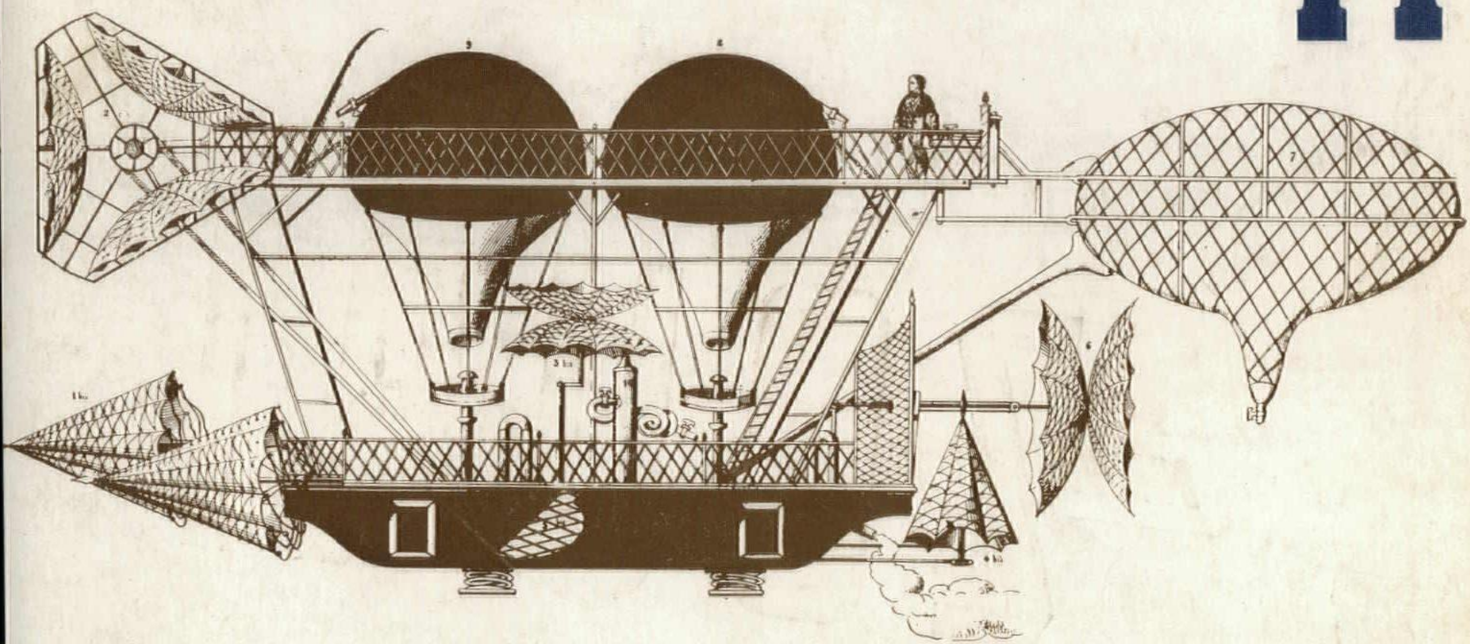
11



1856
1943

Aeronautical Advance Means Work for Architects

NEW PENCIL POINTS

YOU, TOO, MR. ARCHITECT
OR BUILDER!

★ The ZOURI Store Fronts advertisement above is typical of those which are appearing regularly in 22 leading trade magazines — encouraging the merchants of America to plan their store fronts of tomorrow—today! But this involves you, too, Mr. Architect or Builder, for the merchants depend upon you for design and construction. So let's all work together by planning now for post-war prosperity. When ZOURI store front construction is again available, you can be sure that it will be even finer and offer more possibilities for good design than ever before. ZOURI STORE FRONTS, NILES, MICHIGAN.

GET A HEAD START! PLAN TOMORROW'S STORE FRONTS TODAY! SEE SWEET'S

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

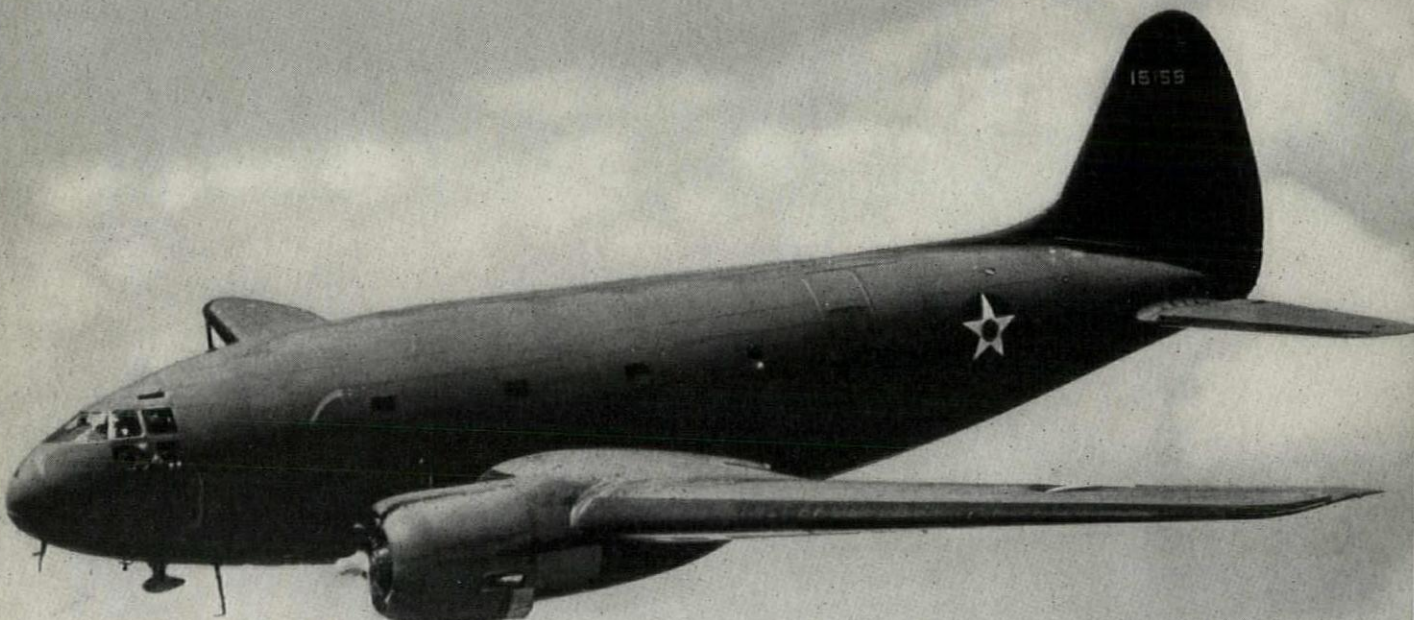
* *20 billion dollars in 1943, 30 billion dollars in 1944. Compare with 3.7 billion as all-time peak for automobile industry in 1941.*

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

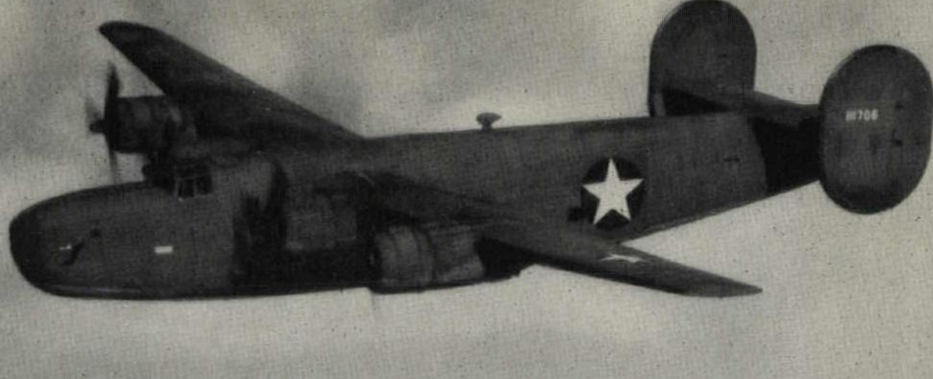
Part I — Status of Aviation Design: Types of Aircraft and Pattern of Development



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.

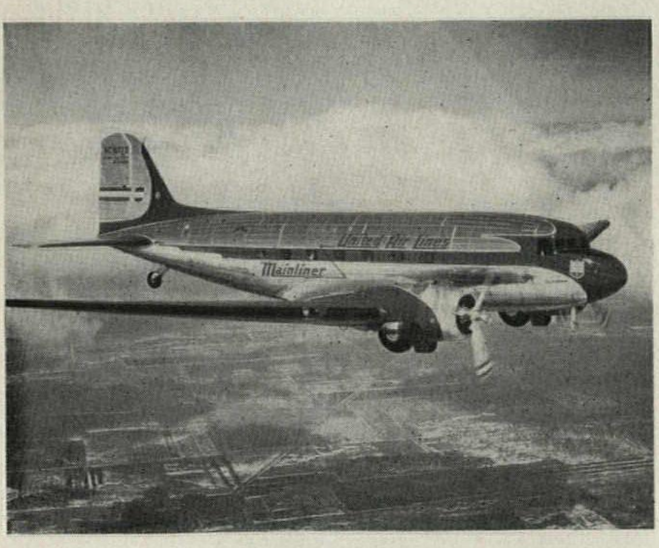
Four New Ideas:

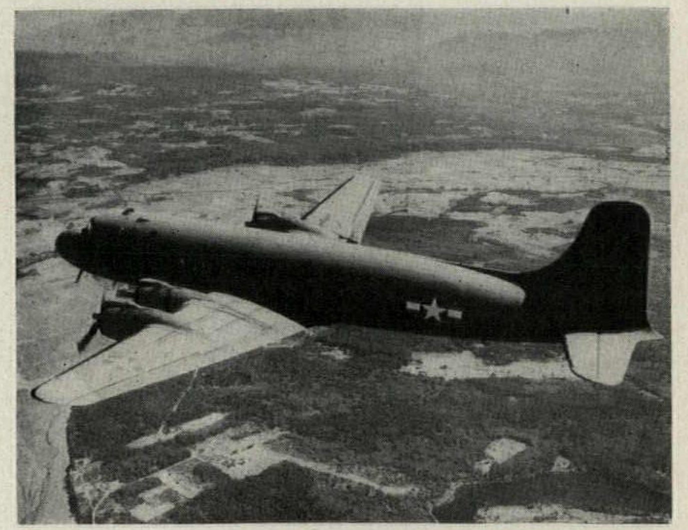
There exists today a potential demand for a gigantic commercial aviation system. The realization of such a system will be based upon entirely new concepts, understanding of which is essential. These are mainly as follows: the relation of space and time, the re-study of physical geography, the re-analysis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

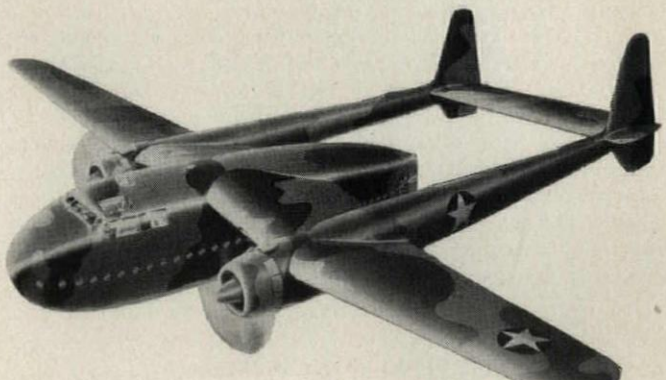
2—The Bird's Eye View

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.

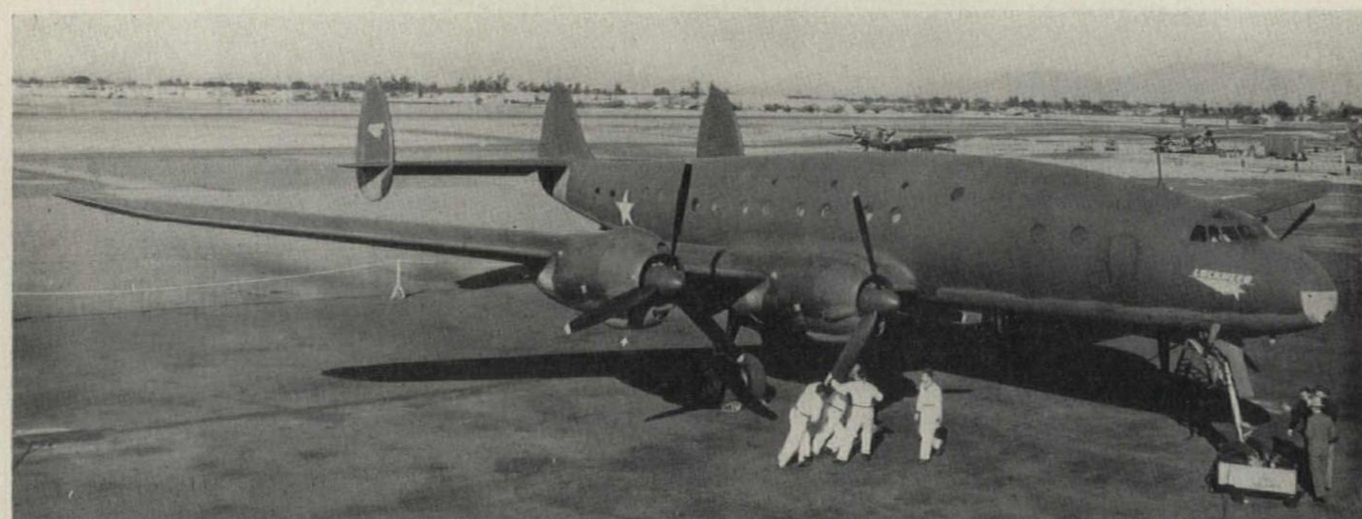
3—Payload Geography

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.

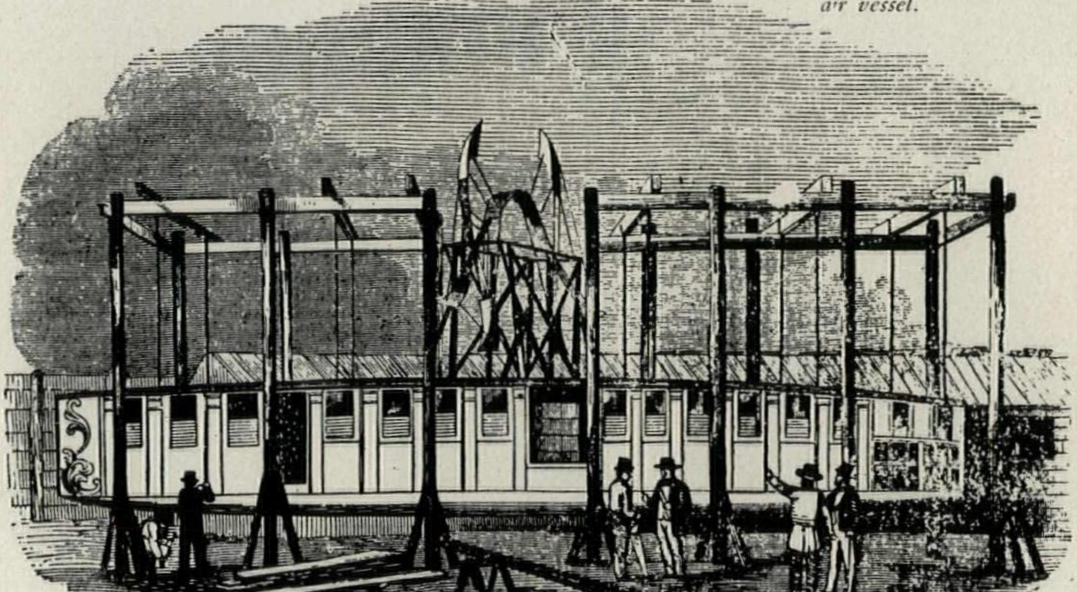
Airway and airport traffic control has anticipated these new technological developments, which will allow aircraft to be "stacked" in layers or spaced in "trains" for blind flying. Such safety devices will simplify traffic control problems and will allow a greater density of aircraft per unit of space, 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.

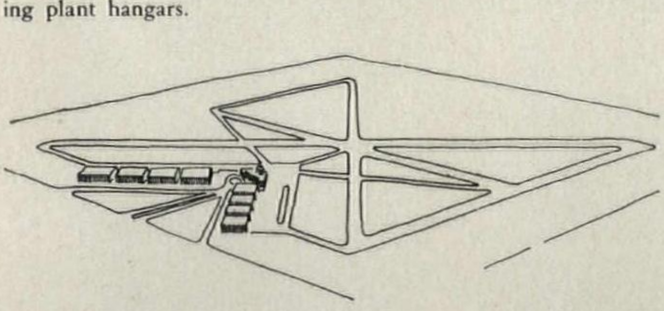
Part 2—AVIATION AS A STIMULUS TO ARCHITECTURE:
Basic Requirements for Ground Facilities

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.



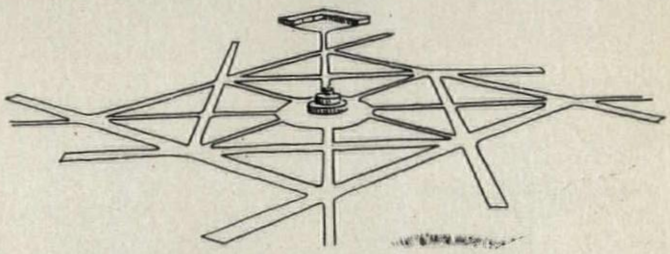
CAA Standards

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

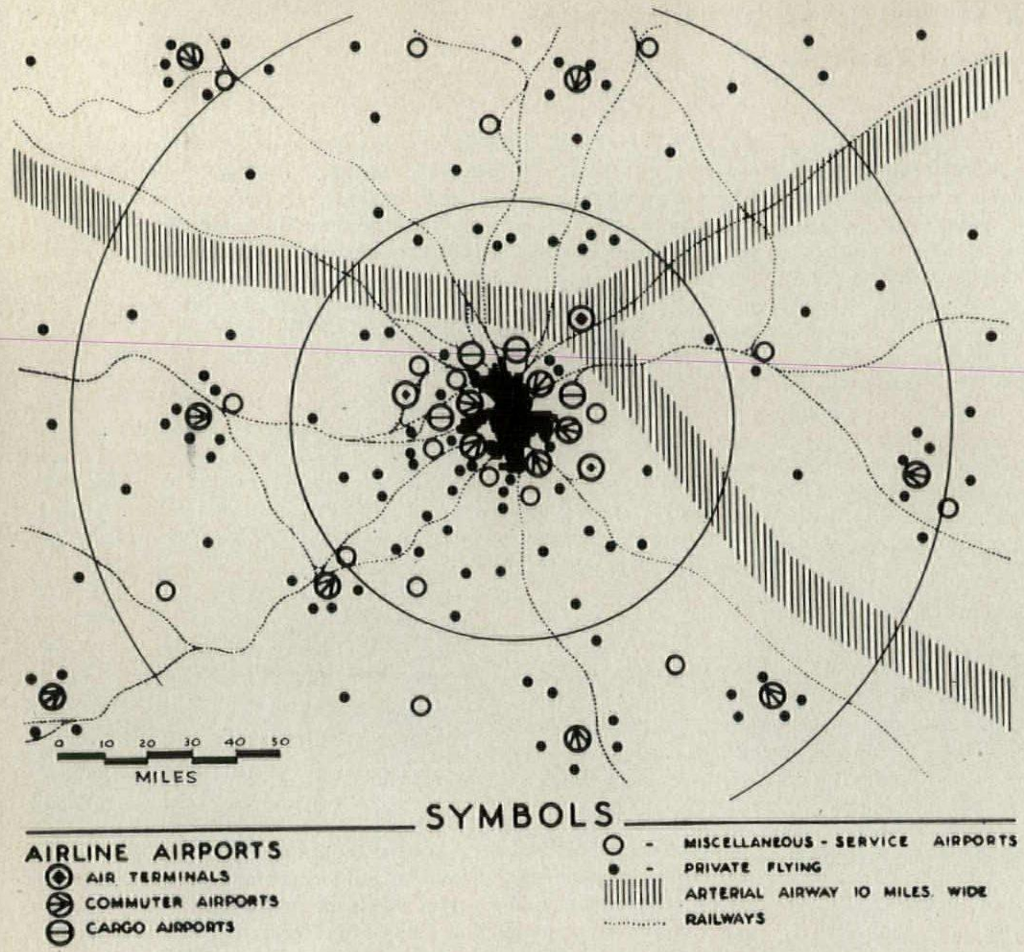
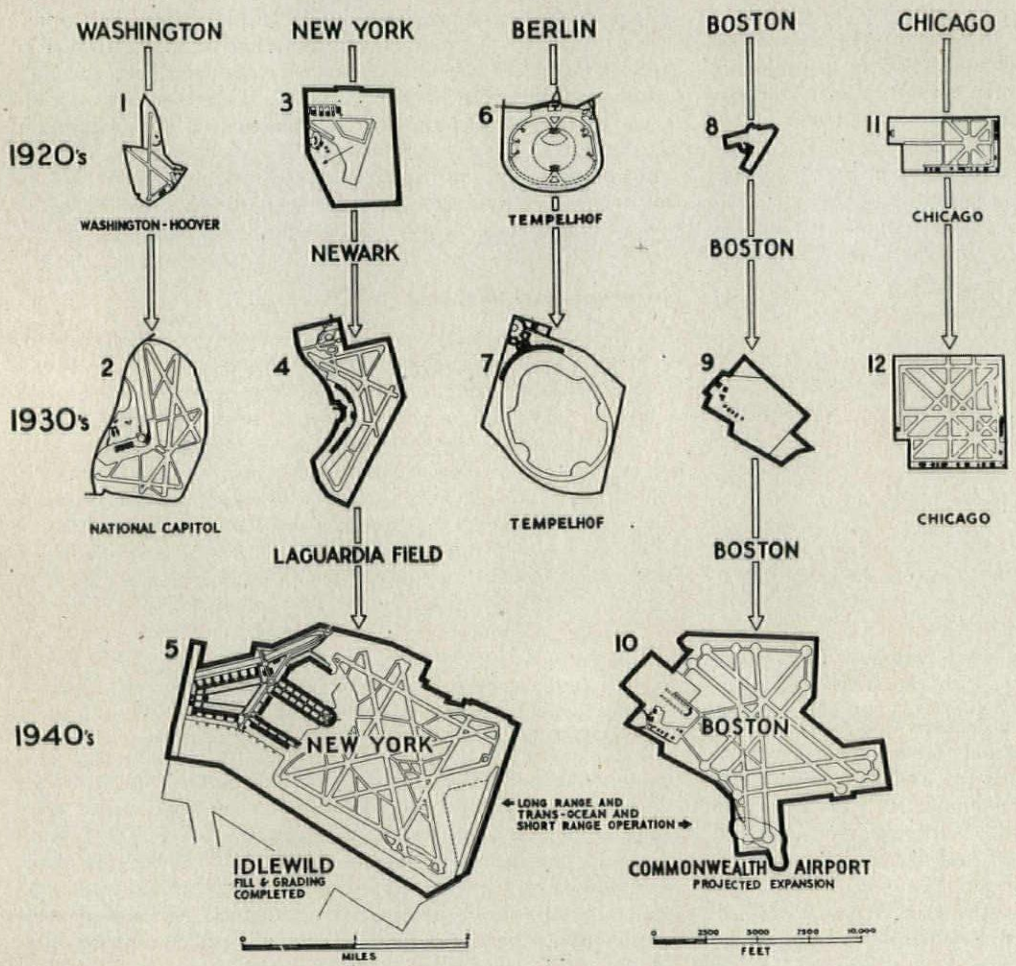
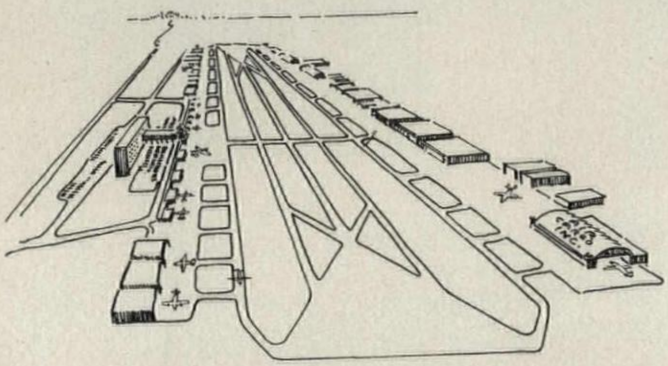


Chart above shows possible distribution of various types of airports about a future metropolitan center. Note terminals and cargo airports close in; outlying and close-in commuter airports; private fields interspersed between. Below, size of metropolitan airports by decades, all drawn to same scale.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

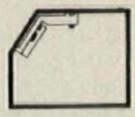
Mail and express, on the increase at an indeterminate rate, depend greatly upon a proper circulation system to expedite their movement and handling. They also require adequate, efficient equipment, plus readily expansible space for their handling. The airmail post office, already mentioned, will have 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.

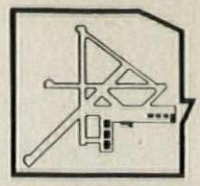
As the number of airport employees increases with the general development, their problems will become correspondingly magnified. Efficient terminal operation demands a constant minimum number of personnel on hand at all times. They will want the usual services (food, refreshment, toilet facilities, locker 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

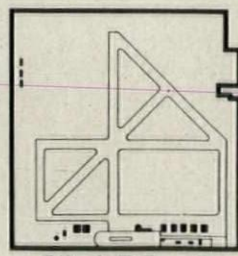
The great extent of operational activities in the new air terminals will require just as efficient an operational setup as was previously achieved by personal contact systems. Use of public address systems, intercommunication systems, private lines, pneumatic tubes, conveyor belt systems, elevators, 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



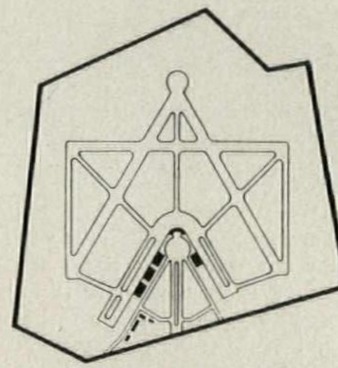
CLASS 1
EFFECTIVE LANDING STRIP LENGTHS 1800' - 2500'



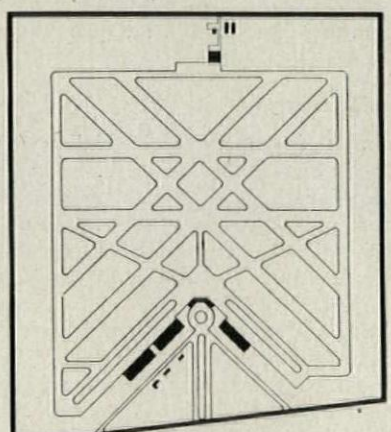
CLASS 2
EFFECTIVE RUNWAY LENGTHS 2500'-3500'



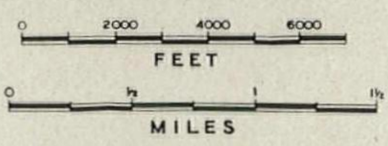
CLASS 3
EFFECTIVE RUNWAY LENGTHS 3500'-4500'



CLASS 4
EFFECTIVE RUNWAY LENGTHS 4500'-5500'



CLASS 5
EFFECTIVE RUNWAY LENGHTS 5500'-6500'



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.

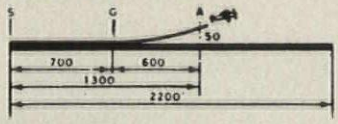
Takeoff Distances to Clear 50-foot Obstacle

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

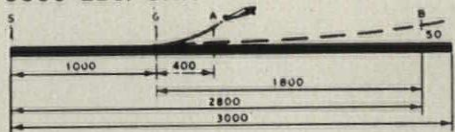
SA—IS DISTANCE FROM START TO CLEAR 50 FT. . . . ALL ENGINES OPERATING

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

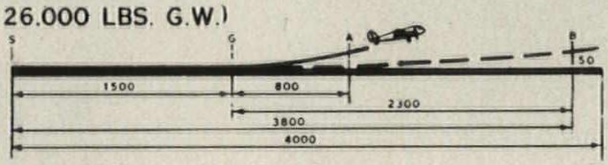
LIGHT AIRPLANE (APPROX. 2000 LBS. G.W.) — CLASS I AIRPORT 2200 FT. RUNWAY



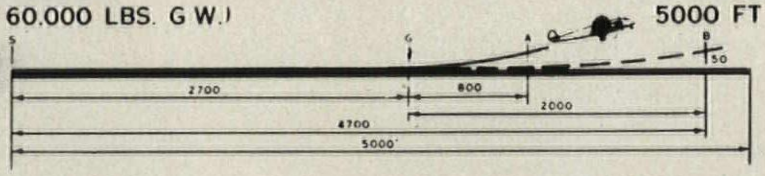
SMALL TRANSPORT (APPROX. 8000 LBS. G.W.) — CLASS II AIRPORT 3000 FT. RUNWAY



MEDIUM TRANSPORT (APPROX. 26.000 LBS. G.W.) — CLASS III AIRPORT 4000 FT. RUNWAY

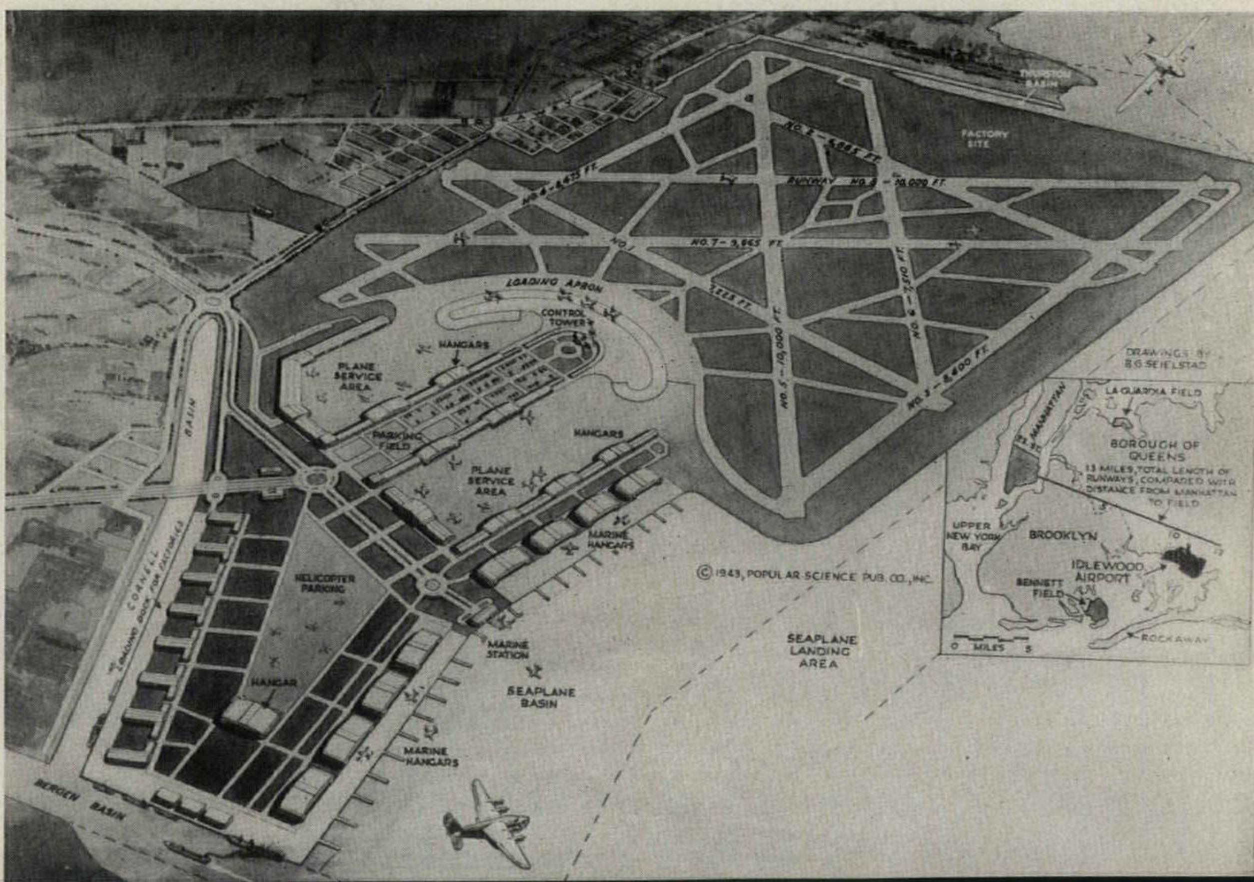


LARGE TRANSPORT (APPROX. 60.000 LBS. G.W.) — CLASS IV AIRPORT 5000 FT RUNWAY



Proposals for Idlewild Airport, New York City

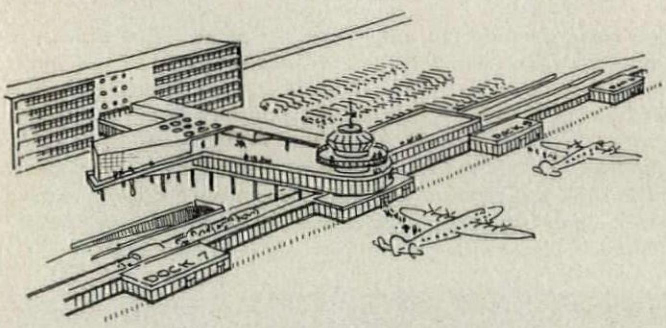
The scheme for New York's future transcontinental and transoceanic air terminal, at Idlewild on Long Island, may be superseded by a more advanced design. Below is the published scheme, the familiar rectangle-and-diagonal layout greatly enlarged to provide 13 miles of runways, some of them 10,000 ft. 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.

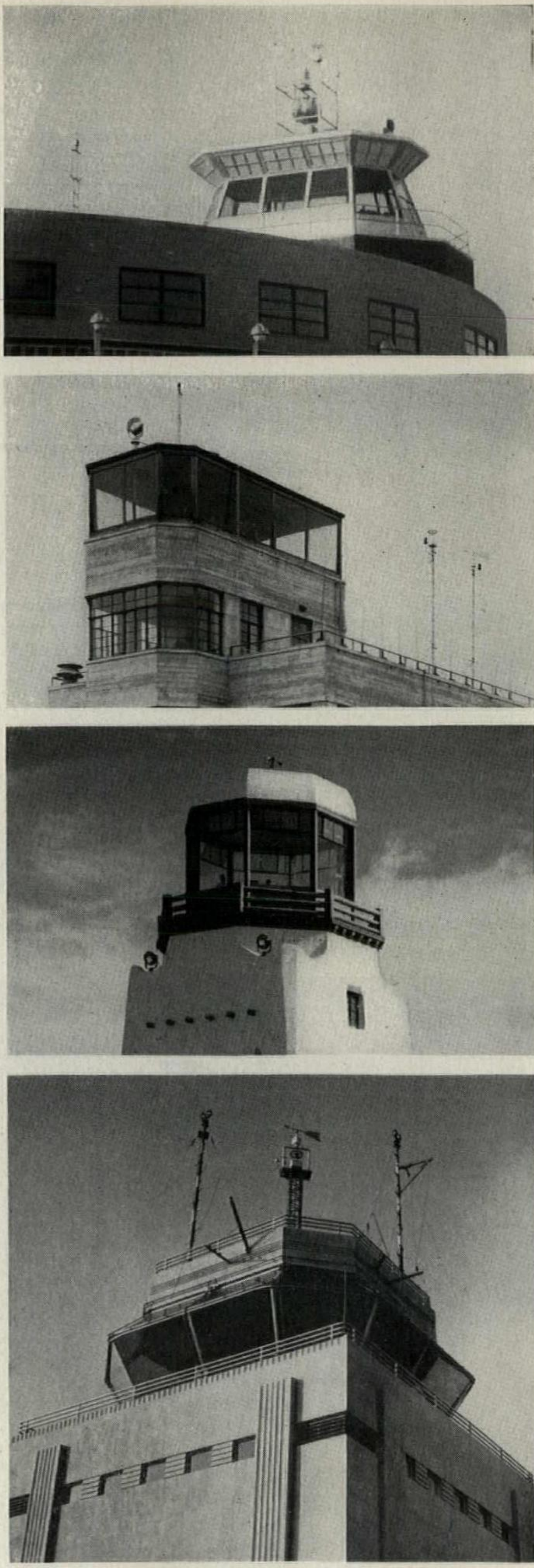
The important principle upon which one terminal solution was based may be stated as follows. It has been estimated that in some cities 80 to 90 percent of all airline tickets are purchased at downtown ticket offices, because the airport ticket office is remote. The airport passenger is presumably interested 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

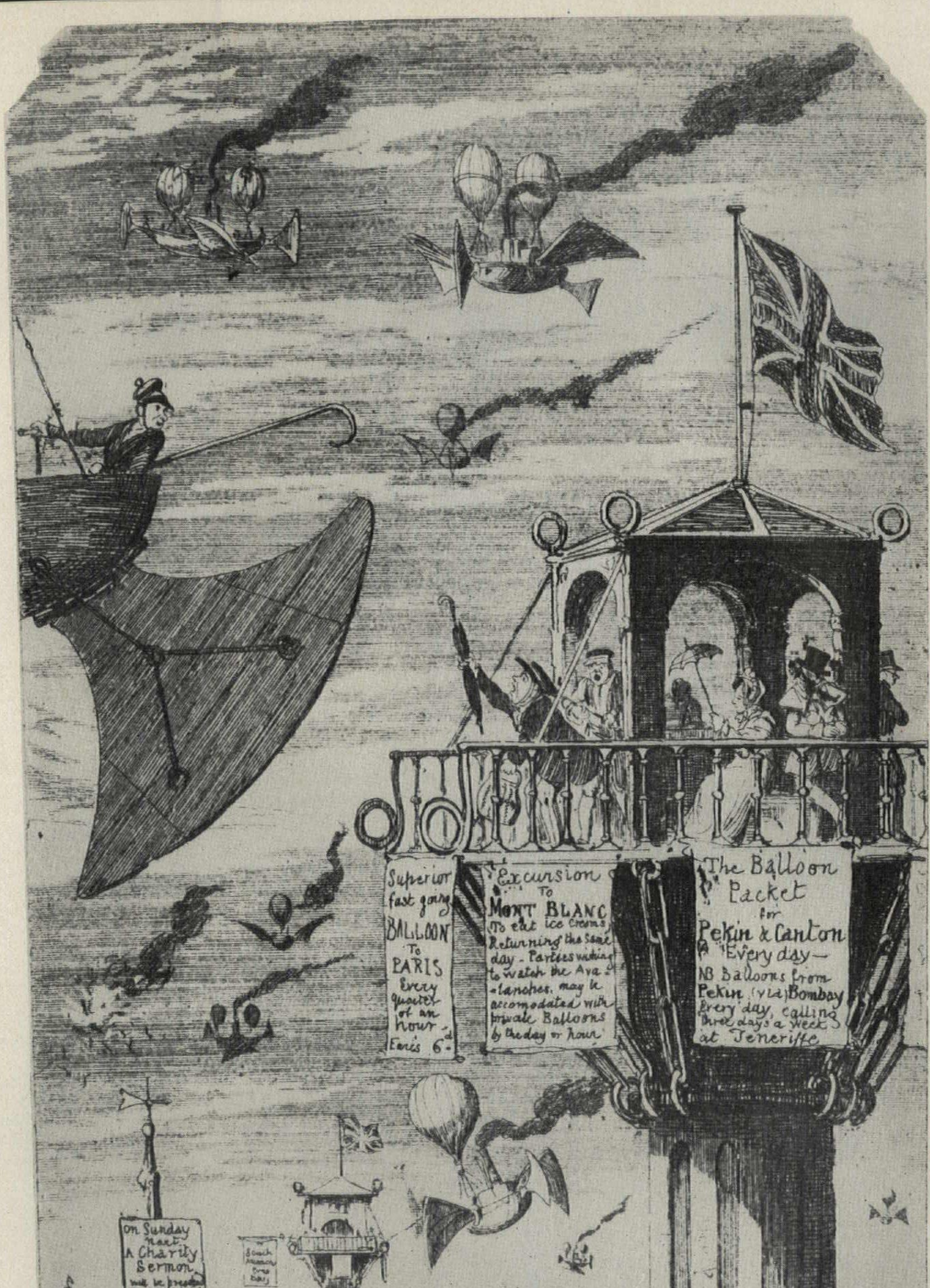
Still more problems of terminal design have not as yet reached an ultimate solution. In inclement weather, particularly in colder climates, protected en-planeing and de-planeing of passengers and baggage is a big problem. In designing the aforementioned dock



Official U. S. Navy Photo

Control Towers

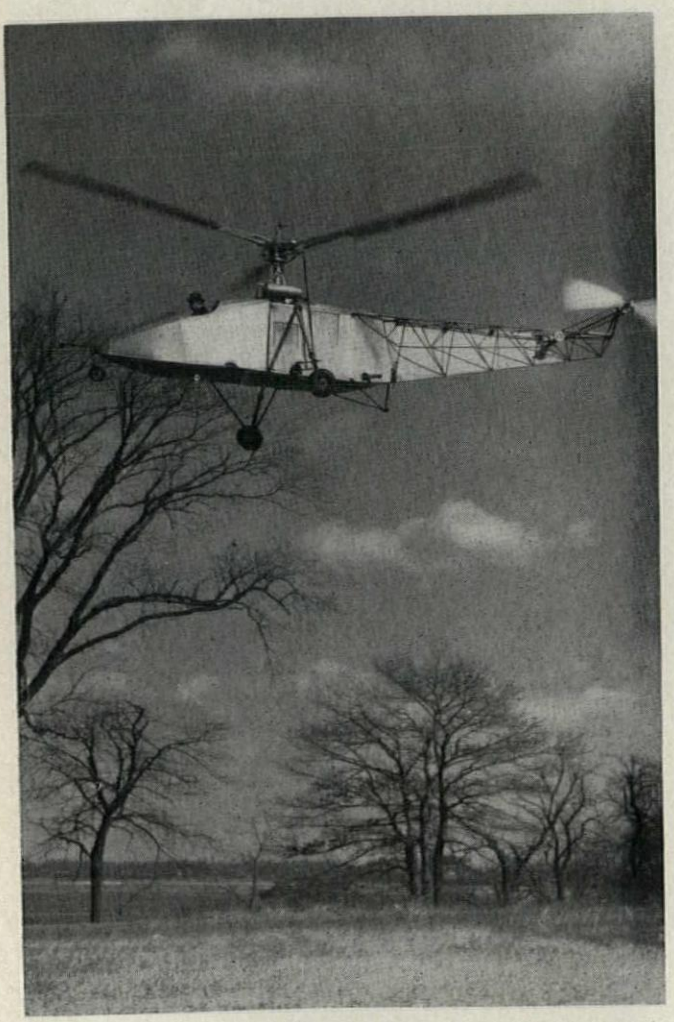
Top to bottom, La Guardia Field, New York; a military airport; El Paso, Texas, commercial airport; a Naval Air Station.



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.)

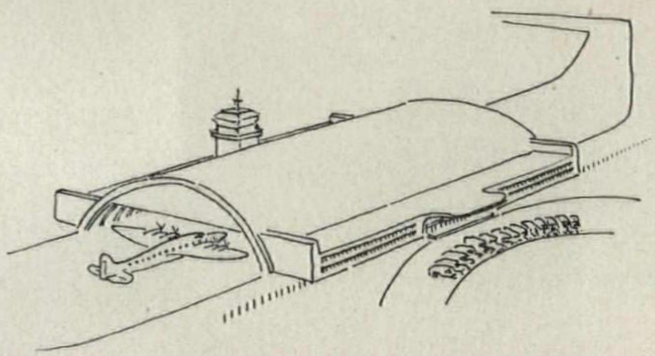
Official U. S. Navy Photo, courtey Skyways

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.

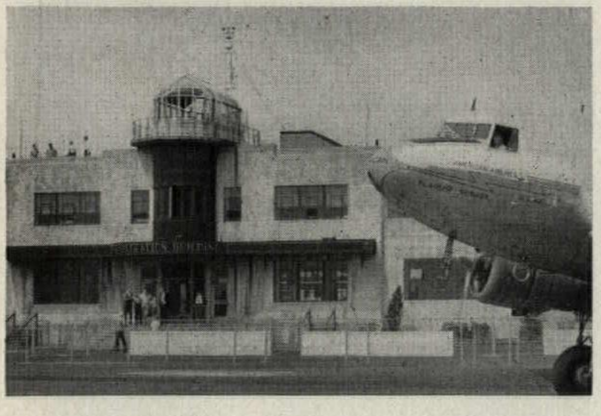


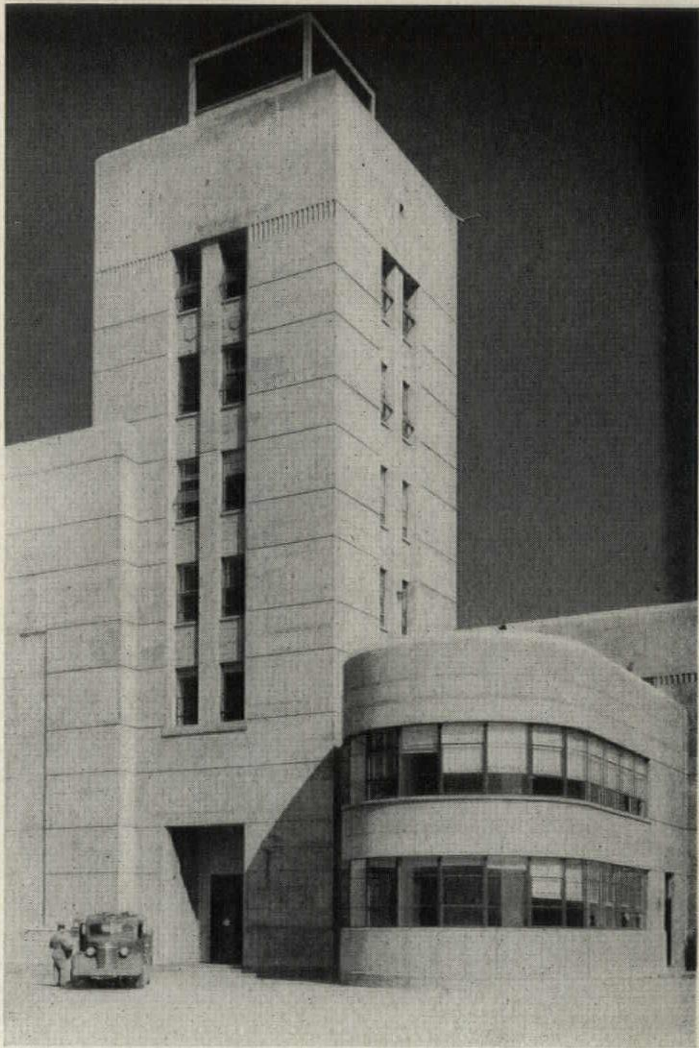
This type of passenger station is suitable for line station operations only. It would not be desirable for a terminal, where the lead plane could delay other flights. Such facilities, though, may be suitable for cargo terminals where maintenance of accurate time tables is not imperative, but saving perishable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

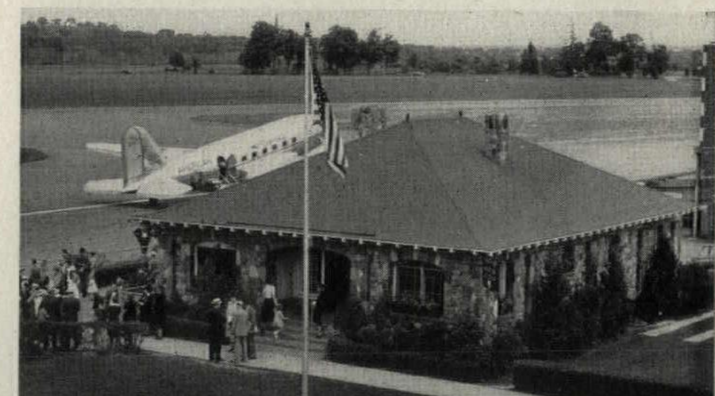
Nose loading of passenger or cargo ships makes it necessary to use cantilevered roofs over nose docks. This method, unless the design incorporates hangar facilities, appears to be too costly and clumsy an expedient except for warm climates, due to the difficulties involved if anything more than the nose 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







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.

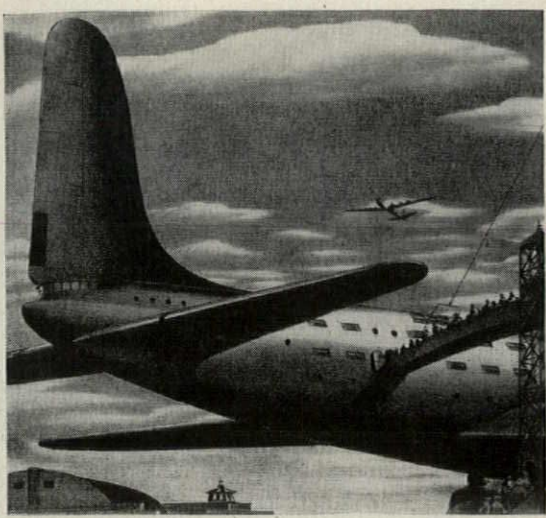
The analysis of aircraft hangar design problems, as to basic types and plans, structural types and variations, as well as a survey of the advantages and limitations of each type, is a task as complex and difficult as that of terminal design, if not more lengthy. Even greater complexities are encountered 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.

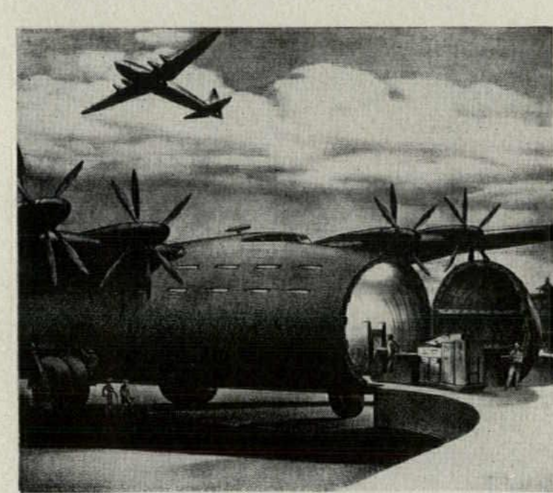
Independent Power Plants for Municipal Airports

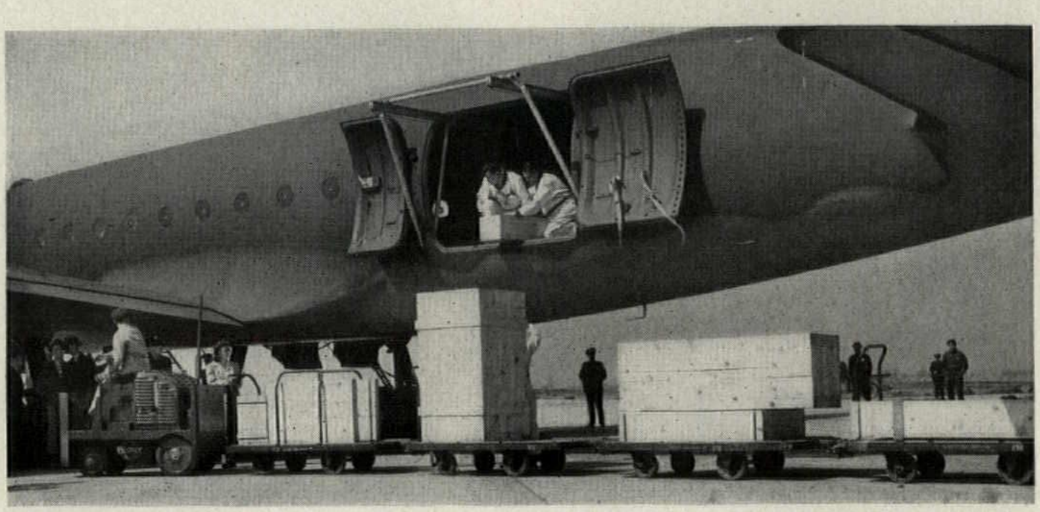
A service that seems to have been overlooked at many municipal airports is establishment of a central power plant for heating all airport buildings. This could be a source of municipal revenue and would limit chimney obstructions to one adjacent location. Such a power plant could provide the essential 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.

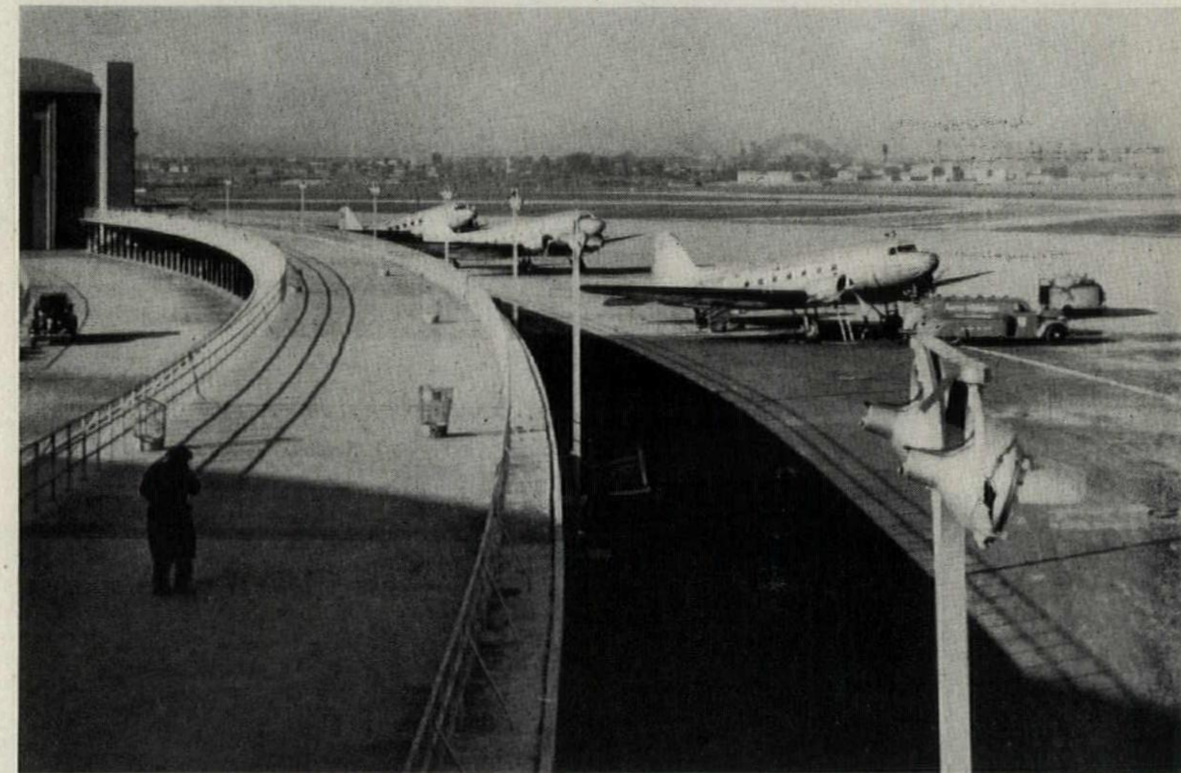
This discussion is in essence but a mere skimming over the surface, an outline of many items requiring deeper study and analysis. It has dealt mainly with some of the architectural and airport problems of commercial airline operation. The effect of aviation upon architectural practices and methods is 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

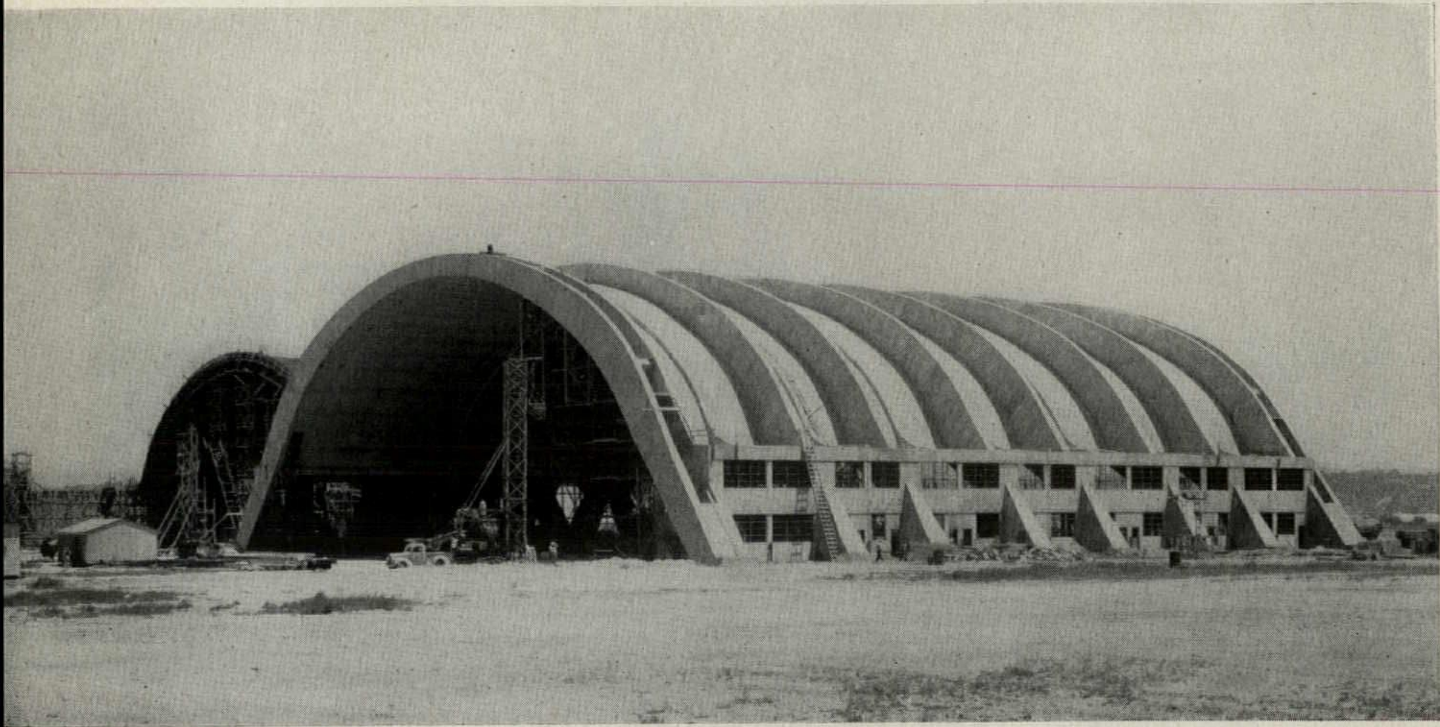




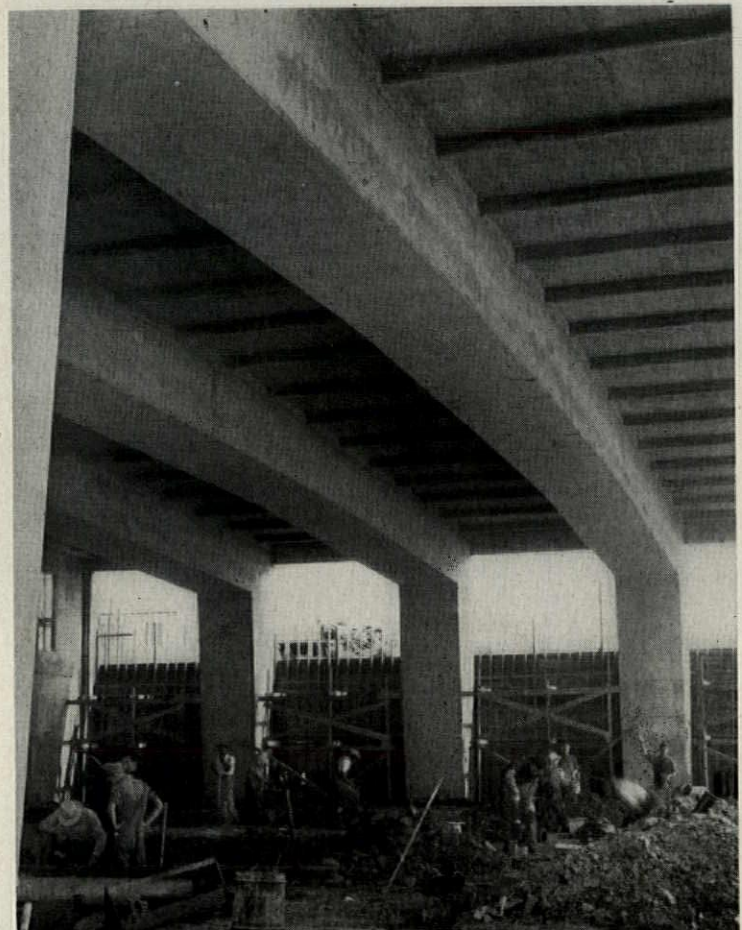




Handling of cargo, passengers, sight-seers, express, and mail demand a thorough integration of different kinds of traffic facilities and equipment. Indeed, expediting various kinds of payloads is the crucial problem in terminal building design; to separate the different kinds of users from one another 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.



Official U. S. Navy Photo



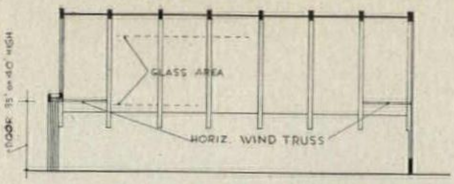
Strictly speaking, it is difficult to segregate different kinds of hangar buildings by "types", except as some house lighter-than-air ships and others heavier-than-air planes. In the former case, the necessity for economizing on structure and materials (a war need now, potentially a peacetime necessity 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.

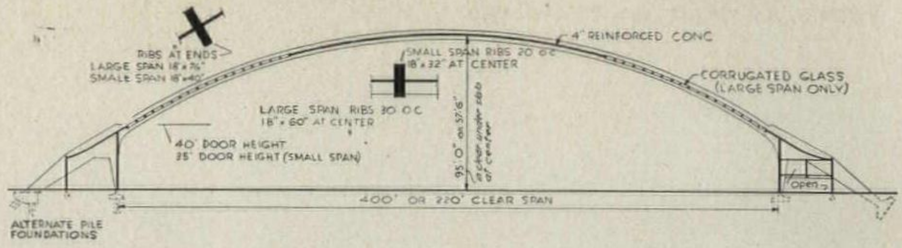
Above is a Naval hangar of thin-shell concrete construction, with exterior arch ribs (Architecturally, this is reminiscent of the famous hangar at Orleans, France.) Here, the span is 294 ft., the rise, 84 feet. Roberts and Schaefer were the consulting engineers, Joe H. Lapish was the associate architect.

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.

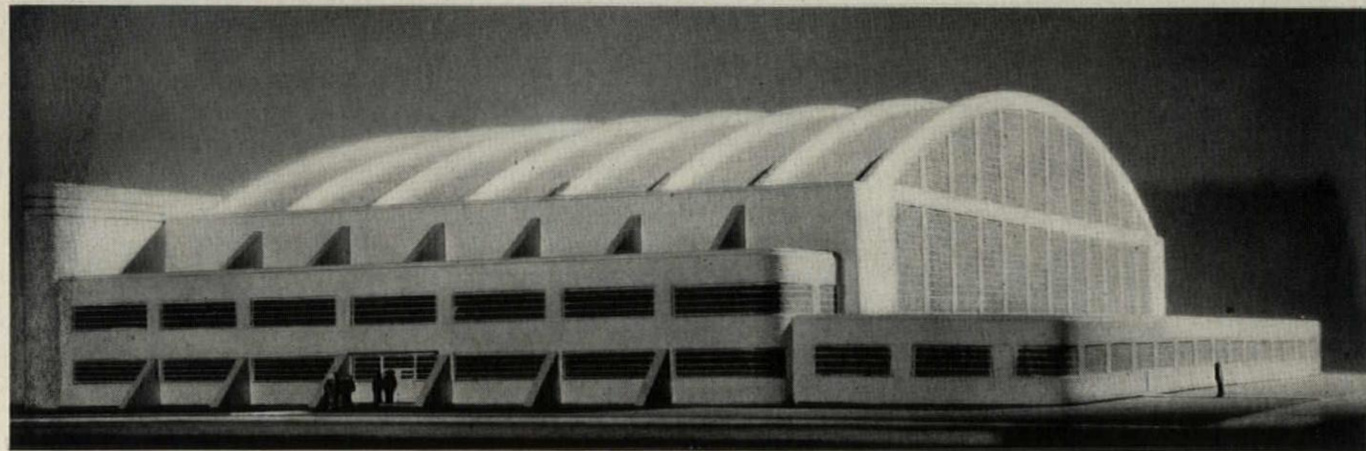
On the facing page, in the center, is a typical commercial hangar for United Air Lines at the Denver Airport. It is chiefly of metal construction, and has an office building annex at the rear. Albert Kahn Associated Architects and Engineers, Inc.

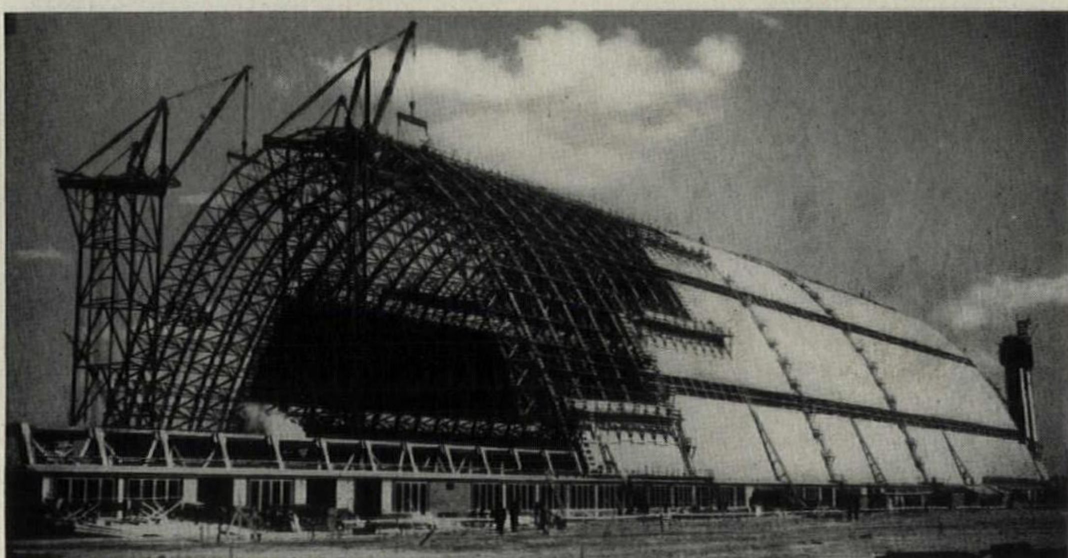
At the bottom of page 53 is a huge Naval dirigible hangar constructed of wood. Its design and construction were made possible by the development of timber connectors. To assure permanence, the wood is pressure-treated against decay or attack by insects.

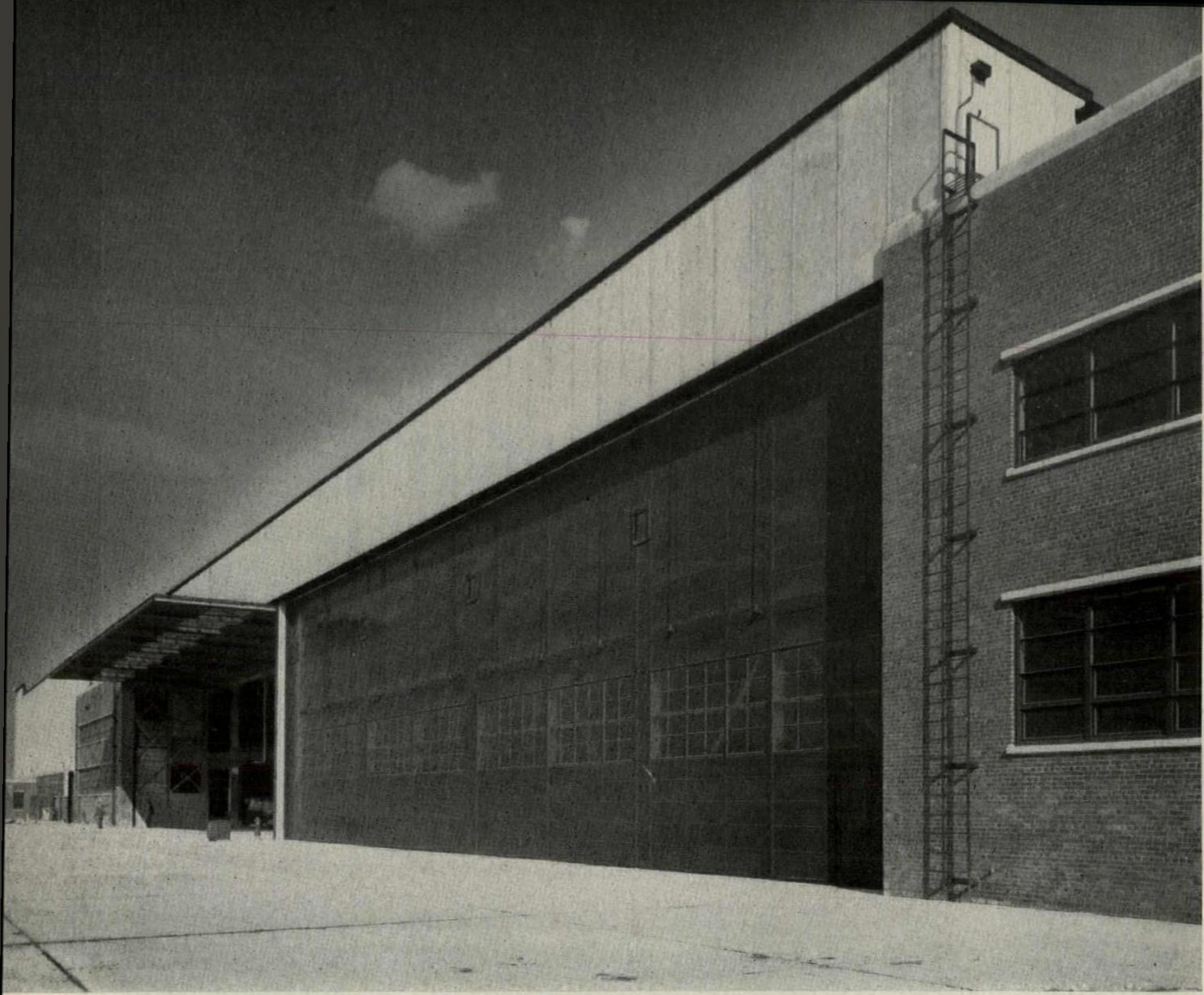




Above, sections; below, photograph of model, of a type of concrete hangar designed by Charles S. Whitney, consulting engineer, of Milwaukee, Wis. It consists of a 4-inch-thick reinforced concrete shell stiffened by integrally cast ribs spaced 20 to 30 feet on centers. Part of the roof slab may be replaced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

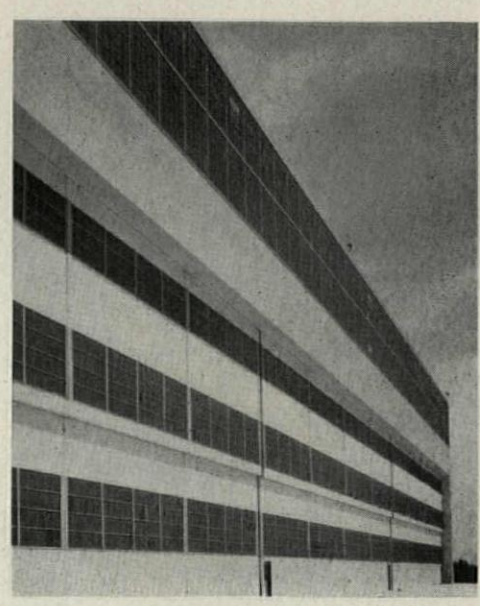


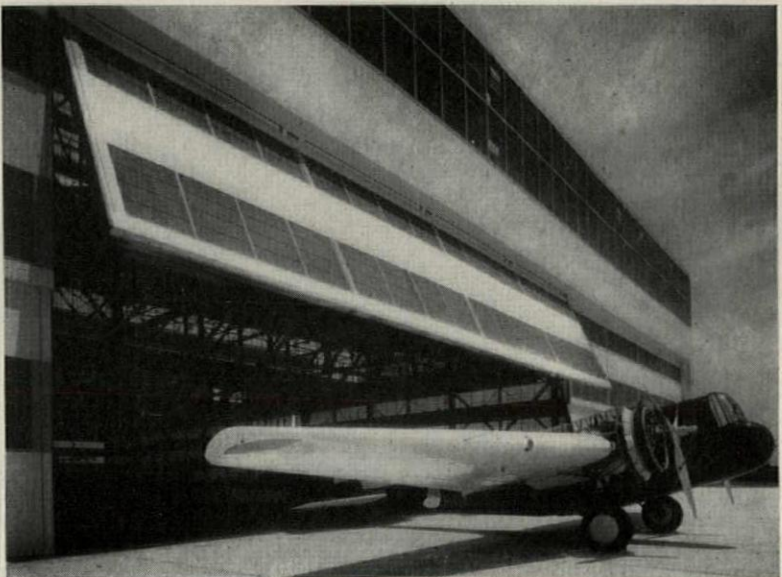


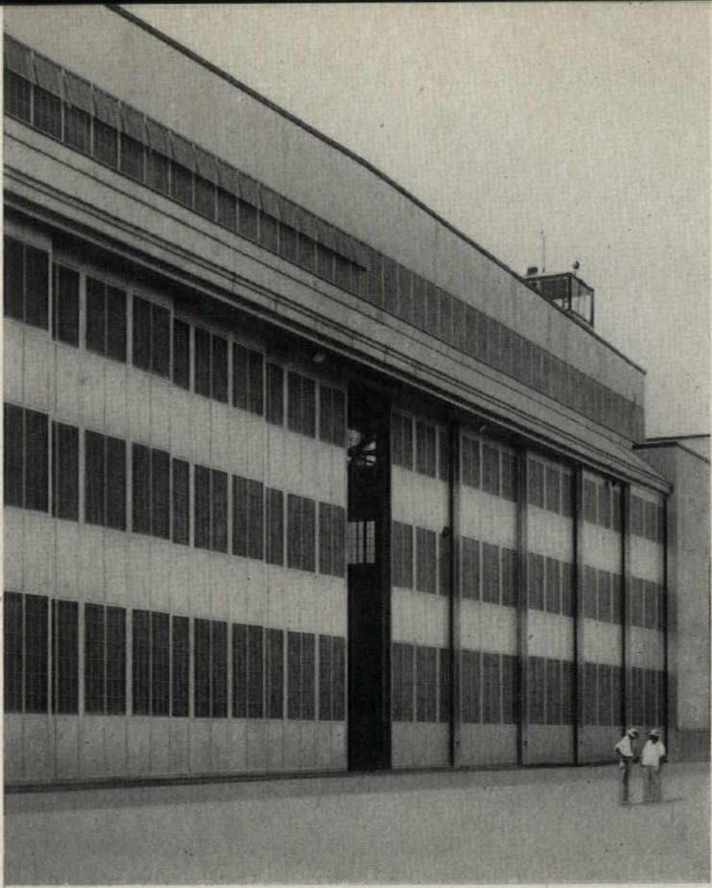


Hangar Doors

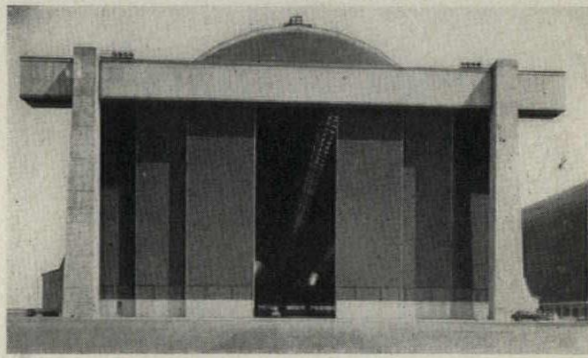
For the average case, there are two principal types of hangar doors: canopy and horizontal sliding types. Advantages are claimed for both kinds; the designer has to select the one which meets all his requirements best. Above is an excellent example of the canopy door, demonstrating how the door, when 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.

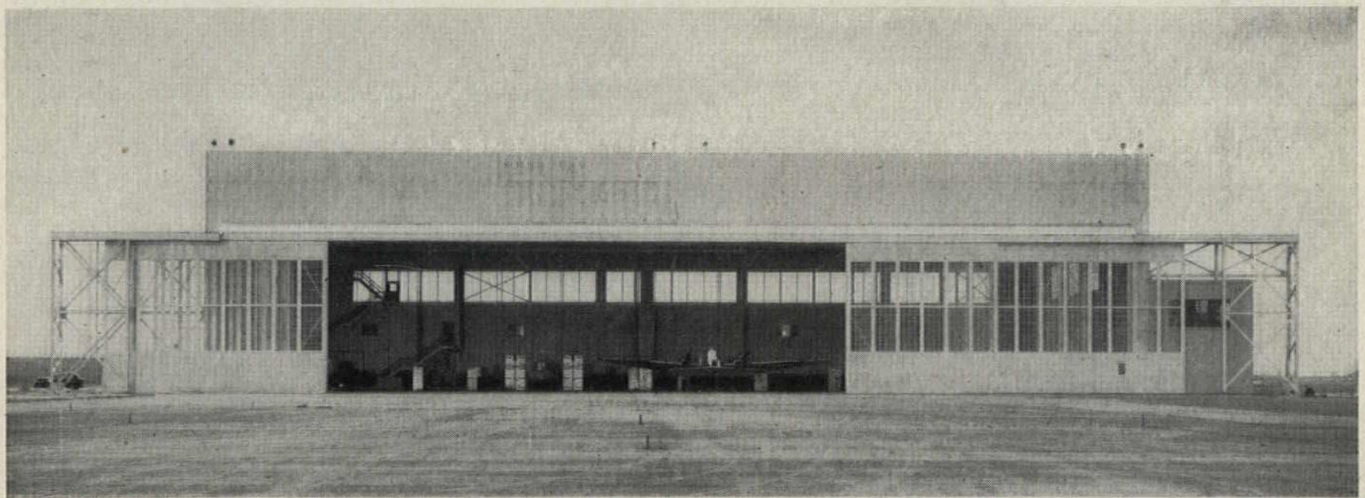




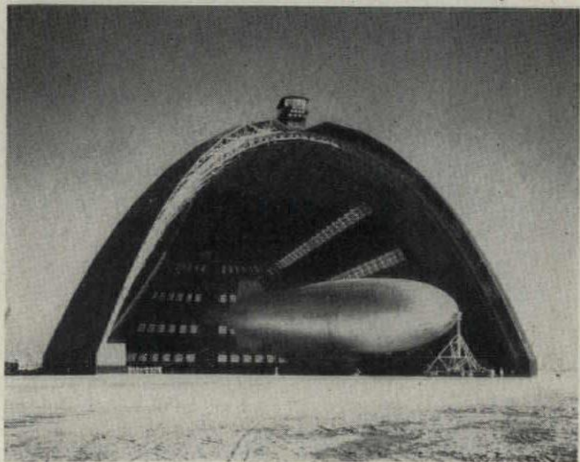


Various types of sliding hangar doors appear on this page. At left is a motor-driven type for a 250 by 48-ft. opening. Leaves move at different rates of speed so that all arrive simultaneously at open or closed position. Below is a similar door for a Navy lighter-than-air hangar. Difference between the 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.)



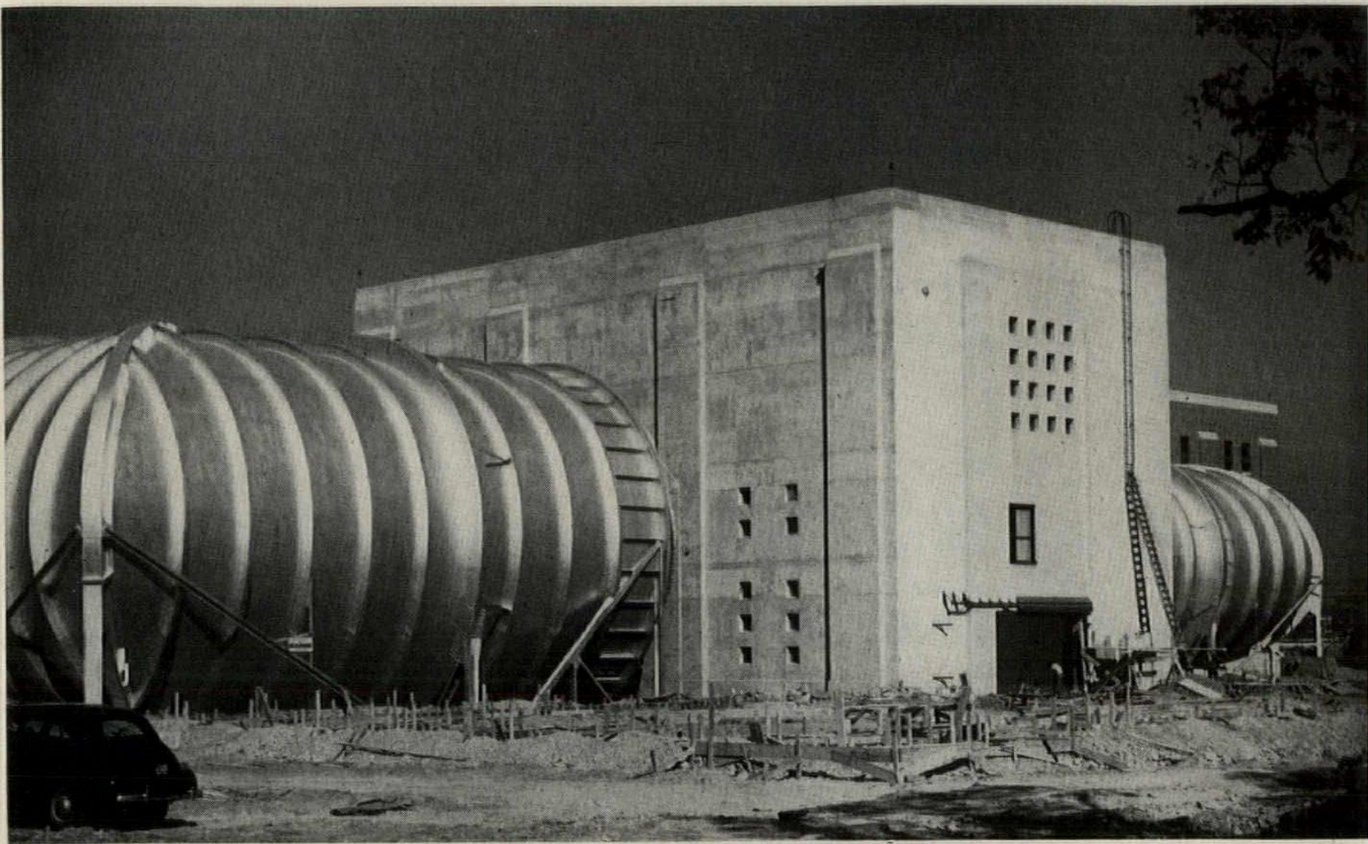


Official U. S. Navy Photos



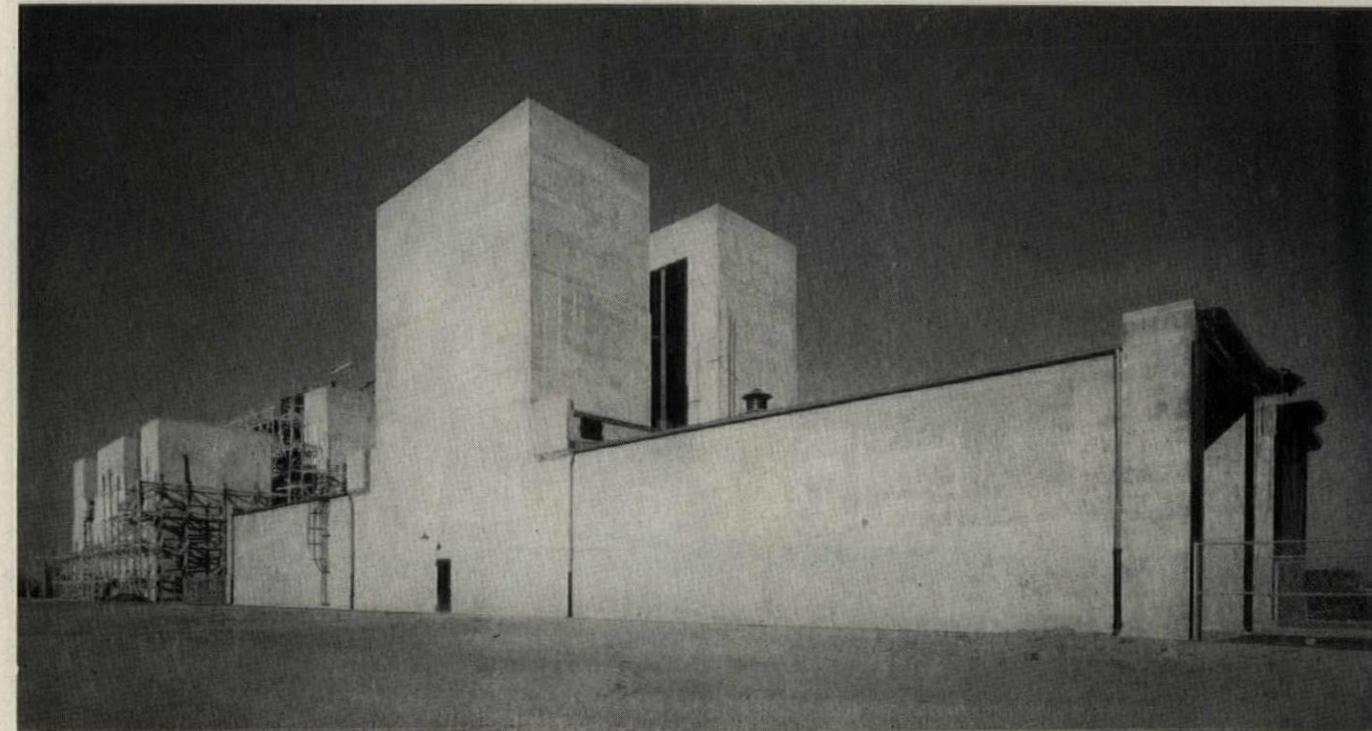
Above is the United Air Lines hangar at the Denver, Colorado, Airport, designed by Albert Kahn Associated Architects and Engineers, Inc. It is another development of principles demonstrated in the photograph at top right.

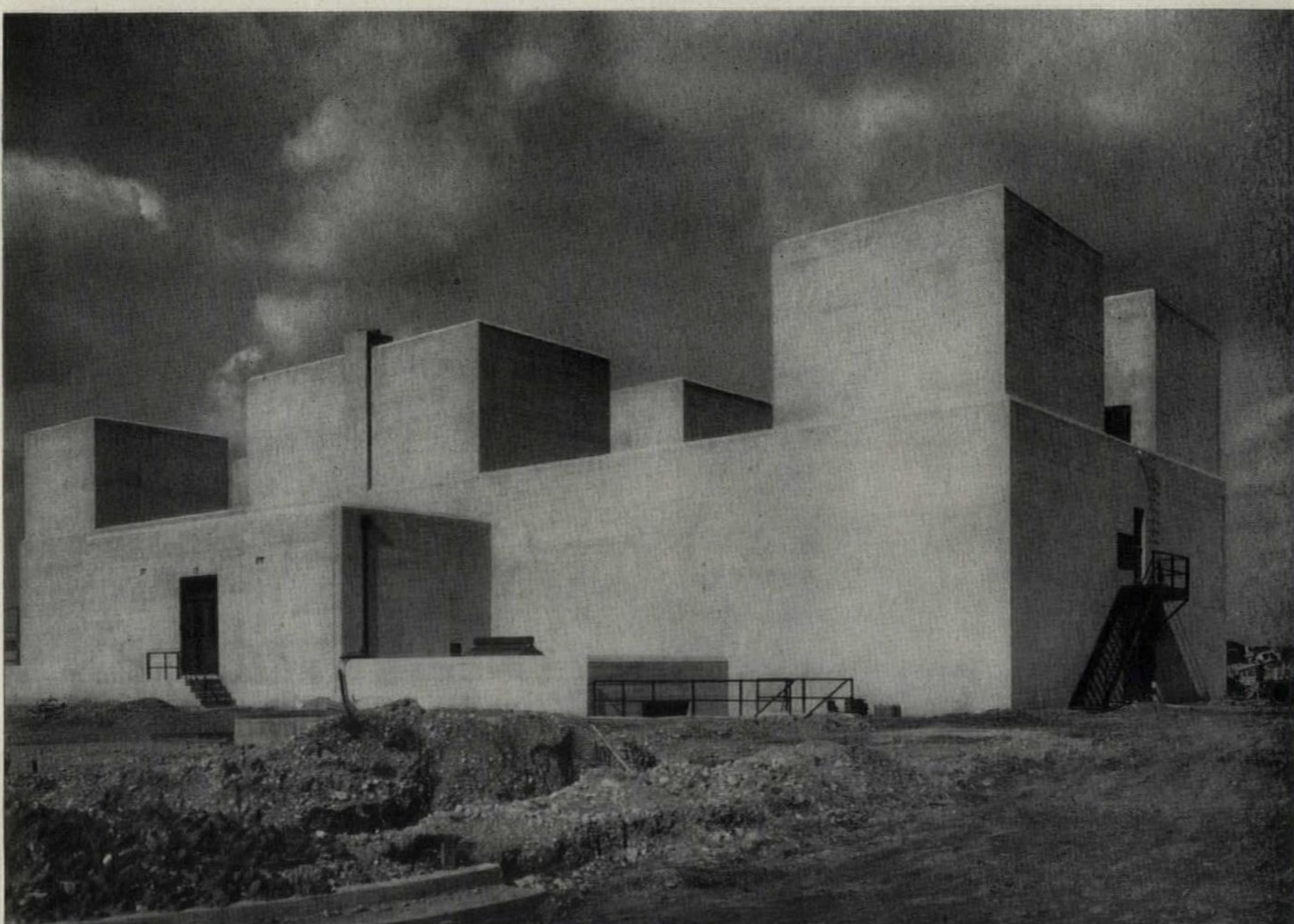
The lighter-than-air hangar at the immediate right is equipped with "orange-peel" doors—basically a horizontal sliding door, but with leaves pivoted at the top center.



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.)

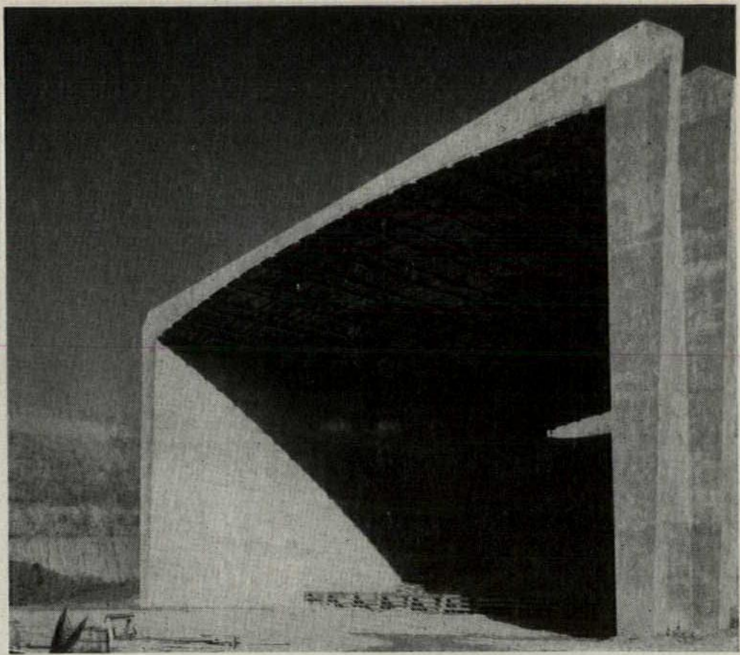
On this page are two groups of engine test blocks. In general, this type of structure requires one or more test cells, each with an exhaust stack equipped with baffles or otherwise treated to reduce the volume of escaping sound; and control rooms from which motors can be safely observed in operation. 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.)*

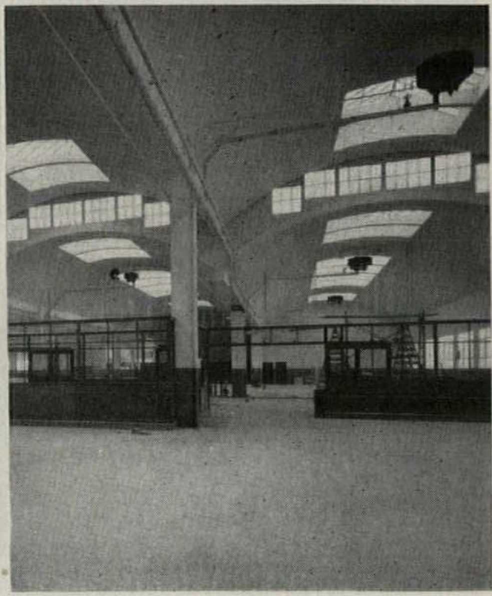




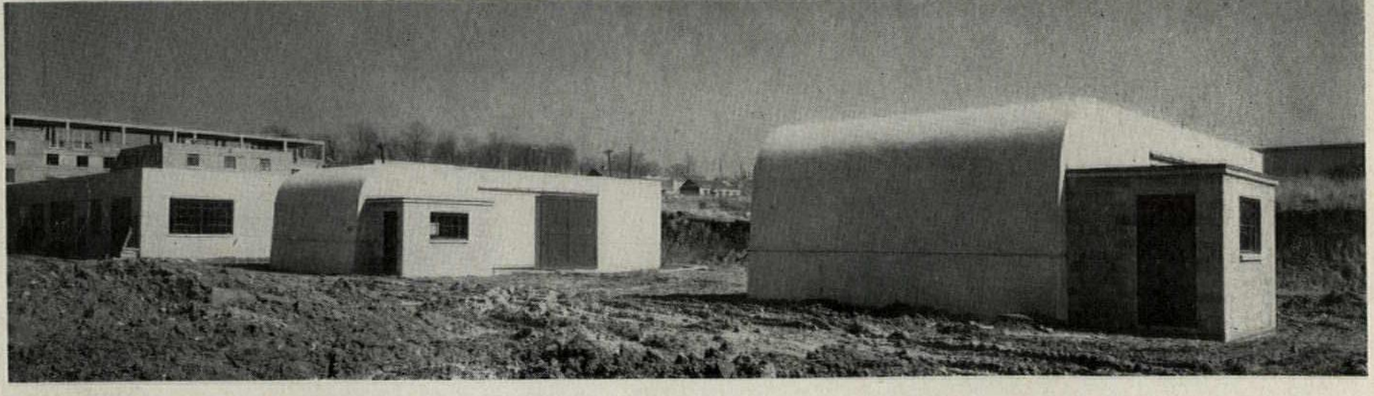
Subsidiary Buildings for War Indicate Peacetime Requirements

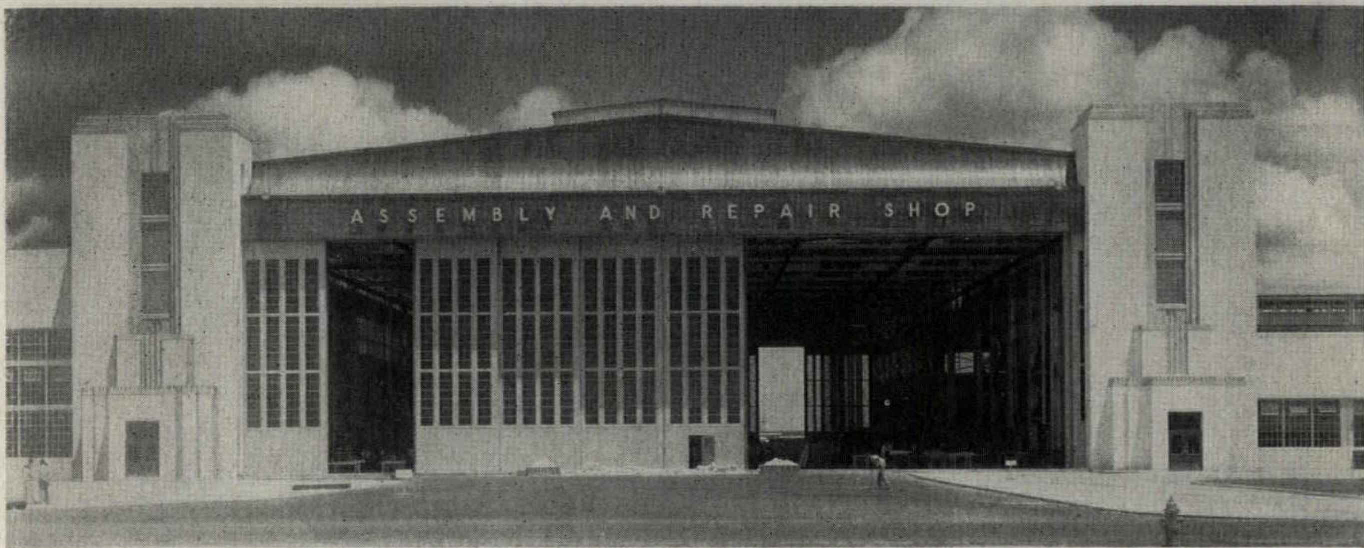
Buildings on these two pages are all at large Army and Navy fields; though not all will have their counterparts in a peacetime establishment, they embody some design and construction principles which will prove valuable. The firing-range cover, at right, was designed by the U. S. Engineers for an armament 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).

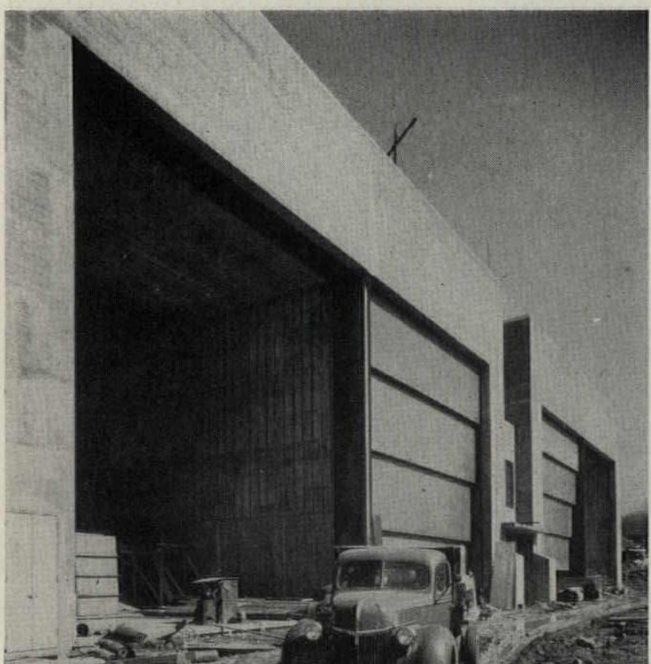


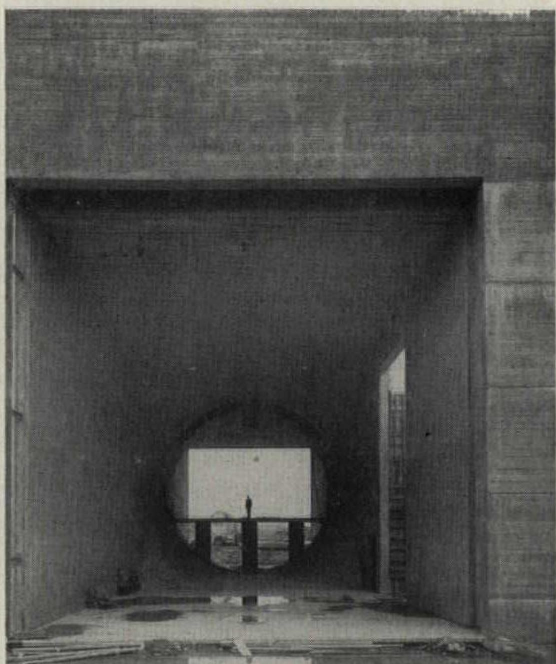


Official U. S. Navy Photo.

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.

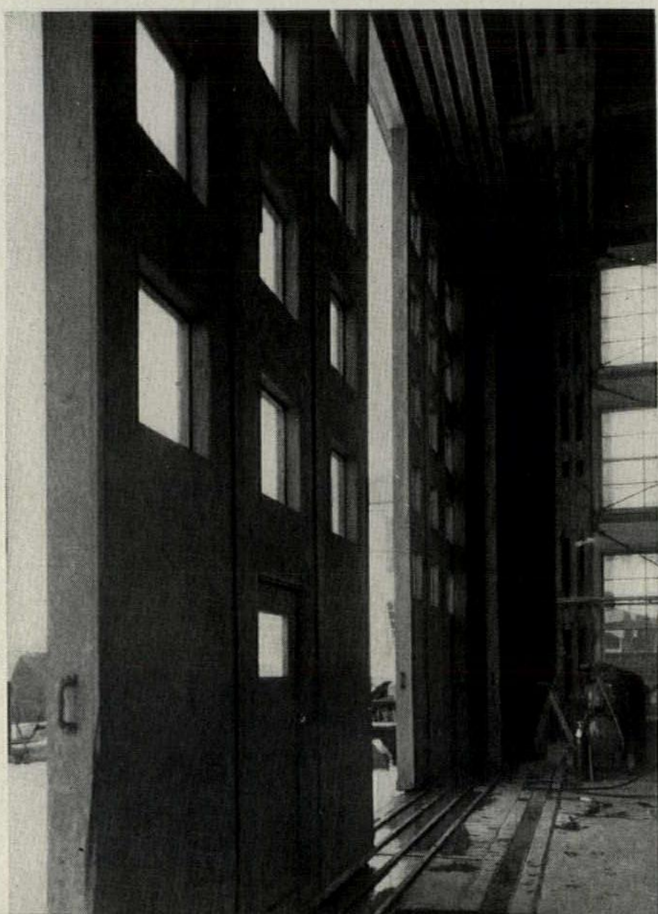
Below, views of U. S. Army field propellor torque stands. Essentially they are enormous Venturi sections grouped in 2-cell units. Problems were need for vibration-protection for control room, for smooth cell-interiors, and an interior shape changing from a 45-ft. square to a 42-ft. circle, and back to 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.)





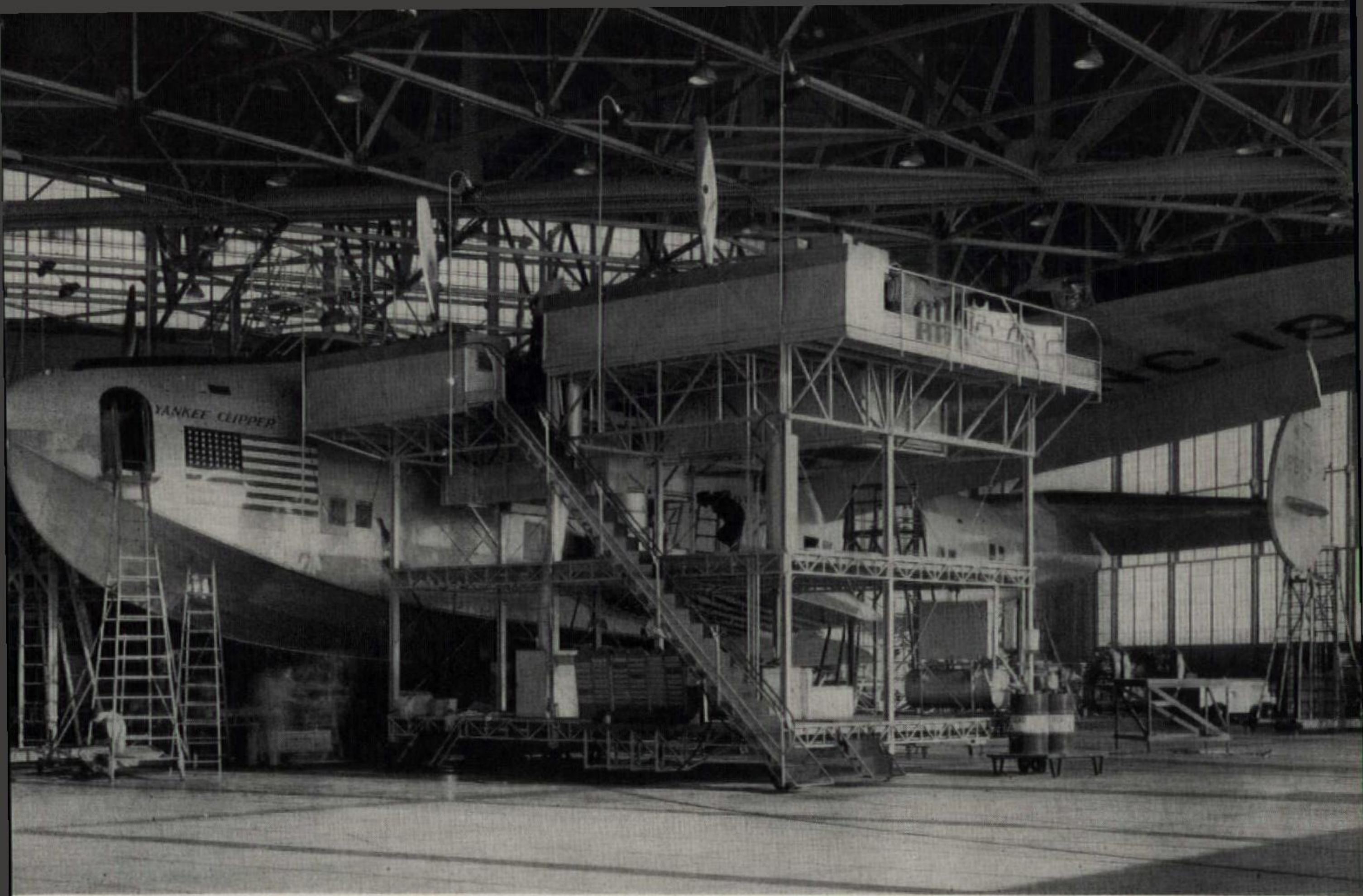

Hedrich-Blessing

**Building Equipment:
Heating, Lighting, Power, Service Outlets**



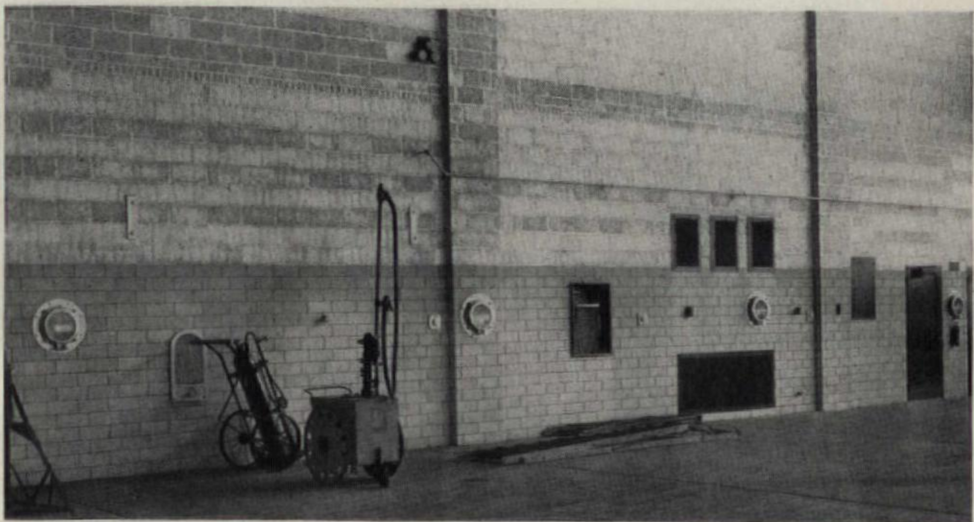
Perhaps the most complex part of designing buildings for the aviation industry has to do with providing the necessary services. Not only is the airplane the most up-to-the-minute symptom of technological advance—and hence, one which requires the newest and best for service, maintenance, construction, 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.

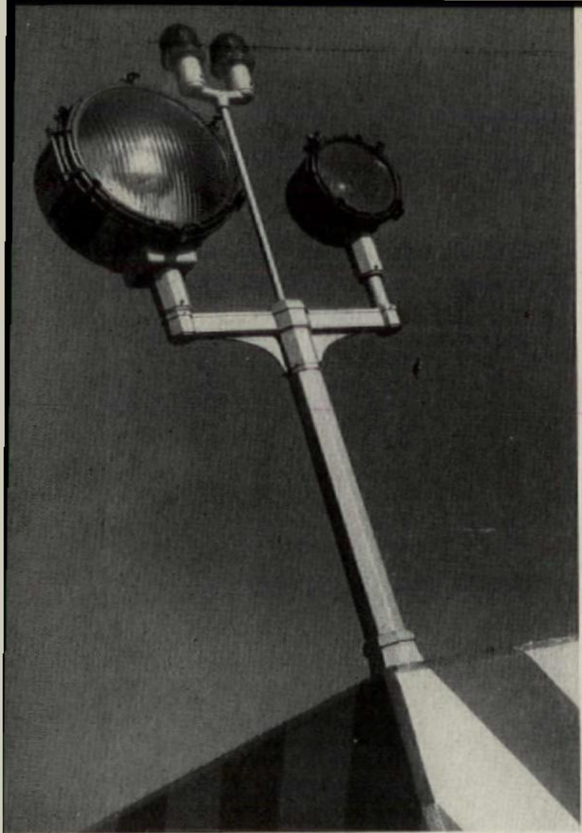
At the top of this page is a view of a Curtiss-Wright assembly building designed by Albert Kahn Associated Architects and Engineers, Inc.; at right is an Army hangar. Both are huge structures with tremendous doors which increase heating difficulties. Various methods have been used in different cases: 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.

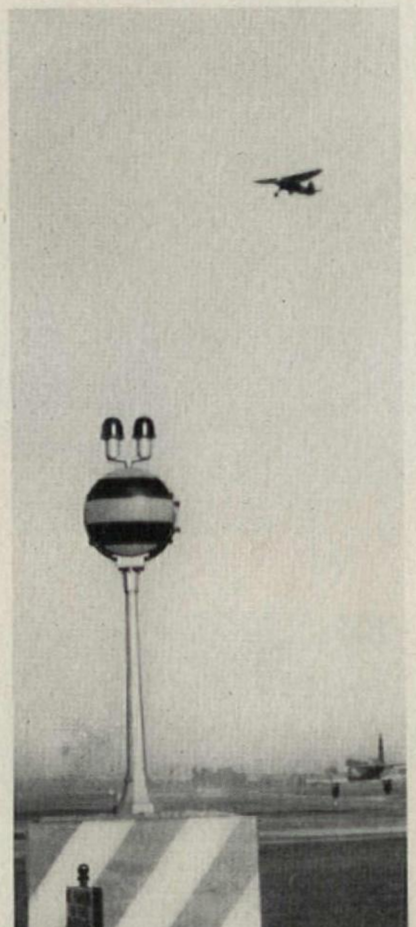




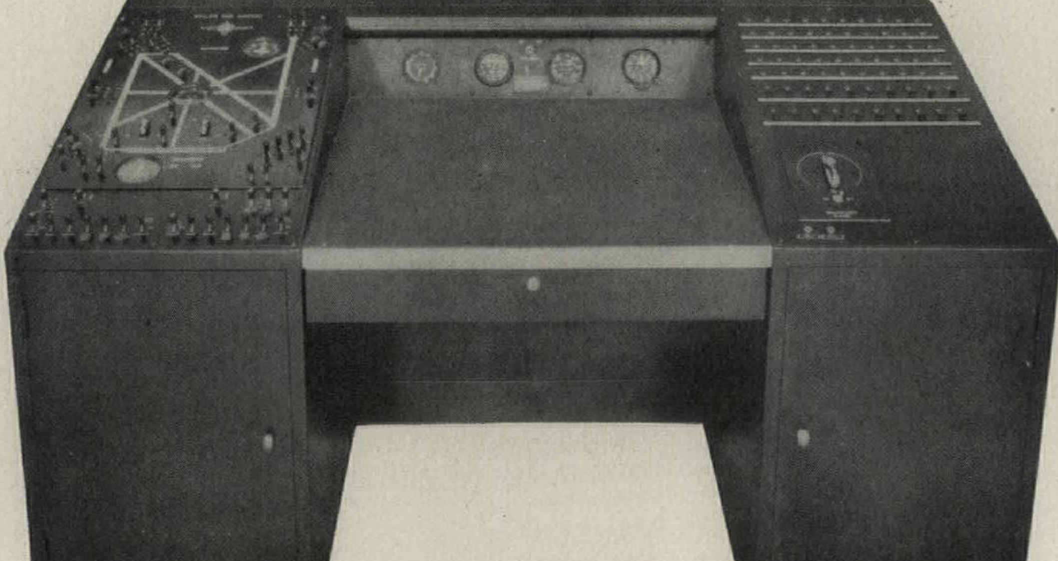
Field Lighting

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.

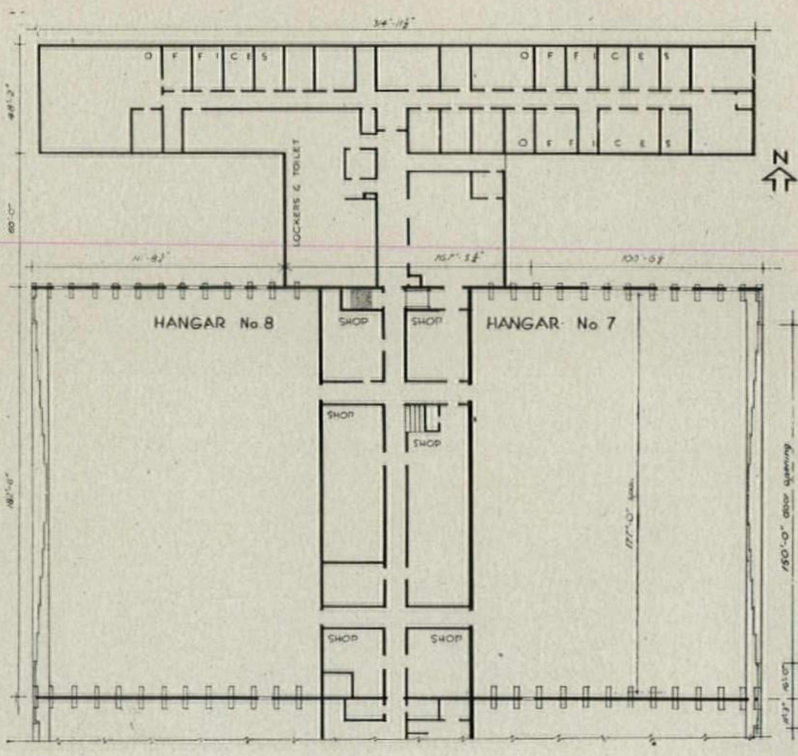


Above, floodlights installed on hangar piers, where they help illuminate the hanger apron as well as runways; Rochester, (N. Y.) Airport. Below, typical control desk for lighting equipment, showing the complexity of the system; Ford Airport.

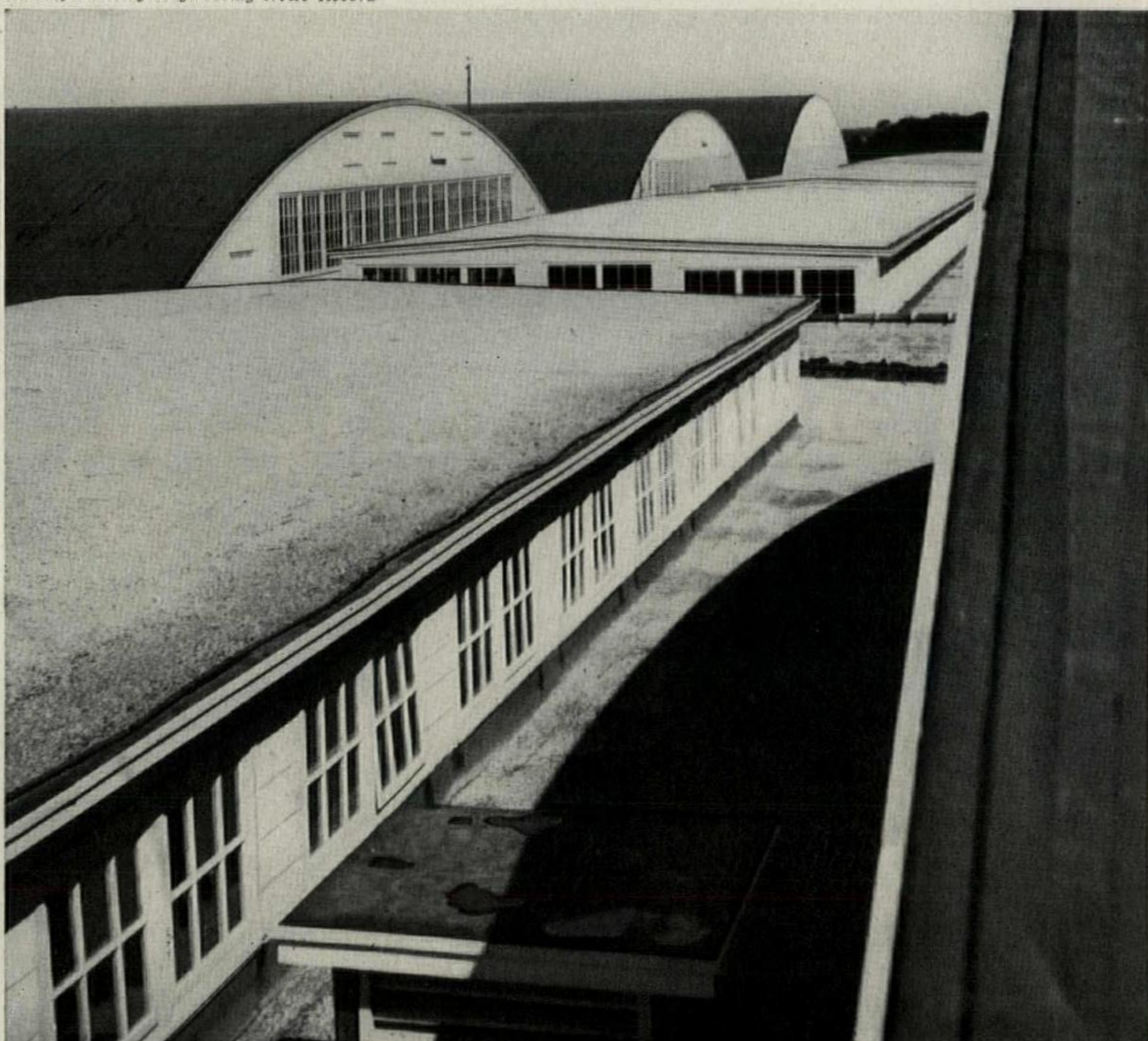


Wood Hangars for Modification Center

U. S. Army Engineers



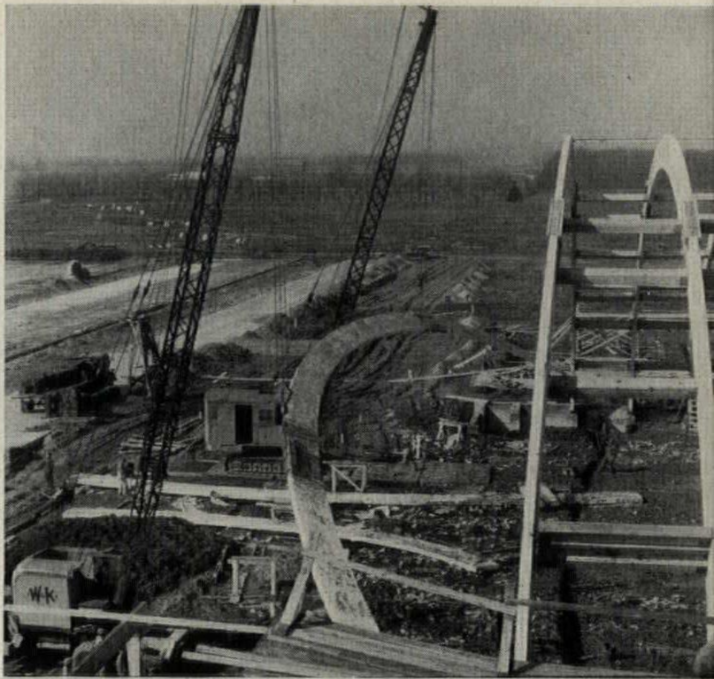
Photos, Courtesy Engineering News Record

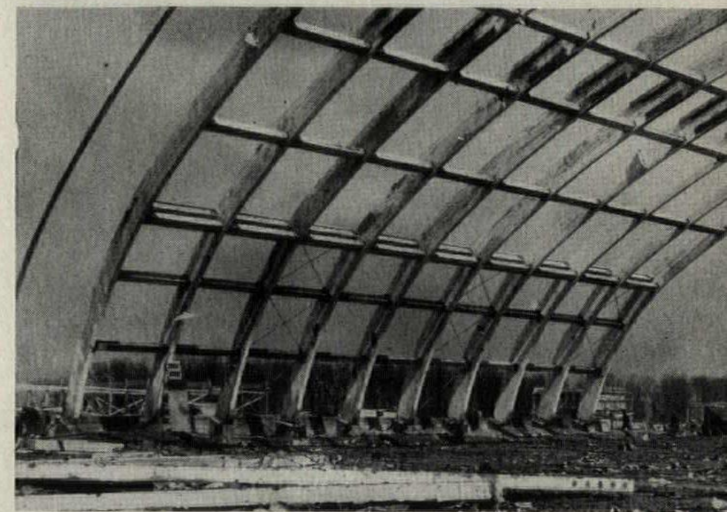


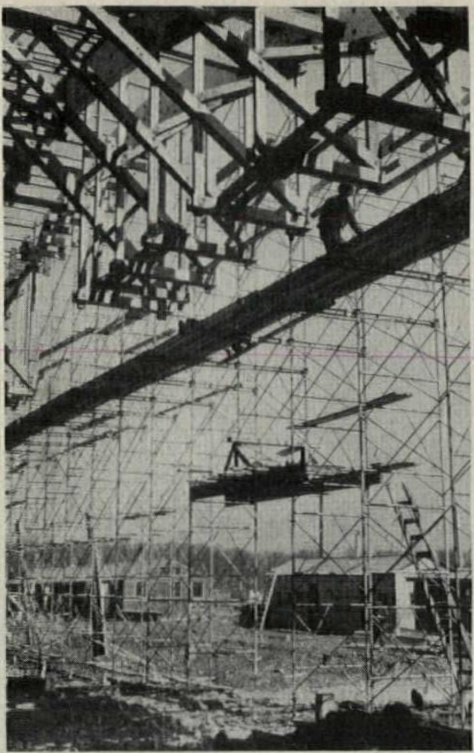
One of the new architectural problems created by the growth of aviation—the provision of facilities for large-scale repair operations—was solved by the U. S. Army Engineers according to the plan illustrated on the opposite page. This midwest modification center, intended for large military aircraft, 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.

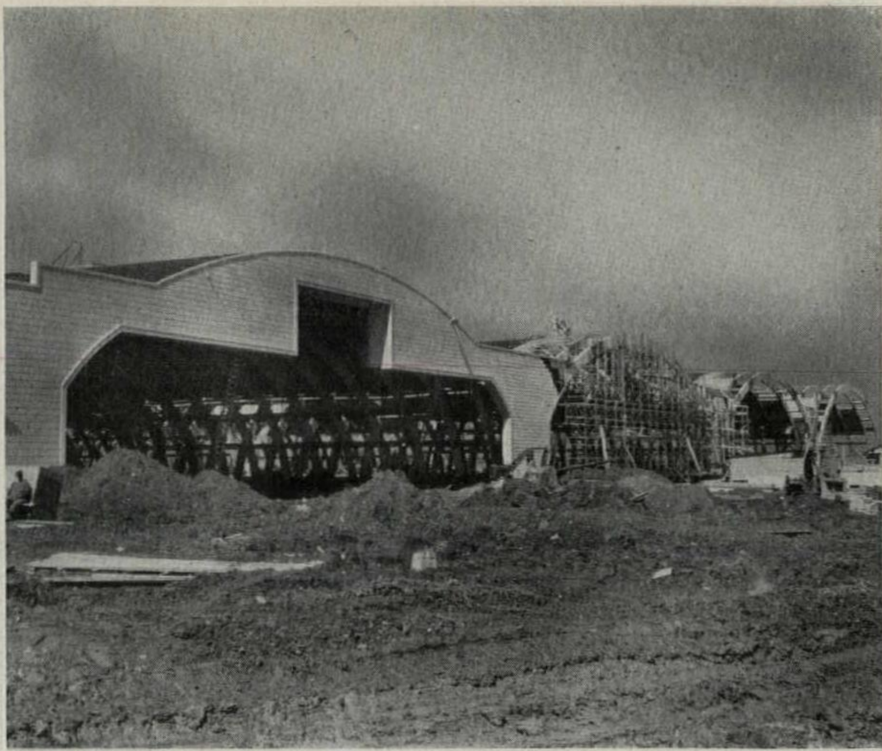
Controlling factors in the design were the necessity for elasticity in the use of the hangars, and the need for a convenient placement of shops and offices. According to the layout, shops are within easy reach of the hangars, and office buildings are placed where shop noises cannot disturb the office 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.





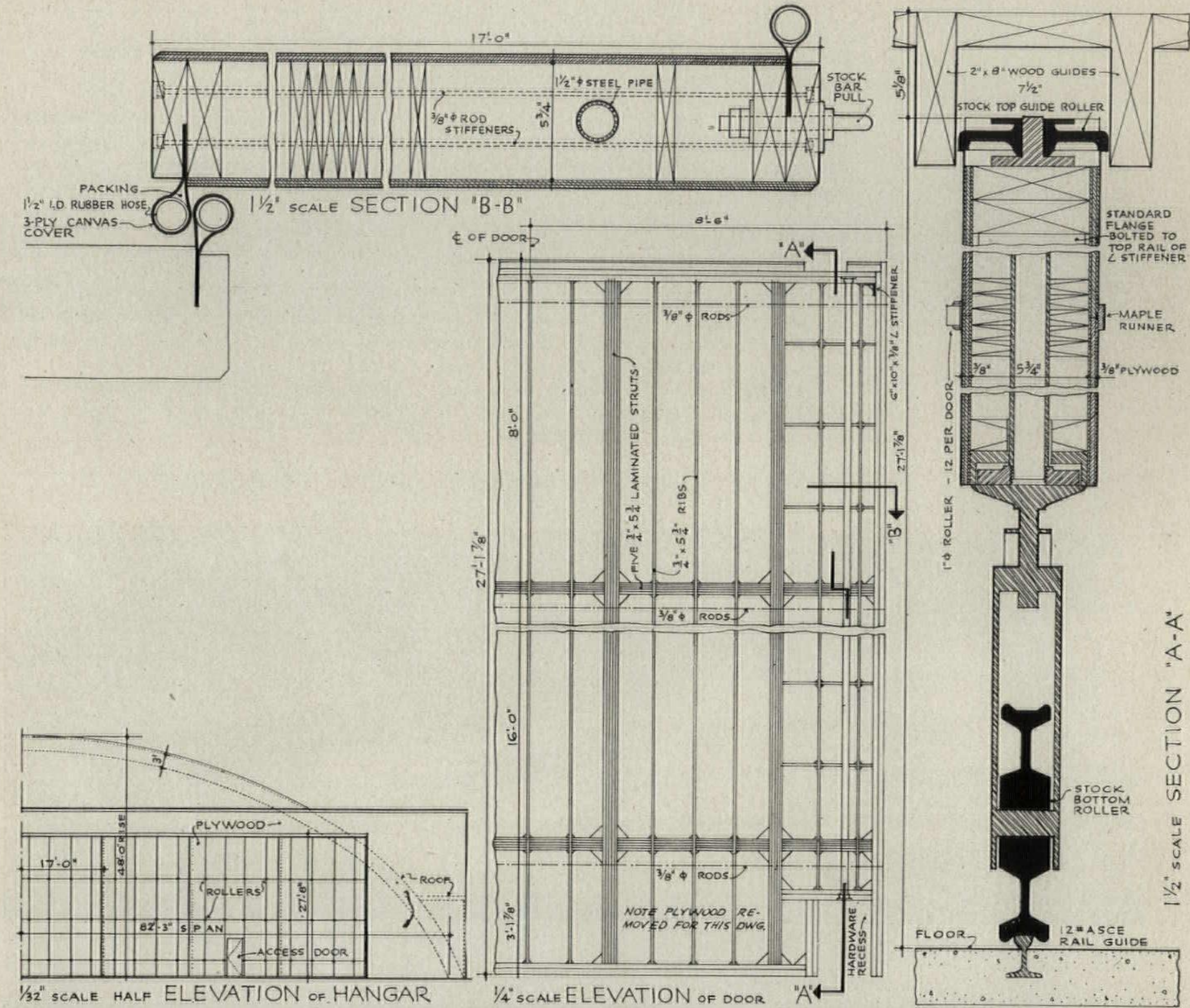




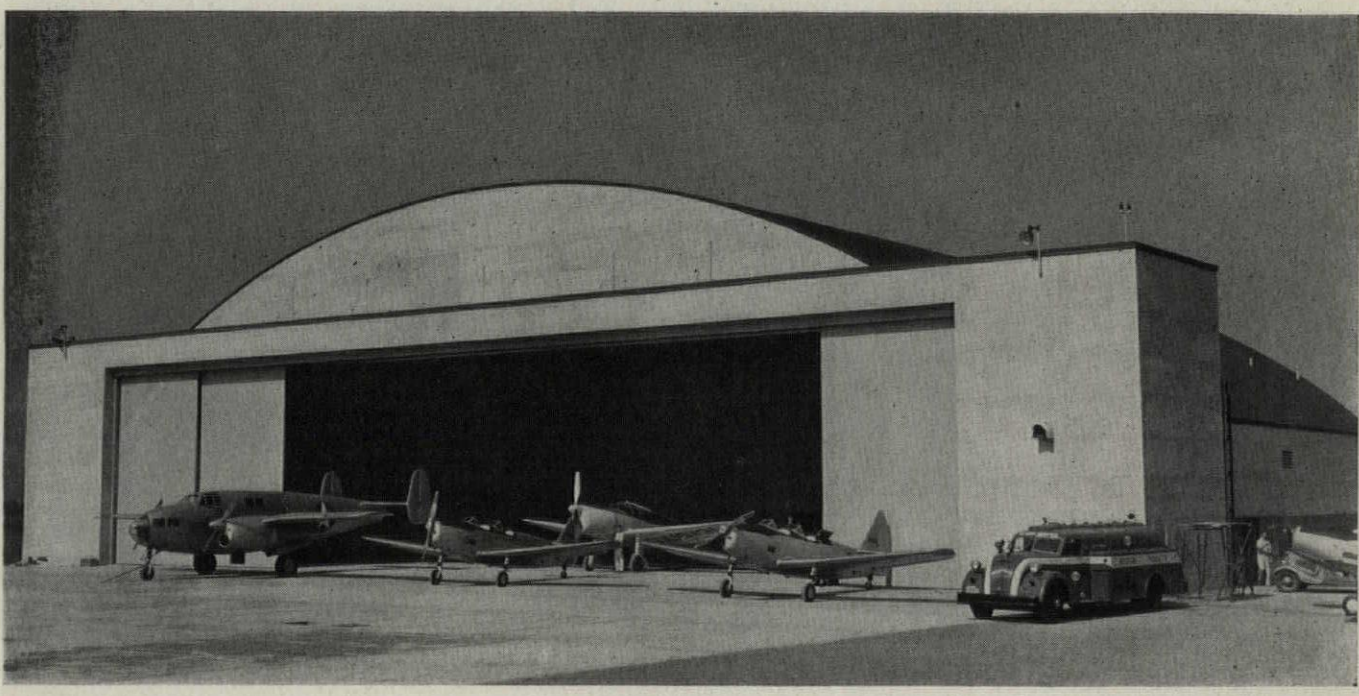
Photos on this page courtesy Engineering News Record

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.



17'-0"
1½"φ STEEL PIPE
STOCK BAR PULL
3/8"φ ROD STIFFENERS
PACKING
1½" I.D. RUBBER HOSE
3-PLY CANVAS COVER
1½" SCALE SECTION "B-B"
2" x 8" WOOD GUIDES
7½"
STOCK TOP GUIDE ROLLER
STANDARD FLANGE BOLTED TO TOP RAIL OF ∠ STIFFENER
MAPLE RUNNER
3/8" PLYWOOD
1"φ ROLLER - 12 PER DOOR
STOCK BOTTOM ROLLER
FLOOR
12# ASCE RAIL GUIDE
1½" SCALE SECTION "A-A"
8'-6"
℄ OF DOOR
3/8"φ RODS
FIVE 1¼" x 5¼" LAMINATED STRUTS
1¼" x 5¼" RIBS
6" x 10" x 3/8" ∠ STIFFENER
NOTE PLYWOOD REMOVED FOR THIS DWG.
HARDWARE RECESS
1/4" SCALE ELEVATION OF DOOR
PLYWOOD
ROLLERS
82'-3" SPAN
ACCESS DOOR
ROOF
1/32" SCALE HALF ELEVATION OF HANGAR



Hangar Building, Bomber Plant, Ypsilanti, Mich.

Albert Kahn Associated Architects and Engineers, Inc.

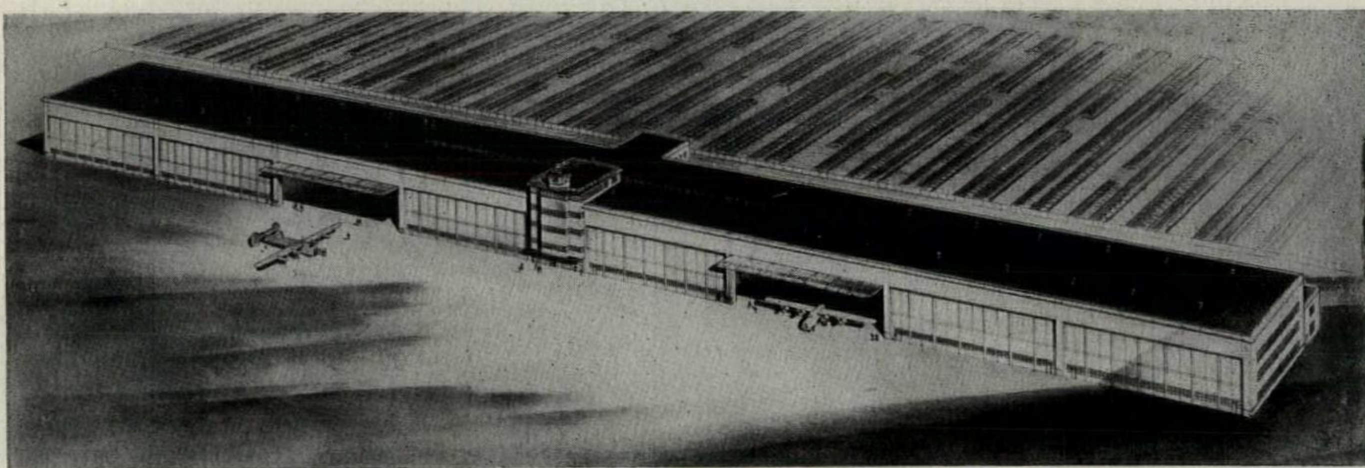
In size, this hangar building is fully in keeping with the vastness of the bomber plant of which it is part—one of the world's largest industrial units under one roof.

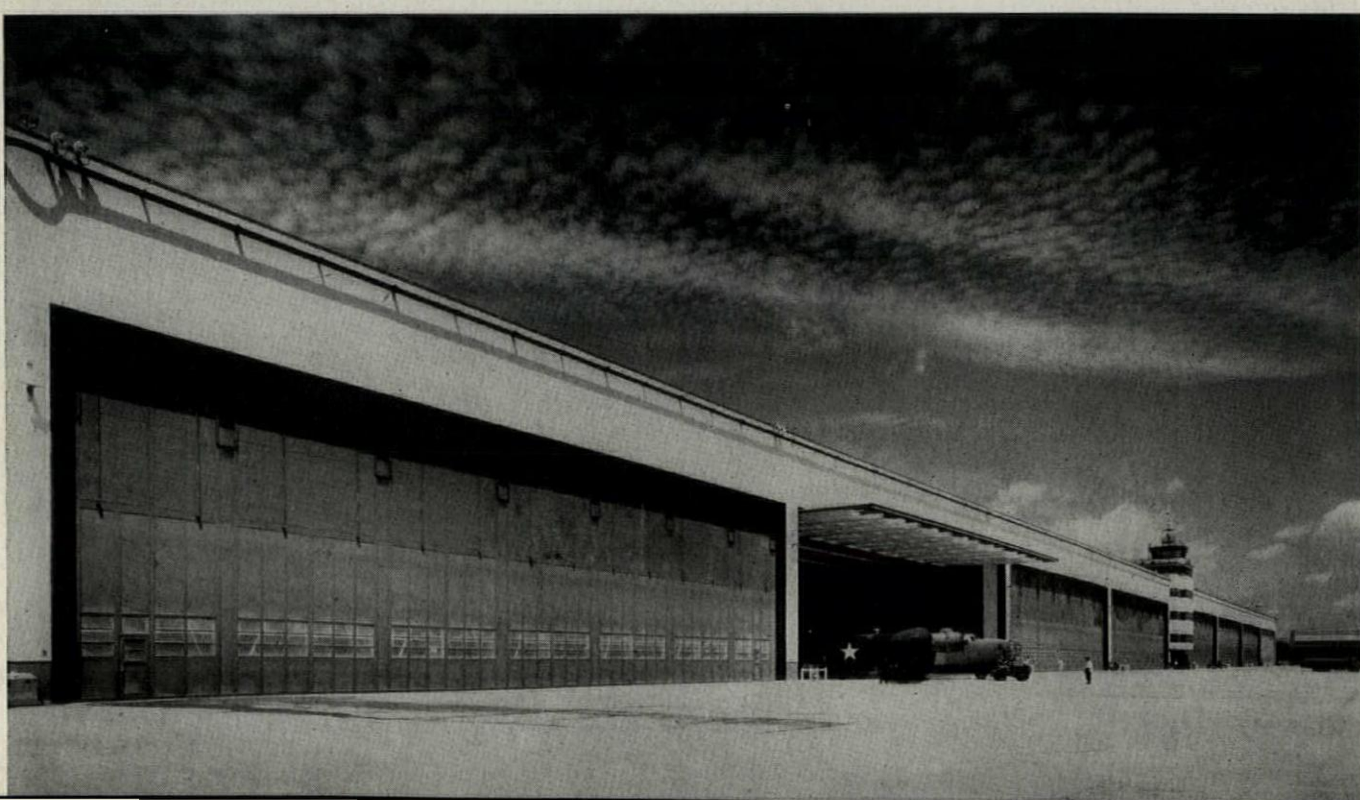
Actually, the hangar, for purposes of description, can be divided into three parts—the five-story building that constitutes its center section, housing administrative offices, living quarters and classrooms, airport control room and many other departments, and the two great hangars that flank it.

Bordering the airport, the hangar building is 1,256 feet long. The central portion contains offices and living quarters. Extending the full length of the hangar is a two-story "lean-to," 30 feet wide, housing service rooms and garages.

The total area of the hangar sections is 156,000 square feet of uninterrupted floor space. A notable feature of the hangar set-up is the vast concrete apron that extends along and beyond the entire front of the building. The apron is 1,450 feet long, more than two city blocks in extent, and 450 feet wide, which is nearly a block deep. Also awe-inspiring in their size are the eight hangar doors that open onto the concrete apron. Electrically-operated and of the canopy type, each of the doors is 150 feet wide and 40 feet high.

To make possible the easy handling of engines, propellers, wings, and even fuselage sections of





the big bombers, two large overhead cranes, operating on monorails, have been installed in each hangar section. Each set of cranes has a total lifting capacity of 30 tons.

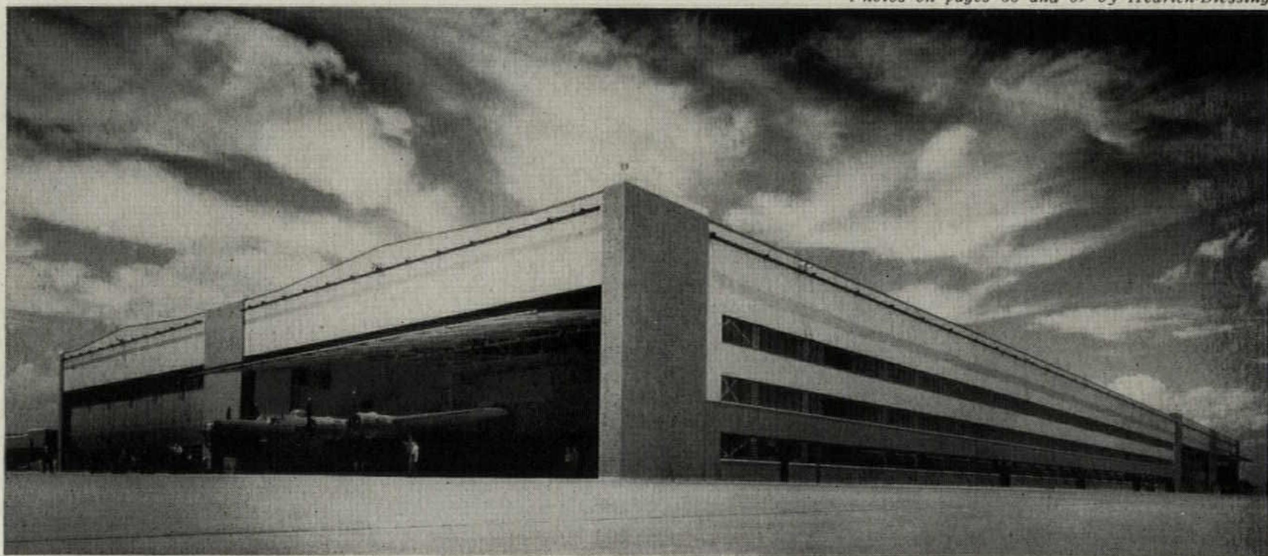
Approximately 3,400 tons of steel went into the construction of the hangar. Notable for their length are the three trusses that extend the length of the building, along its front. Two of them are 450 feet long and one is 350 feet in length. They are supported by double columns, which separate the eight hangar doors. To support the roof, transverse trusses, spaced at intervals of slightly more than 21 feet, frame into the long front trusses and the rear wall. The roof is of cement tile and composition. The building was designed to withstand a wind stress of 20 pounds per square foot.

The exceptionally large glass area of the building brings in plenty of daylight. Walls of the building are of brick up to the sill line. Then comes a strip of continuous steel sash, topped by a wall section of gunite. From sill line to roof, which is 59 feet above the ground, sash and gunite sections alternate.

Floors of the hangar portions are of cement, while those of the central section, containing offices and other facilities, are of asphalt tile and terrazzo.

The first floor of the five-story central portion of the hangar contains an Army officers' waiting

Photos on pages 68 and 69 by Hedrich-Blessing



room, where pilots can rest and relax between flights. On this level are also garage space for fire trucks and ambulances, always in readiness to rush out onto the flying field in the event of accident; a first aid room for the treatment of minor injuries, and electrical control and battery rooms. There is also a parachute loft, beginning on the first floor and extending through to the ceiling of the second. Here parachutes are hung for drying and also are repacked.

The second floor contains offices for the officers in command and for pilots and other flight personnel.

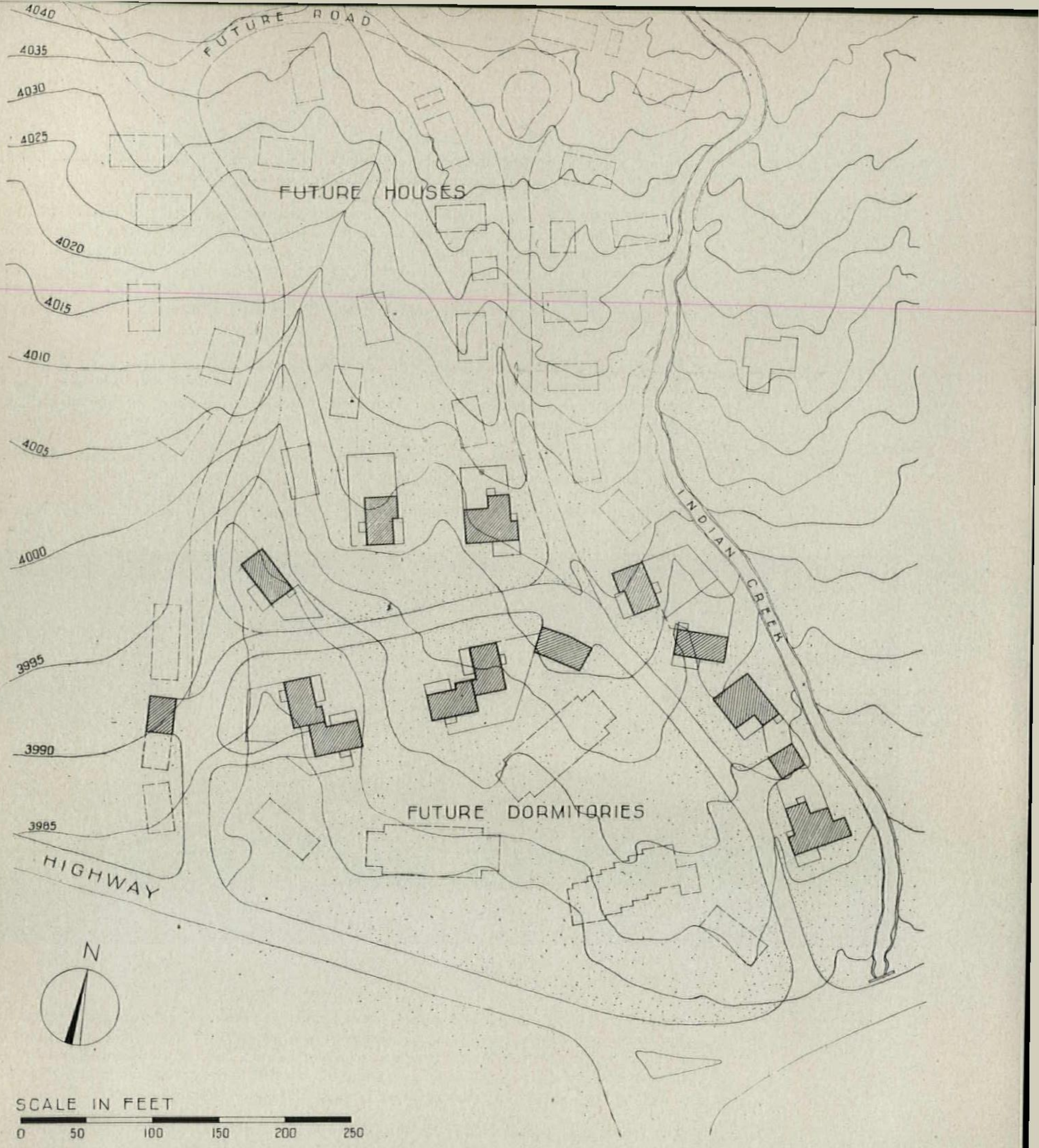
On the third floor are classrooms for the training and instruction of personnel, a mess hall for enlisted men, private dining rooms for officers, modern kitchens and refrigeration equipment. On this floor there is also a Link Trainer room, where Army fliers can be given periodical tests.

Largely given over to living quarters is the fourth floor. Here are two bedrooms, each with private bath, for officers of lesser ranks, and a dormitory accommodating 36 enlisted men, with full shower and toilet facilities adjoining it. Lounge and recreation rooms are provided on this floor for both officers and enlisted men.

The fifth floor houses the communications system and the weather bureau of the airfield.

Above the fifth floor and commanding a view of the entire airfield and the surrounding countryside is the control room. From this point are governed the movements of all incoming and outgoing planes. Field lighting and all other operations are controlled from this point.

The five-story central portion of the hangar is fully air conditioned.



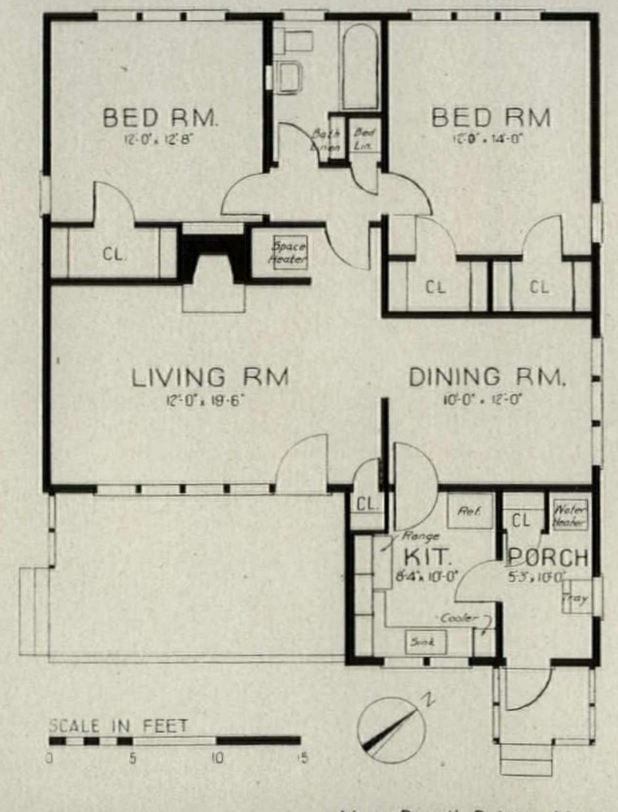
Housing, Yosemite National Park, Calif.

Eldridge T. Spencer, A. I. A., Architect

Located in Yosemite Valley, this housing project, completed in 1942, was designed to provide facilities for employees of the Park and of the Curry Company, concessionaires of the National Park Service. It had to meet the rigid requirements of the Park Service. Included in the program were site improvements, sewer, electricity, water, roads, landscaping, and play yards, as well as the individual buildings.

In order that the development would not interfere with the natural landscape—for which Yosemite is famous—the site chosen was a very rocky slope, hidden from the public view by a dense growth of cedar, oak, and manzanite. The houses are arranged to suit the terrain, each with privacy and view assured by the rising terrain.

Photos by Ansel Adams



The accompanying floor plan is typical, although since there are almost no duplications of plan and detail, none can be said to be truly the "type." Construction is simple: wood frame, insulated for heat and sound, on continuous reinforced concrete foundations, with resawn redwood exterior finish applied in simple patterns to provide texture and composition.

Roofs of the Yosemite houses are flat decks with membrane surfacing. This was used both to keep the houses as low as possible (thus minimizing their projection into the landscape) and to make the most of the protecting blanket of snow as heat insulation in cold weather. This device was previously used by Mr. Spencer in a gasoline service station for Yosemite, in which the roof was designed for an 80-pound snow load (New Pencil Points, January, 1942).

Interior finish of the houses is gypsum lath painted with casein paint. Floors are oak, ceilings are of insulation board chosen for its acoustical properties. Kitchens are equipped with electric ranges and refrigerators. Heating is provided by oil-burning space heaters, with supplementary electric wall radiators in baths and bedrooms. There is no basement. Cost was approximately $4.50 per square foot, complete.

Photos on pages 71, 72 and 73 by Ansel Adams

English Woods: Public Housing, Cincinnati, O.

Allied Architects for the Cincinnati Metropolitan Housing Authority

English woods is situated on a height well above surrounding valleys—a location which would never, in all probability, have been used by private developers. However, it has excellent possibilities as far as light, air, and view are concerned; and with a reasonable amount of grading became, to quote the Chief Architect, "ideal for a housing development."

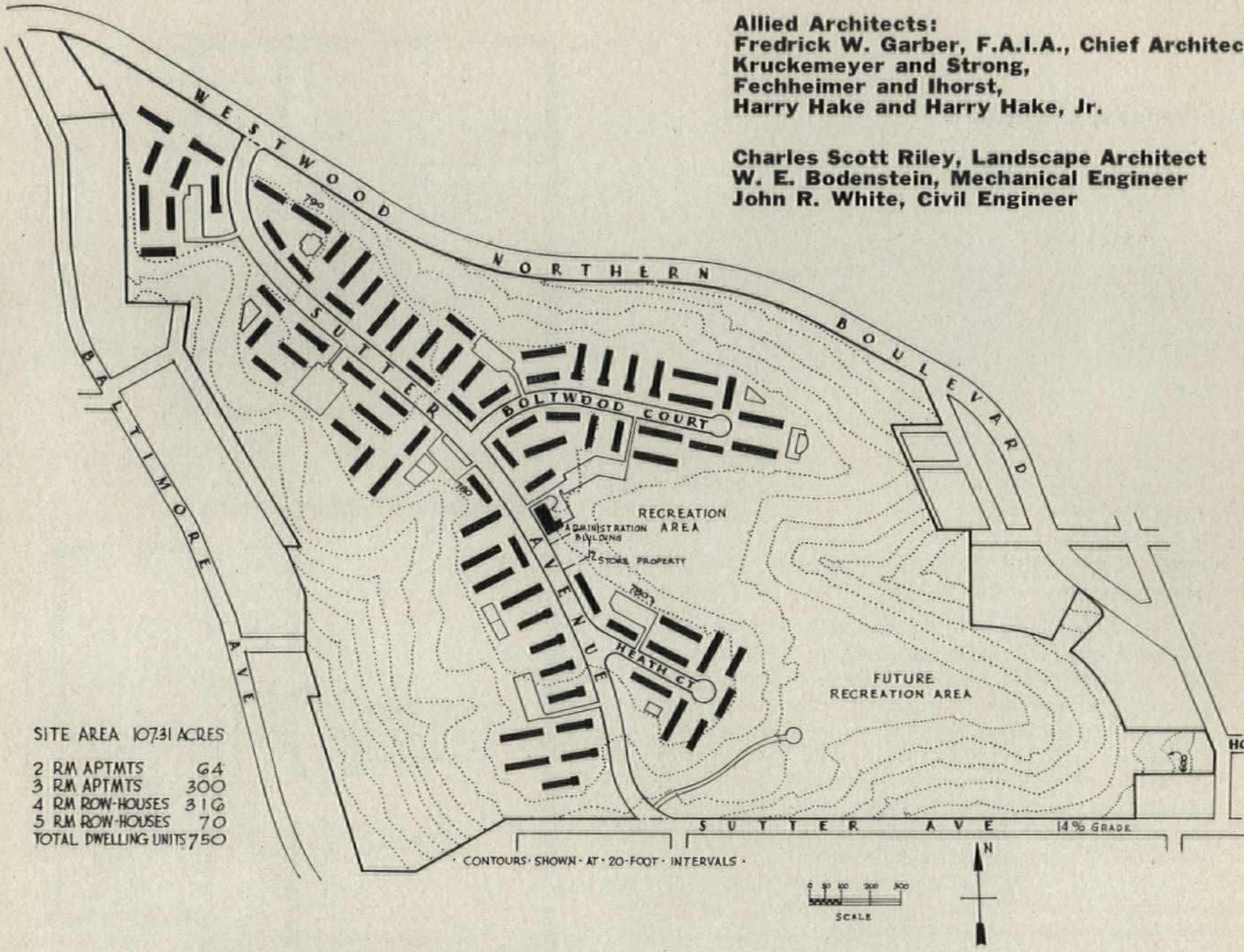
A glance at the accompanying site plan will reveal that there is a difference in level of nearly 200 feet between the lower right hand corner of the site and the upper left. The crown of the spur of the hill, on which most of the buildings are placed, was graded, and the resulting fill was used to level off the present large playground area.

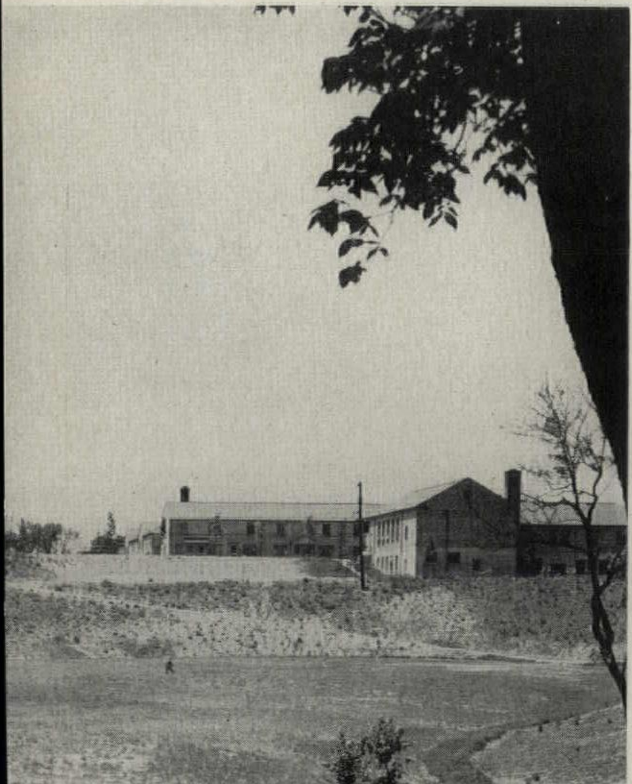
Thoroughfares shown on the plot plan are paved vehicular traffic ways (except for the lane leading the future recreation area). Not shown are the entrance and service walks, which provide access to all sides of the buildings, and the unpaved trail walks which lead from various parts of the development to the surrounding streets. Scattered among the buildings, each located to serve a group of structures, are seven parking courts and seven minor play areas. Most of the small play areas have facilities for spray pools, etc., for children's use in hot weather.

Orientation of the buildings was governed partly by contours, partly by the prevailing winds, which come from the south, southeast, and east, depending on the time of the year.

Allied Architects:
Fredrick W. Garber, F.A.I.A., Chief Architect,
Kruckemeyer and Strong,
Fechheimer and Ihorst,
Harry Hake and Harry Hake, Jr.

Charles Scott Riley, Landscape Architect
W. E. Bodenstein, Mechanical Engineer
John R. White, Civil Engineer





Recreation area, surrounded on three sides by buildings, was leveled with fill from the ridge. Future recreation area will be developed on a level spot which is a filled-in quarry, hence land unsuitable for building. When developed, it will probably be extremely popular, as it overlooks the whole valley; from it the tops of tall buildings are visible in the distance.

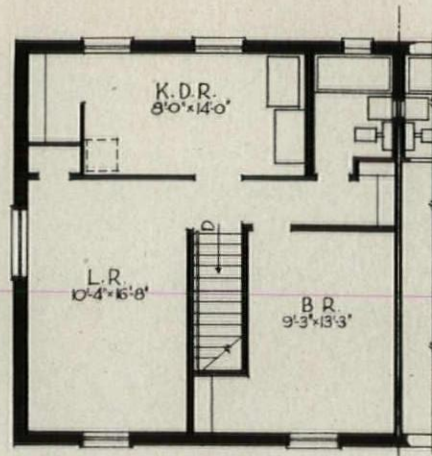
English Woods, continued

Typical unit plans, shown at right, are combined in the following proportions:

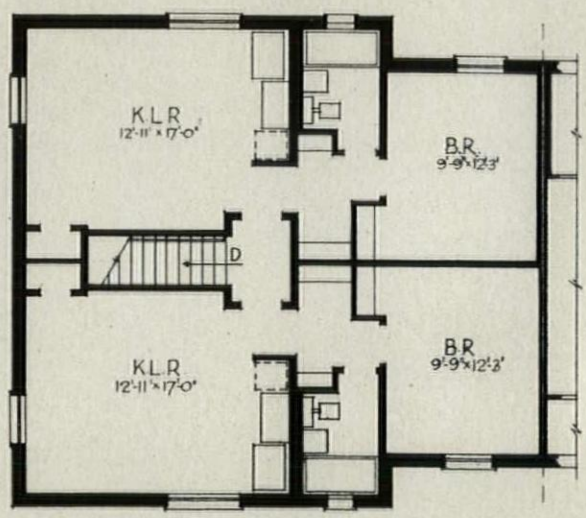
Apartments		*Row Houses*	
2 room	64	4 room	316
3 room	300	5 room	70
Total	364	Total	386
		Total apartments	364
		Total dwelling units	750

Most of the buildings have their long axes running northeast and southwest; a few lie in other directions of the compass. There are only four types of buildings; but although the number of buildings totals over 80, the changes in level and the curved streets have helped the designers to avoid that sterile monotony which characterizes many less carefully laid out projects.

Points worthy of note on the unit plans include the economical placement of stairs; location of closets, stairs, etc. (where possible), so that they form noise barriers between apartments; and provision, in most cases, of space inside the main entrances so that outside doors do not open directly into living rooms. These considerations, however, apparently could not outweigh such public housing requirements as the paramount need for economy in planning; the bedroom floor plan of the ingeniously interlocked larger row house units seems to offer little opposition to noise passing from one apartment to the other.

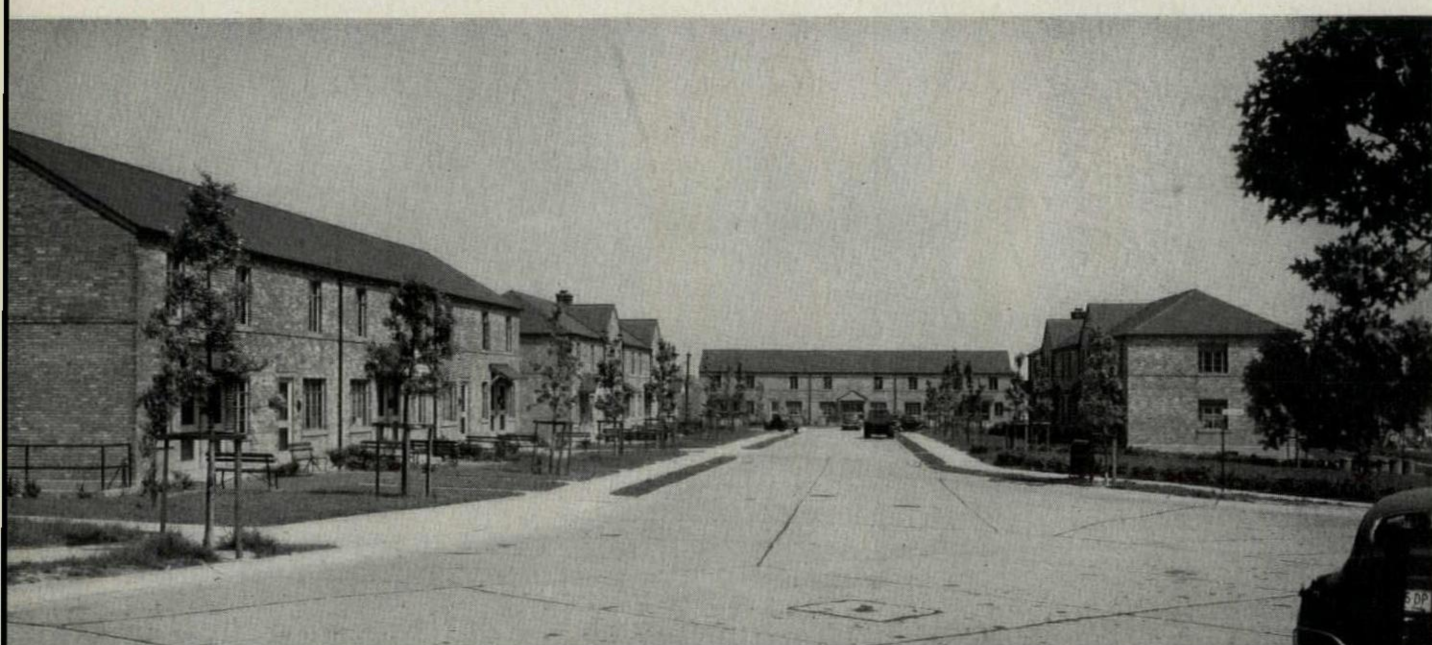


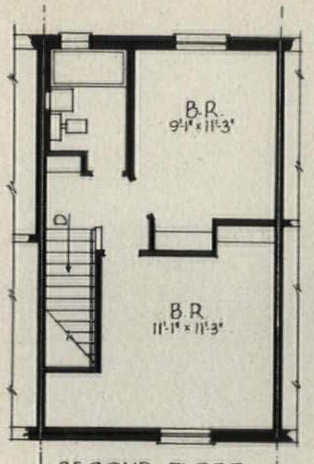
3½ RM END APARTMENT



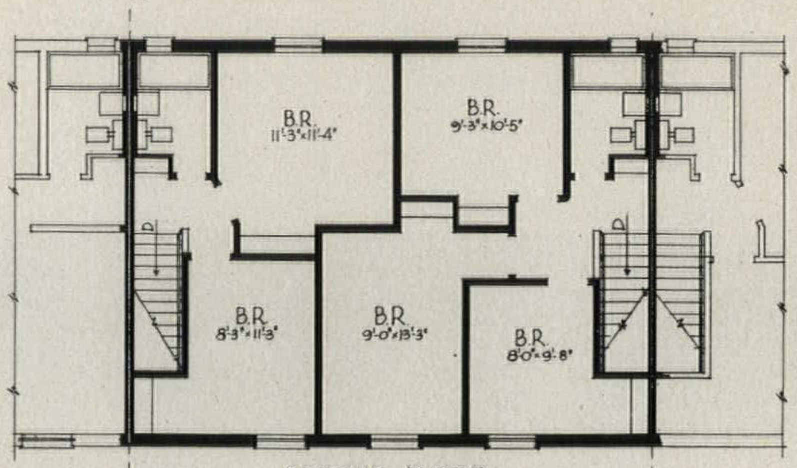
2½ ROOM END APARTMENTS

SCALE · 0 5 10

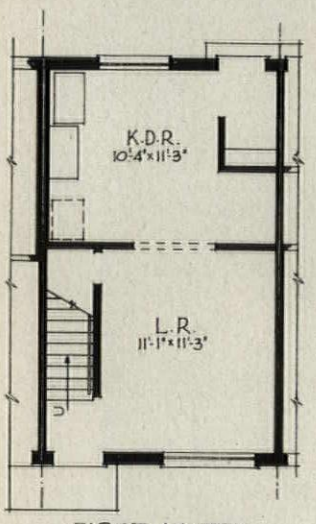




SECOND FLOOR

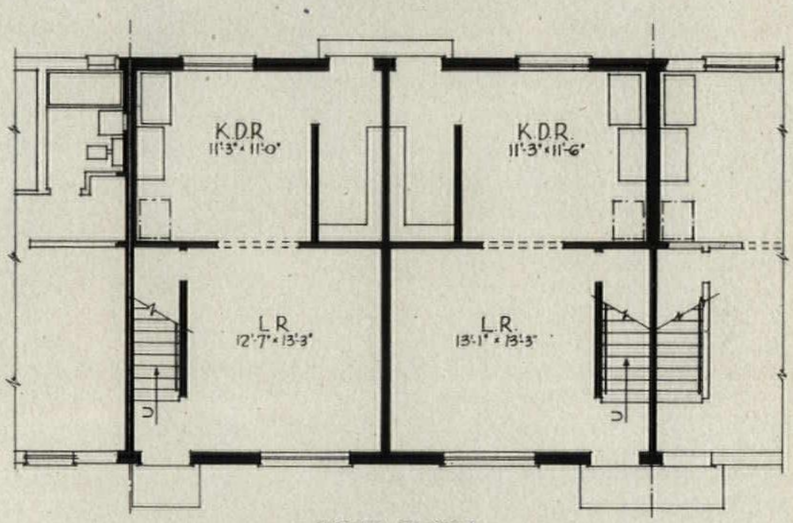


SECOND FLOOR



FIRST FLOOR

TYPICAL 4½ ROOM
ROW-HOUSE



FIRST FLOOR

TYPICAL INTERLOCKING 4½-5½ ROOM
ROW-HOUSE

In these photographs the variety achieved with the aid of curving streets and contours is readily visible. Unfortunately, however, black-and-white photography cannot convey the full impression of color, which is most important in English Woods. Roofs are of blue slate; brick is a common back-up type, soft, and tannish-pink in color. It was chosen partly as a background for the planting, which has not yet attained its ultimate growth. Another influence on the selection of brick was the fact that the same architects used a red brick in another public housing project, and did not want any casual spectator to have cause to say "There's another housing project."

One criticism of English Woods might concern its remoteness from any local shopping center. It was planned to have stores flank the administration building in the center of the project, but the war has prevented their construction. Gabled roofs have been used on all the buildings; this too, may be criticized. The designers state that gables were used because difficulties, due to climate conditions, have been encountered locally with parapet walls and flat roofs; and since the amortization period for the development is 60 years, it was thought desirable to avoid trouble. Also, adds Mr. Garber, the gabled roof "removes the institutional look."

An Architect Looks to New York City's Future

by Charles Downing Lay, A. I. A.

All architects are concerned about the postwar future and are trying to discern their position in it; what cities will be like, when they have a chance to design and build again.

Conditions seem favorable for a great change in the pattern of our living. Real estate is nearly bankrupt; technological advance in the planning and equipment of all kinds of buildings has made half or perhaps more of our homes and factories so out of date that they should be destroyed to be replaced by structures better planned, better built, better equipped. The conditions that made twelve story tenements necessary to show a profit on expensive land no longer exist in large districts of the city. It would be difficult today to buy a useful building to tear down and build a new one which will pay interest on the old and on the new. Unearned increment on building sites has gone by the board. The habit now is to buy any building for a song and slick it up enough to pay interest on the song. This is contrary to modern ideas of full employment since it tends to make durable goods too durable.

The savings banks have written off tremendous losses but still think of real property in the same old way, as if it had value above the return on its use. Doubtless there has already been a revolution in our attitude toward real property which property owners of all kinds are reluctant to admit. If the war lasts two or three years longer the banks may then be ready to finance a new kind of building project on urban land which, because of this revolution, closer control by zoning, and a fairly complete rapid transit system, has lost most of its speculative value. This leveling of land values is bound to increase because of further restrictions by zoning and rapid transit extensions until land becomes, more or less, community property having no great exceptional value because of its location.

In all the activities of reconstruction of a city which is still going through a revolution the architect should be the leader, thinking for the future, urging the die-hards to be realistic and to help to direct a force which cannot be stayed; pointing out fresh fields for safe investments, and with foresight planning a better city.

It is doubtful if the present tax structure in New York City can be maintained. If assessments were reduced to anywhere near actual values the City would have to go to the State Legislature for power to impose other taxes in order to get its necessary income. Pay-as-you-go is universal with Federal Housing Loans and would be readily accepted by everyone in New York if the tax were based on a percentage of the rent and paid in monthly installments. To bring about some such reform should be the first interest of architects, who well know that the cost of living in New York must be paid by the people who live there and that it makes no difference whether it comes out of the rent pocket or some other pocket.

People who talk about the future have a lot to say about gadgets, new metals, new plastics, new everything. The architect must prepare himself for using these things in the buildings he designs and in order to use them he must see that the building code is elastic enough to permit anything new which does not endanger high standards of construction and equipment.

The new things will probably be partly or wholly prefabricated which means more work in the shop, less work on the job. The unions of the building trades must therefore be placated by the assurance of enough work on installation to keep the usual number of men fully employed in New York City.

Before the architects commit themselves to any type of new development in New York City, they should try to discover why the population of Manhattan is declining. There have been many reasons suggested: the attraction of the suburbs for families with small children, ease of travel to distant parts of the city by rapid transit lines, the automobile, and other reasons without number.

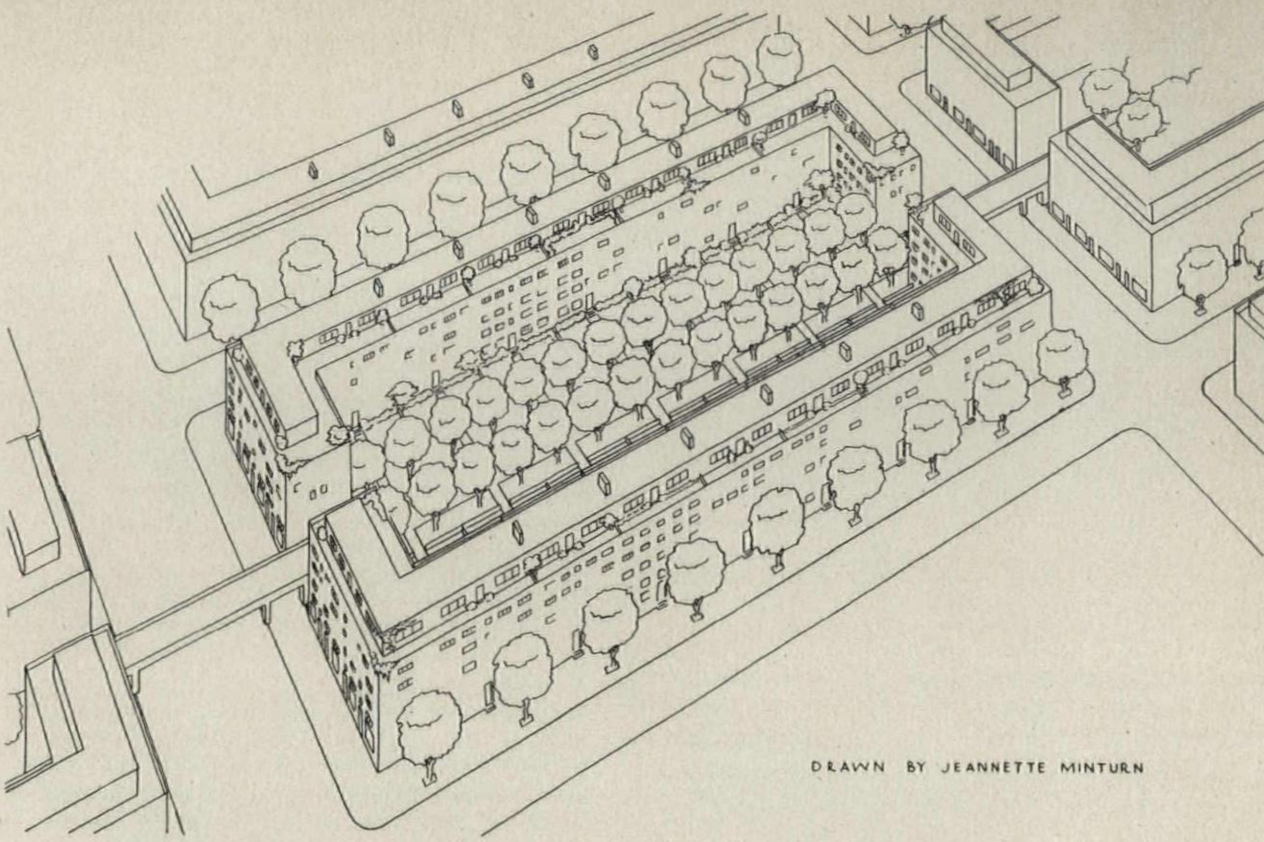
My own explanation for the exodus is purely emotional: people leave Manhattan because they do not like life there. Why this is so I cannot say. There are as many reasons as there are people leaving, but in general I think the things that influence them most are difficult living conditions in old-fashioned houses, not enough play space indoors or out, and traffic dangers on the streets.

My own discontent with living in Manhattan has been resolved into a desire for a simpler kind of living somewhat as follows: in any district north of 60th Street which is ripe for rehabilitation I would use the present street plan which would save heavy costs. The average city block would be occupied by row houses not more than 40 feet deep (40% lot coverage) height 54 feet in all, possibly garage space in the cellar, an elevator from street level. Houses will be 120 feet from back to back. There might be private gardens 40 feet deep with low fences for each unit of 50 feet. Between the gardens would be an esplanade or pedestrian street from avenue to avenue. The whole space between houses thus becomes a park for adults and a playground for children. There would be one heating plant for a whole district, with mains running through the cellars. Apartments could be bought or rented. If bought and fully paid for, the monthly payments would be for taxes, maintenance, heat, light and power. This is a deliberate plan to establish standard housing for all income classes, giving those who have lower incomes more space than they are used to, and people with higher incomes more light, more air, and a more pleasant outlook. In no case will any interference with through ventilation, north and south, be permitted. For lower-rent units, elevators might be omitted and the district might be less fashionable.

The elasticity of the plan is great. One individual might take twenty-five feet, six stories high; another might have forty by a hundred feet on one floor.

Shops would be on the avenues, but not where pedestrian streets enter. A higher level for the pedestrian street, where practicable, would make possible bridges across the avenues.

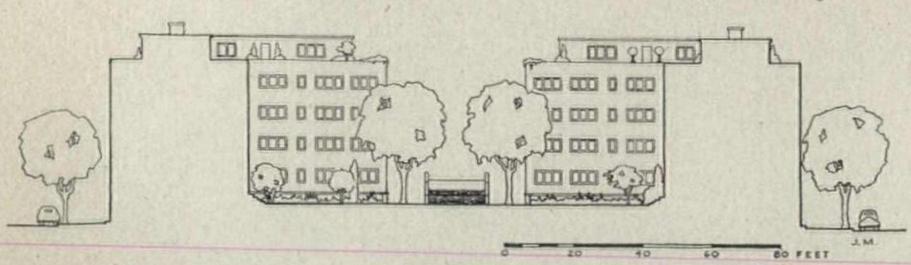
It is my belief that people never change. What they have once liked they always like, and, to a degree, what I like other people like. Because of my experience I am more understanding of likes and dislikes than most people. I like ease and do not ordinarily like to walk even a quarter of a mile to a park, or to have my children that far from home. I like to look out a window at grass and trees; to sit by the front door (in the scheme I propose, the garden door) and see children playing and people walking by. I like the children to be under a watchful eye, not ten or more stories below, where they are too far away to be reached quickly in case of trouble. I like to walk not more than half a block to the corner store for cigarettes or



Charles Downing Lay proposes that the rectangular city block be retained, but that the type of development upon it be required to provide more of the amenities than today's haphazard practice permits. With a limited height and depth (front to back), and a block interior raised a full story height above sidewalk level, ample sun and air are assured. Block interiors might become pedestrian walkways, with bridges over the streets. Below is a view of the neighborhood surrounding New York's Harlem River Housing, in which are types of development which Mr. Lay questions: superblock, intensive apartment use, and the more usual heterogeneous mess. Mr. Lay's scheme, though designed for New York, might be equally suitable in other cities where a similar street pattern and orientation exist.

Fairchild Aerial Surveys, Inc.

The section shows, more clearly than words, how limitation of building height and depth can provide sunlight and airy room in block interiors. Raising the level of the interior court is an additional means of raising the ground level to a point where sunlight can strike it.



SECTION

a newspaper. All these comforts are provided in my scheme, which besides has other advantages: additional pedestrian walks might be laid out running parallel with the avenues and forty feet away; on these pedestrian ways there could be second story shops.

Shops on the avenues could occupy the whole building (40 by 80 feet) or there might be offices above. The gross area occupied by buildings would be about 30 percent, disregarding avenues and buildings on avenues.

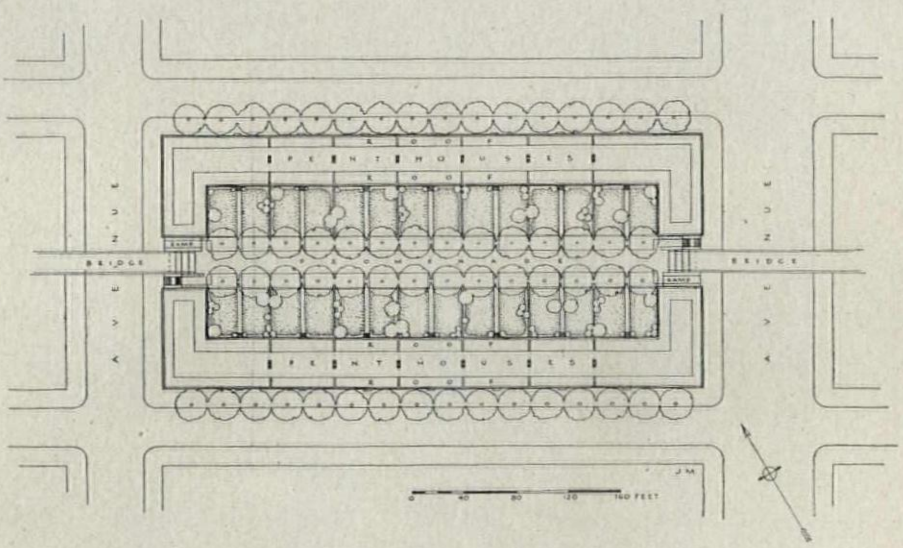
The romantic town planners of the early twentieth century were horrified by New York's gridiron plan, but I have always thought it admirable for an American city the size of New York when physical conditions permit. It makes it easy to orient one's self and easy to find one's way about. It avoids the ugly, angular street intersections of the Washington plan, which produce such awkward triangular lots, impossible to build on; and it gives every house on a side street an ideal orientation, a little west of south. It is fairly well in scale with human beings, providing, when not too closely built up, enough light and air but not too great distances to walk. It is to my way of thinking a great mistake to abandon it for the imaginary advantages of the super-block.

I do not like the super-block and see no great advantage in it. Streets are always favorite playgrounds for children and might well be kept as such with traffic barred. It is doubtful if the space would be as useful the year round if put in lawns and planting. I do not like the tall buildings of the super-block. The shadow of a thirteen story building in winter is too great. I must have sunlight and for shade in summer I prefer trees. In the super-block everything is too far away; down in an elevator, along a walk for possibly three long blocks and across a busy street to the drug store—which I would like to have on the corner of my own block.

The total residential area of Manhattan is estimated to be 9,500 acres. At 150 people per acre net, my plan would accomodate 1,425,000 people, but the number per acre net would not have to be increased much to equal the 200 per acre gross which now houses the present population of 1,867,000 and the difference could be adjusted in the 25 to 50 years which it might take to complete rebuilding on my plan.

Urban redevelopment done on this or a similar plan will require much new legislation, which architects must help to obtain. It is time to reconsider the whole question of real property and to make it more fluid as an investment and more stable in value.

I believe this is a favorable time to try something which will give New York more comfort in living, more *rus in urbe,* and make it possible for us to enjoy all the emotional and intellectual delights of a great city without foregoing satisfaction of the deep spiritual necessity for sunlight, air, and sight of trees and flowers from the window.



Mr. Lay's scheme is not radically different from that of many typical blocks in Manhattan; the principal difference lies in the unification of the peripheral buildings and provisions for full utilization of the interior space. Curiously, there exist in Manhattan delightful examples of similar use of the interior court; but these isolated cases serve only to emphasize the possibilities if the practice were more universal.