious relation of such a structure to soil conditions, utilities, highways, etc. will be neglected here as this is also predetermined to a degree by the airport plan. Analyze the basic factors and one common characteristic is apparent: they are all *mobile, variable* factors, changing in size and quantity or both, and all act as integrated parts of the entire scheme.

To consider them in detail, aircraft are increasing in physical size, in carrying capacity, in number, and in requiring greater area for manoeuvering. But *the rate of these increases is indeterminate.* The day is past when commercial airlines will standardize on one type of plane, as almost occurred when the DC-3 was commercially accepted. However, the number of aircraft manufacturers now operating with gigantic production setups indicates that a great number of types and sizes of commercial planes will be available. Competition between airlines foreshadows the use of different types of planes by each line in its effort to fly more functional ships than competitors. The problem of operating feeder lines, local short-stop flights (milk runs), non-stop transcontinental and trans-oceanic routes points to the use of different types of aircraft for specialized uses within a single air carrier company.

Facilities for Passengers

Greater carrying capacity and increased demand for air travel leads inevitably to an increase in number of passengers, possibly to increased acceptance of baggage at minimum charges over and above the 40-lb. free limit. The passenger is a particular problem in that his demands for service at terminals are bound to become more varied and complex as air travel expands. The basic passenger demand is for toilet facilities, communications, and food. Toilet facilities must be ample; adjacent lounges are essential. Communications are of three varieties: telephone, telegraph, and mail. The telephone booth is easily located at focal points in numbers sufficient for all needs. Telegraph offices are not as flexible; it is not profitable to provide them in quantity. Telegrams must usually be sent from telephone booths or ticket counters. Airport post offices, for air mail, can be enlarged by adding public service windows, general delivery facilities, even post office boxes. The mail pick-up box can be strategically located to serve widely separated parts of the terminal. As for food and refreshment, it is reasonable to assume that large airports will have diversified developments such as cafeterias, restaurants, public and private dining rooms, lunch counters, soda bars, sandwich bars, tap rooms, "sky rooms," grills, clubs, etc.

Secondary facilities for passenger service are also multiple and still more diversified, although these will be essential only at major airports. Baggage check rooms or mechanical lockers, separate and distinct from the airlines baggage room, are desirable. The demand for candy, cigars, news, magazines, souvenirs, drugs, etc., must be satisfied. Newsreel theatres, billiards, bowling, and other amusements may be demanded by the passenger who has time on his hands. Short-duration, round-trip passengers will desire protected parking lot facilities. In colder climates, heated parking garages and service facilities may be profitable. Barber and beauty shops, as well as many hotel accommodations (sleeping rooms, showers and dressing rooms, conference or exhibition rooms, laundry and tailor services, etc.) will also be desired. Many demands of a minor nature, but extremely important to the passenger, such as the procurement of cigarettes, candy, and soft drinks, can be satisfied by installing automatic vending machines. The passenger, a mobile unit, must be controlled and guided for safety and operating efficiency, in his own interest. The rate of passenger growth is also indeterminate. Passenger travel has been seasonal, but the war has temporarily, perhaps permanently, ended seasonal fluctuations.

Attendant upon many air travelers are friends and relatives, to see them off or welcome them. These well wishers alone can

create a serious problem, (aside from that of the idle curiosity-led spectator) since they will do anything to remain with or meet passengers. It is questionable whether present methods of ticket-taking and gate-control can survive unchanged.

Next consider the spectator, who usually pays the taxes which finance the airport and its terminal building, and consequently feels that he has a right to use it as a place for sight-seeing, entertainment, and dining. The old fashioned habit of going down to the railroad station to watch the trains come in has now been replaced by a kindred mass movement to the airport. Surveys vary, but the majority indicate that spectators now outnumber passengers in the ratio of 6 or 8 to 1. Charging admission to the field has not curbed spectators; and though it has added another source of revenue, it has sometimes greatly irked the taxpayer-spectator. How long the airport will remain a novelty and thus have a spectator problem is also indeterminate and must be considered in terminal design. It is essential to segregate the spectator from all operations, and from passenger services and activities, to as great a degree as possible.

Separation of Mail and Passenger Traffic

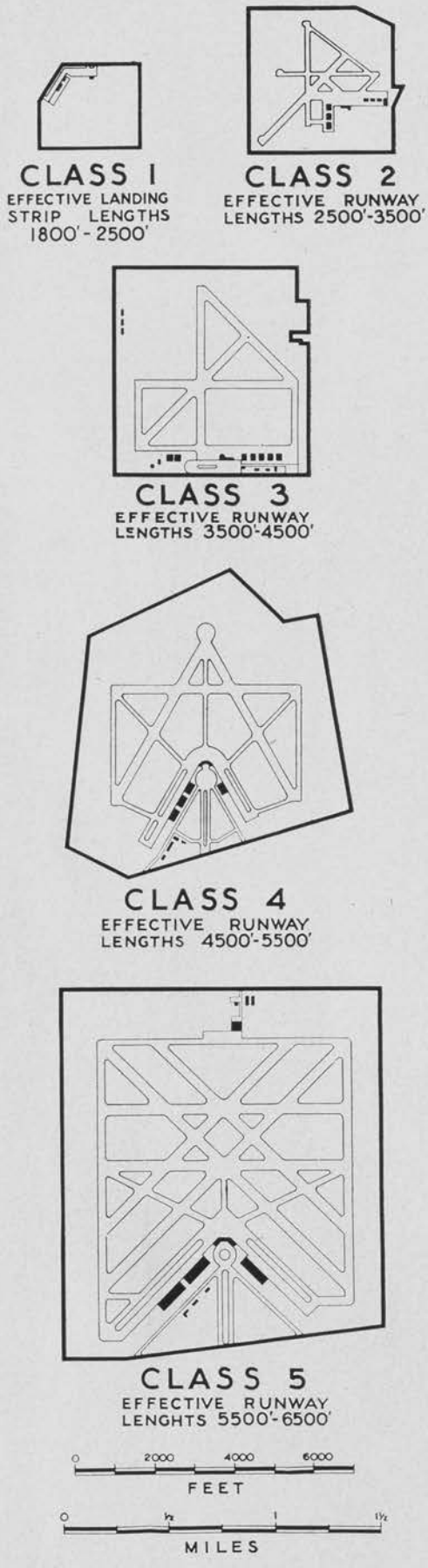
Mail and express, on the increase at an indeterminate rate, depend greatly upon a proper circulation system to expedite their movement and handling. They also require adequate, efficient equipment, plus readily expansible space for their handling. The airmail post office, already mentioned, will have much greater importance if volume of air mail continues to increase until all first class mail going more than 150 or 200 miles is handled by air. Under such conditions it is not unlikely that independent post office structures will be required at major airports and terminals to handle and sort mail. Since feeder line operations are likely to involve a combination of mail and passenger traffic, it appears extremely doubtful that air mail and passenger operations will be carried on at separate fields, even at major terminals. It does seem logical that as cargo traffic develops, air express will be divorced from passenger operations, especially on transcontinental trunk lines, and will need separate fields.

The automobile, increasing in numbers at the airport, will very likely remain the most mobile method of transportation to and from the airport and will require adequate circulation and parking facilities. Parking areas may require subdivision or segregation as to user; moreover, if parking space is limited, other solutions to the transportation problem (buses, trams, surface cars, subways) should be analyzed and, if necessary, incorporated into the local transportation system.

As the number of airport employees increases with the general development, their problems will become correspondingly magnified. Efficient terminal operation demands a constant minimum number of personnel on hand at all times. They will want the usual services (food, refreshment, toilet facilities, locker rooms, rest rooms) separate in many instances from those of the airline passenger. With respect to office space, there is every reason to recommend that the administrative function as represented by offices (*not* airport control functions) be removed as a wing or even a distinct building away from the aircraft ramp positions; thus providing for expansion, reducing noise created by aircraft, and eliminating the confusion which results when administration and passenger and spectator services are combined. All these point to a definite need for flexibility, and for planning for future expansion, in the design of passenger terminal buildings.

Efficient Operation of Air Terminals

The great extent of operational activities in the new air terminals will require just as efficient an operational setup as was previously achieved by personal contact systems. Use of public address systems, intercommunication systems, private lines, pneumatic tubes, conveyor belt systems, elevators, lifts, escalators, television, etc., make this possible. These will be the solutions to the handling of mail, express, baggage, weather reports, flight plans, orders, and



Size of Typical Class 1-2-3-4-5 Airports

Diagrams above and at top of page 45 are from the Civil Aeronautics Authority. The above diagrams and the published proposal for New York's gigantic Idlewild Airport, across page, are based on rectangular and diagonal runways laid out in accordance with prevailing winds.

Takeoff Distances to Clear 50-foot Obstacle

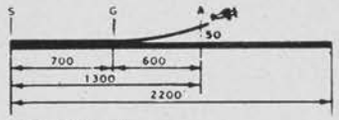
SG—IS DISTANCE FROM START TO POINT OF TAKE-OFF

SA—IS DISTANCE FROM START TO CLEAR 50 FT. . . . ALL ENGINES OPERATING

SB—IS DISTANCE FROM START TO CLEAR 50 FT. . . . ONE ENGINE INOPERATIVE AT POINT G

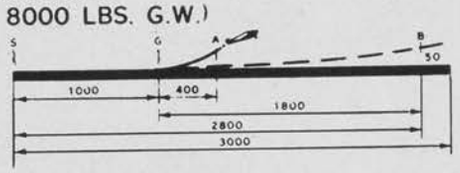
LIGHT AIRPLANE
(APPROX. 2000 LBS. G.W.)

CLASS I AIRPORT
2200 FT. RUNWAY



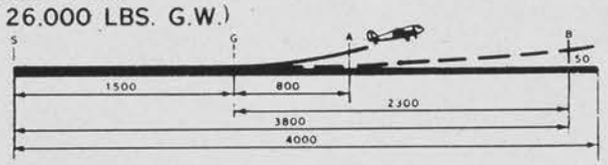
SMALL TRANSPORT
(APPROX. 8000 LBS. G.W.)

CLASS II AIRPORT
3000 FT. RUNWAY



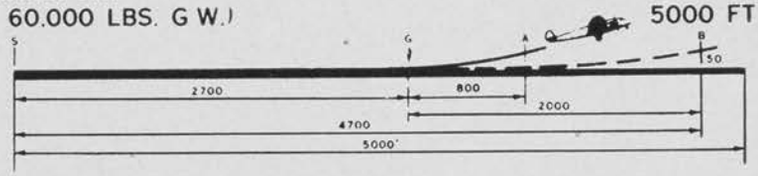
MEDIUM TRANSPORT
(APPROX. 26.000 LBS. G.W.)

CLASS III AIRPORT
4000 FT. RUNWAY



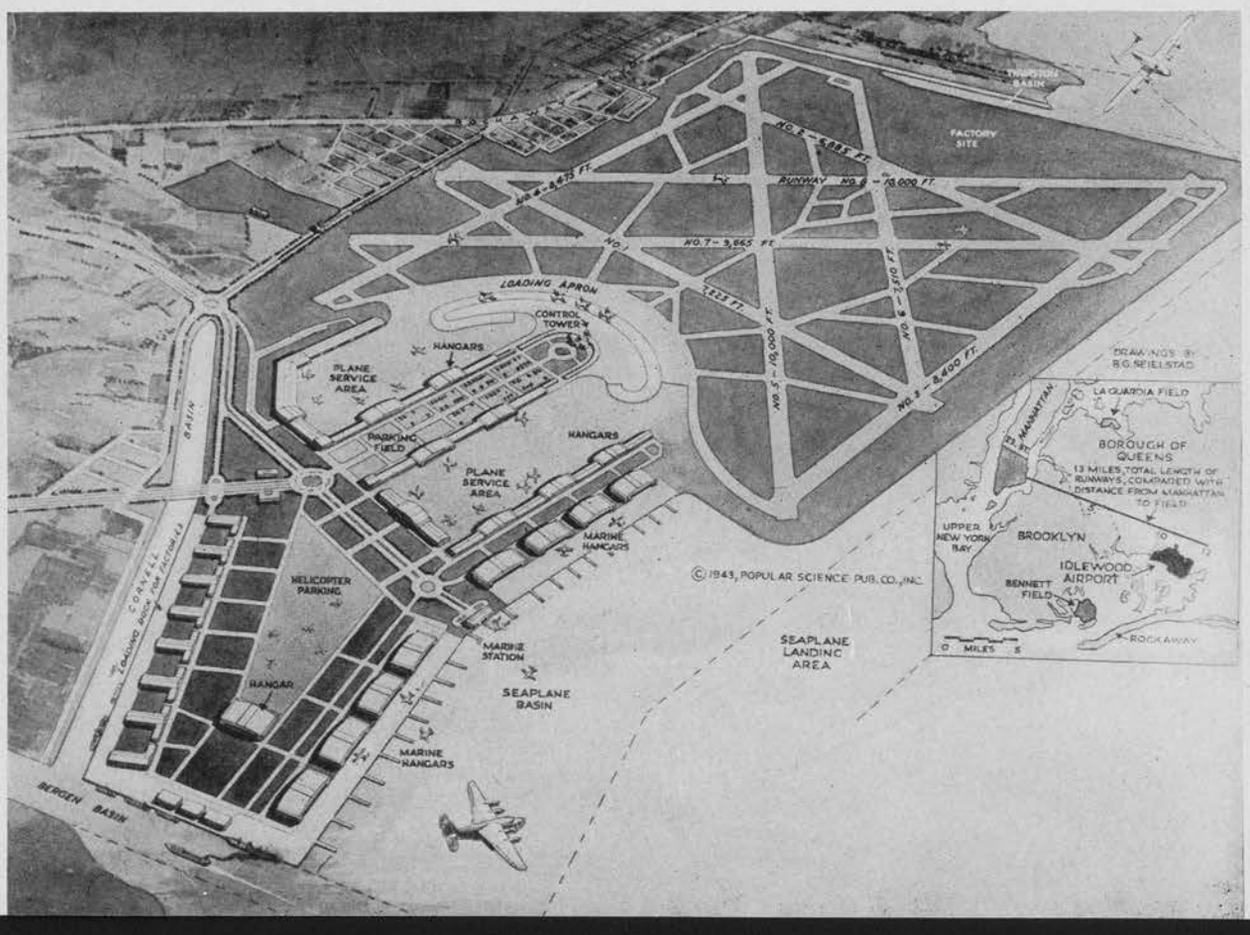
LARGE TRANSPORT
(APPROX. 60.000 LBS. G W.)

CLASS IV AIRPORT
5000 FT RUNWAY



Proposals for Idlewild Airport, New York City

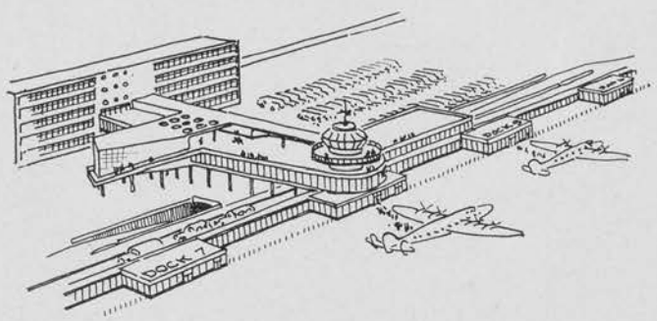
The scheme for New York's future transcontinental and transoceanic air terminal, at Idlewild on Long Island, may be superseded by a more advanced design. Below is the published scheme, the familiar rectangle-and-diagonal layout greatly enlarged to provide 13 miles of runways, some of them 10,000 ft. long, 200 ft. wide. Recently American Aviation *revealed that at least one airline questions this layout, proposing instead a "tangent runway" pattern, which is pinwheel-like, with terminal building and ramps forming the hub, and runways, the tangential "spokes." Landings, made with 45° of wind direction, point toward the hub; takeoffs are made similarly but away from the center. Taxi distance is much reduced. Access to central buildings is by tunnel under runways. Studies reportedly show that the rectangular scheme will permit only 80 takeoffs and landings per hour (at this rate, estimates indicate, New York will need 3 Idlewilds plus LaGuardia Field within 9 years after the war) while a single tangential layout at Idlewild could permit 375 plane movements per hour. Among other claimed advantages this would reduce land area needed for the total volume of air traffic from 12,834 to 5612 acres.*



tickets, from centralized offices to decentralized loading stations, ports, docks or ramps.

Based upon this kind of analysis, Northwest Airlines has been studying the passenger terminal problem and is in the process of designing several theoretically ideal terminals. Plans have been conceived with a view to having answers ready for the questions that have and will come from municipalities when they plan new passenger terminals. The position of the airlines as advisors to the municipalities they serve is a serious one inasmuch as both must plan their air age future together. What either does will have a decided effect upon the others; future efforts must be even more cooperative than they have been in the past.

The important principle upon which one terminal solution was based may be stated as follows. It has been estimated that in some cities 80 to 90 percent of all airline tickets are purchased at downtown ticket offices, because the airport ticket office is remote. The airport passenger is presumably interested in buying *airline time*; such time should be carried over into ground operations as far as possible. It should not take the passenger an hour to reach the airport, nor should we have to be there half an hour ahead of scheduled departure for a flight of perhaps only an hour's duration. Travel time to the airport is regulated principally by distance and existing speed laws, so that once an airport site is selected this factor is fixed. However, the passenger who arrives at the airport by private car, cab, airline limousine, or bus is primarily interested in a direct effortless transfer from his automotive conveyance through the airport barrier to the plane, with his ticket being checked and his baggage cared for en route. The reverse process is true for "terminating" passengers. Only those who are changing planes or are held over at the airport will make the most of the services provided in the terminal building.



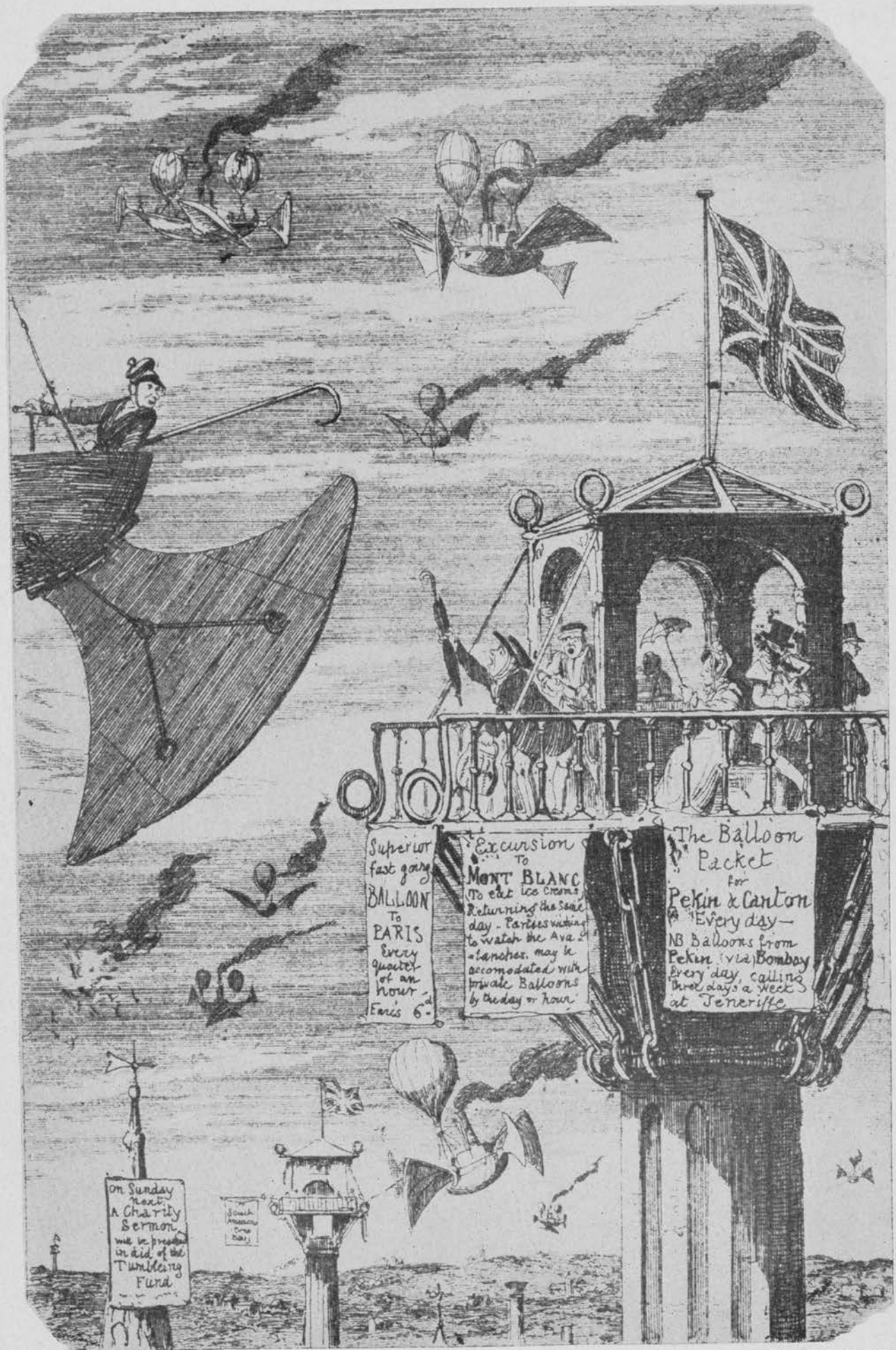
The solution referred to provides a number of individual docks or passenger stations, connected by covered passageways and underground service tunnels for utilities, mail, and express. These docks are flexible entities in that they can be added one after another as the demand arises. They are centered so as to provide between them the minimum space required for aircraft to manoeuver into ramp position. They are flexible in that they can be respaced if larger aircraft are operated, or their waiting rooms and services can be expanded to meet the needs of aircraft with greater passenger capacity. Several docks can be set aside for international traffic, and additional facilities for customs and immigration can be provided. If time tables are accurately maintained there is no reason why every hour, on the hour, a plane should not leave from Dock 5 for Seattle just as the westbound express always is to be found on Track 5 at 6 A.M. Furthermore, the entire terminal could be operated by the municipality and the airlines as a joint project, or separate docks could be rented to separate airlines in proportion to their schedule of operations. This latter system would allow the airlines exterior advertising by means of controlled signs on each dock.

Weather Protection at the Air Terminal

Still more problems of terminal design have not as yet reached an ultimate solution. In inclement weather, particularly in colder climates, protected en-planeing and de-planeing of passengers and baggage is a big problem. In designing the aforementioned dock

Official U. S. Navy Photo

Control Towers
Top to bottom, La Guardia Field, New York; a military airport; El Paso, Texas, commercial airport; a Naval Air Station.



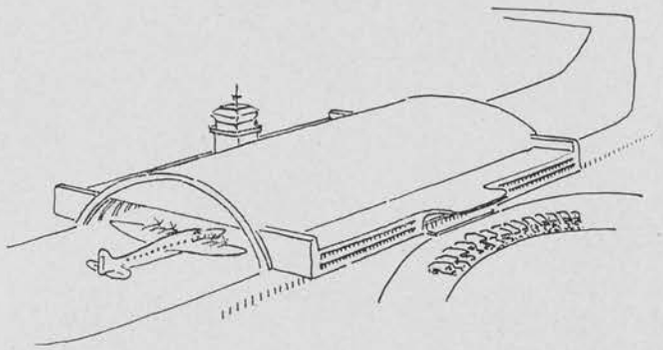
George Cruikshank, in 1843, thought he made the "impossible" the butt of his wit. Judged by military developments today, his predictions weren't very far-fetched. (Drawing from Institute of Aeronautical Science.)

Official U. S. Navy Photo, courtey Skyways

Above, a Beechcraft Transport, typical of the smaller plane which may serve feeder lines and the wealthier private fliers. Below, the much-publicized helicopter, projected by some as the future air-flivver, everyman's plane, etc.

system, telescoping passageways from dock to plane were envisioned, but these were not regarded as final. Mail and express in such a dock system could be handled underground, with lifts up to planes on ramps. This system will eliminate the enormous cost of attempting to enclose the entire plane, a difficult problem because aircraft are still increasing in size. However, if aircraft become larger, some ships may load from second- or third-story levels, a scheme which requires bridges, cantilevered platforms, or special nose docks for head-on loading. Such planes may revolutionize air terminal design by distributing different kinds of traffic to different levels: mail, express, and baggage at ground level, passengers and friends on an intermediate level, spectators on the top level.

Another solution to loading under cover is the use of tunnel shelters much like some of the wood, laminated-arch hangars now in use. Such shelters would be open at both ends and would "process" planes through in train fashion. In cold climates, quick-operating doors could be provided at each end.



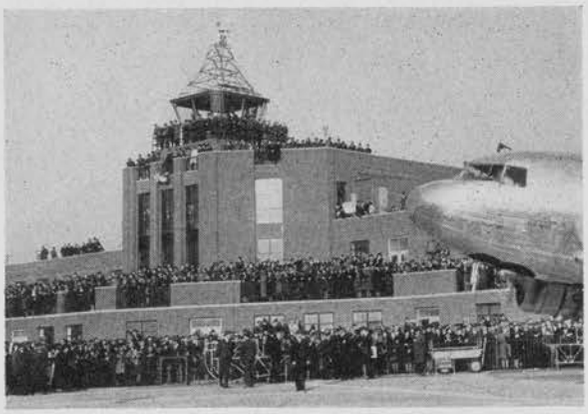
This type of passenger station is suitable for line station operations only. It would not be desirable for a terminal, where the lead plane could delay other flights. Such facilities, though, may be suitable for cargo terminals where maintenance of accurate time tables is not imperative, but saving perishable cargo from damage is important.

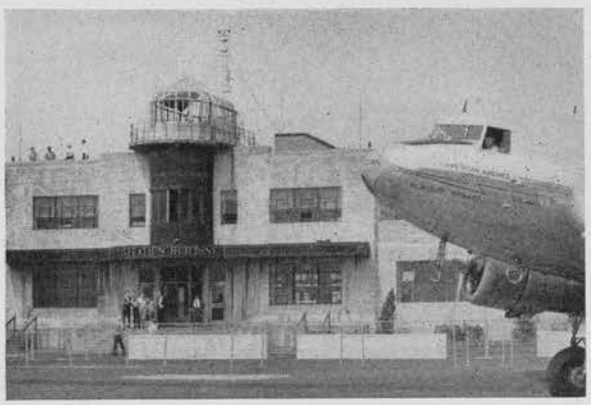
Nose loading of passenger or cargo ships makes it necessary to use cantilevered roofs over nose docks. This method, unless the design incorporates hangar facilities, appears to be too costly and clumsy an expedient except for warm climates, due to the difficulties involved if anything more than the nose of the ship is enclosed. Northwest Airlines has already successfully used "nose hangars" for aircraft repair and maintenance work, and for removing engine and propellers for overhaul in very cold temperatures. In these cases, aircraft remain in the hangars for a long time. There is also the possibility of approaching aircraft underground, utilizing lifts to emplane or deplane passengers. This is excellent in theory, in that it keeps passengers off the ramp areas, but might keep a crew of men busy operating the lifts to gratify passengers' whims. Cargo which has no mind of its own could be more easily and expediently handled in this manner. Elevators may be unsatisfactory because only limited amounts of passengers can be handled per trip, leaving others waiting.

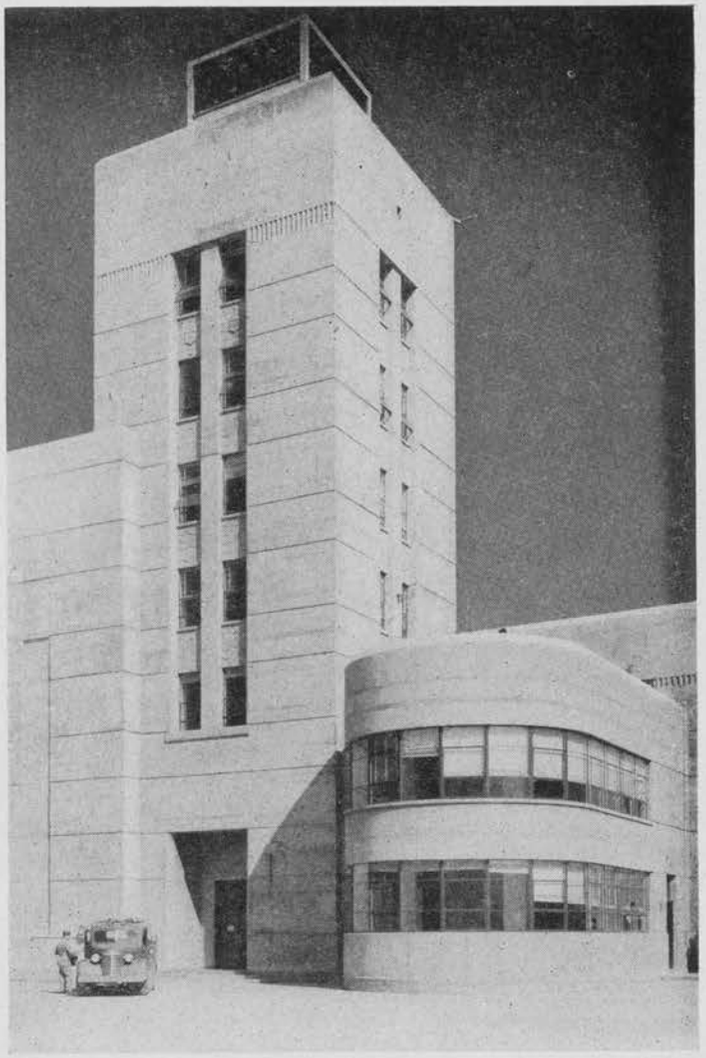
Problems In Handling Air Cargo

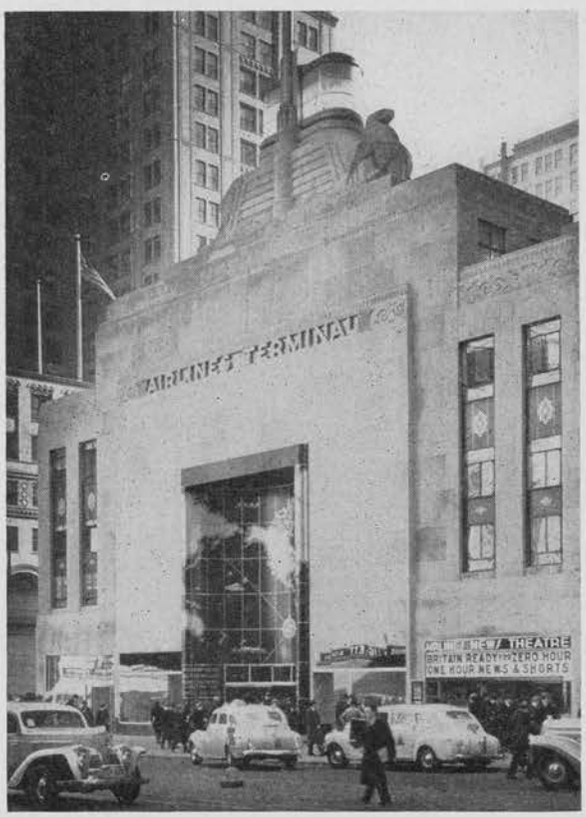
Cargo handling via aircraft presents a multitude of problems, from education of shippers to design of warehouses, docks, and cargo handling equipment and systems. This subject has been treated in great detail by Karl O. Larson, Chief Engineer for Northwest Airlines, in a paper entitled "Terminal Handling of Air Cargo," which was presented in Chicago on December 9, 1942, at a meeting of the Society of Automotive Engineers. It is sufficient to say that here again the design of the airplane itself, and its method of loading (through top hatches, side doors, nose, or up through the bottom) will in a great measure determine the type of handling equipment to be used, and will affect the design of related structures. It is hoped that ideal solutions will be

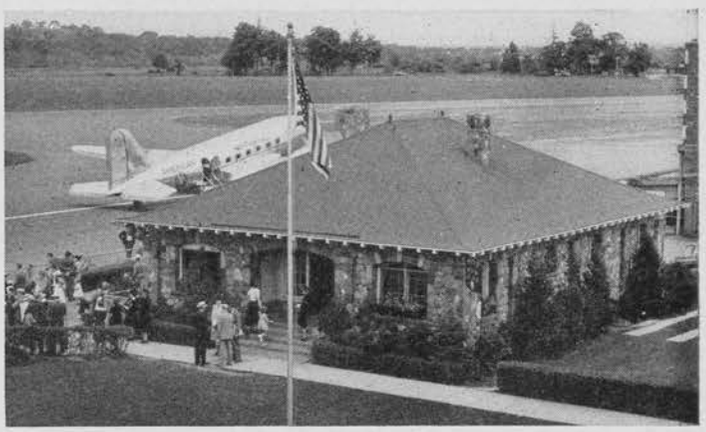
Administration Buildings











Upper left, administration buildings at Baltimore and Newark Airports. Top right, administration and control unit at a military field. Left, Airlines Terminal, on Forty Second Street in New York City, best known in-city terminal building. Directly above, Syracuse Airport building suggests the possible country-club airport of the future. These indicate the range of building types now in existence; few of them are really adequate. It is up to designers to make them function according to the demands of the planes they serve.

found more quickly for cargo terminals where there exists no predetermined pattern to mislead designers, than for passenger terminals.

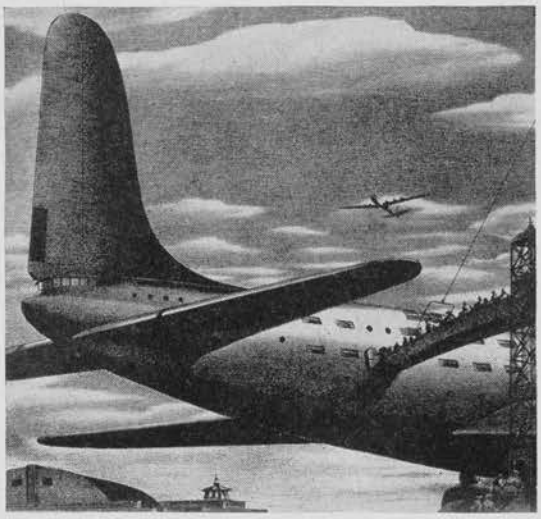
Design of hangars and adjacent shops is another pertinent problem, intricately involved with the planning of an airport. Completely enclosed hangars are a necessity in cold climates; some shelter is necessary for ground crews and mechanics in all climates. With the physical size of aircraft still increasing, there exists an unpublicized competition between structural engineers and aircraft designers, defined as "bigger plane versus bigger hangar." Thoughts differ on hangar design but here again a few factors are outstanding. The numbers of commercial aircraft are likely to be such that it will be financially impossible to provide complete hangar coverage for all ships not in operation. Aircraft now designed to fly through all kinds of weather can be parked outdoors, in those same kinds of weather, without adverse results.

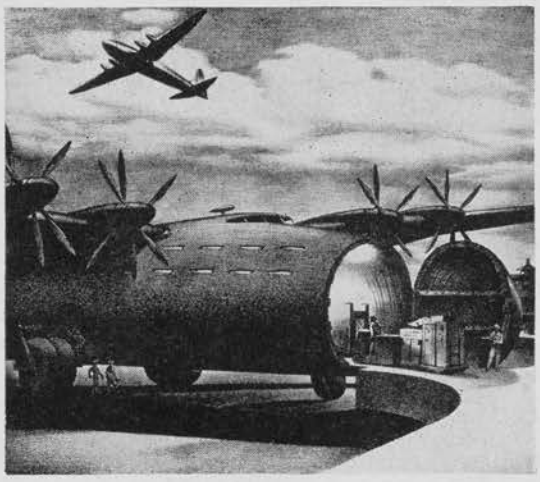
The analysis of aircraft hangar design problems, as to basic types and plans, structural types and variations, as well as a survey of the advantages and limitations of each type, is a task as complex and difficult as that of terminal design, if not more lengthy. Even greater complexities are encountered in the design of specialized overhaul and repair shops necessary for the maintenance of a commercial airline. Functions and requirements of such shops are complex to the point of requiring specialists for their design. Hangar and shop layout for a major overhaul base is another complex problem, comparable to designing an industrial plant. Very important is the external relation of such a base to the airport plan as a whole. As has been previously pointed out, there are usually both a premium and limitations on buildable area immediately adjacent to ramps and taxiways. It is therefore rapidly becoming obvious that only small routine service hangars and facilities can be located near the terminal building. This gives planning and location of major overhaul bases a new aspect.

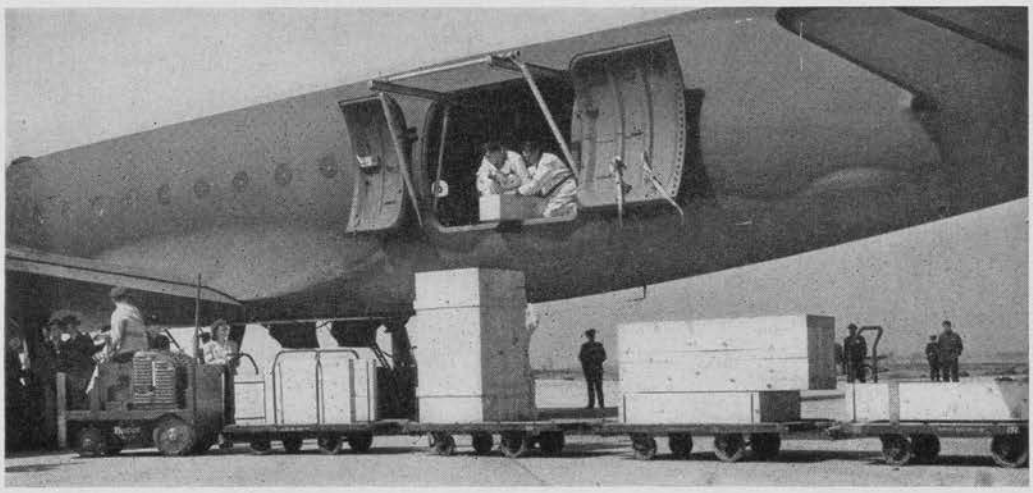
Independent Power Plants for Municipal Airports

A service that seems to have been overlooked at many municipal airports is establishment of a central power plant for heating all airport buildings. This could be a source of municipal revenue and would limit chimney obstructions to one adjacent location. Such a power plant could provide the essential auxiliary power service necessary in case of a power failure by the normal supplier. Failure of radio facilities or field lighting is a dangerous situation, especially when weather conditions are adverse.

This discussion is in essence but a mere skimming over the surface, an outline of many items requiring deeper study and analysis. It has dealt mainly with some of the architectural and airport problems of commercial airline operation. The effect of aviation upon architectural practices and methods is still another story, for aviation has helped to develop the use of plastics, the light metals, stressed skin construction, and many other items that will not remain the sole property of aviation when the present conflict is over.

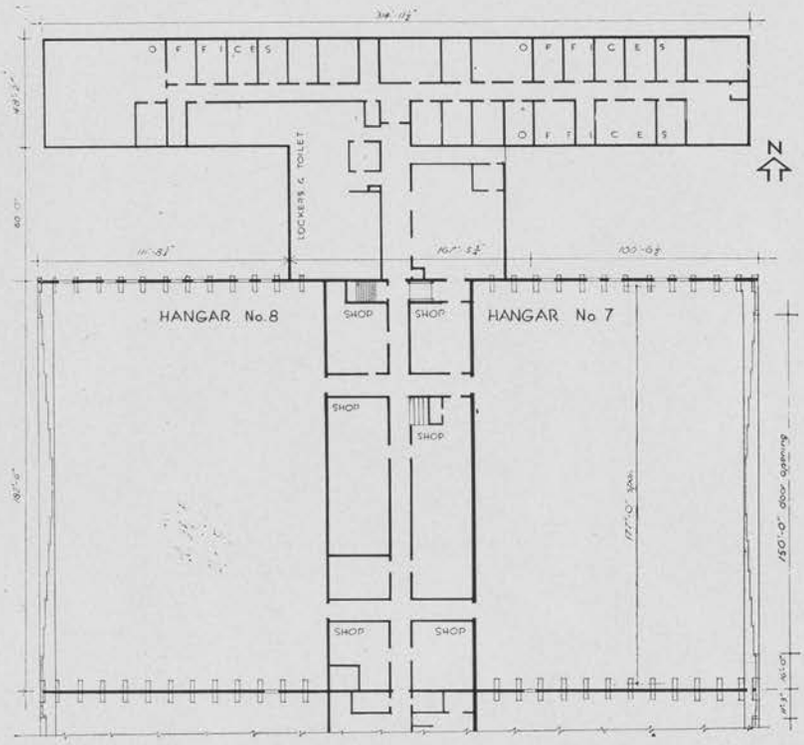




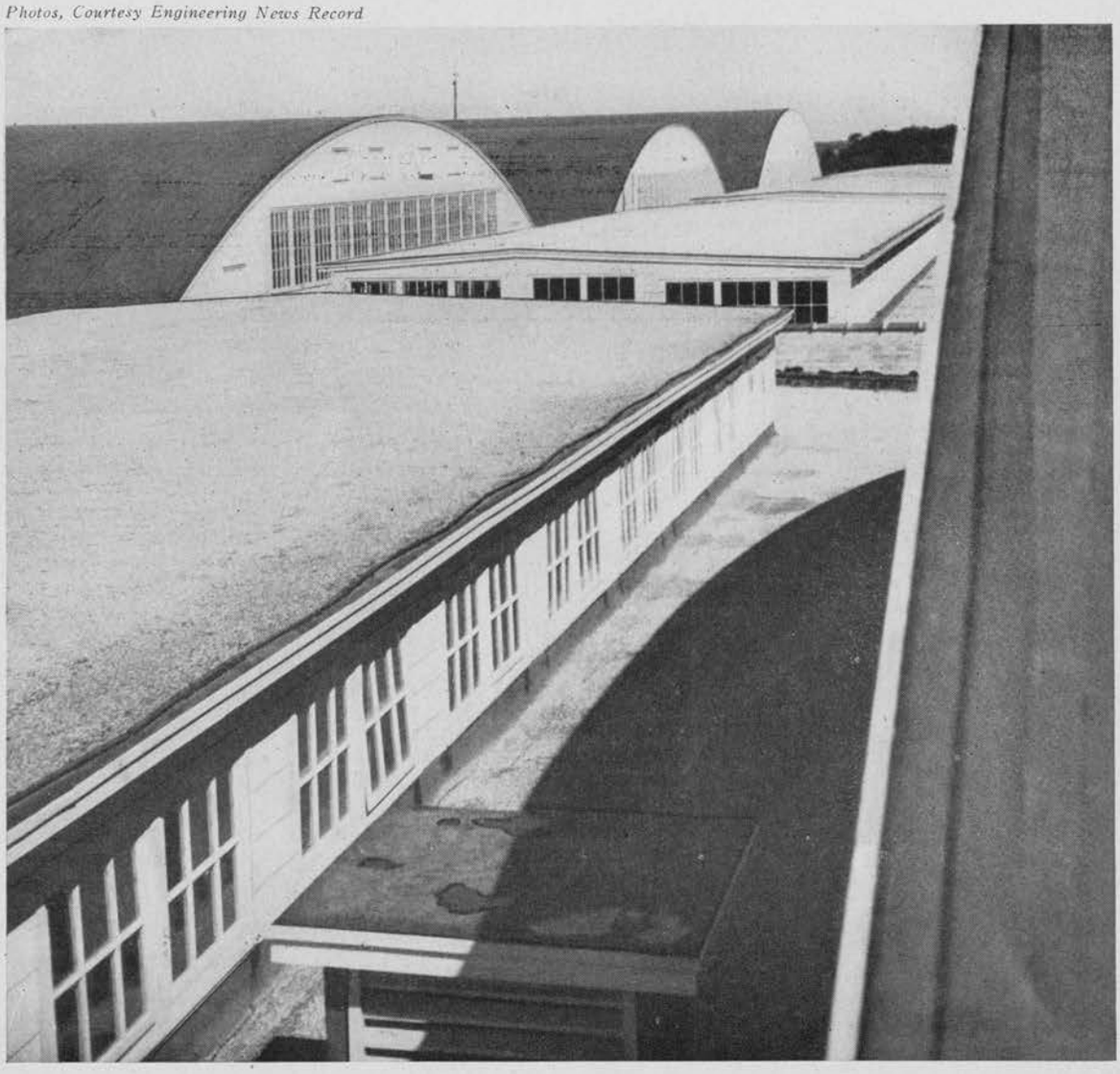


Wood Hangars for Modification Center

U. S. Army Engineers



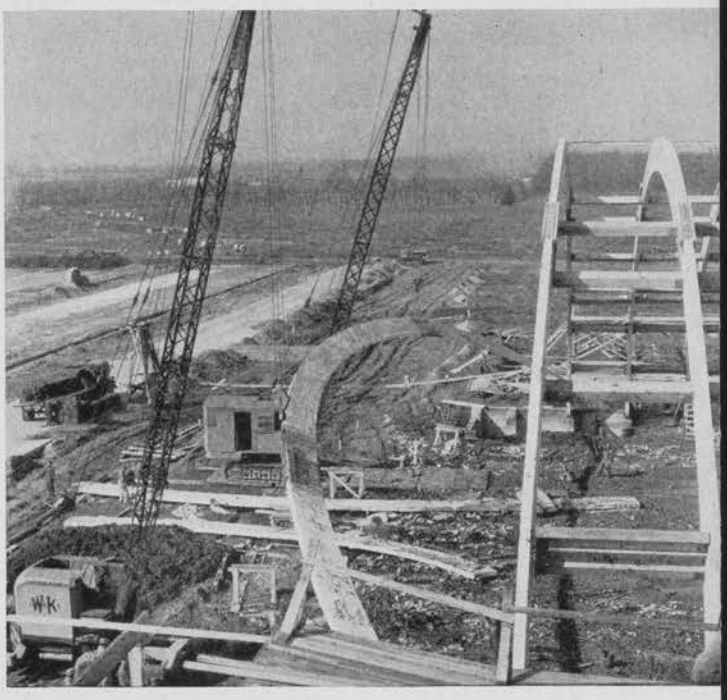
Photos, Courtesy Engineering News Record

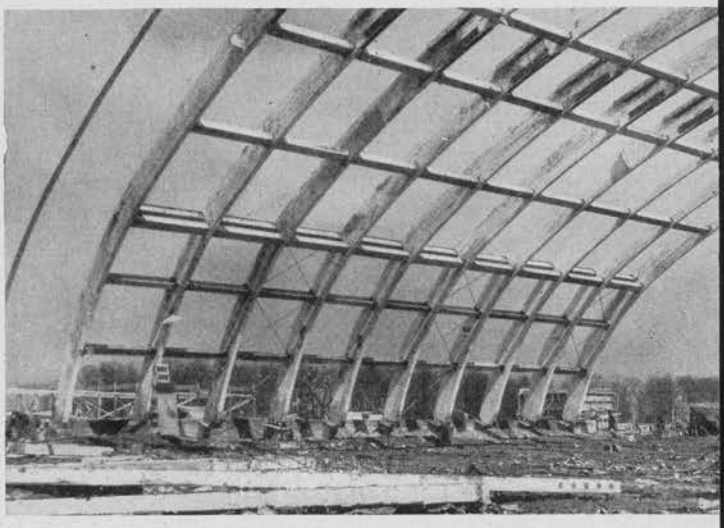


One of the new architectural problems created by the growth of aviation—the provision of facilities for large-scale repair operations—was solved by the U. S. Army Engineers according to the plan illustrated on the opposite page. This midwest modification center, intended for large military aircraft, consists of eight hangars in two north-south rows of four each. The illustration shows two of these hangars of 177-foot span each. The other six, although of but 160-foot span, are similar to the two shown. The two rows of hangars are separated by two-story timber-frame shops; about sixty feet from the hangars, both to the north and south, are timber-frame office-administration buildings; one of these includes a control tower.

Controlling factors in the design were the necessity for elasticity in the use of the hangars, and the need for a convenient placement of shops and offices. According to the layout, shops are within easy reach of the hangars, and office buildings are placed where shop noises cannot disturb the office personnel. The hangar doors open out on areas free from obstruction from either shop or office buildings. Because of their location between the hangars, the shops are easy to heat. The photograph on the opposite page shows the front of an administration building and the arches of the hangar beyond.

Supported by long-span laminated timber arches, the project makes minimum use of critical materials. Photographs at the right show the arches being raised, and in position. The two largest hangars required arches of 177-foot span, probably the longest timber arches ever erected.





Pencil Points
PROGRESSIVE ARCHITECTURE

YOU Are Making The Future!

The shape of things to come after the war is at this moment somewhat obscure. No one knows surely just how the world after Victory will work out—economically, politically, socially, or any other way. There are too many uncertain factors. Yet people persist in speculating about tomorrow (perhaps because of this very uncertainty) and they reach various conclusions, each according to the way he wishes his tomorrow to be.

In general, the dreams fall into two categories. Timid men, shaken by these troubled days, picture a future modeled after some part of the past which they remember as most friendly and peaceful, and to which they want to return. Younger and bolder spirits envision a new and exciting era in which men, grown weary not only of wars but of poverty and disease and hardship, will finally work together with wisdom and science toward the goal of universal human welfare, abundance, and peace. Architects who understand and value and strive to exercise creative imagination, might be expected to side with the second group. Perhaps most of them do.

At any rate, architects do have, more than most, a chance to influence the future by helping to form at least the physical environment in which people will work and rest and enjoy themselves. Already they are laying out the houses and schools and hospitals and stores and workshops of tomorrow. Already they are helping to plan and replan the communities in which their fellow men will live. Soon their drafting rooms will expand with increasing work and builders will commence to put together in solid materials the things first visualized on paper. We will then be in full swing on the way to making the new world we have talked about so long.

What sort of architecture will we produce? Will it reflect predominantly the views of those who want to turn back the clock? Will it be a hodgepodge of exhibitionistic mediocrity such as we see about us today, if we look at it honestly? Or will it be a brave new architecture created in the belief that this era must be true to itself and take advantage of all the possibilities our industrial civilization has laid before us to serve the needs of the people?

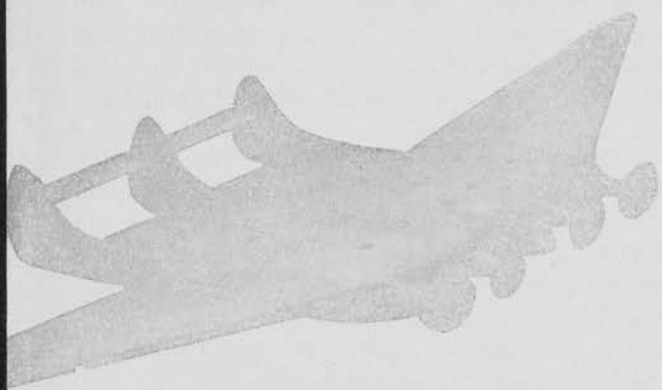
Our own sympathies, as stated again and again in this magazine since we took our positive stand for progressive architecture in May 1942, are with the forward-looking groups. We believe thoroughly in the vitality and honesty of their efforts to get rid of the superficial shell that had grown upon the practice of architecture during the age of eclecticism and to get back to the fundamental principles that have always guided good design. We have directed our editorial policy during the last two-and-a-half years to the encouragement of this return to basic thinking.

Apparently our change was in line with current trends, for our circulation has grown during this time until now we have more architects, more architectural draftsmen, and a larger total of professional men as paid subscribers than any magazine in the field. We welcome this endorsement as evidence that American architecture is moving toward a better, saner, and more honest type of design than we knew before.

This is, as Herbert Agar has said, "A Time for Greatness"—and will continue to be. And the greatness must be found in places of low as well as of high degree. Along with everyone else, the architect faces the challenge of the future. To meet it successfully, every architectural man must share the responsibility of building the better world. No job of his is so small that it cannot be directed to this end. Let us all resolve to write our part of the record of these next decades in such architecture as will take its place with the best in all history. It could be! Let's not have to say afterwards "It might have been!"

Kenneth Reid

AIR TERMINALS FOR MASS



Francis Meisch has probably had a better chance to study the design of airport structures "from the inside" than most American architects. In his capacity as Architect and Plant Engineer for Northwest Airlines, he has had many an occasion to develop schemes designed to indicate to municipalities along the airline's route what type and size of buildings his company needed; and he has spent much time on the problem of the air terminal building.

Photographs of the Burnelli Flying Wing, above, and the British "Miles X," appear through the courtesy of Skyways. *Most of the drawings in and following this article were prepared by Mr. Meisch; the remainder were redrawn from his originals.*

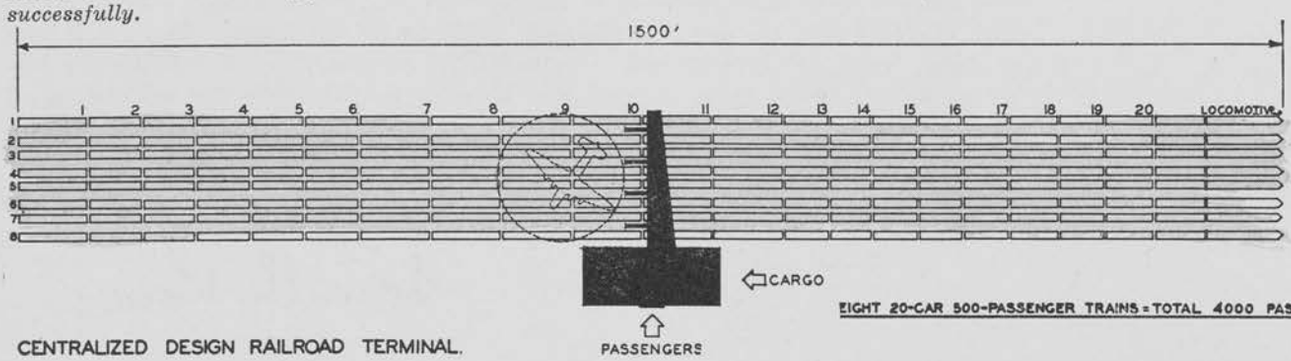
The Past

Up to now, airport administration buildings have been erected with little regard for function or changing conditions. The buildings were planned for smaller planes and plane loads than are now being handled or anticipated. Both administrative and terminal functions were combined within one structure, together with any number of related and unrelated minor activities. Too many of these functions, subject to expansion, were crowded into symmetrical structures built in too permanent a manner. The buildings were either low-cost structures which, through poor maintenance, soon deteriorated into veritable slums, or expensive municipal monuments, show places for the general public. The monumental stone or concrete edifices defied all attempts at economic remodeling or expansion to keep pace with the fast-growing air transport industry. Consequently, their useful life was terminated far ahead of their previously estimated economic life or amortization period.

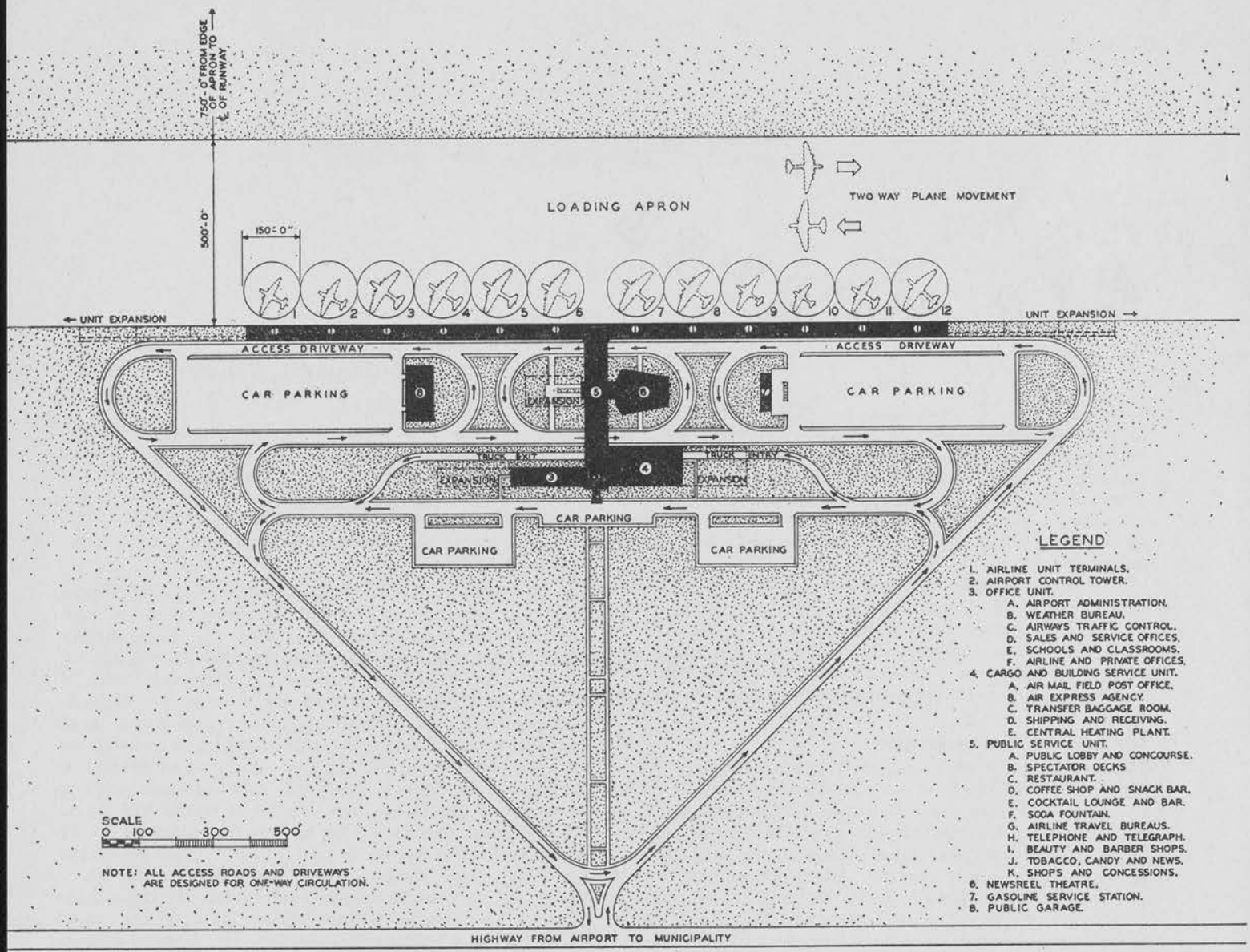
The buildings had other faults. Often there were too little space and too few facilities for the airline passenger and the airline operational functions, in contrast to public areas. In addition, little thought was given to developing service and revenue-producing facilities of a high standard for the convenience of passengers, the public, and employees. The result was that the airlines were expected to pay the lion's share of the operating costs of these monuments. The buildings themselves were often poorly placed in relation to apron and apron expansion, runways and proposed runways, access roads and drives, parking areas, and other fixed construction such as hangars. This placement, in most instances, excluded any possibility of expansion.

In many cases there was a lack of balance in the various types of traffic flow; consequently, bottlenecks developed. The various types of traffic flow—plane, passenger, cargo, general public, and automotive—are governed

The two drawings below compare, for a railroad and an airline terminal, the maximum number of passengers which each can serve from a centralized terminal building. The author believes the analogy between rail and air travel cannot be carried this far successfully.



CENTRALIZED DESIGN RAILROAD TERMINAL.



problem of loading air passengers and cargo under cover so difficult and so extremely expensive.

The time factor has a definite relation to the physical factors in both rail and air terminal design, but is more difficult to analyze. In air travel the passenger who is forced to enplane through a central building may have to walk several thousand feet to the plane, necessitating the "calling" of the flight a number of minutes ahead of scheduled departure. Railroad cars have several entrances; planes at the present time have only one, but the industry is looking forward to the installation of several doors in larger aircraft as a means of reducing terminal time. Aircraft must fuel at their gate position, except for some originating flights which may fuel at the hangar.

This fueling operation is time-consuming, but a ship must occupy its position until the process is completed. The fueling operation is also a function which must be closely watched and protected for safety. Railroad trains, on the other hand, usually need not wait to fuel but can change engines, while in the station, in a matter of a few minutes. The physical differences in aircraft present operational problems in passenger and cargo handling. Baggage carts may be standardized, but passenger loading steps and ramps, cargo loaders and chutes, ladders, etc., will vary with the plane. If more than one entrance is provided per plane, additional steps or ramps will be required. The railroads do not have this problem, nor the attendant one of storage for so much varied equipment. Due to the weight factor, it is very unlikely that planes will carry their access steps, etc., from place to place as an integral part of the plane.

Rail travel is mass handling of people and baggage. Air travel is still personalized service, the individual handling of passengers. Air travel expects soon to be mass travel, and the airlines are looking for ways and means of expediting mass handling of passengers without eliminating the personalized service for which they are noted. Airports, in contrast to railroad stations, are usually situated some distance from the heart of the city. This location difference means that airline passengers arrive at the airport either in a private car, a taxi, an airline limousine, or a bus; and are often pre-ticketed. In the case of the airline limousine, the passenger may have already checked in at the downtown ticket office, where his ticket was picked up and his baggage checked through to destination. These pre-checked passengers are ready to board the plane when they arrive at the airport. Rail and plane ticket sales vary little in the time element, but making plane reservations and checking in plane passengers and their baggage involve a time factor which railroads do not have to consider. All plane seats are now reserved, and weight-control of passengers, baggage, and air cargo is essential. Railroads have no such problem of weight-control. In most instances railroad passengers carry their own baggage aboard, a procedure not likely to be utilized by airlines until two or more classes of air

AIR TRAVEL

by Francis R. Meisch

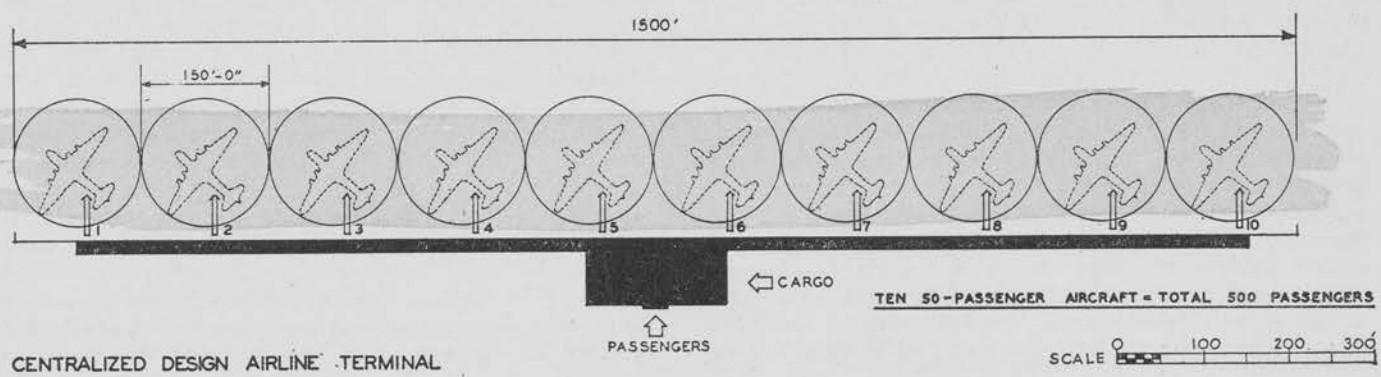
Architect and Plant Engineer, Northwest Airlines

by many factors. These factors, in the main, are air traffic circle capacity, runway configuration capacity, taxi-way pattern capacity, apron or gate capacity, terminal building capacity (for adequate handling of passengers, baggage, air cargo, the general public, and spectators), parking lot capacity, capacity of access drives and roads, and capacity of the highway between the airport and the city for volume or high-speed traffic. In terminal design, the building, the apron, the parking lot, and the access drives are of primary concern. The other considerations fall into the realm of airport planning or city planning. Balancing all the factors to provide uniform traffic flow is very essential.

The Case for Decentralization

The prototype of many a poorly planned, monumental air terminal of the past was the railroad station with the central type of plan. The parallel between air and rail travel can be carried only so far before it breaks down. There are physical and operational differences resulting from many factors. The railroads have had the physical advantage of dealing with standard units—a standard gauge of track, a standard length of coach or pullman car with an approximately uniform height and a standard floor level at which all loading is accomplished. The airlines, on the other hand, have had and will continue to have equipment which, even within a single company, varies as to physical standards. Great variations exist in the length, height, and wingspread of aircraft, and the floor levels to which loads must be raised; in some instances the floor or deck to be loaded is in a sloping position when the aircraft is on the ground. This means that aircraft gate positions with fixed facilities for fueling, air conditioning, sewage disposal, water, power, turntables, etc., must be designed and spaced to accommodate the largest reasonably anticipated aircraft. When such positions are occupied by smaller aircraft, an operational waste of apron or gate area occurs, yet the cost of providing fixed facilities for fueling, air conditioning, sewage within a given apron area is at present too great to make it economically possible to eliminate this waste. Mobile services are possible but also expensive, and the number required constitutes an additional operational hazard.

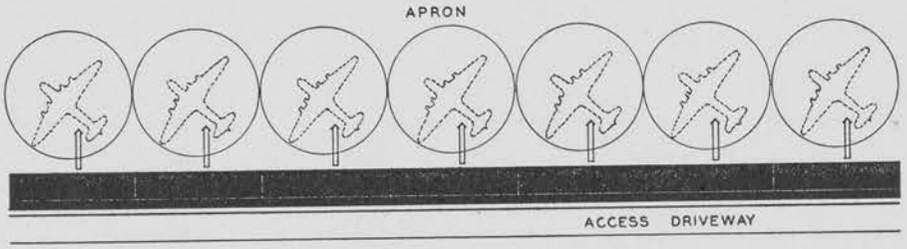
An understanding of the physical-numerical differences in passenger and cargo handling problems of rail and air carriers is essential. Consider the 50-passenger plane which requires 150 lineal feet of gate space or, to put it in other terms, a 150-foot-diameter circle of apron area on which to maneuver into and out of loading position. In approximately the same apron area and clearances used up by this plane, it is possible to provide platform space and the eight tracks needed to accommodate sixteen standard railroad cars with a capacity of 900 passengers. In other words, the lineal feet of gate space used up by one 50-passenger plane is equivalent to the lineal feet of gate space providing access to four platforms and eight tracks on which trains of any length might load. A 20-car train handling 500 passengers will use 1500 to 1650 feet of track. While ten 50-passenger planes handling 500 passengers will require 1500 lineal feet of apron, actually, the apron area which they use could contain track and platform area for eight 20-car trains with a total capacity of 4000 persons. The amount of apron space required per person in air travel (based on 50-passenger aircraft) is roughly eight times the track and platform space required per person in rail travel. The amount of plane gate space per person is eighteen times the gate space required in rail travel. This physical difference is one of the great factors pointing toward the decentralization of air terminal facilities, as unusually great areas and distances are involved in the terminal mass handling of air passengers. It is these same physical factors which have made the solution to the



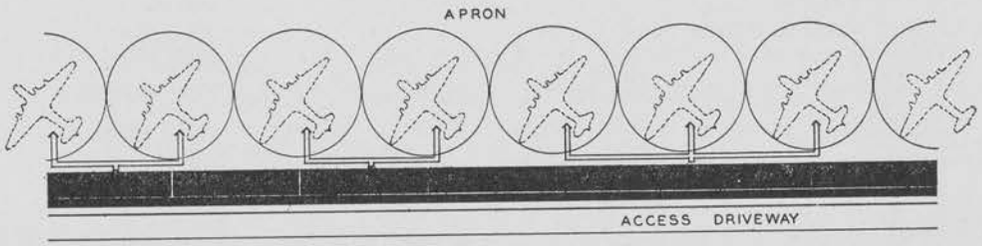
CENTRALIZED DESIGN AIRLINE TERMINAL

AIR TERMINALS

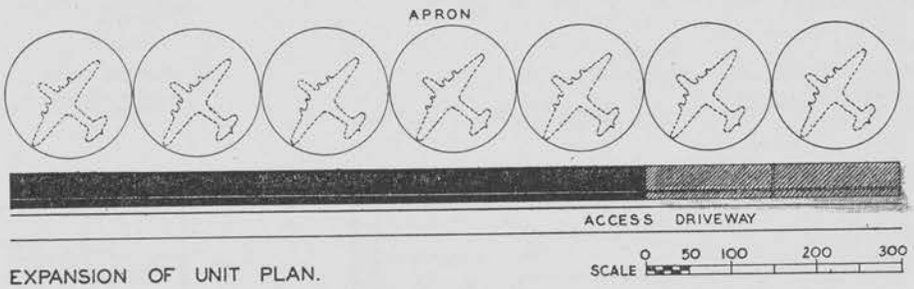
The larger air terminal might well have an "airport community center" containing necessary services and public facilities, with a small unit terminal at each gate position. Such a development permits building expansion or change in accordance with actual need.



TYPICAL UNIT PLAN.

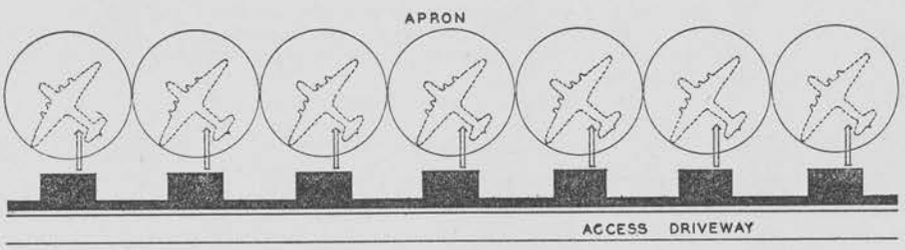


VARIATIONS IN UNIT PLAN.

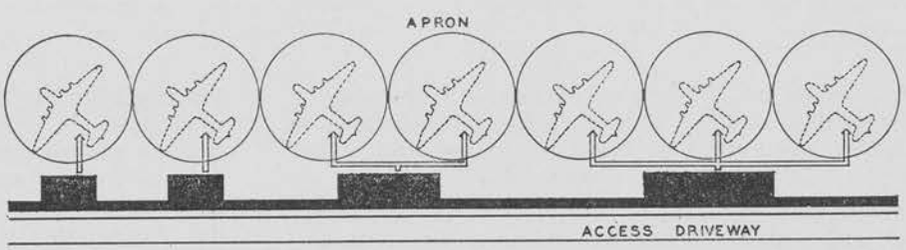


EXPANSION OF UNIT PLAN.

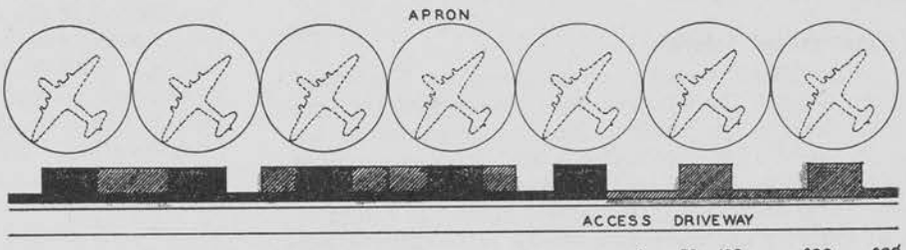
Northwest Airlines and United Airlines, at work simultaneously on the problem, arrived at very similar results. Above, United's unit scheme permits of extension only at the end of the row of continuous units. Below, Northwest's discontinuous dock scheme reduces initial building cubage and permits expansion between docks as well as at the end of the row.



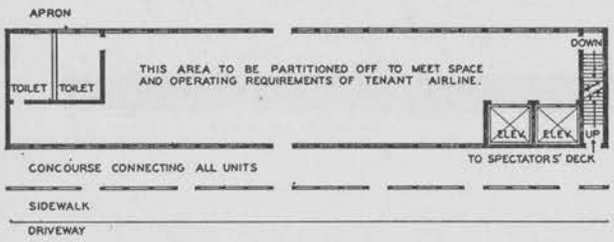
TYPICAL DOCK PLAN.



VARIATIONS IN DOCK PLAN.



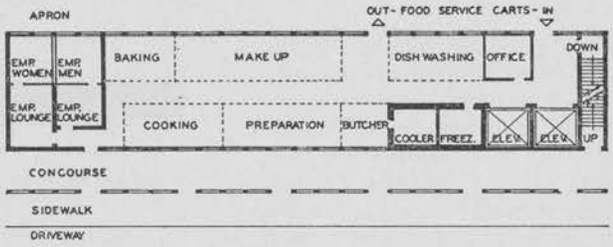
EXPANSION OF DOCK PLAN.



BASIC UNIT – GROUND FLOOR PLAN.

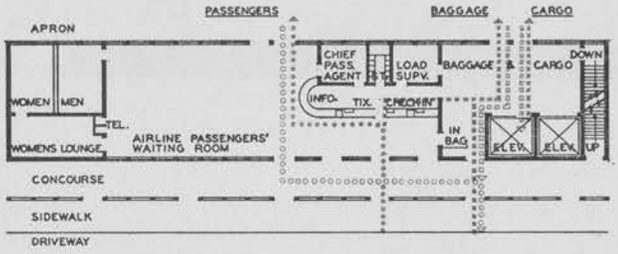
MINUS SUBDIVISION OF AIRLINE SPACE.

SCALE 0 10 20 30 40 50'



COMMISSARY UNIT – AIRCRAFT FOOD SERVICE PREPARATION.

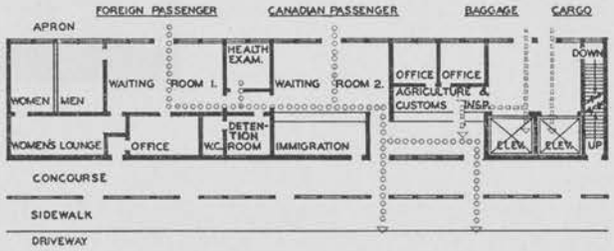
BASEMENT PROVIDES BULK FOOD, FROZEN FOOD, AND ACCESSORIES STORAGE AS WELL AS LOCKER AND SHOWER ROOMS FOR COMMISSARY EMPLOYEES.



DOMESTIC TRAVEL UNIT – PASSENGERS AND CARGO.

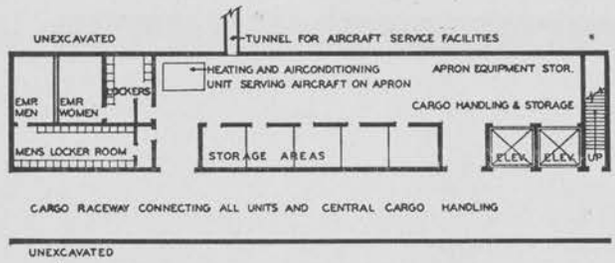
SEE BASEMENT PLAN.

LEGEND: PASSENGERS TO PLANES ●●●. PASSENGERS FROM PLANES ○○○. BAGGAGE AND CARGO TO PLANES ▪▪▪. BAGGAGE AND CARGO FROM PLANES ▫▫▫.



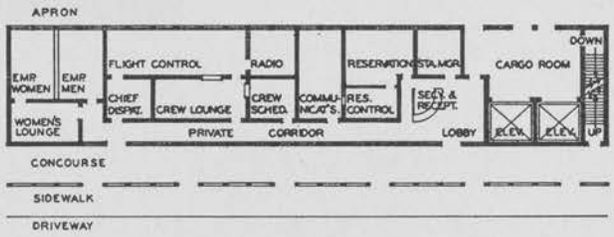
FOREIGN TRAVEL UNIT – CUSTOMS AND IMMIGRATION FACILITIES.

BASEMENT PROVIDES BOND ROOMS FOR CUSTOMS STORAGE AND ROOMS FOR AGRICULTURE QUARANTINE AS WELL AS EMPLOYEES' LOCKER ROOMS.



DOMESTIC TRAVEL UNIT – BASEMENT FLOOR PLAN.

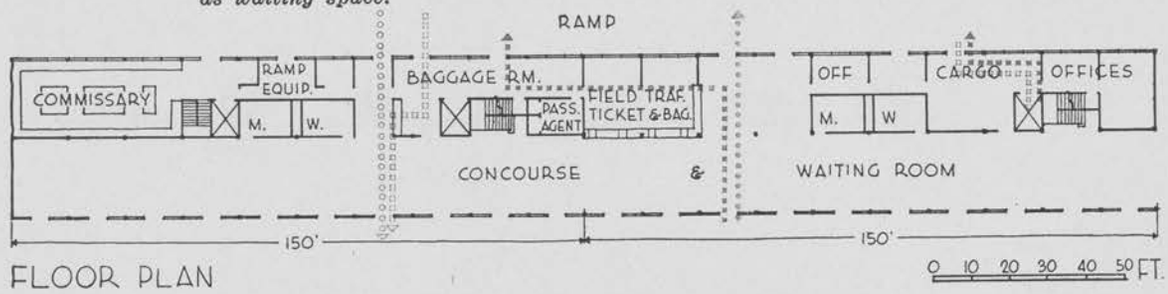
GROUND FLOOR ALL-CARGO UNIT SIMILAR IN PLAN EXCEPT FOR RACEWAY.



AIRLINE OPERATIONS AND RESERVATIONS UNIT.

SPACE LAYOUT VARIES WITH EACH TENANT AIRLINE.

Above, varying developments within the shell of the standard unit. If the narrow concourse were adopted, additional waiting space would have to be provided. Below is a variation of the basic idea incorporating a wider concourse which can also serve as waiting space.



FLOOR PLAN

travel are set up. Plane reservations will probably be indispensable until a high frequency of schedule is available; and even then there is the possibility that some form of weight-control may remain.

This has been but a brief analysis of differences between rail and air travel as affects terminal design, but it illustrates the impossibility of planning air terminals on railroad standards for the centralized mass handling of passengers.

The Decentralized Solution

The decentralized scheme, as proposed by Northwest Airlines, utilizes the advantageous features of the centralized design. A central building containing the necessary services is established with a number of minor stations or units located like satellites along the loading apron. Total decentralization would mean the construction of entirely separate and wholly self-sufficient airline stations around the perimeter of the airport.

The trend toward decentralization has so far been limited to proposals of airlines which were searching for a solution to the terminal building problem. The nearest existing counterpart to the decentralized solution is the enclosed gate concourse at LaGuardia Field, New York; but this solution stops far short of the goals proposed by airlines. It was the major terminal, with its widely separated plane positions, that led Northwest Airlines to study decentralized designs. After close analysis it was seen that the decentralized solution had an advantage for the smallest station as well as for the largest terminal. While Northwest Airlines was arriving at its answer to the problem, United Air Lines in its research arrived at the same conclusion concerning decentralization. The basic scheme and underlying principles are identical in both airline solutions, although minor differences, with attendant advantages and disadvantages, occur.

Northwest Airlines proposed the discontinuous "unit"

or "dock" solution, and United Air Lines proposed the continuous "unit" solution. The Northwest Airlines' scheme allows the individual docks to be expanded to the full length of the gate position, or additional docks and gate positions can be added at either end of the apron. This is done only when needs dictate, thus keeping the original investment small until economic justification for expansion exists. The dock scheme was proposed for large terminals where it was found that the airline functions for passenger traffic and cargo handling did not at the present time require terminal facilities the entire length of the gate position. If space were desired for airline field operations, communications, offices, commissary, etc., along the length of the gate position as well, then the continuous "dock" or "unit" was required.

United Air Lines' scheme was based upon housing some of these additional functions at the apron; hence, the continuous unit. This scheme presents internal expansion difficulties where several airlines are concerned. "Cushion" functions, which can be removed to provide for expansion, must be located in units between airlines. If this is not done, the airline or lines in the center push those airlines on the ends out into new units as more gate and terminal space is required. Using light demountable partitions, the physical changes are not difficult to make; but the resulting disruption in terminal activities for the airlines required to move is not at all desirable. Since their inception, various ideas from the two solutions have been interchanged and combined so as to provide a common solution to the industry's problem.

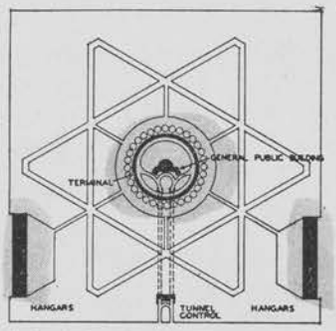
The basic premise of the decentralized scheme is the localization of the individual airline functions adjacent to the apron or gate positions, with a driveway on the off-field side so as to simplify and expedite the transition of passengers from automotive conveyances to aircraft. This permits a clear-cut separation of airline functions, from one another and from all other airport activities such as airport administration, concessions, government offices, fixed base operators, etc. Inter-connection is maintained between airlines, main public building, and administrative offices through the use of a covered concourse serving all docks or units. At terminals large enough to make the investment economical, a cargo raceway for handling transfer baggage, mail, and express should connect all airlines with one another, with the airmail field post office, and with the air express agency. This raceway can also provide space in which to run all building utilities from a central plant or control point.

The second premise is the concentration of the revenue-producing concessions, public service areas, airport administration, government, and private offices into a general public building or "airport community center." This structure is usually centrally located with respect to all gate positions. The list of facilities for such a building or buildings is long and varied. The number of facilities for an airport community center will vary with the size of the terminal and the municipality. In larger terminals it is possible to locate mail and express facilities in the general public building, or to provide smaller separate buildings (which are more easily expanded). The only airline function to be located in the general public building would be a common information center or separate airline travel bureau offices. The use of additional office space in the central public building would be a matter of individual airline policy.

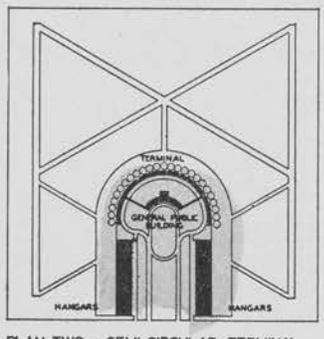
Advantages of Decentralization

Expandability has been discussed. Besides expansion in a horizontal plane, vertical expansion is possible, especially in the "units." The units should be structurally designed in the beginning to support an enclosed second story from which the large planes of the future may eventually be loaded by gangplanks. An elevated passenger drive might follow, with the old passenger drive at ground level becoming available for cargo truck operators.

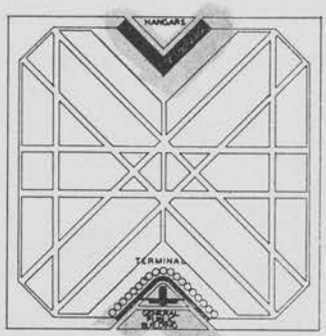
Flexibility is another advantage. The over-all scheme is adaptable to any shape of terminal area, providing sufficient room is available for expansion. The scheme may be symmetrical or unsymmetrical. The central public building may be either at the apron edge between the units, or set back, allowing the units to occupy the valuable apron frontage. Flexibility exists in the design



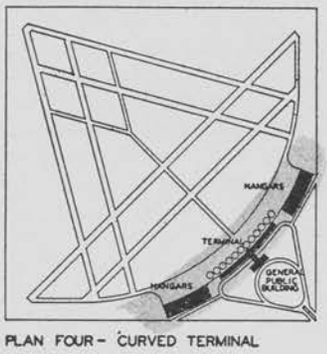
PLAN ONE - CIRCULAR TERMINAL.



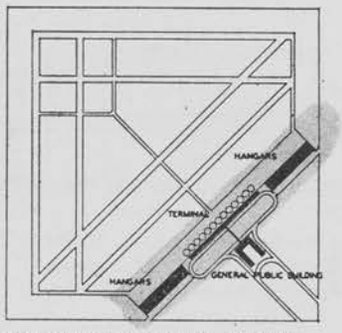
PLAN TWO - SEMI-CIRCULAR TERMINAL.



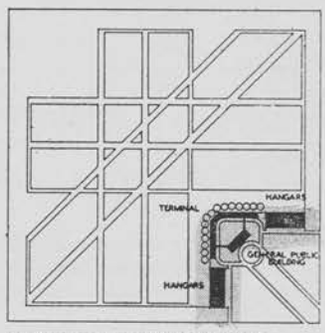
PLAN THREE - "V" SHAPED TERMINAL



PLAN FOUR - CURVED TERMINAL



PLAN FIVE - STRAIGHT LINE TERMINAL



PLAN SIX - "L" SHAPED TERMINAL

AIR TERMINALS

The decentralized dock scheme is adaptable to any shape or location of terminal buildings on the field.

of the units. Once a basic unit is established (width, length, cross section, fixed facilities such as ramps, stairs, toilets, lifts, etc.), each airline can arrange its partitions, counters, exits, and entrances to suit its own particular operating methods. Flexibility exists in the use of the units. Units may be designed for domestic operations, for foreign operations complete with customs and immigration facilities, for cargo warehouses, for airline commissaries, or for airline offices; or they may be converted from one function to another. To this end a standard cross section, free of columns, with exterior walls constructed of uniform structural bays, is desirable, in order to allow an interchange of door and window panels to provide freedom in planning.

Segregation is another advantage. Each airline has control of its own operations and can render more personalized service to its patrons. The airline passenger is separated from the general public and from cargo operations, thus simplifying passenger handling by airline personnel. Fewer opportunities will exist for mishandling cargo and passenger baggage. The spectator is given an observation deck from which he can watch apron loading activities without interference with the operations. This all helps to avoid congestion and to facilitate the mass handling of passengers.

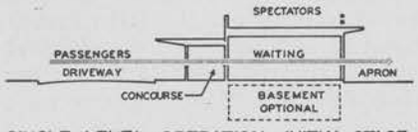
Economy is still another advantage. The decentralized terminal can be developed by stages to parallel the economic demand and justification for facilities. Thus there can be no over-expansion. The investment in decentralized terminals can be amortized over a long period without fear of obsolescence and inadequacy, which have made so many terminals economic liabilities in the past.

Passenger convenience is a great advantage. The decentralized terminal is planned primarily to expedite passenger handling and to bridge the gap between air and ground travel in the most convenient, effortless way. The passenger is no longer forced, together with the general public, through a central building where delays occur and congestion abounds. The concessions and services of the central building are still available, ready to serve the passenger who has time to spend at the terminal. The airline passenger purchases air travel because it means time and convenience to him. For this reason it is to the best interests of the industry to cut passenger time at the terminal to a minimum. Immediate passenger requirements such as toilet facilities, telephones, telegrams, vending machines for bottled drinks, candy, cigarettes, etc., can be provided in each unit terminal, thus eliminating the necessity for the hurried passenger to rush to the main building.

Safety and *efficiency* are still other advantages which result from segregation and localization of operations.

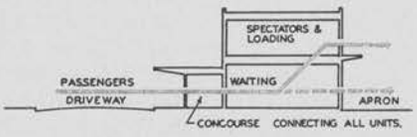
Unlimited Possibilities

The patterns and schemes which result from a decentralized solution are unlimited. The fundamental governing item is the size of the aircraft, which determines the unit terminal length or gate position size. Major



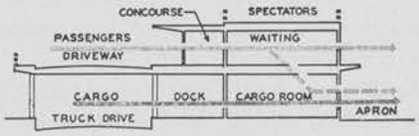
SINGLE LEVEL OPERATION—INITIAL STAGE.

CARGO HANDLING ON APRON PASSING IN FRONT OF EACH UNIT OR FROM PASSENGERS DRIVEWAY THROUGH UNIT TO APRON.

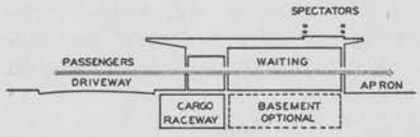


EXPANSION: PARTIAL TWO LEVEL OPERATION.

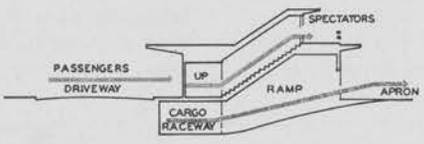
CARGO HANDLING STILL ALONG APRON OR THROUGH UNIT TO APRON.



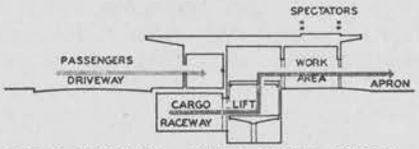
EXPANSION: FULL TWO LEVEL OPERATION.



CARGO HANDLING - BASEMENT RACEWAY.

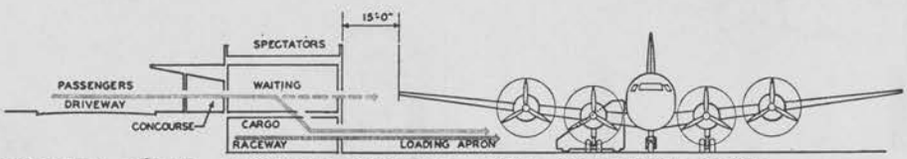


CARGO HANDLING - RAMP TO APRON.

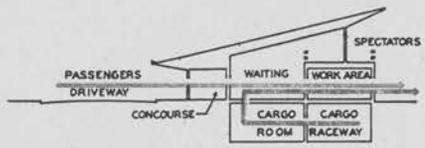


CARGO HANDLING - ELEVATOR TO APRON.

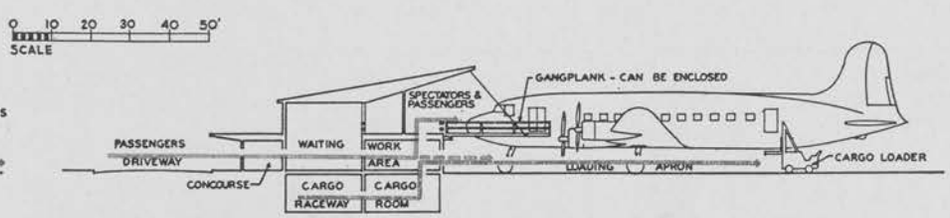
SPLIT LEVEL SCHEME - INITIAL STAGE.



TWO LEVEL SCHEME - TWO LEVEL OPERATION - INITIAL AND ULTIMATE STAGE.



TWO LEVEL OPERATION - INITIAL STAGE.



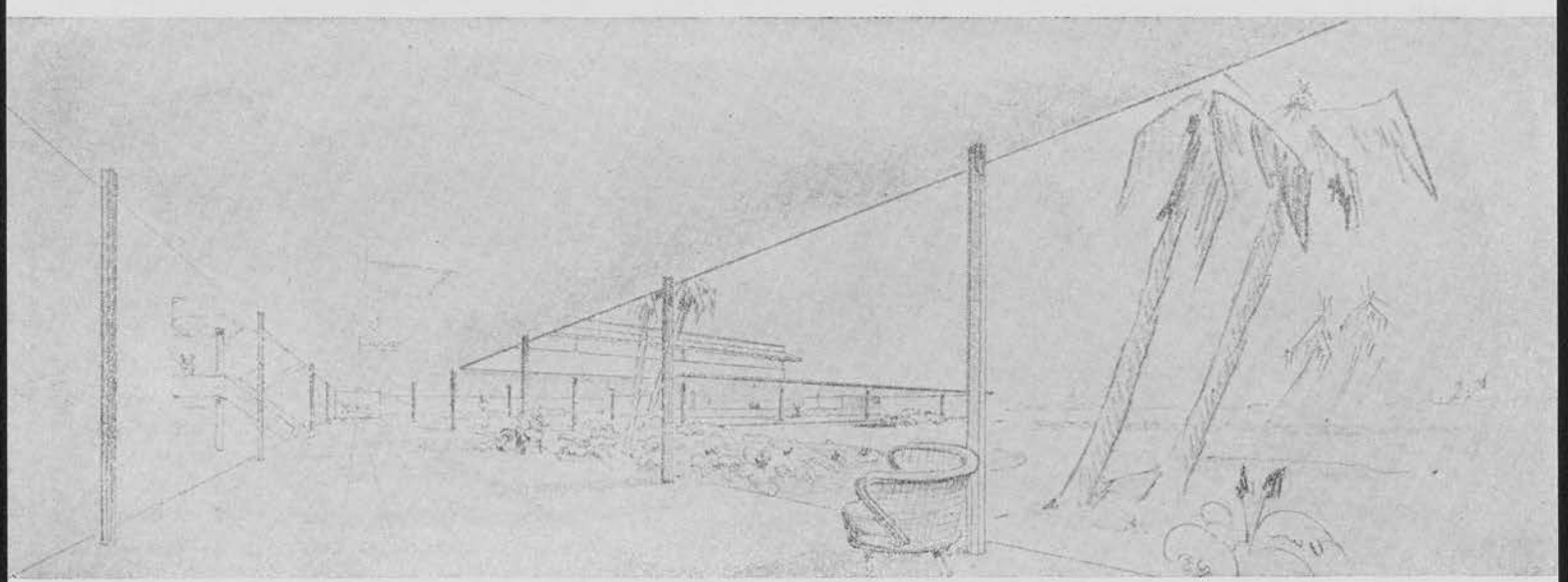
TWO LEVEL INTO THREE LEVEL OPERATION - ULTIMATE STAGE.

Northwest Airline's dock unit scheme is readily susceptible to vertical expansion. Units should be structurally designed in the beginning to support a second story from which future large planes may be loaded. Eventually the passenger driveway might also be elevated.

terminals are now being designed with gate positions 150 feet on centers, but 175 feet is considered ideal. Minor stations serving one or two airlines can get by with units (not gate positions) as short as 75 to 100 feet in length. Unit terminals can be designed to any width, but a 30-foot unit, plus a 10-foot combination vestibule and concourse, has been regarded as the minimum.

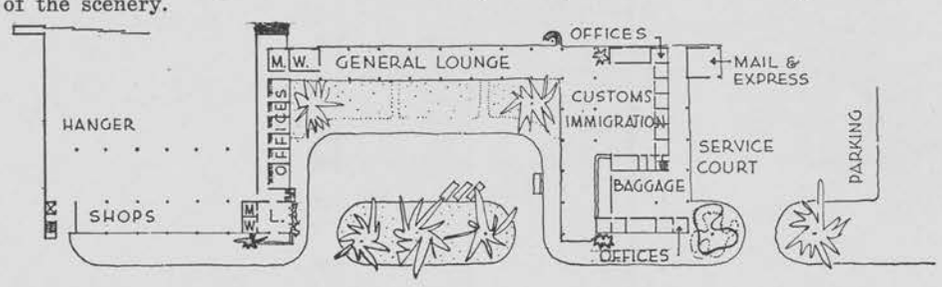
The use of mechanical and electronic aids will offset the strain on communications caused by decentralization. The major terminal will require, for passenger and employee use, an intra-airport system of ground transportation connecting all unit terminals with the general public building. Conveyor belts or cargo trains will connect the unit terminals with the central cargo functions. Impressive, though not monumental, architectural solutions can result through establishment of a basic "appearance" scheme for the over-all terminal development. Adequate airline publicity and directional assistance can be obtained through the use of controlled signs on each unit without marring the architectural effect. Above all, it is important to locate the decentralized scheme on the airport so as to provide space for the maximum anticipated expansion without interfering with runway clearances or fixed construction, as well as to provide for adequate vehicular circulation and parking. The decentralized scheme should not result in stereotyped solutions; fundamentally, it is a planning principle which serves as a guide, not a limit.

In the remainder of this article numerous applications of the unit idea, as well as several examples of possible specialized developments, are presented. All are schemes developed by the architectural department of Northwest Airlines under the supervision of Francis R. Meisch.



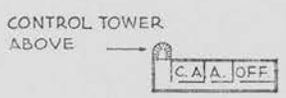
TERMINAL BUILDING FOR A SITE IN HAWAII

This design was prepared to indicate the type and extent of facilities which the airline would require if it should extend its service to Honolulu. Though not a "unit" development, the same principles of traffic flow govern its arrangement. The general lounge, glazed on both walls and having above it a promenade deck for sightseers, takes full advantage of the scenery.

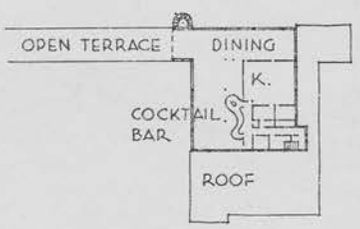


GROUND FLOOR

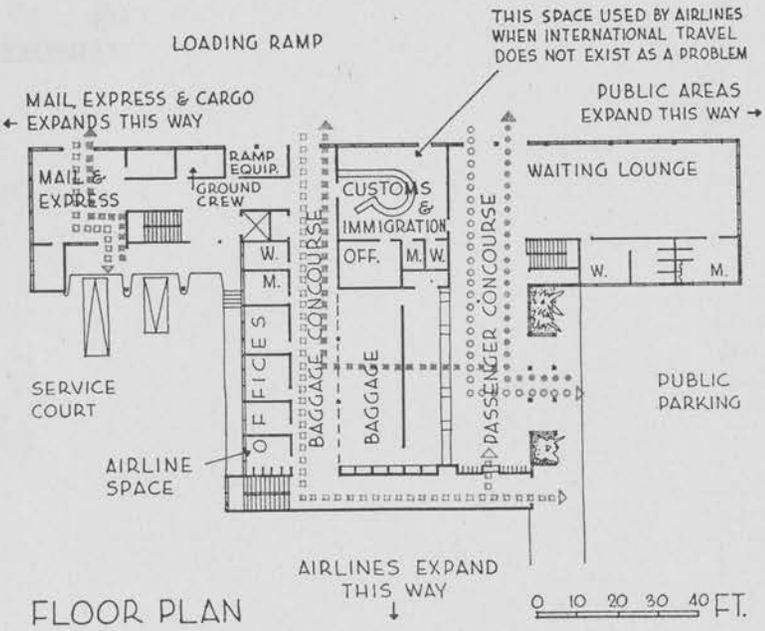
0 20 40 60 80 100 FT.



THIRD FLOOR



SECOND FLOOR 0 20 40 FT.

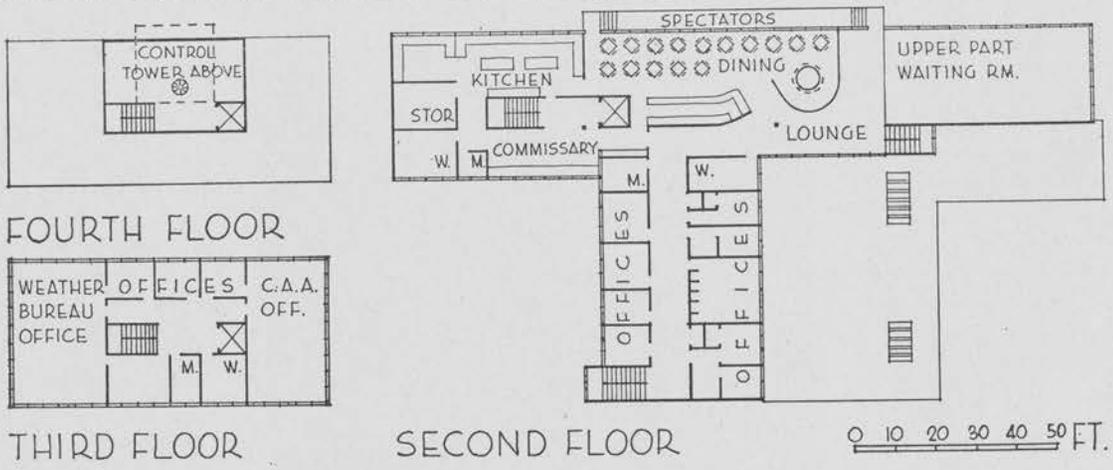


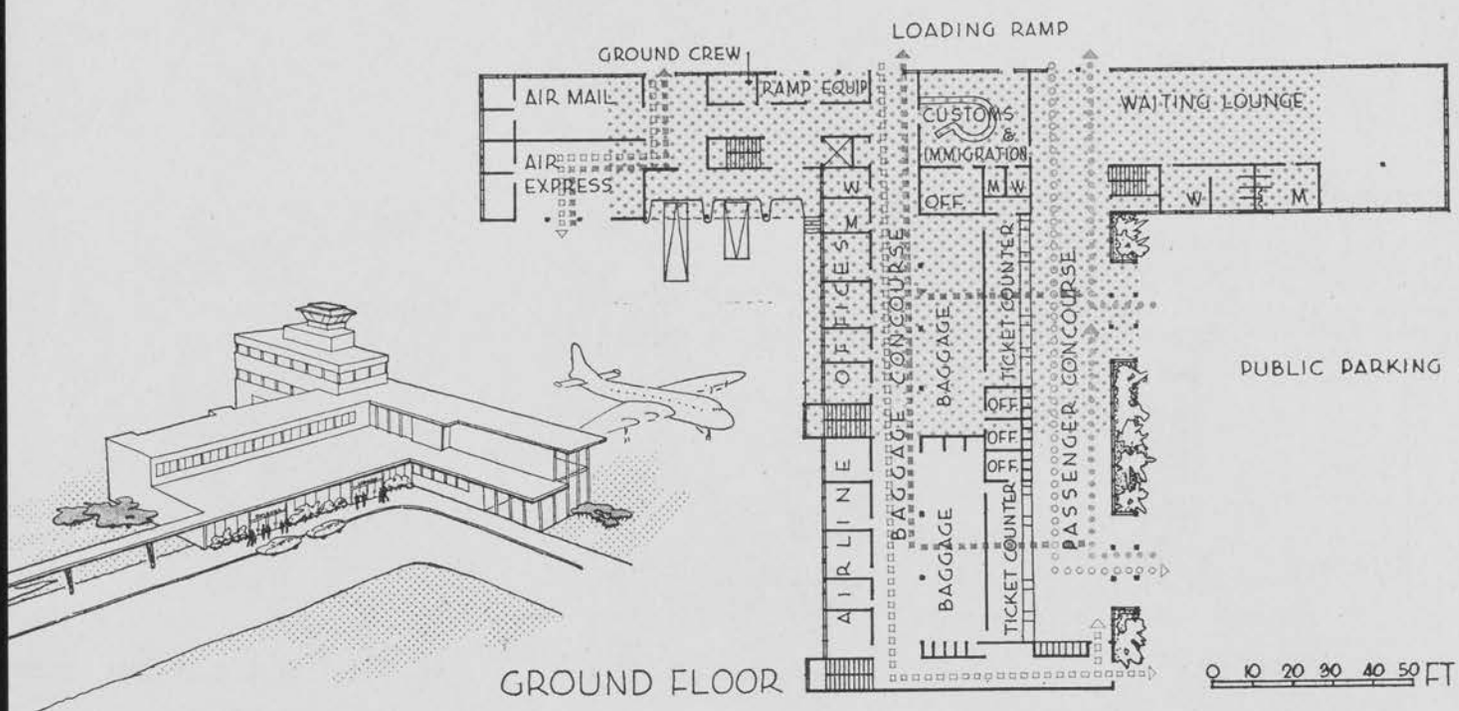
This small, combined administration building and airline terminal, adaptable to many a proposed postwar airfield, can be expanded both horizontally and vertically. Originally only one story high, it can have its wings extended, or stories added, or both—piecemeal or all at once. It might conceivably be so altered as to interior arrangements that unit docks could be added along the loading apron. In the ground floor plan of the final stage, the original extent is indicated by colored shading.

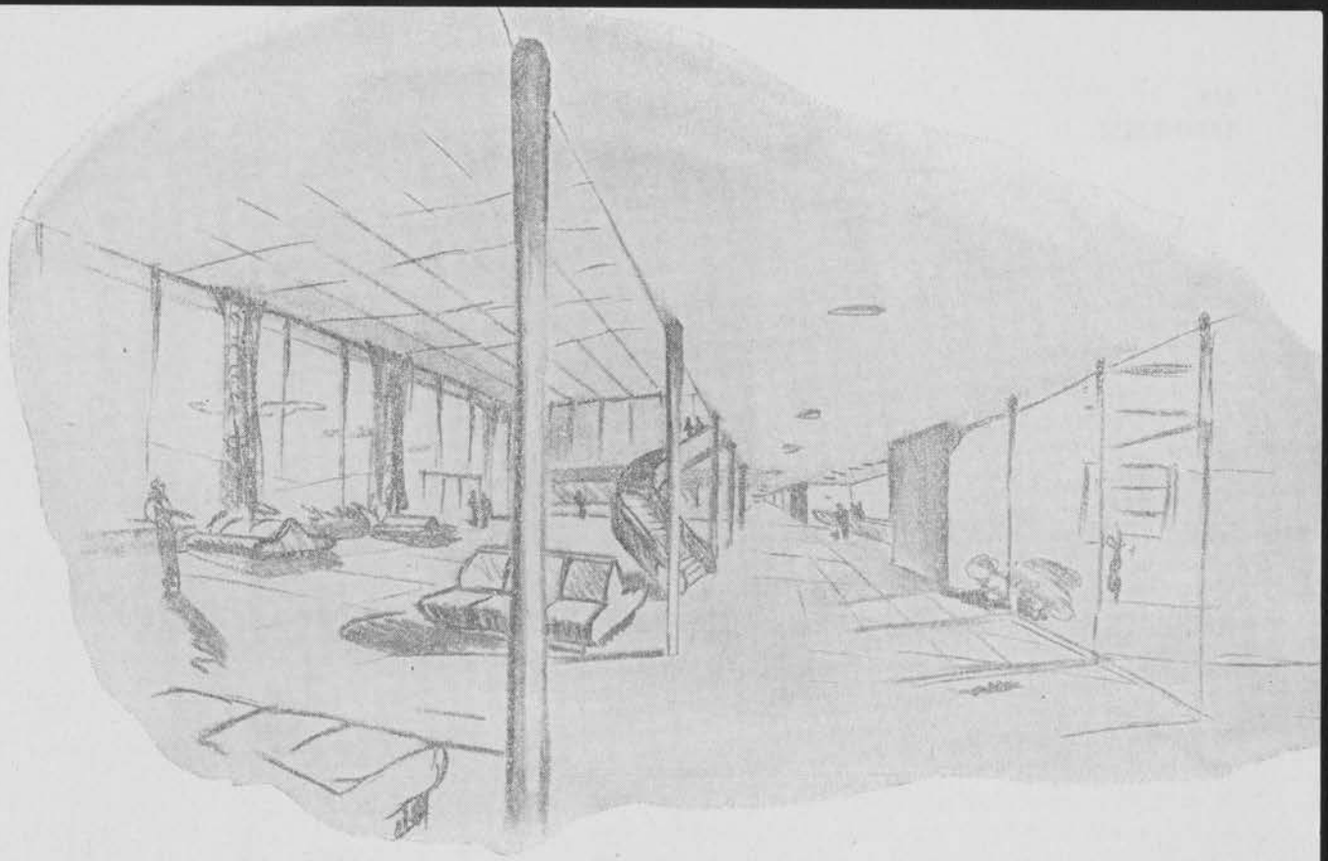
INITIAL STAGE

ADMINISTRATION BUILDING DESIGNED TO EXPAND AS NEED ARISES

FINAL STAGE

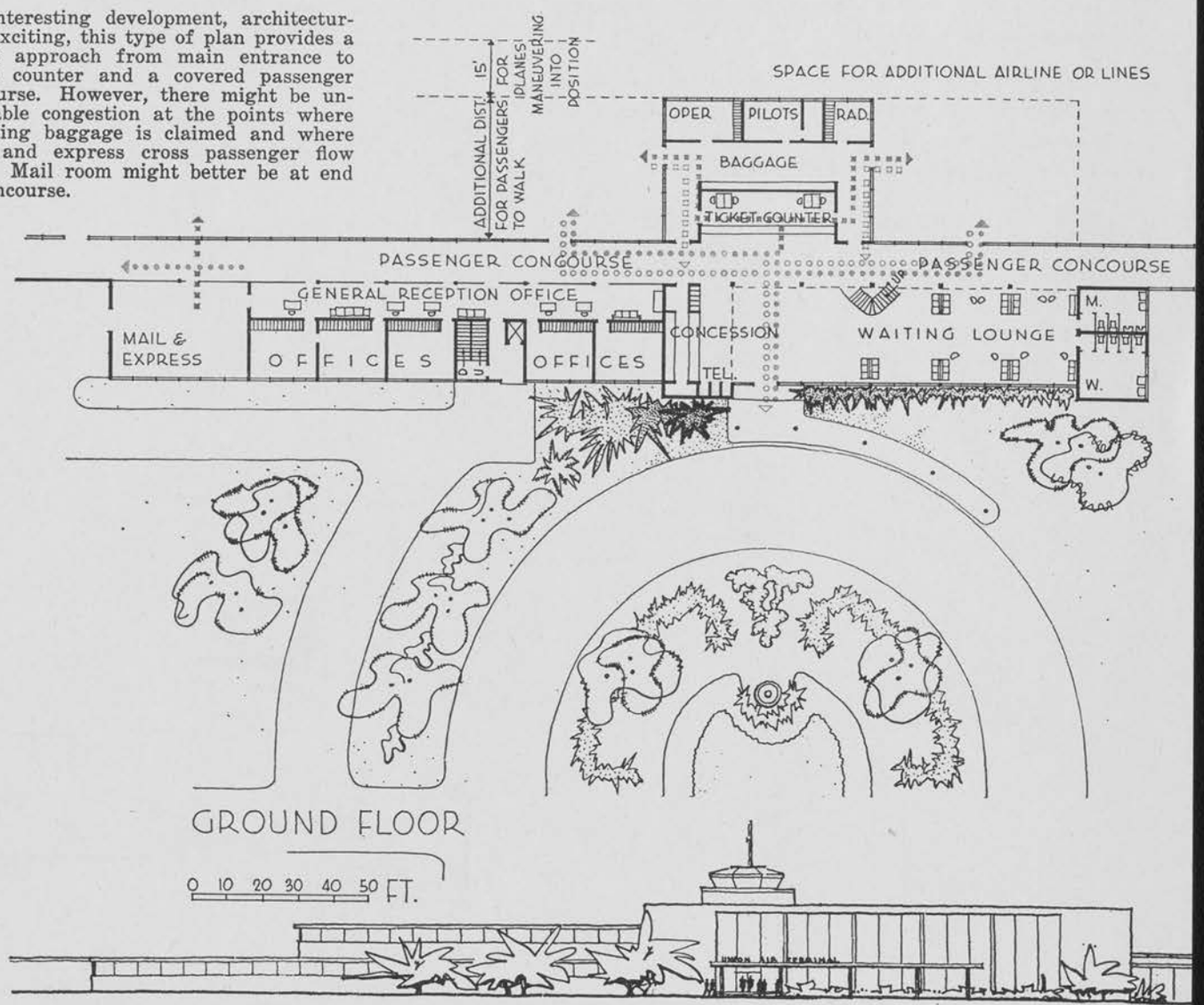


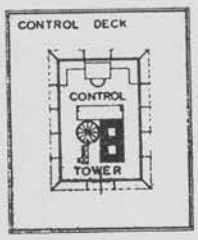




ADMINISTRATION BUILDING FOR A LARGER AIRPORT

An interesting development, architecturally exciting, this type of plan provides a direct approach from main entrance to ticket counter and a covered passenger concourse. However, there might be undesirable congestion at the points where incoming baggage is claimed and where mail and express cross passenger flow lines. Mail room might better be at end of concourse.





CONTROL TOWER FLOOR PLAN

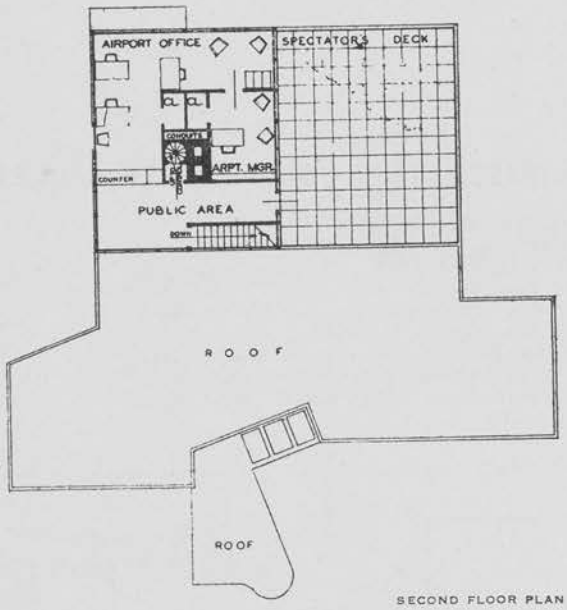
THE COUNTRY CLUB TYPE OF AIRPORT

REQUIRES AN EXPANDABLE BUILDING FOR POSSIBLE COMMERCIAL DEVELOPMENTS

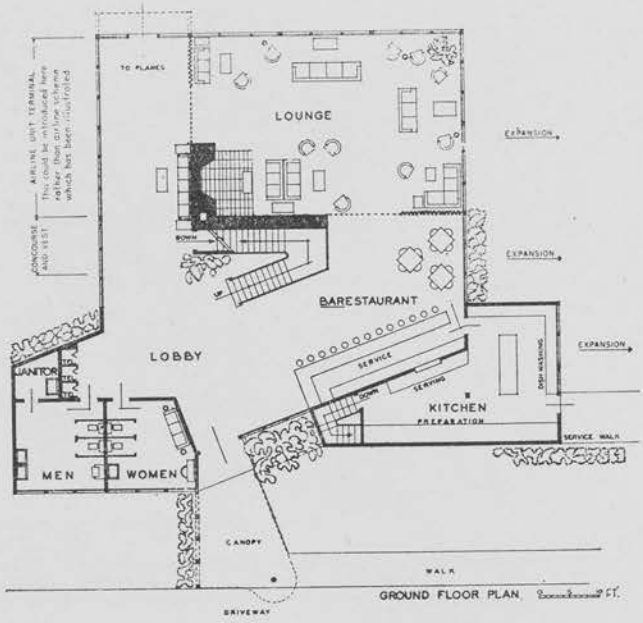
If private flying is to increase rapidly in volume after this war (and many people are doing more than guessing that it will) then private flying fields will become a necessity. But it would be folly to design the buildings which they will require without thought for potential commercial development. Even if the private field eventually becomes only a minor "way station," it will need facilities for passengers and some airline functions.

On these two pages is shown a conception of a clubhouse, for a private field, which can be enlarged to accommodate passengers and other commercial traffic. The enlarged building is shown on the following pages.

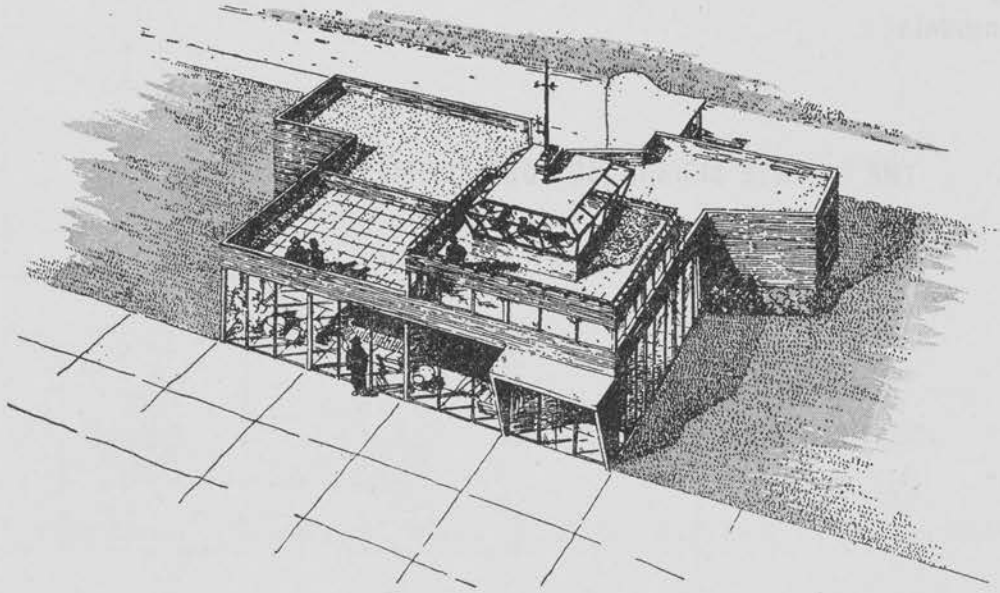
This is a preliminary study only, and like many preliminaries has its faults. When he submitted it Mr. Meisch called attention to some of these. For instance, location of the chimney is poor. Rising through the control tower as it does, it obstructs visibility; it should be relocated so it would not interfere with either the view or the operation of delicate weather-recording instruments. This would necessitate restudy of the first-floor fireplace location.

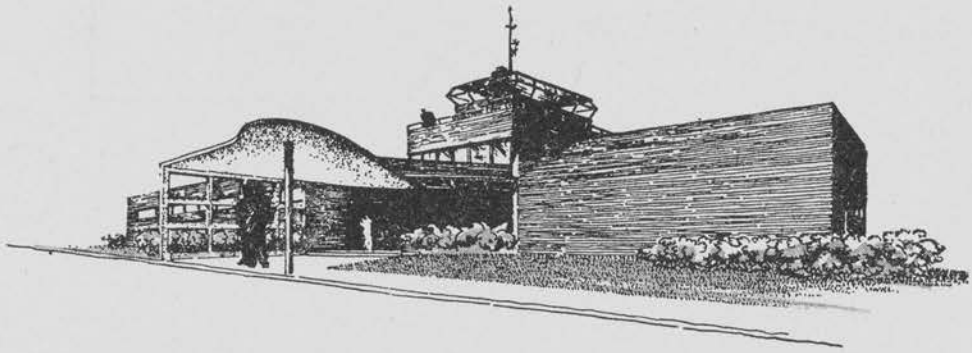


SECOND FLOOR PLAN

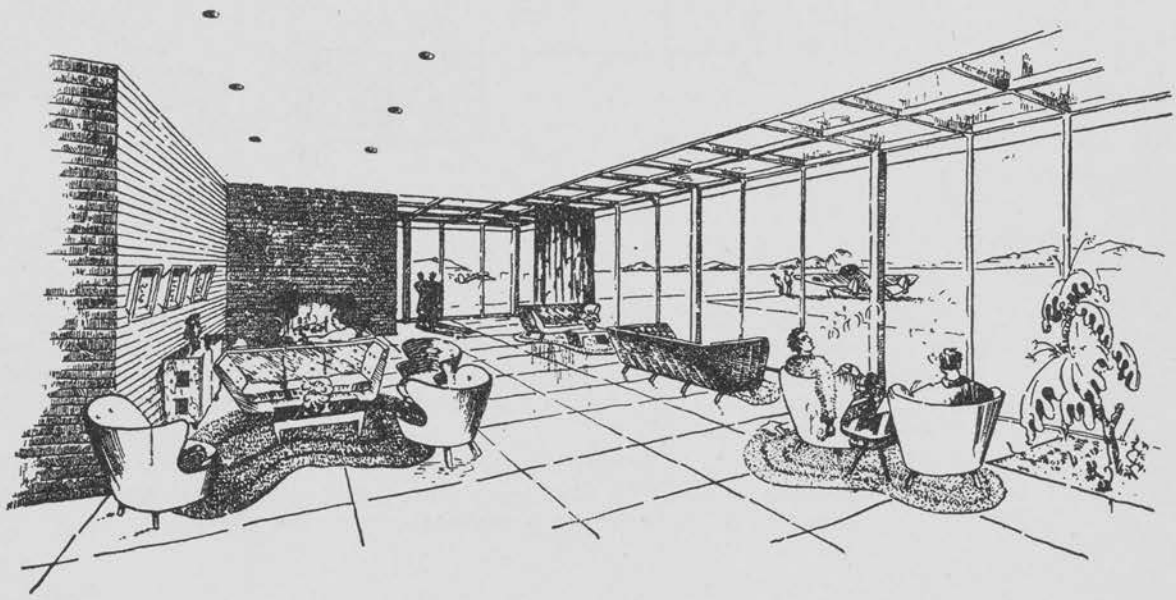


GROUND FLOOR PLAN

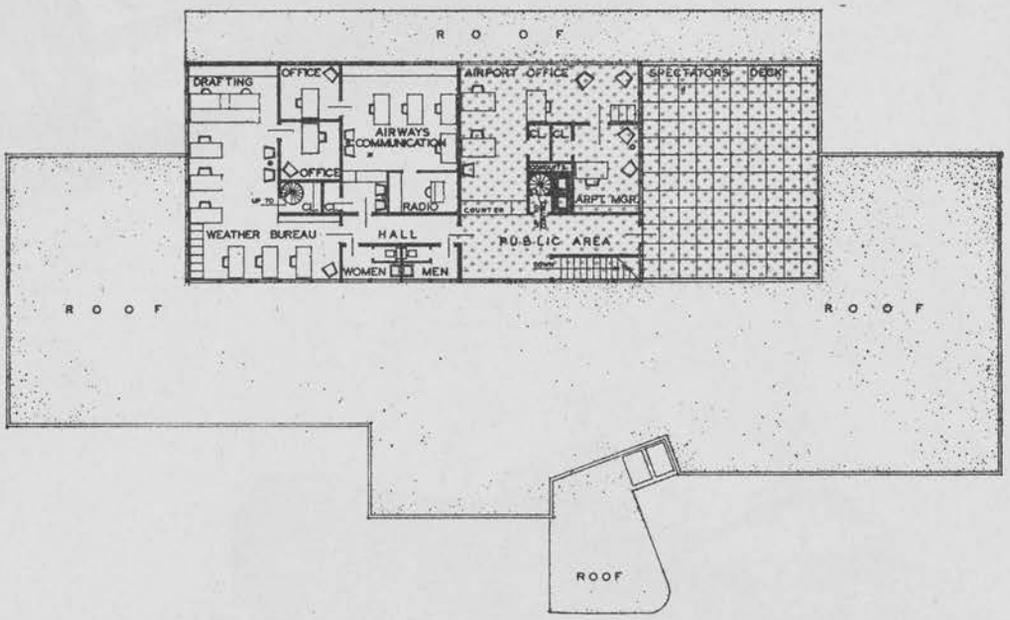


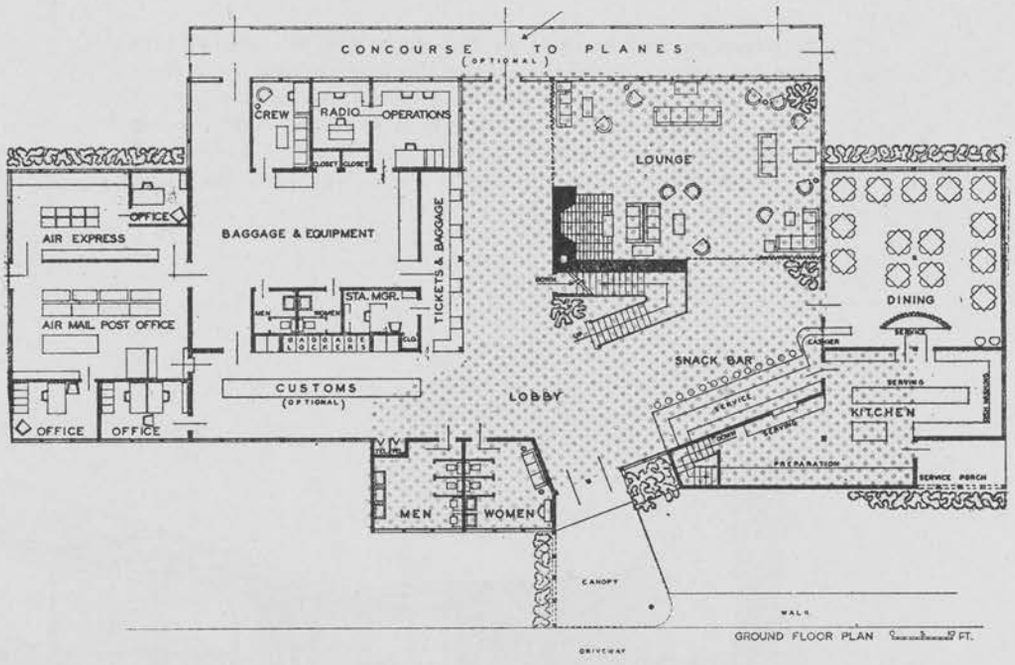


Exteriors and interior of the clubhouse for the private field. At top, aerial view from the field; center, view from the driveway; below, interior of the lounge looking toward the fireplace wall. The flying field is at the right, visible through a glass wall. To understand how the addition of commercial facilities affects the building, turn the page.



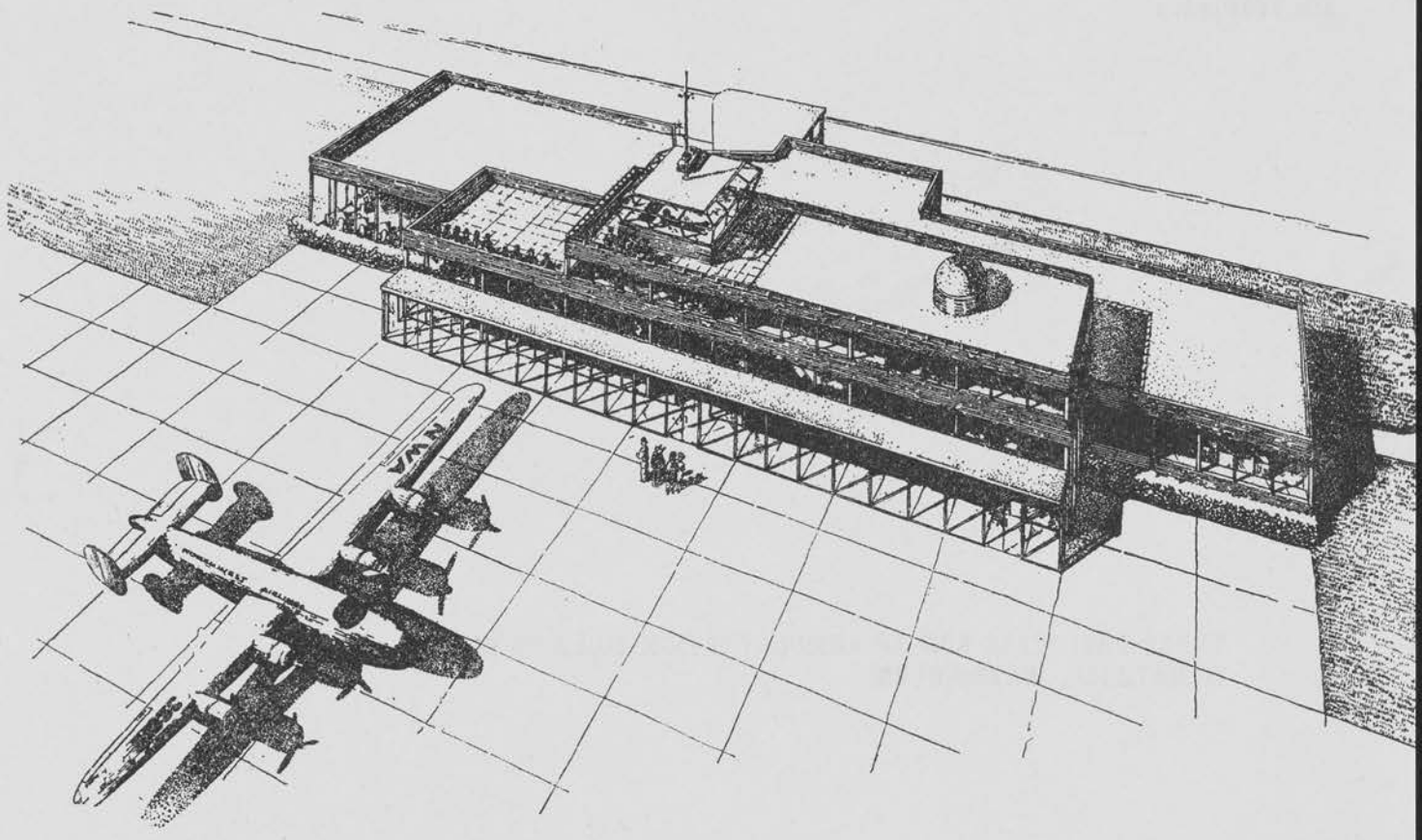
THE PRIVATE CLUBHOUSE ADDS COMMERCIAL FACILITIES

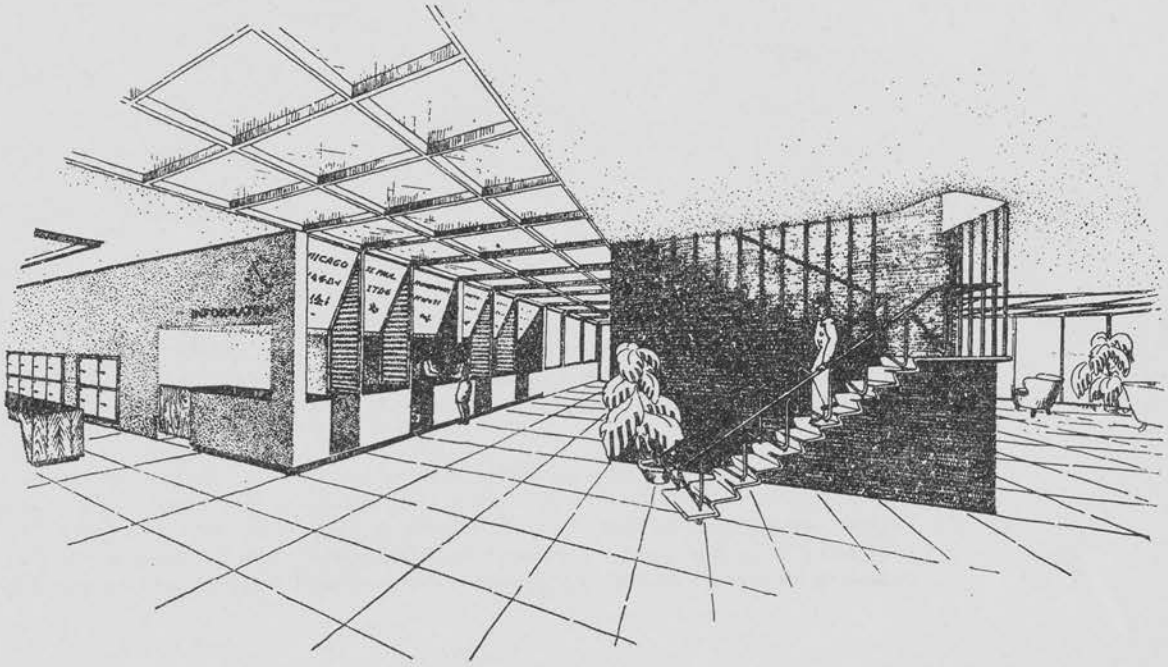




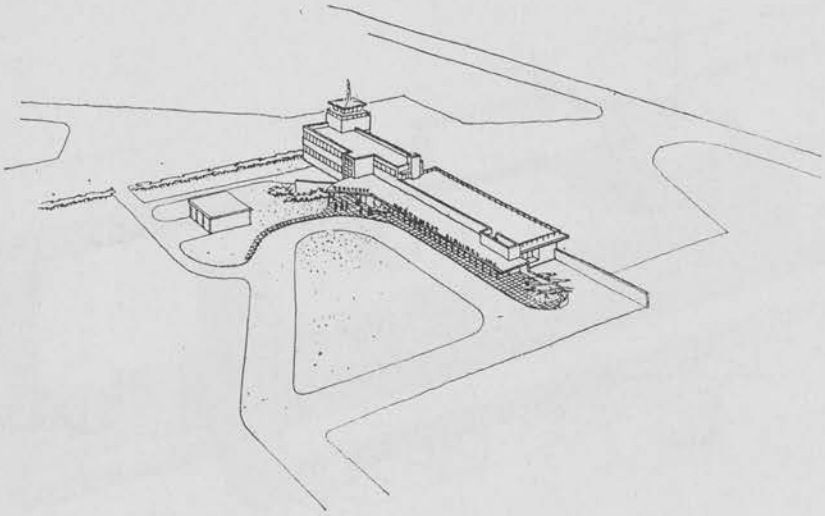
The area of the former clubhouse, detailed on the preceding page, is shown by colored shading. This project was an early development in Northwest Airlines' architectural department; currently they would advocate adding a standard unit terminal to the left-hand side of the clubhouse area, rather than the specialized—and possibly limiting—plan shown.

Mr. Meisch has also criticized the second floor layout in that a better relationship is required between CAA facilities, weather bureau, pilots' chart room, and airport office. Access to the control tower is preferably from CAA offices.

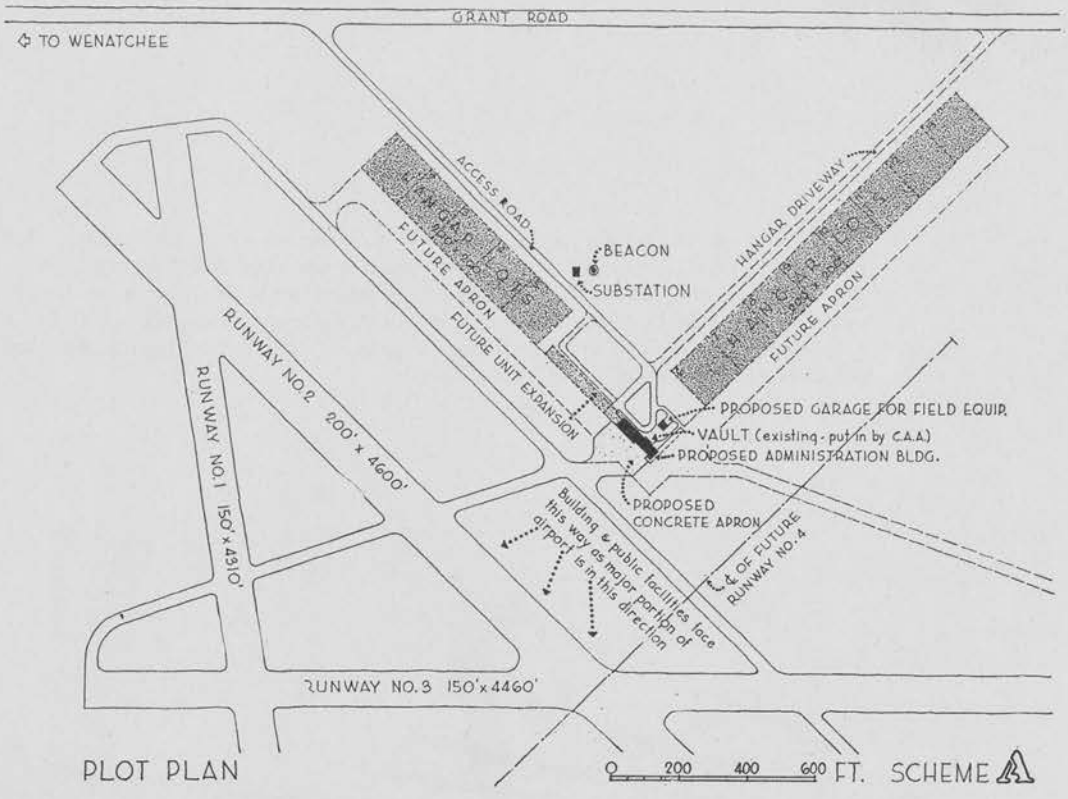




Two views of the small terminal which started out as a clubhouse; above, aerial perspective from the flying field; below, interior showing ticket counter which replaced the left-hand wall of the old building. Although some faults can be found with the building as a terminal, the whole conception has an important virtue: it can be altered economically to suit changing needs—something which can hardly be said of most existing air terminals.

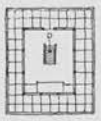


THREE PROPOSALS FOR AN ADMINISTRATION BUILDING FOR WENATCHEE, WASHINGTON

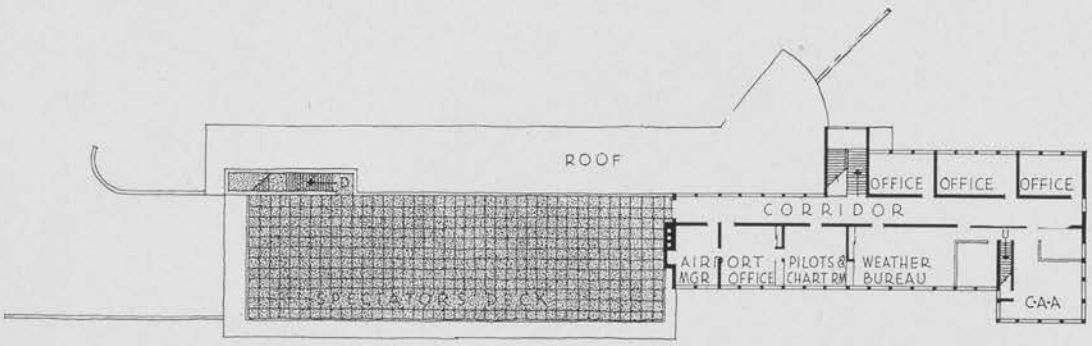


Wenatchee, a small community in the State of Washington, required an administration and terminal building for its airport. The community receives scheduled air transport service, but the present extent of use is limited and traffic at the port is not expected to grow beyond a reasonably modest maximum. In this and the two following pages are shown Northwest Airlines' suggestions, which are now under consideration. They embody the company's latest thinking on unit terminal design in a rather interesting fashion.

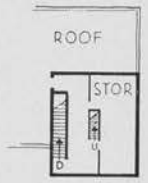
CAA had provided certain facilities, such as an existing transformer vault, runway layout, etc., which had to be taken into consideration. Northwest Airlines has made three suggestions, the first of which, Scheme A, appears on these two pages. Scheme A appears to be too large for present conditions, but might be required in the future. Notice, on airport plan above, provision for both unit terminal and hangar expansion.



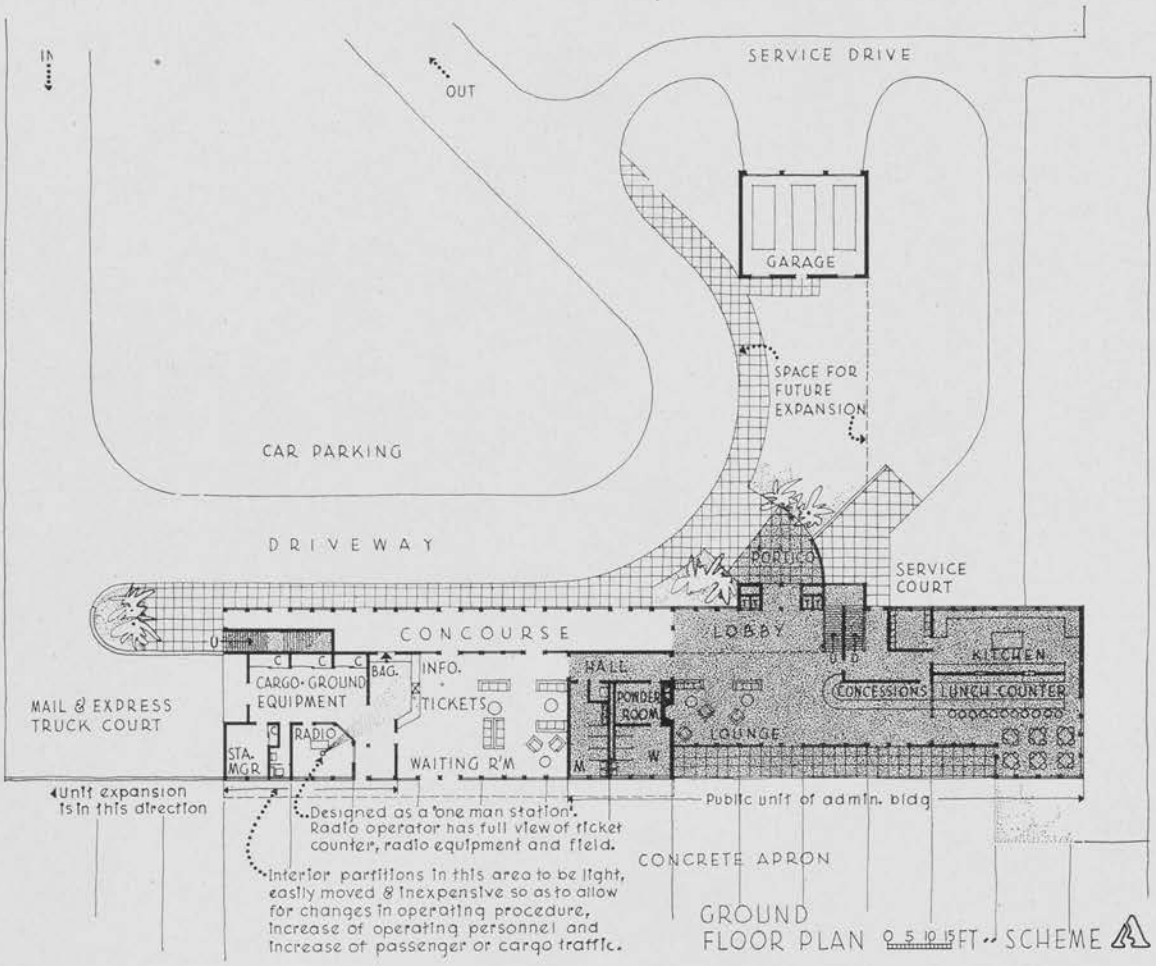
TOWER PLAN
0 5 10 15 20 25 FT



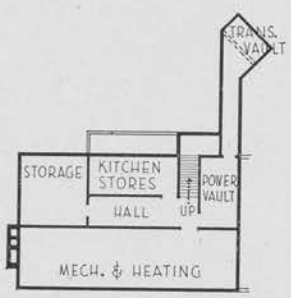
SECOND FLOOR PLAN 0 5 10 15 FT·· SCHEME A



ROOF LEVEL PLAN 0 5 10 FT

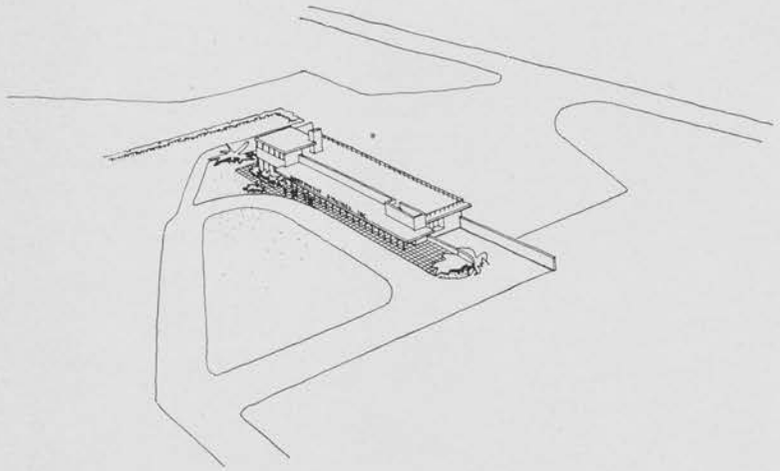


GROUND FLOOR PLAN 0 5 10 15 FT·· SCHEME A

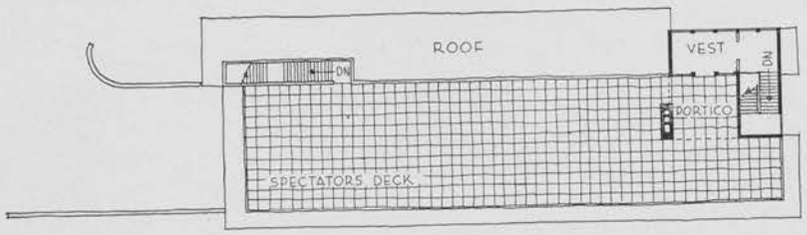


BASEMENT PLAN 0 5 10 FT

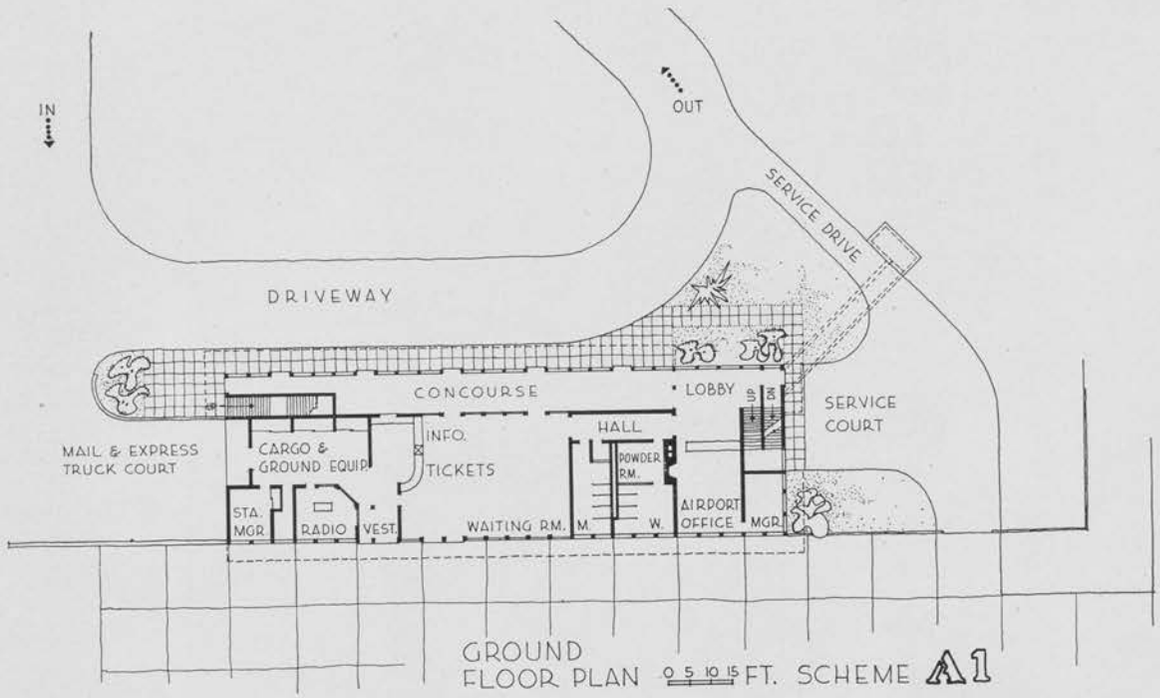
Gray areas in plans above show extent of public areas. In some cases, the concourse is considered to be entirely public space; but it might also be considered a passenger concourse, particularly if terminal units are added as indicated, and hence is here included in the area from which the general public might be excluded. Again, the toilets might be considered part of the unit terminal rather than public space; in so small a building one set of such facilities can serve both parts.



SECOND SCHEME FOR THE WENATCHEE ADMINISTRATION BUILDING



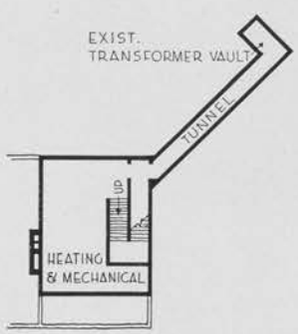
SECOND FLOOR PLAN 0 5 10 15 FT.



GROUND FLOOR PLAN 0 5 10 15 FT. SCHEME A1

This second scheme would appear to be the most sensible type of solution for current needs, and can be expanded into Scheme A, shown on the preceding page, when conditions warrant. Like Scheme A, it is designed for "one-man" operation. Public facilities are limited to a deck for spectators, to which there is access directly from the walk and driveway. Aside from the unit terminal, the building contains only an office for the airport manager and his small staff. In all these schemes the amount of concrete paving necessary for initial traffic is held to a minimum.

According to the author, the V-shaped site, so common at CAA-planned ports, is one of the most difficult for which to design a terminal if proper automotive circulation, expandability, and flexibility in use are to receive due consideration.



BASEMENT PLAN 0 5 10 15 FT.

Perspectives:

The Earnest Young Man with the Flying Parti: Francis R. Meisch

Although Francis Meisch has just celebrated his twenty-ninth birthday, he has a pretty good idea of the place to which he'd eventually like to retire. He was reasonably sure of the kind of higher education he wanted quite a while before it was time for him to start it. He looked around, during the early stages of the current war, for a job which would help prosecute it and, at the same time, had a rosy future. He satisfied himself that the aviation industry fulfilled these two requirements, and he got an architectural job with an airline. He's done pretty well at it.

He is not smug in being so sure of himself; far from it. He is only deadly serious about his work. Meisch's ideals are pretty strongly with him, at work or at play.

As long as he can remember, Francis R. Meisch has been interested—as he deprecatingly puts it—in drawing and painting. We aren't sure how far back his memory carries, so we can't tell you about his being born with a brush in his hand; but we can state that he was born, and where: in St. Paul, Minnesota, on October 9, 1915. That is a matter of record. Furthermore he lived in St. Paul until he finished his formal education, and St. Paul is the site of his present home office. Chronologically, the story goes something like this:

Meisch acquired some facility in sketching, together with an appreciation of nature, during summer vacations from high school. He spent most of these working on his grandmother's farm in the hilly country of southeastern Minnesota. The facility developed into a certain ability and led, before high school days were over, to an intense interest in architecture. By the time college days came along, he was sure that architecture was to be his profession, even though those were also the days immediately after the New York stock market hit bottom, when architects were selling their share of apples on city street corners.

When he entered college, Meisch had already read both Louis Sullivan's "Autobiography of an Idea" and Wright's "Autobiography." He expected to find the study of architecture a logical, exciting adventure. He says he was disappointed to find that the best "philosophy of design" available involved considerable cold cribbing. It was rather an unpleasant experience, that freshman year; faculty and students alike were confused over what architecture really was. Meisch began to wonder if his reading had misled him. He felt pretty bad over it at times, and after one year he quit to go to work for an architect—any architect—to find out for himself whether architecture *was* the glamorously idealistic profession he had envisioned, or just another business, albeit one in which facility with a pencil helped.

By the time he re-entered the University of Minnesota he had a feeling that he knew what he wanted out of a formal education. He worked his way through a five-year course in four and a quarter years and got his degree in March, 1939. His earlier practice at landscape sketching helped mightily, enabling him to do renderings and other free lance work part time during the academic year and full time during vacations. Working his way through college meant no janitorial jobs; it meant furthering himself in his chosen profession. Everything he did he turned to that same account.

This practical experience was gained in offices fairly close to home—in Minneapolis, St. Paul, and Eveleth, Minnesota; and in the St. Anthony Falls Hydraulic Laboratory at his University. It varied in kind from small homes to municipal buildings, from hospitals to power plants; and a good half of it was what even he calls engineering, rather than architectural, in nature.

In 1939, with a graduate scholarship to his credit, he entered Massachusetts Institute of Technology. After getting his Master's in 1940 at Cambridge he went back west again, but not home. For a year he instructed in the Department of Architecture at North Dakota Agricultural College, where he taught Sophomore Design, assisted in the other design courses, and had classes in freehand drawing, water color, history of furniture and interior decoration, and history of painting and sculpture. The architectural department was quite small. An instructor had to double in brass as well as possess lots of it.

Defense was the cry in 1940. Anybody who had his eyes and ears open knew we were in for a war ourselves. Besides, "defense" entailed lots of construction jobs if not lots of architecture. The combined appeal of patriotism and practicality was not lost on Francis Meisch. At the end of the school year he returned to St. Paul and went to work again at the drafting board, and debated with himself on the advisability of continuing teaching.

When a defense job in a part of the country he had never seen presented itself, Meisch decided to take it. As a draftsman for the firm of Shanley, Van Teylingen and Henningson, he went to Great Falls and West Yellowstone, Montana, and to Idaho Falls, Idaho. The job was concerned with the U. S. Army Winter Training Camp program, and, like many war projects, was terminated before it reached the construction stage. Next he went to work in Las Vegas, Nevada, for the McNeil Construction Company of Los Angeles, as a draftsman in their engineering unit. The job here was the design of contractor's facilities for a magnesium plant.

By this time 1942 had rolled along, Meisch began to feel the need of some permanent connection. He remembered the boost the first world war gave the automobile industry, and he looked around for a field which could expect the same stimulus from World War II, one whose ground-floor doors were still open. Aviation was, of

course, the answer. But Meisch wasn't satisfied with "aviation" in general; he took a long, hard look at aviation manufacturing and decided it was by no means as attractive as the business of commercial airline operation. Air transport had scraped along for years, with most airlines running on financial shoestrings. The war boomed them. He didn't see how their business could decrease after the war; by all the signs it should expand as only a few had previously dreamed it could. Manufacture of aircraft, on the other hand, would probably be a rather tough business once military contracts ceased. So, on the score of prospects, air transport was his choice.

What about the need for architectural services? Could he justify being an architect for an airline? He rather thought he could. He got a job in the engineering department of Northwest Airlines, whose home offices are in St. Paul. That was in February, 1942, and he has been plugging away excitedly at buildings and facilities for airlines ever since.

Ton-mile costs now roll glibly off the end of his tongue, to be translated, by the time they become pencil scratches on a luncheon tablecloth, into more efficient buildings—offices, terminals, overhaul shops, etc.—or airports, or headquarters, or any phase of aviation construction to which design talent can be applied. In ordinary times, "ever since 1942" would not be a very long period, but during an air war and in the aviation industry it is the equivalent of a normal decade. Meisch did not come by his familiarity with ton-mile rates without an intense apprenticeship.

In the course of his work for the airline he had as his first project the completion of, and installation of machinery and equipment in, a shop addition to Northwest's main overhaul hangar. There followed one project after another related to war contract construction: more shops, offices, restaurant facilities, and other work. A major job was the design and setting up of a large outdoor bomber modification center, complete even to utilities and equipment. This was in a terrific rush, and was handled by the Army's Corps of Engineers after development of the basic scheme. There was another, more complex modification center, set up by the airline, and there were hangars for the Air Transport Command.

Meisch's guess about the future of air transport seems confirmed by one phase of his current activities. Soon after the tremendous importance of military aviation was recognized, and larger, faster, more powerful planes were designed and built, all kinds of municipalities, from the largest to the smallest, began thinking and asking questions about expanding airports, building new airports, providing new administration buildings and the like, and getting and sustaining airline service. The Engineering Division of Northwest Airlines was flooded with requests for advice, opinions, information.

The Engineering Division began to get uncomfortable about the situation. They did not customarily wear turbans, nor did they peer into crystal balls. Their company was far too occupied with the day-to-day problems of running the business to give such requests the serious attention everybody realized they deserved. It became apparent that somebody had to do some research, and consequently the Engineering Department, in addition to being concerned with design and construction, found itself studying, analyzing, collating, drawing conclusions on postwar airport and airport building design problems. It had to be 'way ahead of the rest of its company's departments. Not only did it have to solve existing problems, it had also to anticipate the problems of the next few years, and find solutions for them.

That is progressive architecture indeed! Is it any wonder that Meisch is excited over it? Only twenty-nine, and with a bear by the tail—if he weren't a phlegmatic Minnesotan, the mere prospect would be his ruination. At times it must exasperate him to have to deal in today's stodgy realities. As it is, he works with a Plant Engineering Section to which he gives much credit, under a Chief Engineer and Chief Plant Engineer who apparently have high regard for his abilities. The majority of his company's airport and airport building problems and design are routed to Meisch.

In 1942, the same year that he went to work for Northwest, Meisch married Elaine Hanson, interior decorator, whom he met working over a drafting table. His year-old son exhibits talents more destructive than constructive—a common enough failing at that age. As is common, too, in these days, his job cuts deeply into his personal life; in truth, he is more subject than most of us to absences from home. Expected and unexpected travel, much of it by air, often takes him away for days on end. If he finds spare time, he reads, paints, or sketches in water color, but he has to forego etching, an old love, because he has neither the time nor an etching press.

Francis Meisch's grandfather settled the family homestead, the four quarter-sections in southeast Minnesota where a younger Meisch spent his high school vacations. The original farmhouse and outbuildings stood in a river valley from which spread small wild canyons whose sides were steep, eroded bluffs. The stand of buildings has since been replaced by one farther back from the principal valley, closer to the more profitable farmland which the family accumulated as it prospered.

Some day Meisch hopes to build his own family a home on the fairly level top of one of the spurs between the finger-like ravines, above the site of the old homestead. The view up and down the valley is superb, he says; and the sunsets are gorgeous. He hopes he won't be so busy, so he can sit outdoors and paint, and smoke the pipe he prefers to the more convenient cigarette, while, perhaps, he discourses with a friend pleasantly, if rather earnestly, about the merits as students of young men from Middlewestern farms, young men to whom springhouses and barns and silos are architecture, to whom a ten-story building is a novel sight, to whom eggs and darts are henfruit and arrows. He found them pretty good material when he was teaching, 'way back before he got into that air transport game.

Meisch, Vernon Lundquist, Northwest's Chief Plant Engineer, and Richard Frahm, architectural designer, discuss an airport planning problem.

AUXILIARY FACILITIES

There are two types of ancillary spaces at an airport: those that are auxiliary to the primary passenger and passenger's baggage circulation in the air terminal building; and those that are auxiliary to the terminal building and its operation on the airport as a whole. Within the first category the airport planner must consider:

Airlines Operational Space: This will vary considerably with the individual airline and its operating policies, the size of the airport, and the extent of the airline's local operations (a regional office for an airline might be located, for instance, at a comparatively small port). In some instances, the airline's working space might be placed in its own area on the field; in others, all its work will be done in the terminal building. Functions which should be discussed with each airline's representatives would include the following, in addition to ticket-and-baggage reception counter: passenger agent's, station manager's, reservation offices; message center for radio, teletype, etc. (perhaps a coordinated area with separate airlines' communications facilities); flight crew and ground crew ready-rooms; flight control room; meteorology room; storage space for ground equipment; oil storage; food service for in-flight meals; baggage room; cargo room; employe lockers; rest room and lunch facilities.

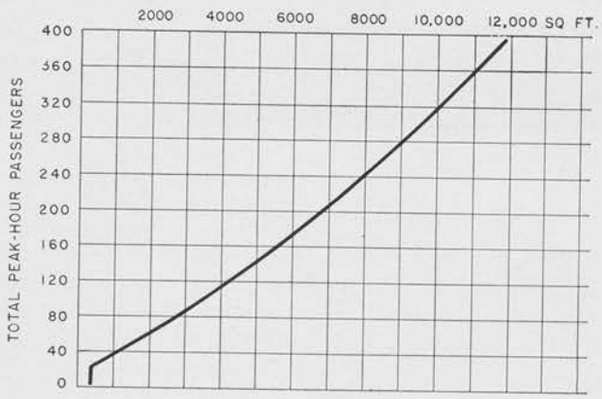
Airport Administration, Operation, and Maintenance Space: This too will depend on the size of the airport, the functions to be handled by the airport manager, and his own wishes and preferences. In its simplest form it is a single business office; in a more complex program it may be a suite of offices and many storage areas, shops, garage facilities, and stock rooms.

Government Functions: For these spaces the designers must first determine the character of the airport; international ports not only require special passenger circulation facilities, but office space as well for immigration, customs, health, and perhaps internal revenue and agricultural bureau representatives. There may be need for unusual local offices, for CAA staff, weather bureau, traffic control, mail and express, or airway communications.

Other Office Space: The planner should inquire from both management and the airlines as to other spaces that may be either functionally necessary, or possible sources of rental revenue—Pilots' Union, oil company offices, office space for dealers in aircraft or aircraft supplies, etc.

Traffic Control: CAA standards for this space should be consulted; and CAA approval—or, at least, satisfaction—is necessary. "Standards" are no longer in graphic form, but are written advice on the amount and the slope of glazed areas, dimensions

APRON SERVICE FACILITIES *are plotted against CAA peak-hour enplaned and deplaned passenger surveys* (below). *While it still commands surrounding air corridor approaches, all aspects of the field and apron are visible from the control tower at Missoula, Montana's Airport. Architects: William Fox & Oscar Ballas.*



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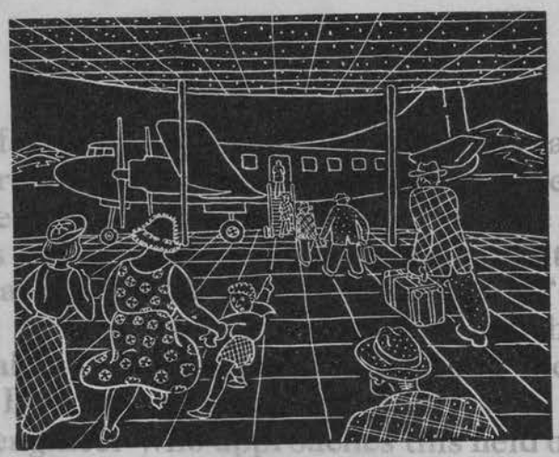
December 6, 2016



TWENTIETH CENTURY BUILDING TYPE

airport terminal buildings

This study has been prepared by the Editors of **Progressive Architecture,** *and the opinions and conclusions expressed are theirs. Technical advice and assistance have been received from:*

Nicolas R. Arroyo, Architect; Havana, Cuba.
John Grisdale, Architect; Carroll, Grisdale & Van Alen, Philadelphia, Pennsylvania.
Albert F. Heino, Architect; Chicago, Illinois.
Francis R. Meisch, Architect; Minneapolis, Minnesota.
Walther Prokosch, Architect; Knappen, Tippets, Abbott Engineering Company, New York, N. Y.
And staff members of the Civil Aeronautics Administration, Department of Commerce, Washington, D. C.; Phillips Moore, Director, Office of Airports; including:
H. Orville Varty, Chief Airport Architect
James Hoban, Airport Architect
Paul H. Stafford, Chief, Airport Planning Division

Partially Scanned Material

Version 2
December 6, 2016

PA-4
Printed in U.S.A.

INTER-OFFICE COMMUNICATION

NORTHWEST AIRLINES, INC.

Executive Offices, St. Paul, Minn.

March 20th, - - -19 44

To: Francis R. Meisch - Plant Engineer - GO, ZP

From: Frank C. Judd - SA

Dear Francis:

Thank you very much for your prompt response to our request for six copies of your excellent article on "Architecture and Air Transportation". We plan to use them this Thursday in an air transporation session particularly considering airports.

Sincerely,

Frank

Frank C. Judd,
Superintendent of Operations,
Western Region.

FCJ/ch

March 20th, - - - 44

Francis R. Meisch - Plant Engineer - GO, ZP

Frank C. Judd - SA

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Sincerely,

Frank C. Judd,
Superintendent of Operations,
Western Region.

FCJ/ch

ENGR. PROJECT NO.	
ROUTE THIS COPY TO	
Lindquist	L

January 14, 1944

Mr. Quay Bair
1026 East High Ave.
New Philadelphia, Ohio

Dear Mr. Bair:

We received your idea for runway design, and our engineers have given it due consideration.

The consensus of opinion is that such a runway design would be neither practical nor economical. The idea of heating runways to remove snow and ice is not a new one, but such ideas have proved impractical, not only because of the initial installation cost but because of the operating cost involved.

A system of runway contact lights now in use on a number of airports has proven adequate for defining the limits of the runway, but does have a shortcoming, in that it is impossible to generate enough heat from the light itself to melt snow and ice that may form over the contact lights. These lights are quite powerful, and are visible even under three or four inches of snow. However, they must be swept off at intervals during a snow storm or immediately after to insure their full visibility.

We appreciate your interest in this problem, and thank you for being so kind as to send us your idea.

Yours very truly,

NORTHWEST AIRLINES, INC.

F. R. Meisch
Architect

FRM/SF

1026 East High Avenue
New Philadelphia, Ohio
January 11, 1944

Francis R. Meisch
Plant Engineer, Northwest Airlines, Inc.
Minneapolis, Minnesota

Dear Sir:

The article "Architecture and Air Transportation" appearing in New Pencil Points magazine No.11 is a very interesting article for post-war planning of airports.

You do not ask for suggestions on this subject and perhaps my idea would not meet your requirements as this is your business and there are angles to be considered, nevertheless, it takes an idea for development.

My idea is pertaining to the foundations of the runways of airports in the colder climates for other than helicopter flying. It is agreed that ice and snow is a hazard for flying and also landings. In appreciation of paragraph "No matter what the weather", which takes care under technological developments that part of flying for the helicopter, but the landing part will be, and probably has been given consideration.

Therefore, permit me to outline my possible idea as follows: Checker board the runways having a concrete section at a specified thickness and an adjacent composition section constructed of steel beams properly spaced and electrically or steam equipped in this section, if electrically equipped light units for illumination purpose and heat of which such unit could serve both purpose. The substructure to have a glass and steel covering supported by thebeams.

I have in mind should the section be designed for electricity and lighting, the said top or cover of said section to be of the like material used for over coal doors to buildings as seen in most cities, made up of heavy frosted glass and steel and having a great bearing factor.

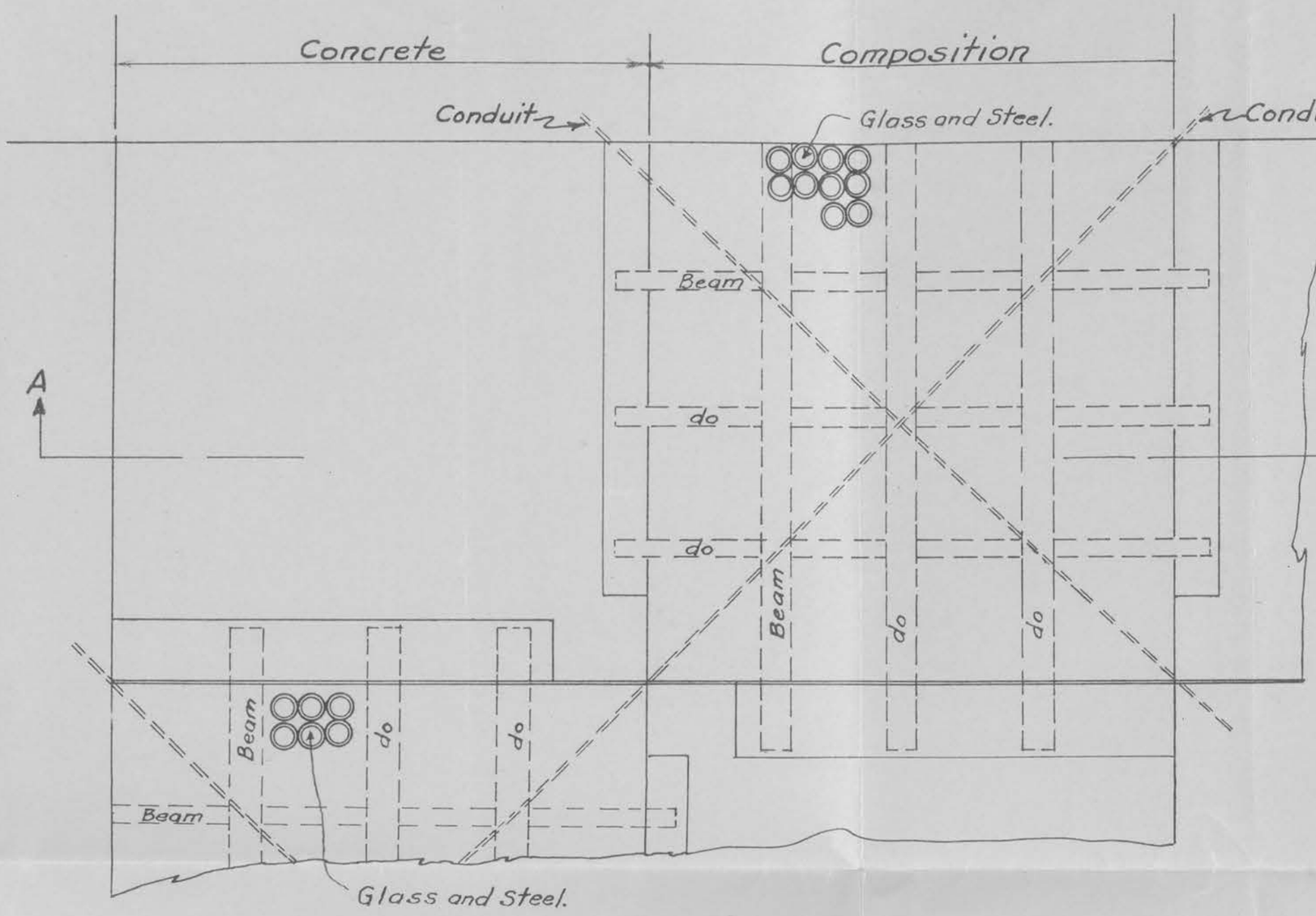
The cost of such design might not justify the architecture, but this rough idea might lead to some design for a runway adequate in cost and above all safety and beauty.

Attached is a pencil sketch showing the part section and plan of the described idea.

Trust this will aid in some development for the future.

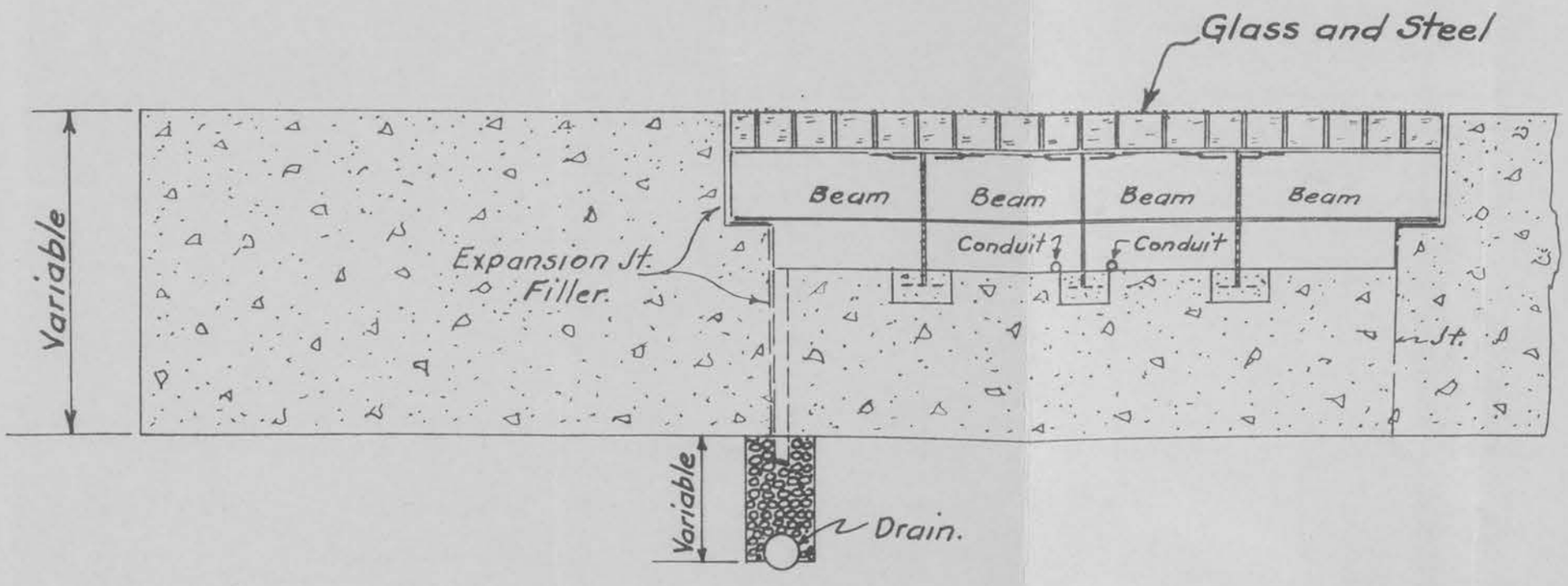
Yours truly,

Quay Bair



PLAN

N.T.S.



SECTION A-A.

N.T.S.

PLAN & SECTION SHOWING IDEA FOR AIR-PORT RUNWAY

Q.B.

ENGR. PROJECT NO.	
ROUTE THIS COPY TO	

November 17, 1944

Mr. Charles Magruder
Associate Editor, Pencil Points
330 West 42nd Street
New York, 18, New York

Dear Mr. Magruder:

I wish to acknowledge receipt of the reprints of my article in the November, 1943, issue of Pencil Points, and to express my thanks for sending them to me.

Yours truly,

NORTHWEST AIRLINES, INC.

F. R. Meisch
Architect and Plant Engineer

FRM/SF

Pencil Points . . . the magazine of architecture

published by Reinhold Publishing Corporation, 330 West 42nd St., New York 18, N. Y. BRyant 9-4430

November 9th
1944.

Mr. Francis R. Meisch
Architect and Plant Engineer
Northwest Airlines, Inc.
1885 University Avenue
Saint Paul 4, Minnesota

Dear Mr. Meisch:

When transferring reprints from our current file for storage in another part of the building, we came across some copies of your article from the November 1943 issue of PENCIL POINTS. We are sending these to you under separate cover in the hope that you may find some use for them.

Very truly yours,

Charles Magruder

Charles Magruder
Associate Editor

cm:el

also publishers of Chemical Engineering Catalog, Metal Industries Catalog, Metals and Alloys, Architectural, Technical, and Engineering Books

ENGR. PROJECT NO.	
ROUTE THIS COPY TO	

July 31, 1944

Mr. Kenneth Reid,
Editor, Pencil Points,
330 West 42nd Street,
New York 18, New York

Dear Mr. Reid:

I am sorry that I did not have time to write you sooner, but on my return from New York and Washington we moved our Engineering offices to a new location which resulted in a very hectic two week period of operations.

I am sending you under seprate cover prints of the type that we have been distributing upon request to municipalities as an aid to their planning Administration Buildings and Terminal Buildings. Some of these plans do not embody our latest thinking and will have to be revised to remove technical bugs and to bring them up to date. I have made notes on those plans pointing out the items in question. All in all our thinking has been a process of continuous development and evolution in the search for the theoretical and functional ideal as based upon practical experience in the field of air transport. We have stressed the principles of flexibility and expandability in these plans as the only means of erecting economically sound buildings in a period of transition and development which has no clearly defined limits. Among technical men these ideas could have been diagramatically presented but since so many of these schemes had to be presented to non-technical groups, we had to utilize the preliminary sketch method as a means of expressing our ideas.

In recent months we have studied the "unit" terminal idea, which we arrived at two years ago. At first we thought it only practical or necessary for major terminals, but since have come to regard it as also well suited for intermediate stations and minor stops. The "unit" terminal scheme has found favor and is being developed for both the Seattle-Tacoma and the new Chicago Terminal Buildings. This fact may be of interest to you that a rough survey of terminal facilities needed and partially planned for along our routes added up to the sum of over thirteen million dollars whereas the airport developments in those same areas ran over one hundred and ten million dollars.

Mr. Kenneth Reid

July 31, 1944

I very much enjoyed my visit with you and Mr. Lopez in New York, and hope that I may have the pleasure of meeting you again.

Yours sincerely,

FRM

Mr. Francis R. Meisch
Architect and Plant Engineer

FRM/SF

AIR COMMERCE
EDITION OF FLYING
540 NORTH MICHIGAN AVENUE
CHICAGO 11, ILLINOIS

January 19, 1944

DEL 6100

Mr. F. R. Meisch
Plant Engineer
Northwest Airlines Inc.
St. Paul 4, Minn.

Dear Mr. Meisch:

Thank you for your letter advising us of your desire to cooperate with us in publishing sketches of terminals that you are in the process of preparing. You stated that you would be unable to determine to what length you could go until after the end of the year.

This is merely a reminder and a query as to what prospects are for early submission of this material.

Sincerely yours,

AIR COMMERCE

David Goodman

DavidGoodman:jf

Associate Editor

ENGR. PROJECT NO.	
ROUTE THIS COPY TO	

March 7, 1944

Mr. David Goodman
Associate Editor
Air Commerce
540 N. Michigan Ave.
Chicago, 11, Illinois

Dear Mr. Goodman:

We received your letter of January 19, 1944, but were forced to delay our reply. Our period of project and personnel reorganization required a great deal more time than was anticipated.

At the present time we are beginning to get back into the solution of Terminal problems. We wish to assure you that we have kept your request in mind, and that as soon as material is available for publication, we will contact you.

Very truly yours,

NORTHWEST AIRLINES, INC.

F. R. Meisch
Plant Engineer

FRM/SF

AIR COMMERCE
EDITION OF FLYING
540 NORTH MICHIGAN AVENUE
CHICAGO 11, ILLINOIS

December 21, 1943

Mr. Francis R. Meisch
Plant Engineer
Northwest Airlines, Inc.
1885 University Avenue
St. Paul, Minn.

Dear Mr. Meisch:

We were extremely interested in your article appearing in the November issue of New Pencil Points magazine entitled "Architecture and Air Transport." You mention that Northwest Airlines is in the process of designing several theoretically ideal terminals with a view to being ready for queries from municipalities. We would be interested in publishing sketches of these terminals either in preliminary or final form.

In addition we would like to invite you to submit an article based on the ideas incorporated into these terminal designs - an article aimed at advising municipalities on airport development. This article might embody some of the ideas contained in "New Pencil Points." There is no particular limit as to length, but illustrations should accompany materials submitted. We would, of course, pay well for the article.

We shall look forward to hearing from you.

Sincerely yours,

AIR COMMERCE

David Goodman

DavidGoodman:jf

Associate Editor

ENGR. PROJECT NO.

ROUTE THIS COPY TO

Lindquist VCL

December 24, 1943

David Goodman
Associate Editor
Air Commerce
540 North Michigan Ave.
Chicago, 11, Illinois

Dear Mr. Goodman:

I received your letter of December 21, 1943, concerning your desire to publish sketches of terminals we are in the process of preparing.

At the present I am desirous of cooperating with you in this matter, but will be unable to determine to what length I can go until after the end of the year. You see, our normal operational requirements take precedence over our post war planning. Consequently, our terminal studies and sketches are not being completed at any given rate, but rather by sporadic periods of work.

I will contact you some time during January as soon as our project requirements for the coming year are defined.

Yours truly,

NORTHWEST AIRLINES, INC.

F. R. Meisch

F. R. Meisch
Plant Engineer

FRM/SF

FLYING

540 NORTH MICHIGAN AVENUE
CHICAGO 11, ILLINOIS

Dear Sir:

Man's conquest of the air has been spectacular -- but developments that portend in aviation promise an even more amazing aspect...developments that would have seemed incredible, just a relatively short time ago.

The speeding of passengers and commodities through the air, in volume and at a pace heretofore undreamed of, soon will be a commonplace -- it will be the accepted mode of transportation.

Consider the amount of planning and building that the Air Age will require -- hangars and other buildings, facilities for the accommodation of aircraft and personnel -- myriad developments in architecture engendered by the new transportation methods.

For the purpose of keeping yourself acquainted with all developments in aviation that are bringing about this transition, you need a reliable medium of information as to what is taking place in the field...and FLYING magazine is that medium. A steadily increasing number of architects are finding it an essential publication in their reading program. FLYING presents facts in the matter of developments in aviation -- the most up-to-the-minute news interestingly presented, editorially -- information on all that's taking place now in the realm of aviation, and what is forecast for tomorrow.

FLYING, staffed by editors of outstanding ability and experience, gathers for its readers from authentic sources all of the news you want and need in this field. Articles by experts -- recognized authorities on their respective topics -- are carefully selected for each issue. No effort is spared to make FLYING the most interesting and helpful medium of its kind - to present to its readers all available data on the vital subject of aviation in all of its aspects.

FLYING is the aeronautical magazine that you need and should have -- it's designed to fit your requirements on these subjects and to keep pace with them.

Events are taking place now in aviation with exciting speed - don't let these events "get ahead of you"...subscribe NOW to FLYING --- a subscription order card and a business reply envelope are enclosed herein for your convenience.

Cordially yours

H. G. Strong
Circulation Director

ZIFF-DAVIS PUBLISHING COMPANY

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219 Abbey.

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FRANCIS R MEISCH NORTHWEST AIRLINES INC

WOULD GREATLY APPRECIATE COLLECT WIRE TELLING US ARCHITECTS NAME FOR ST AUSTINS CATHOLIC CHURCH ST PAUL ALSO YOUR OPINIO N ITS MERIT. MANY THANKS

GEORGE A SANDERSON PENCIL POINTS MAGAZINE 330 WEST 42 ST.

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441P

Wallboard Tile
Acoustic good

Pencil Points... the magazine of architecture

published by Reinhold Publishing Corporation, 330 West 42nd St., New York 18, N. Y. BRyant 9-4430

VIA AIR MAIL

October 12th
1945

Mr. Francis R. Meisch
Northwest Airlines, Inc.
1885 University Avenue
St. Paul, Minnesota

Dear Mr. Meisch:

Thank you very much for your kindness in giving us such complete information about St. Austin's Catholic Church in Minneapolis. It was really much appreciated. We came across a few under-construction photographs and it looked as if it should be good, but we had no idea that after the frame was finished they had felt the need to make it look as if it had been done with concrete, if not mirrors. Frank will proceed with the use of one of the construction pictures, but I guess I won't get too excited about the finished job.

It certainly was a coincidence to have the news item turn up just now about Colonel Troy's return from the war to take up the cudgels again at St. Austin's.

Thank you, too, for your mention of the Lutheran Church designed by the late Walter Huchthausen. I shall write to Roy Jones to make further inquiries about it.

I hope things are going well with you, and I trust that my request did not constitute too great an imposition. Ken and Frank join me in kindest regards.

Sincerely,

George A. Sanderson

George A. Sanderson
Editor

gs:el

also publishers of Chemical Engineering Catalog, Metal Industries Catalog, Metals and Alloys, Architectural, Technical, and Engineering Books

REVIEWS

(Continued from page 96)

Design calculations for radiant heating become more lengthy (*not* more complex); they include more factors than do calculations for other types of heating—texture and finish of interior surfaces as they affect body Btu loss under varying conditions of outside and inside temperature; relative humidity; mean radiant temperature. And because radiant heating formulas take such factors into account, the heating system developed by their use can provide greater comfort in specific cases than other formulas and methods. It is true that many factors enter into heating requirements which cannot at present be analyzed or precisely calculated; but in radiant heating formulas we have taken a long step forward.

The author's association with the heating specialty field (in developing radiant heating controls) is indicated in detailed analysis of air venting, flow adjustment, and controls. Equally practical is the presentation of methods of radiant cooling and snow melting, accompanied by design graphs and installation details.

Much of the information in the book has hitherto been widely disseminated. Here, in one volume, are heat emission graphs; tables of heat transmission coefficients, conductivities, and temperatures; pipe selection, sizing, and spacing data; coil dimensioning charts covering most of the conceivable installation conditions. Their convenient reference form will be welcomed.

PHILIP F. HALLOCK

THE HOME FREEZER HANDBOOK

Gerald J. Stout and Philip H. Hallock. D. Van Nostrand Co., Inc., 250 Fourth Ave., New York, N. Y., 1947. 337 pp., illus., 5½" x 8½", diagrams, index. $3.95

This book is concerned chiefly with large freezers for suburban or farm houses. The authors consider that freezer compartments now available in domestic refrigerators are sufficient for city use where packaged frozen foods are readily obtainable; for country use the minimum size should be 40 or 50 cu ft capacity.

Complete descriptions are given for constructing home-built freezers costing much less than the commercially built units on the market. Operating costs are also much less. It is recognized, however, that long storage in a freezer does add considerably to costs of food and much of the book is concerned with economical planning of the family food supply.

Most interesting to architects is the authors' suggestion to include a cold storage room in house plans and build the freezer in this cold storage room, combining the advantages of the old fashioned "root cellar" and the modern freezer.

JOHN RANNELS

AIRPORTS: DESIGN, CONSTRUCTION, AND MANAGEMENT

Horace K. Glidden, Hervey F. Law, and John E. Cowles. McGraw-Hill Book Co., 330 W. 42 St., New York 18, N. Y., 1946. 662 pp., illus., 142 figures, 55 tables, 6" x 9", cloth, introduction, appendices, index. $7.00

This is a book by three Civil Aeronautics Administration employees expounding Civil Aeronautic Administration methods of airport design, construction, and management, as well as the part government plays in the development of airports. It is, to a degree, an index to past government thinking and standards in the field of airport development. The intention of the authors was to acquaint the reader with the important factors that enter into problems of airport design, construction, and management. In addition, they attempted to provide procedures and guides for solving these problems.

In providing procedures and guides, the

(Continued on page 100)

WITH COPPER TUBES;

you **subtract** *installation time . . .*

add *years of rust-free service*

WHETHER it's a heating installation like this one, or a simple plumbing job for a small home, Anaconda Copper Tubes offer the advantages of comparatively easy installation, freedom from rust, light weight, smooth flow through solder-type fittings, moderate cost and long-term service.

The economies afforded by copper tubes make them a paying investment not only for water lines, but also in forced circulation hot water heating, as well as for lawn sprinkler systems, tank-to-oil-burner, bottled gas and other connections.

Anaconda Copper Water Tubes, Types K and L, together with solder-type fittings are supplied by wholesale distributors from coast to coast. Further information in Sweet's, 1946, A-26-1. 4776-B

ANACONDA
from mine to consumer

Anaconda

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THE AMERICAN BRASS COMPANY

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Subsidiary of Anaconda Copper Mining Company
In Canada: ANACONDA AMERICAN BRASS LTD.
New Toronto, Ont.

REVIEWS

(Continued from page 98)

authors have collected a great deal of technical data and often go into minute design detail. Since the chapters which cover various aspects of airport development are not equal in importance or treated alike in respect to detail, the book lacks balance. Of the 662 pages in this book, 292 pages are in text, 284 pages are appendices and 114 pages are illustrations, tables, or graphs. There are 31 appendices, of which 24 are reprints of the Department of Commerce Civil Aeronautics Administration specifications.

The text is devoid of imagination and creative thinking and in some instances the material is misleading and confusingly presented. This is especially true of the chapter on "Airport Buildings," wherein the lists of facilities for airline operators at major terminal buildings infers situations and arrangements which are directly opposed to airline policy, practices, and standards. The material on airline maintenance hangar facilities is confusingly arranged and shows a poor grasp of the functional organization of such facilities. Next to the chapter on "Airport Buildings," the chapter on "Management and Operation" is the most disappointing in the book; although "Management" is emphasized in the title of the book, only 22 pages out of the 662 are devoted to this topic.

F. R. MEISCH

NAMES ON THE LAND

A Historical Account of Place Naming in the United States. George R. Stewart. Random House, Inc., 20 E. 57 St., New York, N. Y., 1946. 418 pp. $3.00

Although George R. Stewart omitted the familiar and dubious tale of how Staten Island, New York, was named (said one Dutchman to another: Iss dat en island?), he produced an amusing and fascinating book out of America's picturesque place names. Some of his stories are fantastic, some are frankly questionable, but all seem more valid than the Staten Island yarn.

One of the best anecdotes in the book concerns the naming of Oregon. In 1715 a careless engraver, copying a French map of the unexplored Midwest which spelled the Wisconsin River, Ouisconsink, wrote instead Ouariconsint and hyphenated the word before *sint.* There thus appeared an Ouaricon River, which Major Robert Rogers in 1765 offered to discover for Britain's king. In his petition the spelling was variously Ouragon, Ourgan, and Ourigan. (Grammar-school educations were at a premium apparently.) Another explorer got to the river, which turned out to be on the

(Continued on page 102)

PA-4
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INTER-OFFICE COMMUNICATION

NORTHWEST AIRLINES, INC.
Executive Offices, St. Paul, Minn.

January 30, 1945

To: F. R. Meisch, Architect & Plant Engineer ZP

From: General Manager's Office SA

Subject:

Dear Frank,

May I extend my congratulations on your excellent article in the November "Pencil Points". I know that it represents a great deal of planning and effort on your part.

Northwest Airlines is certainly fortunate in having one with so fine a knowledge and planning ability for the future development suggestions which your article promises.

Congratulations!

Sincerely,

Frank.

FRANK C. JUDD
General Manager, Western Region

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C
J

PROGRESSIVE ARCHITECTURE

REINHOLD PUBLISHING CORPORATION • 330 W. 42 STREET, NEW YORK 36, N. Y.

February 4, 1953

Mr. Francis R. Meisch
2815 41st Avenue South
Minneapolis, Minnesota

Dear Mr. Meisch:

I am enclosing a draft of the copy which we have prepared for the special airport issue of PROGRESSIVE ARCHITECTURE. I would very much appreciate your critical appraisal of what we are planning to say about the subject of planning airplane terminal buildings.

You will understand that the text runs throughout an entire issue of the magazine and will be liberally illustrated with charts and diagrams as well as pictures of a great many airport buildings.

I don't want to rush you on this "crit" but I would appreciate receiving your comments within a couple of weeks.

Sincerely,

Thomas H. Creighton
Editor

THCREIGHTON:MC
Enc

2815 - 41st Avenue South
Minneapolis 6, Minnesota
February 15, 1953

Mr. Thomas H. Creighton, Editor,
Progressive Architecture,
330 West 42nd Street,
New York 36, N. Y.

Dear Mr. Creighton:

I am returning herewith the manuscript for the May issue of Progressive Architecture. The manuscript on the whole read well, held my interest, and was well balanced. You have done an excellent job of organizing and simplifying a subject that lends itself to complexities. I believe you have brought the subject out in the open and have treated it from a number of view points that have not been treated previously in an architectural publication.

Rather than mark up the manuscript too much I am putting my comments in this letter with a reference to the item and paggenumber. In general there is only one technical term that I should like to correct and that is the use of the word 'ramp' for apron. Technical men within the airlines regard a ramp as an inclined plane and prefer the word apron. It is possible though that the word ramp has been used to such an extent in the industry that its use may never be eradicated. Taxiways are often ramped to accommodate chagges in grade and ramps are used within terminals for vehicle traffic; so it is to avoid confusion that the word apron is favored.

Item 1. Page 1. Probably safe to leave this as is although this depends on whose estimates you are using as to whether this is true or not.

Item 2. Page 1. The economic position of the airlines is the reason for much confusion and many complications; however many carriers are paying their way and many are operating without subsidies. The airlines fought the stigma of subsidy for many years and still resent it. The original purpose of the mail pay subsidy and that is true for the feeder lines who are receiving subsidies today was the building of a strong commercial airline system. Mail pay was high until the carriers developed passenger traffic. As passenger revenues rose, mail pay dropped. Finally mail pay was so low that the Post Office Department really made money on the airmail carried by many of the large airlines. Some short time after the war statistics showed that the profits from airmail for the P.O. Dept. were greater than all the previous subsidies that had been paid the airlines. Thus the taxpayer actually got his dollars back. Present day profits from the big carriers are being used to develope the feeder lines. Trans-ocean mail pay which was at first in the subsidy class has and is being cut drastically and this is being done because the government feels thatthe U.S. carriers are now strong enough to compete with the foreign

carriers who operate under subsidy by foreign governments and with lower wage scales.
The crucial item in airline economics is the break-even point. It has been said there is no industry in which you can make or lose money more rapidly. As a public carrier, you just don't go out of business in the off season and only operate when the going is good. An abnormal situation sends profits soaring or plunges the carrier into the red. The break even point is based upon too many variable factors. For example an increase in cost of one-half a cent a gallon in the cost of aviation gasoline could mean the loss of as much as $750,000 annually to an airline. Poor weather in the height of the traffic season or a crash can lower traffic and ticket sales appreciably. The major air carriers want to pay their way and many of them do so today, but with profits on such an unstable basis they fight to maintain the status quo of the factors that affect profits. The trouble with the sentence under discussion is that it is subject matter for a book on airline economics and not an article like yours. Its effect on airline participation in the airport and terminal is this: a desire for stability in use fees and rentals to aid in establishing the annual airline budget, and a reluctance to commit future uncertain profits fnr drastic changes.

Item 3. Page 3. Page 17. Page 68. Standardization of aircraft and related items is a very worthy goal. At the end of the last war many technical men in the airlines recommended such a policy to their managements without success. I believe that it was competition rather than jealousy between lines that really prevented this. The competitive position of the aircraft manufacturers in going after airline business was based on the fact that they had something better to sell; they wanted to exceed their competition not standardize with their competitors. The lessons learned so far have been this:(by the manufacturer) a. There is more money in military aircraft. b. Tailor making aircraft varieties to different airline needs is too expensive. c. There is little enough profit in manufacturing commercial aircraft so only produce one good type and offer it to all who are willing to purchase same. With both the profit margin and the demand for commercial aircraft small there are now fewer manufacturers offering commercial aircraft for sale. A limited degree of standardization is going to be forced upon the airlines by just such facts. Airlines on the otherhand want aircraft best suited to their specific problems and so you get different aircraft and component parts to meet some of the following requirements: a. short haul business, b. medium hall business, c. long haul business, d. high passenger - low cargo combination, e. high cargo - low passenger combination, f. luxury travel, g. coach travel, etc. etc. etc. If only the standard model is available at the factory, the airlines will take delivery and then modify the aircraft to meet their own particular route characteristics and airport problems. All terminal planners agree that standardization in aircraft would sdve many problems but none feel that standardization will ever reach the point that has been achieved in railroad cars. Aircraft are designed first to fly - the air is their natural medium - and only secondly (often it appears to be an afterthough) for movement and handling on the ground. Second story loading of aircraft which would be highly desirable at a congested center like Chicago is rejected because the aircraft serving Chicago also serve many small communities where the built in passenger step is an advantage and a necessity in reducing ground time and where second story loading would be costly and inefficient.

Item 4. Page 3. Page 18. In regard to the subject of jets and helicopters there is still a great deal of indecision. The helicopter has the advantage of appearing easier to assimilate into the existing airport than the jet. The single engine helicopter is regarded with suspicion by the airlines with multi-engine thinking and experience. Helicopters cannot fly through all kinds of weather and an engine failure can result in a serious crash. The helicopter, regarded at the end of the war as everyman's private plane, is still far from that goal.
The jet picture has changed rapidly during just the last six months. The airlines are gearing their thinking to the use of commercial jet aircraft. Except for those carriers who buy foreign made jets, the U.S. manufactured commercial jet is from five to seven years distant today. Jets while noisy from the ground are going to be attractive for passenger traffic because they are noiseless within and free of vibration. The airlines feel they will be simpler and less expensive to maintain. On todays standards they use a less expensive fuel but much greater quantities of fuel. This will call for greater GPM dispensing facilities at airports in order to cut down ground time. Jets today have only a medium range because they must come down to fuel. Jets cannot be stacked at airports in bad weather because they burn up their fuel too fast. They must have landing priority over conventional aircraft. In instrument weather the number of jets that could be handled at a major traffic center would be very much limited. One international carrier was advised recently by a manufacturer that three jet aircraft was all that they could efficiently hope to use for their South American operation. The hours per day that they can be flown is much greater than with conventional aircraft. For long haul business, however, the turbo-prop aircraft may be superior to the jet. The time lost by the jet making refueling stops keeps it from equaling the lesser speed but constant flight characteristic of the turbo-prop aircraft. The jet is here, but the airline economics of jet operation are still very hazzy. No one knows if they will make money or not. Runways must be increased in length etc for jet operation, however stops at small airports do not appear imminent unless there is a fuel problem.

Item 5. Page55. In regard to airline financial support of the airport Detroit is a case in point. Someday someone will probably write a book about the story of airline operation in the Detroit region. Indecision by the local government forced the airlines to go to Willow Run airport for the operation of four engine aircraft. There the airlines attempted to give the problem of consolidated operation a big try. Whether it was a fair try is a moot question. It ended with the carriers going back to individual operation BUT with the carriers jointly operating the terminal facility. The airlines claim today that they pay their way at Detroit and that they have developed non airline sources of revenue which in turn have helped to pay part of their operating costs. They feel that they have a more efficient management than many big municipalites can give them. They say that there is no padding of the payroll for political purposes such as occurrs at some cities with the excess costs collected from the airlines in high use fees. While we are on the subject of Detroit it might be well to point out one of the causes for abandoning consolidated operation. Cargo handling was the problem. The terminal ground crew loaded and unloaded each aircarft. The ground crew was supposed to be efficient in that there were just the right number of men on each shift to handle the peak load. Each individual air

carrier didn't have duplicating ground crews as was standard in an individual operation. Now we get back to the fact that aircraft are not standard and their cargo compartments are not standard in layout in the same type of aircraft owned by two different lines. Cargo loaded first is usually the last to come off and is removed at the terminating point on the run. Cargo to be unloaded at intermediate points must be placed in specific bins, etc., so that the ground crew at that particular city can readily find it and remove it. If cargo is misplaced, ground time is increased while the crew searches for it and even completely unloads the aircraft to find it - with of course a resultant reloading of everything. Schedules cannot be maintained. Passengers miss connections and everything gets fouled up. The crux of the situation was this at Detroit. Say eight airlines flying seven different basic aircraft types destined to more than a hundred different cities was the situation. The consolidated ground crew with some highly paid damn smart supervisors could get the right cargo (mail express, baggage) into the right cargo compartments on each aircraft so that at the next stop down the line or at all the stops on the line, the proper cargo could be readily found and removed. The net result was that Detroit under consolidated operation was getting aircraft out on time but was causing delays in many cities down the line and costing the airlines money and hard feelings. So --- the carriers went back to the individual cargo crews who knew the airline aircraft and its loading procedures - and I hope lived happily thereafter.

Item 6. Page 9. At small airports where the visitor-spectator ratio is high the comingling with the passenger is a problem and much congestion results - usually because the waiting room provides a view of the field for the benefit of the passenger and the local citizens. I dont believe in painting windows black in order to charge for a view of the airport, but unless local airport management is willing to provide additional waiting room space or spectator galleries, they had better think twice about where they provide the view of the airport.

Item 7. Page 10. I do not know whether there are any other statistics to support this contention or not. Several years ago at Minneapolis, NWA was tied up by a strike of mechanics for several days. Airport management expected that restaurant receipts would drop sharply from loss of passenger revenue. However, there was no appreciable drop, and the resulting deduction was that in Minneapolis the major income on food was from the employees at the airport and not from the passengers.

Item 8. Page 15. If you can show this by formula or graphically it might help in explaining the problem. Average aircraft seating capacity is quite a problem for the uninformed. Should you say more about this? Seating capacity is limited on through flights and can also be limited on originating flights. Ground time for aircraft often varies with the size of the aircraft. Airports with terminating and originating flights don't always average out to 15 minutes per movement. Originating flight require 2 to 3 times the ground time of a terminating flight and by this I mean the time the aircraft is parked at a gate position. Aircraft in international traffic require considerably longer periods of time - sometimes several hours. Based upon published airline schedules and a knoweldge of the actual time required to handle originating, terminating, and through flights of various types of aircraft, I have graphed the utilization of gate positions on a twenty four hour basis. It is extremely enlightning. Traffic generates traffic and connecting flights which establish some sharp peaks in the number of gate positions required and the time when they are required.

Item 9. Page 26. Something more might be said or illustrated in your article about 'parallel runway principles" The directly parallel runway system is usually to be avoided unless one runway is limited to takeoffs and the other to landings. Simultaneous landings under instrument conditions on parallel runways are not considered practical unless the two runways are so far seperated that they are practically on seperate airports. The tangential runway principle seems to be the only answer to simultaneous landings on instruments.

Item 10. Pages 27-28. The number of runways to be planned depends upon the maximum number of passengers to be handled. I think one might take issue with this. I am afraid it dould be misleading. Actually the number of runways required is a function of available aircraft seat capacity versus passenger demand - not merely passengers alone. Iff aircraft seating capacities are increased in the future - more passengers can be handled without an increase in runway capacity. It might be well to mention somewhere that mixing other operations with that of the commercial airlines poses a different problem for determining runway capacity and number. At airports with private flying or military flying such additional demands for runway usage must be added to those of the airlines. Also the runway number determined via passengers is not an index as to what cargo operations will be. Most carriers expect that cargo will be hauled on all cargo planes in the off-peak period for passengers in order to get greater utilization out of ground personnel without additional help.being needed. Early in commercial aviation passenger travel was restricted to departure times when the mail was ready. This has carried down to the present day. If mail gets to the point where it is carried on all mail flights it is safe to assume that there will be some conflicts with passenger schedules and time of travel habits. Under certain conditions it is possible that runway capacity over and above that indicated by the passenger demand will be required.

Item 11. Page 38. The present unit terminal operation at Chicago Midway airport has been criticized for the distance a transfer passenger must walk on going from one airline at one end to another airline at the other end of the terminal. In the master plan for Chicago Douglas airport which used the finger scheme, I believe the distance involved for a passenger to walk in getting from the end of one finger to the end of another finger was over twice that which has been so severely criticized at Chicago Midway. The planning consultant dodged that one (tried to dodge it anyway) by saying 'Oh well, we will build all the gate positions around the hub of the terminal first and only add others going out on the fingers as traffic requires it! In reality there was no need for the full hub until all the fingers were required and since it was going to be cheaper to build fingers or expand a finger, expansion would naturally run that way and in not the longer walking distances rather than in building the very expensive hub with its relatively few gate positions.

Item 12. Page 39. I have never known any airline that preferred or was satisfied with the double parking of aircraft. It is a terrific operational headache indulged in by the carriers only when there is no other solution. Wide seperation of gate positions of a single airline means more personnel and equipment as well as supervision to cover the water front. Airlines believe in consolidation within an airline even if they won't consider consolidation with other carriers. The only solution to double parking is more gates or more diversified scheduling to avoid the peaks.

Item 13. Page 39. Parking positions for extended layover of aircraft as far as I know have never been objected to by the airlines especially if these positions help to avoid double parking and free valuable aircraft parking positions at the terminal. Layover parking positions will be used by the airlines to a greater extent if they are in the terminal vicinity - for example on the opposite side of the taxiway that serves the apron in front of the terminal building. However on most existing airports runway clearance lines are violated if such positions are constructed. In a new development plans for such positions are possible of incorporation. At Chicago where terminal apron congestion was heavy I put in several layover parking positions for NWA, which were over 1½ miles from the NWA parking positions on the terminal apron. With taxiway space crowded and congested, an aircraft could not always leave its gate position at the terminal and taxi to the layover position in less than ten to twenty minutes. The return trip often took just as long. If the layover time between normal time at the gate position required for arrivals or departures was less than thirty minutes, it is easy to see that it wasn't economical to move the aircraft. This may be an extreme case but it was rather unrealistic to move an aircraft out of its gate position and keep it in motion for almost thirty minutes and add to the in-motion congestion on the airport just to free a gate for thirty minutes. It was done in order to keep things moving at Chicago but I think it points up the case as to why the airlines frowned on such a practice. The theory of layover positions is excellent but they must be properly studied and located near the terminal in order to make short term moving of the aircraft practical and economical. The layover positions can only be farther from the terminal if the layover period is of greater duration. It is more economical to tow aircraft than to taxi them, however at Chicago the congestion called for the greater speed of movement only obtainable with taxiing. Congestion also prevented thorough cleaning of taxiways and aprons of snow and ice in the winter at Chicago and often made towing impossible even if it had been other wise practical. To sum it all up, it appears that the practicality of layover positions is one that requires individual study on each airport to determine if they are workable or unworkable under local conditions.

Item 14. Page 37. Comingling of fuels has been accepted for years by the airlines and they all agree that they have done same and that it has worked. Some say it in an undercover fashion and some say it openly, but they never admit to it as an industry policy. FEAR seems to prevent them from doing this and that fear is municipal control or ownership of the underground pipelines running to each fueling positions. The amortization of the pipeline cost is always or nearly always set up to be a per-gallon tax on the fuel used by each consumer. I believe I have pointed out previously how increases of a fraction of a cent per gallon can give an airline a severe financial headache. Municipalities have always tried to tax aviation gas and comingling of fuels will give the municipaliies an excellent chance to do so. If it is done in one community, then all the cities want to do it. Taxation for amortization doen't always stop when the system is amortized. Comingling of fuels has been regarded by the technical men of the airlines for a long time as the only practical method of fuel handling on large airports. If the financial arrangements can be worked out so that the airlines only pay for the cost of the system and its operation, all will be well. It is municipal ownership with the possibility of municipal purchasing of gasoline and the adding of a municipal 'handling charge' or tax for such a service that is another factor. The subject is very compli-

cated and I could write several pages of very good reasons for the airlines reluctance to accept comingling of fuel. The reasons are almost all legal and financial - very few are technical. There are of course technical problems to overcome but they appear minor compared to the other obstacles. I am afraid that in this case I am trying to point out to you that the airlines are not against progress but that their fears are real and are based upon considerable experience in dealing with municipalities. The use of jet aircraft with their great fuel consumption requirements may turn out to be the factor that will bring about comingling.

Item 15. Page 49. Airline communications is a rather large subject in itself with a very interesting history. Communications are largely intra-airport and inter-airport as well as to aircraft in flight and there are the usual ties with the city being served. I question whether the use of a coordinated space, centralized space, or consolidated space and/or operation is the practical answer. Communications are the nerves of the airlines and communications failures can throw an entire airline off schedule. A lost message or a delayed message can cause more trouble than the loss of an airmail pouch of registered mail. Time is of the essence in communications and therefore the equipment for communications is located at the points on the apron, in the terminal, hangars, ticket offices, etc. where it will function best. I won't go into detail on communications except to say that consolidation of communications or equipment where airline messages could get mixed up with those of another carrier is usually very carefully avoided. Communication costs are big items in every airline's budget. The carriers a few years back got Aeronautical Radio Inc. established to provide them with common facilities and to cut costs and duplication wherever practical. Through the years AerInc as it is known in the industry has taken over more and more communications duties for the airlines. The principal reason has been that the number of radio channels or frequencies available to the airlines have been reduced and curtailed by the FCC forcing the airlines into accepting a consolidated service. This service has been principally a radio service for in-flight communications. Only in a few instances has teletype been turned over to AerInc. Airline studies have shown little or no savings to be gained at major traffic centers by a consolidation of teletype communications.

Item 16. Page 53. Suggest cargo handling or working area be substituted for storage. The working of cargo is the primary consideration and storage is entirely secondary. Cargo destined for air shipment is going via air to save time. While cargo lends itself to storage more readily than passengers do, it too must be kept moving to justify the choice of transportation. Cargo is usually only stored (in the true sense of that word) at an airport when it is being shipped to some destination only accessible by air and not to save time. A case in point could be shipments to some of the Aleutian Islands. Such shipments, too, are more likely to be hauled by the non-scheds than the scheduled carriers.

Item 17. Page 60. It took a long time to get the airlines to realize the advantages of standardizing equipment within an airline so as to cut costs and improve efficiency - on such items as baggage scales and ticket counter inserts, etc. Such items were standardized so that airline personnel could be moved from city to city without retraining and so the airlines type of operation could be improved. Investment not only in equipment, but personnel training, operating manuals, policies, etc. now is so great that the changing of ticket counter insert is more than the mere cost of the insert. Admittedly standard inserts or size of insert would be highly desirable in the industry and I hope it will come, but in the process of changeover a lot of money will have to be spent.

Item 18. Page 63. In the nine years I spent with NWA and in working with technical men and administrators of other carriers, I felt that the airlines were fundamentally conservative only where passenger safety was at stake. I found the airlines to be economically poor and unable to carry many experiments and good ideas into practice because of lack of capital or profits. The industry is loaded with ideas and has always been willing to experiment within its budget. Competition between the carriers has been the cause of many improvements in air travel and one of the reasons for the rapid progress and growth of the industry. On the otherhand competition has had its drawbacks in that it has prevented standardization and more unified action on the part of the industry. Only as the traffic volume and the route pattern for each carrier reaches stability or a leveling-off point will it be possible for the carriers to minimize competition and unite for the broader common good. Should the underlined portion of the sentence read thus: a lack of investment capital on the part of the airlines and a fundamental conservatism on the part of government agencies with regard etc?

Item 19. Page 68. I agree that it is too bad the carriers can't afford to build their own stations. They did build many stations and had some of their most efficient operations in such facilities. UAL and NWA built their own stations at Portland. NWA built its own facilities originally at Yakima and at Miles City. There are many other cases as well. It was airline money that built the present terminal at Chicago and only lack of an adequate site that caused it to be inadequate. The airline planners predicted its inadequacies before it was off the drawing boards. Most stations built by the airlines have been turned over to the municipality in exchange for a lease that amortizes the original investment so as to free the carrier from property taxation.

In order to get these comments to you with a minimum of delay, I am sending them on without restudying or correcting them. I hope you will pardon any errors or lack of organization. These comments might be titled - In Defense of the Airlines - but I do believe that the airlines are fundamentally progressive and that any conservatism on their part is an economic inferiority complex. Competition which is fundamentally good has also been carried to some absurd extremes where it has slowed down progress.

If I can be of additional help, please advise. My best wishes to you and your staff for developing an outstanding issue on terminals. I am enclosing two tickets to the coming American Watercolor Society Exhibition which you or someone on your staff might like to use.

Sincerely yours,

Francis R. Meisch

PROGRESSIVE ARCHITECTURE

REINHOLD PUBLISHING CORPORATION • 330 W. 42 STREET, NEW YORK 36, N. Y.

January 9, 1953

Mr. Francis R. Meisch
2815 - 41st Avenue, South
Minneapolis 6, Minnesota

Dear Mr. Meisch:

I am more grateful than I can tell you for your very thoughtful and detailed response to the outline for the airport issue.

There is a tremendous amount of meat in your comments and I think that a realistic discussion of that sort will help us raise the issue above the usual building type study.

When tentative first copy is prepared, I will send it to you and will hope that once more, you will give us the benefit of your knowledge and experience. We will certainly give full credit in the publication to the help you have given us.

Sincerely,

Thomas H. Creighton
Editor

THCreighton:mg

PROGRESSIVE ARCHITECTURE

REINHOLD PUBLISHING CORPORATION • 330 W. 42 STREET, NEW YORK 36, N. Y.

December 18, 1952

Mr. Francis R. Meisch
2815 41st Avenue South
Minneapolis, Minnesota

Dear Mr. Meisch:

The magazine PROGRESSIVE ARCHITECTURE is preparing a special issue on the subject of the design of airport buildings. Knowing that you have a special interest in this subject, I wonder if I might call on you for advice and help in two respects.

First, I enclose a proposed outline of the issue, on which I would very much appreciate your critical comment. What we would like to do in this issue is present for the architect an illustrated discussion of planning principles for the buildings necessary at an airport, with enough discussion of the over-all problems of air travel, airport planning and the economic and town-planning background so that the point of master-planning and its necessity can be made.

Secondly, after the text for the main body of the issue has been written -- sometime in January -- I wonder if I might have the privilege of sending it to you for your critical comment. It will not be too voluminous, and we do want to have it accurate.

I hope that we can anticipate your help in this respect.

Sincerely,

Thomas H. Creighton
Editor

THCreighton:mg
enclosure

January 4, 1953,
2815 - 41st Ave. So.,
Minneapolis 6, Minn.

Mr. Thomas H. Creighton, Editor,
Progressive Architecture,
330 West 42nd Street,
New York 36, N. Y.

Dear Mr. Creighton:

My comments on the suggested outline for the May issue are enclosed herewith. The comments are in two forms:

(1) A revised outline.
(2) Comments on the revised outline.

I hope that in the comments you will find some inspiration for more than a routine article on terminal design. I am of course prejudiced because of my experience with the airlines, but after a two year seperation from the industry, I think I can comment on the subject with more detachment and an allegiance only to my own profession. Use your own judgment in revising my suggested outline. It is not all inclusive and there are many things I have probably forgotten. You will probably wish to suppress some items and emphasize others.

I will look forward to reviewing the text for the may issue from the standpoint of technical accuracy. I promise to refrain from interjecting my personal viewpoint which I think predominates my comments on the outline too much.

Sincerely yours,

Francis R. Meisch

Suggested Outline for May issue on

COMMERCIAL AIRPORT TERMINAL BUILDINGS

1. INTRODUCTION:

Importance of the problem.
Growth of air traffic.
Future of air traffic.
Position of the architect.
The specialist-consultant.
C.A.A.
Local authorities.
The airlines.

2. PROGRAMMING.

Community studies.
Economic studies.
Traffic studies

3. SITE SELECTION.

4. RUNWAY PLANNING.

(Brief, only studied in relation to planning terminal building).

5. AIRPORT TYPES.

(a) BY SIZE. Small airport. Large intra-national airport. International airport. C.A.A. types.

(b) BY OPERATIONAL SYSTEM. Unit system. Centralized system. Consolidated system.

(c) FLEXIBILITY AND EXPANSION IN ALL TYPES.

6. AIRPLANE CIRCULATION.

Docking methods.
Mechanical docking.
Refeuling.
Cargo handling.
Separate cargo terminals?
Docking in hangars?
Docking under canopies?

7. PASSENGER CIRCULATION.

Ticketing.
In-transit U.S.
Terminating problems.
One- and two-level schemes.
Toilets.
Communications.
Concessions: food (snack bar, coffee counter, restaurant), vending machines, taxis, newsstand, others.

8. BAGGAGE CIRCULATION.

9. ANCILLARY FACILITIES.

Roads and parking.
~~Mail and express.~~
Hangars.
Firehouse.
Police station.
Hotel.
Provision for visitors.
For sightseers.
Employee facilities.

10. MATERIALS, EQUIPMENT, LIGHTING, STRUCTURE.

11. ARCHITECTURAL PRACTICE.

Much time on preliminaries.
Multiplicity of client groups.
Relation with C.A.A.
Is 6% fee adequate?

SUGGESTED REVISED OUTLINE FOR MAY ISSUE ON

COMMERCIAL AIRPORT TERMINAL BUILDINGS

1. INTRODUCTION:

What is the problem?
Why is it important?
Basic factors.
Growth of air traffic.
Future of air traffic.
Position of the architect.
Scope of the work.
The client.
The C.A.A.
The airlines.

2. RESEARCH:

Community studies.
Traffic studies.
Economic studies.
Analysis and interpretation.
Recommendations.

3. PROGRAMMING:

Scope of the work.
Financial.
Architectural.

4. AIRPORT TYPES:

Small airport.
Medium airport.
Large intra-national airport.
International airport.

5. AIRCRAFT:

Aircraft types.
Characteristics.

6. TERMINAL OPERATIONAL SYSTEMS:

Unit system.
Centralized system.
Consolidated system.
Single level system.
Multi-level system.
Combined systems.

7. CIRCULATION:

A basic factor.
Balance.

8. AIRCRAFT CIRCULATION:

The airway and navagational aids.
The airport approach and landing aids.
Airport site selection.
Runway and taxiway planning.
Terminal site selection.
Aircraft parking.
Aircraft servicing.

9. PASSENGER CIRCULATION:

Off the airport.
On the airport.
In the terminal.
To the aircraft.
Methods of enplaning and deplaning.
Terminating passengers.

10. CARGO CIRCULATION:

Baggage.
Airmail and parcel post.
Air express.
Air freight.

11. VISITOR CIRCULATION:

Segragation and control.
Facilities.

12. SERVICE CIRCULATION:

Shipping and receiving.
Employees.
Emergency equipment.
Maintenance equipment.
Aircraft fuel.

13. AUXILLARY FACILITIES:

Airline operational space.
Airport administrationaand operation.
Airport maintenance.
Airport emergency facilities.
Airport traffic control.
Government functions and offices.
Concessions.
Miscellaneous offices.

14. ANCILLARY FACILITIES:

Roads and parking.
Hangars, shops, and offices.
Post office - the A.M.F.
Cargo terminals
Central heating plant.
Landscaping and fencing.
Commisaries.
Hotel.

15. PLANNING PRINCIPLES:

Master plan.
Economic analysis and program.
Circulationaanalysis (Balance).
Functional planning.
Flexibility in planning.
Expansion in planning.

16. TECHNICAL DETAILS:

Materials.
Equipment.
Structure.
Lighting.
Sound control.
Communications.
Signs.

17. ARCHITECTURAL PRACTICE:

Relation to client.
Multiplicity of client groups.
The specialist-consultant.
Relation with C.A.A.
Relation with state aviation agency.
Fees.
Expert advice.
Engineering services.

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COMMERCIAL AIRPORT TERMINAL BUILDINGS

1. INTRODUCTION.

What is the problem? The ultimate objective is to design a successful terminal building, but the road to that objective is one long series of complex problems. Most architects are competent to design a terminal building, but few have succeeded in designing good terminal buildings because they have not attempted to go beyond the architectural aspects of the terminal building and the client's immediate requirements. Regional planning, town planning, airport planning, site planning, economic planning, circulation planning, functional planning, functional knowledge, building techniques, divining the future, keeping abreast of technical developments in aviation, etc. are all elements of the problem.

Why is it important? The terminal building is a new building type with a comparatively brief past or historical development. It does have parallel aspects in other forms of transportation but these can not be relied upon in developing a successful solution. Failure to find successful solutions to the problems will burden the public (and that means John Q. Taxpayer and John Q. Passenger), and the air carriers non functional buildings and a terrific economic burden.

Basic Factors. To get at the roots of the airport problem it is necessary to by-pass the technical and aethetic aspects of architecture (which we assume the architect has already mastered and can apply) and look for the controlling factors. Airport problems differ the world over but all have several things in common: the economic element, circulation planning, and a need for functional design. The problem can be approached from any one of these factors and has, but it is the economic element that has probably been the one that has been most neglected by the architects. How much does it cost? Who pays for it? And how? No one who has traveled the airlines needs to be told about the inefficient and outmoded airport facilities that are still in use or the costly unfunctional monuments that are still being built. The need for sound long range planning in the commercial aviation field still exists. The airlines, the federal government, and local municipalities are all guilty in this respect.

To begin with the airlines were offered the world witha fence around it by many communities in order to induce the airlines to provide them with the benefits of air service. The airlines made the best deals they could in each community without regard for an overall balance or equity in their dealings with these communities. As time passed, the piper had to be paid, but equity in treatment was difficult to achieve for many reasons. The municipalities wanted to get away from subsidizing the carriers regardless as to whether or not their community was an economic asset or liability to the carriers involved. The city fathers wanted to put the airport on a pay as you go basis and avoid the taxpayers' criticisms. There is nothing wrong with that economic principle providing that the carriers get full value in revenue and services in return. However, competition between cities had forced some into building structures that were too permanent and too expensive for a growing industry to operate in on an economic and efficient basis.

The rapid growth of air transportation during the war years outmoded many facilities before they were amortized. Funds for expansion were not made available by the taxpayers who disliked throwing good money after that which had been unwisely invested or who felt that the airlines had grown up and therefore should pay the full costs. The limit of bonded indebtedness and other needs of the community for schools etc. all played their part in the picture. Financing required the participation of many parties - federal, state, local, private, and commercial. The many sources of finance resulted in many voices in the planning and management and in many conflicting claims. The tragedy of obsolete and inadequate facilities is that they were planned by serious competent individuals in many cases and that these individuals thought they were doing the right thing based on the knowledge available at that time. Was this because they were up against a new industry or a new building type? How can we be sure we are on the right path today?

The commercial airlines are in business to make money as well as to provide air service. Many of them have not made money nor known real economic stability. The government has by both direct and indirect subsidies attempted to build a strong commercial aviation structure in the United States. The airlines would like to operate on their own ability and pay their own way. This is not always possible because of the conflicting aims of government at various levels (to say nothing of politics and pressure groups). The government takes with one hand and gives with the other, often with strings attached. High airport use fees, gasoline taxes, multiple taxation on flight property, space rentals, etc., force the airlines to seek subsidy or rate increases, and in the end it is the public and the taxpayer who pay. Local politicians would rather have the federal government (or the citizens at large) pay for airport developments and improvements than have the local taxpayer finance the local airport development directly.

Until one realizes how complex this economic merry-go-round is, one cannot properly evaluate the airport problem and who should pay who for what! Funds wrongly spent are usually impossible to salvage. The greater the investment the less chance for change and the greater the resistance to correcting the mistakes of the past. Continued growth of the commercial aviation industry is dependent upon a favorable economic situation: rates and fares that are reasonable and competitive; economic, efficient, and safe operation by the airlines; and reasonable taxation, use fees, and space rentals by the various levels of government. Inflation and the rising costs of operation (both labor and materials) have made it difficult to determine just what constitutes reasonable and just use fees and space rentals. In as much as construction costs and sound planning play a part in determining use fees and space rentals, the architect is directly involved in the overall economic picture. The architect's solution for the use of airline space in the terminal building determines how efficiently and economically the airline can operate in that phase of its business. The question of high initial costs versus long range economies always comes up in construction problems. From the standpoint of a growing industry, the interest centers on a low initial cost with the higher costs deferred until the industry grows up enough to pay them. Of course this type of airline policy cannot be carried on too long. Some day and that could be today, the industry will have reached its potential growth and the leveling out process will begin.

Aside from economics, the problem of circulation planning is the next most complex factor that the architect should be expected to solve, and this is the one major factor that he is by training and experience most competent to solve. He may be forced to lean on the help of others in economic planning, but in circulation planning he is the one on whom others will look for leadership and the solution. More about circulation later.

Functional planning is also the architects domain and I use the word functional here in the sense that it covers everything from A to Z in the design and construction of a building.

Growth of air traffic. This I thought you meant to be historical figures (best illustrated by graphs) on the growth of airline passenger traffic, air mail, air parcel post, air express, and air freight. This could also be air traffic meaning plane traffic from the airspace congestion stand point. This involves the number of aircraft movements on the airways and the number of aircraft landings and departures it is possible to make on the airport. Of grave concern is the number of landings and takeoofs that can be made under instrument conditions at major metropolitan centers. I don't think you were thinking of this aspect but it is the governing factor in attaining a goal of 100% all weather operation with all scheduled flights completed. Unless this is attained, the fantastic capacities of certain airports in good weather would be severely handicapped in bad weather. It would be foolish to plan terminals based on the potential fair weather capacity of an airport when actually the instrument whather operation capacity is the factor that determines how many aircraft can be economically scheduled and operated in to that airport.

Future of air traffic. This I assume you mean to be projections and estimates of future ait traffic, such as passengers, mail, etc. Here is where I wish I had a dollar for every bad guess that was made in the past. You can assemble such estimates on a national basis and graph them, but they will mean nothing to a local architect unless he uses them very judiciously. Local traffic curves vary widely from the national total. Projections based on cities in the various population brackets tend to vary greatly when you get into cities with small populations. Rochester, Minnesota, for example, has a phenomenal air traffic in proportion to its population because of the Mayo Clinic. Many small communities still have air service today not because the population or even the trade area population deserves such service, but because the airline originally had to have a fuel stop (gas stop) in that location. The C.A.B. and politics have prevented the carrier from suspending service in a number of such locations. The experts of three different airlines worked independently and used three different systems to develope and project an air traffic curve for the city of Chicago. The airline results were so close to being identical that it appeared to be more than a coincidence and the results were then combined to form a master projection. The airline projection, however, was far below that of the projection made by the airport consultant for the city of Chicago. Time is now proving the airline estimate to be the realistic one. Traffic projections and estimates are very important to both physical and economic planning in the airport problem but they must be REALISTIC. They are dynamite because only the passage of time will verify their accuracy. The program based on unrealstic estimates sooner or later will show weak spots, deficiencies, lack of balance, etc. If the overall airport traffic flow (circulation) system is out of balance, check your traffic projections again.

Position of the architect. The architect usually ends up face down in the middle of the ring whereas he should be the referee. The architect is the one person who by training and experience should be the leader in this project. He should control or direct the research fundamental to the solution of his problem and he should avail himself of proper technical advice where his knowledge or experience is inadequate. He should cooperate with those whose problems are mutual and interrealted. He must lead and educate the client. Howver, the client, is usually a municipality as represented by its mayor, councilmen, airport manager, and/or airport committee or commission. They are all past or future clients of the architect and so he strives hard to please them quite often to the detriment of the project. One airport building is the only structure of that type that he is likely to design and so he does not dig deep enough into the problem to get all the facts or grasp the entire picture; in fact, his fee usually will not allow him to spend that much time on the project. (This is an argument for bringingiin the specialist-consultant.) One of the architects fisst acts is to go on a junket with the mayor or the airport manager to see what Podunk and Squeedunk have done at their airports. On his return he is instructed to design a bigger monument than the one at Podunk. We are now getting some pretty good terminal buildings in the smaller cities, (there the problem is usually less complex but the economics are just as critical) so these junkets are not as out of place as they used to be. At one time there was little to be seen other than the mistakes that had been made in the past and the architects didn't seem to profit by seeing them. The architect, unless he is backed up by a very intelligent and avaition conversant client, is going to have to lead the client in the establishment of a program. Much of the architect's information will not come from the client but must be obtained first hand from the airlines, the C.A.A., Post Office, Weather Bureau, airport manager, private flyers, base operators, concessionaires, etc. The specialist-consultant has developed out of the need for someone to do the necessary research and preplanning which should be a part of the architect's services. The architect is the one person who should be in an unbiased position to to formulate the economic reports and analysis that form the basis for the programming. This may sound like a lot of work (architects are supposed to like to have a lot of work), but it is the only way that an architect can get in on the ground floor and stay there. Lessees like to know how much space will cost and what it will be like in quality and character before they commit themselves on how much they will lease. (Note there is a big difference sometimes between what a lessee needs and what he can afford to pay.) The architect is best qualified to give the answer. The answer should of course be given to the lessee via the lessor or client where rentals are subject to negotiations unless the client allows the architect direct contact with the lessee and has the architect establish the overall economic program. The later is by far the most desirable but little used method of approach. Advance economic study and programming saves hours of negotiating, changes in plans, changes during construction, and results in far better relations between all concerned. The specialist-consultant should probably be discussed at this point because of his historical relation with the client and the architect.

Just as there are many breeds of cats, so it goes with the specialist-consultant. They range from those who offer financial and legal consultation to those who will make traffic studies, estimates, flow diagrams, establish the program, and tell the architect how to run his own profession.

Unfortunately I am prejudiced against the specialist because of what I have seen in the industry. I have seen liars figure and figures lie. Some of the specialists do an excellent and honest job. In many cases the specialist has only added to the confusion by presenting in his report unrealistic and over optimistic pictures which could have been prepared at one-tenth of the cost and a hundred times better by the local architect. The specialist-consultant has the same client as the architect. The specialist is interested in pleasing and flattering the client (to obtain a good recommendation to show to the next client) and usually does it with a voluminous report interleaved with plastics thoroughly sprinkled with Hollywood stardust and bound in leather with the mayor's name in gold leaf on the cover. His fee is so large and he usually tries to take over so much of the architect's work that any 4% architect can carry on from the point where the specialist leaves off. But the specialist is usually looking for another sucker and has left town before his report blows up and leaves the architect holding the bag. The money paid this pseudo-economic expert would be better spent on a larger architect's fee and a less flashy but more honest report and economic program prepared by the architect. There are always plenty of sound businessmen in a community such as lawyers, bankers, realtors, etc. who can assist in making a report and economic plan that would really work. Where the specialist serves for a fee that is too low, there is always the danger that his report will not have been thoroughly prepared and that his recommendations can not be relied upon. I think that the curse could be taken out of the architect client specialist triangle if the specialist consultant were to serve the architect and be retained by the architect rather than the client.

Now as to some of the other breeds of specialists - let us call them, experts. By all means consult them for the various phases of the airport problem such as airport lighting, soils, runway planning, drainage, aviation fuel systems, airport zoning, traffic control, control tower design, etc. These men will be experts on a subject and will have to be relied upon to give the right solution to the individual problems. They will be found in the C.A.A., the airlines, the oil companies, as manufacturer's representatives, professional men, etc.

Scope of the work. This should be determined at the outset of the project. Who does what? Where? and When? It must be understood who is to control and direct the project, its research, studies, analysis, and reports. Who will make the recommendations, the contacts with various agencies, and who do the necessary negotiating. Will it be the architect? the client? the specialist? the engineer? the C.A.A.? The more complex the team is the more essential it is to settle the scope of everyones work in advance. Is it a straight architectural problem? or does it involve complex mechanical help? Is it concerned with runways, taxiways, streets and highways etc.? Who formulates the economic planning? We haven't said much about the engineer yet but don't forget that he is ever present on these airport projects and very necessary. Don't sell him or his services short in this work.

The client. The client is usually the local authorities. This gets pretty deep into politics and varies greatly with the type of government and the individuals involved. The airport manager, airport director, or airport commissioner will usually be the best man to deal with on the local problem and usually has the best knowledge of the immediate problem. On the other hand contact may be entirely with the mayor, councilmen, city manager, or a special committee. City engineers are sometimes concerned with the airport but usually have too many other duties. All in all, in one form or another they are the client, sometimes against their

wishes or better judgement. They are the ones who pay the fee for professional service and decide how much money can be spent on the project.

The C.A.A. This group too has its various personalities but by and large they are a group of competent serious individuals. They are hampered by the fact that they are government employees, subject to government control, directives, censure, and acts of Congress. They live by the 'book' and the Washington directive and lack initiative and immagination. Don't expect those at lower levels to depart from what the 'book' says. There is a lot of good advice in the 'book' as well as a lot of good thinking behind it, but the 'book' is put out by Washington and it takes a lot of red tape and time to change the 'book', hence it may not be up to date and progressive in its entirety. The C.A.A. stands ready to help on airport planning problems and since they have been given funds to dole out for airport and building construction, they also wield a powerful club. They can be very helpful to the architect and should be consulted on all matters that affect them. Remember that many C.A.A. employees are only experts on a particular subject and are not sympathetic to all of the architect's problems. When they are requesting rent free or dollar a year space for government functions in the terminal building, they are quite likely to be over optimistic and unrealistic in their requests. (Don't know whether something should be said at this point about the other government agencies or left until they rear their heads later on in your story. That is the Post Office, Customs and Immigration, Department of Agriculture, Public Health.)

The airlines. The airlines as a word covers a broad field. I assume you are thinking of the scheduled air carriers. How about the non-scheduled carriers? Don't sell the airlines short. The large air carriers have some pretty good staffs of experts on their payrolls and can usually be counted on for traffic forecasts, financial advice, engineering and technical assistance. Some also have very competent architects on their staffs. The smaller air carriers who cannot afford that type of overhead, usually have well experienced operations and station supervisory personnel who will be of assistance. Request your information from these people in writing and get your answers in writing. These people are usually on the move a great deal and you won't always get a chance to talk to the same man a second time. Airlines operate into manydifferent cities under many different conditions on an airline system. They have tested and tried all sorts of things in their short life time and they know a few things about the aviation industry. They LIVE in many different terminal buildings. The local airport manager has usually only lived in one terminal building. The airlines are interested in economic, efficient, and functional terminal buildings. The airlines are quite often competitive at which time they will show the teeth and fight tooth and nail. They will play politics and try to throw their weight around. This when they are negotiating for favored plane parking positions, prime ticket counter locations, etc. On the whole they will maintain a united and solid front in the solution of many of their mutual problems. They have formed the Air Transportation Association of Ameraica as a clearing house for much of this type of thing. There is also IATA (International Air Transportation Association). There are many differences in airline operations and proceedure based upon route structure, financing, equipment, policies, size, etc. Study them carefully.

2. RESEARCH.

Community studies.
Traffic studies.
Economic studies.
Analysis and interpretation.
Recommendations.

All of these items in their broadest sense are the necessary preplanning to the program. This has been the work of the specialist-consultant. It iw work which I believe the architect should do. Economic studies should be more than just an economic evaluation of the community with respect to potential traffic. It should be a study of the potential revenues and costs of airport operation and maintenance. Which in turn is the basis of how much should be spent for the terminal building and redated facilities and what space and services will cost the lessors, concessionaires, and the public. Under analysis the problem of peak conditions and how they should be interpreted should be discussed.

3. PROGRAMMING.

Scope of the work.
Financial.
Architectural.

These are the aspects of programming as based upon the preceeding research.

4. AIRPORT TYPES.

Small airport.
Medium airport.
Large intra-national airport.
International airport.

Discuss by size, C.A.A. type, A.T.A. type, runway length, operations per hour, the mixing of private flying on small and medium airports with that of commercial operations. The problem with the military air operations mixed with commercial operations. Desirability of segragation.

5. AIRCRAFT TYPES.

List aircraft types.
Characteristics.

This is the nonstandardized object you are planning for. Point out its common characteristics and its differences, passenger capacities, cargo capacities, speeds, methods of loading, fueling, servicing, etc. They cost from $ 500,000 to $ 2,000,000 apiece and are not economical to revamp to fit terminal designs. The terminal must accommodate them. That which is most manouverable and fast in the air may be very clumsy and difficult to handle on the ground. Don't forget wheel loads, wheel base, turning radius on the ground and in the air, overall dimensions, etc.

6. TERMINAL OPERATIONAL SYSTEMS.

Unit system.
Centralized system.
Consolidated system.
Single level system.
Multi-level system.
Combined systems.

In here should be much of the meat of the subject. Don't forget to mentionestudying these various systems as to the personnel required to operate them - a big economic factor. Multi-level systems not too good for small operations or small airline. The consolidated system has always looked ideal to the outsider and the only way for the airlines to operate in an

economical manner. Airline experience has shown it to be uneconomical and fraught with many problems. Competition has been the American way of life and free enterprise. Consolidation used where consolidation is practicable and will work is one thing. Forcing airlines into a consolidated operation to achieve pseudo-economies is another thing.

7. CIRCULATION.

A basic factor. Balance. Airport circulation is composed of many types of circulation: aircraft, vehicular, passengers, cargo, and services. The terminal is a focus for these many types, a means of transfer from one type to another. This is a flow process from one media and method to another. It is necessary to maintain all in balance. A limit in the capacity of the flow at any one point is the limit for the total airport. For example the volume of automotive traffic to the airport produces so many passengers who require so much terminal space, so many aircraft parking positions, so many aircraft of such a size, and so many operations per hour and runway capacity and airway capacity to handle same. Circulation throughout its entire pattern of transitions must be in balance. The time-volume frequency will determine the size of many functional elements.

8. AIRCRAFT CIRCULATION.

The airway and navagational aids. This is point to point traffic circulation in the air. It has a town planning aspect in the avoidance of obstructions, flying over densely populated areas, relation to existing airports, future airports, site selection, runway planning, etc. It is concerned with airways traffic control policies and methods, aircraft types and speeds, and navagational aids. Its economic aspect is to maintain the shortest possible air distances between points. Flight time when reduced by minutes or miles results in substantial operational savings. The planning and control of the airways and navagational aids is a C.A.A. function and not the architect's problem. The C.A.A. should and does relocate airways when necessary to improve traffic control or when new airport sites are selected and developed. It is from this angle that it may be necessary for the architect to deal with the C.A.A. in formulating a satisfactory master solution to the problem.

The airport approach and landing aids. This is aircraft circulation after the plane leaves the airways and enters the air traffic pattern around the airport. The plane has left the airways traffic control system and is now under the airport traffic control system or directives from the control tower. Thiscontrol tower operation is a C.A.A. function, but here the architect and the C.A.A. meet on common ground with common problems that both must solve jointly. They are concerned with both the landing and takeoff of aircraft, rejation to the airways, obstructions, zoning of the airspace around the airport and on the runway approaches, landing aids, lighting, control tower visability, the stacking and holding of aircraft overhead in bad weather, etc. This is the link between the getting the aircraft off or onto the airways and off or on to the airport. The problems of circulation here have a broad town planning aspect and economic aspect. A number of the factors of airport site selection are also integral with this phase of the operations.

Airport site selection. Site selection has both internal and exterbal aspects. The external ones are largely those of town planning; relation to the community, the airways, highways, radio towers, other airports, tall buildings, and immovable objects such as cemetaries, rivers, rail roads, powerlines etc. A location by at least two of the last four mentioned items seems to be the criteria by which most airport sites were selected. The internal aspects are those of soil condition, topography, drainage, shape of the property, cost, etc. I have by no means even scratched the surface of the problems inherent in this topic, all of which have major economic implications.

Runway and taxiway planning. This is aircraft circulation and control on the ground. The control tower directs the movements of the aircraft until the ground crew assists the plane crew in parking the aircraft Aprons are used for aircraft movement as wellass the static positioning of aircraft. Hndy must be mentioned here although they are more properly planned in relation to the terminal building or the hangars. One can very easily get lost on the subject of runway and taxiway planning. It is affected by so many thigs: types of aircraft, their performance characteristics, obstructions, soil, drainage, possibilities for expansion, etc. Of importance is the relation to the airways for straight on in approaches and takeoffs. Don't forget the importance of taxiway planning and the relation of the terminal area to the runways. Minimum taxiway distances are desirable to cut down operating costs. Big aircraft cost money to taxi. Time is also valuable. A large aircraft with a crew of seven and four engines running probably costs in the neighborhood of $ 120 an hour to taxi. Save five minutes on taxi and takeoff time by good planning and you save $ 10 per operation. Repeat your saving ten times a day and you have $ 100 or $ 36,500 a year. In ten years it is $ 365,000. Do this at ten airports and you can save $ 3,650.000. Or do this on an airport with two to three hundred operations a day and the money to be saved is phenomenal. This is an example of what I mean by the economic factor that must be recognized in so many of the things that affect airport planning. The airlines are selling time as well as transportation and that time means money to someone. Save time without sacrificing safety and you are saving money and this is true whether you are handling passengers at the ticket counter, baggage, or the aircraft.

Terminal site selection. The problem of the terminal building site selection is related to the community from one angle, to the runways from another angle, and to the hangars from still another angle, with a lot of other problems such as size of apron, expansion space, car parking space, control tower visability, etc. all thrown in.

Aircraft parking. Avoid the term docking. To airline people docks are a system of fixed or movable scaffolds used in or at hangars to service and overhaul aircraft. Subheadings under this topic are as follows:

Size of parking position required.
Number of positions required.
Spacing and planning of positions.
Orientation of aircraft when parked.
    Parallel to terminal.
    Diagonal.
    Tdiddim.
    Nosed in.
Method of parking.
    Under own power.
    Towed in.
    Mechanical methods.

Aircraft servicing. This is a complex subject that varies greatly with plane types and with airlines. Subheadings are as follows:
Gasoline.
Oil.
Water.
Other fluids.
Air conditioning. (Heating and cooling)
Power requirements.
Sewage disposal.
Grooming.
Food service.
Cargo handling. (Cover in detail later)
Passenger handling. (Cover in detail later)
Fire protection.
Weather protection.
Services from overhead or from underground?

9. PASSENGER CIRCULATION. (The animate element in the circulation problem)

Off the airport. This is concerned with where does the passenger come from; hotels, offices, residences, etc. What part of the community generates the most traffic? How does this relate to the airport? How do you get the passenger from point of origin such as airline city ticket office, residence, etc. to the airport? What are the methods of transportation, their proportions, their routes, travel distances, travel time, costs? Private car, taxim bus, airline limo, street car, subway, train, helicopter, etc. It is town planning and the superhighway.

On the airport. This is vehicle traffic handling, movement, control, segragation, parking, and storage. Here you start to merge with the problems of cargo traffic, service and supply traffic, employees, etc. Here is where the passenger proceeds on foot with the related problem of baggage handling.

In the terminal. You have both the entrance on foot and via vehicle. The passenger may be preticked and can go direct to the plane or must go to a check in counter. The unticketed passenger heads for the airport ticketing and baggage check in counter. This process of ticketing varies with airlines, type of passengers, and with the terminal operational system, and includes information, ticket sales, and baggage check in. Must be studied in relation to the following passenger types:

Domestic passenger.
Transfer passenger intra-airline.
Transfer passenger inter-airline.
International passenger outbound.
In-transit alien.

This subject of passenger circulation and ticketing gets into the problems of ticket counter design, unit types, counter lengths, standardization, competitive positions, centralized versus decentralized locations etc. The competitive situation is one of the biggest planning headaches for everyone concerned. Much in the way of politics, pressure, seniority rights, volume of business, etc. is used by the carriers to secure what they consider is the best location for their business. It is politic for the architect to plan ticket counters that are all in locations of

equal visability, prominence, advertising value, and distance from the terminal entrance. Passenger circulation if concerned with the terminal facilities used by the~~in bound~~, outbound, and intransit passengers. They are as follows: Waiting room. (Nursery) (First Aid) (Special Facilities)
Information.
Toilets.
Communications.
Food service concessions. (List types)
Other concessions. (List types)
Control of the passenger is a problem. Discuss methods such as loud speaker system, canned announcements, physical segragation, special waiting rooms, etc.

To the aircraft. This is concerned with control points, guards, methods, secondary waiting rooms, single level or multi-level schemes, weather protection, fencing, canopies, etc.

Method of enplaning and deplaning. List types such as:
Steps integral with aircraft.
Steps as ground equipment.
Loading bridges, gangplanks, elevators, etc. that are a physical part of the terminal building or apron.

Terminating passengers. Study these passengers from the standpoint of both the domestic and the international passenger. Of importance to the domestic passenger is the location of the baggage claim counter and the time involved in getting the baggage. Of importance to the international passenger is the process of detention, waiting, immigration, public health, quarantine, customs inspection, plant quarantine, etc and final release with baggage. The problem for all terminating passengers is that of getting themselves and baggage to some form of ground transportation.

10. CARGO CIRCULATION. (This is the inanimate element in circulation)

Cargo is an all inclusive term for baggage, mail, express, feight.

Baggage. Here one is concerned with methods and means of handling such as conveyors chutes, carts, elevators, etc. The various types of baggage are as follows:
Domestic outbound.
Domestic inbound,
Domestic transfer inter-aitline.
Domestic transfer intra-airline.
International outbound.
International in-transit. (usually in bond)
International inbound. (Customs facilities)

Airmail and air parcel post. In the terminal building and elsewhere? Size of facilities required at large installations versus none at many of the small airports. Methods and means of handling. The various types are as follows:
Inbound.
Outbound.
Transfer through A.M.F. or inter-airline or intra-airline.

Air express. In the terminal building or a seperate facility? List methods and means of handling. The various types are as follows:

Inbound.
Outbound.
Transfer - intra-airline and inter-airline.
International etc.

Handling is by the agency, the individual airline, consolidated service, etc.

Air freight. In the terminal building or a seperate facility? List the various types as follows:

Inbound.
Outbound.
Transfer - intra-airline and inter-airline.
International etc.

Cargo circulation is the problem of solving for pattern, method, time, and cost in the most efficient and economic manner. Mail, express and freight should be studied from the standpoint of origin and destination in the community in the same manner that parallels the 'Off the Airport' circulation of the passenger. Then there is the on the airport cargo circulation from the stand point of both the pre and post agency handling of same. This involves types of vehicles, service roads, types of buildings, methods of handling such as by hand, by cart, cargo trains, conveyor belts, chutes, elevators, lift trucks, pneumatic tubes. Also involved are methods of temporary storage such as in bins, on carts, on pallets, heated storage, refrigerated storage, bonded storage, etc. Special provisions must be made for special types of cargo such as birds, animals, flowers, plants, perishables, valuables, radio-active elements, etc. There is the problem of single level versus multi-level cargo handling.

11. VISITOR CIRCULATION.

The term visitor is used here to encompass the sightseer. Relatives and friends who see passengers off or who greet them on their return follow the paths established for the passenger to a large extent; in fact to as great an extent as airport control systems and methods will allow them to do so. The problem of the visitor as a sightseer is a hot subject. There is the visitor who is at the airport out of a genuine interest in aviation and there is the character who comes out with hope of seeing a plane crack up. These represent the two extremes and include inbetween them the Sunday driver, those after food service facilities, curosity struck individuals, and those who consider the airport activity a swell show. There are those proponnents of the visitor who wish to encourage them because of their cash register value to the airport, and because contact with aviation may some day make them users of air transportation. There are those who wish to discourage the visitor and eliminate the facilities (and their cost) necessary to control and satisfy the visitor. The segragation of the visitor from the passenger is an expensive process. Peak load visitor traffic often falls at the same time as peak passenger traffic loads and tends to slow up and block the rapid movement of passengers. Is the airport visitor on the increase? or the decrease? and which philosophy should one follow in planning for them?

Segragation and control. How, how much and in what manner? By levels?
Facilities. Open, enclosed, heated, free, or a source of revenue?

12. SERVICE CIRCULATION. (Supply, opefation, and maintenance)

Shipping and receiving.
Employees.
Emergency equipment.
Maintenance equipment.
Aircraft fuel.

Service circulation is both an off the airport and on the airport problem for many of the elements involved. For some it is even an IN the airport problem. By this I mean the service roads to the ends of runways and around the airport for the use of snow plows, service trucks, grass mowers, fire fighting and crash equipment, etc., all of which operate inside of the fence that seperates the flight area or area of aircraft movement from that of the public areas. Shipping and receiving is concerned with food supplies, wastes, parts, fuel for heating, building supplies, construction supplies, aircraft engine oil, etc. Employees circulation is a problem of providing adequate transportation, automotive parking areas, and development of controls to keep vihitor from usurping the employees parking areas. Aircraft fuel circulation is a major problem on many airports. Is it delivered by truck, tankcar, barge, boat, or pipeline? Where and how stored? How does it get to the aircraft, by truck, pipeline, high pressure system, low pressure system, jeep assisted, hydrant system, pit system? How many grades of fuel? Individual systems for each airline? Or a consolidated system ? Airport owned and operated? Airline owned and operated? Oil company owned and operated? There is plenty of dynamite in this subject. It is both economic and legal in its aspects with overtures of political control, taxation, free enterprise, and the breaking of anti-trust laws.

13. AUXILLARY FACILITIES. (to the passenger circulation in the terminal)

Airline operational space. This varies with the individual airline, its operating policies, size of local operation, and weather it has hangar facilites also on the airport. It may be more economical to locate certain functions in the hangar than in the terminal building. The distance - time factor of terminal to hangar also affects the planning. Function which might be included are as follows:

Ticket counter. (See passenger circulation)
Passenger agents office.(Desirable under certain conditions)
Station manager office.(Secretary? Assistant station manager?)
Operations office. (Load control, flight dispatch)
Message center. (Radio, teletype, etc.)
Flight crew ready room.
Ground crew ready room.
Employee locker and lunch facilities. (White collar, Coveralls)
Baggage room. (Inbound, outbound, transfer)
Baggage claim. (Individual or consolidated)
Cargo room (Big unit or just for top-off load storage?)
Ground equipment storage. (Trucks, carts, jeeps, ladders, tow motors, wing covers, brooms, fire extinguishers, heaters, passenger steps, ground power units, deicing units, etc.)
Food service for inflight feeding. (Prepared by airline or a concessionaire? On or off the airport? In the terminal?)
Oil storage. (Fireproof room, types of fluids, quantities, and methods of handling - see local codes and insurance.)
Aircraft sewage disposal facilities. (Methods vary.)
Groomers' room and supplies.
Reservations'
Flight control'
Meterology.

Airport administration and operation. This in its most simple form is the airport manager's office. Or it can be a complex of offices depending on the functions that the airport administration must handle.

Airport maintenance. This may be in the terminal or elsewhere or even split between various locations. It includes shops, garage facilities, stock, storage, employee facilities, etc.

Airport emergency facilities. This is fire fighting and crash equipment storage and ready room facilities. It is sometimes in the terminal but is better located elsewhere.

Airport traffic control. This is the control tower and its related equipment and facilities. It is usually in the terminal building and usually under C.A.A. control.

Government functions and offices. These vary with size or location.

Weather bureau.
Airways traffic control.
Airways communications.
C.A.A. offices. (Many types and kinds)
Customs
Immigration.
Department of Agriculture plant quarantine.
Public Health.
Post Office Department. (Postal sub station not A.M.F.)

Concessions. This varies with each airport. Usually desirable from the standpoint of developing non airline revenue. Must be studied from the economic viewpoint, traffic flow, merchandising, impulse buying, necessities versusuluxuries. Usually divided into food service and non food service concessions. List types.

Miscellaneous offices. This is a catch all for many things connected with aviation and the airport. Pilots union, Oil company, Aircraft dealer, etc.

14. ANCILLARY FACILITIES. (to the terminal building and its operation)

Roads and parkings. (free or fee? Service station, storage garage)

Hangars, shops, and offices.

Post office - the A.M.F.

Cargo terminal(s).

Central heating plant. (Auxillary or emergency power and light)

Landscaping and fencing.

Commissaries.

Hotel. This under certain circumstances would be a nice passenger convenience to incorporate, but I don8t think that it can be economically

justified. The ultimate destination of the majority of airline passengers is not the airport but the community. With the airlines completing 97% to 100% of their scheduled operations, you are attempting to build a hotel business on the failure of the air carrier to maintain or complete its schedule. It does not seem to be a sound premise to hope that the 0 to 3 or 4% of failure on the part of the air carrier to perform is a basis for for a business. Reports are published as to the percentages of schedules completed by the various airlines. The air carriers are trying to lick even this small percentage of failure. Rooms if rented to flight crews could be a steady source of income, but then they would not be available as a passenger convenience. The passenger demand for hotel facilities at the airport would be one with large peaks (weather or mechanical trouble) and an unpredictable frequency. It is not wise or economical to plan to meet these peaks. The private flyer who drops his plane in on an airport and wishes for the convenience of an airport motel is usually not allowed to land at the big city airports. Emergency facilities are provided for those who get ill enroute or at the airport, and nurseries are provided for mothers traveling with children and small babies. These are considered the more practicable substitute for the hotel room which would otherwise be required by these passengers.

15. PLANNING PRINCIPLES.

Master plan. (Explain need for master plan of development.)

Economic analysis and program.

Circulation analysis. (Explain need for balance and simple direct solution.)

Functional planning.

Flexibility in planning.

Expansion in planning.

16. TECHNICAL DETAILS.

Materials.

Equipment.

Structure.

Lighting.

Sound control

Communications.

Signs. (Directional and advertising signs.)

17. ARCHITECTURAL PRACTICE.

Relation to client. Clearly define the scope of the work and who is to do what, and how contacts with all other parties will be made.

Multiplicity of client groups. This is one cause of architects failing to design good terminals. They become confused by the conflicting claims and demands and thinking that is presented.

The specialist consultant. Should he serve the architect or the client?

Relation with the C.A.A. This can cover both planning adivice, technical assistance, and financial aid to the client.

Relation with state aviation agency. This is usually one of financial aid to the client, might be broader in some states or non-existant in others.

Fees. Much too much time required on preliminaries. The 6% fee is not adequate except on the very smallest of terminal structures. If the architect is to do adequate research, make economic studies, and present recommendations, his fee must be increased proportionately.

Expert advice. Seek the advice of the proper expert on that which is unknown to the architect. Much advice can be had for free from the C.A.A., the airlines, the airport manager, etc.

Engineering services. Retain topnotch mechanical, electrical, and structural engineering services. The planning principles apply to the work of these professional men as well as to that of the architect. Good electrical planning and engineering is an airport must.

SUGGESTED REVISED OUTLINE FOR MAY ISSUE ON

COMMERCIAL AIRPORT TERMINAL BUILDINGS

1. INTRODUCTION:

What is the problem?
Why is it important?
Basic factors ~~of economics, circulation, and functional planning.~~
Growth of air traffic.
Future of air traffic.
Position of the architect.
Scope of the work.
The client.
The C.A.A.
The airlines.

2. RESEARCH:

Community studies.
Traffic studies.
Economic studies. — ~~time for peaks~~
Analysis and interpretation.
Recommendations. — PEAK CONDITIONS

3. PROGRAMMING.

Financial.
Architectural.

4. AIRPORT TYPES:

~~Small airport.~~
Medium airport.
Large intra-national airport.
International airport.
C.A.A. types.

AIRCRAFT TYPES

5. TERMINAL OPERATIONAL SYSTEMS:

Unit system.
Centralized system.
Consolidated system.
Single level system
Multi-level system.

6. CIRCULATION - ~~THE BASIC DESIGN FACTOR~~:

~~The terminal is a focus for~~ A basic factor in the design of many types of circulation.

7. AIRCRAFT CIRCULATION:

The airway and navagational aids.
The airport approach and landing aids.
Airport site selection.
Runway and taxiway planning.
Terminal site selection.
Aircraft parking.
Aircraft servicing.

9 8. PASSENGER CIRCULATION:

Off the airport.
On the airport.
In the terminal.
    Types of passengers.
    Passenger processing.
    Passenger facilities.
    Control of the passenger.
To the aircraft.
Methods of enplaning and deplaning.
Terminating passengers.
    Domestic.
    International.

10 9. CARGO CIRCULATION:

Baggage.
Air mail. ~~and air parcel post.~~
Air express.
Air freight.
Methods of handling.

11 10. VISITOR ~~AND SIGHTSEER~~ CIRCULATION:

Segragation and control.
Facilities.

12 11. SERVICE CIRCULATION:

Shipping and receiving.
Employees.
Emergency equpment.
Maintenance equipment.
Aircraft fuel.

13 12. AUXILLARY FACILITIES:

Airline terminal space.
Airport administration. and operation
Airport maintenance ~~and operation~~.
~~Control tower.~~ Emergency facilities
Government functions and offices.
Concessions. Airport Traffic Control

13.

14 13. ANCILLARY FACILITIES:

Post office.
Cargo terminal.
Heating plant.
Roads and parking.
Landscaping and fencing.
Hangars and shops.
Commissaries.
Hotel

15 14. PLANNING PRINCIPLES:

Need for master plan of development.
Economic analysis and program.
Circulation analysis and simple direct solution.
Functional planning.
Flexibility in planning
Expansion in planning.
BALANCE

15. TECHNICAL DETAILS:

16

Materials.
Equipment.
Structure.
Lighting.
Sound control.
Communications.

17 16. ARCHITECTURAL PRACTICE:

Relation to client.
Multiplicity of client groups.
The specialist consultant.
Relation with the C.A.A.
Relation with the State.
Fees.
Expert advice.
Engineering services.

COMMERCIAL AIRPORT TERMINAL BUILDINGS

1. INTRODUCTION:

Importance of the problem. (What is the problem? Is it to design a terminal building? Most architects are competent to do just that but few have designed good terminal buildings because they have not attempted to go beyond the terminal building and the client's immediate requirements. Site planning, airport planning, town planning, functional knowledge and planning, building techniques, divining the future, keeping abreast of technical developments in avation, and economic planning are all fundamental aspects of the problem.

To get at the roots of the airport problem it is necessay to by-pass the the functional and aesthetic aspects of architecture and look for the controlling factor. Airport problems differ the world over but all have one thing in common - the economic element. How much does it cost? Who pays for it? And how? No one who has traveled the airlines needs to be told about the inefficient and outmoded airport facilities that are still in use or the costly unfunctional monuments that are still being built. The need for more sound long range planning in the commercial avation field still exists.

To begin with the airlines were offered the world with a fence around it by many communities in order to induce the airlines to provide them with the benefits of air service. The airlines made the best deals they could in each community without regard for an overall balance or equity in their dealings with these communities. As time passed the piper had to be paid but equity in treatment was difficult to achieve for many reasons. Municipalities wanted to get away from subsidizing the carriers regardless as to whether or not their community was an economic asset to the carriers involved. The city fathers wanted to put the airport on a pay as you go basis and avoid the taxpayers' criticisms. There is nothing wrong with that economic principle providing you are getting your full value in services in return. However, competition between cities had forced some into building structures that were too permanemt and too expensive for a growing industry to operate in economically and efficiently.

The rapid growth of air transportation during the war years outmoded many facilities before they were amortized. Funds for expansion were not made available by the taxpayers who disliked throwing good money after that which had been unwisely invested or who felt that the airlines had grown up and therefore should pay the full costs. The limits of bonded indebtedness and the other needs of the community for schools etc. all played their part in the picture. Financing required the participation of many parties, federal, state, local, private, and commercial. The many sources of finance resulted in many voices in the planning and mangement and in many conflicting claims.

The commercial airlines are in business to make money as well as to provide air service and many of them have not made money nor known real economic stability. The government has by both direct and indirect subsidies attempted to build a strong commercial avation structure in the United States. The airlines would like to operate on their own ability and by paying their own way. This is not always possible because of the conflicting aims of government at various levels. The government takes with one hand and gives with the other, often with strings attached. High airport use fees, gasoline taxes, multiple taxes, space rentals, etc., force the airlines to seek subsidy or rate increases and in the end it is the public and the taxpayer who pay. Local politicians would rather have the federal government and the citizens at large pay for airport developments and improvements than have the local taxpayer finance the local airport development directly.

Until one realizes how complex this economic merry-go-round is, one cannot properly evaluate the airport problem. Funds wrongly spent are usually impossible to salvage. Continued growth of the commercial aviation industry is dependent upon a favorable economic situation - rates and fares that are reasonable and competitive; economic, efficient, and safe operation on the part of the airlines; and reasonable taxation, use fees and space rental by the various levels of government. Inflation and rising costs of operation have made it difficult to determine just what constitutes reasonable and just use fees and space rental. However, since construction costs and sound planning play their part in determining use fees and space rentals, the architect is directly involved in the economic picture of the airport and the airlines. The architect's solution for the use of airline space in the terminal building determines how effeciently and economically the airline can operate in that phase of its business. The question of high initial costs versus long range economy always comes up in construction. From the stand point of a growing industry, the interest centers on a low initial cost with with the higher costs deferred until the industry grows up to meet them.)

Growth of air traffic. (Historical figures best illustrated by graphs on the growth of airline passenger traffic, air mail, air express, air parcel post, air cargo. This could also include air traffic from the airspace congestion stand point which involves the number of aircraft movements on the airways and the number of aircraft landings and departures it is possible to make under instrument conditions at major metropolitan centers. I don't think you were thinking of the latter but it is the governing factor in attaining a a goal of 100% of all scheduled flights completed regradless of the weather conditions. Unless this is attained the fantastic capacities of certain airports in fair weather would be severely limited in bad weather. It would also be foolish to plan terminals based on the fair weather capacity of an airport when actually the bad weather or instrument ~~condition~~ weather condition at the airport was the factor that determined how many aircraft could be economically scheduled and operated in to that airport.)

Future of air traffic. (Projections and estimates of future air traffic such as passengers, mail, express, cargo, etc. Here is where I wish I had a dollar for every bad guess that was made in the past. You can assemble such estimates on a national basis and graph them, but they mean nothing to a local architect unless he uses them very judiciously. Local curves vary widely from the national total picture. Projections based on cities in various population brackets tend to vary greatly when you get into the cities with small populations. Rochester, Minnesota, for example has a phenomenal air traffic in proportion to population because of the Mayo Clinic. It took the experts of three different airlines, using three different systems of projection to plot a curve for the city of Chicago. In this case the airline curves were so close to being identical that it was startling. The airline projection, however, was far below that of the airport consultant for the city of Chicago. Time is now proving the airline estimate to be the realistic one.)

Position of the architect. (The architect usually ends up face down in the middle of the ring whereas he should be refereeing the affair. The architect is one person who by training and experience should be the leader in this project and is most qualified to do so. However, his client, is usually

the municipality as represented by its mayor, councilmen, airport manager, and/or airport commission. They are all past or future clients of the architect and so he strives hard to please them. One airport building is the only structure of that type that he is likely to design and so he does not dig deep enough into the problem to get all the facts or grasp the entire picture; in fact, his fee usually will not allow him to spend that much time on the project. One of his first acts is to go on a junket with the mayor or the airport manager to see what Podunk and Squeedunk have done at their airports. On his return he is instructed to design a bigger monument than the one at Podunk. We are now getting some pretty good terminal buildings in the smaller cities, (where the problem is less complex, but where the economics are just as critical) so these junkets are not as out of place as they used to be. At one time there was very little to be seenbesides the mistakes that had been made in the past and the architects didn't seem to profit by seeing them. The architect, unless he is backed up by a pretty intelligent and avation conversant client, is going to have to lead the client in the establishment of a progam. Much of the architect's infomation will not come from the client but must be obtained first hand from the C.A.A., Postal Authorities, Weather Bureau, Airlines, Airport Manager, Private Flyers, Concessionaires, etc. The architect should obtain or insist on the services of qualified engineering consultants for the project. Electrical is very important. The research and preplanning necessary to establish the program should be a part of the architect's services. He is the one person who should be in an unbiased position to formulate the economic reports and analysis that form the basis for the programming. This may sound like a lot of work but it is the only way that an architect can get in on the ground floor with his feet firmly planted where they belong. Lessees like to know how much space will cost and what it will be like in quality and character before they commit themselves on the amount they will take. The architect is the one person best qualified to give this answer. The answer should of course be given through the client to the lessees. Advance economic study and programing saves hours of negotiating, changes in plans and during construction, and results in far better relations between all concerned.)

The specialist-consultant. (Just as there are many breeds of cats, so it goes with the specialists. Unfortunately I am prejudiced against them because of what I have seen in the industry. I have seen liars figure and the figures lie. Some of the specialists do an excellent and honest job. In many cases the consultant has only added to the confusion by presenting in his report unrealistic over optimistic pictures which could have been prepared at one-tenth the cost and a hundred times better by the local architect. The specialist-consultant has the same client as the architect. The consultant is interested in pleasing and flattering the client and usually does it with a voluminous report interleaved with plastics thoroughly sprinkled with Hollywood stardust and bound in leather with the mayor's name in gold leaf on the cover. His fee is so large andthe takes over so much of the architect's work that any 4% architect can carry on from the point where the consultant leaves off. But the consultant is usually looking for another sucker and has left town before his report blows up behind him. The money paid this pseudo economic expert would be better spent on a larger architect's fee and a less flashy but more honest report and economic program prepared by the architect. There are always plenty of sound businessmen in a locality such as lawyers, bankers, real estate men etc. who can assist in making a report and economic plan that would really work. Now as to the other breeds of specialists, by all means consult them for the various phases of the airport problem such as airport lighting, soils, runway planning, drainage, avation fuel systems, airport zoning, traffic control, control tower design, etc.)

C. A. A. (This group too has its various personalities but by and large they are a group of competent serious individuals. They are hampered by the fact that they are government employees, subject to government directives, control, and censure. They live by the 'book' and the Washington directive and lack initiative and immagination. Don't expect those at the lower levels to depart from what the 'book' says. A lot of good advice is in the 'book' as well as a lot of good thinking behind it, but the 'book' is put out by Washington and it takes a lot of time and red tape to revise the 'book' hence it will usually not be up to date and progressive in its entire outlook. The C.A.A. stands ready to help on airport planning and since they have been given funds to dole out for airport and building construction they wield a powerful club. They are very helpful to the architect and should be consulted on all the points that affect them. Remember many of the C.A.A. employees available for consultation and that goes for their engineers too are not architects and are not sympathetic to the architect's problems. When they are requesting rent free or dollar a year space for government functions in terminal buildings, they are quite likely to overly optimistic and unrealistic in their requests.)

(How about something at this point about the other government agencies such as Post Office Department, Immigration and Customs, Department of Agriculture, and Quarantine. Don't forget air express either.)

Local Authorities. (This gets pretty deep into politics and varies greatly with the type of government and the individuals involved. The airport manager, airport director, or airport commissioner will usually be the best man to deal with on the local problem and usually has the best knowedge of the immediate problem. City engineers are sometimes concerned with the airport but do not have suffucient knowledge of the problems because of their other duties. All in all, in one form or another they are the client, the one who pays the bills, signs the contact, and decides how much money can be spent.)

The Airlines. (Don't sell this group short. The large air carriers have some pretty good staffs of experts on their payrolls and can usually be counted on for traffic forecasts, financial advice, engineering and technical assistance. Some have very competent architects on their staff. The smaller air carriers who cannot afford such overhead usually have well experienced operations and station supervisory personnel who can be of assistance. Request your information from these people in writing and get your answers in writing. These people are on the move and you don't always get a chance to talk to the same man a second time. Airlines operate into many cities on a system and under many different conditions. They have tested and tried all sorts of things in their short life time and know a few things about the avation industry. They live in many different terminal buildings. The local airport manager has usually only lived in one terminal building.) The airlines are interested in economic, efficient, and functional terminal buildings. Are you considering more than just the scheduled air carriers? The non scheduled air carriers?

2. PROGRAMMING. (Shouldn't you call this RESEARCH or PREPLANNING? It is essential that much be done before the architectural program in its strictest sense is established.)

Community Studies.

Economic Studies . (To this group add Traffic Studies and Forecasts. Also Analysis and Iterpretation, then formulate the program. Economic Studies is a broad term and could be taken to mean just an economic evaluation of the community with respect to potential traffic. It should mean and include the potential revenues and costs of airport operation and maintenance. Which in turn is the basis as to how much should be spent for the building and what space and services will cost the lessors, concessionaires, and the public.

3. SITE SELECTION. (Airport site selection? or Terminal Building site selection? Both are important in their own way and involve one at once in questions of town-planning. The first one is one of relation to the community, the airways, highways, radio towers, other airports, tall buildings, and immovable objects such as cemetaries, rivers, railroads, powerlines, etc. A ~~spot~~ location by at least two of the last four mentioned items seems to be the criteria by which most airport sites were selected. I have by no means even scratched the surface of the problems inherent in this topic, all of which have terrific economic implications, The problem of terminal building site selection is related to the community in one aspect and to the runways from another aspect with alot of other problems such as size of apron, expansion space, relation to hangars, car parking space, expansion space etc. all thrown in.

4. RUNWAY (AND TAXIWAY) PLANNING. (Yes, you can get lost in this subject very easily. This is affected by many things, types of aircraft and their performance characteristics, obstructions etc. Of importance is the relation to the airways for straight on in approaches and take offs. Don't forget the importance of taxiway planning and the relation to the terminal area. Minimum taxiway distances are desirable to cut down operating costs. Big aircraft cost money to taxi. Time is also valuable. A stratocruiser type aircraft with a crew of seven and four engines operating probably costs in the neighborhood of $ 120 an hour to taxi. Save five minutes on taxi and takeoff time by good planning and you save $10 per operation. Repeat your saving ten times a day and you have a $100 or $36,500 a year. In ten years it is $365,000. Do this on ten airports and you can save $ 3,650.000. That is an example of what I mean by the economic factor that must be recognized in so many things that affect airport planning. The airlines are selling time as well as transportation and that time means money to someone. Save time without sacrificing safety and you are saving money and this is true whether you are handling passengers at the ticket counter, baggage, or the aircraft.

5. AIRPORT TYPES. (Include under this your division by size, ie runway length and operations per hour)

(A) Small Airport.
(B) Large Intra-national Airport.
(C) International Airport.
Use C.A.A. types

. OPERATIONAL SYSTEM OF TERMINAL BUILDING. (Suggest that this be a major division)

(A) Unit System.
(B) Centralized System.
(C) Consolidated System. (to the outsider looking in this seems ideal and the only economical way to operate. Airline experience has shown it to be uneconomical. Competition is the American way of free enterprise and here it works better than consolidation.
(D) Single or multi-level System. Personnel required to operate either system are a big factor in determining the economic aspect.

5. FLEXIBILITY AND EXPANSION IN ALL TYPES (Suggest that this not be a major heading as such under airport types, but that a major division be established with the title PLANNING PRINCIPLES and locate it just ahead of the division on ARCHITECTURAL PRACTICE. Flexibility and expansion are planning principles of the greatest importance in all aspects of the airport problem. They are applicable to airport sites and property, runways and runway layouts, taxiways, aprons, terminal buildings, ticket counters, passenger handling, cargo handling, aircraft docking, aircraft servicing, roads and car parking, etc.)

6. AIRPLANE CIRCULATION. (If you approach the entire problem from the stand point of circulation as a method of outlining and treating your subject considerable revision in your outline would be necessary and helpful. Suggest the following:

A. AIRCRAFT CIRCULATION.

(a) THE AIRWAY AND NAVAGATIONAL AIDS. (This is point to point traffic circulation in the air. It has a town planning aspect in the avoidance of obstructions, flying over densely populated areas, relation to existing airports, future airports, site selection, runway planning, etc. It is concerned with airways traffic control policies and methods, aircraft types and speeds, and navagational aids. Its economic aspect is to maintain the shortest possible air distances between points. Flight time when reduced by minutes or miles results in substatial savings in the same manner as reducing taxi time on the ground. The planning and control of the airways and navagational aids is a C.A.A. function and not the architect's problem. The C.A.A. should and will relocate airways where necessary to improve traffic control when new airport sites are selected and developed. It is from this angle that it may be necessary for the architect to deal with the C.A.A. in formulating a satisfactory master solution to the problem.)

or

(b) THE AIRPORT APPROACH AND LANDING AIDS. (This is aircraft circulation movement after the plane leaves the airways and enters the traffic pattern in the airspace around the airport. The plane has left the airways traffic control system and is now under the airport traffic control system or airport control tower directives. This too is a C.A.A. function, but here the architect and the C.A.A. meet on common ground with common problems that both must solve jointly. Theyare concerned with both the landing and the take off of aircraft, relation to the airways, obstructions, zoning of the airspace about the airport and on the runway approaches, obstructions, landing aids, lighting, control tower visability, the stacking and holding of aircraft overhead in bad weather, etc. This is the link between getting the aircraft off or onto the airways and off or on to the airport. Several aspects of airport site selection come into focus under this topic which of course has a broad town planning aspect and many economic problems.)

(c) RUNWAY AND TAXIWAY PLANNING. (This is aircraft circulation and control on the ground. The control tower still directs the movement of aircraft until the ground crew assists the plane crew in the parking of the aircraft. This is Item 4. on your outline and this topic might be included here rather than as Item 4. It is related to and covers certain problems inherent in airport site selection. Site selection which is Item 3 on your outline might be treated in segments under the various circulation elements which affect it and then be summarized in a later heading in order to emphasize the relation of the airport site selection problem to the sum total of all factors. Aprons are used for aircraft

movement as well as the static positioning of aircraft and could come under this heading too. The apron is aslo tightly tied to the terminal and hangar building problem and certain aspects of apron design must be studied in relation to those structures and to seperate cargo terminals.

(d) AIRCRAFT PARKING AND SERVICING. (Avoid the term docking - to airline people docks are a system of fixed or moveable scaffolds used in or at hangers to service and overhaul the aircraft. Subheadings under this are as follow:)

PLANE PARKING: (At the terminal)
- SIZE of SPACE or POSITION REQUIRED
- SPACING OF POSITIONS
- NUMBER REQUIRED
- ORIENTATION OF AIRCRAFT:
  - PARALLEL
  - DIAGONAL
  - TAIL IN
  - NOSE IN
- METHOD OF PARKING:
  - UNDER OWN POWER
  - TOWED IN
  - MECHANICAL METHODS

PLANE SERVICING:
- GASOLINE
- OIL
- WATER
- AIR CONDITIONING
- POWER REQUIREMENTS
- SEWAGE DISPOSAL
- GROOMING
- FOOD SERVICE
- CARGO HANDLING (Cover in detail later)
- PASSENGER HANDLING (Cover in detail later)
- FIRE PROTECTION
- WEATHER PROTECTION

PASSENGER CIRCULATION. (This deals with the animate element in the circulation problem. It might have the following divisions:)

OFF THE AIRPORT. (This is concerned with where does the passenger come from, hotels, residences, offices, etc. What part of town generates the most passenger traffic? How does this relate to the airport (site selection and town planning and economics) How do you get the passenger from the residence, City ticket office, etc to the airport? What are the methods? and the proportions of one method to another? Private car, Taxi, Bus, Airline Limousine, Street cars, Subways, Trains, Helicopters, Private planes. What are the travel distances, costs, time of travel, etc. It is town planning - the superhighway etc.

ON THE AIRPORT. (This is vehicle traffic handling, movement, parking, storage, and circultaion. Here you start to merge with Cargo traffic, Service and Supply traffic, Employees, etc. Then you get the passenger proceeding on foot with related problem of baggage handling.

AT THE TERMINAL.
- ENTRANCE (a) on foot (b) via vehicle.
- PRE TICKETED (a) direct to plane or (b) to check in counter.

AIRPORT TICKETING AND CHECK IN (This consists of various methods such as by individual airlines, consolidated service by airlines or corporation and includes information, sales, baggage check in, etc. Methods also vary in handling the following passenger types:

DOMESTIC PASSENGER
TRANSFER PASSENGER INTRA-AIRLINE
TRANSFER PASSENGER INTER-AIRLINE
INTERNATIONAL PASSENGER OUTBOUND
IN-TRANSIT ALIEN

This subject gets into the problems of ticket counter design, unit types, counter lengths, relation to one another for competitive airlines, centralized versus decentralized locations. The competitive situation is one of the biggest problems in the industry. Much in the way of politics, pressure, seniority rights, volume of business etc is used by the carriers to secure what they consider best for their business. It behooves the architect to plan his counters so that all will be in locations of equal visability and advertising value in relation to the terminal entrance etc.

TERMINAL FACILITIES used by inbound, outbound and in-transit passengers

WAITING ROOM (NURSERY) (INTERNATIONAL FACILITIES)
INFORMATION
TOILETS
COMMUNICATIONS
FOOD SERVICE CONCESSIONS List types
OTHER CONCESSIONS Attended and/or mechanical
List types

CONTROL OF THE PASSENGER Methods

ROUTE TO AND FROM THE AIRCRAFT

Single level
Multi level
Whether protection
Fencing

METHOD OF LOADING (and unloading)

Steps integral with aircraft
Steps as ground equipment
Loading bridges, gangplanks, elevators, etc.

TERMINATING PASSENGER AND BAGGAGE CLAIM

ROUTE AND DISTANCE TO GROUND TRANSPORTATION
INTER NATIONAL PASSENGER - INBOUND
CUSTOMS
IMMIGRATION
QUARANTINE

CARGO CIRCULATION. (This deals with the inanimate element in the circulation problem. It includes the following:)

BAGGAGE

Domestic Inbound
Outbound
Transfer inter airline
Transfer intra airline
International Inbound - CUSTOMS - AGRICULTURE
Outbound -
In transit

METHODS AND MEANS OF HANDLING
CONVEYORS
CHUTES
ELEVATORS
CARTS, ETC.

AIR MAIL AND AIR PARCEL POST

Inbound
Outbound
Transfer - intra and inter airline

THE AIRMAIL FIELD POST OFFICE

AIR EXPRESS
Inbound
Outbound
Transfer - intra and inter airline
THE AIRPORT AIR EXPRESS OFFICE
In terminal
by the airline
by the agency
consolidated
Seperate building etc.
AIR CARGO OR AIR FREIGHT
Inbound
Outbound
Transfer - intra and inter airline
International - Customs
FACILITIES in the terminal or seperate

Cargo circulation is used here as an all inclusive term for the handling of baggage, mail, express and freight. The last named three types of cargo should be studied from the stand point of origination and destination in the community and this parallels the OFF THE AIRPORT circulation problem of the passenger. Then there is the ON THE AIRPORT circulation problem. This involves types of vehicles, service roads, types of buildings, methods of handling such as by hand, by cart, cargo trains, conveyor belts, chutes, elevators, lifts trucks, pneumatic tubes. Methods of storage such as in bins, on carts, on pallets, heated storage, refrigerated storage, , etc. Special provisions for special types of cargo, birds, annimals, flowers, perishables, etc. Radio active elements. Valuables requiring guards, vaults, etc. There is also the problem of single versus multi-level handling in building design.

12 SERVICE CIRCULATION. (This includes the problems of supply and maintenance for the airport, the hangars, the terminal building, etc. This is a both on and off the airport problem for many of the items involved and for some it is an IN the airport problem. By that I mean service roads to the ends or runways and taxiways and around the airport for snow plows, service trucks, fire fighting equipment, etc. all of which are inside the fence that is used to seperate the general airport activity from activity of aircraft movement.
SHIPPING AND RECEIVING of food supplies, wastes, parts, fuel for heating, building supplies, construction supplies.
EMPLOYEE TRANSPORTATION AND PARKING
AIRPORT MAINTENANCE EQUIPMENT AND STRUCTURES
FIRE PROTECTION EQUIPMENT AND STRUCTURES
POLICE AND EMERGENCY (FIRST AID) EQUIPMENT AND STRUCTURES
AIRCRAFT FUEL - DELIVERY, STORAGE, AND TRANSFER TO AIRCRAFT
(This is a big problem on many airports. Is it delivered by truck, tankcar, barge, boat or pipeline? Where and how stored? How does it get to the aircraft? Truck, or pipeline, low pressure or high pressue system? How many grades of fuel? Individual systems for each airline? Consolidated system? Airport owned? Airline owned? Oil compnay owned? There is plenty of dynamite in this subject. It is both an economic and a legal problem with overtures of political control, taxation, and the breaking of the anti-trust laws involved.

12 VISITOR AND SIGHTSEER CIRCULATION. (This is another hot subject. Relatives and friends who see passengers off and meet them on their return follow the paths established by the passenger to a large extent. The sightseer who is at the airport out of genuine intrest in aviation to the one that goes in the hopes of seeing a plane crack up represent the two extremes and include those with nothing else to do, the Sunday driver, those after a good meal, curosity stuck individuals, and those who consider the airport activity a swell show. There are those proponnents of the sightseer who wish to encourage them because of their cash register value to the airport and because contact with aviation may someday make them users of air transportation. There are those who wish to discourage the sightseer and eliminate the facilities (and their cost) necessary to control the sight seer and seperate them from the airline passengers. Is the airport sightseer on the increase or decrease at the airport and which philosophy should one follow in planning for them?

SEGRAGATION How much? OF CIRCULATION, in the terminal, and on the
CONTROL How much? In what manner? By levels? airport.
FACILITIES Weather protected ? Enclosed? Free? or a source of revenue.

13 AUXILLARY FACILITIES (In the terminal Building) to the Passenger Circulation etc)

AIRLINE OPERATIONAL SPACE (This varies with size of operation and whether airline has hangar facilities also on air port. If so it may be more economical to locate certain airline functions in the hangar than in the terminal. This is also related to the distance the hangar is from the terminal.

- TICKET COUNTER (See Passenger Circulation)
- TICKET COUNTER OFFICE (Desirable under certain conditions)
- STATION MANAGER (Office with or with out secretary - Is there an assistant station manager?
- OPERATIONS OFFICE (Load Control, Flight dispatch)
- MESSAGE CENTER (Radio, teletype, etc.)
- FLIGHT CREW READY ROOM
- GROUND CREW READY ROOM
- EMPLOYEES LOCKER AND LUNCH FACILITIES (White collar vs. Coverall gang)
- BAGGAGE ROOM (Inbound, outbound, and transfer)
- BAGGAGE CLAIM (Individual carrier or consolidated)
- CARGO ROOM (The big unit or just for load top-off only?)
- GROUND EQUIPMENT STORAGE (Trucks, carts, jeeps, ladders, wing covers, fire extinguishers, passenger steps, tow motors, heaters, etc. etc.)
- FOOD SERVICE FOR INFLIGHT FEEDING (Prepared by airline or concessionaire? On or off the Airport? In the Terminal?)
- OIL STORAGE (Fireproof room, Types and kinds of fluids handled, Quantities and methods of handling.)
- AIRCRAFT SEWAGE DISPOSAL FACILITIES (Methods vary)
- GROOMERS' ROOM AND SUPPLIES

Might also include
Reservations
Flight Control

AIRPORT ADMINISTRATION

- AIRPORT MANAGERS OFFICE (This varies in compexity with the size of the airport and its activity and the relation between it and the parent body or municipality.)

AIRPORT MAINTENANCE

- SHOPS, GARAGES, STORAGE (In the terminal or elsewhere?)
- FIRE STATION

FEDERAL FACILITIES (Vary with size of Airport)
CONTROL TOWER and related functions.
AIRWAYS TRAFFIC CONTROL
WEATHER BUREAU
C.A.A. OFFICES Many types and kinds.
CUSTOMS
IMMIGRATION
DEPT of AGRICULTURE
PUBLIC HEALTH - *QUARANTINE and DETENTION
POST OFFICE (Postal sub station not the A.M.F.)
CONCESSIONS (List same) These vary with the size of airport type of traffic, community, etc. What is sauce for one goose is poison for another.

14. ANCILLARY FACILITIES (To the Terminal Building)

MANY ITEMS UNDER THE SECTION ON AUXILLARY FACILITIES might fall into this class or be seperate from the terminal building proper. Then comes the question - Do they belong in the terminal area or the hangar area of the airport?
ROADS AND PARKING - AUTOMOTIVE SERVICE STATION
STORAGE GARAGE
POST OFFICE
CARGO TERMINAL
CENTRAL HEATING PLANT
AUXILLARY SOURCE OF POWER SUPPLY
LANDSCAPING
FENCING
HAWGHES
HOTEL (This under certain circumstances would be a nice passenger convenience to have, but I don't think it is economically justifiable. The ultimate destination of the majority of airline passengers is not the airport but the community. With airlines completing 97% to 100 % of their scheduled operations (monthly reports of the percentages completed are published I believe) you are attempting to run a concession on the failure of the airlines to maintain or complete their schedules. It does not appear to be a sound premise to base a business on the possibility that some one else will fail 0 to 3 or 4% of the time in their business. The airlines hope to lick even this small percentage of failure. Rooms if rented to flight crews would be steady income but would not then be available to passengers. The passenger demand for hotel rooms at the airport would show a curve with very high peaks and unpredictable in their frequency.

15. PLANNING PRINCIPLES . (Suggest that this be here) and operations.

1. Economic Analysis of all aspects of planning, equipment, structure,
2. Circulation Analysis of all aspects of planning and structure.
3. Functional Planning
4. Flexibility in Planning
5. Expansion in Planning

16. TECHNICAL DETAIL.

MATERIALS, EQUIPMENT, LIGHTING, STRUCTURE, ETC. ACOUSTICS
SELECTED as to FUNCTION AND ECONOMY.
(Lighting is one of the most important in this division, also don't overlook communications.)

11. ARCHITECTURAL PRACTICE.

RELATION TO CLIENT. (Clearly define the scope of the work and who is to do what and how contacts with all other parties will be made.)

MULTIPLICITY OF CLIENT GROUPS (This is one cause of architects failing to design good terminals. They become confused by the conflicting claims and demands and thought presented.)

THE SPECIALIST CONSULTANT. (Should he serve the architect and be hired by the architect rather than the client?)

RELATION WITH THE C.A.A. (FEDERAL) (This can cover both planning advice, technical assistance, and financial aid to client.)

RELATION WITH THE STATE AVIATION AGENCY . (This is usually one of financial aid to the client, might be broader in some states or non-existant in others.)

FEES. (Much too much time required on preliminaries. The 6% fee is not adequate except on the very smallest of terminal structures. If architect is to do adequate research, make economic studies, analyze same and present recommendations, his fee must be increased proportionately.)

SEEK THE ADVICE OF THE PROPER EXPERT ON THAT WHICH IS UNKNOWN TO THE ARCHITECT. (Much advice can be had for free from the C.A.A., the airlines, airport manager, manufacturers, etc,)

RETAIN TOPNOTCH MECHANICAL, ELECTRICAL, AND STRUCTURAL ENGINEERING AIDS. (The PLANNING PRINCIPLES apply to the work of these men just as they do to that of the architect.)

pa PROGRESSIVE ARCHITECTURE

REINHOLD PUBLISHING CORPORATION • 330 W. 42 STREET, NEW YORK 18, N. Y.

February 20, 1953

Mr. Francis R. Meisch
2815 41st Avenue South
Minneapolis, Minnesota

Dear Mr. Meisch:

Thanks for your prompt and very full comment on the preliminary airport planning manuscript. We are most grateful for the suggestions that you made and within the limitations of space, we will certainly incorporate all of your thoughts.

I am also grateful for the tickets for the exhibition of The American Watercolor Society. I assume that you have some work exhibited there and I look forward to seeing it.

Sincerely,

Thomas H. Creighton
Editor

THCreighton:mg

REVIEWS

GUIDE AND IDEA SOURCE

Airport Planning. Charles Froesch and Walter Prokosch. John Wiley and Sons, Inc., 440 Fourth Ave., New York, N. Y., 1946. 251 pp., illus. $7.00

This is an important contribution to technical literature on airport design and related facilities. Most of the available literature on this subject has been published in pamphlet or periodical form and covered only limited aspects of the problems involved. The rapidity with which the art and science of airport planning was advanced during the war years rendered much material obsolete shortly after it was published. Consequently, there existed a need for a good sound fundamental treatise on the subject.

The experience of the authors in the field of air transport has made them extremely cognizant of the dynamic nature of their subject. They therefore elected to treat the functional factors and basic fundamentals governing airport design and related facilities rather than specific design detail.

The authors' prime objectives were to indicate the proper relationship of landing facilities to communities or regions they are to serve; to analyze the characteristics of aircraft which affect the planning and design of landing facilities; and to strike a correct balance among the various elements of landing facilities. These objectives are achieved through a logical, well organized presentation of innumerable factors affecting or governing airport design, size, capacity, lighting, site selection, terminal design, hangar design, and special services. Supplementing the text are a number of tables and numerous illustrations.

The book should prove invaluable to everyone with an airport planning problem, from the student and the teacher to the practicing architect and the engineer. It is not, however, a book which can be used as a ready reference unless the user has thoroughly perused the entire text and thoughtfully studied the illustrations. The book presents no set formulae for airport design but rather acts as a guide to the airport planner and as a source from which ideas can be developed. For this reason it may have a longer-than-average life for a book on such an evolving subject.

The weaknesses of the book are few. The authors have been forced, for lack of up-to-date material illustrating the latest thinking on airport design, to use some illustrations which might better have been left unpublished. It is regrettable that illustrations of the Washington National Airport Terminal Building were included in a book which espouses the functional approach to design. Also to be regretted is the inclusion of (Parks Air College) illustrations of airparks wherein trees are shown at ends of runways. These trees are definite obstructions and hazards to flight and are in contravention to what the authors state in their section on obstruction and zoning. The greatest weakness of the book is in its lack of emphasis and material on proper and adequately planned buildings and facilities for the fixed base operator and the private flyer. Too little thought has been given to this phase of aeronautical activity which, according to the experts, will account for a major portion of the national total activity. More sound material must be published as a guide and source of ideas if the smaller airports and airparks are to be successful elements of communities and not eyesores, as so many filling stations and garages are today.

FRANCIS R. MEISCH

HOUSING DOWN UNDER

Homes in the Sun: The past, present, and future of Australian housing. Walter Bunning. W. J. Nesbit, 124 Liverpool Street, Sydney, 1945. 100 pp., 182 illus.

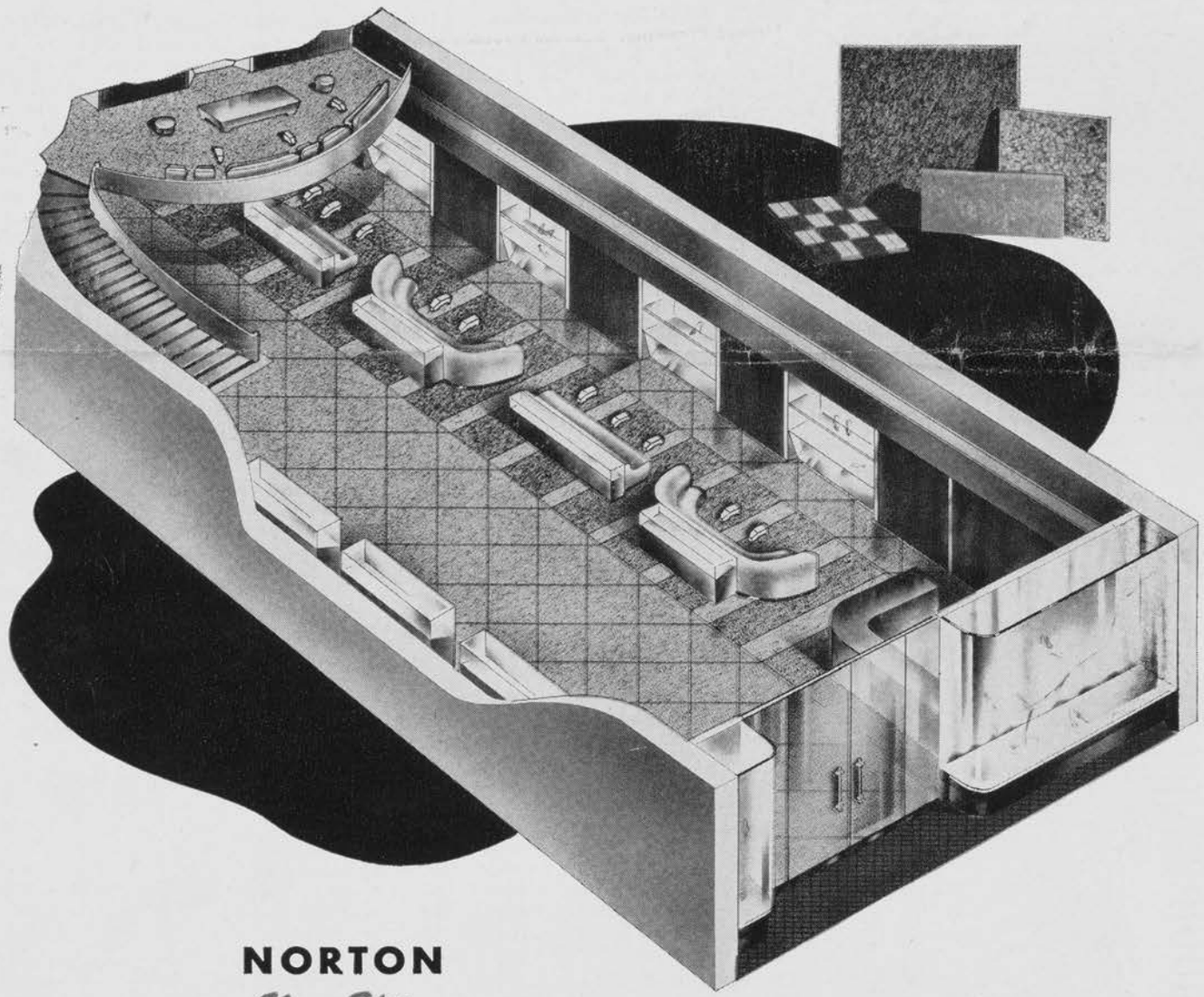
What has gone wrong in the Australian past in the fields of home design and community planning to bring about the present critical problems is forcefully demonstrated in this work by a former executive officer of the Commonwealth Housing Commission. These problems as described have an uncomfortable similarity to our own. The solutions recommended are sound, sensible applications of the principles of modern architecture to home design, and accepted community planning procedures to provide a better general environment for living.

To exemplify his theories the author chiefly relies on illustrations from non-Australian publications, especially from American periodicals. Those chosen display his good judgment and taste as they are some of the best that have appeared here. Unfortunately for us we have not begun on any large scale to approach their high level.

Capable sketches by the author enliven the text, which briefly develops the needs of the individual family, of the community, and of the larger community—the region. The book is climaxed by a final plea for cooperation from each citizen in support of a constructive housing and planning policy.

LAWRENCE E. MAWN

Safety in Walking - An Important Feature In a Shoe Store of Distinction



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Safety in walking is an important feature in any building where it is desirable to have a wear-resistant surface that is permanently non-slip even when wet. Non-slip flooring is a "natural" for a shoe store. The shoe store illustrated above has been designed to have ALUNDUM aggregate mixed with marble to make the terrazzo flooring in the entry way, on the main floor and on the stairs and mezzanine safe from slipping hazards. Combine beauty with safety and add years of wear-resistant service by using Norton non-slip ALUNDUM floor products: aggregate, stair tile, ceramic mosaic tile. For free color samples write to:

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Printed in U.S.A.

INTER-OFFICE COMMUNICATION

NORTHWEST AIRLINES, INC.

February 1 19 45

To: Frank Meisch

From: K. R. Ferguson

Dear Frank,

I thoroughly enjoyed your article in Pencil Point and want to congratulate you on a damn good job.

Regards.

Sincerely,

K. R. Ferguson
Vice President

cc: Verne Lundquist
E. J. McKellar
R. E. Geror

ENGR. PROJECT NO.

ROUTE TAG COPY TO

January 25, 1945

Mr. John Zellner
Circulation Manager
Pencil Points
330 West 42nd Street
New York 18, N. Y.

Dear Mr. Zellner:

Many thanks for the eight copies of the November 1944 issue of Pencil Points.

Please bill Northwest Airlines and send the bill to my attention.

Yours very truly,

NORTHWEST AIRLINES, INC.

F. R. Meisch
Architect and Plant Engineer

FRM/GE

Pencil Points . . . the magazine of architecture

published by Reinhold Publishing Corporation, 330 West 42nd St., New York 18, N. Y. BRyant 9-4430

January 8, 1945

Mr. F. R. Meisch
Architect and Plant Engineer
Northwest Airlines, Incorporated
Saint Paul 4, Minnesota

Dear Mr. Meisch:

I have managed to get my hands on a few additional copies of the November issue of PENCIL POINTS. I have sent you eight.

If any more come to hand we shall be glad to send you additional copies.

Cordially,

PENCIL POINTS

John Zellner

JZellner:ls

Circulation Manager

also publishers of Chemical Engineering Catalog, Metal Industries Catalog, Metals and Alloys, Architectural, Technical, and Engineering Books

TRANSCONTINENTAL & WESTERN AIR, INC.

KANSAS CITY, MISSOURI

December 8, 1944

Mr. F. R. Meisch
Plant Engineer
Northwest Airlines, Inc.
1885 University Avenue
St. Paul 4, Minnesota

Dear Francis:

Congratulations on the excellent manner in which you prepared and presented the airport terminal problem in the November issue of "Pencil Points"!

I read with considerable interest your discussion and quite often I could see Meisch himself talking across the table in Chicago.

I believe that you have presented the story in such a way that those who are not connected with the industry can understand the problems that we fight out monthly in Chicago. I also feel that the article should be of great help to lots of architects in the designing of terminal buildings for small cities.

In closing, I want to reiterate and say that I think the article was certainly a job well done.

Personal regards,

Sully

T. M. Sullivan
Central Division Supervisor,
Construction Department

TMS:MA

CE 652

Minneapolis, Minn.,
December 12, 1944

Mr. Frank Meisch
Northwest Airlines, Inc.,
St. Paul, Minnesota

Dear Frank:

Congratulations on the very good article and the excellent presentation in last Pencil Points. It's too bad that one side of Plant Engineering can shine so bright while the other side looks so dark knowing that it is the same group and type of men that work both sides.

More power to you, and a Merry Christmas and Happy New Year.

Regards,

KOL-t

KARL O LARSON
INDUSTRIAL ENGINEERING
RAND TOWER — 225
MINNEAPOLIS - 2

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January 3, 1945

Mr. Francis R. Meisch
Northwest Air Lines
1885 University Avenue
St.Paul 4, Minnesota

Dear Sir:

I have just gone through your most interesting article and illustrations appearing in the November issue of "Pencil Points", and I would like to congratulate you on the thoroughness with which you have treated your subject.

We have been retained by one of the large light plane manufacturers to prepare what we may call an "operator's handbook". The book will be for those in the business of operating airports and flying services, as well as for those entering the business for the first time.

The book is broken down into four sections - namely: Planning and building the airport, Management, Selling Airplanes at a Profit, and Making the Airport Pay. There will be about twenty-five chapters in all. Under Section I,we take the newcomer from the point of actually choosing the city or town location, size and shape of field through the problems of constructing the various buildings.

The chapter covering planning and construction of the Administration building, hangars and shops for the small operator is one which we want to treat carefully and with a great deal of thought. It strikes me that maybe you would have some material in the way of plans and recommendations that would fit into this particular chapter. I would appreciate knowing your reaction to this proposal,together with your ideas on how we might work out something that would be mutually beneficial.

Very truly yours,

AVIATION ASSOCIATES

V. C. Rasmussen

VCR/hw

JOHN A. HOLABIRD F.A.I.A.
JOHN W. ROOT F.A.I.A.

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J. Z. BURGEE
WM. HOLABIRD
J. C. SHERRICK

December 11, 1944

Mr. Francis R. Meisch,
Northwest Airlines,
St. Paul, Minnesota.

Dear Mr. Meisch:

Congratulations on the article and presentation of your ideas on Air Terminals in Pencil Points. It is an excellent, informative and progressive document. I hope the new airport designs will profit by your work.

With best wishes.

Sincerely,

John W. Root

JWR:mc

Pencil Points . . . the magazine of architecture

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December 20, 1944

Mr. F. R. Meisch
Architect and Plant Engineer
Northwest Airlines, Incorporated
Saint Paul 4, Minnesota

Dear Mr. Meisch:

Mr. Lopez has sent along to me your letter of December 11th and it is very embarrassing for me to tell you that we can't send you twelve copies of the November issue of PENCIL POINTS. However, we haven't got them. We haven't even one copy unless some one returns them because they do not want them; this is not likely to happen. However, if it does we shall certainly see that you get whatever we can send you.

Cordially,

PENCIL POINTS

JZellner:ls

Circulation Manager

Pencil Points . . . the magazine of architecture

published by Reinhold Publishing Corporation, 330 West 42nd St., New York 18, N. Y. BRyant 9-4430

December 18, 1944

Mr. Francis R. Meisch
1885 University Avenue
St. Paul 4, Minnesota

Dear Mr. Meisch:

Just a note to go along with the enclosed check to thank you once again for your contribution to the November Pencil Points and all your cooperation in its preparation.

Sincerely,

Frank G. Lopez, Jr.
Frank G. Lopez, Jr.
Editor

FGL/ml
enc. check $175.

December 23, 1944

Mr. Frank G. Lopez, Editor
Pencil Points
330 West 42nd Street
New York City, 18, New York

Dear Mr. Lopez:

Received your letter of December 18th and the enclosed check, I wish to thank Pencil Points for the check and to state that it has been a pleasure to submit material to the magazine.

I have received comments from a number of persons in the air transport industry who think the material was well presented and that it will greatly assist the architectual profession in appreciating the industry's problems and ultimately help to secure for the industry the type of facilities it so badly needs in so many locations.

Sincerely yours,

F. R. Meisch
Architect and Plant Engineer

FRM:BEW

ENGR. PROJECT NO.	
ROUTE THIS COPY TO:	

December 11, 1944

Mr. Frank G. Lopez
Editor, Pencil Points
330 West 42nd Street
New York 18, New York

Dear Mr. Lopez:

I wish to acknowledge receipt of original drawings and prints used in connection with my article.

Can you supply the Plant Engineering Section with twelve (12) copies of the November, 1944, issue of Pencil Points and bill us for same?

Yours truly,

NORTHWEST AIRLINES, INC.

F. R. Meisch

F. R. Meisch
Architect & Plant Engineer

FRM/SF

Pencil Points... the magazine of architecture

published by Reinhold Publishing Corporation, 330 West 42nd St., New York 18, N. Y. BRyant 9-4430

December 5, 1944

Mr. Francis Meisch
1885 University Avenue
St. Paul, Minnesota

Dear Mr. Meisch:

I have returned under separate cover the material which you were kind enough to let us use in connection with our presentation of your article on air travel.

I hope you will find the damage done to the material during the course of publication not too great.

We wish to thank you again for your kind consideration in letting us use this material.

Sincerely,

Marion F. Laibach

Marion F. Laibach
Secretary to F. Lopez
Editor

ML

October 13, 1944

Mr. Kenneth Reid
Editor, Pencil Points
330 West 42nd Street
New York, New York (18)

Dear Mr. Reid:

Expect to be in New York City the latter part of next week, probably October 19th and 20th. If time permits I will visit you for a few minutes.

Sincerely yours,

Francis R. Meisch
Architect & Plant Engineer

FRM/SF

September 11, 1944

Mr. Kenneth Reid
Editor, Pencil Points
330 West 42nd Street
New York, 18, New York

Dear Mr. Reid:

I have been out of town and just received your letter of August 30th.

I am interested and would be pleased to submit an article on the Unit Terminal idea. I may be pressed for time, but will try to have it in the mail by the 25th of September.

My first thought is that I would like to keep the article as short as possible and let illustrations tell the story. If you have any ideas on the presentation of this topic, I would be glad to receive them.

Sincerely yours,

F. R. Meisch

Francis R. Meisch
Architect & Plant Engineer

FRM/SF

Pencil Points . . . the magazine of architecture

published by Reinhold Publishing Corporation, 330 West 42nd St., New York 18, N. Y. BRyant 9-4430

August 30, 1944

Mr. Francis R. Meisch
Architect and Plant Engineer
Northwest Airlines Inc.
1885 University Avenue
Saint Paul 4, Minnesota

Dear Mr. Meisch:

Your letter of July 31st arrived just before I was setting off on a vacation and the drawings did not come in before I left. I therefore postponed writing to you until my return the other day.

Your unit terminal idea sounds extremely logical and I looked through the drawings with a great deal of interest. It seems to me that this material could be advantageously presented to the field and I am hoping that you will have time to write an article for us discussing the subject and using these drawings as illustrations.

I believe I told you we are devoting the November issue to the general subject of air travel and transport and we would like if possible to have the story in time for inclusion therein. The text would need to be in our hands by the end of September at the latest and if we could by any chance have it a week or so earlier than that it would be a great help. Do you think you could do it?

With best wishes,

Yours ~~most~~ sincerely,

Kenneth Reid

KR/ag

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JH/HA.

28th September 1945.

Francis R. Meisch Esq.,
C/o Pencil Points,
Reinhold Publishing Corporation,
330 West 42nd Street,
New York 18, N.Y., U.S.A.

Dear Mr. Meisch,

Your very interesting details concerning Airport construction is of particular interest to us. During the war period we have constructed many Aerodromes for the Ministries and have always felt that the Commercial Aerodrome calls for a special treatment, such as detailed by yourself in "Pencil Points" published November 1944.

Whether or not results will mature through this letter I obviously cannot indicate, but I do feel if you care to correspond with us on this particular subject perhaps opportunities might arise in the near future whereby we could get together and produce something of mutual advantage.

In brief we are civil engineering construction contractors, have the connection and can probably be instrumental in the development of your ideas in this country on the assumption we can come to some reasonable working arrangement.

P.T.O.

Francis R. Meisch Esq. 28th September 1945.

If the matter does not interest you, then do not trouble to reply as we shall quite understand you have other plans. On the other hand, we shall be glad to hear from you but as stated at the beginning of this letter, naturally cannot indicate if any particular development may ensue.

Yours truly,
JOHN HOWARD & COMPANY LTD.

Julian Halford

Julian Halford.
London Manager.

October 29, 1945

John Howard and Company Ltd.
Civil Engineering Contractors,
13, Buckingham Gate,
London S.W.I., England,

Att: Mr. Julian Halford.
London Manager.

Dear Mr. Halford:

I wish to acknowledge receipt of your letter of September 28th, 1945, which reached me via 'Pencil Points'. I am pleased that you are interested in my theories and designs for air terminal facilities. Also I shall be happy to correspond with you on the subject or any of its details.

You may be interested to learn that officials of Trans-Canada Airlines are utilizing some of my theories in their plans for facilities. Also some of my plans are in the hands of the British Air Ministry. Squadron Leader Buchannon, I believe, secured the plans from me while in this country on a mission of examining air facilities here.

Now that the war is over, we are having our first opportunity to see some of the plans carried through into construction and tested by use. A temporary terminal building (anticipated five year use) is now under construction at Chicago which incorporates the principles of decentralized design. The permanent terminal building at New York's Idlewild Airport will also make use of decentralized planning.

Sincerely yours,

Francis R. Meisch, A.I.A.

September 19, 1944

Mr. Kenneth Reid
Editor, Pencil Points
330 West 42nd Street
New York 18, New York

Dear Mr. Reid:

I have your letter of September 13th but delayed replying until I could give you a definite answer.

I have completed the manuscript and am now having it proofread by several persons to check on items which might be controversial. I intend to develop some illustrations (largely diagramatic) to go with the article. I think that the solutions presented for Wenatchee, Butte and Yakima would be suitable for showing the adoption of the unit scheme to specific sites. I would hesitate to use the Chicago studies to illustrate the large terminal development, since the airlines have not as yet released such information to the Chicago newspapers or the City. I have to spend Thursday in Chicago, but will be back the following day to check the manuscript and to forward a copy to you. The necessary illustrations will be forthcoming as fast as I can produce them.

I know Al Heino of United Air Lines very well, and we have done a great deal of development work on unit terminals together.

Sincerely yours,

Francis R. Meisch

Francis R. Meisch
Architect & Plant Engineer

FRM/SF

Pencil Points ... the magazine of architecture

published by Reinhold Publishing Corporation, 330 West 42nd St., New York 18, N. Y. BRyant 9-4430

September 13, 1944

Mr. Francis R. Meisch
Architect and Plant Engineer
Northwest Airlines Inc.
1885 University Avenue
Saint Paul 4, Minnesota

Dear Mr. Meisch:

I am greatly pleased that even in face of the pressure of work you are willing to undertake to write the article I requested. I agree with you that it should be kept short and that the illustrations can tell a good part of the story.

It would help if you could suggest a logical organization of the various drawings and specify which of them in your mind would best tell an adequate story. Perhaps you could make a rough pencil layout establishing the order in which the drawings should appear. We will take care of having the reproduction drawings made from your prints, and I presume that the notes you were good enough to put on the prints will give us the essential dope for captions.

I saw the CAA people in Washington the other day and expect to get from them some of their new standards for small airport buildings, as worked out by a fellow named Thompson who is preparing a CAA manual to be published around the first of November. I also saw Keeble of Nashville who is doing us an article about the scheme for a coordinated development of the Nashville Airport.

I had a talk with Scofield of American Airlines and may have something from him or Glenn Markt. Scofield himself is not strong for the Unit Terminal idea but acknowledges that his company seems to be in favor. He also says that Heino of United is extremely keen about it.

It will be all right if we get the text of your story by the 25th, but if it is at all possible I would like to have you send us the suggested rough layout as soon as convenient. With best wishes,

Yours most sincerely,

Kenneth Reid

KR/ag

also publishers of Chemical Engineering Catalog, Metal Industries Catalog, Metals and Alloys, Architectural, Technical, and Engineering Books

September 25, 1944

Mr. Kenneth Reid
Editor, Pencil Points
330mWest 42nd Street
New York 18, New York

Dear Mr. Reid:

Enclosed find two copies of the manuscript. I am sending the illustrations under separate cover tomorrow. The illustrations are original tracings which I wish you would return to us when you are through with them.

Please feel free to cut the story, change the title, or eliminate illustrations as your judgment may dictate. One item which might be changed for the better is the reference in the story to the illustrations, such as "see Figure I". With good titles on the illustrations, it might not be necessary to use this reference.

As I indicated in a previous letter, I feel that Butte, Wenatchee or Yakima terminal plans might be used to supplement the illustrations as an example of the decentralized scheme applied to a specific site.

Sincerely yours,

Francis R. Meisch
Architect & Plant Engineer

FRM/SF
Encl.

Pencil Points . . . the magazine of architecture

published by Reinhold Publishing Corporation, 330 West 42nd St., New York 18, N. Y. BRyant 9-4430

VIA AIR MAIL

September 21, 1944

Mr. Francis R. Meisch
Architect and Plant Engineer
Northwest Airlines Inc.
1885 University Avenue
Saint Paul 4, MINNESOTA

Dear Mr. Meisch:

I am very pleased to know that the story is nearly ready to send to us and hope that the preparation of illustrations will not cause you a lot of extra effort. I wish you could give us as soon as possible some sort of a rough setup, or a list of desirable illustrations, so that we can plan for a definite amount of space. Remember that we are equipped to have plans redrawn for reproduction, which will save you unnecessary labor.

With best wishes,

Yours most sincerely,

Kenneth Reid

KR/ag

also publishers of Chemical Engineering Catalog, Metal Industries Catalog, Metals and Alloys, Architectural, Technical, and Engineering Books

AIR TERMINALS FOR MASS AIR TRAVEL

1. The Past

Airport administration buildings have in the past been erected with little regard for function or changing conditions. These buildings were planned for smaller planes and plane loads than are now being handled or anticipated. Both the administrative functions and the terminal functions were combined within one structure, together with any number of related and unrelated minor activities. Too many of these functions subject to expansion were crowded into symmetrical structures built in too permanent a manner. The buildings were either low cost structures which, through poor maintenance, soon deteriorated into veritable slums or they were high cost municipal monuments or show places for the general public. The monumental stone or concrete edifices defied all attempts at economic remodeling or expansion to keep pace with the fast growing air transport industry. Consequently, their useful life was terminated far ahead of their previously estimated economic life or amortization period.

The buildings had other faults. There often was too little space and a lack of facilities for the airline passenger and the airline operational functions, in contrast to the public areas. In addition, little thought was given to developing service and revenue producing facilities of a high standard for the convenience of passengers, the public, and employees. The result was that the airlines were expected to pay the lion's share of the operating costs of these monuments. The building itself was often poorly placed in relation to apron and apron expansion, runways, and proposed runways, access roads, and drives, parking areas, and other fixed construction such as hangars. This, in most instances, excluded any possibility of expansion.

In many cases there was a lack of balance in the various types of traffic flow; consequently, bottlenecks developed. These various types of traffic flow, plane,

passenger, cargo, general public, and automotive, are governed by many factors. These factors, in the main, are air traffic circle capacity, runway configuration capacity, taxiway pattern capacity, apron or gate capacity, terminal building capacity (the adequate handling of passengers, baggage, and air cargo, the general public and spectators), parking lot capacity, the capacity of the access drives and roads, and the capacity of the highway between the airport and the city for volume or high-speed traffic. In terminal design, it is the building, the apron, the parking lot, and the access drives that are of primary concern. The other considerations fall into the realm of airport planning or city planning. The balancing of all the factors to provide uniform traffic flow is very essential.

II. The Case for Decentralization

The prototype of many of the poorly planned and monumental air terminals of the past was the railroad station with the central type plan. The parallel between air and rail travel can be carried only so far, before it breaks down. There are physical and operational differences resulting from many factors. The railroads have had the physical advantage of dealing with standard units - a standard gauge track, a standard length coach or pullman car with an approximately uniform height and a standard floor level to which all loading must be accomplished. The airlines, on the other hand, have had and will continue to have equipment which even within a single company varies as to physical standards. Great variations exist in the length, height, and wingspread of aircraft, and the floor levels to which the loading must be accomplished. In some instances the floor or deck which must be loaded is in a sloping position when the aircraft is on the ground. All of this means that aircraft gate positions with fixed facilities for fueling, air conditioning, sewage disposal, water, power, turntables, etc., must be designed and spaced to accommodate the largest reasonably anticipated aircraft. When such

positions are occupied by smaller aircraft, an operational waste of apron or gate area occurs. Yet the cost of providing fixed facilities for spacing several sizes of aircraft within a given apron area is too great to make it economically possible to eliminate this apron area waste. Mobile services are possible but also expensive and the number required constitute additional operational hazards.

An understanding of the physical-numerical differences in passenger and cargo handling problems of rail and air carriers is essential (See Figure I). Consider the 50 passenger plane which requires 150 lineal feet of gate space or requires a 150 foot diameter circle of apron area on which to maneuver into and out of loading position. In approximately the same apron area and clearances used up by this plane, it is possible to provide platform space and eight tracks on which sixteen standard railroad cars would provide a capacity of 900 passengers. In other words, the lineal feet of gate space used up by one 50 passenger plane is equivalent to the lineal feet of gate space providing access to four platforms and eight tracks on which trains of any length might load. A 20 car train handling 500 passengers will use 1500 to 1600 feet of track. Ten 50 passenger planes handling 500 passengers will require 1500 lineal feet of apron. Actually, the apron area used by these ten aircraft could provide track and platform area for eight 20 car trains with a total capacity of 4000 persons. The ratio of apron space required per person in air travel (based on 50 passenger aircraft) is roughly eight times the track and platform space required per person in rail travel. The ratio of plane gate space per person is eighteen times the gate space required in rail travel. It is this physical difference that is one of the great factors in pointing toward the decentralization of air terminal facilities, as unusually great areas and distances are involved in the terminal mass handling of air passengers. It is these same physical factors which have made the solution of loading air passengers and cargo under cover so difficult and extremely expensive.

The time factor has a definite correlation with the physical factors in both rail and air terminal design but is more difficult to analyze. In air travel the passenger who is forced to enplane through a central building may have to walk several thousand feet to the plane, necessitating the calling of the flight a number of minutes ahead of scheduled departure. Railroad cars have several entrances; planes at the present time have only one entrance, but the industry is looking forward to several doors in the larger aircraft as a means of cutting terminal time down. Aircraft must fuel at their gate position except for some originating flights which may fuel at the hangar. This fueling operation is time consuming, but a ship must occupy its position until the process is completed. This fueling operation is also a function that must be closely watched and protected for safety. Railroad trains, on the other hand, usually need not wait to fuel but can change engines while in the station in a matter of a few minutes. The physical differences in aircraft present operational problems in passenger and cargo handling. Baggage carts may be standardized, but passenger loading steps and ramps, cargo loaders and chutes, ladders, etc., will vary with the plane. If more than one entrance is provided per plane, additional steps or ramps will be required. The railroads do not have this problem nor the attendant storage problem for so much varied equipment. Because of the weight factor, it is very unlikely that planes will carry their access steps, etc., from place to place as an integral part of the plane.

Rail travel is mass handling of people and baggage. Air travel is still personalized service and the individual handling of passengers. Air travel soon expects to be mass travel, and the airlines are looking for ways and means to expedite this mass handling of passengers without giving up the personalized service for which they are noted. Airports are usually situated some distance from the heart of the city in contrast to railroad stations. This location difference means that airline

passengers arrive at the airport either in a private car, a taxi, an airline limousine, or a bus; and are often pre-ticketed. In the case of the airline limousine, the passenger may have already checked in at the downtown ticket office, where his ticket was picked up and his baggage checked through to destination. These pre-checked passengers are ready to board the plane on arrival at the airport. Rail and plane ticket sales vary little in the time element, but the making of plane reservations and the checking in of plane passengers and their baggage is a time factor which the railroads do not have to consider. All plane seats now sold are reserved and the weight control of passengers, baggage and air cargo is essential. The railroads have no such problem of weight control. In most instances railroad passengers carry their own baggage aboard; a fact not likely to be utilized by the airlines until two or more classes of air travel are set up. It is not likely that plane reservations will be dispensed with until a high frequency of schedule is available and even then there is the possibility that some form of weight control may yet remain. This has been but a brief analysis of differences between rail and air travel as affects terminal design, but it illustrates the impossibility of planning air terminals on railroad standards for the centralized mass handling of passengers.

III. The Decentralized Solution

The decentralized scheme, as proposed by Northwest Airlines, utilizes the advantageous features of the centralized design. A central building containing the necessary services is established with a number of minor stations or units located like satellites along the loading apron (See Figure II). Total decentralization would mean the construction of entirely separate and wholly self-sufficient airline stations around the perimeter of the airport.

The trend toward decentralization has so far been limited to proposals of airlines which were searching for a solution to the terminal building problem. The

nearest existing counterpart to the decentralized solution is the enclosed gate concourse at LaGuardia Field, New York; though this solution stops far short of the designs proposed by the airlines. It was the major terminal with its far flung plane positions that led Northwest Airlines to study decentralized designs. After close analysis it was seen that the decentralized solution had an advantage for the smallest station as well as for the largest terminal. While Northwest Airlines was arriving at its answer to the problem, United Air Lines in their research arrived at the same conclusion concerning decentralization. The basic scheme and underlying principles are identical in both airline solutions; though minor differences with attendant advantages and disadvantages occur in either solution.

Northwest Airlines proposed the discontinuous "unit" or "dock" solution (see Figure III), and United Air Lines proposed the continuous "unit" solution (see Figure IV). The Northwest Airlines' scheme allows the individual docks to be expanded to the full length of the gate position, or additional docks and gate positions can be added at either end of the apron. This is done only when needs dictate, thus keeping the original investment small until economic justification for expansion exists. The dock scheme was proposed for large terminals where it was found that the airline functions for passenger traffic and cargo handling did not at the present time require terminal facilities the entire length of the gate position. If space were desired for airline field operations, communications, offices, commissary, etc., along the length of the gate position as well, then the continuous "dock" or "unit" was required. United Air Lines' scheme was based upon housing some of these additional functions at the apron, hence - the continuous unit. This scheme presents internal expansion difficulties where several airlines are concerned. Cushion functions which can be removed to provide for expansion must be located in units between airlines. If this is not done, the airline or lines in the center push out those airlines on the ends into new units as more gate and terminal space

is required. Using light demountable partitions, the physical changes are not difficult to make; but the resulting disruption in terminal activities for the airlines required to move is not at all desirable. Since their inception, various ideas from the two solutions have been interchanged and combined so as to provide a common solution to the industry's problem.

The basic premise of the decentralized scheme is the localization of the individual airline functions adjacent to the apron or gate positions, with a driveway on the off-field side so as to simplify and expedite the transition of passengers from automotive conveyances to aircraft. This allows a clear cut separation of airline functions from one another, and from all other airport activities such as the airport administration, concessions, government offices, fixed base operators, etc. Inter-connection is maintained between airlines and the main public building and administrative offices through the use of a covered concourse serving all docks or units. At terminals large enough to make the investment economical, a cargo race-way for the handling of transfer baggage, mail, and express should connect all airlines with one another, the airmail field post office, and the air express agency. This race-way also provides the space in which to run all the building utilities from a central plant or control point.

The second premise is the concentration of the revenue producing concessions, public service areas, airport administration, government, and private offices into a general public building or "airport community center." This structure is usually centrally located with respect to all gate positions. The list of facilities for such a building or buildings is multiple and varied. The number of facilities for an airport community center will vary with the size of the terminal and the municipality. In the larger terminals it is possible to locate the mail and express facilities in the general public building or to provide smaller separate buildings which are more easily expanded. The only airline function to be located in the general

public building would be a common information center or separate airline travel bureau offices. The use of additional office space in the central public building would be a matter of individual airline policy.

IV. Advantages of Decentralization

Expandability has been previously mentioned. Besides expansion in a horizontal plane, vertical expansion is possible - especially in the units (See Figure V). The units should be structurally designed in the beginning to support an enclosed second story from which the large planes of the future may be loaded by gangplanks when that period of air travel arrives. An elevated passenger drive might follow this step with the old passenger drive at ground level used for cargo truck operators.

Flexibility is another advantage. The overall scheme is adaptable to any shape of terminal area providing sufficient area for expansion is available (See Figure VI). The scheme may be symmetrical or unsymmetrical and the central public building may be either at the apron edge between the units, or it may be set back allowing the units to occupy the valuable apron frontage. Flexibility exists in the design of the units. Once a basic unit is established (width, length, cross section, fixed facilities such as ramps, stairs, toilets, lifts, etc.), each airline can arrange its partitions, counters, exits, and entrances to suit its own particular operating methods. Flexibility exists in the use of the units (See Figure VII). Units may be designed for domestic operations, for foreign operations complete with customs and immigration facilities, for cargo warehouses, for airline commissaries, or for airline offices; or converted from one function to another. To this end a standard cross section free of columns, with exterior walls constructed of uniform structural bays, is desirable. This will allow an interchange of door and window panels to provide freedom in planning.

Segregation is another advantage. Each airline has control of its own operations and can render more personalized service to its patrons. The airline passenger is separated from the general public and from cargo operations thus simplifying passenger handling by airline personnel. Fewer opportunities will exist for mishandling cargo and passenger baggage. The spectator is given an observation deck from which he can watch the apron loading activities without interference with the operations. This all helps to avoid congestion and promote the mass handling of passengers.

Economy is still another advantage. The decentralized terminal can be developed by stages to parallel the economic demand and justification for facilities. Thus there can be no over-expansion. The investment in decentralized terminals can be amortized over a long period without fear of the obsolescence and inadequacy which made an economic liability out of so many terminals in the past.

Passenger convenience is a great advantage. The decentralized terminal is primarily planned to expedite passenger handling and to bridge the gap between air and ground travel in the most convenient effortless way. The passenger is no longer forced through a central building together with the general public where delays occur and congestion abounds. The concessions and services of the central building are still available and ready to serve the passenger who has time to spend at the terminal. The airline passenger purchases air travel because it means time and convenience to him. For this reason it is to the best interests of the industry to cut passenger time at the terminal to a minimum. Immediate passenger requirements such as toilet facilities, telephones, telegrams, vending machines for bottled drinks, candy, cigarettes, etc. can be provided in each unit terminal, thus eliminating the necessity for the hurried passenger to go to the general public building. Safety and efficiency are still other advantages which result from segregation and localization of operations.

V. Unlimited Possibilities

The patterns and schemes which result from a decentralized solution are unlimited. The fundamental governing item is the size of the aircraft which determines the unit terminal length or gate position size. Major terminals are now being designed with gate positions 150 feet on center, but 175 feet is considered ideal. Minor stations serving one or two airlines can get by with units (not gate positions) as short as 75 to 100 feet in length. Unit terminals can be designed to any width but a 30 foot unit plus a 10 foot combination vestibule and concourse has been regarded as the minimum width.

The use of mechanical and electronic aids will off-set the strain on communications caused by decentralization. The major terminal will require for passenger and employee use an intra-airport system of ground transportation connecting all unit terminals with the general public building. Conveyor belts or cargo trains will connect the unit terminals with the central cargo functions. Impressive, though not monumental, architectural solutions can result through establishment of a basic "appearance" scheme for the overall terminal development. Adequate airline publicity and directional assistance can be obtained through the use of controlled signs on each unit without marring the architectural effect. Above all, it is important to locate the decentralized scheme on the airport so as to provide space for the maximum anticipated expansion without interference with runway clearances or fixed construction, as well as to provide for adequate vehicular circulation and parking. The decentralized scheme should not result in stereotyped solutions; fundamentally, it is a planning principle which serves as a guide but not a limit.

WESTERN UNION

PUP80 65

NHG NEWYORK NY SEP 1944 202P

FRANCIS K MEISCH NORTHWEST AIRLINES INC

ILLUSTRATIONS JUST ARRIVED DELIGHTED WITH THEM AND ARTICLE WILL ALSO USE PLANS AS SUGGESTED YOUR LETTER SEPTEMBER 25 HAVE DUE FURTHER REQUEST CAN YOU FURNISH US PERSONNEL AND BIOGRAPHICAL DATA ALSO PHOTO OF YOURSELF AND POSSIBLY PHOTO OF YOU ON THE JOB FOR NORTHWEST. WE WANT TO MAKE YOU THE SUBJECT OF OUR "PERSPECTIVE" FOR NOVEMBER PLEASE WIRE REPLY AND AIR MAIL DATA IF POSSIBLE

FRANK G LOPEZ JR PENCIL POINTS MAGAZINE.

23XXX25.

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RPUP 80 HP THANX

24-536

R. Buchan —

To Palmer House —

ENGR. PROJECT NO.
P-1357
ROUTE THIS COPY TO

September 30, 1944

Frank G. Lopez
Managing Editor
Pencil Points
330 West 42nd St.
New York 18, New York

Dear Mr. Lopez:

Enclosed is personal and biographical data. Hope it will give you the information you need. Expect to send photos air mail on Monday.

I hope the telegram on completion of room title reached you before cuts were made.

Sincerely yours,

NORTHWEST AIRLINES, INC.

F R Meisch

Francis R. Meisch
Architect & Plant Engineer

FRM/SF
Encl.

Francis R. Meisch - Personal and Biographical Data

Was born in St. Paul, Minnesota, October 9, 1915, and lived there until completion of my university education. As long as I can remember I was interested in drawing and painting. During my high school years I spent my summers working on my grandmother's farm in the hills of southeastern Minnesota. It was here that I began sketching landscapes and acquired an appreciation of nature. This landscape sketching later proved a valuable asset in architectural delineation and helped me to 'draw my way through school' - scholastically and financially. My interest in architecture developed while in high school. By the time I entered the university I was firmly convinced that I wanted to be an architect even though a good many architects were forsaking the profession for work that would keep body and soul together.

My first year of college left me disillusioned. Architectural education was in a transition period. Both faculty and students were torn between period design and functional modern. The best 'philosophy of design' was the cribbing method utilizing the B.A.I.D. bulletins and like material. I had already read Wright's 'Autobiography' and Louis Sullivan's 'The Autobiography of An Idea', so I decided to forsake theory for the practical experience of an architect's office. After working for a year in several offices, I again entered the university with the feeling that I knew what I wanted and what formal education could do for me. From that point on I worked my way through school doing renderings, drafting, and free lance work part time while in school and full time during summers and vacations. A five year course was crammed into four and one quarter years and in March 1939 I received my Bachelor of Architecture Degree from the University of Minnesota.

My practical experience had been gained with Rollin C. Chapin, Architect of Minneapolis; Carl H. Buetow, Architect of St. Paul; Elwin H. Berg, Architect of Eveleth, Minnesota; William Pedersen, Architectural Engineer and Land Surveyor of St. Paul; G. M. Orr and Company, Consulting Engineers of Minneapolis; and Dr. L. G. Straub, Consulting Engineer and Head of the St. Anthony Falls Hydraulic Laboratory of the University of Minnesota. The work had varied from small homes and municipal buildings to hospitals, power plants, and hydraulic laboratory design - a good half of the work being engineering rather than architectural in nature.

I entered Massachusetts Institute of Technology on a graduate scholarship in 1939 and received my Master in Architecture degree from that institution in 1940. In the fall of 1940 I went to Fargo, North Dakota to become an Instructor in Architecture at the North Dakota Agricultural College. The Department of Architecture was small and I taught Sophomore architectural design and assisted in teaching all other grades. Besides that I had classes in freehand drawing, watercolor, history of furniture and interior decoration and history of painting and sculpture. At the end of the school year I returned to St. Paul and worked for several of the aforementioned firms. At this time I debated whether to continue teaching or to get into defense construction work.

A defense job in a part of the country I had never seen presented itself. This job took me to Great Falls, Montana, West Yellowstone, Montana, and Idaho Falls, Idaho, as a draftsman for the firm of Shanley Van Teylingen and Henningson, Architects and Engineers, on the U. S. Army Winter Training Camp project. On termination of this project which never reached the construction stage, I accepted a job with the McNeil Construction Company of Los Angeles. I worked at Las Vegas, Nevada, as a draftsman in their engineering unit on the design of contractor's facilities for the Basic Magnesium Compnay plant.

I left this project in February 1942 to accept a position in the Northwest Airlines Engineering Department at St. Paul, Minnesota. After knocking around the way I had, I was looking for a job that would aid in the war effort and yet have a future. I felt that the aviation industry was about in the same position in relation to World War II as the automobile industry was to World War I, and that the 'ground floor' was still open. In addition I saw a broader horizon and more architectural opportunities in the air transport field than I did in aircraft manufacturing. So far I have not been disappointed. The airlines which for so many years were marginal financial operations and which through the war have grown like Topsy still have much they can gain from competent architectural services.

Assignments and duties were many and varied since coming with Northwest Airlines. My first project was the completion and installation of machinery and equipment in a shop addition to the main overhaul hangar. This was followed with one job after another related to war contract construction and included more shops, offices, restaurant facilities, etc. One of the major projects was the design and setting up of a large outdoor bomber modification center complete with all facilities, utilities, and equipment. Plans were also started to house this project before winter weather set in. After the basic scheme was developed, the project was handled by the Corps of Engineers. The same process was true of yet another but more complex modification center set up by the airline as well as of the design of hangars for the Air Transport Command.

The tremendous aviation development occassioned by the war soon started municipalities, large and small, to thinking about expanding airports, new airports, new administration buildings, and airline service. The Engineering Division of Northwest Airlines was soon flooded with requests for advice, opinions, and information. Some of this information was not available and in some cases is still not available without the assistance of a turban and a crystal ball. These requests for information and assistance forced the Plant Engineering Section to study and analyze the postwar airport and airport building problems as well as related matters far in advance of the rest of the company's thinking. It became necessary to anticipate problems in advance of their possible occurrance and to provide a solution.

The majority of the airport and airport building problems and design was routed to me. The work was carried on under Chief Engineer, Karl O. Larson, and Chief Plant Engineer, Vernon C. Lundquist. The credit for the

work accompolished must be given to the entire Plant Engineering Section. Without the assistance of experts in many specialized fields the results achieved would not have been possible. In much of the architectural work I have been ably assisted by our architectural designer, Richard N. Frahm.

Was married in 1942 to Elaine A. Hanson, interior decorator. I met her in the same way that so many University of Minnesota architects met their future wives - working over a drafting table. We are the proud parents of one son who at the tender age of one year exhibits more destructive than constructive talents. Airline work with its periods of expected and unexpected travel often cuts deeply into home and personal life. My spare time is usually spent in reading or in painting and sketching in watercolor. Etching, an old love of mine, is now dormant because of lack of time and an etching press, but some day I hope to get back to working on copper.

WESTERN UNION

PUP82 DL PD

NHG NEWYORK NY OCT 4 102P

FRANCIS MEISCH NORTHWEST AIRLINES INC

PERSONAL DATE AND PHOTOS RECEIVED THANKS ALSO WE ARE

ENTHUSIASTIC ABOUT ARTICLE ON TERMINALS AND ARE USING SOME

COLOR PRINTING AND SPECIAL PAPER TO PRESENT IT

FRANK LOPEZ PENCIL POINTS

119P

WESTERN UNION

ENGR. PROJECT NO.	
ROUTE [illegible]	
V.C. Lundquist VCL	

February 3, 1944

Mr. Kenneth Reid
Editor
Pencil Points
330 West 42nd St.
New York 18, N. Y.

Dear Mr. Reid:

This is to acknowledge receipt of the reprints of the "Architecture and Air Transportation" article in the November, 1943 issue of Pencil Points.

Will you kindly have your accounting department bill Northwest Airlines, Inc. for the cost of these reprints and send the invoice to my attention?

Many thanks for your cooperation in securing these reprints.

Sincerely yours,

NORTHWEST AIRLINES, INC.

FRM

F. R. Meisch
Architect

FRM/SF

NEW PENCIL POINTS

Reinhold Publishing Corporation
330 West 42nd Street
New York 18, N. Y.
BRyant 9-4430

December 16, 1943

Mr. F. R. Meisch
Northwest Airlines Inc.
1885 University Avenue
St. Paul, 4, Minnesota

Dear Mr. Meisch:

Thank you very much indeed for your several letters and for the information you have given me about Messrs. Brandhorst and Hardenburgh. In the light of what you have said, coupled with Harmon Hallett's investigation here, I am inclined to let the whole matter drop as representing nothing but a passing indiscretion.

The letter they sent me is unprintable and I can't send you a copy. It contained no criticism that deserves any answer.

I was interested in discovering that you went to MIT for your Master Degree. I am a Tech man myself of the class of 1918, so when we meet some day we can swap yarns about the old school.

Frank Lopez will take care of the matter of securing reprints for Mr. Larson, but under present conditions it will take sometime before they are delivered. Our printer is swamped with work and is shorthanded so any extra assignments have to be fitted in when they can.

I am glad that the presentation of the article meets with your approval. I have not had any letters commenting on it, but have had a number of oral expressions, all favorable. American Airlines and Pan American asked for extra copies and several of the aviation publications, including "American Aviation" and "Skyways," were most enthusiastic.

We propose to follow this beginning with another issue during 1944 in which we will attempt to become more specific on some of the things that are being developed. I hope particularly to get a complete story for the tangent design for large airports worked out by American and now modified and improved in collaboration with all the other lines using New York facilities. Civil Aeronautics Authority expects to have some revised standards ready by spring and they have promised to give us the privilege of publishing them as soon as they are ready. I will call upon you again, if your are willing, to provide us with something on one of the subjects you mentioned in an earlier letter as deserving special treatment. With best wishes,

Yours most sincerely,

Kenneth Reid

Kenneth Reid,
Editor

KR/ag

p.S. We have a few over-run sheets of the issue sent down every month and are mailing you under separate cover the pages containing your story. They may be useful in some way.

K.R.

ENGR. PROJECT NO.	
ROUTE THIS COPY TO	

December 27, 1943

Mr. Kenneth Reid
Editor
New Pencil Points
330 West 42nd Street
New York 18, New York

Dear Mr. Reid:

I was pleased to receive your letter of December 16th, and I wish to acknowledge receipt of the over-run sheets of the article and to thank you for the same. There is no rush for the reprints, so we shall wait until they can be handled by your printer in the normal course of events.

We have received a number of oral and written comments concerning the article, all of which have been favorable. If any unusual comments come up I shall forward a copy to you. I think that your policy of publishing information on the tangent airport design and the revised CAA standards is a good one.

The Minnesota Legislature has established a Department of Aeronautics headed by a Commissioner, whose duty has been the planning of the aviation future of the state. In this connection, the Commissioner has contacted many municipalities and sounded them out on the airport plans, and, in a number of instances, the municipalities have, through the Department of Aeronautics, secured the services of architect-engineer firms to prepare master plans of airports and administration buildings for erection in the post war period.

I believe I can state with certainty that airport and airport building design data in the architectural magazines is very carefully being studied by architects in this state and that currently keeping them up to date on design developments will be a much appreciated service that the architectural magazines can render.

We will be pleased to cooperate with you at such times in the future when you may desire information or when we have any material that we feel would be of advantage to the profession.

Very sincerely yours,

Francis R. Meisch
Architect

FRM/SF

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1206

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NEWCOMB CARLTON, CHAIRMAN OF THE BOARD
J. C. WILLEVER, FIRST VICE-PRESIDENT

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Send the following message, subject to the terms on back hereof, which are hereby agreed to

St. Paul, Minnesota
December 9, 1943

ENGR. PROJECT NO.	
ROUTE THIS COPY TO	

Kenneth Reid, Editor
New Pencil Points
330 West 42nd Street
New York 18, New York

RE SHALLET CALL AIRMAIL REPLY TO FOLLOW.

F. R. Meisch
Plant Engineer

F R Meisch
Approved

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6. The Company will not be liable for damages or statutory penalties in the case of any message except an intrastate message in Texas where the claim is not presented in writing to the Company within sixty days after the message is filed with the Company for transmission, and in the case of an intrastate message in Texas the Company will not be liable for damages or statutory penalties where the claim is not presented in writing to the Company within ninety-five days after the cause of action, if any, shall have accrued; provided, however, that neither of these conditions shall apply to claims for damages or overcharges within the purview of Section 415 of the Communications Act of 1934.

7. It is agreed that in any action by the Company to recover the tolls for any message or messages the prompt and correct transmission and delivery thereof shall be presumed, subject to rebuttal by competent evidence.

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9. No employee of the Company is authorized to vary the foregoing.

10-42

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Messages taking precedence over all other messages except government messages.

NEW PENCIL POINTS

Reinhold Publishing Corporation
330 West 42nd Street
New York 18, N. Y.
BRyant 9-4430

December 10, 1943

Dear Mr. Meisch-

Your letter came Saturday to Ken Reid and I read it over the phone to him, as he is laid up with a touch of the flu. He will probably write you shortly on the details.

Mr. Brandhorst rather set us back on our heels with his two sentence letter commenting on your article. I have been shouting to the architects since I received the copy of the manuscript which you so kindly sent me, that I was just a little bit hot too. His carefully couched phrase liquid s--t became the first dirty comment this office has ever received and I guess that everyone wanted to take a crack at him. Then we wondered whether we would give him the satisfaction of noticing him. Mr. Zellner's circulation department took steps to issue a check to him cancelling the balance of his subscription.

In the meantime, I found out where I could reach him and got in touch with him by phone. He told me that he had not graduated as you said and everything else seemed to check. I tried to find out what there was about the article that he did not like and as far as I could learn, he had an idea that it was just a rehash of what he had read somewhere's else. He said that he liked the magazine and made no personal comments about you so I devoted the rest of the conversation to talk about school. He did ask me to meet him sometime and hear him spout his pet peeves. Hardenburgh went to school with him also. They are now working in a glider plant on Long Island designing tools.

We had an editorial meeting Friday and decided-

New Don Graf series to start in 1944
Color plates, first ones in Jan issue.
More details and more sketches
A new series to run for about two years on the reasoning behind the present modern design.

Excuse the errors. I am my own typist and it is Sunday night and I have just gotten out 236 letters since Saturday morning.

Cordially,

K. A. Hallett

I imagine an immediate order will go to the printer Monday for reprints. Several airlines have asked for copies. Let me know if you want any thing in a hurry.

WILLIAM EMERSON, F.A.I.A.
ARCHITECT - 107 MASSACHUSETTS AVENUE
TELEPHONE BOSTON 15 COM. 0522

December 6, 1943

Kenneth Reid, Esquire
Pencil Points
New York, New York

Dear Ken Reid:

I want to make a point of congratulating you on the recent numbers of Pencil Points and their effective use of the material presented. You have shown throughout this new edition flexibility, ingenuity and quality, and are doing a real service to the profession.

I have not my records at hand so that I do not know whether my subscription requires renewal.

May I hear from you?

Sincerely yours,

William Emerson

WEfbd

December 15, 1943

Mr. H. A. Hallett
Reinhold Publishing Corp
330 West 42nd Street
New York, New York

Dear Mr. Hallett:

I was pleased to receive your recent letter and to get the details of the Brandhorst letter incident, together with the comments of your conversation with him.

I can well imagine why the office was angry and annoyed. However, I am willing to call the incident closed and forget about it.

Your remarks about the decisions at the editorial meeting were interesting to me. For years I have enjoyed the color plates that have appeared in Pencil Points, and will look forward to the ones proposed in the January issue. Since the color plates disappeared from Pencil Points, it has been an idea of mine to write the magazine and put in a plug for the publication of such plates, but like so many other ideas, it was one that never reached the written stage.

Sincerely yours,

F. R. Meisch

F. R. Meisch
Plant Engineer

FRM/SF

NEW PENCIL POINTS

Reinhold Publishing Corporation
330 West 42nd Street
New York 18, N. Y.
BRyant 9-4430

December 9, 1943

Mr. Francis R. Meisch
Northwest Airlines Inc.
1885 University Avenue
St Paul 4, Minnesota

Dear Mr. Meisch:

Reaction to your article has so far been favorable, but I received yesterday a scurrilous letter, apparently motivated by some grudge held by the writers either against you, or against the magazine, signed by two men, Gerhard Brandhorst and Collis Hardenburgh. Brandhorst is a subscriber and his original subscription order discloses that he lived in Minneapolis in 1940, although he is at present here in the east. The two men work in a glider plant in Long Island City.

I am writing to inquire if you know anything of the two that would help to explain their curious attitude.

While there is nothing in the letter to establish any direct Nazi or bundist connections, it discloses a type of thinking that makes me suspicious, and I may even turn the matter over to the FBI for investigation.

Yours most sincerely,

Kenneth Reid

Kenneth Reid,
Editor

KR/ag

December 14, 1943

Mr. Kenneth Reid, Editor
New Pencil Points
330 W. 42nd Street
New York 18, New York

Dear Mr. Reid:

I received your letter of December 9, concerning the letter you received from Brandhorst and Hardenburgh.

I am quite at a loss to explain their attitude beyond the fact that such an attitude is an intricate part of their personalities. During the time I was in college, I can never remember any conflict between myself and Mr. Brandhorst. In fact, I can remember only one instance where we were both working on the same design problem. Mr. Brandhorst, however, was a very frank, super-critical individual with a high opinion of his own ability and a correspondingly low opinion of the ability of everyone else - in other words, the ideal debunker.

I have talked with some of the men in the office who have known both individuals, and while they find it difficult to explain Mr. Hardenburgh's attitude, they do substantiate the statements I have made about Mr. Brandhorst.

Mr. Hardenburgh was at one time employed by a glider manufacturing company whose president and one of whose directors are also directors of Northwest Airlines. I have no knowledge of any grudge that he might have against either company. I am curious enough to desire a copy of the letter which was sent to New Pencil Points.

It is still my personal opinion that the greatest blow to their vanity would result from your ignoring their letter by not replying. However, this may be against your editorial policy of answering all criticism.

I have not seen Mr. Brandhorst for about five years so that I have no knowledge of any un-American type of thinking that he may have acquired.

Sincerely yours,

F. R. Meisch

F. R. Meisch
Architect & Plant Engineer

FRM:BJB

NEW PENCIL POINTS

Reinhold Publishing Corporation
330 West 42nd Street
New York 18, N. Y.
BRyant 9-4430

December 6, 1943

Mr. Francis R. Meisch
Northwest Airlines Inc.
1885 University Avenue
St. Paul 4, Minnesota

Dear Mr. Meisch:

I expect that by this time you have received copies of the November issue containing your article. I hope that the way we handled it will meet with your approval and that you will not be troubled by the fact that we assembled illustrations from various sources other than limiting them to what you could supply. I believe the story will be well received by our audience and that it will be helpful in promoting interest in the problems of commercial and civilian aviation. I enclose a modest honorarium in line with our limited editorial budget. Although we did not discuss payment for your article, I hope that you will find this acceptable.

With best wishes and thanks,

Yours most sincerely,

Kenneth Reid

Kenneth Reid,
Editor

KR/AG
ENCL.

December 9, 1943

Kenneth Reid, Editor
New Pencil Points
330 West 42nd Street
New York, New York (18)

Dear Mr. Reid:

I am sorry I was not in the office this morning to receive Mr. Shallet's call. In reference to that matter, here is the information that I have.

Mr. Hardenburgh's name sounds familiar; I do not recall him. Mr. Brandhorst and I were students together at the University of Minnesota. Mr. Brandhorst started a year before I did, and after a very erratic attendance, left school without graduating. He has subsequently joined up with a real estate operator and designed a number of small homes around Minneapolis. According to the State Board of Registration for Architects, Engineers and Land Surveyors, he applied for registration but never completed the procedure.

My personal opinion is that if the letter is purely derogatory it is not worth answering; but, if it contains sound and definite criticism, a reply should be made.

It may be to your advantage to have additional information about me. I have my Bachelor Degree in Architecture from the University of Minnesota, and I have my Master Degree in Architecture from the Massachusettes Institute of Technology. Upon graduating from the latter institution, I taught architecture for one year at North Dakota State College. I left that position to go into defense construction work and later was employed by Northwest Airlines.

At the present time I am a Registered Architect in the State of Minnesota, and have applied to the National Council of Architectural Registration Boards for a council record and investigation for the purpose of extending my registration to other states.

In the past I have twice been a finalist in the Annual Rome Prize Competitions, and was co-author with K. I. Hibner in the Owens Illinois Insulux Glass Block Competitions of the drawing awarded sixth prize in competition No. 3, and the drawing awarded third prize in competition No. 4, and fourth grand prize.

I am now employed by Northwest Airlines, Inc. as Plant Engineer and Architect under Mr. V. C. Lundquist, Chief Plant Engineer, and supervise the buildings and grounds design work, including airports. I have been acting as representative of Northwest Airlines, Inc. on the Airline Technical Committee now advising the Chicago Plan Commission in the development of an airport program for Chicago. As a representative of Northwest Airlines, Inc. I am also a member of the Committee on Airport Development Program of the Air Transport Association of America.

At the present time I am not a member of the American Ins itute of Architects but have recently been approached about membership.

Yours very sincerely,

FRM

F. R. Meisch
Plant Engineer

FRM/SF

December 9, 1943

Kenneth Reid, Editor
New Pencil Points
330 West 42nd Street
New York, 18, New York

Dear Mr. Reid:

I wish to acknowledge receipt of your check and to express my thanks for the same. I also have received the copies of the November issue and I am pleased to state that the way in which you handled the article has my hearty approval. I am very interested in what your subscribers' reactions to the article will be and hope that you will let me know the pros and cons of their comments.

Mr. K. O. Larson, our Chief Engineer, has expressed a desire to circulate this article within the company as an Engineering Report. On this basis, I should like to know what steps will have to be taken to secure 200 reprints of the article; that is, pages 35 to 52, or, if possible, through page 66.

Incidentally, if you do not already have the information, the following may be of interest to you:

The wood hangars for modification center which you illustrated on pages 64, 65 and 66 are a part of the modification project initiated, designed and proposed by the Northwest Airlines Plant Engineering Section. The U. S. Army Engineers carried out the construction of this project with the Chicago firm of Fugard, Olsen, Urbain & Heiler serving as Architect-Engineers. The Plant Engineering Section collaborated with the Architect-Engineers on the final design of the project, and now handles all remodeling or new construction at this Modification Center, which is operated by Northwest Airlines, Inc.

I am sending you this data, not for release or to claim credit, but to further illustrate some of the work that the Plant Engineering Section has been engaged in. I am pleased that you were able to secure pictures of this project and would have attempted to secure similar illustrations for you but for the fact that we have had considerable difficulty with the Military authorities in securing permission to release such material concerning this project and others for publication.

Sincerely yours,

F. R. Meisch
Plant Engineer

SF

NEW PENCIL POINTS

Reinhold Publishing Corporation
330 West 42nd Street
New York 18, N. Y.
BRyant 9-4430

October 29, 1943

Mr. Francis R. Meisch
Northwest Airlines, Inc.
1885 University Avenue
Saint Paul 4, Minnesota

Dear Mr. Meisch:

I am enclosing copies of the galley proofs of your article on "Architecture and Air Transportation" which is to appear in the next issue of New Pencil Points. These have not been corrected as they have just come in from the printer, consequently, you will find a few typographical errors.

You will notice that we have made a few changes in the text, usually with the intention of improving grammar and syntax. You will also note that on the galley No.8 which is the first of the set, we have added a footnote which is self-explanatory and which might ward off question from those who did not perfectly understand your statement.

I don't believe you will find that we have changed the sense of the article at all. There was a certain amount of repitition in it which we have tried to eliminate but aside from the types of things I have indicated, we have not attempted to inject our own thoughts into your very excellent work.

If you have further corrections, please Airmail them back to us so that we can catch the printer before it is too late.

Sincerely yours,

Frank G. Lopez

Frank G. Lopez, Jr.
Managing Editor

FGL:ML
Enc.

November 2, 1943

Air Mail

Mr. Frank G. Lopez, Jr.
Managing Editor
New Pencil Points
330 W. 42nd Street
New York 18, New York

Dear Mr. Lopez:

I have received and have gone over the galley proofs of my article on "Architecture and Air Transportation". Outside of a few typographical errors, the only major error which could lead to controversy is on galley No. 10 where the existing railroad express rates have been quoted as seven cents to eight cents per ton mile. Railroad express is eleven cents to eighteen cents per ton mile, and it is LCL freight that goes for seven cents to eight cents per ton mile.

I am very much in agreement with the changes you have made in the text and feel that these changes have not in any way effected the thought of the article.

Yours truly,

NORTHWEST AIRLINES, INC.

F. R. Meisch
Architect

FRM:BJB
Enc.

November 2, 1943

Air Mail

Mr. Frank G. Lopez, Jr.
Managing Editor
New Pencil Points
330 W. 42nd Street
New York 18, New York

Dear Mr. Lopez:

I have received and have gone over the galley proofs of my article on "Architecture and Air Transportation". Outside of a few typographical errors, the only major error which could lead to controversy is on galley No. 10 where the existing railroad express rates have been quoted as seven cents to eight cents per ton mile. Railroad express is eleven cents to eighteen cents per ton mile, and it is LCL freight that goes for seven cents to eight cents per ton mile.

I am very much in agreement with the changes you have made in the text and feel that these changes have not in any way effected the thought of the article.

Yours truly,

NORTHWEST AIRLINES, INC.

F. R. Meisch
Architect

FRM:BJB
Enc.

ENGR. PROJECT NO. PL-43009	
ROUTE THIS COPY TO	
Lindquist	✓

September 24, 1943

Mr. Kenneth Reed
Editor, New Pencil Points
330 West Forty Second St.
New York 18, New York

Dear Mr. Reed:

I was pleased to receive your letter of September 17th and to learn that you will be able to use some of the material that I submitted.

In reference to illustrations, it may be possible to provide some material. I was unable to contact Mr. J. E. Ferris, our Director of Public Information, until his return yesterday. He now has a photographer on the Western Region taking pictures of line stations and we have permission to use all pictures passed by the military authorities. Many of these photographs are being gathered for our plant records and some are for publicity purposes, but Mr. Ferris suggested that if you could furnish us with any specific illustrative requirements, we could have our photographer take the necessary pictures while he is still on the line.

Frankly, I think that much of the architectural work and airport planning along the line is a better example of what not to do. It represents the type of development that should be avoided in the post war years. The major portion of our recent work is of duration construction but out of this material we may be able to obtain photographs to illustrate new ideas, although the architectural treatment is not the ultimate which we hope to achieve in the post war period when all types of building materials will be available again.

Very truly yours,

NORTHWEST AIRLINES, INC.

F. R. Meisch
Plant Engineer

FRM/SF

NEW PENCIL POINTS

Reinhold Publishing Corporation
330 West 42nd Street
New York 18, N. Y.
BRyant 9-4430

September 17, 1943

Mr. F. R. Meisch
Northwest Airlines Inc.
1885 University Avenue
Saint Paul 4, Minnesota

Dear Mr. Meisch:

I want to apologize profoundly for having let so much time go by without acknowledging your letter of July 30th and the comprehensive article that came with it. I can't explain how it came to go unacknowledged, except to say that this office has been snowed under this summer with the details of getting out the magazine and at the same time we have been struggling with changes in personnel, vacations, necessary business trips and other interruptions which have made the editor's life chaotic.

Your article seems to me to be the most comprehensive discussion it has been my pleasure to encounter on this subject, and I want to use it as completely as space will allow in the November issue. It can be supplemented later on with further discussions of details of the general problem, but as a general statement it seems to me that it will give our architectural audience a much clearer picture of the possibilities than they have had laid before them in the professional press up to date.

We will attempt to gather some additional illustrations, and it occurs to me that you may have some photographs which would be useful to include. Of course, I can realize that photographs of airports are largely restricted these days, but there may be some things that can be published without giving away military secrets.

I have read the article twice, but I want to go over it again to analyze the illustrative possibilities, and I will write you again next week about this.

I hope you will realize that my procrastination has not been due to any lack of interest or appreciation on the splendid job you did in preparing this material.

Yours most sincerely,

Kenneth Reid

Kenneth Reid
Editor

KR/ag

NEW PENCIL POINTS

Reinhold Publishing Corporation
330 West 42nd Street
New York 18, N. Y.
BRyant 9-4430

August 19, 1943.

Mr. F R Meisch, Plant Manager
Northwest Airlines Inc.,
1885 University Avenue,
Saint Paul, 4, Minnesota.

My dear Mr. Meisch:

Your letter of July 30 addressed to Mr. Reid comes during his absence from the office. Upon his return he will communicate with you .

Cordially yours,

Katherine Winnell
Secretary to Mr. Reid.

July 30, 1943

Mr. Kenneth Reid
Editor, Pencil Points
330 West 42nd Street
New York, New York

Dear Mr. Reid:

In reference to your letter of June 30th in which you clearly stated reasons for the reduction in the size of Pencil Points, I must admit I am sorry that the size must be reduced but studying the facts presented, I realize that you are following the only possible course.

In accordance with your suggestion in that letter, I am enclosing a discussion of Architecture and Air Transportation. I hope that you may derive some ideas from it for a future issue of Pencil Points and that you will feel free to call upon the Northwest Airlines Plant Engineering Section for any information or assistance you may desire.

The impact of war activities upon the airline has caused the Plant Engineering Section to be developed and expanded in order to handle projects concerning new construction, remodeling, plant standards, plant records, and post war planning. The Plant Engineering Section is composed of several units and functions to a limited degree in a manner similar to an architect-engineer firm. Its personnel is composed largely of specialized professional men and includes architects, mechanical engineers, structural engineers, electrical engineers, civil engineers, equipment specialists, soils expert, aviation gas systems expert, expediters, interior decorators, draftsmen, and field engineers who are assigned to various regions and locations.

After studying the enclosed discussion, you will gain some idea of the multitude of planning problems being encountered by the airlines. The major items about which detailed discussion and information are desirable are as follows:

1. Aviation Background.
2. Airport Design.
3. Passenger Terminal Design.
4. Cargo Terminal Design.
5. Hangar Design.
6. Specialized Shop Design.
7. Overhaul Base Design.

The subject of airport design and terminal facilities could be organized and treated on the basis of requirements of cities in various population brackets. Whether such a series of articles should be crammed into one issue or whether they could be published better as a series of monthly articles is a matter for you to decide. In the event that the latter is more feasible, I would be glad to supply you with articles on each of the above subjects.

This analysis is from the viewpoint of the scheduled air carrier operator. The non-scheduled commercial operator has still another viewpoint and problems to consider as has private aviation. Because of the possible magnitude of private aviation development an analysis of its problems similar to the commercial aviation outline above would be a great help to the architect and city planner. The military phase of aviation can be neglected at this time for desirable and enlightening though it maybe, such a discussion would be too restricted if not entirely prohibited.

It is my opinion that the basic weakness of architects with respect to aviation, and this is even true of many engineers, is their lack of a proper "aviation background" and the correct perspective of the importance of aviation in the world today. Lacking this, they cannot succeed in giving valuable advice or in properly planning the individual structure of the city pattern to best meet the needs of the Air Age.

Yours truly,

NORTHWEST AIRLINES, INC.

F. R. Meisch

F. R. Meisch
Plant Engineer

FRM/bjb
Enc.

NEW PENCIL POINTS

Reinhold Publishing Corporation
330 West 42nd Street
New York, N. Y.
BRyant 9-4430

June 30, 1943

Mr. Francis R. Meisch,
4532 Bryant Avenue South,
Minneapolis, Minn.

Dear Mr. Meisch:

Thank you very much for your friendly letter of June 28th. You will be pleased to know that the editors are wholly in sympathy with your objections to reducing the size of the magazine, particularly in the middle of the year. We, too, thought that we might deal with the paper shortage by decreasing the number of pages or using a lighter stock, but there are other factors which bear upon the problem.

The pressure to make the change first came from the Architectural Forum in response to a general movement by trade and professional magazines to conform to a standard size of page established by the majority. The Forum got together with the Record and decided to make the change which practically forced us to go along with them since the advertisers frequently use the same plates in successive months in the three magazines in the field. To have refused to conform would have put us in the position of forcing the advertisers and advertising agencies to make additional plates of a different size for inclusion in New Pencil Points. With the competition for advertising so keen as it is we would have been placed at an extra disadvantage since in order to advertise in New Pencil Points extra work and expense would be involved for the agencies.

Of course there was also the argument that, metals being scarce, it is desirable to reduce the amount of engraving as well as the amount of paper. At any rate, we were forced to yield, much to our disappointment and to the disappointment of many subscribers who feel as you do.

We are going to keep as large a size of text page as possible by reducing the margins to a minimum. This will enable us to keep the illustrations practically as large as they are at present which is the best we can do under the circumstances.

Incidentally, all of the magazines have reduced the weight of the paper stock as part of the job of conserving paper.

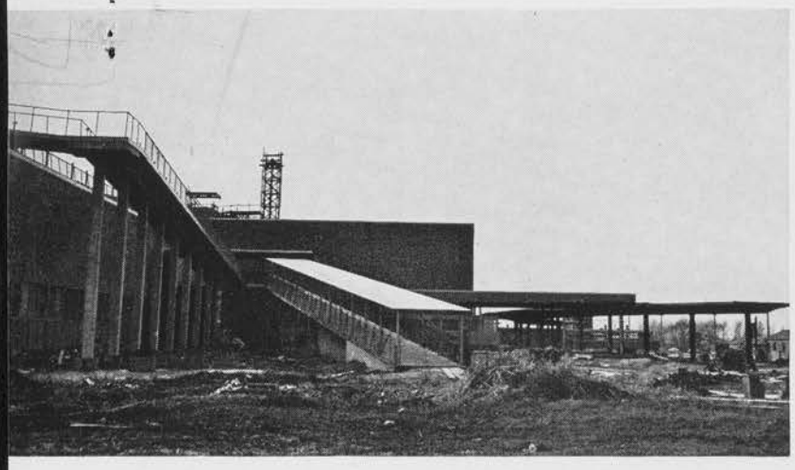
We are contemplating an issue, probably for November of this year, in which the impact of the development of air travel and transportation upon architecture and planning will be the main subject. It occurs to me that through your connection with the airlines you may be in a position to suggest some of the points we ought to cover and possibly contribute something to this special issue. We feel that it is high time for the architects generally to begin to be informed about the probable postwar developments in air travel and transport facilities. We are going to get what we can from the Civil Aeronautics Board, and from the various airplane manufacturers and operating airlines. I would be pleased to hear what you think of this idea, and to have any suggestions you might make as to how we can make such an issue of maximum interest and value.

Yours most sincerely,

Kenneth Reid

Editor

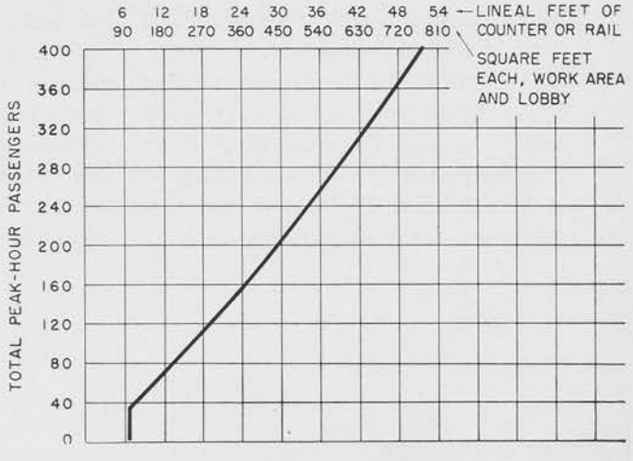
KR/W



SIGHTSEERS *intermingle freely on two levels at the International Airport, Tampa, Florida* (above). *At Philadelphia, they are separated for control and revenue; Philadelphia International Airport; Carroll, Grisdale & Van Alen, Architects* (left).

BAGGAGE CLAIM *graph translates passenger traffic into counter space, lobby and work area requirements. Architects Roy Worden and Vincent Fagan with Frank Montana as Consultant provided recessed baggage-claim counter adjacent to incoming gates and lobby exit at Indiana's South Bend Airport. Though station-to-plane routing provides no overhead protection, once within the building, circulation is isolated; interference with passenger flow prevented* (below).

BAGGAGE *handling at Pittsburgh Airport provides circular chute for rapid vertical transfer of baggage to field level. As opposed to more costly (but less damaging) mechanical conveyors, Architect Joseph Hoover felt budget limitations dictated their use* (above). *Weigh-in platforms at South Bend, Indiana, Airport adjoin separate waiting areas. Direct access from road to individual airline ticket counter eases traffic pattern, but results in duplication of lounge facilities;* (left; also see right). *Typical baggage handling counter and scales are shown at International Airport, Tampa, Florida* (below left; also see above). *Symbol of airline commercial identity, zealously guarded, is information board behind; Eliot Chapin Fletcher; architect.*



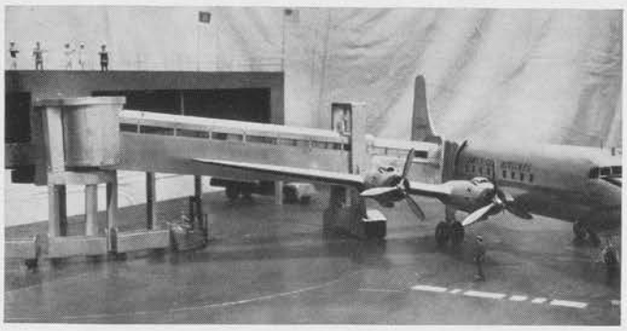
the future of airport design

Anyone speculating about, or attempting to plan for the airport of the future (let us say a period 25 years from now) comes up against a peculiar conflict. On the one hand, there is the unexpectedly great growth of the industry and an already apparent radical change in plane design (jets and helicopters now with us; atomic energy possibly applied to aircraft power; serious discussion of supersonic speeds in the thousands of miles per hours, despite the penalties of increased fuel costs for commercial operations). On the other, the airlines have a lack of investment capital plus an inherent conservatism with regard to the design of ground facilities. Someone is going to take some of the imagination which fires the students of space-flight and rocket travel, apply it to the routine problems of getting from New York to Chicago as quickly as possible, and come up with sensible plans for airports very different from the ones published in this issue. The Editors are not going to suggest what these solutions might be, but simply point to some of the factors which will both stimulate and limit future planning. And on the following two pages, we show an airport which never got built, one which was for a very specialized purpose but indicates some advances in planning that might immediately be made on a wider scale.

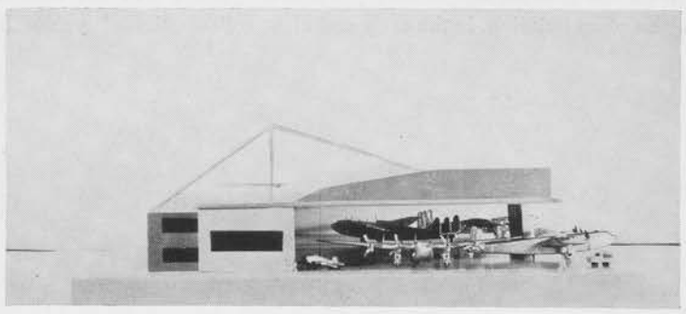
First of all, what would be the aims of future air-flight toward which planning might be directed? Throughout this issue, it has been repeated that one travels by air to get from one place to another quickly — and reduction of that time-distance factor will continue to be the principal aim of the industry and its planners. This means faster flight, less time lost on the ground, more efficient operations at the terminal. Related to this need is the knowledge that commercial air transport must be put on a more secure paying basis. This means more customers, reduction in fares, lessons learned from the presently orphaned "non-scheds" and, again, more efficient operations at the terminal. It also means the development of new untapped uses and therefore new clients for air flight. What changes in the pattern of American life are foreseeable which might affect or influence air travel? The moves toward decentralization—whether for defense or social-planning reasons—are the most obvious. Certainly, then, providing a service for a lesser distance factor than that which now limits air-travel business (cities under 100 miles apart are too close to generate sufficient air traffic for present carriers) would open up new fields of income, service, and planning.

What of aircraft developments which may have an effect of ground planning? At two extremes of travel, important possibilities are opening up. For long distances, the jet, the rocket, the atomic-fissure power plant—with their increased speeds and greater wing loads—are either here or are real possibilities. Their effect on airport planning—length of runways, loading and servicing facilities—is not clear yet. At the moment, the faster the plane, the greater the approach area and the longer the runway needed for landing. But the very speed of landing and take-off may stimulate further experiment and development of catapulting take-off and drag-landing devices, which could actually reduce the required runway length. At the other end of the travel scale, for short-distance passenger and cargo haul, the helicopter is approaching a development which will permit carrying of up to 40 passengers, making it commercially feasible and opening up two new air-travel markets — taxi service to bridge the time-distance gap between present airport and present commercial or residential areas; and commuter or short-distance travel between the suburb or satellite community to central city, or between two cities now considered too close to generate air travel.

These influences may not be realized for some time in planning, except in the

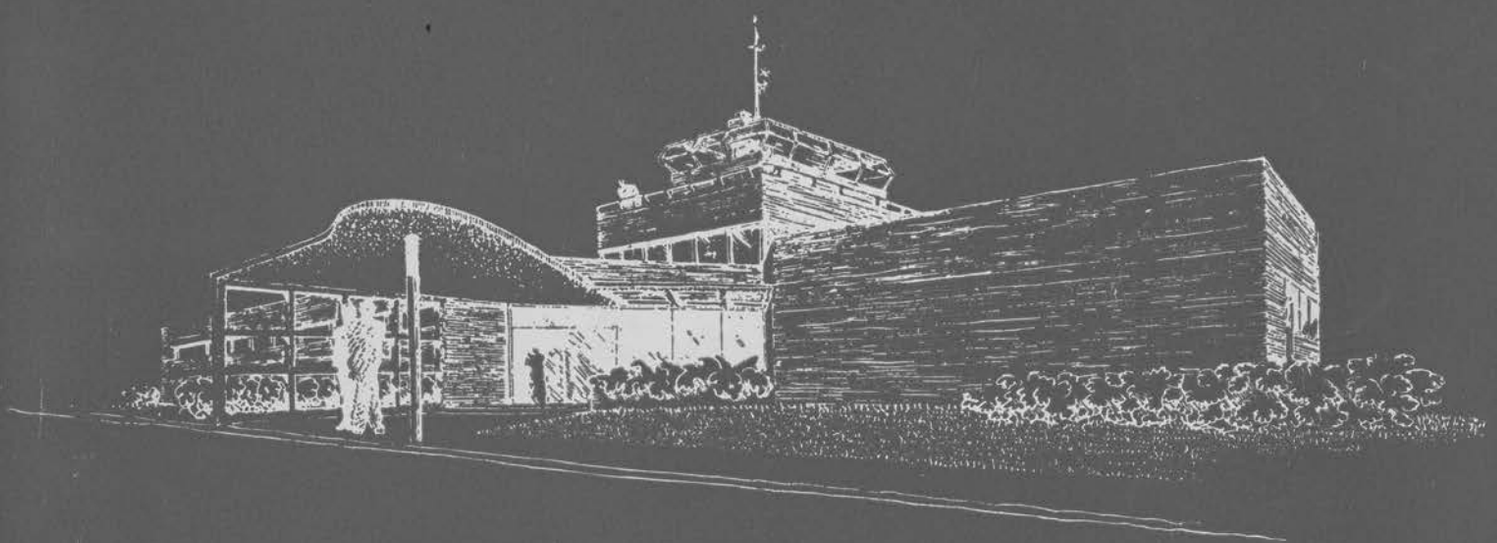


Mobile, covered gangplanks, as developed by the Airways Engineering Corp., provide protected passenger loading from finger to plane (above). *Fewer apron positions are required, and more passenger miles may be flown, since loading time is reduced.*



November, 1944

Airports and Airport Buildings



Pencil Points

PROGRESSIVE ARCHITECTURE

Partially Scanned Material

Version 2
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