F. R. Meisch Papers.

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PLANT FACILITIES FOR AIRPLANE DEALERS

Francis R. Meisch
Registered Architect,
Minneapolis, Minnesota.

I BACKGROUND FOR PLANNING

Progress in the airplane business depends on a broad national program of airport development for the private flyer and on the efficient production, distribution, and servicing of the airplane. Responsibility for production rests with the manufacturer but the distribution and service functions are performed by the manufacturer and his dealers jointly.

The efficient performance of distribution and service functions by airplane dealers, fixed base operators, or airport operators, is essential not only to the success of the manufacturer's business but to that of the dealer's or operator's business as well.

The facilities which dealers possess influence their ability to perform the functions for which they are responsible. These facilities should also help to promote an interest in aviation and in the use of the airplane by the general public. The dealer's physical plant affects his ability to display, condition, and stock new airplanes, to recondition and sell used airplanes, to maintain and repair airplanes for customers, and to distribute replacement parts and accessories.

More and more attention must be focused on distribution because the end of World War II will find the manufacturers collectively able to produce more airplanes than the market will be able to absorb. This also points

to the importance of service as an income for dealers and to the need for additional sources of income to eliminate seasonal slumps in the business. Other sources of income are flight instruction, airplane mechanic training, gasoline and oil sales, aerial taxi service, sightseeing flights, aerial photography, and hangar rental for local and itinerant airplane storage. Facilities and conveniences for the spectator as well as the flyer can provide additional sources of income and increase interest in aviation.

Since the airplane business is a growing industry with a broad future, the limits of which are not yet defined, the dealer must proceed with caution in the planning and construction of his physical plant. To this end the dealer will promote his own interests by securing the services of a competent architect who is familiar with local building conditions, materials, labor, and costs. The architect can assist the dealer in solving many of the problems that pertain to the physical plant, its site, utilities, financing, construction, insurance, maintenance, etc.

Dealer establishments which are functional in design and adequately suited to the multiple needs of the dealer are rare. The past is no guide for the future. In the past the design of hangars and airport buildings governed the conduct of the dealer's business. In the future, however, the design of the dealer's facilities should be determined by the functional requirements of the retail plane sales and service business. These functional requirements are mainly as follow:

1. Management and Administration.
2. New and Used Airplane Display and Sales.

3. Repair and Maintenance.

4. Parts and Accessories Stock, Display, and Sales.

5. Gasoline and Oil Storage and Sales.

6. Airplane Storage Hangars.

7. General Service and Convenience Facilities.

This functional plan of organization is common to many dealerships whether large or small. The functions can all be conducted in one building but wise planning dictates that there be some segragation to allow for efficiency, flexibility, and expansion.

The over all layout of a planned functional airport building group is illustrated in the aerial perspective, Figure I (Sheet 1.). This perspective shows groups of Tee Hangars, Gasoline Pits, Garage Facilities, Airplane Sales and Service Building, Spectator's Area, Airport Public Center, and Car Parking Area. The detailed planning of specific facilities is shown in other illustrations that follow. The illustrations presented herewith are ideas which can serve only as a starting point for the solution of the individual dealer's problem.

II THE MASTER PLAN

The essential basic feature of the over all layout is the development of a master plan which will serve as a guide for initial construction and stage development of plant facilities. It is 'planning insurance' and the only safeguard that can be found for a business which requires expanding plant facilities and flexible functional solutions. Such a plan, though it may be changed to accord with the times, serves as a control in preventing inadequacy, obsolesence, and planning shortsightedness. The master plan is concerned with site planning or the

relation of the project to the airport, to the community, to utilities, to access roads and transportation, to topography, to soil conditions, to finances, etc. The master plan allows the dealer to start out in a modest way with a minimum investment in plant facilities. When necessary, the master plan allows the dealer to expand his plant in successive stages to parallel business developments requiring increased facilities and his economic ability to finance additional plant investments.

III SALES AND SERVICE BUILDING - INITIAL STAGE

The initial stage of development of a Sales and Service Building is illustrated in the plan, Figure II (Sheet 2.). Also shown are alternate schemes for the layout of the office-lobby parts sales display and stock room end of the building. Schemes A and B are predicated upon a 'one man establishment' or a very limited staff. Schemes C and D are based upon having more personnel employed in the initial stage thus allowing greater decentralization of functions. Certain functions are thus segragated initially so that with expansion they will be properly related at a later stage of development. How such a development can logically occurr is illustrated in the plans (based on Scheme D) for the intermediate and advanced stages of the Sales and Service Building.

The size of the initial development is governed by local business conditions. The character of the development is largely determined by the finances available and local building conditions. The ingenuity of the architect is a big factor in determining the ultimate result. Some dealers for example might find the plans proposed under the intermediate stage of development best suited for the initial stage of their plant facilities.

The hangar area proper for sales and service work is designed for cantilever roof construction sa as to always allow for unit expansion on one side. Examples of cantilever roof construction are illustrated in the sections, Figure III (Sheet 7.). This type of hangar is limited in depth but follows the idea of the stall arrangement in automobile service stations. In this type of planning automobiles are readily moved into stalls for work and readily removed when work is completed. This same pattern of planning and operation in an airplane service hangar can increase efficiency by eliminating the 'pocketing effect' of the standard type hangar. This 'pocketing effect' causes much loss of time and often results in damage to airplanes when many planes must be moved in order to bring just one plane out of the hangar.

Proper door selection and design in conjunction with the cantilever truss will produce a hangar that can be expanded to provide almost any width of continuous door opening. The proper door design will also allow the door to be opened at any required point to a width sufficient for the passage of one airplane.

Trusses can be located any number of feet center to center that is consistent with good planning and structural design. In the plans presented here the dimension of ten feet (10' - 0") was used as a repeating modular unit for planning purposes.

Specific shop area requirements and subdivisions are a matter of over all service policy and working procedures which will be determined by the dealer.

IV SALES AND SERVICE BUILDING - INTERMEDIATE STAGE

The intermediate stage of development is illustrated in the plan, Figure IV (Sheet 3.). This stage of the Sales and Service Building shows increased facilities for service as well as a public lounge with a lunch counter. This lounge and lunch counter area can be used in a later stage of development (or even in this stage) as an airplane display and sales and a parts display and sales room. But until a seperate Airport Public Center with food service and lounging facilities is provided, such a unit in the Sales and Service Building will not only attract sales and service business for the dealer but will provide an additional source of revenue.

This stage shows an increase in the size of the heating and mechanical plant and the provision of a locker room for mechanics and shop personnel. The work of mechanics, shop personnel, and parts men is such that they must change from street clothes to work clothes making adequate locker facilities necessary. In conjunction with the lockers it is very desirable to provide shower stalls.

V SALES AND SERVICE BUILDING - ADVANCED STAGE

The advanced stage of development is illustrated in the plan, Figure V (Sheet 4.). Shop and service facilities are increased and a paint shop is included. This paint shop with its paint storage vault and the adjacent oil storage vault for the gasoline and oil sales function should be of fireproof or fire retarding construction. Paint shops or areas require special treatment to reduce the hazzard of fire and explosion and correspondingly keep insurance premiums to a minimum. In the early stages of development the 'paint shop area'

can be curtained off from the rest of the service hangar, but extreme caution is required in its operation.

The best plan, if justified by business volume, is the seperate paint shop. This shop should be equipped with mechanical ventilation which positively removes dangerous vapors through a floor grill (such vapors are heavy and flow down to the floor) and delivers them to the building exterior through a penthouse on the roof. The large volume of clean fresh air required for such a purpose must be brought in from the exterior, heated during cold weather, and filtered free of dust and dirt which would mar paint work. A diagramatic picture of the air flow through a paint shop is illustrated in the cross sections, Figure III (Sheet 7.).

Keeping the air dust free requires that all doors to the paint shop be furnished with weather stripping and made as air tight as possible. Where fire doors are required between the paint shop and other facilities, it may be necessary to install a double door arrangement since it is difficult to make fire doors air tight without impeding their free operation. In order to reduce the hazzard of vapor explosions in the paint shop it is essential that the floor be spark proof (wood or zinc sheet not concrete). All electrical switches, fixtures, lights, motors, etc. in the paint shop should be of the vapor proof or explosion proof type underwriters approved.

Other shops have specific requirements which may or may not be economically justified depending upon the volume of business. Specific requirements on which the safety of flight depends must be included without exception. The instrument shop requires air conditioning to help maintain

a constant temperature and to keep the air dust free. In reference to eliminating dust from the air an electrical precipitron used in conjunction with the air conditioning unit is the specific answer to the problem. The radio shop may require a 'screen room' for the accurate testing of radio equipment. The battery shop requires acid proof benches, acid proof sink and plumbing fixtures, excellent lighting, and excellent ventilation. Shops such as the engine shop can make good use of a hoist. This hoist can be either a portable unit or an overhead track traveling hoist. Propellar shops, if expected to process metal blades, will be better designed if provided with wood floors.

As sales business increases special sales rooms or customer conference rooms will be required. These rooms provide privacy for the customer and the salesman in arranging the final details of purchase. Such rooms should be convenient to the display room and free from distractions.

An attractive display of new planes is extremely important in airplane merchandising. The new plane or planes on display should be the focal point of the establishment. Spectators should have as unobstructed a view of the airplane or planes on display as possible. Because of the size of airplanes this will probably mean that the display area or window will have to be combined with the regular show room exhibit. Where space for the display of more than one or two planes is unobtainable or uneconomical, the use of scale airplane models in display windows may prove to be the answer to the space problem. The inherent beauty of the airplane should be supplemented by the design of its setting when on display. Lighting effects can be of great assistance in display work. Facilities for customers attracted to the display room should

include comfortable seating, toilet facilities, telephone booths, and other conveniences. Desks for sales personnel can be located in the display room. It is possible to capitalize on the attraction value of the new airplanes on display by locating the parts and accessories sales and display adjacent to or opening off of the airplane display room.

VI PUBLIC CENTER BUILDING

Plans for an Airport Public Center Building are illustrated in Figure VI (Sheet 5.). It is possible to start this building as a smaller structure than illustrated, and then expand it as required. The facilities included in this building will be determined by local requirements.

The structural system can be similar to the one used in the Sales and Service Building (thus maintaining the continuity of roof line) and expansion can be carried out on a repeating modular unit basis. The construction of a control tower and office space for the Civil Aeronautics Administration (if any) and the Weather Bureau (if any) is also subject to local conditions and requirements. No attempt is made to provide facilities for scheduled air transport operators in this building although such facilities could be easily added. Rather, it is felt that a clear cut seperation between private flying activities and scheduled air transport is very desirable. If this is not possible through the use of seperate airports, at least seperate sides or areas of the same airport should be used to provide the desired segragation.

An idea of how the Club Lounge and Lobby of the Public Center Building might appear is illustrated in the perspective, Figure VII (Sheet 9.).

This type of building is largely a public service structure or else a private flying club if limited to the local flyers and their guests. Such a building if planned for the general public could be municipally owned, finaced, and operated or it could be leased to the dealer for operation in conjunction with the Sales and Service Building. If financed by the dealer, it could be operated as either a public or private structure. If the local flyers as a strong group are determined to have good facilities on their airport, they may even promote and finance such a structure themselves. In any case the Public Center or the Private Club is a multiple purpose building which the dealer can use to promote the welfare of his business or in the conduct of various phases of his business.

VII SPECTATOR'S AREA

Between the Sales and Service Building and the Public Center is located a Spectator's Area which features a view of the airport and its activities. A portico connecting the two buildings seperates the Spectator's Area from the access road and the car parking area. An idea of how this area might appear to anyone at the airport is illustrated in the perspective, Figure VIII (Sheet 8.). This illustration shows the Sales and Service Building with its display window opening up the airplane display and sales room to the public. This advertising element fronting on the Spectator's Area is thus located where the greatest number of people who are interested in aviation will congregate.

The Spectator's Area should be adequately paved with walks, landscaped with lawn and trees, and neatly maintained. It serves as the 'front' for the dealer's business establishment and gives the aerial tourist or transient their first impression of the municipality to which they have arrived. Additional refinements for this area such as reflecting pools, benches, night lighting, etc are also desireable.

VIII TEE HANGARS

Hangars can be either of the standard type which have the fault of burying airplanes in their depth or of the Tee variety which provide individual stalls for aircraft storage. Two schemes of Tee Hangar planning are illustrated in Figure IX (Sheet 6.). Tee Hangars can be completely seperated from one another as illustrated or the partitions forming the seperate stalls can be eliminated except for the necessary structural supports. Tee Hangars can be built as individual units or as groups of units and expansion can take place in the same manner. Hangars of this type can be built by the dealer for monthly rental to local flyers or for overnight storage of itinerant airplanes. They can also be used by the dealer for new and used airplane storage. However, this is the only exception where the standard type hangar might under an economic analysis appear more desirable. The standard type hangar has an advantage in the bulk storage of airplanes where there is no day to day use of all the airplanes in storage.

IX GASOLINE AND OIL SALES

Facilities required for aviation gasoline and oil sales and disbursement will vary with local requirements and conditions. Representatives of the oil companies can give reliable advice on the size and type of

facilities desirable. The location, though, of such facilities in regard to the over all plan is very important. Such facilities should preferably be between the Tee Hangars and the Sales and Service Building. Here they will be far enough from the Spectator's Area so as to reduce the danger of fire resulting from the cigarette smoking public. Gasoline and oil facilities should be capable of expansion. They should not be so located as to block building expansion or cause increased insurance premiums. Disbursement pumps or pits should be as close as practical to an office from which sales can be readily made. Facilities should be adequately lighted for night operation. All of this may not be possible in all stages of a stage development program, but here is where the master plan helps to produce the best end results.

X GARAGE

Garage facilities may be required for a number of vehicles depending upon local standards and requirements. A probable list follows:

1. Sales and Service Equipment.
   a. Trucks.
   b. Tractors.
   c. Private Cars.
2. Maintenance Equipment.
   a. Field Service Truck.
   b. Snowplow.
   c. Mower and Turf Machinery.
3. Emergency Equipment.
   a. Crash Truck.
   b. Ambulance.
   c. Fire Truck.

The garage facilities on the plans illustrated in Figure V (Sheet 4.), are extremely limited. Individual operating requirements will determine to what extent garage facilities should be provided and whether they should face the field or the access road. The question of heating the garage is one for local decision.

XI COST AND FINANCING

In this consideration of cost it is assumed that the land is either leased on a long term basis or is purchased outright. If the airport is municipally owned it may even be desirable to turn the title to any plant facilities built on the airport over to the municipality in exchange for a long term contract allowing use of the facilities rent free. In this many it is possible to avoid heavy taxes which a new business might find an irksome burden. Many factors affect the cost of plant facilities. Such factors are site, topography, soil conditions, available materials, labor costs, and utilities. These all play an important part in determining the over all cost no matter what the size of the project may be. The first cost is that of design and construction, but there are additional costs such as charges for financing, depreciation, insurance premiums, maintenance and repair, heating, and lighting. These secondary costs are governed largely by what is planned for construction; hence, their control or reduction must be made when the project is in the planning stage.

Much help in the matter of cost and financing can be obtained from the architect and the local banker. The architect realizes that a low first cost very often means high secondary or operating costs. The banker or those who finance building construction know that architect designed

multiple-purpose buildings are a good protection for their investment. Soundly financed plant facilities or capital investments are the basis of all good business.

The architect will make a preliminary estimate of the cost after completing preliminary studies or plans. But not until working drawings and specifications have been completed and bids have been submitted by reliable contractors, can the architect name a cost figure that is accurate to the last dollar. Even then unforseen circumstances and contingencies can arise.

XII INSURANCE AND FIRE PROTECTION

These two factors go hand in hand in the design of airport building facilities. Because airports are usually on the edge of or far from a municipal center, fire protection is poor if not wholly inadequate. Either adequate protection must be established at the site or higher insurance premiums must be paid. This question of high cost financial protection versus the cost of adequate fire fighting facilities is one for the dealer, his architect, and his financier to decide.

One form of protection is fireproof or fire retarding construction. Another form of protection is adequate water supply coupled with a hydrant or sprinkler (automatic) system. Still another form is the use of special chemical extinguishers. Alarm systems which either warn of fire by setting off a siren or by turning on sprinkler or chemical systems are additional protection. All of these protective systems affect the rate to be paid for financial protection. Items such as the proximity and classification of buildings to the insured affect the rate. The quality of building materials used as well as

the construction detail and physical plant layout also affect the rate. In some cases it is possible that a sprinkler system for example may pay for itself in ten to twelve years on the basis of savings in insurance premiums. This phase of the plant facility deserves serious study and consideration.

XIII SPECIAL CONSIDERATIONS

As in the case of fire protection, utilities such as water, gas, electricty, telephone, telegraph, and sewage disposal may be entirely lacking at the airport. Each operator may be expected to provide his own utilities or have them extended to his plant site. The initial cost of securing various utility services will vary with local conditions. The greatest danger lurks in securing an inadequate service or one that can not be readily or economically expanded to handle anticipated future demands. This is especially true of water supply and reservoirs and sewage disposal plants.

Heating, electrical, mechanical, and structural problems are best solved by a competent architect and/or engineer. Such a person should know thoroughly the conditions involved, the initial and the long term costs.

Airplane traffic in and out of the hangar service area creates a special heating problem because of the large door area involved. Drafts are a common complaint; mechanics can not work efficiently if they must wear heavy clthes. Radiant heating may prove to be the answer to this problem. Comfortably cool temperatures are also desired in work areas. The mechanics often work in confined spaces and comfortable temperatures do much to increase efficiency and aid in attracting and holding good men.

Lighting, both natural and artificial, for merchandising appeal, office efficiency, hangar servicing operations, and shop production, varies too greatly to be the subject of any all over formulae. It must be solved on the basis of specific requirements.

All in all the special conditions arising out of planning a plant facility are best solved through the aid of specially trained professional men - the architect and the engineer.

Aviation Associates

Aviation Research Consultants

DIRECTORS
Floyd O. Johnson
V. C. Rasmussen

664 NORTH MICHIGAN AVENUE
CHICAGO 11, ILLINOIS
Phone: SUPerior 9315

April 26, 1945

Mr. Francis R. Meisch
4532 Bryant Avenue South
Apartment #3
Minneapolis 9, Minnesota

Dear Mr. Meisch:

We wish to thank you for your letter of the 23rd and also the manuscript for the comments on the drawings.

We believe you have covered this quite fully. Of course there is a lot of duplication as far as our material is concerned, and we will have to change it to fit the material in the book.

We have looked the drawings over and think they are very fine. One suggestion we did make, however, was missing -- the inclusion of the combination automobile and aircraft gasoline station at the far end of the community building. I firmly believe this is going to take place, and it would have added to the drawing, had it been included. Outside of this, you have done a very nice job.

It will be necessary, we believe, to have the original drawings for reproduction purposes, for we have checked and find the copies you have sent us will not reproduce as accurately as we would like.

The letter from Pencil Points magazine has been referred direct to the Aeronca Corporation for their decision. Personally, it is our opinion that this material is the property of Aeronca and ourselves, and should not be shown or published in any form prior to the publishing of the book -- especially without specific permission from the Aeronca people. We see no reason permission cannot be obtained to use these drawings after the book has been published.

If you get into Chicago we certainly hope you will stop at the office. We would appreciate your comments on the other points we have mentioned.

Sincerely,

AVIATION ASSOCIATES

Floyd O. Johnson
Director

/o

May 2, 1945
Apartment #3,
4532 Bryant Avenue S.,
Minneapolis 9, Minnesota.

Mr. Floyd O. Johnson,
Aviation Associates,
664 North Michigan Avenue,
Chicago 11, Illinois.

Dear Mr. Johnson:

Received your letter of April 26th when I returned from Chicago. Was disappointed that you and Mr. Rasmussen were out of town the day that I was able to be in Chicago.

In reference to your comments, I am not at all surprised that the manuscript will require some revision to eliminate duplication of material in other parts of the book.

The suggestion as to including combined automobile and aviation gasoline facilities was made after a number of the final drawings were in various stages of completion. Consequently, I could not start over on the drawings without taking a financial loss as far as time was concerned.

I am not in favor of giving up the original drawings for purposes of reproduction by photo engravers - I have had several beautiful sketches ruined that way. I did however check on the cost of photographically duplicating the originals on tracing cloth. The cost is $ 17.00 for the nine drawings. If you insist on having the originals and are willing to stand the cost of photo duplication on tracing cloth, I will have the duplicates made and send the originals to you. I am afraid that the originals will be practically useless for printing purposes once the photo engraver gets through with them. It will take several days to get duplicates made so please let me know as soon as possible what you wish in regard to this matter.

I am leaving Sunday, May 6th for Washington, D. C. and do not expect to be back until the night of May 9th. I may be in Chicago on May 11th for a day or so. I will not know until I get back from my Washington trip.

Sincerely,

Francis R. Meisch
Registered Architect.

Aviation Associates

Aviation Research Consultants

DIRECTORS
Floyd O. Johnson
V. C. Rasmussen

664 NORTH MICHIGAN AVENUE
CHICAGO 11, ILLINOIS
Phone: SUPerior 9315

May 24, 1945

Mr. Frances Meisch
4532 Bryant Avenue So.
Minneapolis 9, Minnesota

Dear Mr. Meisch:

Just a line to acknowledge receipt of the nine tracings comprising the project prepared for the Aeronca Aircraft Corporation.

Sincerely yours,

AVIATION ASSOCIATES

K. H. Holmgren

/b

MEMO

Rogers AT 2247

17" X 22" — 9

Water Proof 1.70
Sepia Lines 1.40

Mr. Beckman

Pencil Points
PROGRESSIVE ARCHITECTURE

YOU Are Making The Future!

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

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

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

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

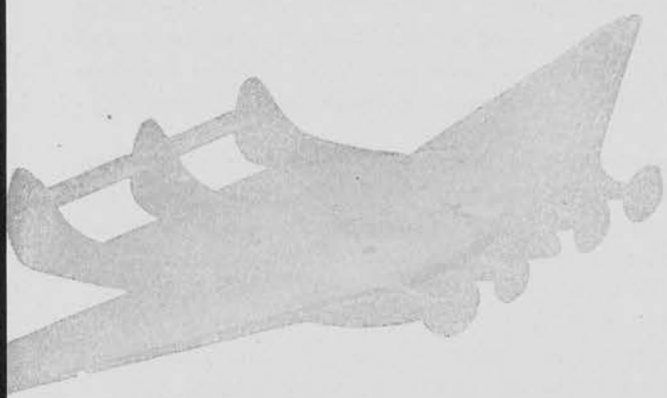
Our own sympathies, as stated again and again in this magazine since we took our positive stand for progressive architecture in May 1942, are with the forward-looking groups. We believe thoroughly in the vitality and honesty of their efforts to get rid of the superficial shell that had grown upon the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

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

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

Kenneth Reid

AIR TERMINALS FOR MASS



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

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

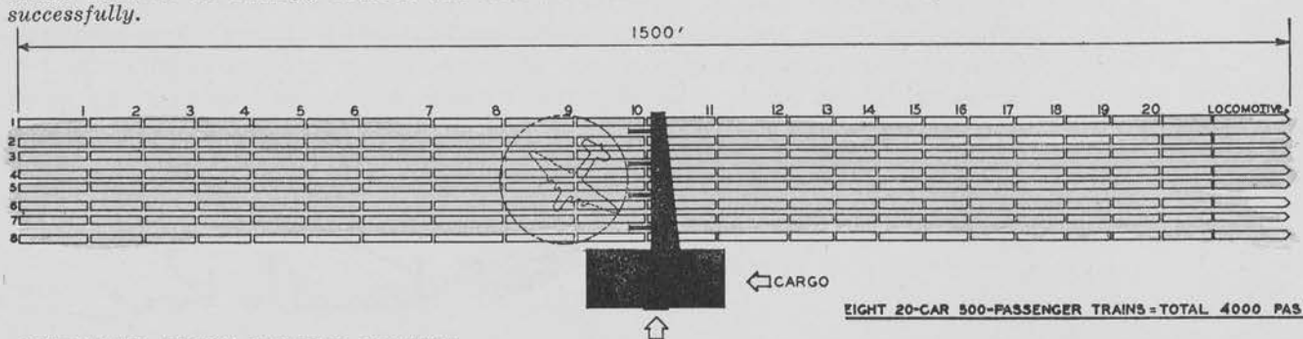
The Past

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

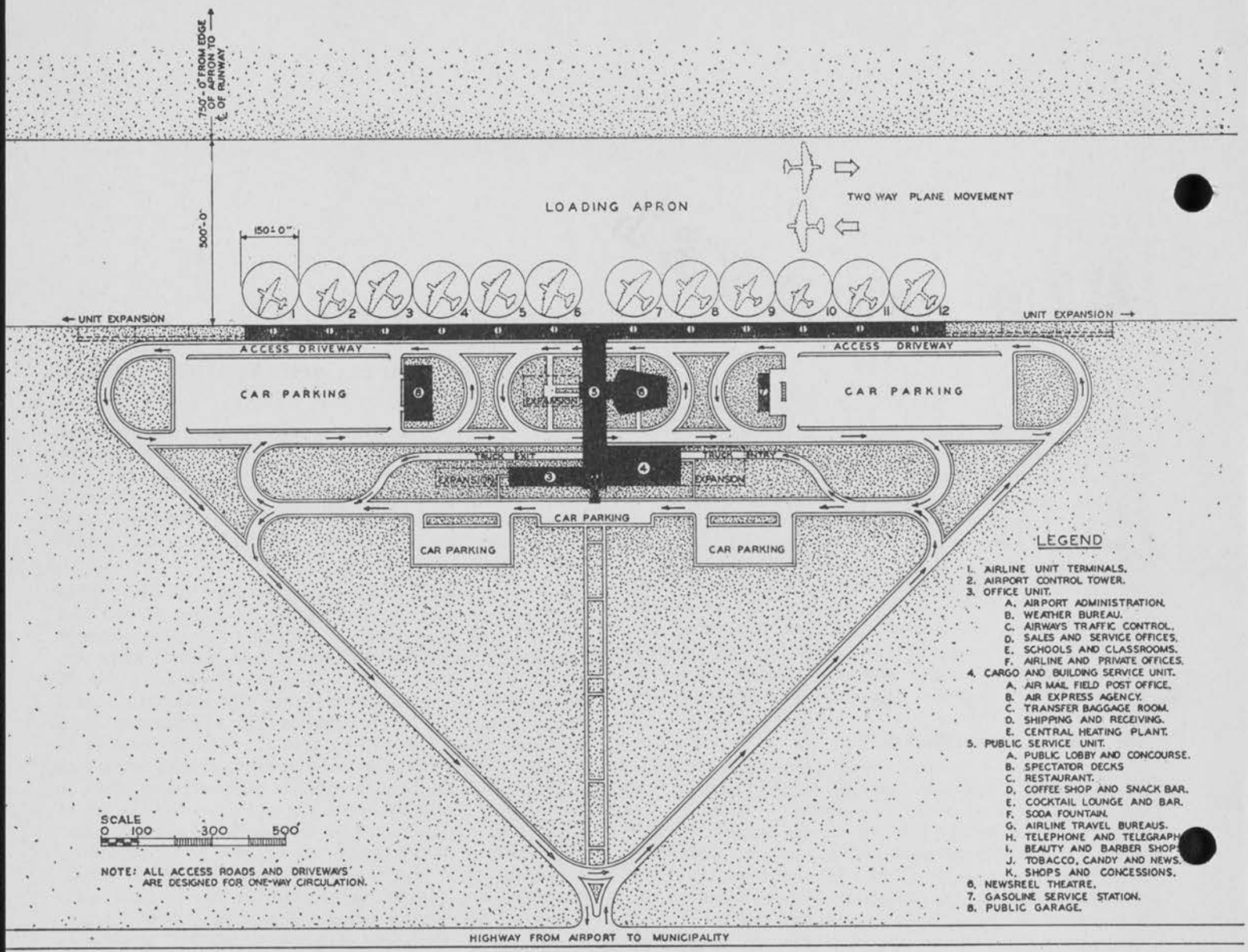
The buildings had other faults. Often there were too little space and too few facilities for the airline passenger and the airline operational functions, in contrast to public areas. In addition, little thought was given to developing service and revenue-producing facilities of a high standard for the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

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

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



CENTRALIZED DESIGN RAILROAD TERMINAL.



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

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

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

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

AIR TRAVEL

by Francis R. Meisch

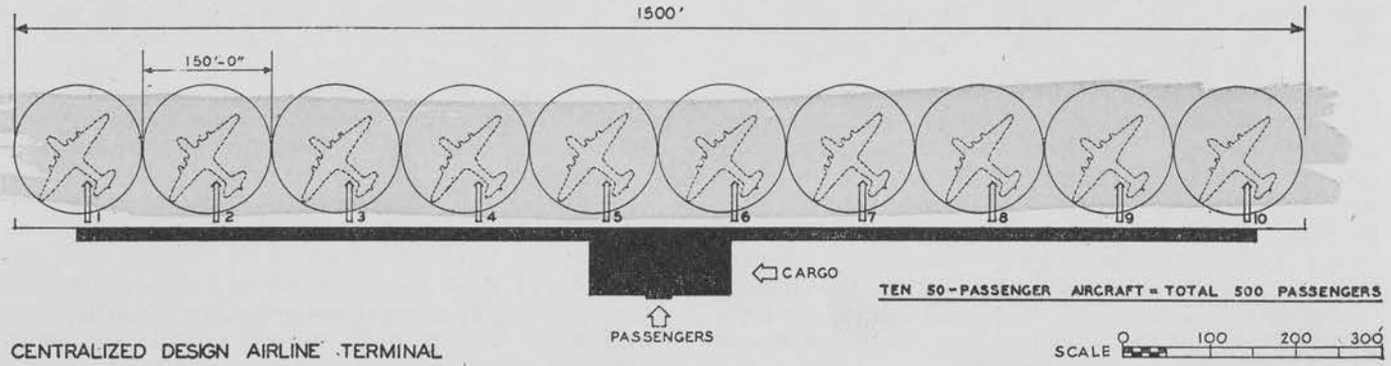
Architect and Plant Engineer, Northwest Airlines

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

The Case for Decentralization

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

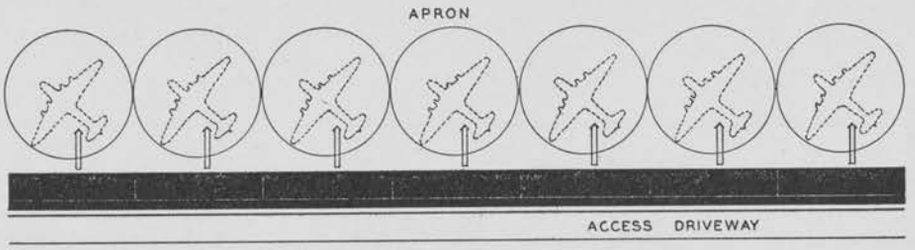
An understanding of the physical-numerical differences in passenger and cargo handling problems of rail and air carriers is essential. Consider the 50-passenger plane which requires 150 lineal feet of gate space or, to put it in other terms, a 150-foot-diameter circle of apron area on which to maneuver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



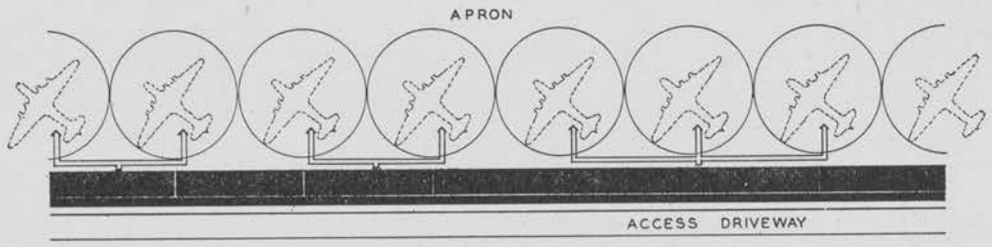
CENTRALIZED DESIGN AIRLINE TERMINAL

AIR TERMINALS

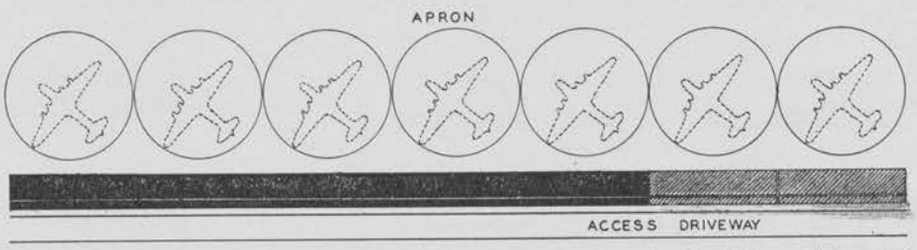
The larger air terminal might well have an "airport community center" containing necessary services and public facilities, with a small unit terminal at each gate position. Such a development permits building expansion or change in accordance with actual need.



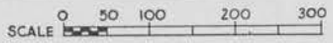
TYPICAL UNIT PLAN.



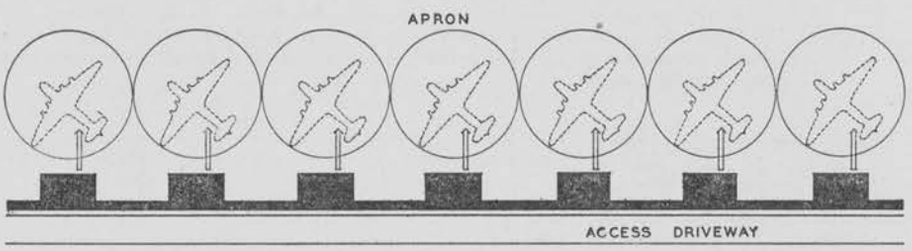
VARIATIONS IN UNIT PLAN.



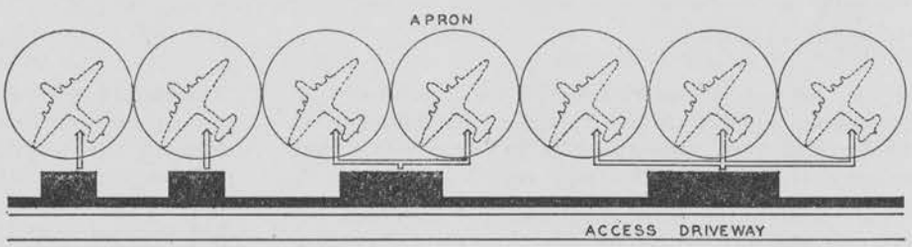
EXPANSION OF UNIT PLAN.



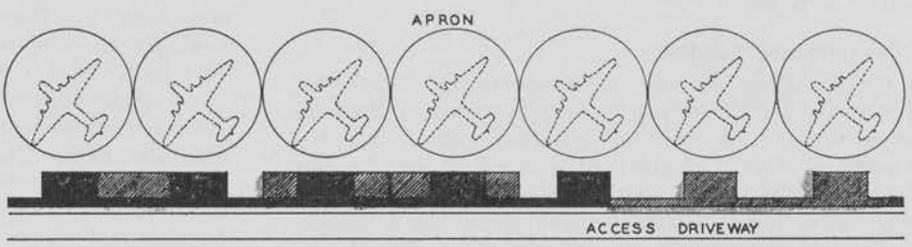
Northwest Airlines and United Airlines, at work simultaneously on the problem, arrived at very similar results. Above, United's unit scheme permits of extension only at the end of the row of continuous units. Below, Northwest's discontinuous dock scheme reduces initial building cubage and permits expansion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



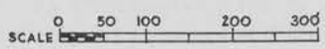
TYPICAL DOCK PLAN.

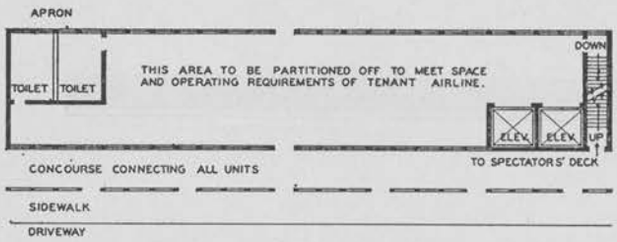


VARIATIONS IN DOCK PLAN.



EXPANSION OF DOCK PLAN.

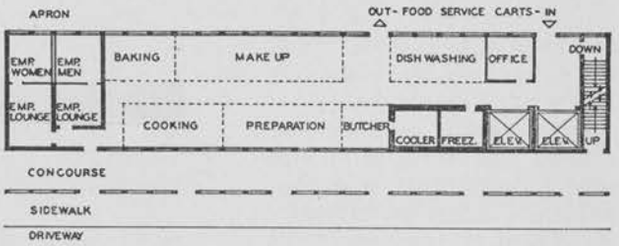




BASIC UNIT – GROUND FLOOR PLAN.

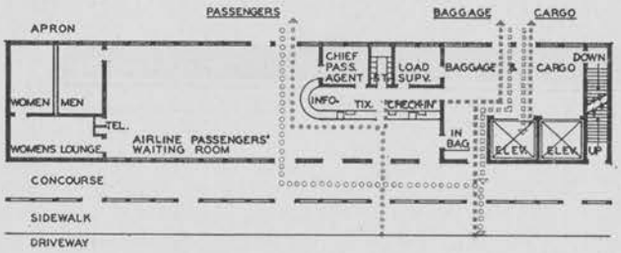
MINUS SUBDIVISION OF AIRLINE SPACE.

SCALE 0 10 20 30 40 50'



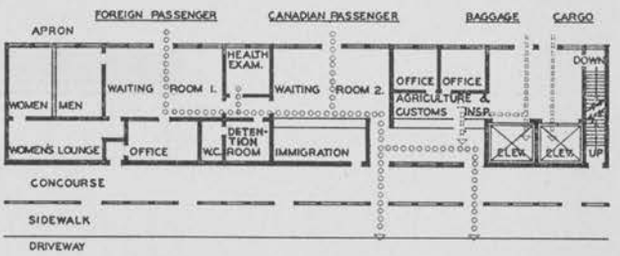
COMMISSARY UNIT – AIRCRAFT FOOD SERVICE PREPARATION.

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



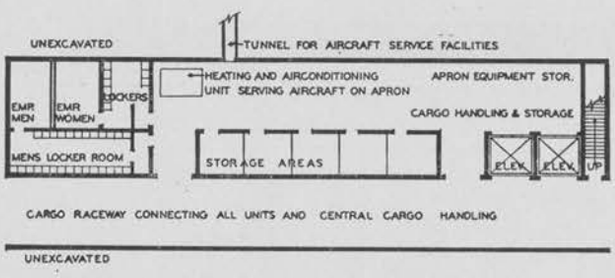
DOMESTIC TRAVEL UNIT – PASSENGERS AND CARGO.

SEE BASEMENT PLAN.
LEGEND: PASSENGERS TO PLANES ●●●. PASSENGERS FROM PLANES ○○○.
BAGGAGE AND CARGO TO PLANES ▬▬▬. BAGGAGE AND CARGO FROM PLANES ▭▭▭.



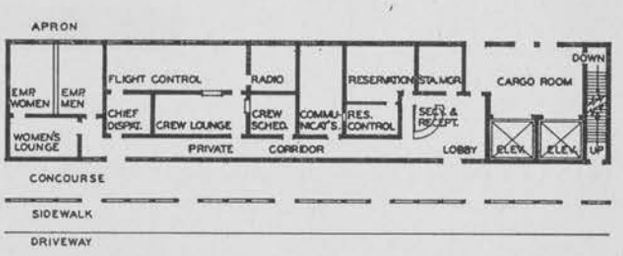
FOREIGN TRAVEL UNIT – CUSTOMS AND IMMIGRATION FACILITIES.

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



DOMESTIC TRAVEL UNIT – BASEMENT FLOOR PLAN.

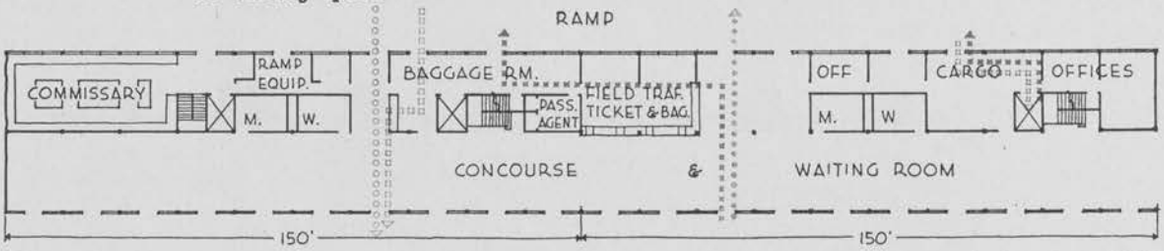
GROUND FLOOR ALL-CARGO UNIT SIMILAR IN PLAN EXCEPT FOR RACEWAY.



AIRLINE OPERATIONS AND RESERVATIONS UNIT.

SPACE LAYOUT VARIES WITH EACH TENANT AIRLINE.

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



FLOOR PLAN

0 10 20 30 40 50 FT.

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

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

The Decentralized Solution

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

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

Northwest Airlines proposed the discontinuous "unit"

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

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

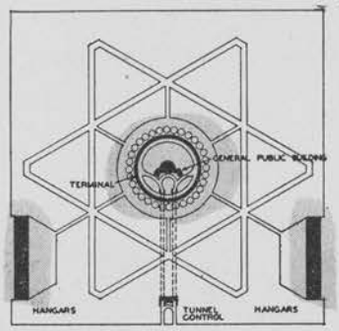
The basic premise of the decentralized scheme is the localization of the individual airline functions adjacent to the apron or gate positions, with a driveway on the off-field side so as to simplify and expedite the transition of passengers from automotive conveyances to aircraft. This permits a clear-cut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

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

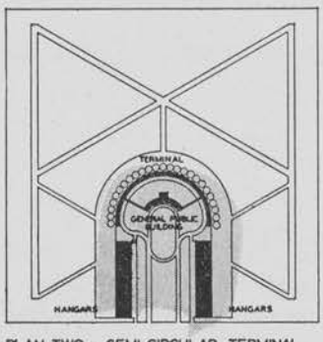
Advantages of Decentralization

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

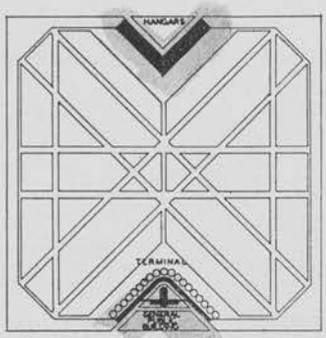
Flexibility is another advantage. The over-all scheme is adaptable to any shape of terminal area, providing sufficient room is available for expansion. The scheme may be symmetrical or unsymmetrical. The central public building may be either at the apron edge between the units, or set back, allowing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



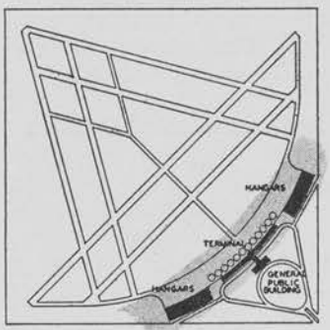
PLAN ONE - CIRCULAR TERMINAL.



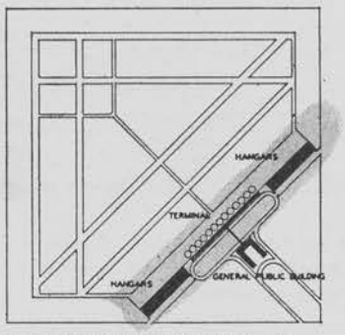
PLAN TWO - SEMI-CIRCULAR TERMINAL.



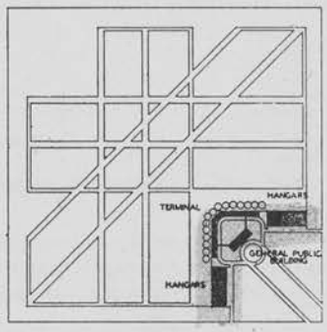
PLAN THREE - "V" SHAPED TERMINAL



PLAN FOUR - CURVED TERMINAL



PLAN FIVE - STRAIGHT LINE TERMINAL



PLAN SIX - "L" SHAPED TERMINAL

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

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

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

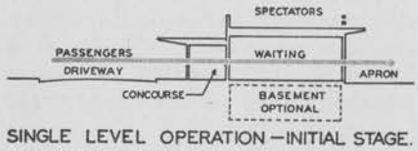
Economy is still another advantage. The decentralized terminal can be developed by stages to parallel the economic demand and justification for facilities. Thus there can be no over-expansion. The investment in decentralized terminals can be amortized over a long period without fear of obsolescence and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

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

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

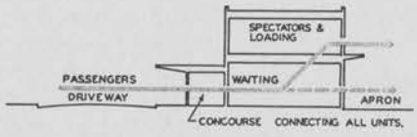
Unlimited Possibilities

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



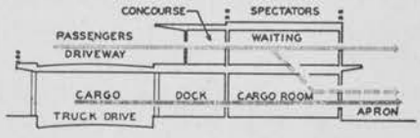
SINGLE LEVEL OPERATION—INITIAL STAGE.

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

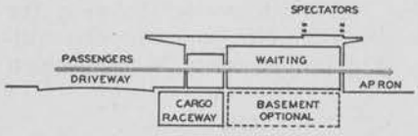


EXPANSION: PARTIAL TWO LEVEL OPERATION.

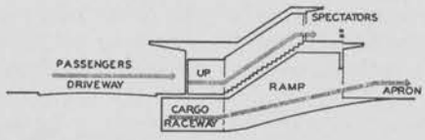
CARGO HANDLING STILL ALONG APRON OR THROUGH UNIT TO APRON.



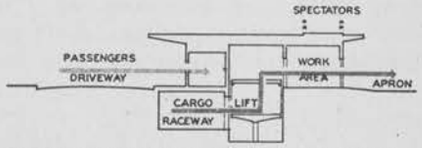
EXPANSION: FULL TWO LEVEL OPERATION.



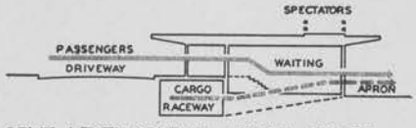
CARGO HANDLING - BASEMENT RACEWAY.



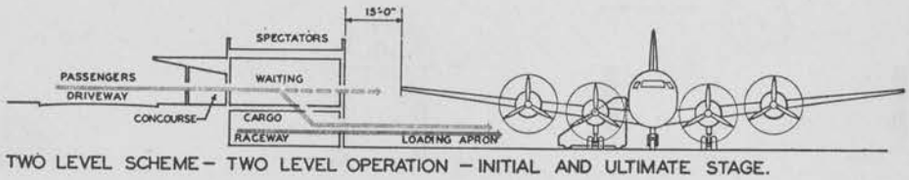
CARGO HANDLING - RAMP TO APRON.



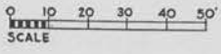
CARGO HANDLING - ELEVATOR TO APRON.

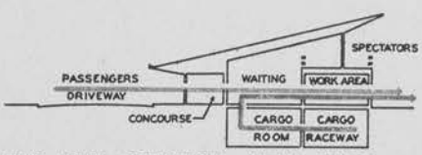


SPLIT LEVEL SCHEME - INITIAL STAGE.

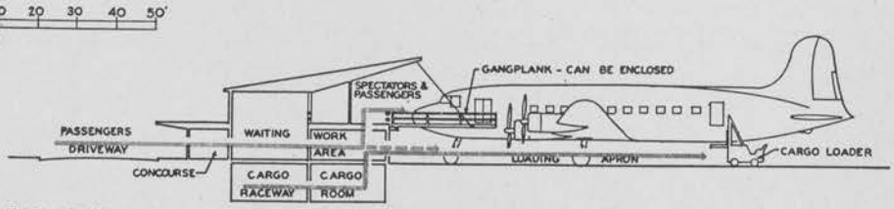


TWO LEVEL SCHEME - TWO LEVEL OPERATION - INITIAL AND ULTIMATE STAGE.





TWO LEVEL OPERATION - INITIAL STAGE.



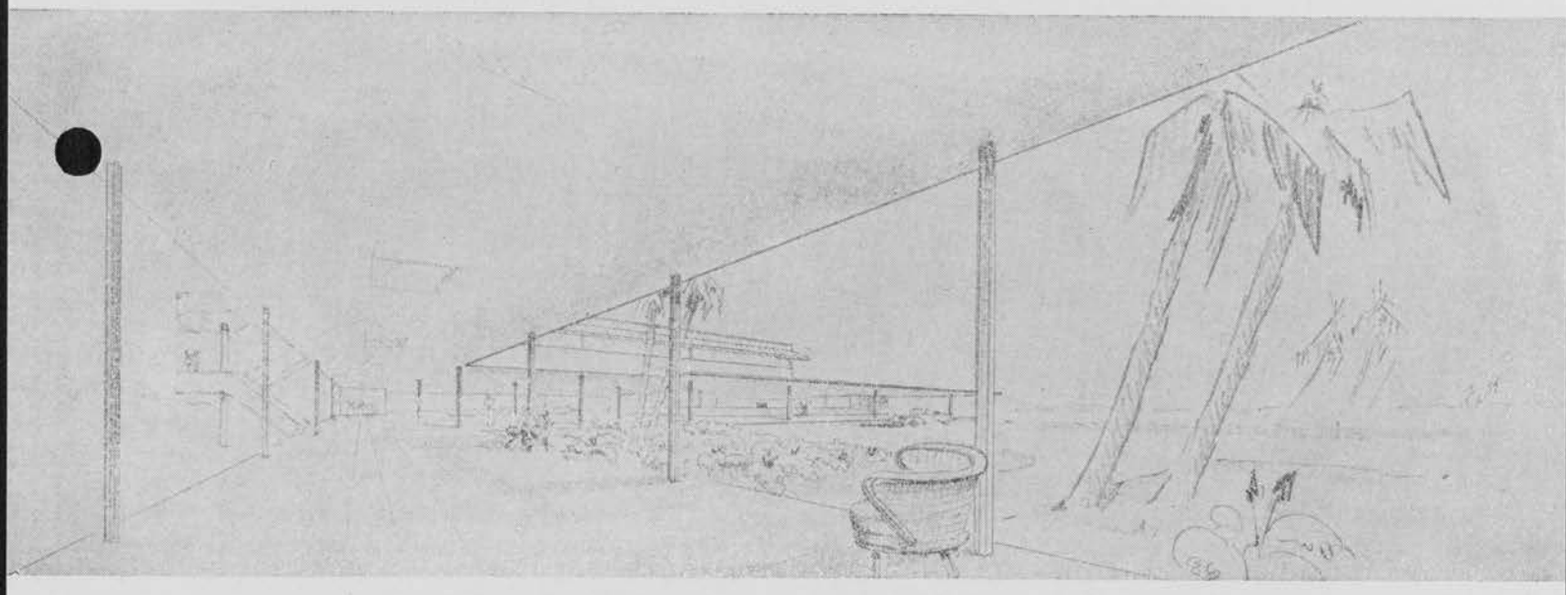
TWO LEVEL INTO THREE LEVEL OPERATION - ULTIMATE STAGE.

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

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

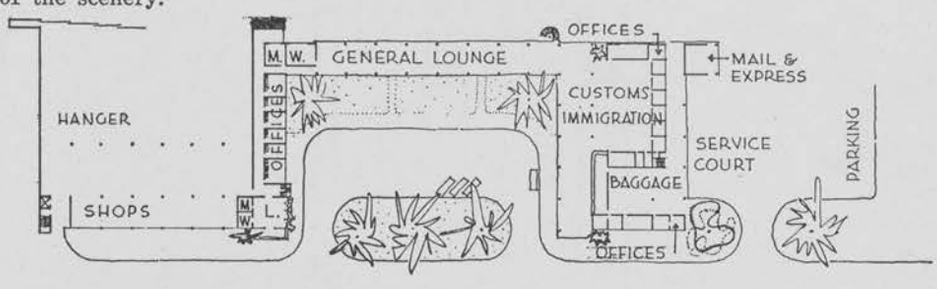
The use of mechanical and electronic aids will offset the strain on communications caused by decentralization. The major terminal will require, for passenger and employee use, an intra-airport system of ground transportation connecting all unit terminals with the general public building. Conveyor belts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

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



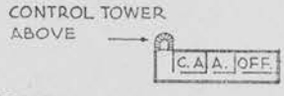
TERMINAL BUILDING FOR A SITE IN HAWAII

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

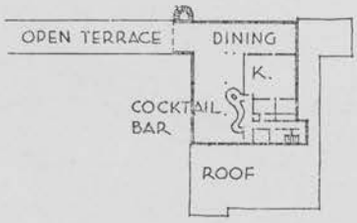


GROUND FLOOR

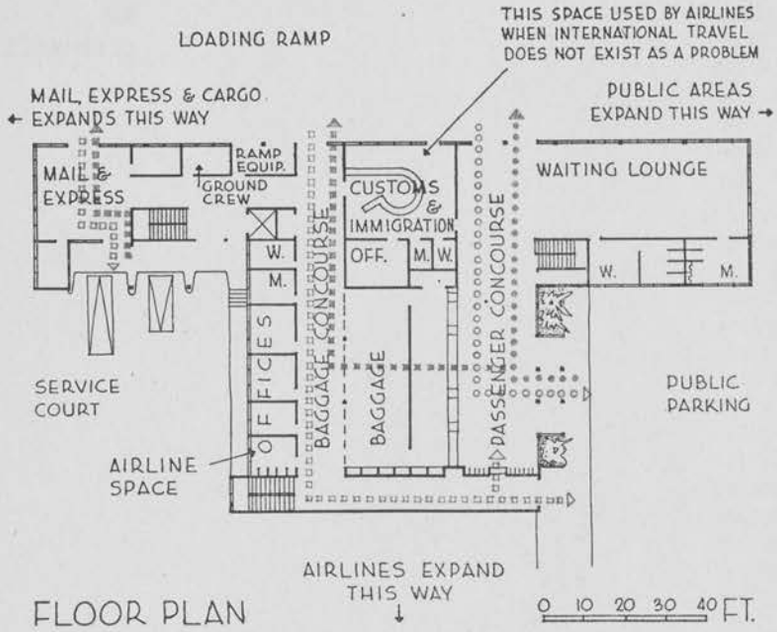
0 20 40 60 80 100 FT.



THIRD FLOOR



SECOND FLOOR 0 20 40 FT.



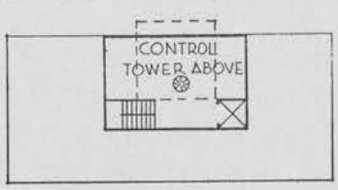
FLOOR PLAN

INITIAL STAGE

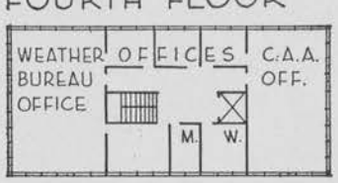
This small, combined administration building and airline terminal, adaptable to many a proposed postwar airfield, can be expanded both horizontally and vertically. Originally only one story high, it can have its wings extended, or stories added, or both—piecemeal or all at once. It might conceivably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

ADMINISTRATION BUILDING DESIGNED TO EXPAND AS NEED ARISES

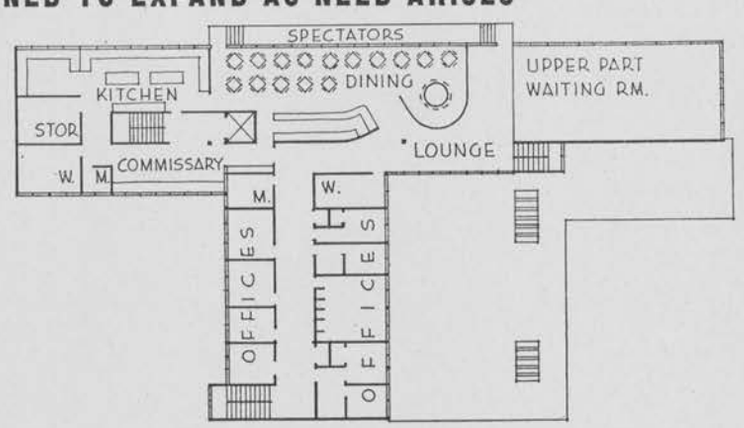
FINAL STAGE



FOURTH FLOOR

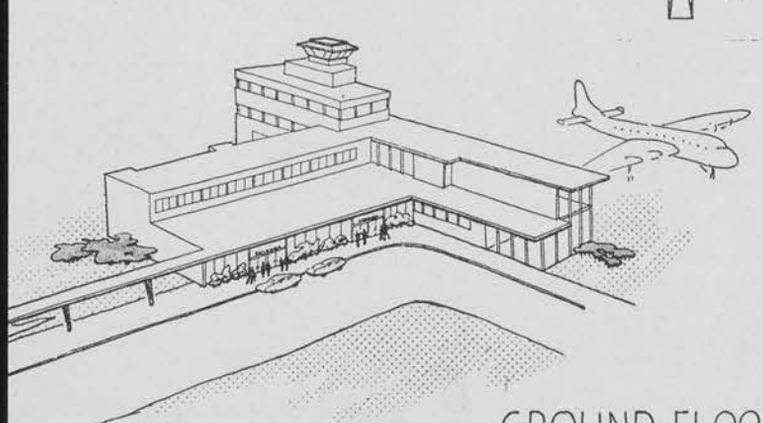


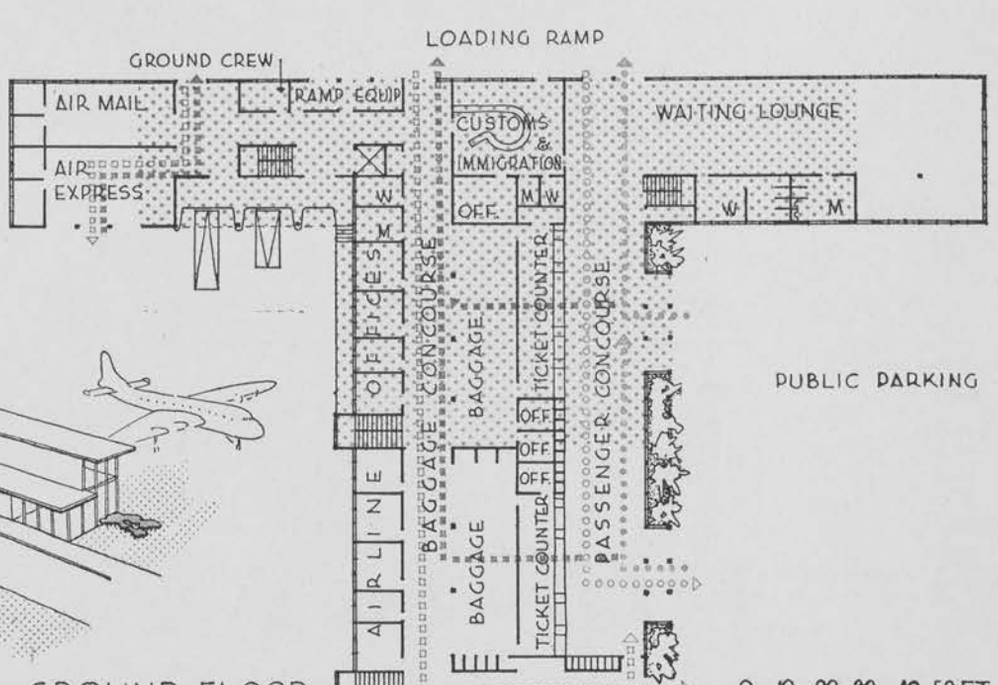
THIRD FLOOR



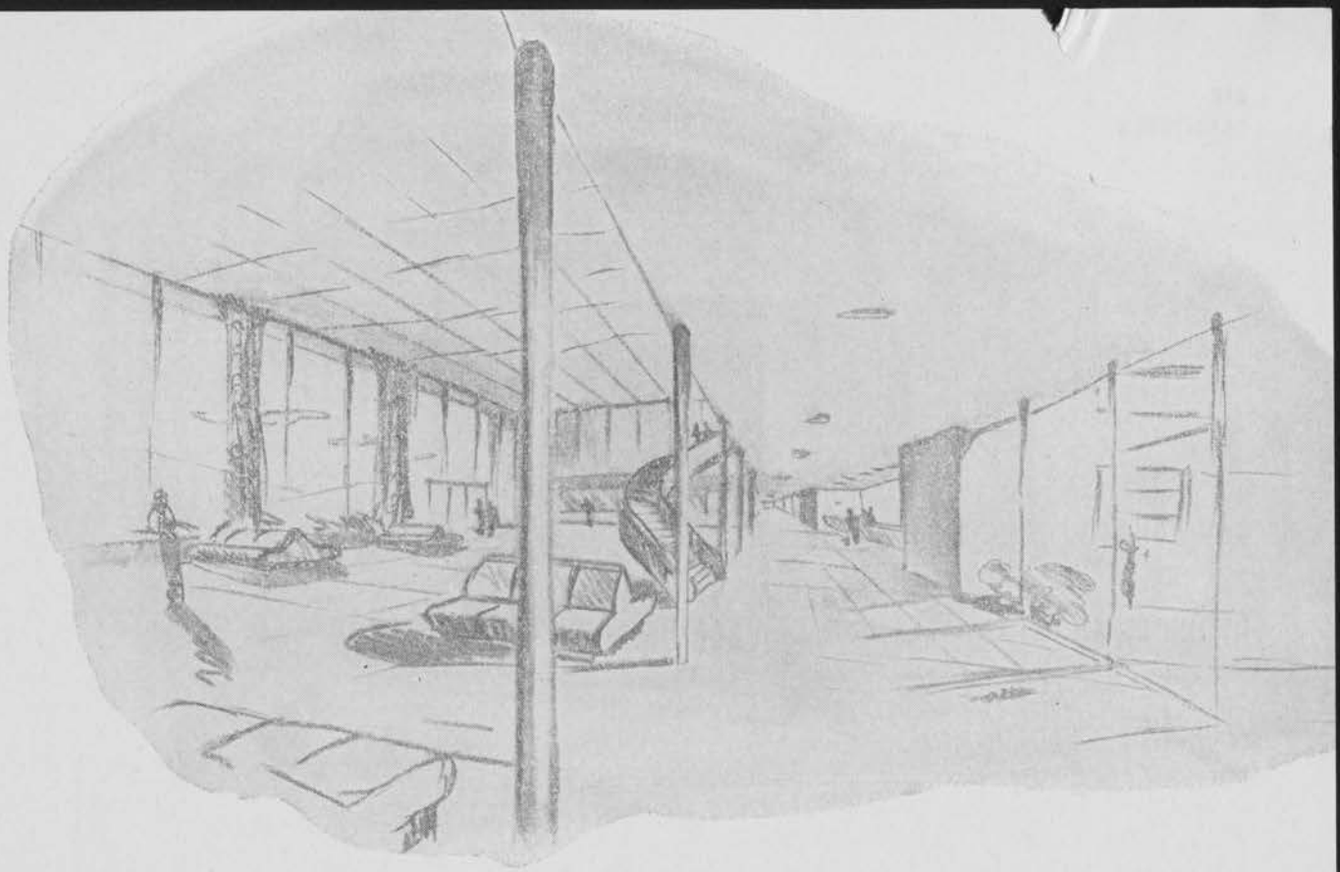
SECOND FLOOR

0 10 20 30 40 50 FT.



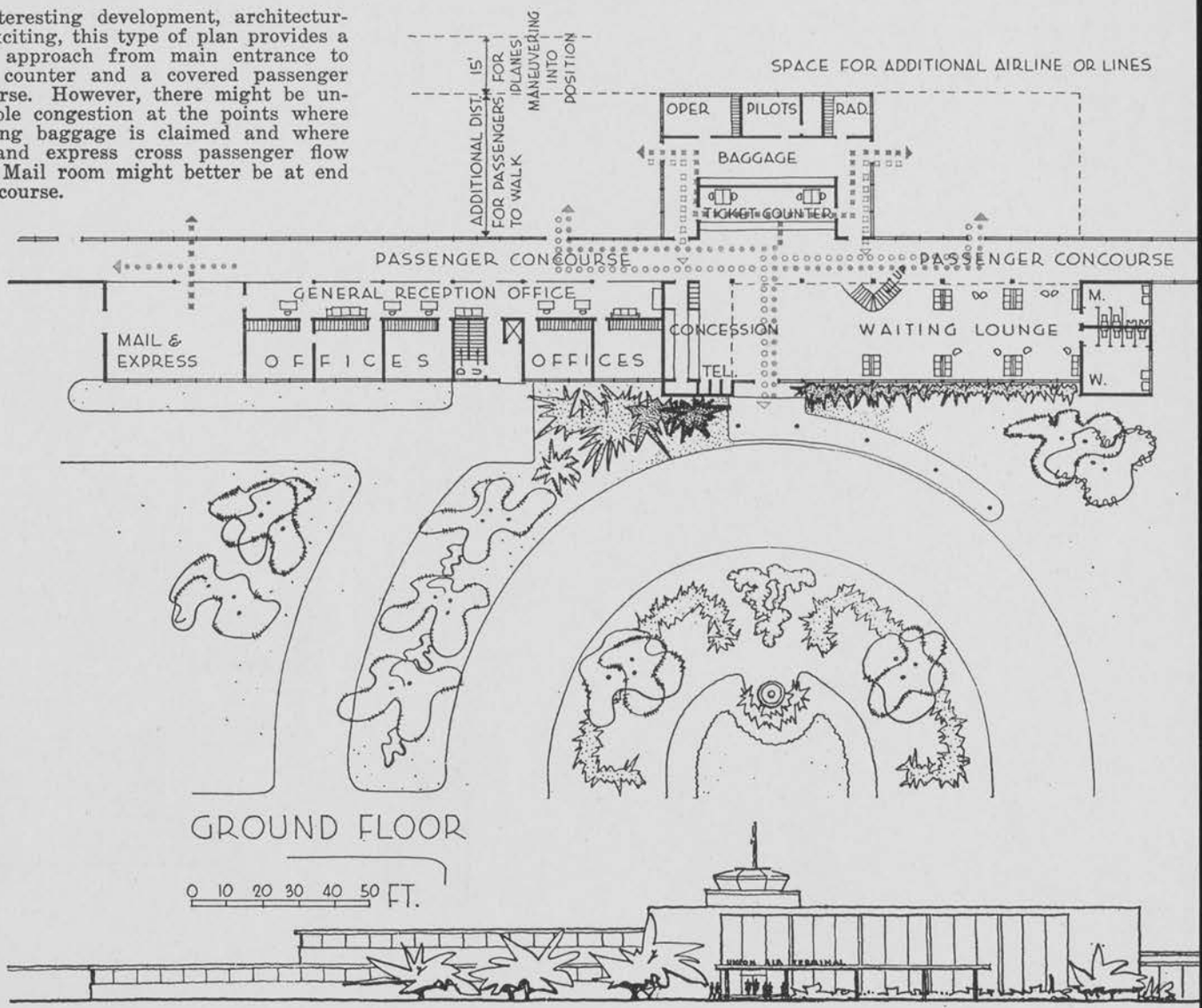


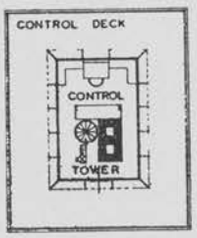
GROUND FLOOR



ADMINISTRATION BUILDING FOR A LARGER AIRPORT

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





CONTROL TOWER FLOOR PLAN

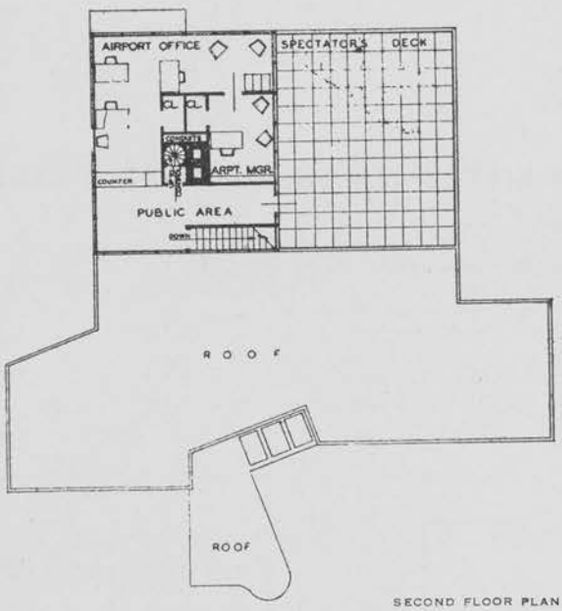
THE COUNTRY CLUB TYPE OF AIRPORT

REQUIRES AN EXPANDABLE BUILDING FOR POSSIBLE COMMERCIAL DEVELOPMENTS

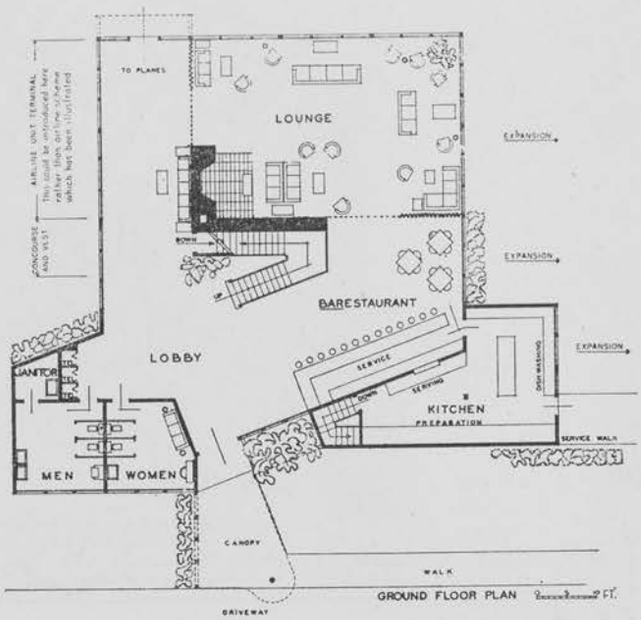
If private flying is to increase rapidly in volume after this war (and many people are doing more than guessing that it will) then private flying fields will become a necessity. But it would be folly to design the buildings which they will require without thought for potential commercial development.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

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

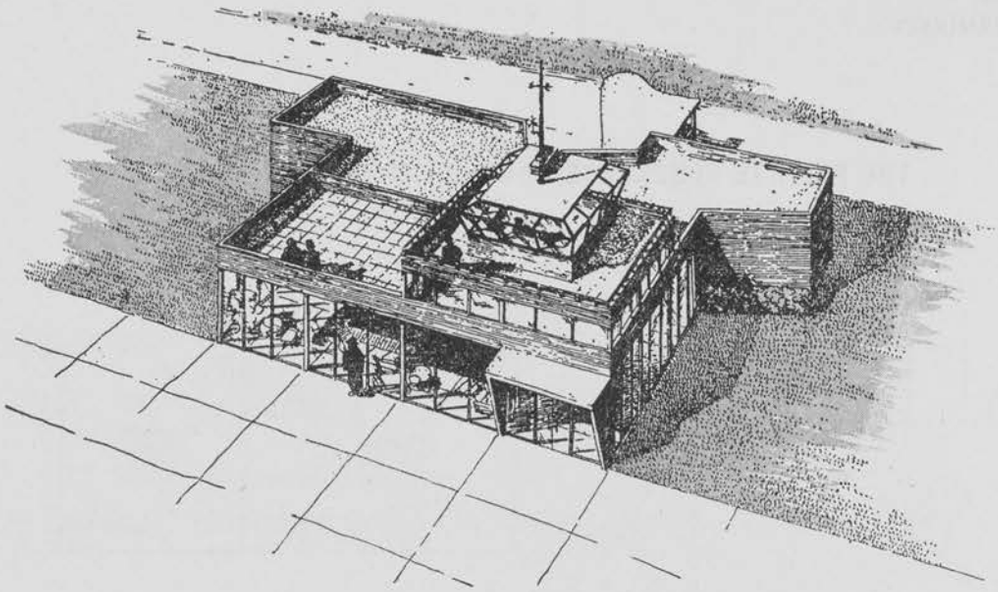
This is a preliminary study only, and like many preliminaries has its faults. When he submitted it Mr. Meisch called attention to some of these. For instance, location of the chimney is poor. Rising through the control tower as it does, it obstructs visibility; it should be relocated so it would not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

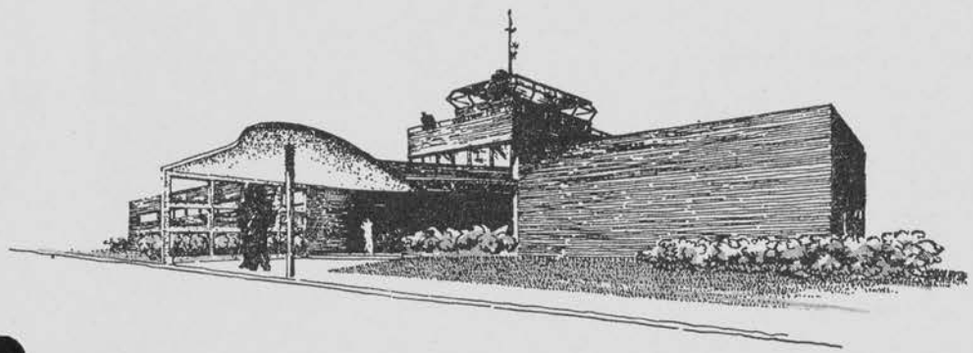


SECOND FLOOR PLAN

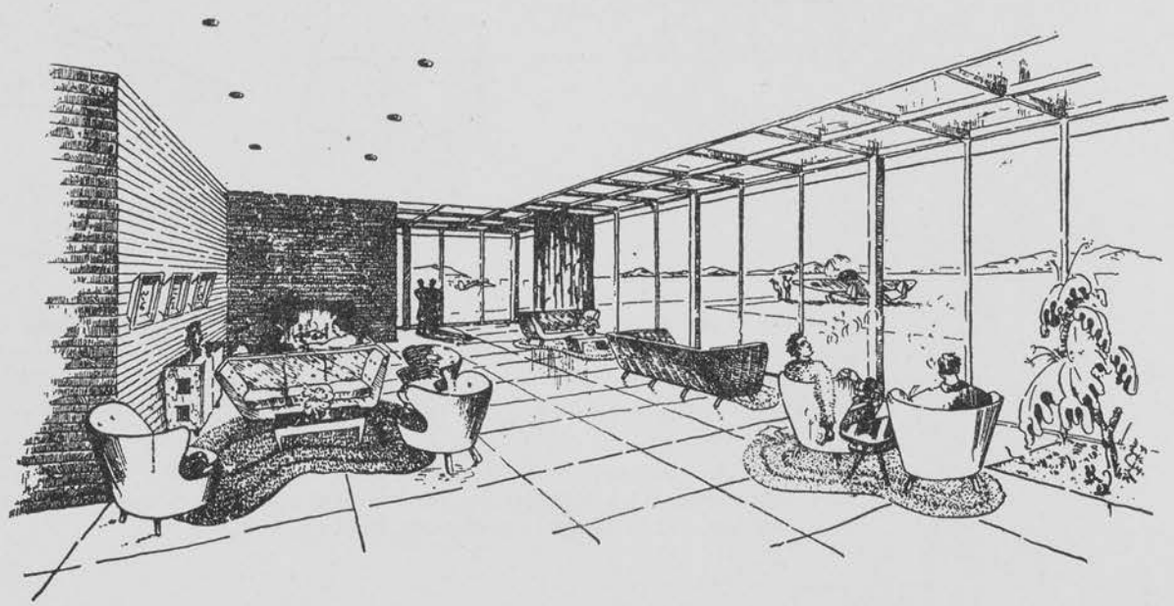


GROUND FLOOR PLAN

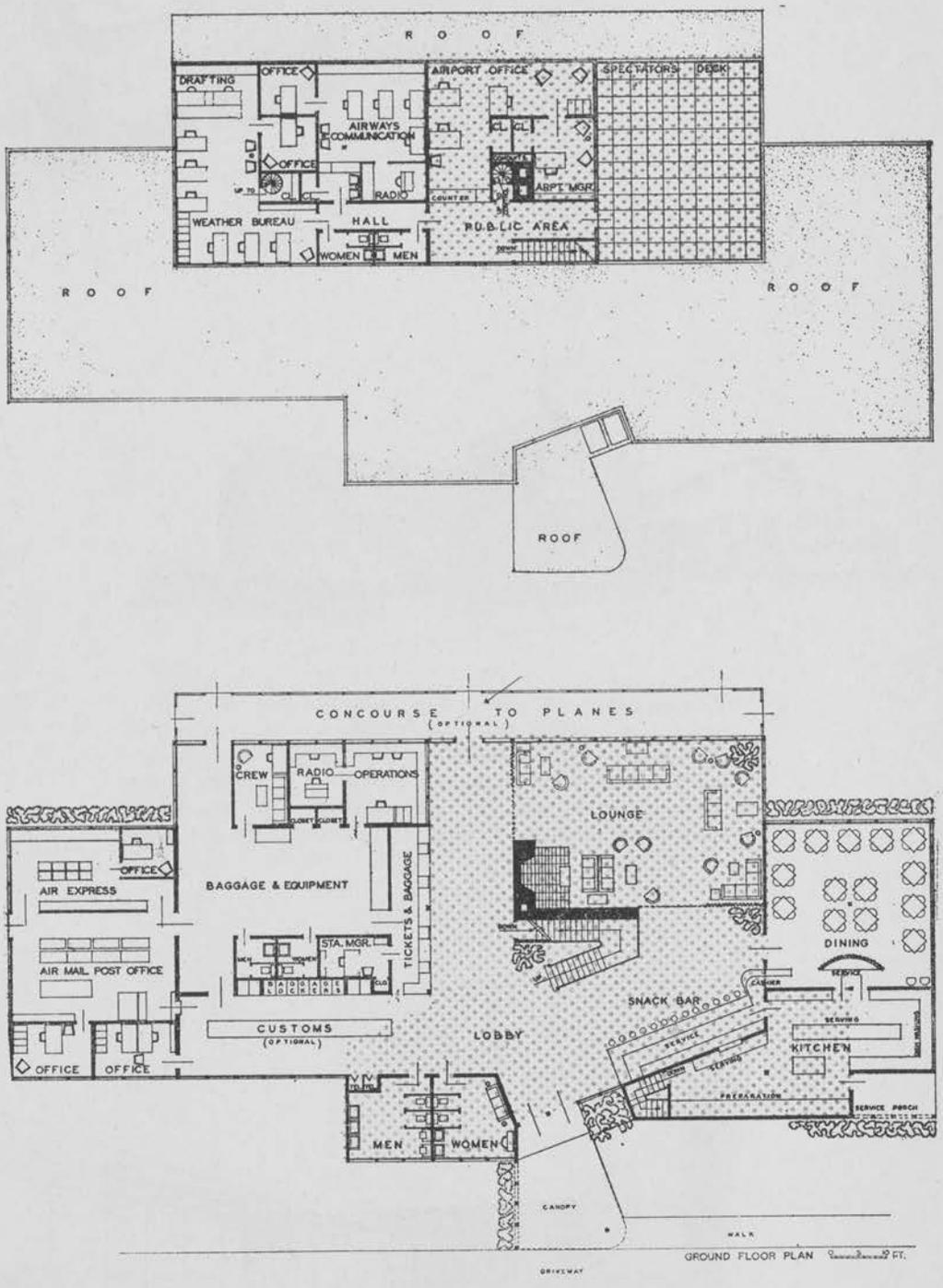




Exteriors and interior of the clubhouse for the private field. At top, aerial view from the field; center, view from the driveway; below, interior of the lounge looking toward the fireplace wall. The flying field is at the right, visible through a glass wall. To understand how the addition of commercial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

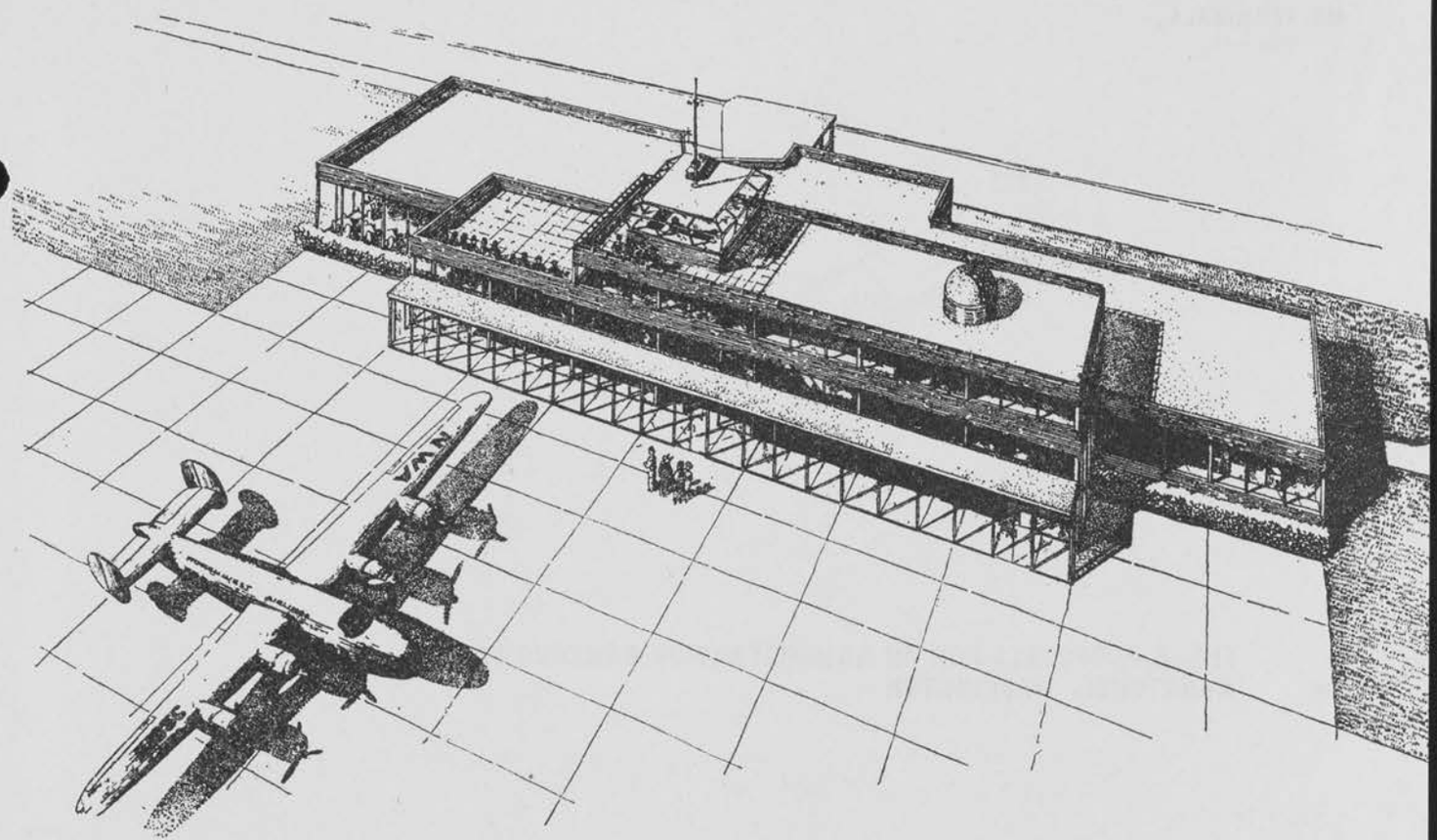


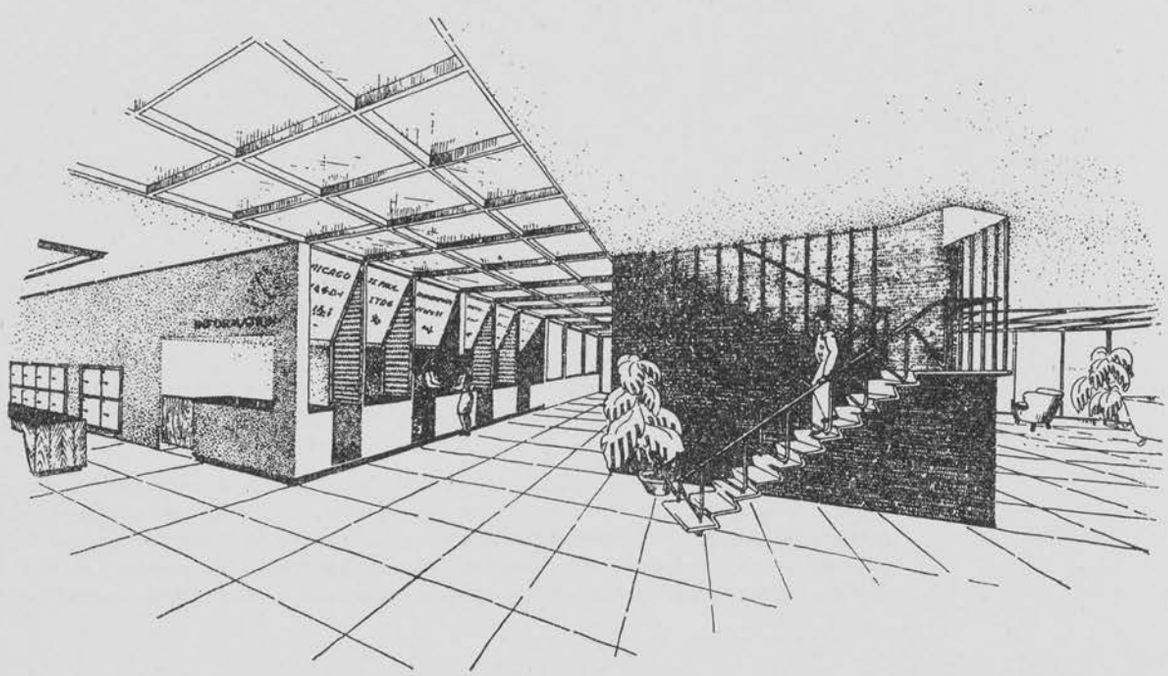
THE PRIVATE CLUBHOUSE ADDS COMMERCIAL FACILITIES



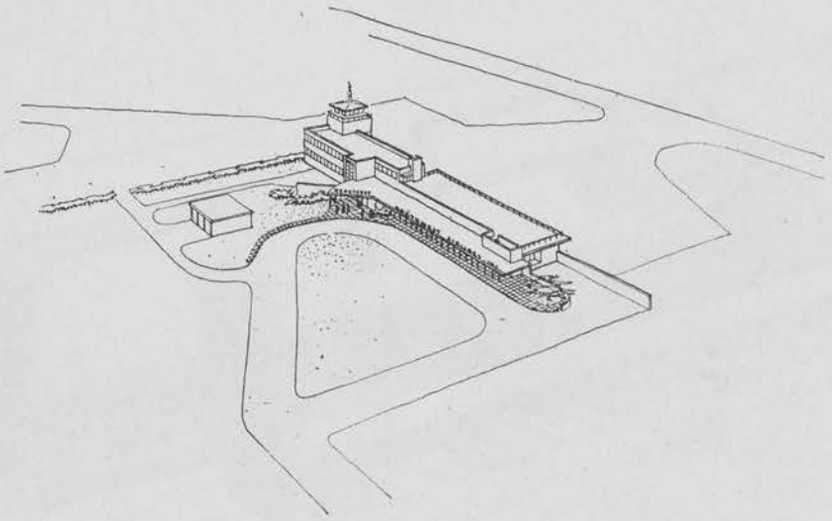
The area of the former clubhouse, detailed on the preceding page, is shown by colored shading. This project was an early development in Northwest Airlines' architectural department; currently they would advocate adding a standard unit terminal to the left-hand side of the clubhouse area, rather than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

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

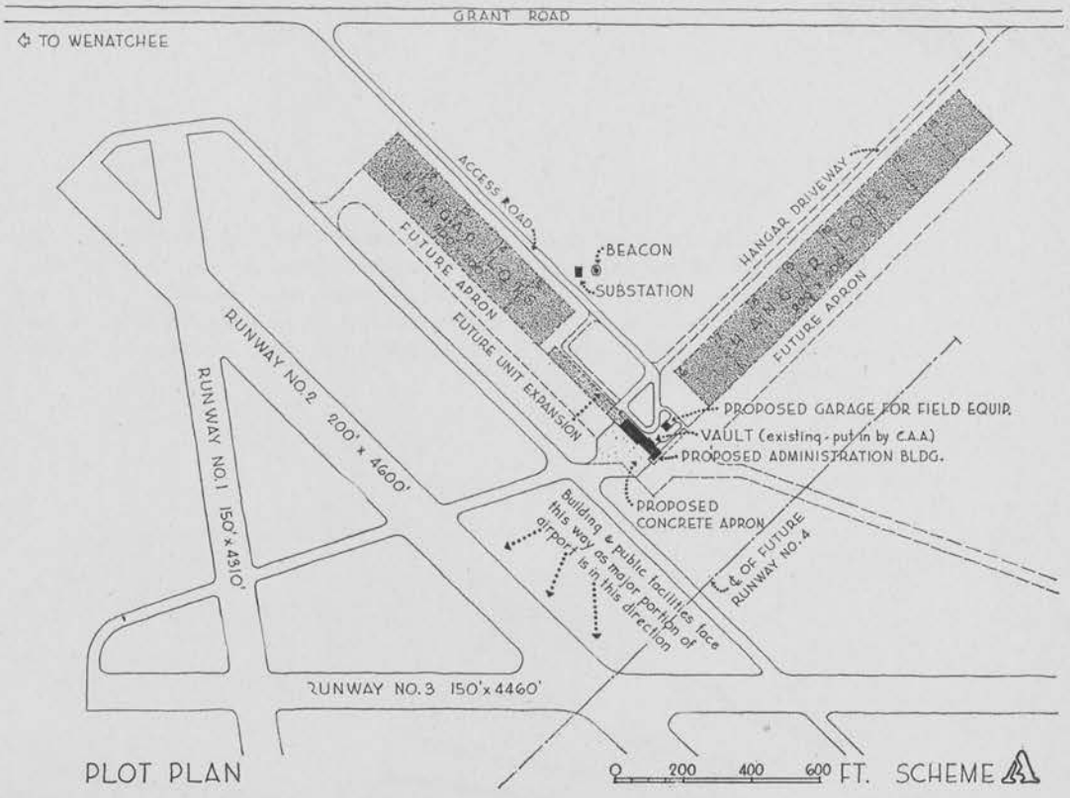




Two views of the small terminal which started out as a clubhouse; above, aerial perspective from the flying field; below, interior showing ticket counter which replaced the left-hand wall of the old building. Although some faults can be found with the building as a terminal, the whole conception has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



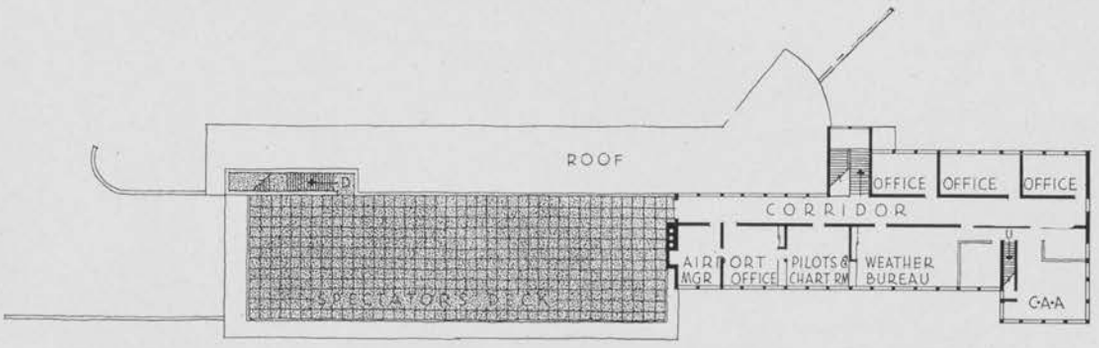
THREE PROPOSALS FOR AN ADMINISTRATION BUILDING FOR WENATCHEE, WASHINGTON



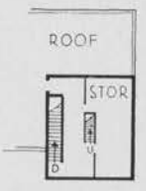
Wenatchee, a small community in the State of Washington, required an administration and terminal building for its airport. The community receives scheduled air transport service, but the present extent of use is limited and traffic at the port is not expected to grow beyond a reasonably modest maximum.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

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

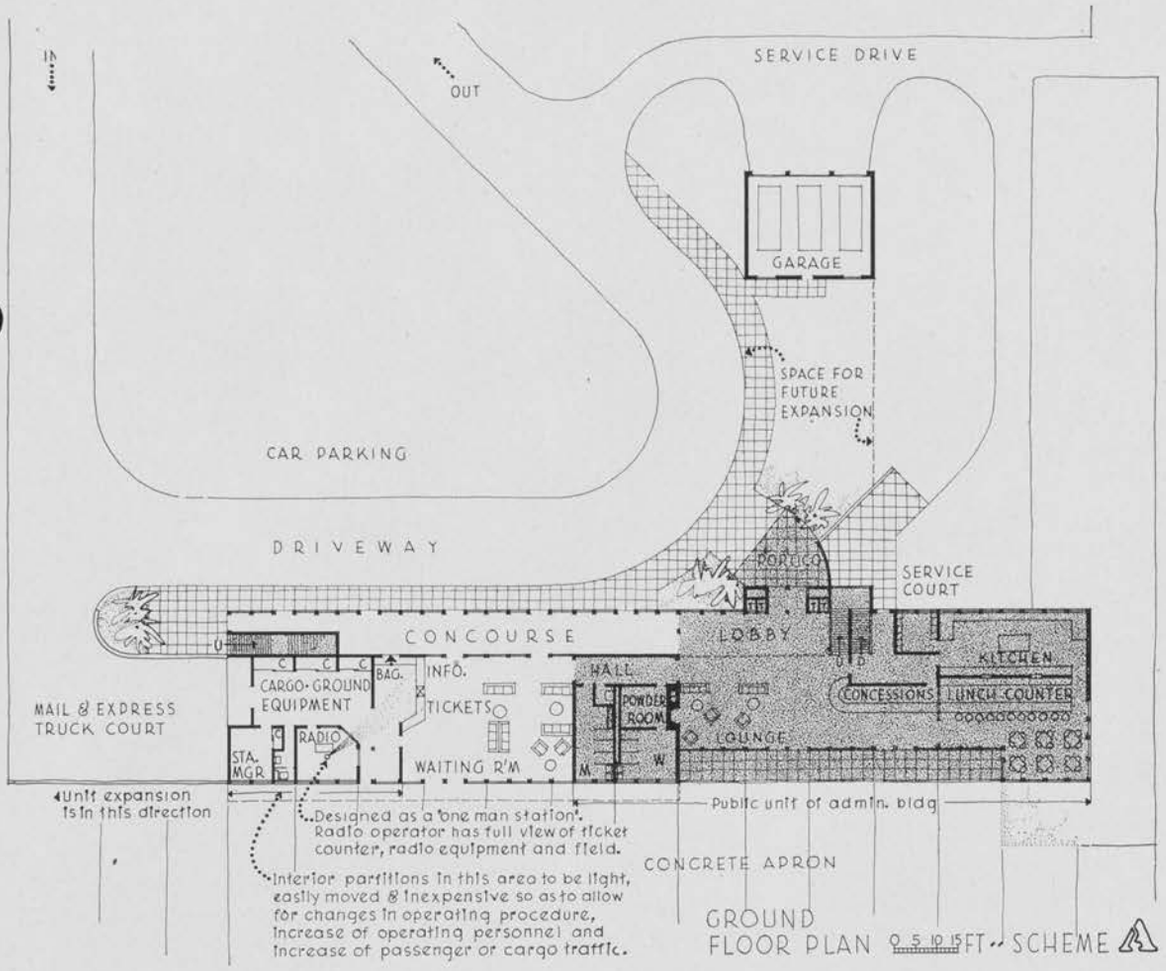
TOWER PLAN
0 5 10 15 20 25 FT



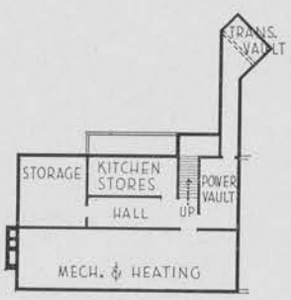
SECOND FLOOR PLAN 0 5 10 15 FT · · SCHEME A



ROOF LEVEL PLAN 0 5 10 FT

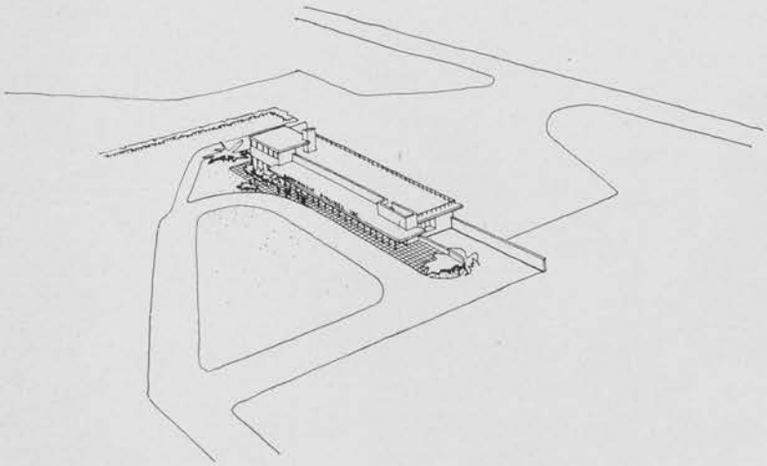


GROUND FLOOR PLAN 0 5 10 15 FT · · SCHEME A

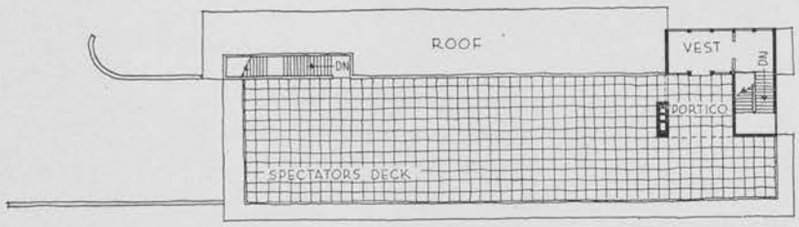


BASEMENT PLAN 0 5 10 FT

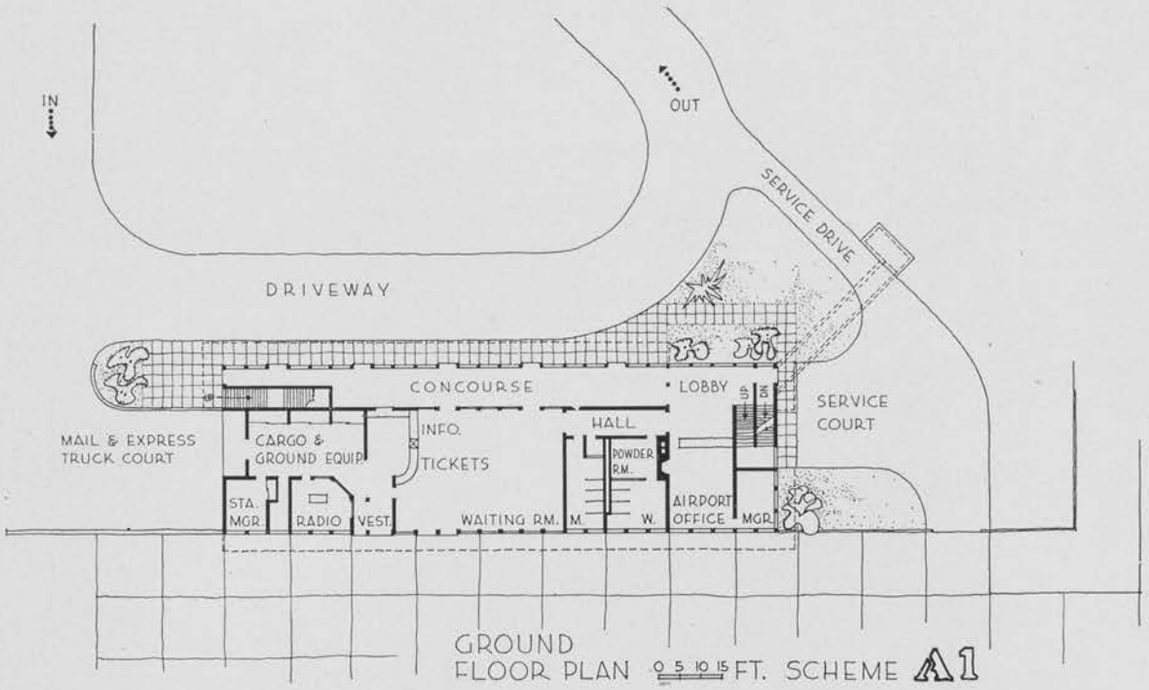
Gray areas in plans above show extent of public areas. In some cases, the concourse is considered to be entirely public space; but it might also be considered a passenger concourse, particularly if terminal units are added as indicated, and hence is here included in the area from which the general public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



SECOND SCHEME FOR THE WENATCHEE ADMINISTRATION BUILDING



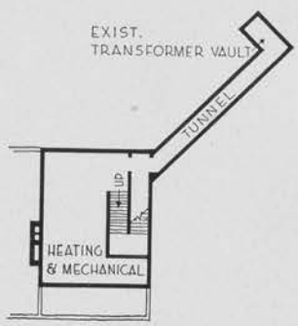
SECOND FLOOR PLAN 0 5 10 15 FT.



GROUND FLOOR PLAN 0 5 10 15 FT. SCHEME A1

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

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



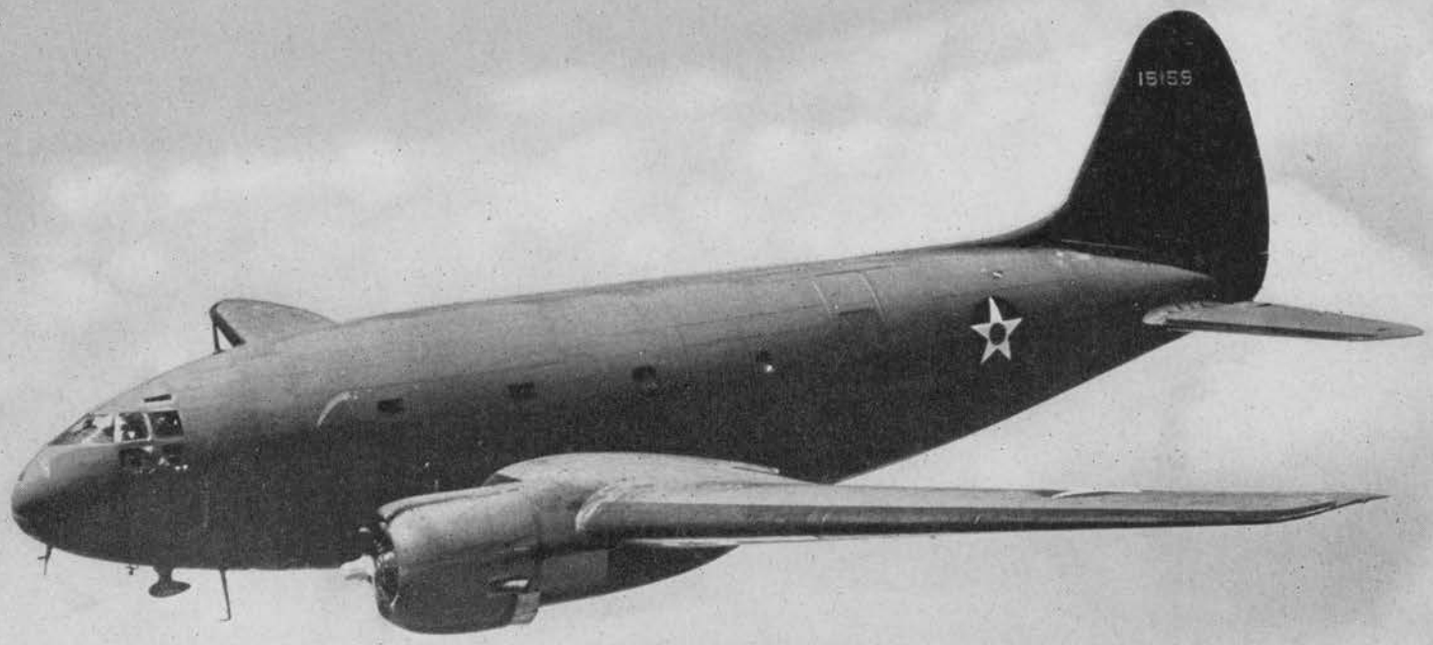
BASEMENT PLAN 0 5 10 15 FT.

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

Francis R. Meisch
Plant Engineer, Northwest Airlines

Architecture and Air

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



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

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

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

Transportation

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

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

Airplane and Airport Design

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

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

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

Commercial Aviation

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

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

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

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

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

Effect of Mass Production of Aircraft

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

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

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

Four New Ideas:

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

1—Airline Space-Time

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

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

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

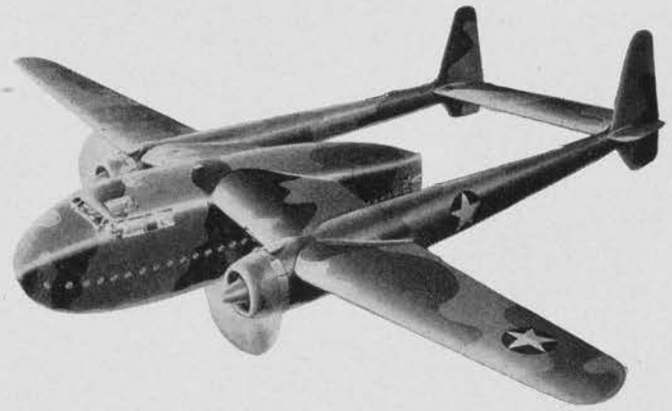
2—The Bird's Eye View

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

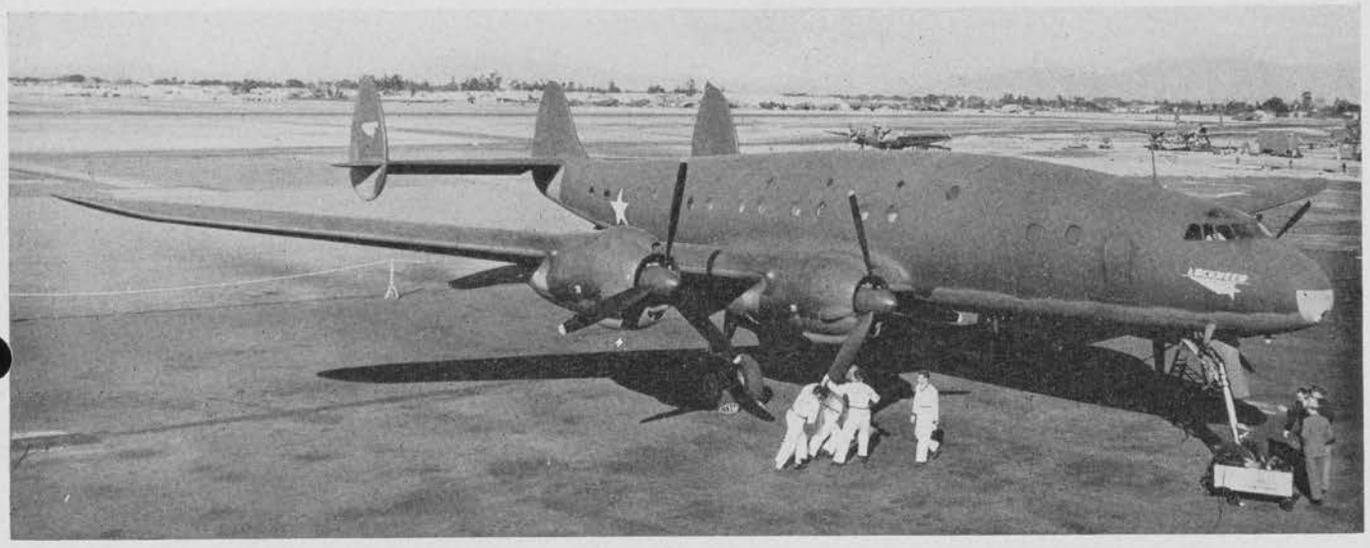
3—Payload Geography

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

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



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



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

4—What Planes Can Do

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

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

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

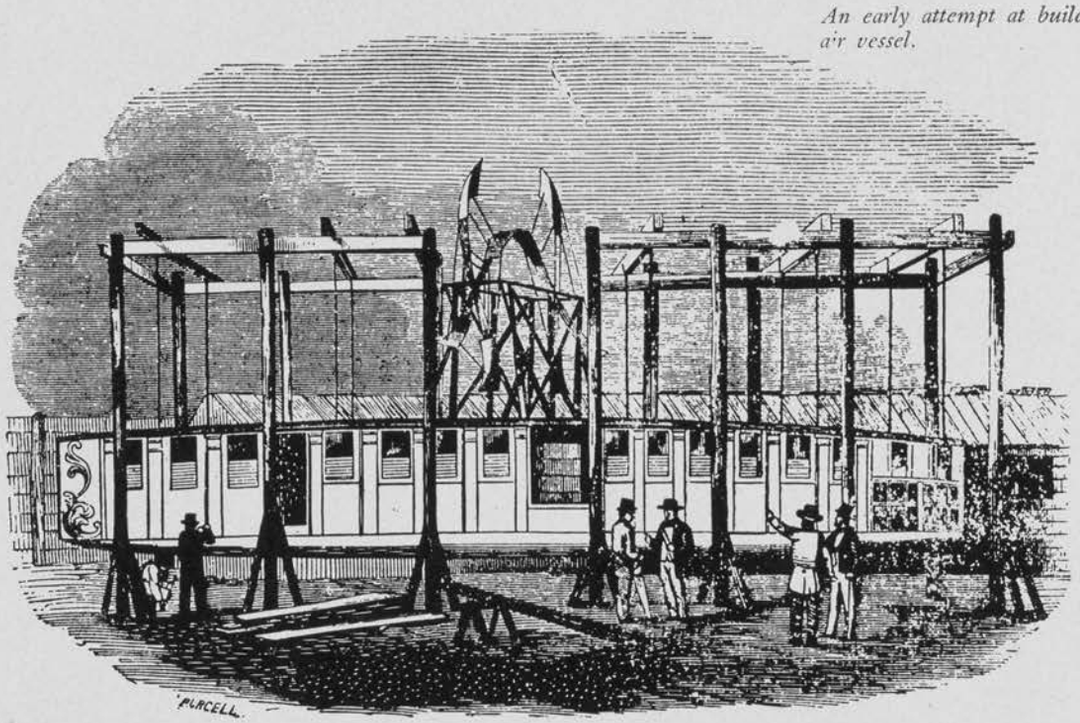
Airway and airport traffic control has anticipated these new technological developments, which will allow aircraft to be "stacked" in layers or spaced in "trains" for blind flying. Such safety devices will simplify traffic control problems and will allow a greater density of aircraft per unit of space,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

Rates Down, Demand Up

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

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

An early attempt at building a cargo air vessel.



VIEW OF THE NEW FLYING SHIP NOW BUILDING AT HOBOKEN.

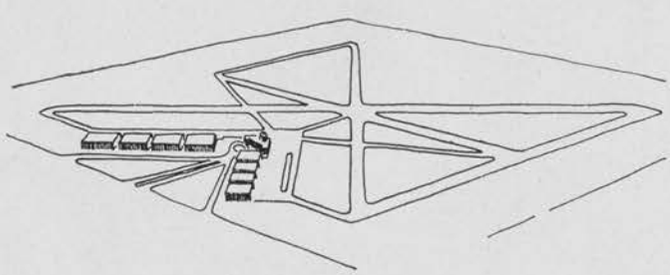
Part 2—AVIATION AS A STIMULUS TO ARCHITECTURE:
Basic Requirements for Ground Facilities

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

Airports

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

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



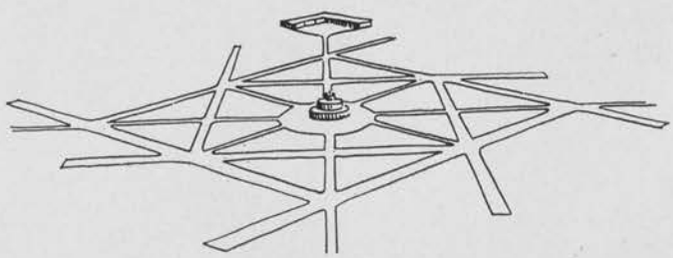
CAA Standards

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

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

The "Central Design"

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



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

International Airports

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

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

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

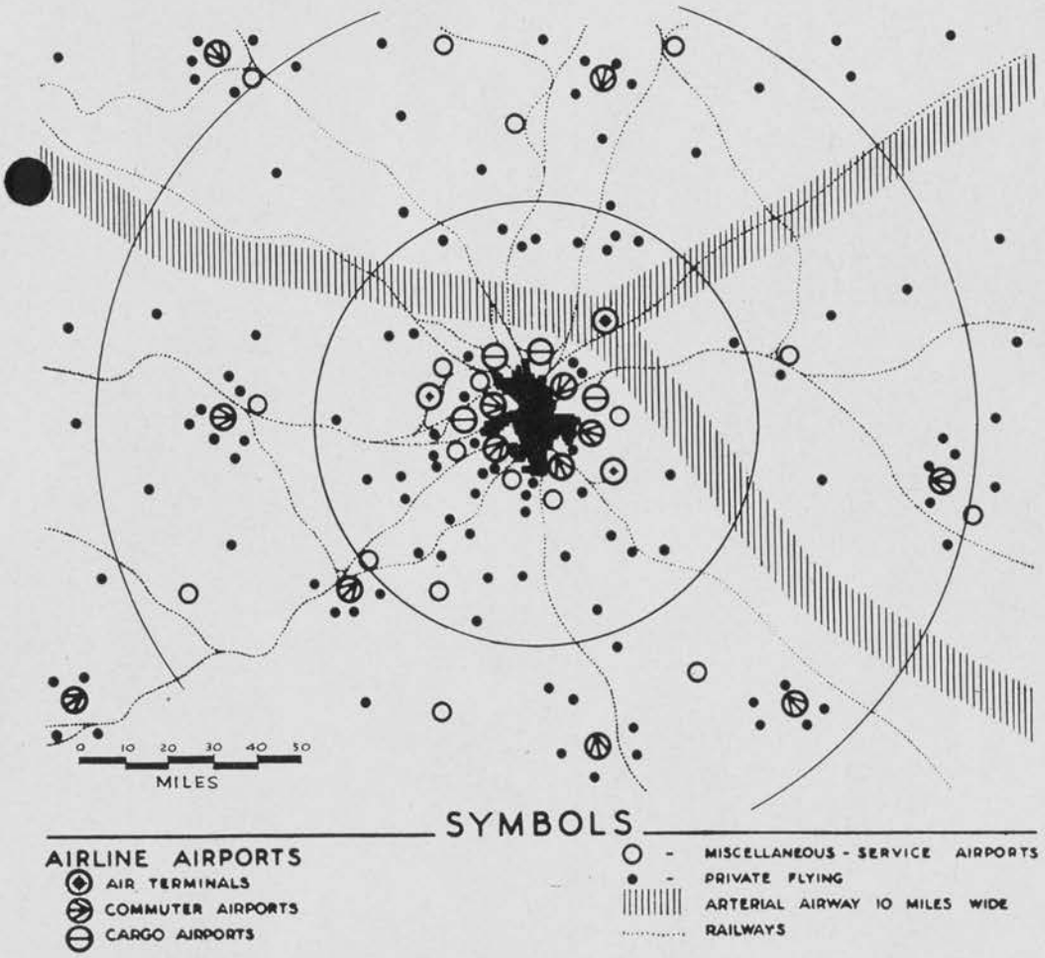
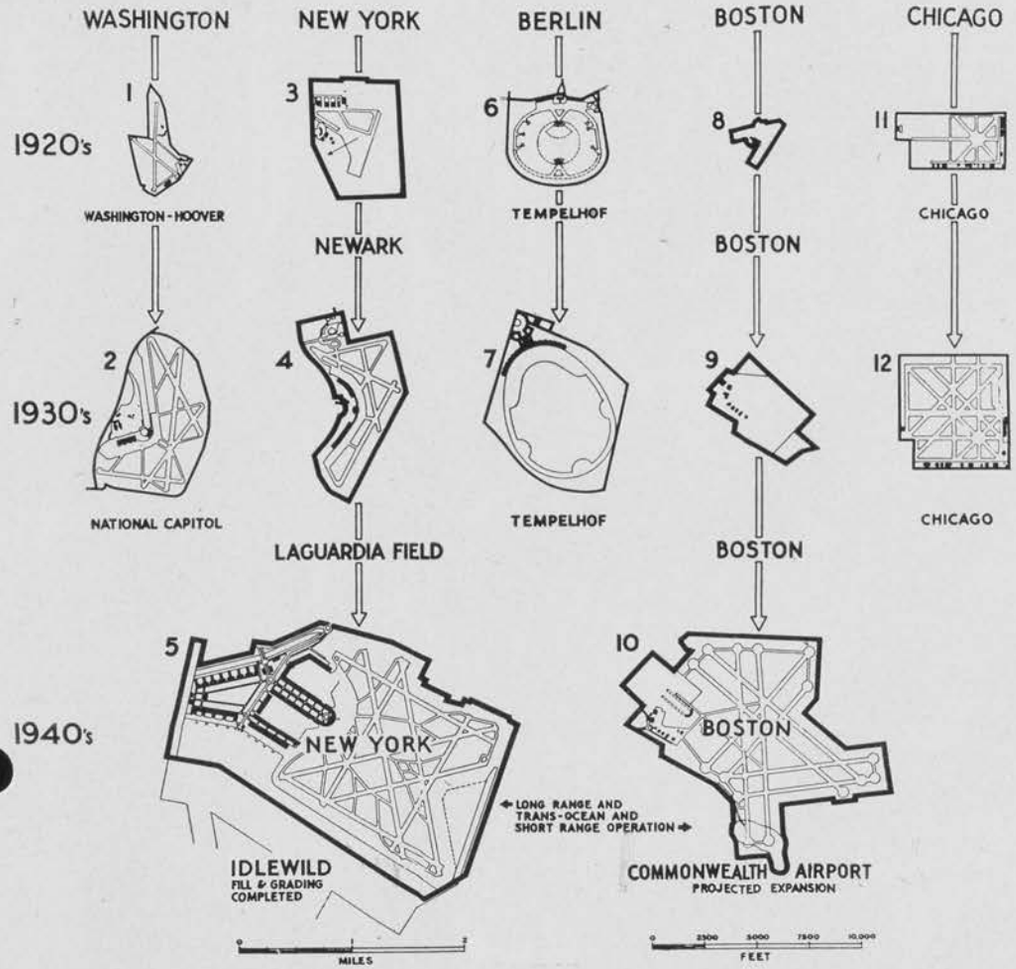
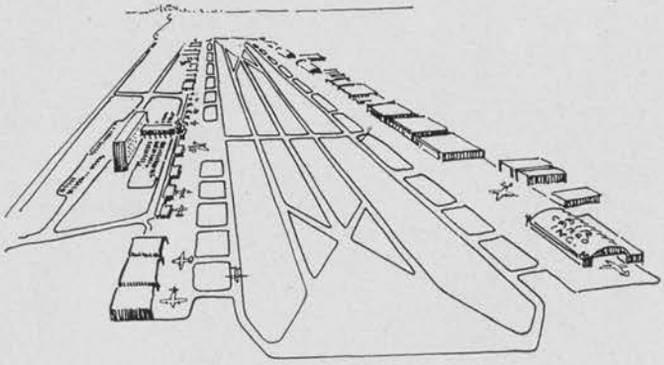


Chart above shows possible distribution of various types of airports about a future metropolitan center. Note terminals and cargo airports close in; outlying and close-in commuter airports; private fields interspersed between. Below, size of metropolitan airports by decades, all drawn to same scale.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

Increasing Size of Major Commercial Airports



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



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

Terminal Buildings

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

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

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

Facilities for Passengers

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

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

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

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

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

Separation of Mail and Passenger Traffic

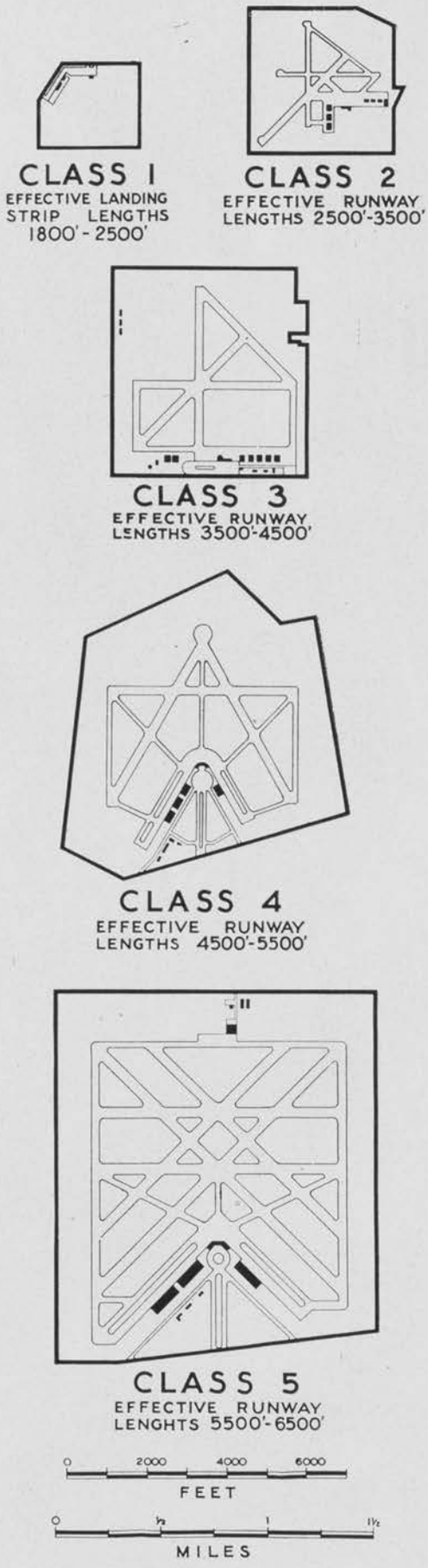
Mail and express, on the increase at an indeterminate rate, depend greatly upon a proper circulation system to expedite their movement and handling. They also require adequate, efficient equipment, plus readily expansible space for their handling. The airmail post office, already mentioned, will have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

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

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

Efficient Operation of Air Terminals

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



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

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

Takeoff Distances to Clear 50-foot Obstacle

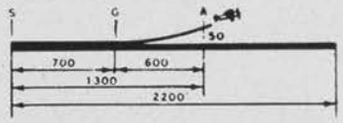
SG—IS DISTANCE FROM START TO POINT OF TAKE-OFF

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

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

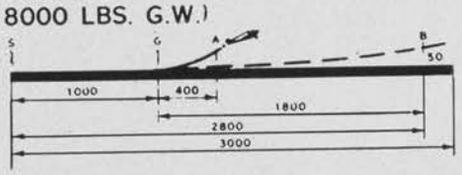
LIGHT AIRPLANE
(APPROX. 2000 LBS. G.W.)

CLASS I AIRPORT
2200 FT. RUNWAY



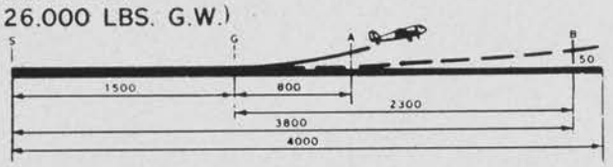
SMALL TRANSPORT
(APPROX. 8000 LBS. G.W.)

CLASS II AIRPORT
3000 FT. RUNWAY



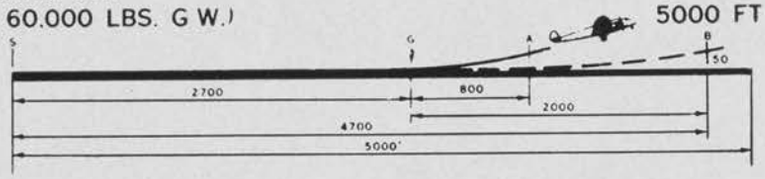
MEDIUM TRANSPORT
(APPROX. 26,000 LBS. G.W.)

CLASS III AIRPORT
4000 FT. RUNWAY



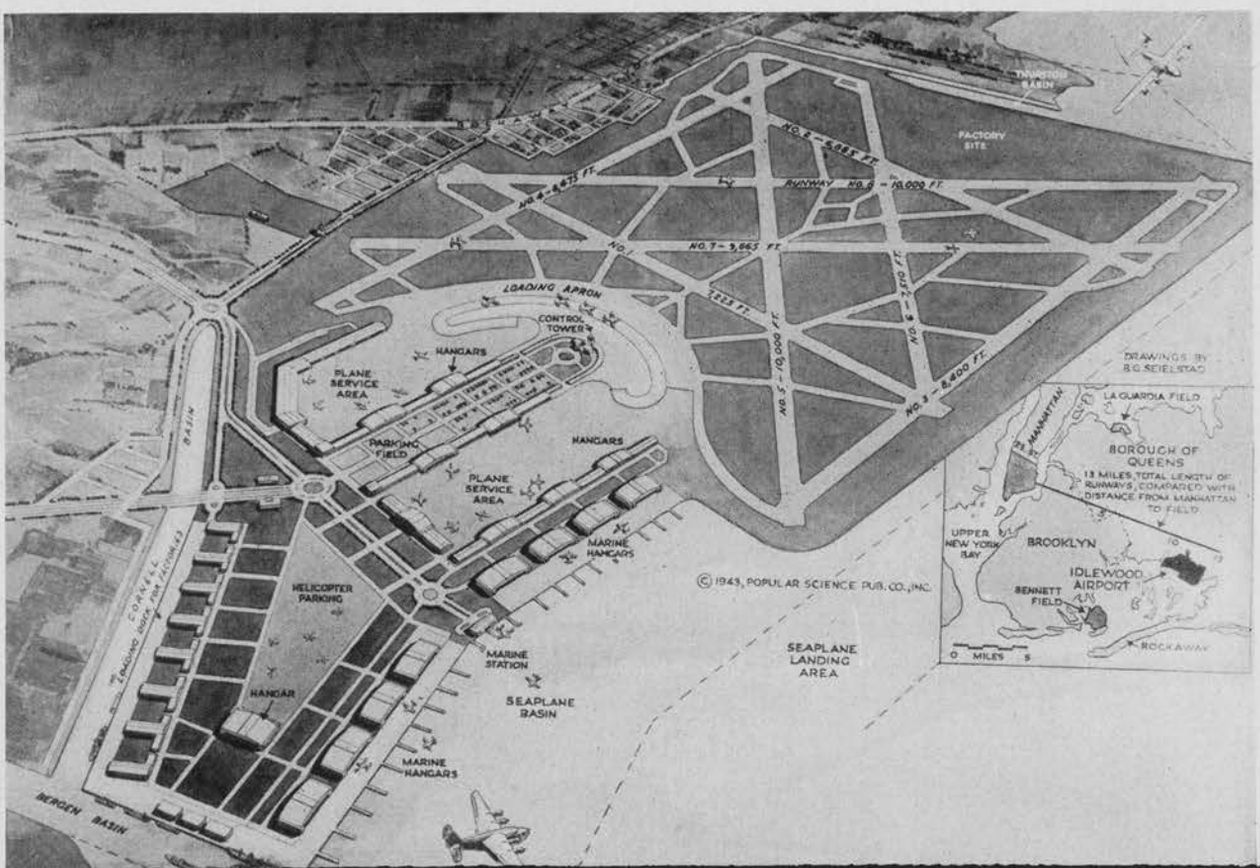
LARGE TRANSPORT
(APPROX. 60,000 LBS. G.W.)

CLASS IV AIRPORT
5000 FT RUNWAY



Proposals for Idlewild Airport, New York City

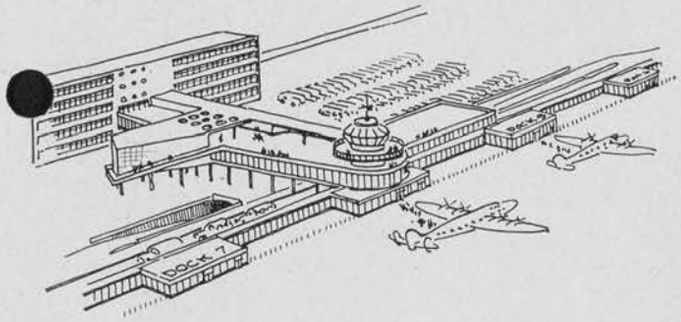
The scheme for New York's future transcontinental and transoceanic air terminal, at Idlewild on Long Island, may be superseded by a more advanced design. Below is the published scheme, the familiar rectangle-and-diagonal layout greatly enlarged to provide 13 miles of runways, some of them 10,000 ft.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



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

Based upon this kind of analysis, Northwest Airlines has been studying the passenger terminal problem and is in the process of designing several theoretically ideal terminals. Plans have been conceived with a view to having answers ready for the questions [redacted] 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.



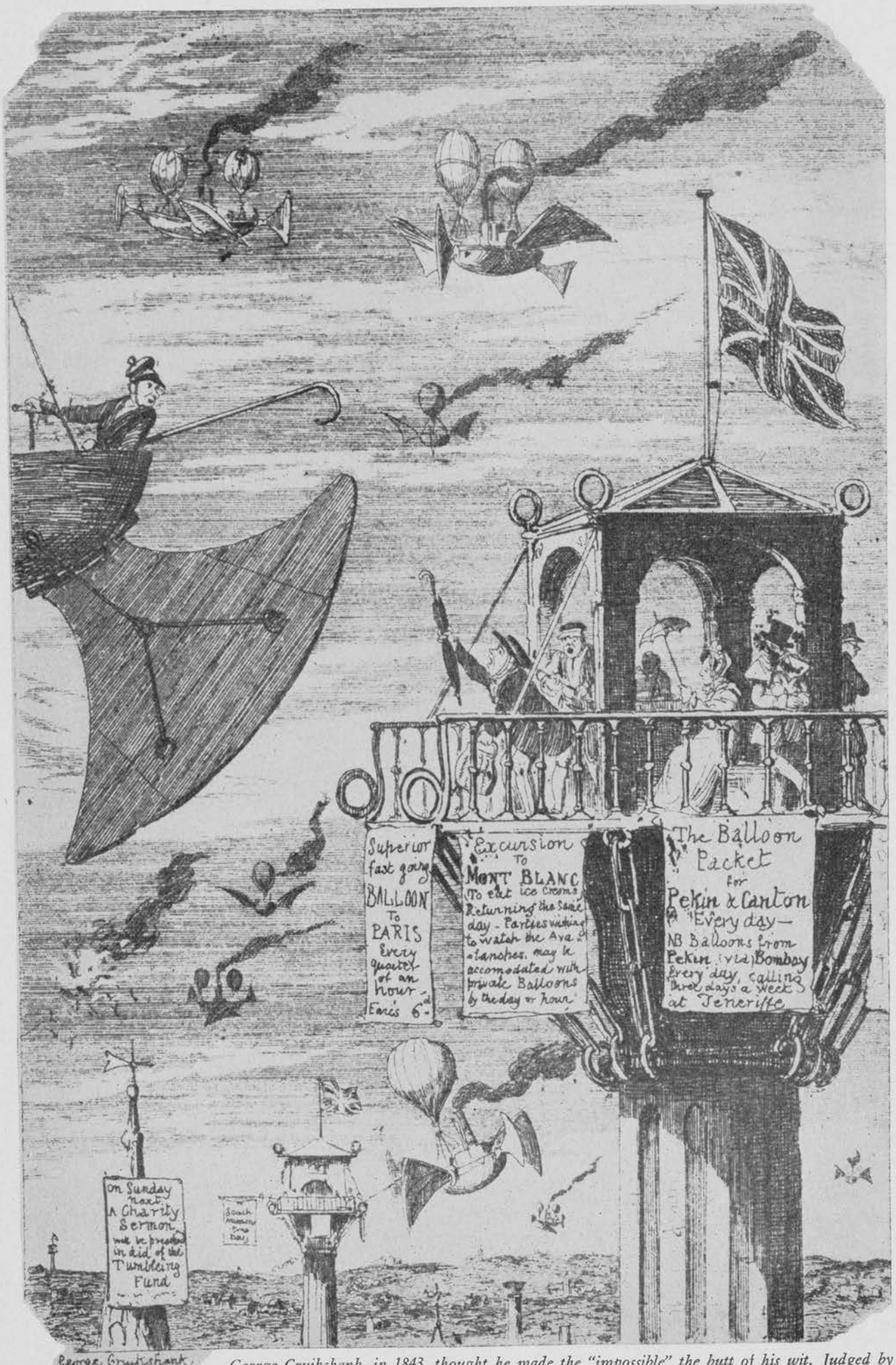
The solution referred to provides a number of individual docks or passenger stations, connected by covered passageways and underground service tunnels for utilities, mail, and express. These docks are flexible entities in that they can be added one after another as the demand arises. They are centered 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 [redacted] 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.



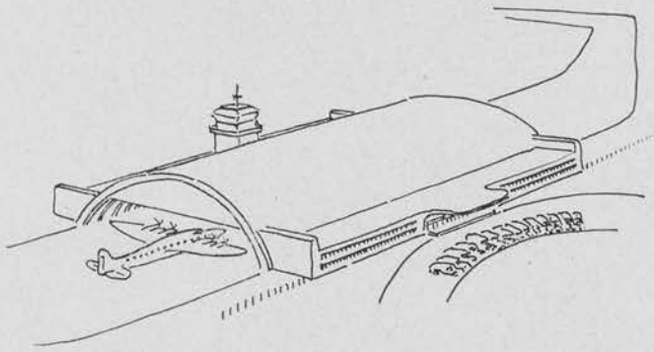
George Cruikshank, in 1843, thought he made the "impossible" the butt of his wit. Judged by military developments today, his predictions weren't very far-fetched. (Drawing from Institute of Aeronautical Science.)

Official U. S. Navy Photo, courtesy Skyways

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

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

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



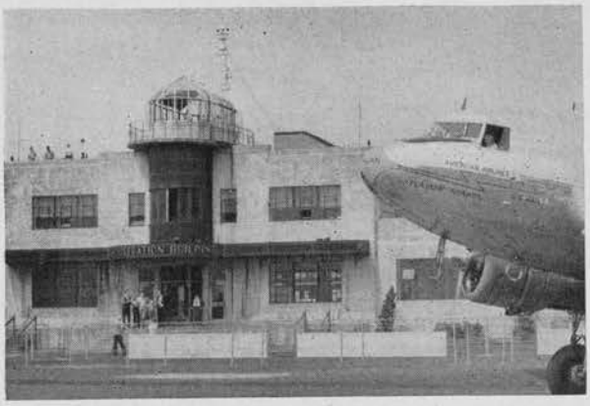
This type of passenger station is suitable for line station operations only. It would not be desirable for a terminal, where the lead plane could delay other flights. Such facilities, though, may be suitable for cargo terminals where maintenance of accurate time tables is not imperative, but saving perishable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

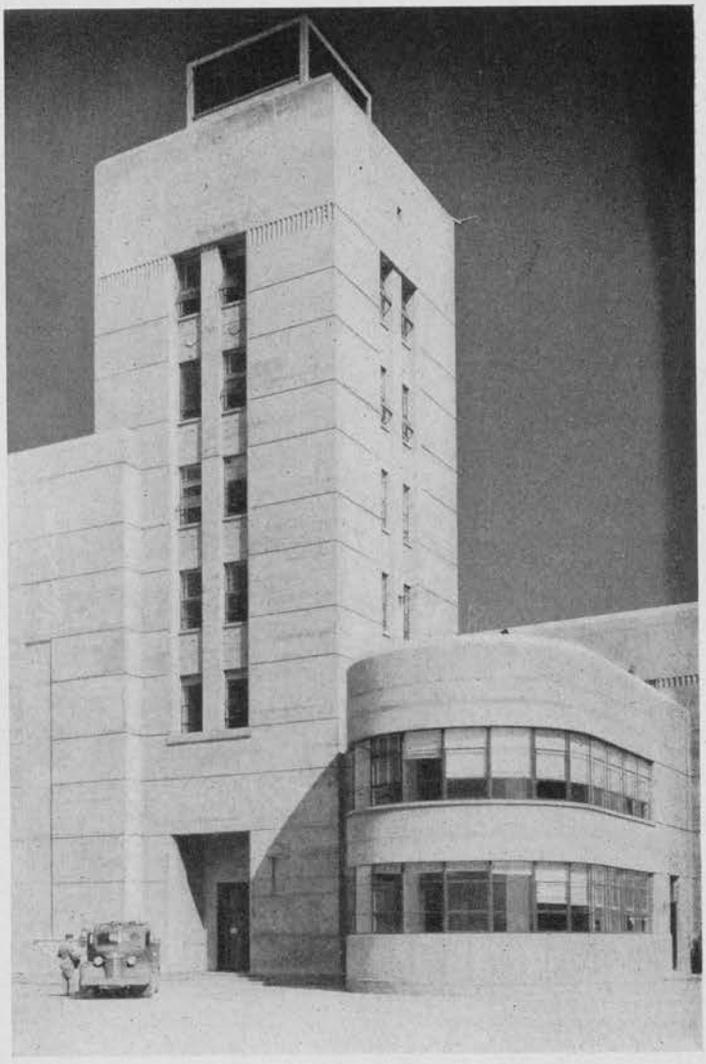
Nose loading of passenger or cargo ships makes it necessary to use cantilevered roofs over nose docks. This method, unless the design incorporates hangar facilities, appears to be too costly and clumsy an expedient except for warm climates, due to the difficulties involved if anything more than the nose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

Problems In Handling Air Cargo

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

Administration Buildings





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

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

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

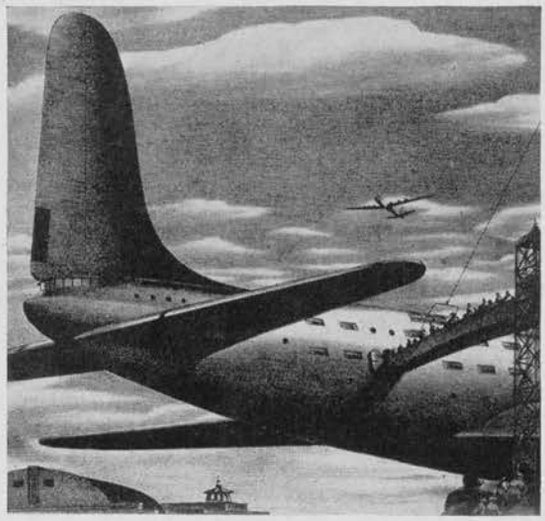
The analysis of aircraft hangar design problems, as to basic types and plans, structural types and variations, as well as a survey of the advantages and limitations of each type, is a task as complex and difficult as that of terminal design, if not more lengthy. Even greater complexities are encountered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

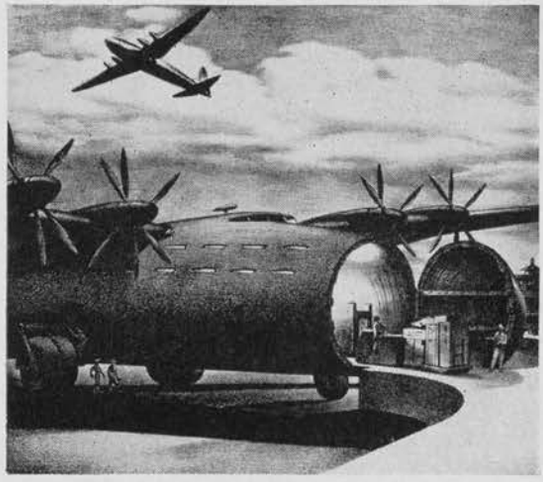
Independent Power Plants for Municipal Airports

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

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

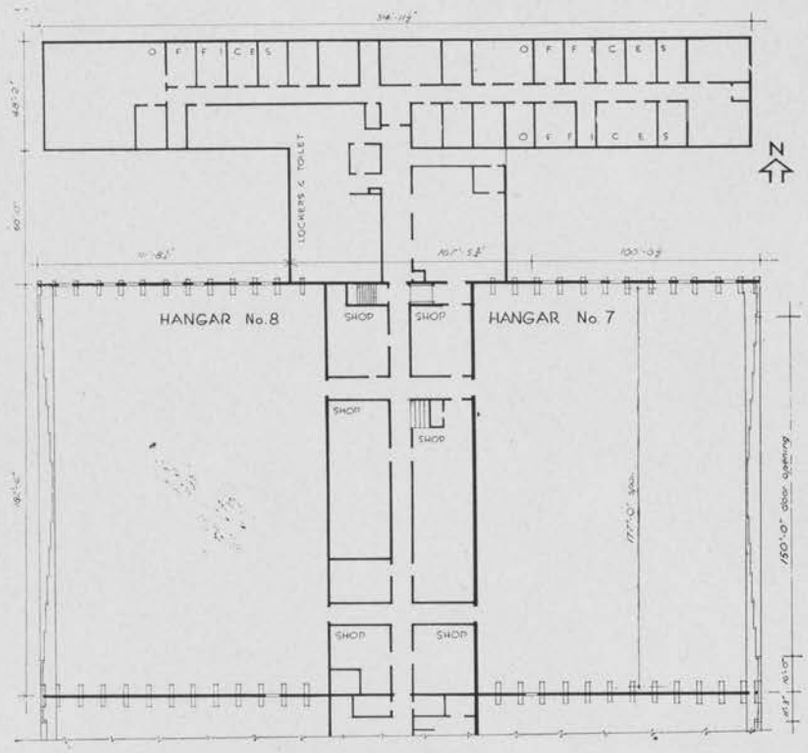
Airport Ground Traffic Problems



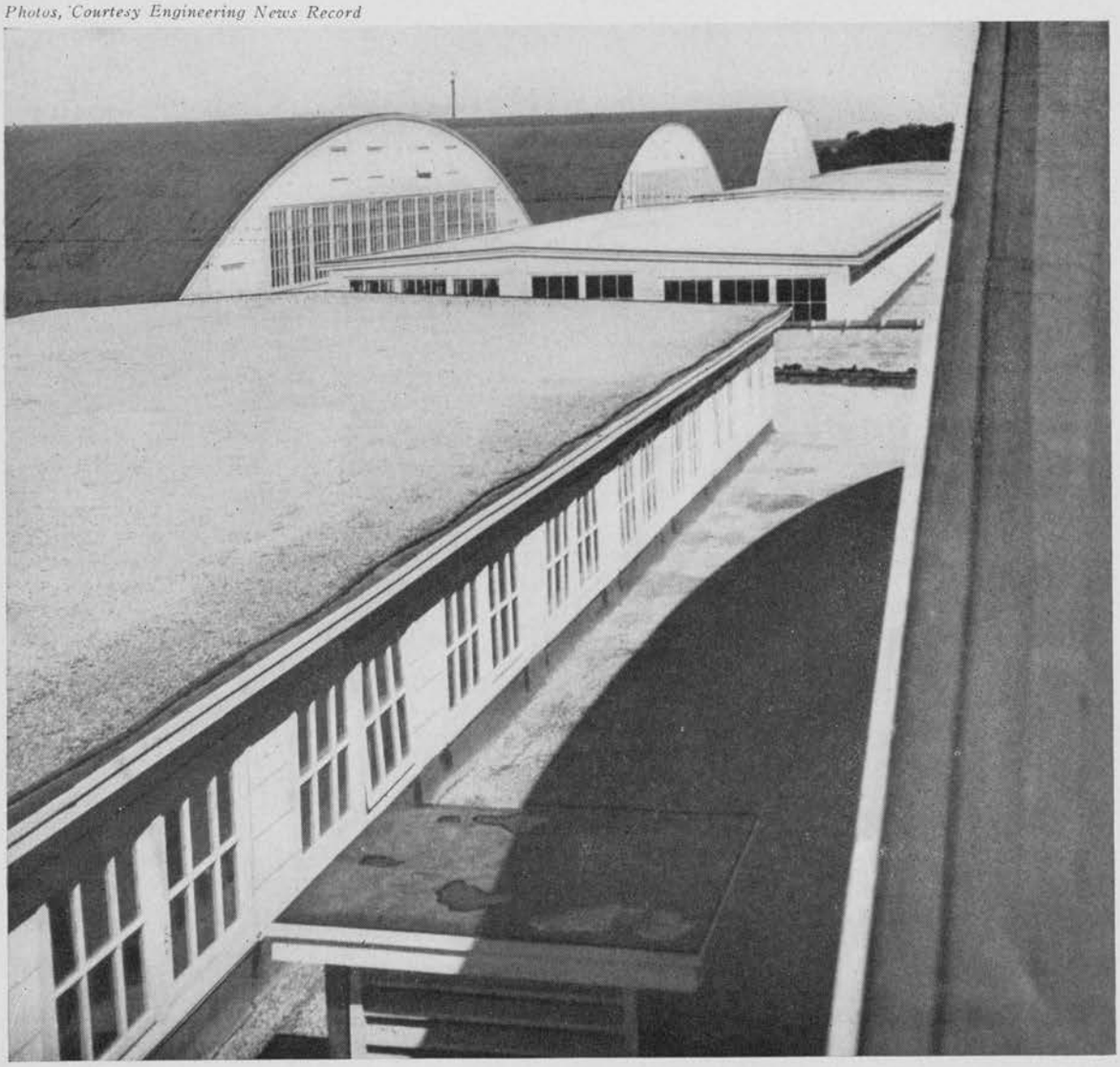


Wood Hangars for Modification Center

U. S. Army Engineers



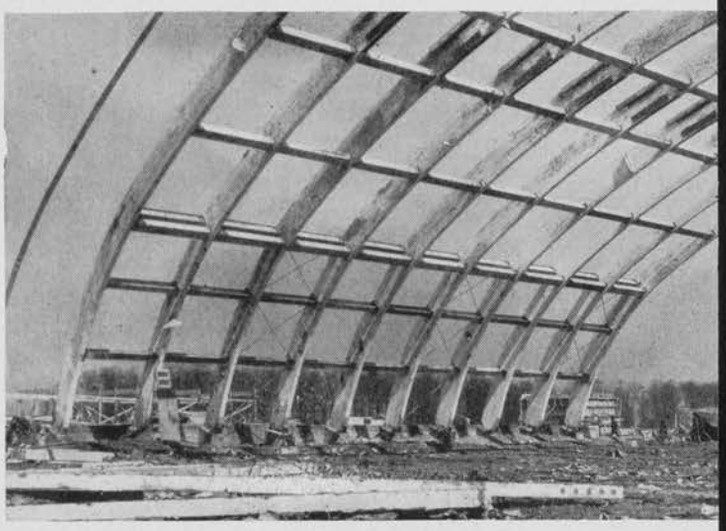
Photos, Courtesy Engineering News Record

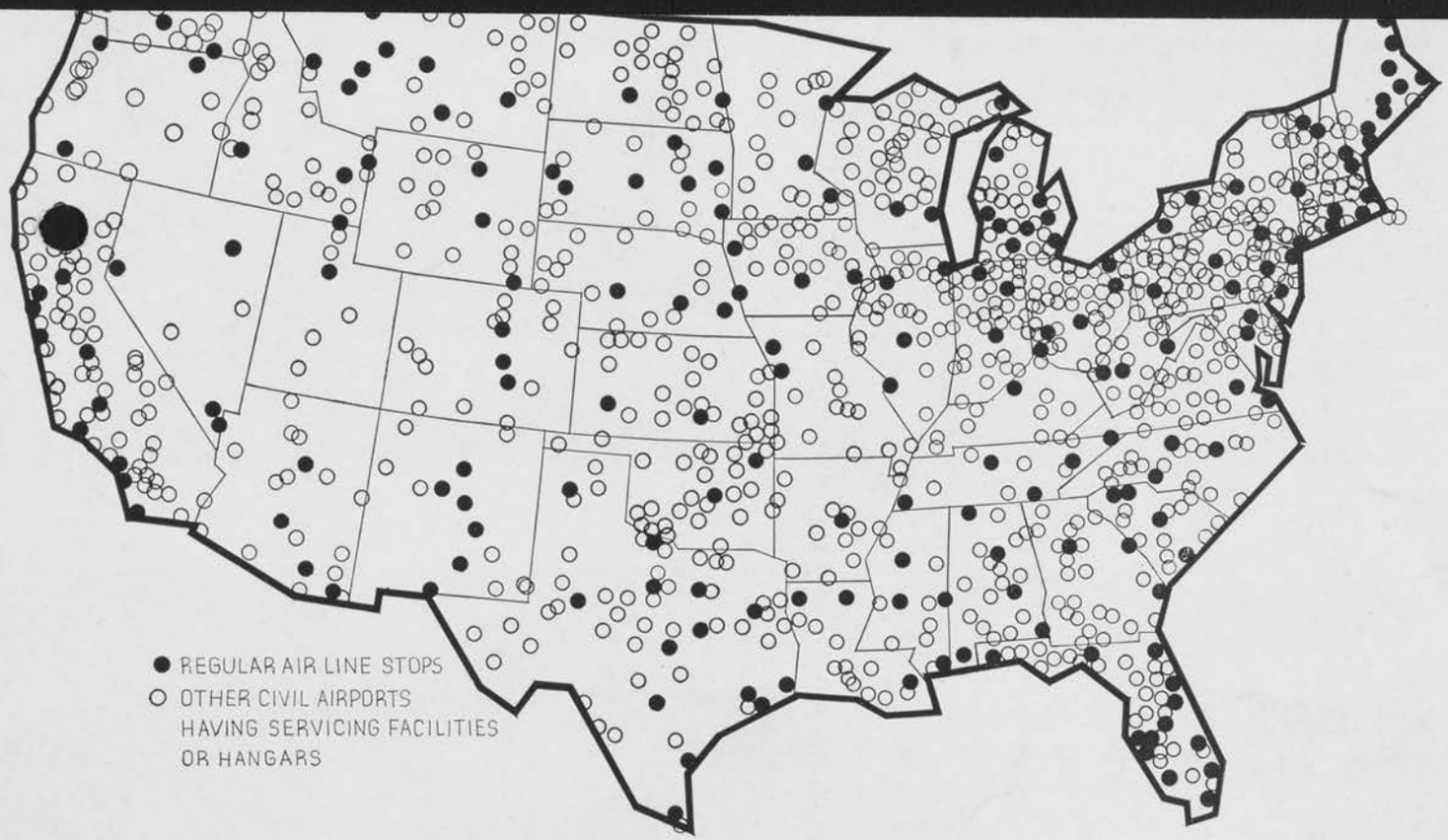


One of the new architectural problems created by the growth of aviation—the provision of facilities for large-scale repair operations—was solved by the U. S. Army Engineers according to the plan illustrated on the opposite page. This midwest modification center, intended for large military aircraft,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





U. S. AIRPORTS

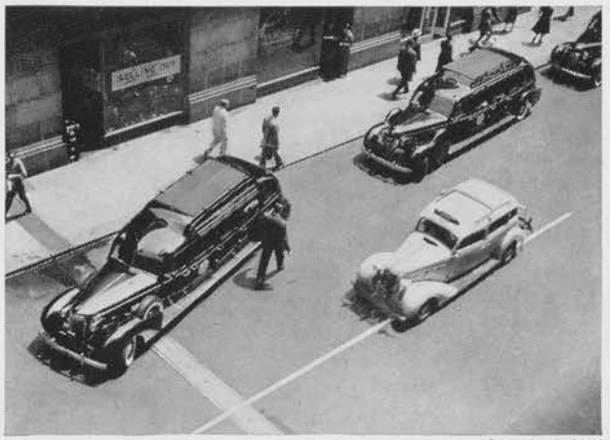
blanket the country with a network of landing points that are now over 2,400 in number. The speckled map above, dotted with circles each covering an area 30 miles in diameter, does not show all of them; nevertheless it is apparent even here that in many sections of the country it is impossible to get more than fifteen miles away from a field. The transport lines that are served by these airports carry more passengers and mail than those of any other country, and passenger traffic alone has increased by about 40 per cent in the past year. So high a pitch of efficiency has been reached in American plane performance and airline operation that in the last year and a quarter there has not been a single casualty on any of the passenger lines. All of this adds up to a satisfying picture until the airports are examined in the light of the present program of defense.

Look again at the map. Note that the 200-odd black dots mark the only commercial fields at which the big transports (read "bombers") can be accommodated. Note also that of these only a bare 36 are Class 3 airports, that is, fields with paved landing strips of adequate length, hangars, shops, two-way radio, visual and instrument traffic control and a weather bureau. What with ten or more billons to be earmarked for armaments, and anywhere from 20,000 to 50,000 planes to be added to the air forces within the next few years, the existing fields are unprepared to handle these planes in peacetime, and certainly not in an emergency. This is the new picture, and it is not so good.

The building of new fields quickly, and bringing the old ones up to scratch is essentially a problem of money and manpower. Fortunately we are well supplied with both. Equally vital, however, is technique of planning. In this respect we are not so well off. Most of our big fields today are merely a patchwork of hap[illegible]rd construction. Among the experts there is disagreement all along the line, understandable enough in view of the brief experience to date, but a handicap at the beginning of a large building program nevertheless. Were it merely a matter of planning for commercial traffic, bad design would probably mean no more than inconvenience, delay and the high costs that accompany inefficiency; with the added factor of national defense, inadequate planning could be disastrous.

The nature of modern warfare has revealed very clearly the close connection between military power and economic potential. The best tractor factories are the best tank factories. If the army should have to move in a hurry it would take to the newest parkways. And the best civil airports are also—with slight modifications—the best military airports. There has been some talk in recent months about underground air bases. The present consensus of opinion among military and civil airport planners is that underground hangars and other facilities are not needed here. The main reason is the complete difference between the U. S. and Europe from the viewpoint of air vulnerability. Another is the expense. Costs for underground hangars whose span may be 150 ft. or more become astronomical; while money becomes a secondary consideration where national security is threatened, the question nevertheless arises whether it might not be more effective to allocate construction funds to a greater number of above-ground fields. The arguments advanced carry much weight with them, and it seems probable that the construction program of the immediate future will concentrate on surface airports with the possible exceptions of such restricted areas as the Canal Zone where the demolition of a single major air base might expose a vital area to destruction.

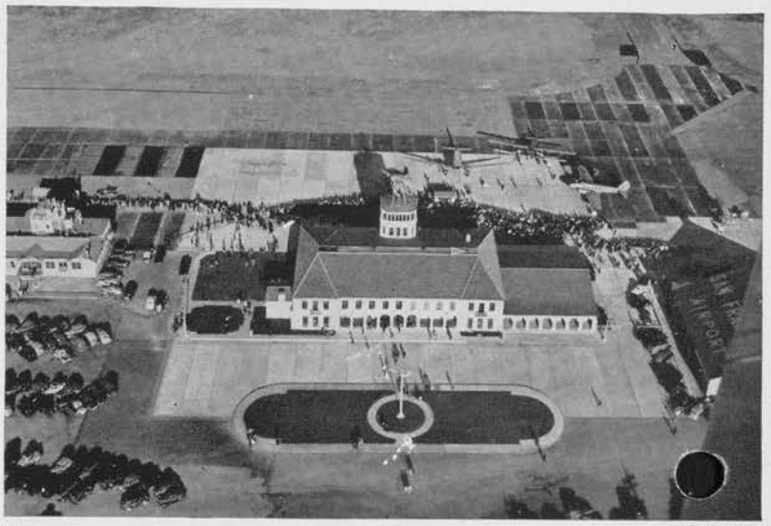
This article, which attempts to explore the basic problems of present-day airport design, contains several assumptions. One is that if this country proceeds to construct the best network of civil airports in the world, it will be well on the way to military air supremacy as well. Another is that there is a maximum size to any airport, beyond which it is economically and technically impractical. Such a maximum would appear to include at least one runway 6,000 to 10,000 feet, depending on altitude, with facilities for handling perhaps 60 planes per hour. Beyond some such ceiling the solution would be to increase the number of fields; on this point both military and commercial authorities are in complete agreement. The rapid development of plane design has obsoleted many fields once considered adequate; recent trends indicate that while planes are getting larger, only slight increases in present maximum runway lengths are likely to be needed. This does not suggest that the need for flexible planning is over—quite the contrary. With the expansion of the air services all over the country it may be taken for granted that most of the smaller fields will have to take a steadily increasing load during the years to come. This article therefore assumes that airport design which is not flexible is not good. And finally, it is most emphatically affirmed that proper planning of landing fields and their adjuncts is not the concern of a few professionals, but of the widest sections of the community. If the question of national defense should become a matter of immediate necessity, a highly developed network of peacetime airports would be of decisive importance to every American. If the emergency should never arrive, we would still have an extremely useful addition to the nation's wealth. Hundreds of airports are going to be built, hundreds more rebuilt. They should be planned and built properly.



1 *John D. Beinert*

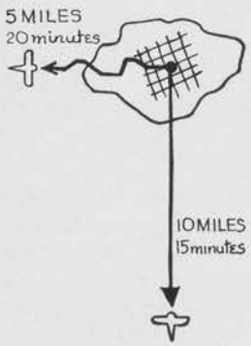
2 *John D. Beinert*

3

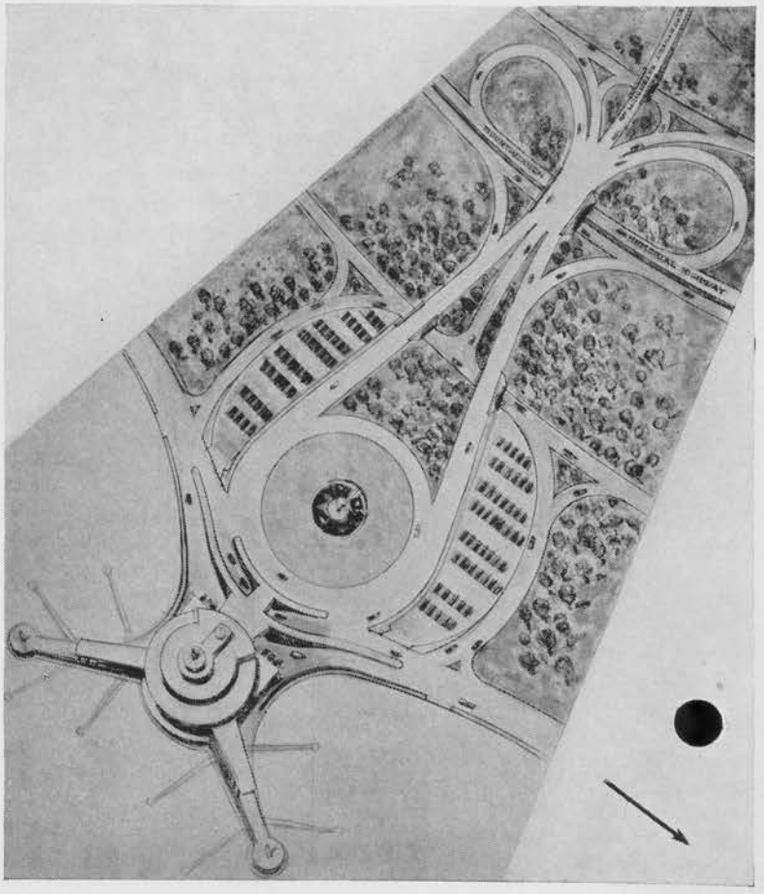


4 *Phil Stroupe*

APPROACH. Air transport, whether of passengers, mail or freight, has to be considered as an operation from point of departure to destination, not from airport to airport. If the 20th Century Limited went from New York to Chicago in sixteen hours, but with a five-mile trip at each end by ox-cart, it would still be twenty hours as far as passengers and shippers were concerned. In air travel such discrepancies actually exist. Hence field location must be considered as part of the city and highway plan, and in this plan, as the above diagram suggests, distance is not necessarily the major factor. New York's field is by no means far removed from the midtown section, but after leaving the ticket office 1 the buses must thread their way through crowded streets before arriving at a fast highway.



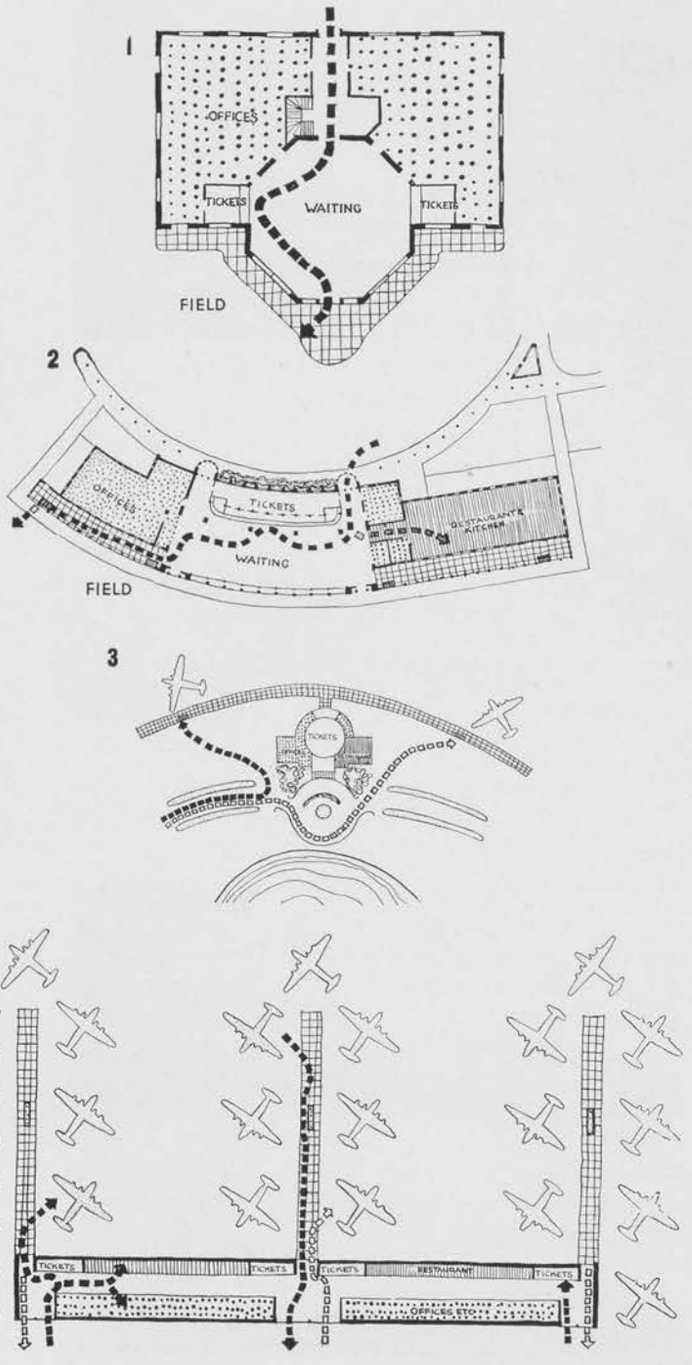
Once at the airport, the approach still remains important. Traffic must be separated to prevent jamming of trucks, limousines, private cars of passengers, visitors and employes, taxis and other vehicles. The terminal at LaGuardia Field in New York, designed by Delano & Aldrich, **2** provides for this. A more completely developed scheme of traffic control is shown in the plot plan of a project **4** by Fellheimer & Wagner for an airport at Washington. Here the principle of traffic separation according to type has been worked out in conjunction with the clover leaf and rotary to permit a rapid flow. In smaller airports, as for example the field at San Francisco **3**, no such elaborate plans are required, but adequate space must still be provided for free movement of traffic.



John D. Beinert

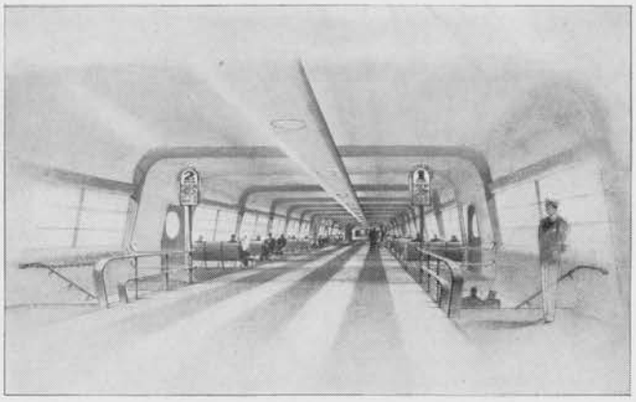
PASSENGERS. The above photograph was taken at New York's LaGuardia Airport, "world's largest and finest." That so fantastically primitive a method of communicating between the terminal and the planes should be accepted at this new field indicates to what degree the problems surrounding air transport still remain unsolved. To some extent, the continuance of practices that would be unthinkable in a third-rate railroad station may be attributed to the lack of experience in this field, but there is no lack of general transportation experience in this country which might reasonably be applied to aviation problems.

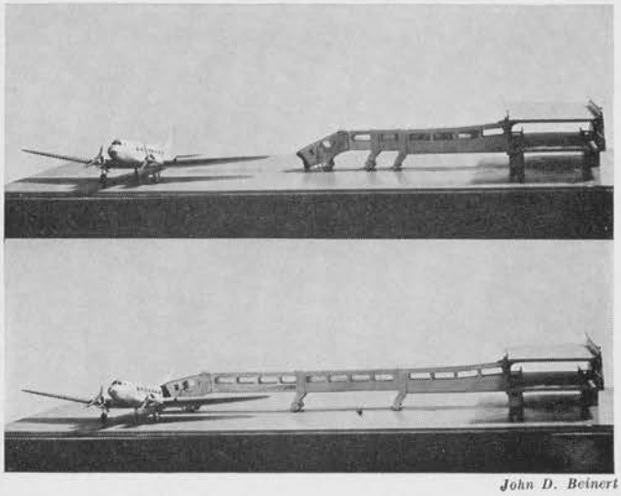
Terminal buildings, serving an exclusively contemporary mode of transportation, show a curious preoccupation with the monumental, entirely inappropriate forms of past centuries. The external appearance of these structures is discussed elsewhere; the attitude, however, has an effect on the plans. Take as illustration diagram **1,** typical of any number of small terminals. Symmetrical in arrangement, it separates the washrooms, offices and ticket windows although there is no conceivable reason for splitting any of these elements save a desire for a conventional exterior. A much more reasonable approach is the plan for the new Washington terminal **2,** where the passenger can go about his business without interfering with the other parts of the building. A basic question on terminal planning is brought up by the LaGuardia field example, where, as indicated in diagram **3,** the great majority of arriving and departing passengers never see the inside of the building but go directly to their planes from the airline limousines. One of the largest lines in the country has estimated that of all passengers using its planes in the big cities, almost 90 per cent never go near the waiting rooms or ticket windows. This circumstance has produced the very intelligent suggestion that terminals be designed to fit this practice, with ticket offices moved to the gates where passengers take their planes **4.**



John D. Beinert

Courtesy, Eastern Airlines

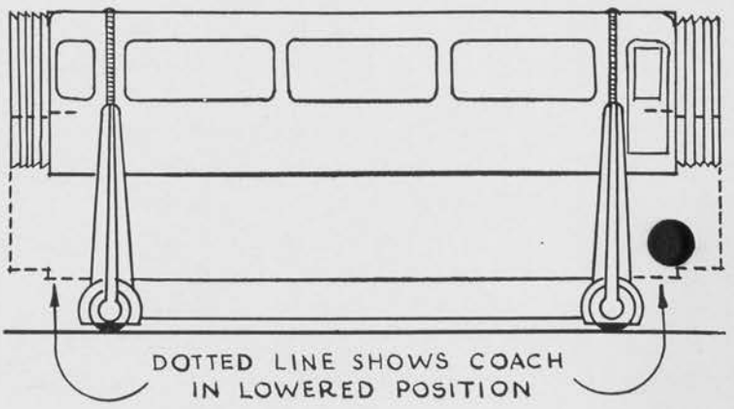




John D. Beinert

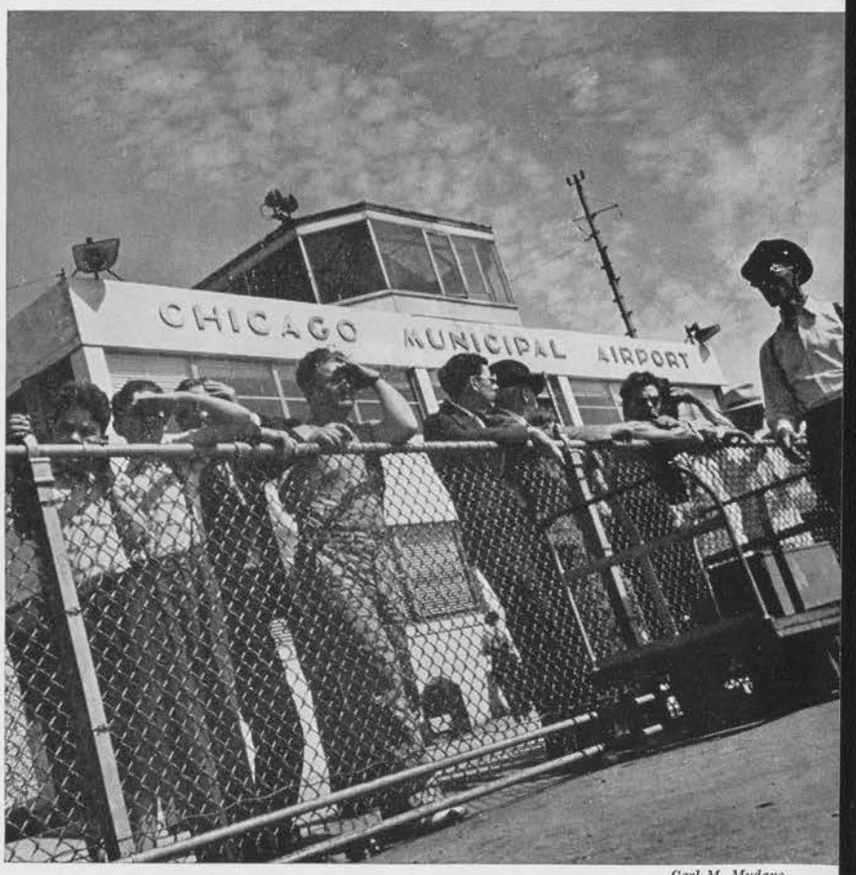
In line with this trend is the building of central terminals in the cities. The terminal for New York City, now nearing completion, is shown at the top of the page. This is a natural solution for metropolitan terminals where in the very near future each city will be served by more than one airport. The central terminal will serve the busy midtown area, and passengers living near the fields will go direct. In the smaller cities it is probable these facilities will continue to be built at the fields. The space needed is not large, as illustrated by the photograph of a typical waiting room. The rendering to the left illustrates the principle which the architects, Fellheimer & Wagner, have applied to their railroad terminals—that passengers wait as close as possible to the point of departure. This arrangement also accommodates the transfer passenger with minimum loss of time. In addition to its practical advantages, this scheme also provides a full view of the field. Plans of the concourse and of the ticket room on the opposite page are shown on page 86.

Elsewhere in this article the problem of getting passengers into planes under cover is discussed more fully. The illustrations at the bottom of the page show a workable scheme developed by Fellheimer & Wagner for a telescoping passageway from the concourse to the planes. The structure would be built of light sections and operated manually or by motors. The special bus, directly below, also by the same architects, has been proposed as means of taking passengers out to the plane at fields where the stopover time is to be kept to a minimum; the use of such a vehicle would eliminate the need for the plane to taxi over to the terminal.



SIGHTSEERS. Sightseers at airports have been variously regarded as a necessary evil, an unnecessary evil, and as a means of stimulating public interest in air travel. At the New York airport it was recently decided to charge an admission fee of ten cents for use of the observation platform, and on one Sunday the revenue was well over $2,000. This has been common practice abroad, and it seems likely that this source of funds will not long go untapped elsewhere in the U. S. The basic problem where visitors are concerned is one of separation, and this separation of visitors from passengers and employes is best handled before they get into the building. Illustration **2** shows an excellent scheme for allowing visitors to look down into the main room of the terminal without interfering with its activities. In this case, they are routed through on an upper level from which they enter an observation deck. The illustrations below show methods of separation used at small and large airports. Both at Syracuse, N. Y. **4** and the new municipal airport at Philadelphia, Pa. **5**, fencing separates the sightseer from the loading apron and the field entrance as well as from the field. At New York **3** a separate observation deck is provided sightseers and a terrace above that for dining, the latter bringing in additional revenue to the airport.

1



Carl M. Mydans

2

3

John D. Bienert

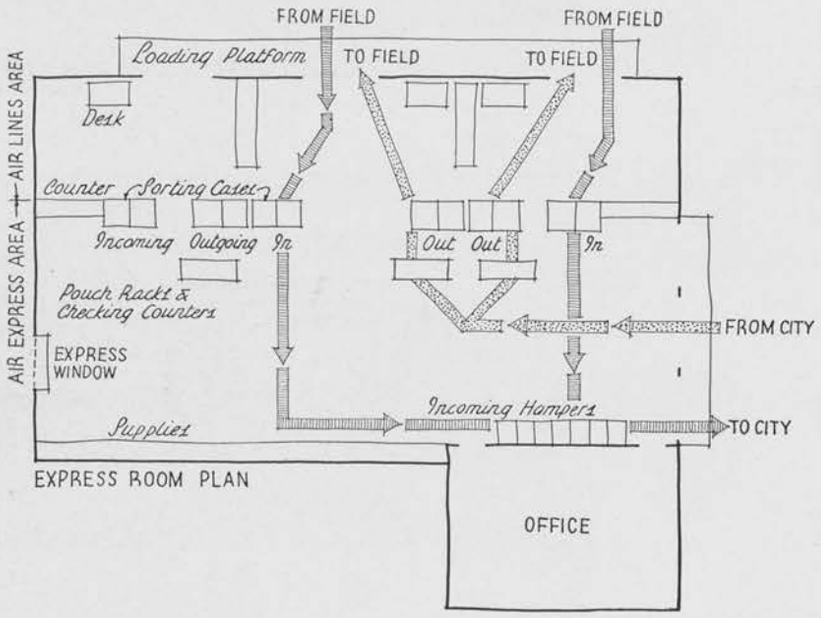
4

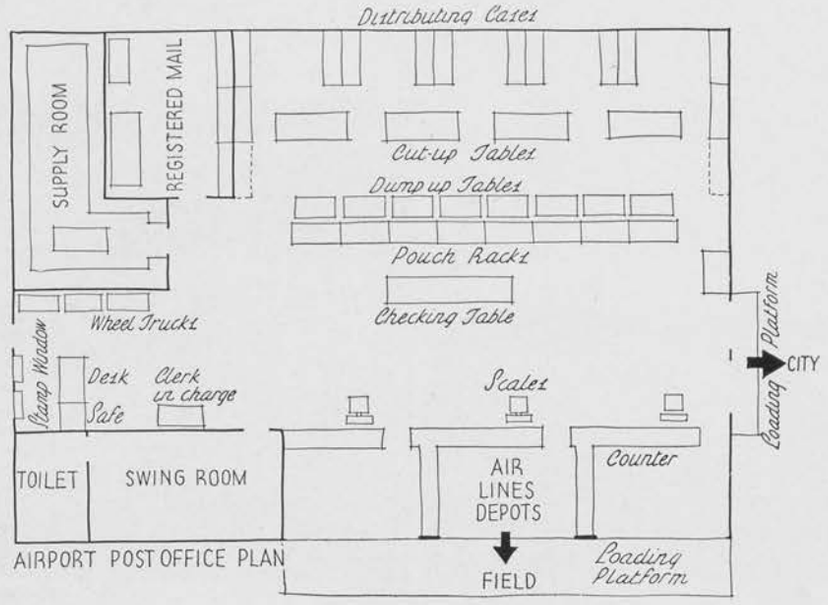
Courtesy American Airlines Inc.

5

Dallin Aerial Surveys

Donald Bixler





EXPRESS AND MAIL

Both air mail and express have shown impressive increases during the past few years, with lowered costs and reduced rates largely responsible. Air mail, for instance, has dropped from 24 cents for the first ounce to six cents. A tremendous increase in tonnage could be obtained by further reductions, but this would probably require the use of special mail planes whose operation is less profitable than those carrying both mail and passengers. Air express, on the other hand, brings in more revenue per pound than passengers, and there is a good possibility that future increases in business will lead to the use of planes carrying only freight.

The diagrams at the left show schemes for an express room and a terminal post office. Both are based on corner locations, which offer advantages for circulation. The solutions are essentially similar in that freight and mail arrive from the city, are distributed in pouches, and then turned over to the different air lines. Loading platforms must be adequate, and capable of easy expansion, as experience to date has shown the original facilities soon prove to be insufficient. Both schemes are based on the requirements of a present-day major airport; they could be reduced for smaller terminals without changing the circulation shown.

OPERATIONS. Because of its invariably conspicuous position, the control tower **1** represents the key to airport operation in the public mind. Actually it is one part of a larger and very carefully organized process.

The control tower is always given a location which permits an uninterrupted view in all directions covering three to five miles. Within some such radius arriving and departing planes are under its sole control, and it is equipped with a transmitter, two receiving sets, wind direction finders, a microphone to the administration building, and controls for the airport lighting system.

Airway Traffic Control **2** is a government office, with complete control of all airways. There are about a dozen such centers at present, each with jurisdiction over a region. On the slanting boards shown a continuous record of each flight is maintained, and pilots follow flight instructions given out by the office. In all cases it should be closely related in plan to the control tower.

The Department of Agriculture maintains weather bureaus at the main terminals. These receive teletyped reports from stations all over the country about every fifteen minutes, and are used as the basis for weather maps. The airlines use this service, and supplement it with departments of their own **3.**

Radio rooms **4** are operated by each airline using a terminal. The line keeps in touch with its pilots throughout each flight, transmits instructions and weather reports.

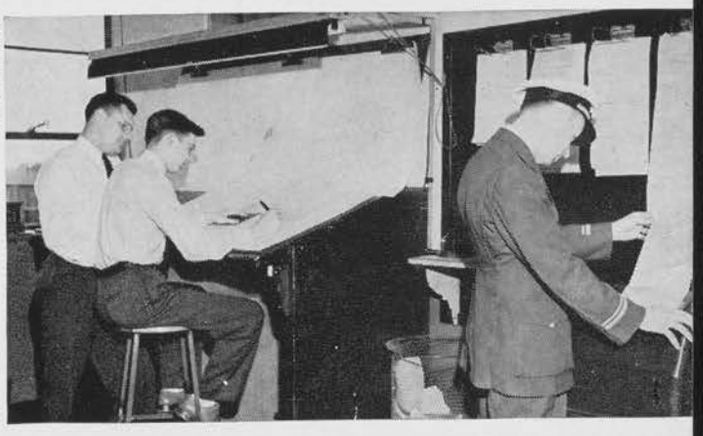
Before every flight the pilot must make a flight plan **5,** on which he charts all details of the proposed flight. This must be approved by the airline dispatcher and filed with Air Traffic Control. After it is checked by the latter to make sure that there is no conflict with other flights, the plane is cleared through the control tower.

Walt Sanders—BS

1

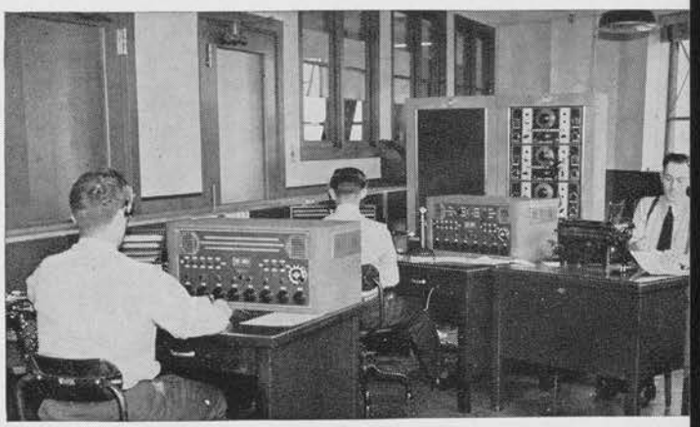
John D. Beinert

2



Courtesy, TWA

3



Courtesy, TWA

4

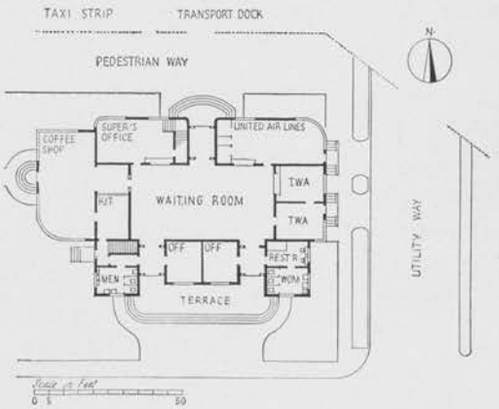
5

Walt Sanders—BS

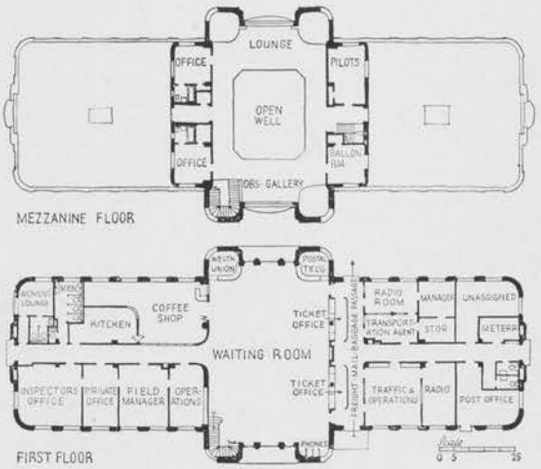
TERMINALS. The plan of the terminal at Fresno shows a fairly typical arrangement for a small station, with a central waiting space surrounded by administration offices, services, and the airline offices. A control tower is provided for on the second floor although at present these facilities are taken care of in the airline offices. Adequate for a limited traffic load, such a plan presents considerable difficulty if expansion of the building should be required. An advantage of the plan is a maximum distance of 400 ft. from car to plane.

Conventional in approach, the station at Houston nevertheless shows a very workable arrangement for a terminal of moderate size. There is complete separation between the passengers and the various control rooms, ticket and operations office are grouped for minimum of personnel, and the coffee shop and washrooms are adequate for the number of people using the station. Provision is made for spectators on the mezzanine terraces. If expansion were desired, the problem would be simpler than in the scheme shown above.

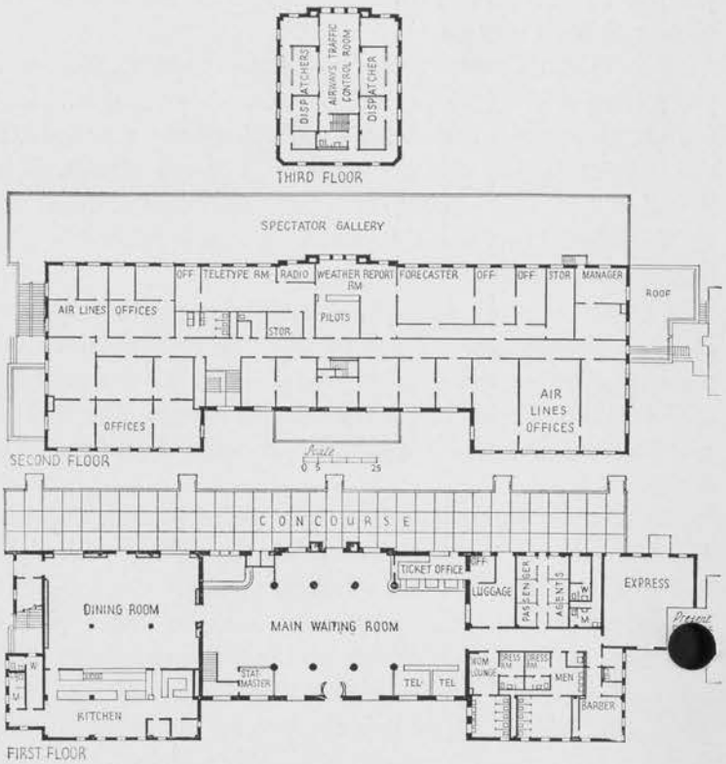
The terminal building in Kansas City is one of the best of such structures built to date. Both plan and exterior are clean, direct in expression, economical in arrangement and use of materials. The second floor offices are properly located, with services related to flight control in a central group directly under the tower. Spectators are given an elevated gallery which has an excellent view of the field without interfering in its operation. Expansion can be provided for by extending the concourse at the dining room end.



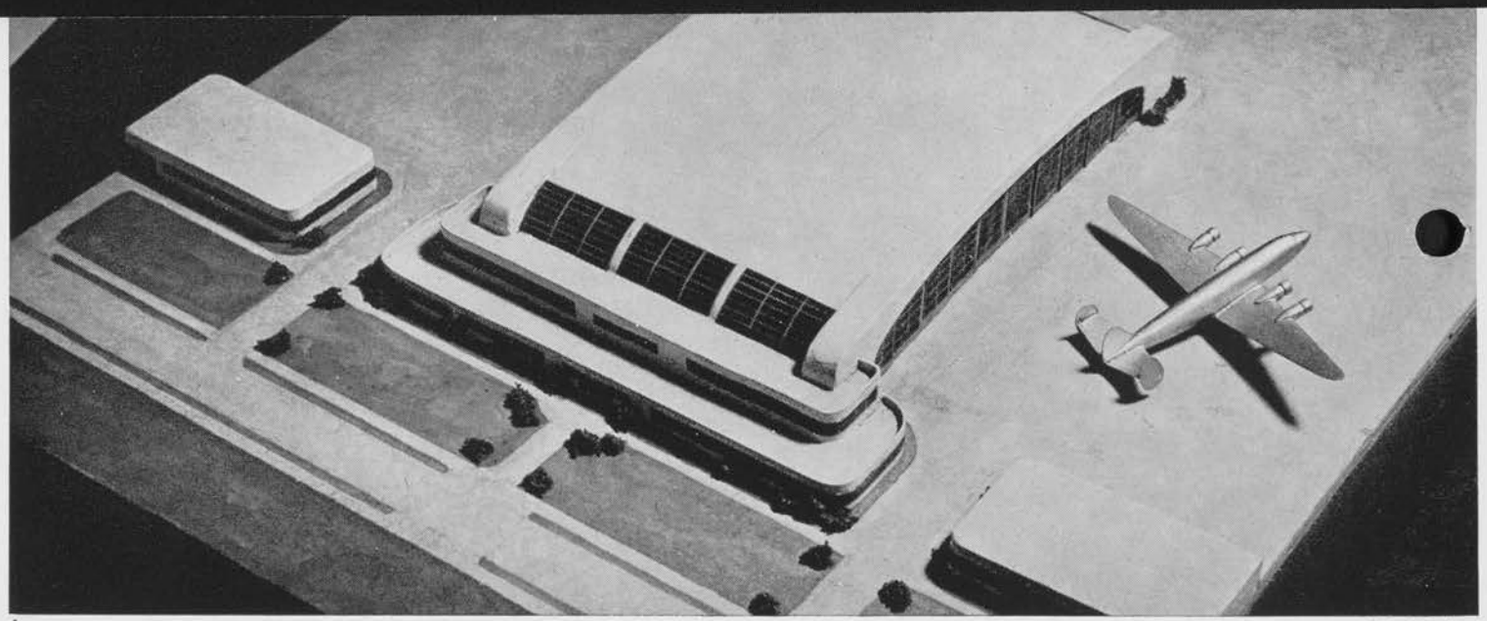
MUNICIPAL AIRPORT, FRESNO, CALIF.
ALBERT C. WHITE, ENGINEER



MUNICIPAL AIRPORT, HOUSTON, TEXAS
JOSEPH FINGER, INC., ARCHITECTS



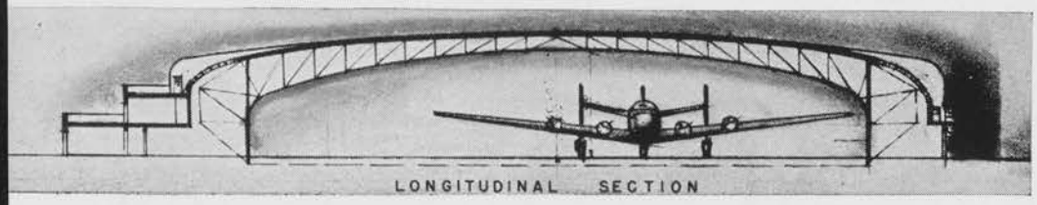
MUNICIPAL AIRPORT, KANSAS CITY, MO.
GENTRY, VOSKAMP AND NEVILLE, ARCHITECTS



1

John B. Beinert

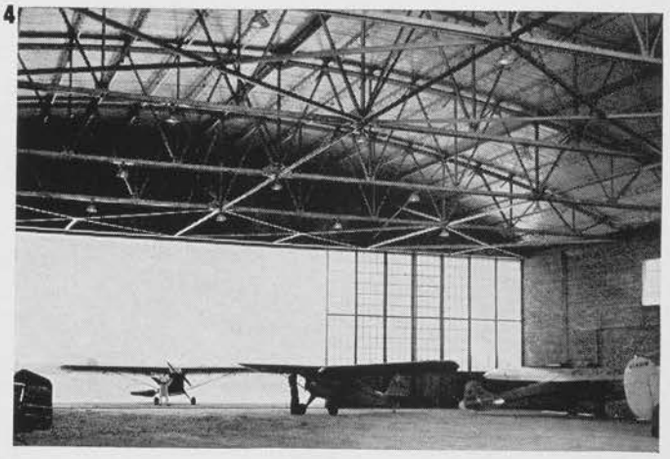
2



3

HANGARS. The essential requirements of a hangar are minimum height, maximum clear span, and easily operated doors. Perhaps the most common and inexpensive type is the steel-framed shed **5,** covered with corrugated iron or some other light material, and equipped with sliding doors. Other types of roof construction are shown in illustrations **2** and **3.** The larger hangars are now being equipped with motor-operated overhead doors **4** which, despite their enormous size, can be opened and shut in well under a minute. An unusually interesting project is shown above (1, 2), designed by Fellheimer and Wagner. Its roof construction reduces the height by as much as 30 feet in some cases without loss of headroom. Doors on each side of the hangar greatly increase the flexibility of the building; shops and offices are located at the ends.

4

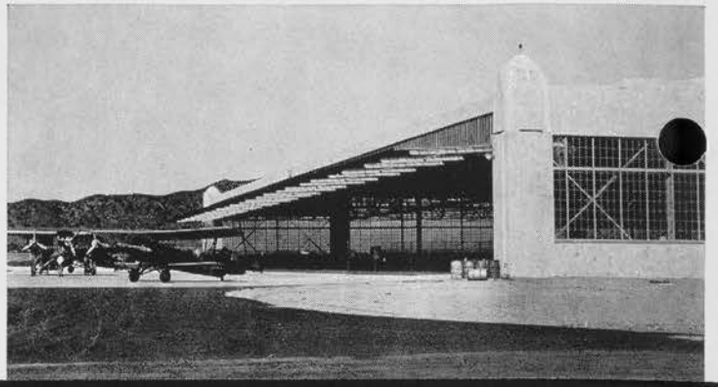


5

De Palma—BS

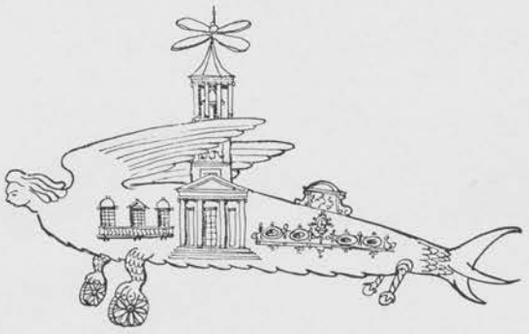
6

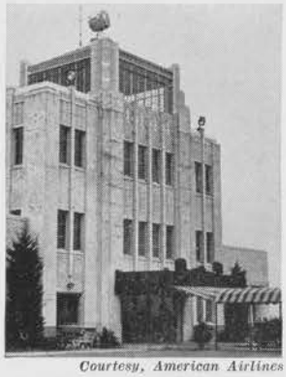
Courtesy, Austin Co.



EXTERIOR DESIGN

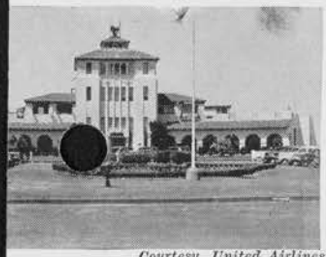
The twenty photographs below present a fair cross-section of terminal buildings found all over the U. S. Well-designed structures are to be found, but not often. It is suggested that if the plane designers operated on the same basis as those responsible for the overwhelming majority of terminals, the latest super stratoliner might not be unlike the sketch at the right.





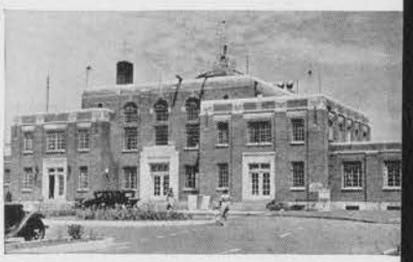
Courtesy, American Airlines

Courtesy, American Airlines



Courtesy, United Airlines

Courtesy, TWA

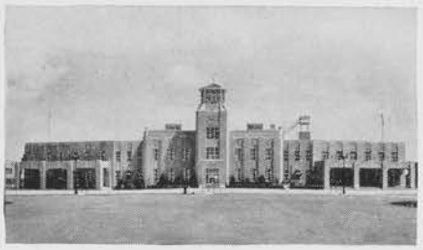


Elwood M. Payne

Courtesy, American Airlines

Courtesy, American Airlines

Edward Lit



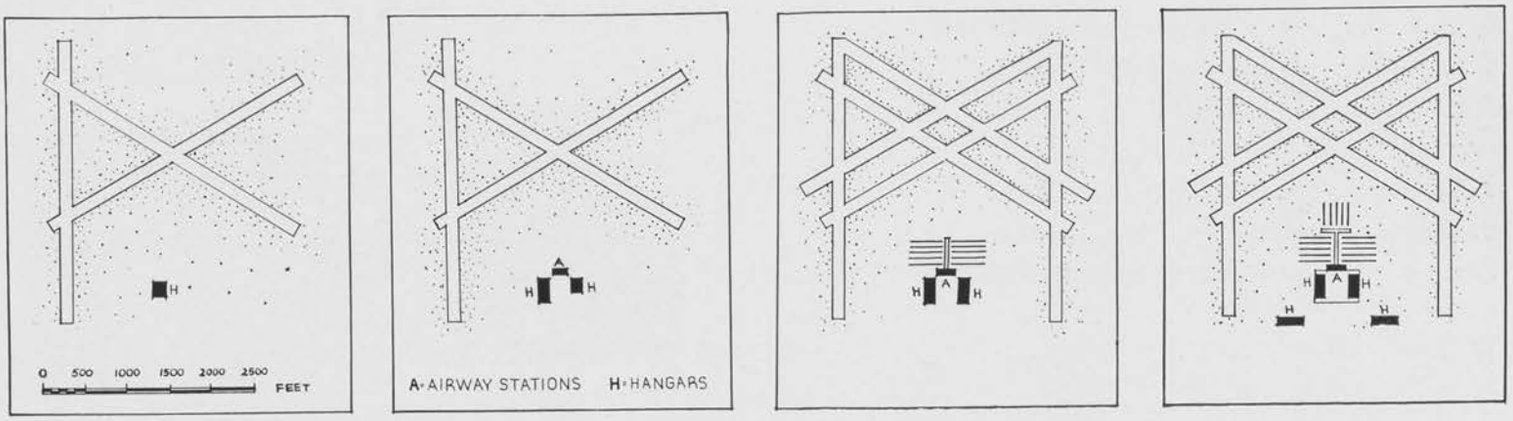
Carl M. Mydans

Courtesy, Eastern Airlines

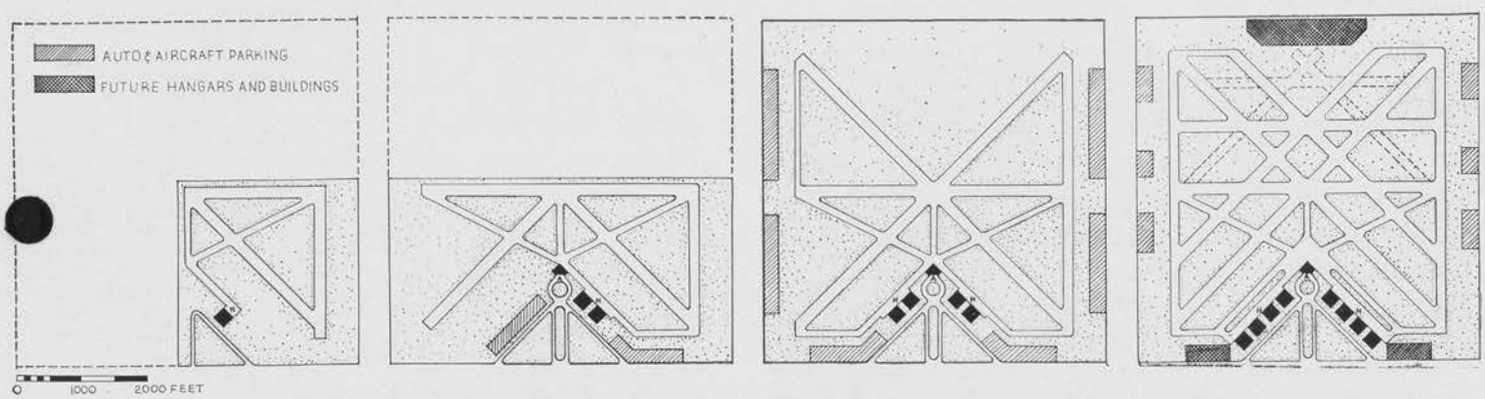
EXPANSION. Of paramount importance, as has been stated elsewhere in this article, is the planning of an airport so that when need arises it may be expanded with a minimum of expense and rearrangement. This applies to both the field and the buildings which serve it. In the light of experience now available to the planner, such provisions are by no means difficult to arrange for, if the community shows sufficient foresight to acquire title to all the land that will eventually be required, and to enact zoning regulations that will adequately control the surroundings.

Two schemes are illustrated here. The plan by Mr. Wood was developed some years ago, and envisages expansion of both field and buildings. The loading platform employs a unique conveyor system described in somewhat more detail on page 88. The plan by the Civil Aeronautics Authority, worked out after more experience had been accumulated, shows a more comprehensive development, from a field handling only light sports and trainer planes, to a complete airport one square mile in area, accommodating the largest transports. The final stage is by no means a complete solution, however, as the solution for automobile traffic and parking is inadequate.

TRAFFIC-CONTROL-AIRPORT-EXPANSION PLAN, John Walter Wood, Airport Consultant



MASTER PLAN, Technical Development Division, Civil Aeronautics Authority



PRINCIPLES OF PLANNING

The following list attempts to summarize, in very condensed form, the basic requirements for a modern airport. It is assumed that the location of the airport has been established after proper consideration of the city's present and probable future needs, the existing and projected highway facilities, and the relation of such an airport to the national defense program.

SITE

The question of size is fundamental. Since the future of the rapidly expanding industry is likely to exceed even the most optimistic of present-day calculations, it seems reasonable that any airport, no matter how small, should control enough ground to permit its eventual development as a Class 4 airport. Zoning restrictions should also be established to prevent the building of obstructions in the vicinity of the field.

A Class 4 airport as defined by the Civil Aeronautics Authority, has sufficient size to permit the safe operation of the largest aircraft now in operation or proposed for the immediate future.

TERMINAL BUILDING

This building will include some or all of the following facilities, depending on the size of the airport: passenger facilities, space for visitors, dining and lunch rooms, offices for traffic control, weather bureau, airline offices, baggage, mail and express rooms, administration offices. In planning for these services, the following should be considered:

1. Orderly arrangement, enabling passengers to locate all facilities readily.

2. Shortest possible walking distance for passenger between car and plane.

3. Complete separation of passenger and service activities.

4. Major station facilities for public at one level.

5. Direct view of all plane gates from passenger concourse.

6. All loading and unloading of passengers, mail and freight to take place under cover, without crossing of circulation.

7. Complete separation of sightseers from rest of station activities.

8. Placing of concessions to ensure adequate patronage.

9. Attention to acoustical design to permit efficient operation of public address system.

10. Traffic control tower to have unimpeded view of entire field. Room should have floor space of at least 120 sq. ft.

11. Restaurant should be designed to give optimum view of field.

12. Adequate provision for expansion of building and plane loading platforms.

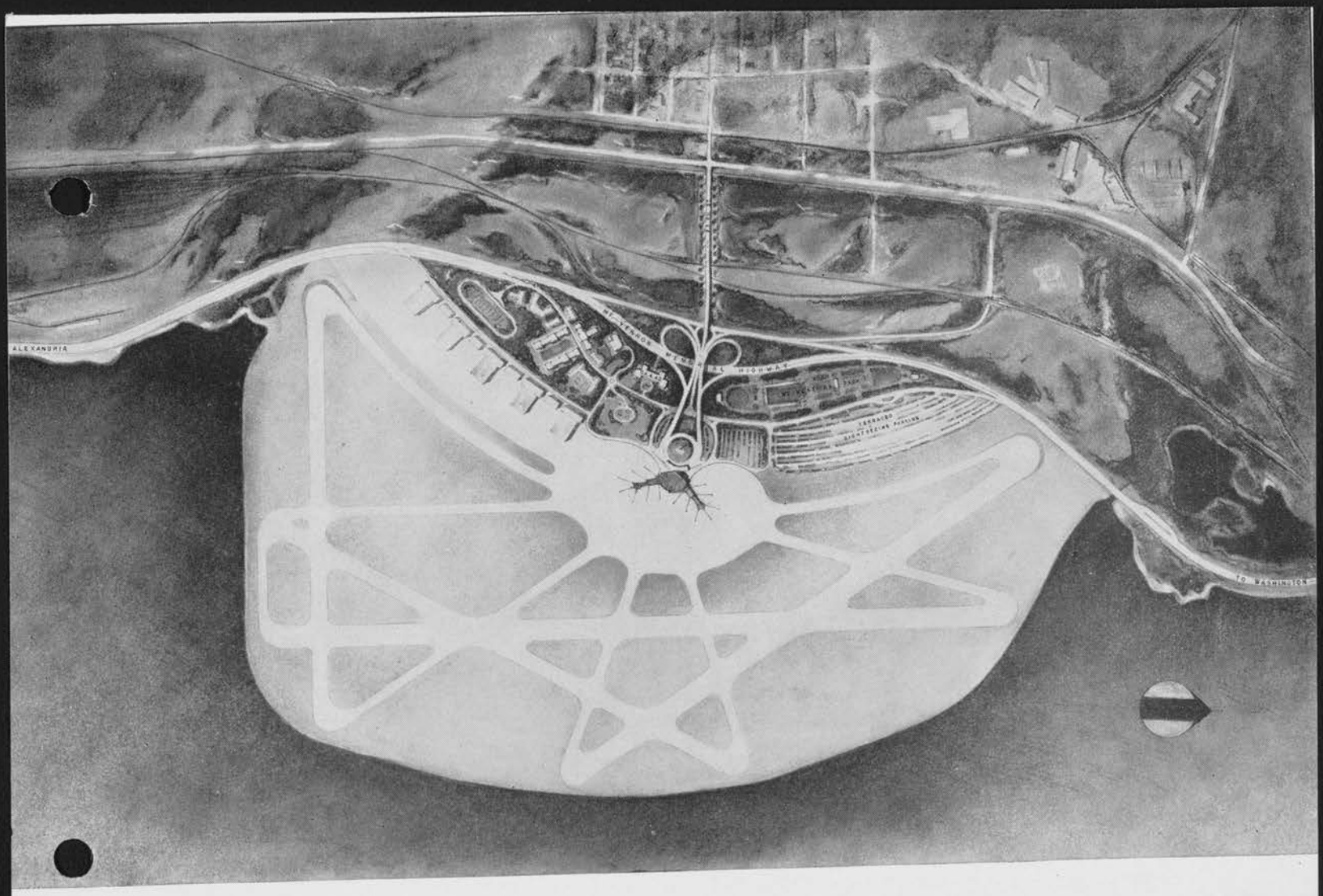
13. Terminal building should be placed in approximate geographical center of field, in close proximity to all runways.

14. Plane taxi strips centered radially on station, and of average length, avoiding excessive distances to any particular runway.

15. Ample provision for various types of parking: passenger, employe, sightseer, directly related to building and to adequate system of one-way roads free from grade crossings.

16. Appearance of terminal to express in a general way its relation to a contemporary mode of transportation. Frank acknowledgment of structural elements. Materials selected with view to effect of lightness. Mass of building as low as possible.

For their generous assistance in connection with the preparation of this article, FORUM wishes to thank the following: Ralph S. Damon, Vice-President in charge of operations, American Airlines, Fellheimer & Wagner, architects, Poor and Wood, airport consultants, Captain Robert Dawson, pilot, United Air Lines, J. C. Young, assistant superintendent Air Mail Service at New York, Frederic A. Rogers, Wm. Steele, Railway Express Company, Major A. B. McMullen, Civil Aeronautics Authority, Joseph Meehan, chief engineer, LaGuardia Field, New York. Eastern Airlines, Inc., Northwest Airlines, Transcontinental and Western Airlines, United Airlines.



PROJECTED AIRPORT

FELLHEIMER & WAGNER, ARCHITECTS*

L. L. ODELL, AVIATION CONSULTANT

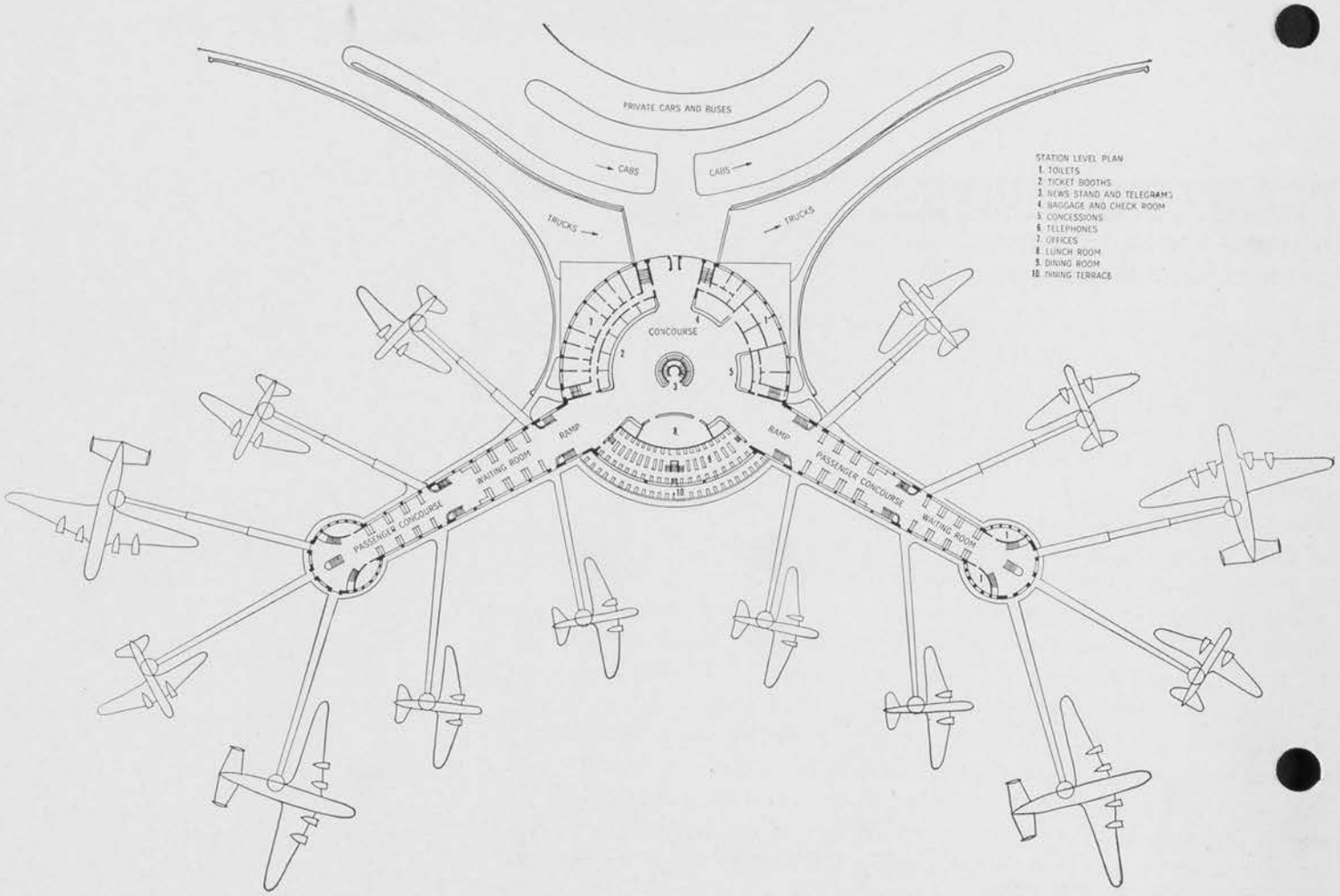
The drawings shown on this and the following page present two schemes prepared by Fellheimer & Wagner in conjunction with their work as consultants for the new airport in Washington. Neither solution is being built, but the plans show so brilliant an approach to a series of transportation problems that they are worthy of the most careful examination.

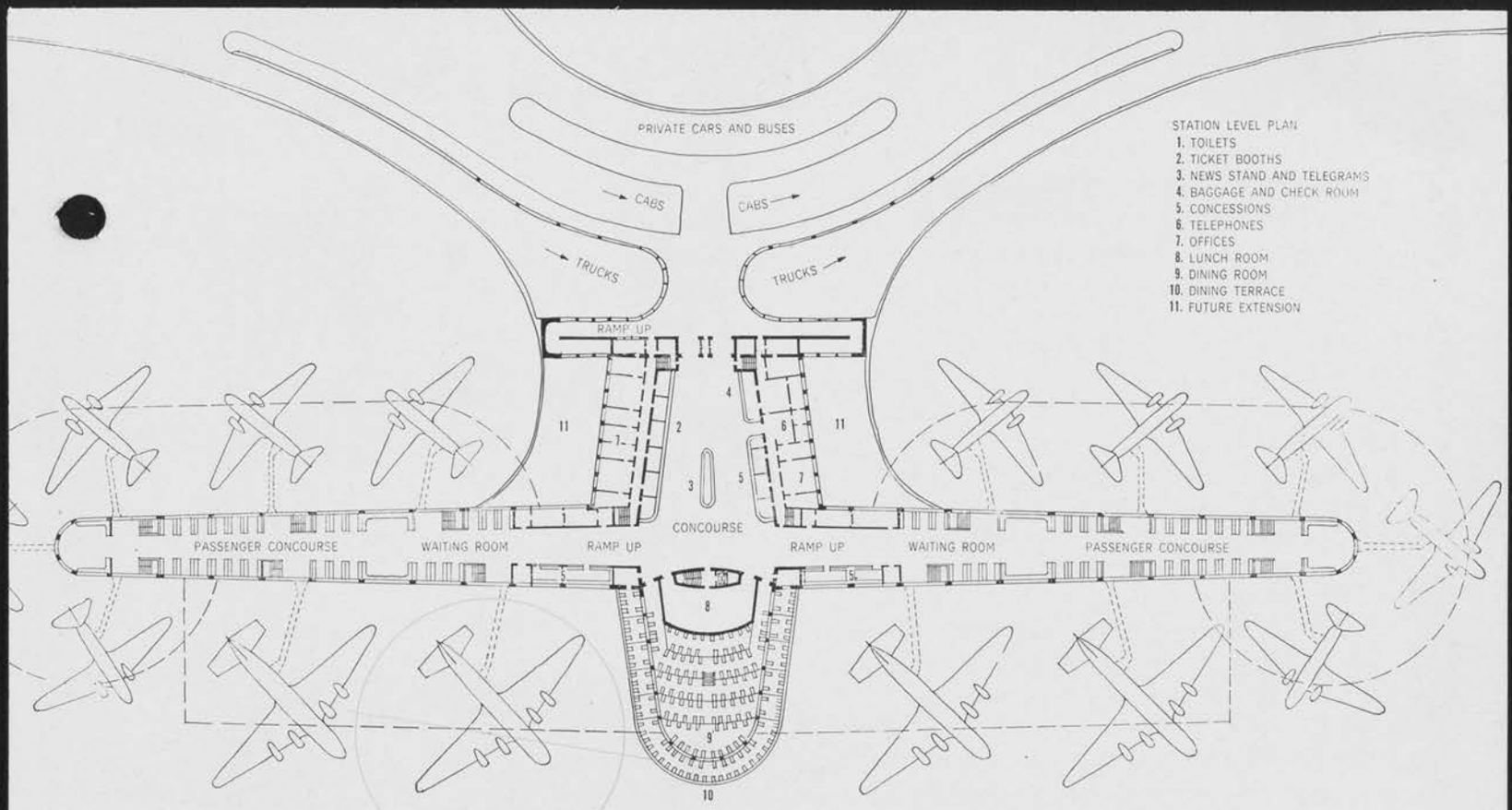
The schemes are essentially similar, and both reflect the importance of using experience gained in other fields of transportation. The reputation of the firm in railroad terminal design is of course well known, and many features developed for these buildings have been used here most successfully. There is a complete system of vehicular approaches to the building, arranged on two main levels to provide complete separation of passengers (upper level) and freight and mail (lower level). Sightseers are routed up ramps at the entrance, so that [illegible] go directly to the observation roofs without in any way disturbing the other functions of the building. In each case the restaurants are so designed that they command a full view of the field; a lunch

*Acknowledgment is made by Fellheimer & Wagner to Mr. Charles Rausch, United Air Lines for his valuable suggestions.

room is placed on the main level for quick service to passengers, and other lunch rooms located on the field level for flying personnel and employes. There is no large waiting room in either plan, but a series of seats all along the passenger concourse. This arrangement was first used by the architects in the Cincinnati terminal to enable passengers to reach gates with the least loss of time. In each plan the entire length of the passenger concourse can be supervised from one central point, thus permitting policing with a minimum of personnel. The architects considered that an under-cover approach to the planes was an absolute necessity. In the first scheme this is provided by a series of adjustable telescoping passageways (see page 76 and below). In the second plan shelter is furnished by cantilevered overhangs, open gangways to the planes being used for access. Common to both schemes are the projecting concourse units, which permit plane loading from both sides at once.

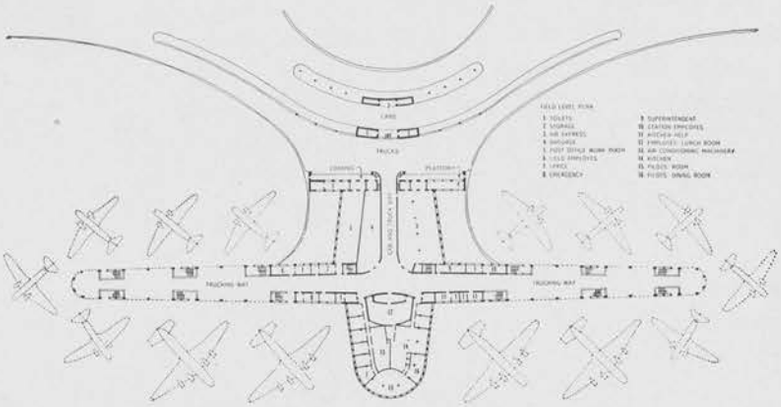
MODEL OF FIRST SCHEME FOR PROJECTED AIRPORT

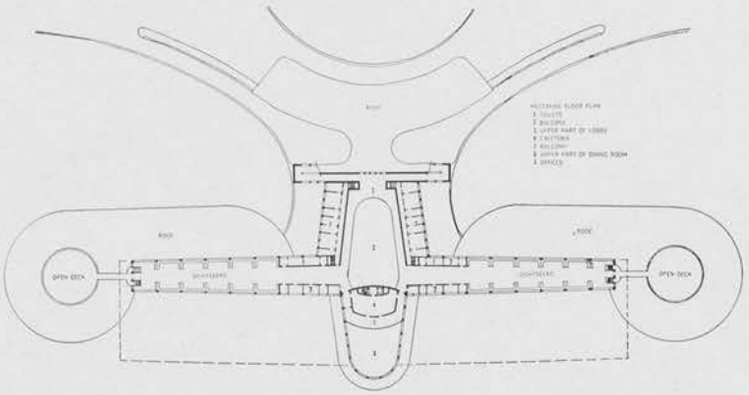


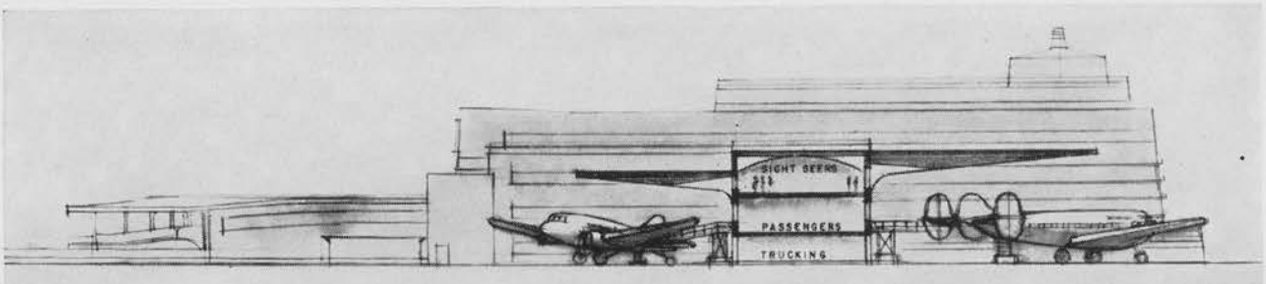


SECOND SCHEME FOR PROJECTED AIRPORT

Outstanding feature of this scheme is the bold use of projecting shelters, cantilevered out from the structure to provide permanent protection of planes and passengers. The architects consider that the added convenience and protection in the loading and unloading of baggage, express and mail matter, and the elimination of damage claims will more than compensate for the cost of this form of shelter. Another interesting characteristic of both schemes is the ease with which expansion can take place. The terminal might consist of only the central unit at the beginning, the wings being added and extended as traffic increases warranted. As in all other airport designs the limits of such expansion would be limited only by the capacity of the optimum field, and by the distance passengers had to travel from the entrance to the plane gates.





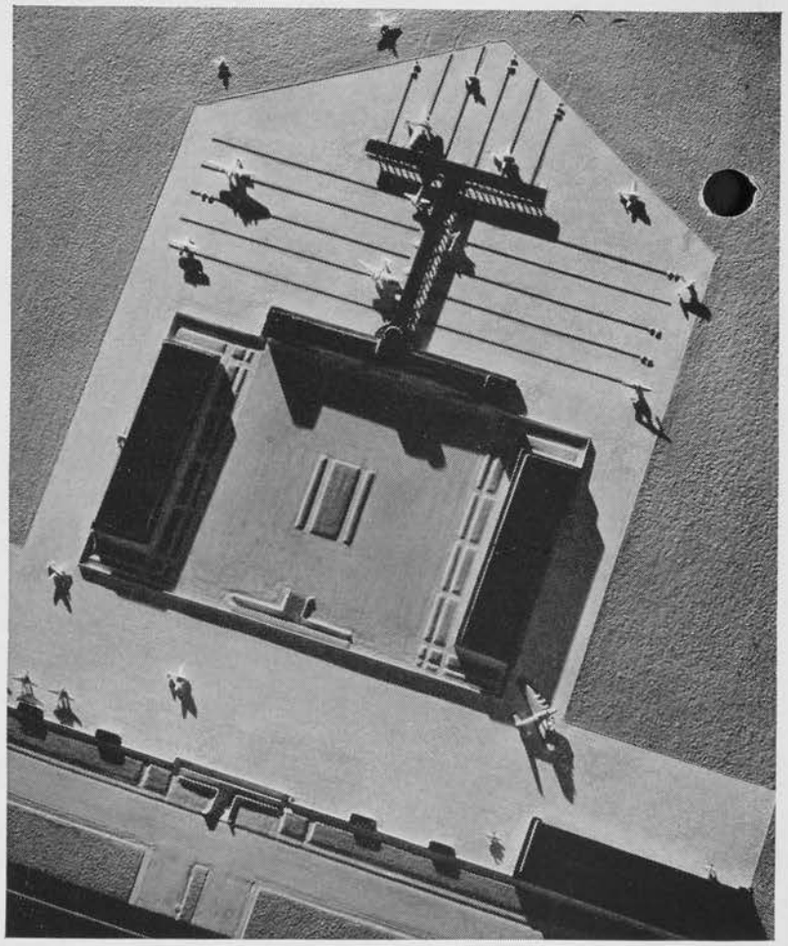


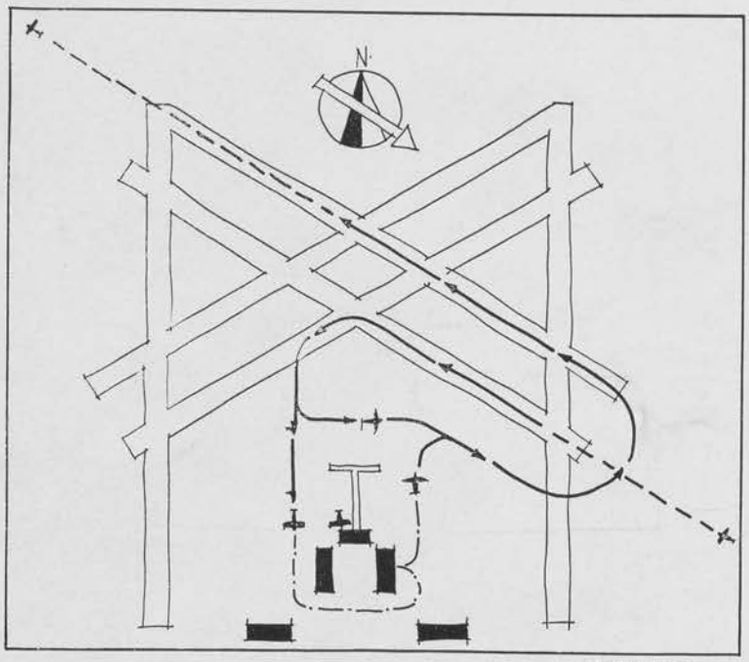
SECTION THRU CONCOURSE

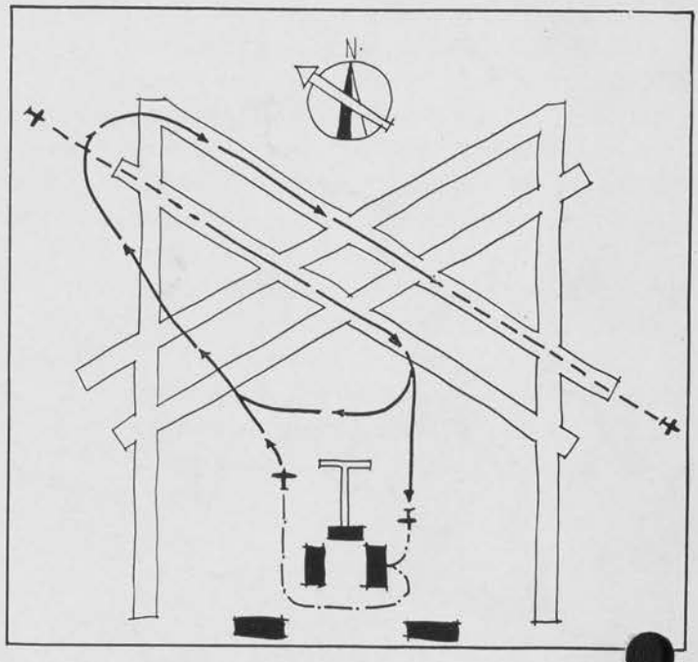
PROJECTED AIRPORT

JOHN WALTER WOOD, AIRPORT CONSULTANT

The most important feature in the Wood plan is that it eliminates all cross circulation of planes on the landing area. The T-shaped loading platform is elevated to avoid mixing of passenger and freight traffic. A mechanical system of conveyors moves the planes into position, eliminating movements of planes near the platform under their own power. This permits a closer, more accurate spacing of the planes and reduces the annoyances of motor noise, dust, and other objectional features of the present-day loading platform. Express planes and through planes would use the exterior platform, while slower planes or those terminating their flight at this station would use the interior one. The circulation diagrams below illustrate the field in use under different wind conditions. The entire plan is described in some detail in Mr. Wood's forthcoming book "Airports—Some Elements of Design and Future Development" which also includes plans and photographs of 50 existing airports. This book will be published in the autumn by Coward-McCann, Inc.





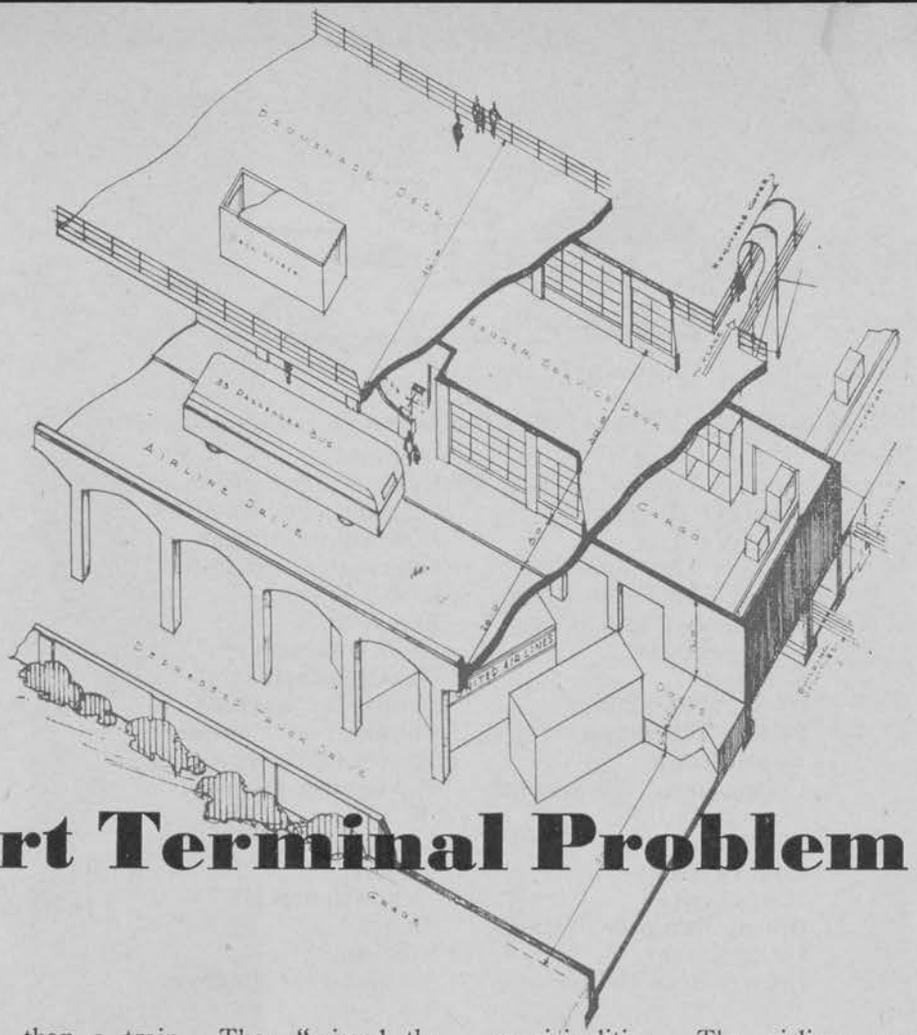


LEGEND

—— Planes Loaded

—·—·— Planes Unloaded

- - - - - Planes In Flight



Section showing second stage of unit terminal development.
Ground level—cargo
First deck—Passenger service
Top deck—Spectators

Albert F. Heino
Architect United Air Lines

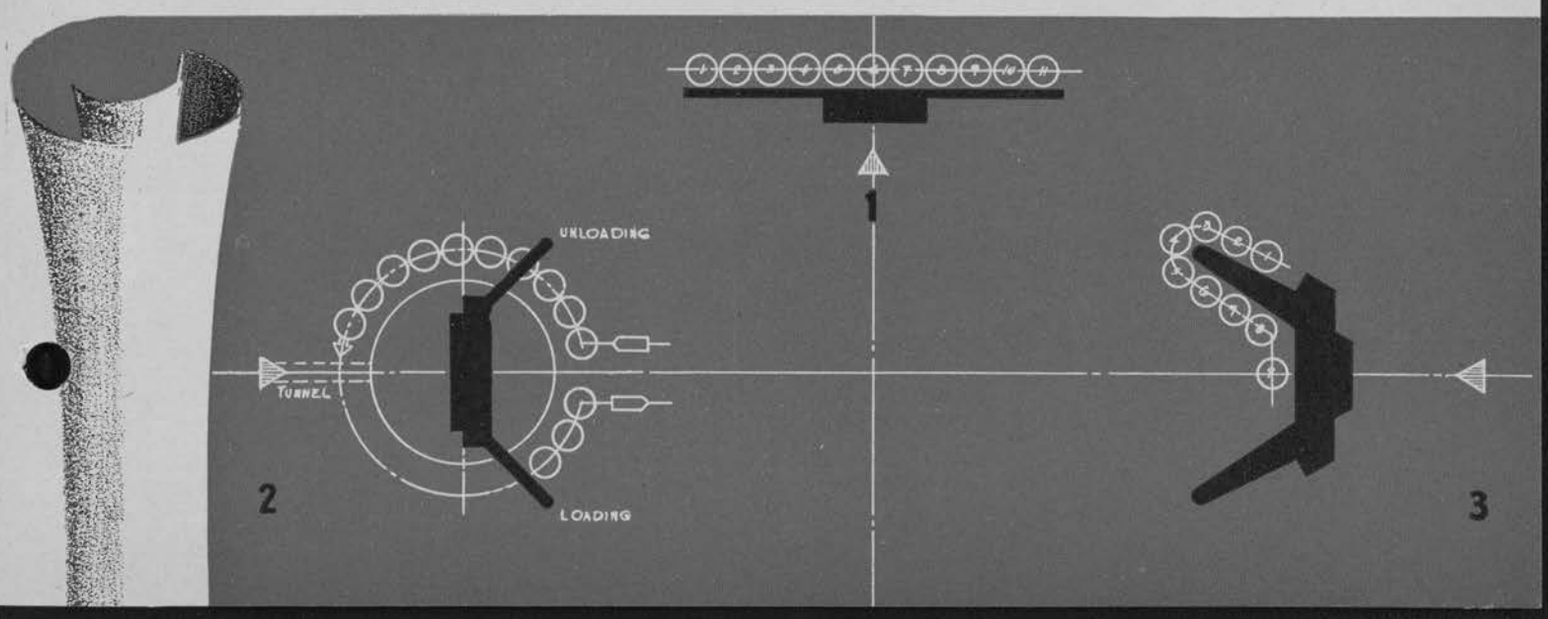
The Airport Terminal Problem

IT HAS been the custom for municipalities, when they have built terminal buildings, to call in local architects, many of whom had little or no experience with airline operation, and, after a very limited study of these problems, they produced designs that were monumental in character and in most cases lacked evidence of functional study. Certainly they provided very little for expansion, a prime requisite in airport development. They emulated railroad stations and disregarded the fact that an airplane, by its very nature, requires a different sort of berth than a train. They "missed the boat" in not creating a new type of architectural development made possible by air transportation.

A hopeful sign for the future is the realization by the airlines that this problem is vital to them and they are studying the problem intensively, offering their service to the municipalities to assist them in planning for the future. Airline technical committees composed of engineers representing the individual airlines concerned, are studying the problem in an advisory capacity to airline management and to the municipalities. The airlines are "pooling" their best technical thinking in these committees in an effort to avoid the mistakes made in the early development of the industry and to plan with vision for the future. The CAA and the ATA are likewise setting up agencies for the study of airport planning. With such intensive study and with the cooperation of municipalities we may expect a rate of development comparable to that of the aeronautical engineers who have progressed far beyond the ground planners.

In an analysis of the airport ter-

Figure 1—Variations of central design.



Partially Scanned Material

Version 2
December 6, 2016

The Airline Unit Terminal Plan

by

ALBERT F. HEINO
Architect, United Air Lines

Reprinted from
AIR TRANSPORT, January, 1945

Partially Scanned Material

Version 2
December 6, 2016

REPRINT.--Paper presented at Chicago, Ill., Dec. 9, 1942, at the Air Cargo Engineering Meeting, sponsored by the Chicago Section of the Society of Automotive Engineers, with the cooperation of the SAE Aircraft Activity, the Air Transport Association and the Aeronautical Chamber of Commerce. Subject to revision.

TERMINAL HANDLING OF AIR CARGO

By

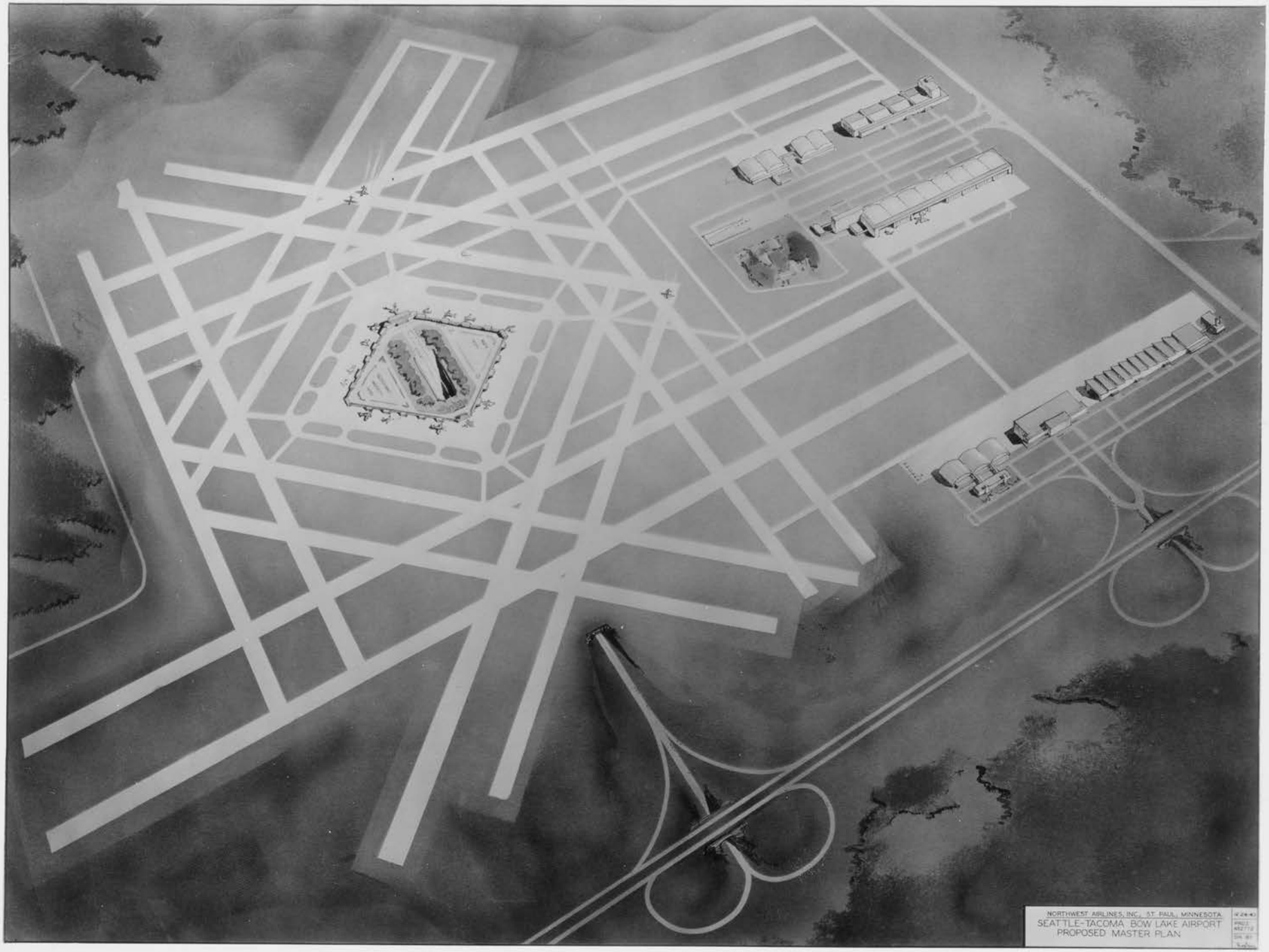
Karl O. Larson
Northwest Airlines - St. Paul
Chief Engineer

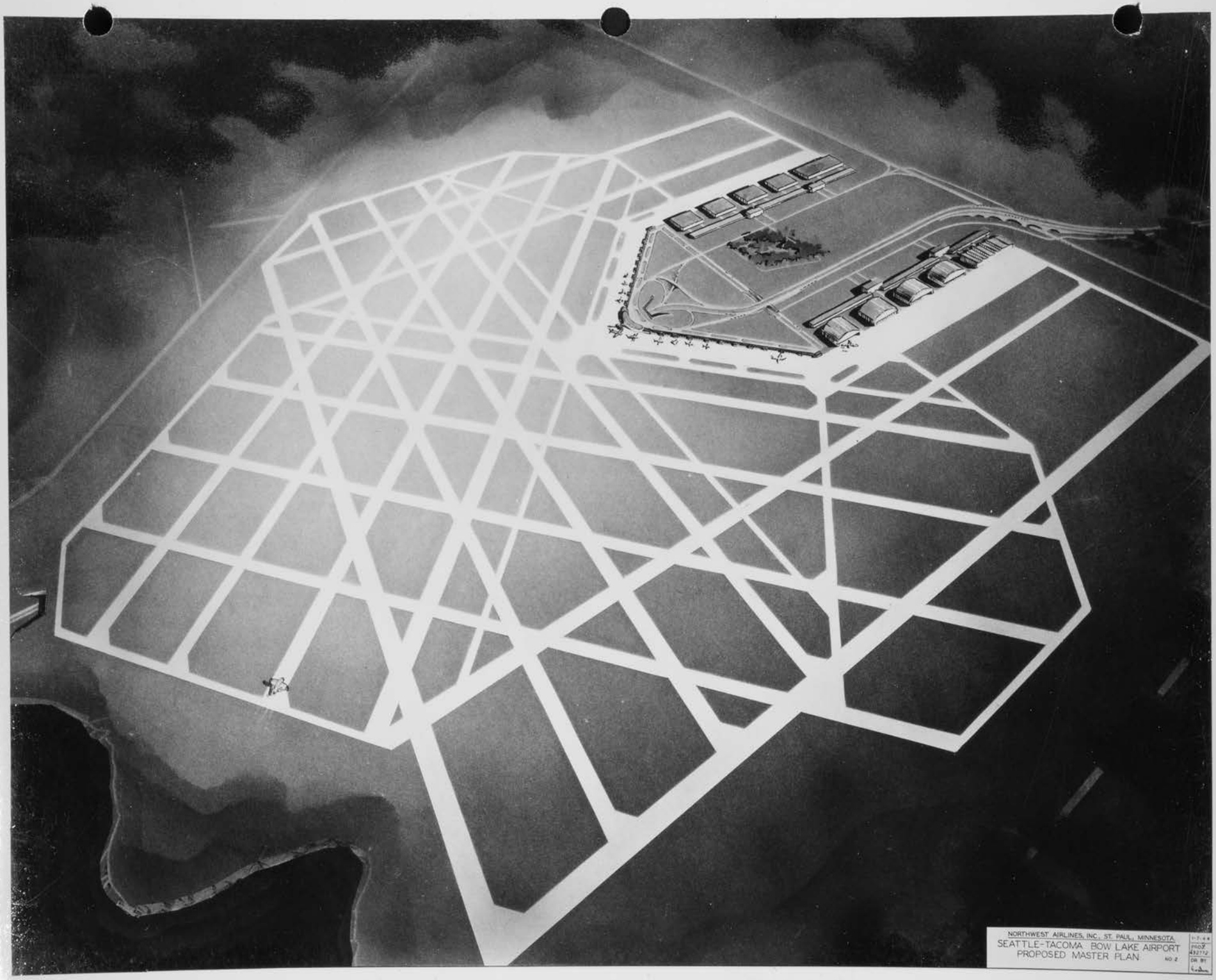
Terminal handling of air cargo as a subject for a paper did not lend itself too well as a subject for technical analysis largely because of the indeterminates that go to make up the principals of the subject. We have no air cargo terminals and we have not yet developed air cargo. We are today handling rail cargo and we are doing it at passenger terminals and hauling it in passenger aircraft.

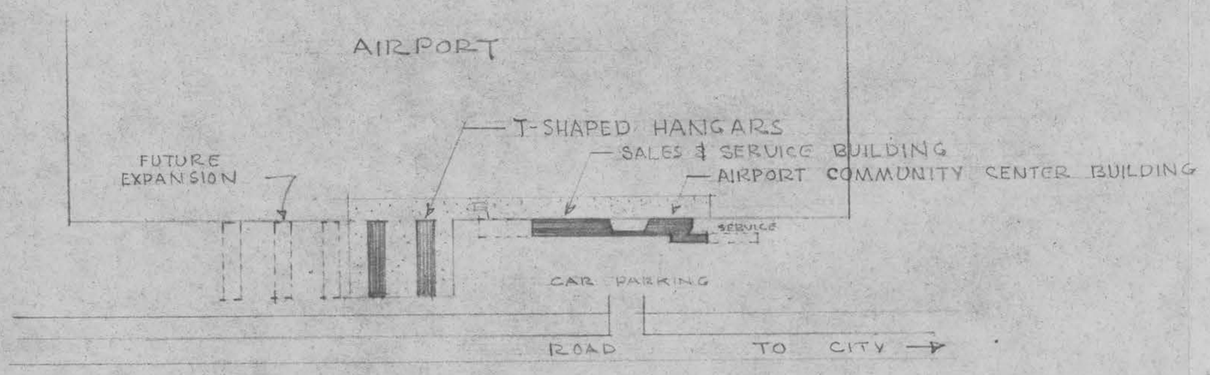
As of today we have no air cargo in the true meaning of the word. We carry that small fringe of the total cargo that must move quickly at any cost. We take it or reject it depending on the load capacity of the aircraft. We cannot guarantee its scheduled delivery. Our handling from the time it is picked up until the time it is delivered leaves much to be desired by ourselves and by the shipper.

Partially Scanned Material

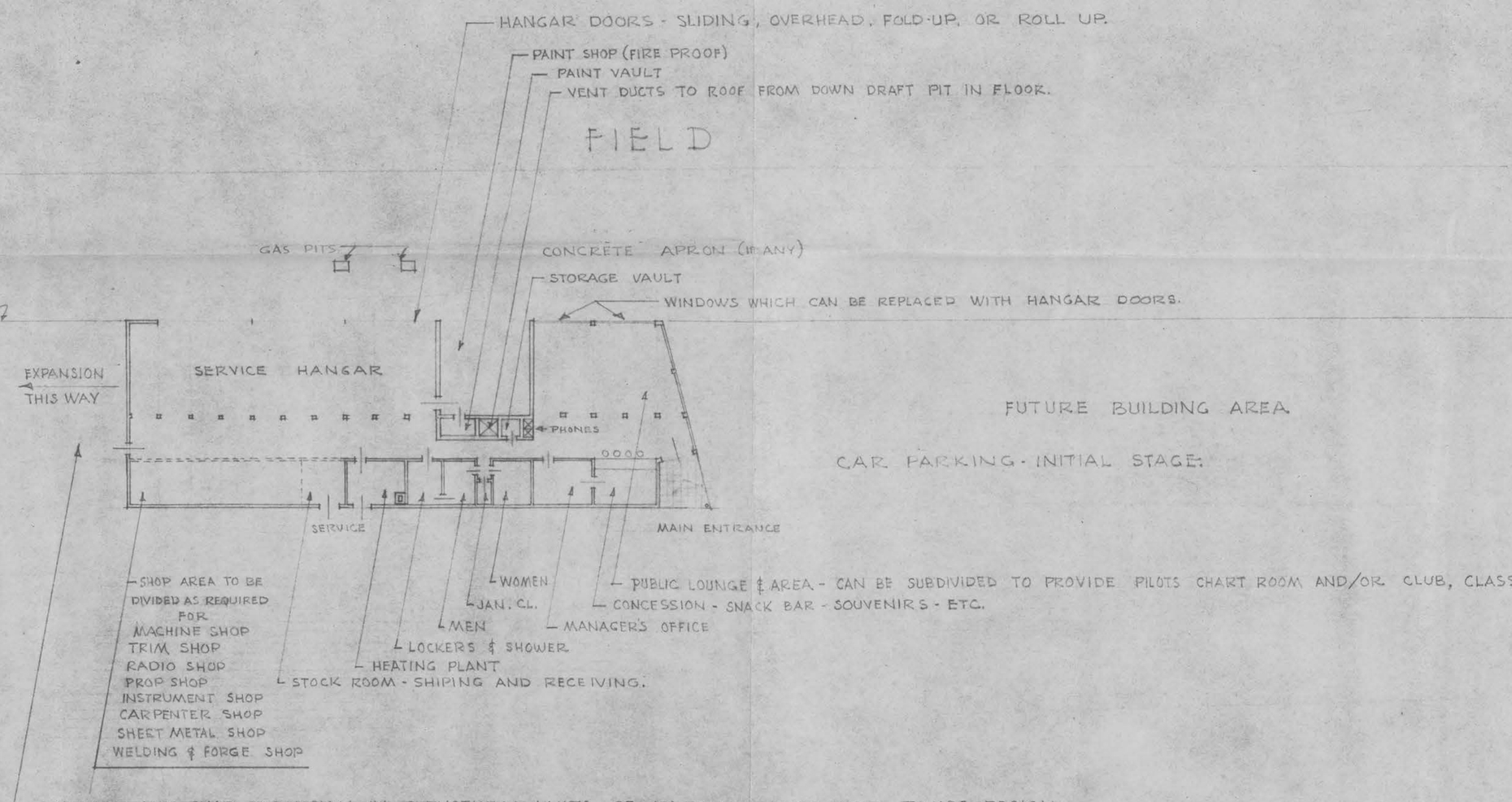
Version 2
December 6, 2016


NORTHWEST AIRLINES, INC., ST. PAUL, MINNESOTA
SEATTLE-TACOMA BOW LAKE AIRPORT
PROPOSED MASTER PLAN


NORTHWEST AIRLINES, INC., ST. PAUL, MINNESOTA
SEATTLE-TACOMA BOW LAKE AIRPORT
PROPOSED MASTER PLAN
NO. 2
11-7-44
PROJ. 43212
DR. BY



PLOT PLAN NO SCALE

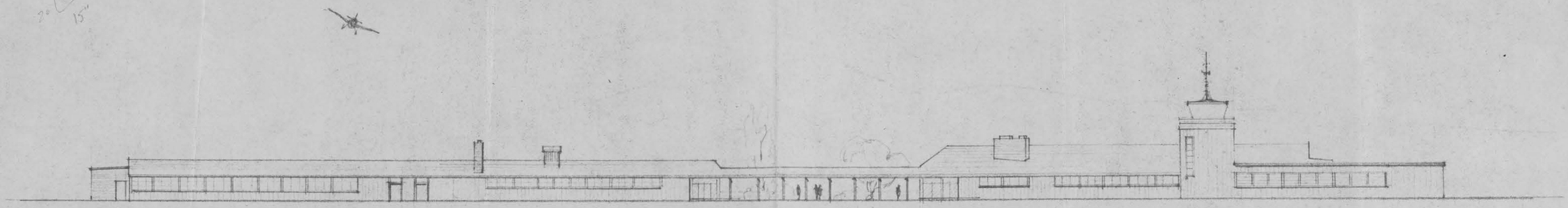


INITIAL STAGE - SALES AND SERVICE BUILDING.

SCALE: 1" = 30'-0"

F.R. MEISCH, REG. ARCHITECT. MINNEAPOLIS. MINNESOTA. JAN. 24. 1945

10" / 30 / 300' / 15" / 20



ELEVATION FROM CAR PARKING AREA

FIELD

GAS PITS

OIL STORAGE

PAINT SHOP

Planes would flow to & from hangar

Support to cable between T-Hangars & main bldg.

CONCRETE APRON

GAS PITS — OIL STORAGE & DE-ICER FLUID

IN THIS AREA PUBLIC VIEW OF AIRPORT

Too much traffic near offices?

Partition in initial stage to keep out noise of general public in lounge & cafe?

DOORS

OFFICE

FENCE

PL. GLASS WINDOWS

SPECTATOR'S RAMP

SERVICE & REPAIR HANGAR (POSSIBLY TRANSIENT AIRCRAFT STORAGE)

PAINT SHOP

AIRCRAFT DISPLAY & SALES

LOUNGE

CAFE

LUNCH BAR

KITCHEN

SERVICE COURT

POOL

PATIO

SHOP

MEN LOUNGE

DOWN

PHONES

PARTS DISPLAY

PORTICO

PROJ. BOOTH, AUDITORIUM - THEATRE CLASSROOM

PAINT VAULT

SHOPS

SHOPS

ETC. STORAGE

HEATING

M.

W.

OFFICE

WOMEN

MEN

BASEMENT UNDER

FIRE TRUCK GARAGE (FIREPROOF CONST.)

SERVICE

EXPANSION

EXPANDED HEATING PLANT

HEATING PLANT

STOCK ROOM

PARTS DISPLAY

MAIN ENTRANCE

CHART ROOM

AIRPORT OFFICE

MANAGERS OFFICE

DEVELOPE INTO CONCESSIONS OR PILOTS CLUB ROOMS IF OFFICE AND SCHOOL WING IS CONSTRUCTED

HEATING PLANT for Paint Shop

SALES AND SERVICE BUILDING

CAR PARKING AREA

AIRPORT OFFICES - CLASS ROOMS - SCHOOL OFFICES LINK TRAINER ROOM, ETC. CONSTRUCT AS EXPANDED NEEDS DICTATE. EXPANSION MAY ALSO BE BY A 2ND FLOOR.

CONTROL TOWER AT 3RD FLOOR LEVEL IF WARRANTED BY AIRPORT TRAFFIC VOLUME.

INITIAL STAGE?

2ND OR ULTIMATE STAGE ADDITIONAL SHOP SPACE CONNECTS PAINT SHOP TO REPAIR HANGAR.

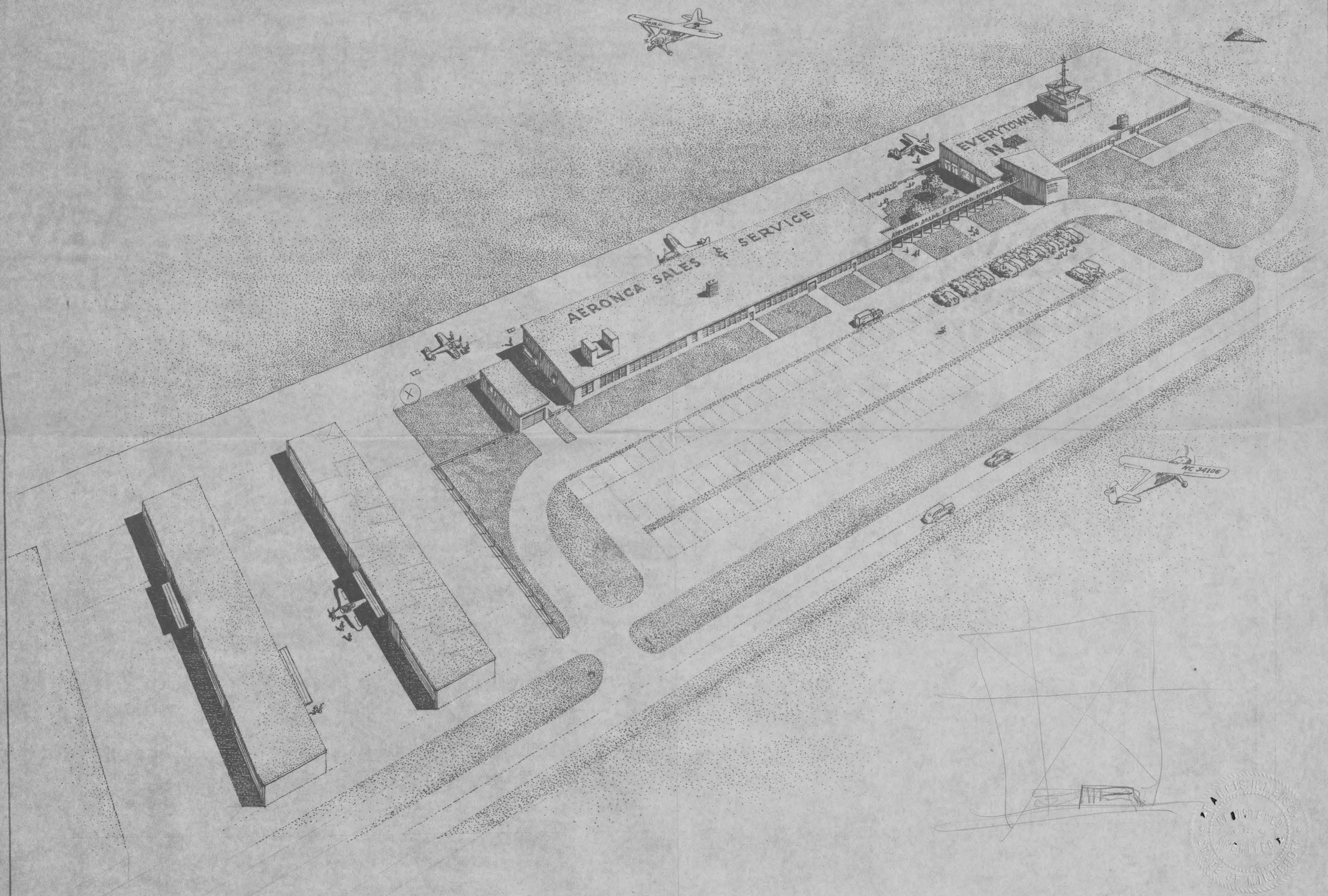
INITIAL STAGE

AIRPORT COMMUNITY CENTER BUILDING.

ADVANCED STAGE · AIRPORT COMMUNITY CENTER.

SCALE: 1" = 30'-0"

F.R. MEISCH, REG. ARCHITECT. MINNEAPOLIS, MINNESOTA. JAN 24, 1945



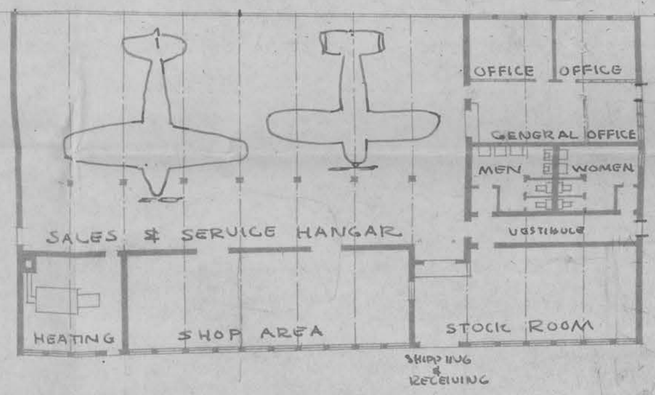
PILOT'S (BIRD'S EYE OR AERIAL) PERSPECTIVE OF AIRPORT BUILDING DEVELOPMENT.

INCOMPLETE 3/6/45

FIELD

GAS PITS

FUTURE EXPANSION



FENCE

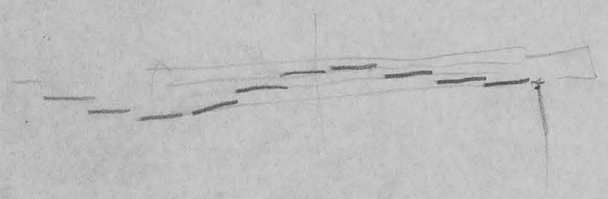
SPECTATOR'S AREA

FUTURE EXPANSION

ENTRY

TO TEE HANGARS.

ACCESS ROAD & CAR PARKING



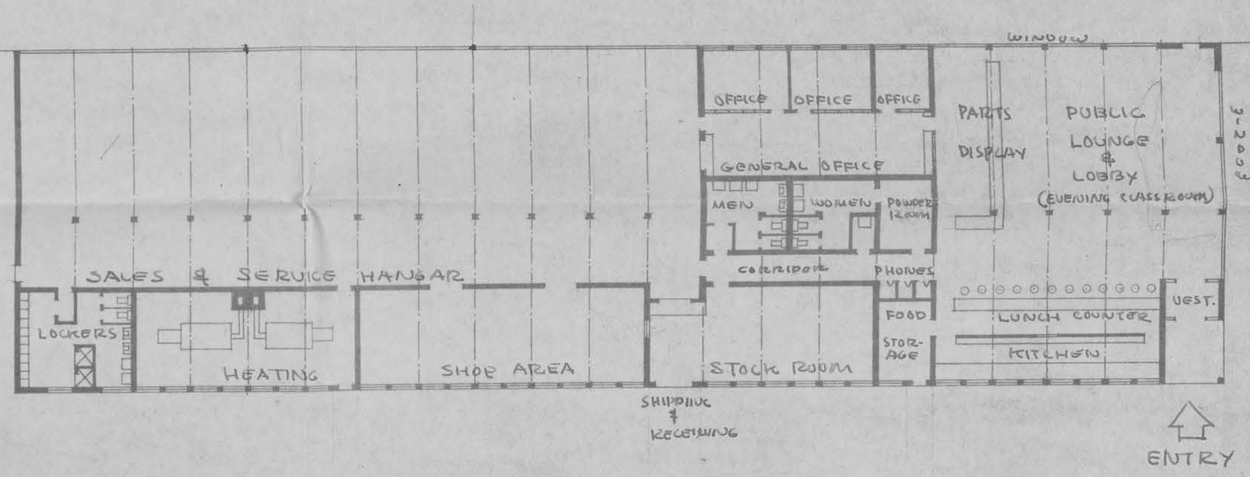
SALES & SERVICE BUILDING · INITIAL STAGE SCALE: 1" = 20'-0"

INCOMPLETE 3/6/45

FIELD

GAS PITS

FUTURE EXPANSION



← TO TEE HANGARS.

ACCESS ROAD & CAR PARKING

FRANCIS B. LEE REGISTERED ARCHITECT STATE OF MINNESOTA

SALES & SERVICE BUILDING - INTERMEDIATE STAGE SCALE 1" = 20'-0"

INCOMPLETE 3/6/45

FIELD

GAS PITS

CONCRETE APRON?

UNDER GROUND FUEL STORAGE

CRASH TRUCK & FIRE TRUCK

SALES & SERVICE TRUCK & SNOW PLOW ETC

GAS & OIL

OIL & ~~GREASE~~ FLUID & STORAGE AIR COMPRESS

VEST.

PAINT VAULT

PAINT SHOP

EXHAUST DUCTS TO ROOF

FILTERS

HEAT COILS OR RADIATORS

SCREENED LOUVRES

(ACCESSORIES) (STRUCTURAL) (ENGINE OVERHAUL)

SERVICE HANGAR

CIRCULATION AREA

RADIO - INSTRUMENT - TRIM SHOP AREA

LOCKERS

HEATING

ENGINE - MACHINE - WELDING SHOP AREA

SHIPPING AND RECEIVING

OFFICE OFFICE OFFICE

GENERAL OFFICE

MEN WOMEN POWDER ROOM

CORRIDOR

PHONES

STOCK ROOM

DOOR

AIRCRAFT DISPLAY & SALES ROOM

PARTS & ACCESSORIES DISPLAY & SALES

VEST.

3-2 x 0.3

℄ FENCE

SPECTATORS AREA / COURT / PATIO

PORTICO TO ADMINISTRATION BUILDING

ACCESS ROAD & CAR PARKING

← TO TEE HANGARS

FRANCIS KALEITA REGISTERED ARCHITECT STATE OF MINNESOTA

SALES & SERVICE BUILDING - ADVANCED STAGE SCALE 1" = 20'-0"

INCOMPLETE 3/6/45

FIELD

CONCRETE APRON

℄ FENCE

SPECTATOR'S AREA (LANDSCAPED)

CLUB LOUNGE & LOBBY

CANTS

CASHIER CIGARS & NEWS

RESTAURANT

LUNCH COUNTER SODA BAR

KITCHEN

SERVICE ENTRANCE & PORCH

SERVICE

SERV. VEST

UP TO CONTROL TOWER

D.C.

PHONES

FENCE

SERVICE

PHONES

VESTIBULE

PROJ. ROOM

100

PORTICO TO SALES & SERVICE BUILDING

POWDER ROOM

WOMEN

MEN

PILOTS CHART ROOM

AIRPORT OFFICE

AIRPORT MANAGER

HEATING

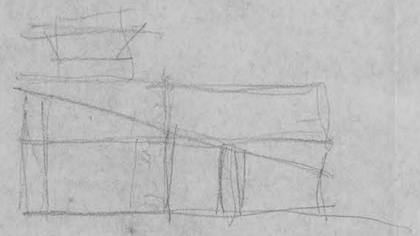
HEATING

ENTRY

AUDITORIUM
1. MOTION PICTURES
2. LECTURES
3. CLASSES
4. MEETINGS

POSSIBLE FUTURE ADDITIONS - ONE OR TWO STORY.
1. ADDITIONAL OFFICES
2. CLASS ROOMS } FLIGHT INSTRUCTION/ RADIO CLASSES/ INSTRUMENT REPAIR/
3. LABORATORY ROOMS }
4. LIBRARY
5. CLUBROOMS
6. SALES OFFICES
7. SERVICE SHOPS. AIRCRAFT ACCESSORIES - MFR. & R. R&R
8. PILOTS LOCKERS & SHOWERS
9. SLEEPING ROOMS - AERIAL TOURISTS SERVICE.

ACCESS ROAD & CAR PARKING



? what to call

AIRPORT ADMINISTRATION BUILDING · OR · PUBLIC CENTER FLYING CLUB · (EXPANDABLE) · TWO STAGES SCALE 1" = 20'-0"

INCOMPLETE 3/6/45

Aviation Associates

Aviation Research Consultants

DIRECTORS
Floyd O. Johnson
V. C. Rasmussen

664 NORTH MICHIGAN AVENUE
CHICAGO 11, ILLINOIS
Phone: SUPerior 9315

May 14. 1945

Mr. Francis R. Meisch
4532 Bryant Avenue, So.
Minneapolis 9, Minnesota

Dear Francis:

I talked to Floyd Johnson on the phone the other evening and it is definite that we wish to have a copy of the drawings on tracing paper (or cloth?). We understand that the cost for this service will be approximately $17.00.

It was nice to have talked to you over the phone while you were in Chicago.

Sincerely yours,

AVIATION ASSOCIATES

K. H. Holmgren

/b

Aviation Associates

Aviation Research Consultants

DIRECTORS
Floyd O. Johnson
V. C. Rasmussen

664 NORTH MICHIGAN AVENUE
CHICAGO 11, ILLINOIS
Phone: SUPerior 9315

May 5, 1945

Mr. Francis R. Meisch
Apt. #3 - 4532 Bryant Avenue S.
Minneapolis 9, Minnesota

Dear Mr. Meisch:

Thanks for your letter of May 2. I am certainly sorry we haven't been able to get together to talk over the situation, as we could probably accomplish a lot more than by letter writing.

We have been further delayed on production of the book; in fact, as it now stands, it probably won't go to the printer until July or August. So I guess we would have had plenty of time to make any changes in the drawings that might have been to advantage.

I appreciate the situation on the automobile gas station. It is our thought that these drawings, being as complete as they were, would have been much more so, showing the automobile facilities. In checking with the various operators, I do know that they are thinking along these lines.

With reference to the reproduction of the drawings, if you feel it is necessary to have photo duplicates made of the originals, I imagine this will be in order. However, we do not understand why an engraver would ruin the original drawings. If you have had experience along this line, we will use your judgment in the matter.

Both Vic and I are leaving on a trip which will take us away from the office for a month, so if you are in town and want to call Ken Holmgren, he will be here carrying on at the office.

Regards.

Sincerely,

AVIATION ASSOCIATES

Floyd O. Johnson
Director

/o

Francis R. Meisch A.I.A.
Registered Architect
4532 Bryant Avenue South
Minneapolis 9, Minnesota

To: Aviation Associates
664 North Michigan Avenue,
Chicago 11, Illinois.

June 1, 1945

For professional services rendered.	$ 250.00
Reproduction of original drawings on tracing cloth and delivery of original drawings to Aviation Associates.	$ 16.65
Total:	$ 266.65

ENGR. PROJECT NO.

January 4, 1945

Mr. V. C. Rasmussen
Aviation Associates
664 North Michigan Ave.
Chicago 11, Illinois

Dear Mr. Rasmussen:

Was pleased to receive your letter of January 3rd. If time permits, I shall be glad to assist you with any material we may have available.

I shall be in New York from January 8th to the 17th or 18th, but expect to be in Chicago shortly thereafter for a meeting of the Chicago Terminal Building Committee. I would suggest that I meet with you at that time and discuss the matter.

Sincerely yours,

NORTHWEST AIRLINES, INC.

F. R. Meisch
Architect & Plant Engineer

FRM/GE

Aviation Associates

Aviation Research Consultants

DIRECTORS
Floyd O. Johnson
V. C. Rasmussen

664 NORTH MICHIGAN AVENUE
CHICAGO 11, ILLINOIS
Phone: SUPerior 9315

ENGR. PROJECT NO.
ROUTE THIS COPY TO

RECEIVED
JAN 26 1945
PLANT ENG.
BRANCH

January 25, 1945

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

Dear Mr. Meisch:

We have been expecting to hear from you since the 17th, and presume you were delayed in New York or tied up with other company business.

We are getting along with the Airport Operator's Handbook we discussed with you and are still interested in knowing what you can do in handling the airport building design section for us.

We would appreciate hearing from you at your earliest convenience.

Very truly yours,

AVIATION ASSOCIATES

V. C. Rasmussen
Director

/o

January 27, 1945,
Apartment # 3,
4532 Bryant Ave. S.,
Minneapolis 9, Minn.

Mr. V. C. Rasmussen,
Aviation Associates,
664 North Michigan Ave.,
Chicago 11, Illinois,

Dear Mr. Rasmussen:

I have been behind the proverbial 'eight ball', first tied up longer in New York than I had anticipated and then I had a short illness on my return which slowed things up. I received your letter of January 25th today just after having had prints made of my sketches. I had expected to have had a meeting scheduled for Chicago on January 31st but that has now been scheduled for New York on February 3rd. Consequently the chance of our getting to gether this coming week is a bit slim. I am leaving tomorrow for Detroit and will mail this letter in Chicago on my way through. Expect to be back in Minneapolis on January 30th but will leave for New York February 1st and will return February 4th. I expect to have an hour and twenty minutes lay over in Chicago on the 1st of February, 3:40 PM to 5:00 PM at the airport. I will have less than an hour on my return which as you can guess may be not on the date that I plan on.

I am enclosing two sets of prints of my sketches for your study, comment, and criticism. They are quite preliminary and not at all complete but the nucleus of the idea is there. There are several items that need fruther study and investigation. The primary one is the maximum wingspread, length and height of aircraft that the sales, service, repair, and display hangar should be designed to accommodate. This primarily affects structural considerations and overall cost. Then there is the matter of booklet size, the scale of the drawings and lettering so that room titles etc will be visable when reduced to booklet size. There is also the question of the number of drawings required such as plans showing development by stages, cross sections showing alternate forms of construction, elevations of the buildings showing various building materials or else perspectives of the over all development.

Depending upon the ultimate number of drawings required and the scale of the drawings the cost would vary but I think that work of the quality you desire could be performed for about $ 250.00. I should like your reaction to the sketches as soon as is possible.

Sincerely yours,

FRM.

Francis R. Meisch,
Registered Architect.

Aviation Associates

Aviation Research Consultants

DIRECTORS
Floyd O. Johnson
V. C. Rasmussen

664 NORTH MICHIGAN AVENUE
CHICAGO 11, ILLINOIS
Phone: SUPerior 9315

February 10, 1945

Mr. Francis R. Meisch,
4532 Bryant Ave. S.
Apartment #3
Minneapolis 9, Minn.

Dear Mr. Meisch:

Both Mr. Rasmussen and Mr. Johnson are on the road and are not expected back until the 15th of the month. We discussed your sketches before they left and Mr. Rasmussen contacted the Aeronca Corporation for the go-ahead signal. They have approved $250 for the project.

We have not written sooner since we expected you might call in or be in Chicago earlier this week.

Several rough sketches are inclosed for the service and display building, which have as the main feature the serving of the retail counter and repair shop from a common stockroom.

We believe also the paint shop should be located in a separate building or at least attached to one side with a fire wall protection for the planes in the hangar. One copy each of your sketches is being returned, on which you will note we have placed further suggestions.

In general we believe your ideas are on the right track. We believe the aircraft display area should be able to accommodate at least one airplane with a wing span of 50', approximately 40' in length and a height of 12'. It is expected that a number of the private postwar aircraft will incorporate the tricycle landing gear -- placing the tail at a good height.

The present plans call for a book having a page size approximately 6" x 9".

We agree that the plan should show several stages of development beginning with the very simplest hangar, ~~and~~ shop *and office*.

We should also like to have some figures on the cost of construction of the buildings, either brick, steel, cement, stone, or in combination -- estimated bills of material and dimensions.

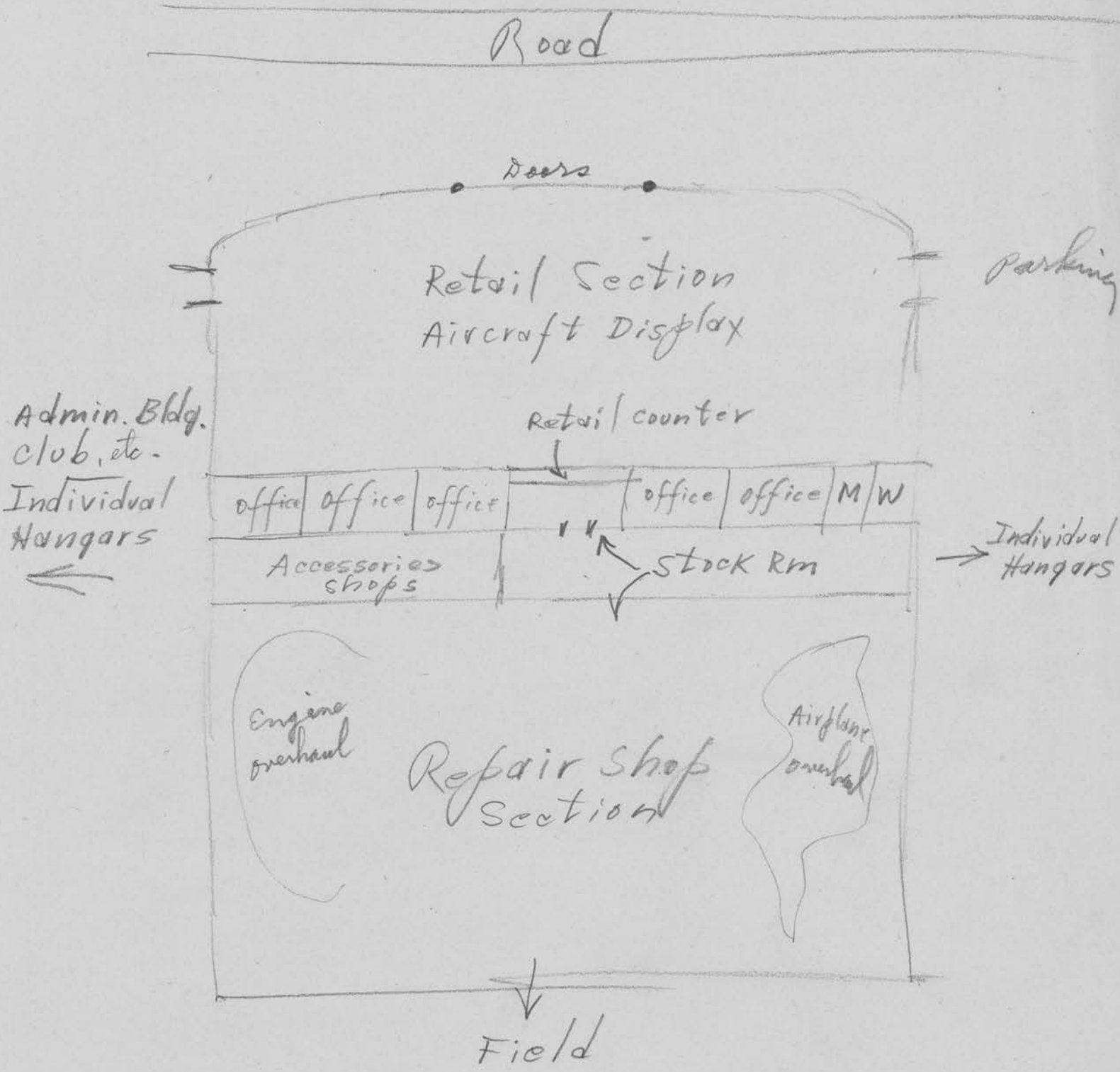
We talked to Mr. Johnson on the phone yesterday and he mentioned that the time is growing short, so we will appreciate the new material as soon as possible.

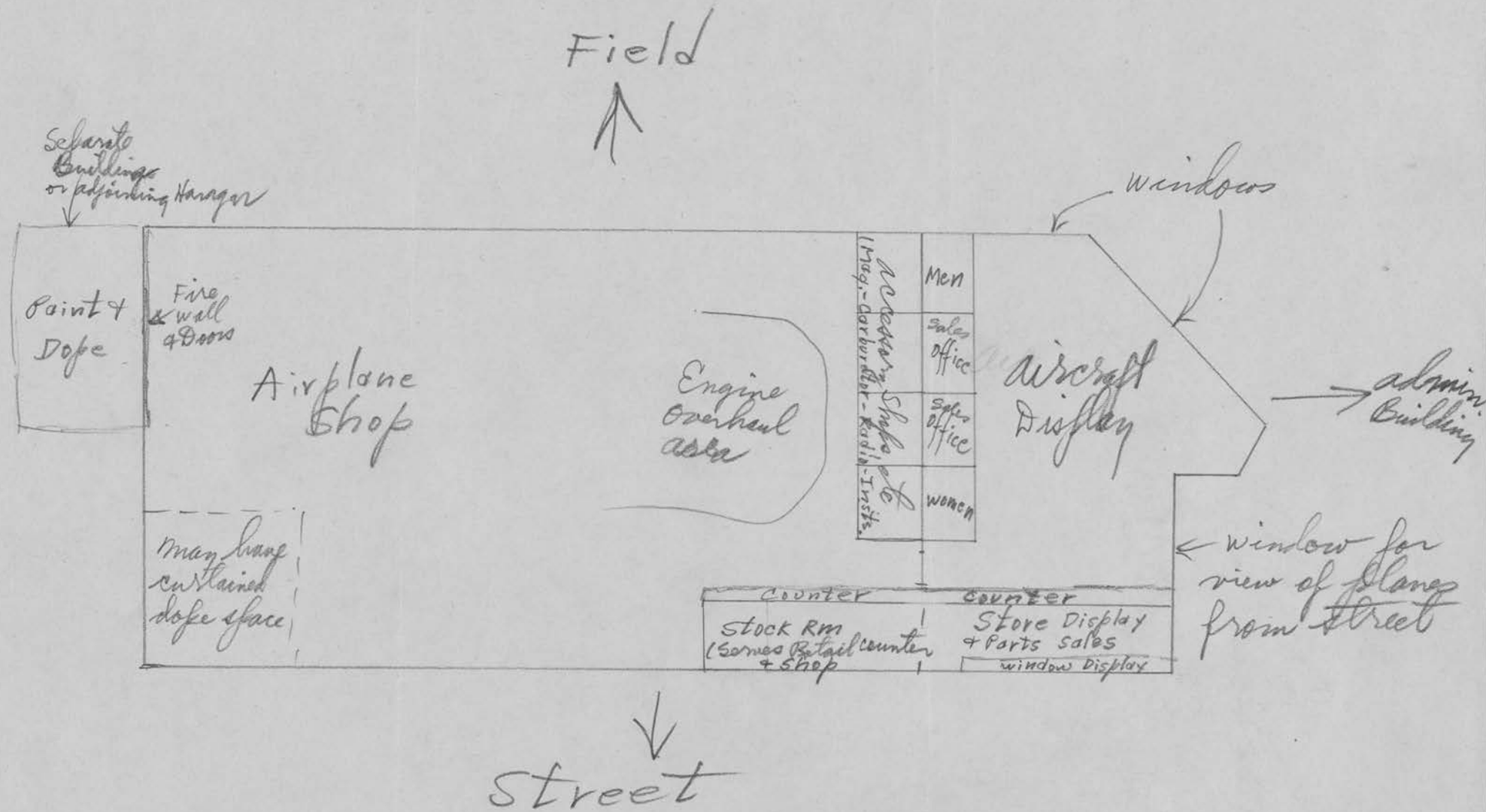
Very truly yours,
AVIATION ASSOCIATES

K. H. Holmgren

K. H. Holmgren

/o


Road
Doors
Retail Section
Aircraft Display
parking
Admin. Bldg.
Club, etc.
Individual
Hangars
Retail counter
office
office
office
office
office
M
W
Accessories
shops
Stock Rm
Individual
Hangars
Engine
overhaul
Repair Shop
Section
Airplane
overhaul
Field


Field
Separate Buildings or adjoining Hangar
windows
Paint & Dope
Fire & wall & Doors
Airplane Shop
Engine Overhaul asbs
Accessory Shop (Mags-Carburetor-Radio-Instr.)
Men
Sales office
Supv. office
Women
aircraft Display
admin. Building
window for view of plane from street
May have curtained dope space
Counter
Counter
Stock Rm (Serves Retail counter & Shop
Store Display & Parts sales
window Display
Street

February 21, 1945
Apartment #3,
4532 Bryant Avenue So.,
Minneapolis 9, Minn.

Mr. V. C. Rasmussen,
Aviation Associates,
664 North Michigan Ave.,
Chicago 11, Illinois.

Dear Mr. Rasmussen:

Received Mr. K. H. Holmgren's letter of February 10th on my return to the Twin Cities but was unable to spare any time until today. I am now taking some vacation and hope to get your work out as soon as possible; consequently progress on the work will await your reply. I am sorry that I have not had time to stop over in Chicago for a discussion of the sketches - it would have helped to eliminate this lengthly letter writing. Following are some questions:

1. Page size 6"x9", Does this include a border or is this the area of the page that will be covered with printed matter?
2. Studying your rough sketches of service and display building I see your suggestion of serving retail counter and repair shop from common stock room and will develope that idea. However your offices in that or those sketches are poorly lighted . These same sketches are of buildings that are difficult to expand; hence a large initial investment will be required to make these structures adequate. Actually the crux of the entire scheme is the paint shop or dope room. If this room is located between aircraft display and the repair hangar, it will allow the repair hangar to be expanded as one unit. However this will require that firewalls be built entirely around the paint shop. If the paint shop is at one end of the repair shop it will block repair shop expansion. If the paint shop is in a seperate building an additional heating system will be required. However if in a seperate building the paint shop could be combined with fireproof oil storgae and aircraft gasing could be located adjacent. I am assuming that the paint shop should accommodate one airplane at a time.
3. I can give you figures on costs of various stages of construction but they will be only approximate. Costs vary as to type of materials used, labor available (union or non union) distance of project from source of supply, locality (North, South, East, West, or Central U.S.). The way costs are rising today I must warn you that any figures we present may soon look like very misleading statements.
4. Do you wish any more pencil sketches before I start making pen and ink drawings for reproduction ?

Sincerely yours,

Francis R. Meisch
Registered Architect

Aviation Associates
C H I C A G O

Mar 3, 1955

Mr Musch-

Here is something I think may fit into the drawings you are preparing for us. It may give you an idea anyway.

J Rasmussen

Plase return when finished with it.

V

CHICAGO
SUITE 630
664 N. MICHIGAN AVENUE
ZONE 11
SUPERIOR 9315

AVIATION
RESEARCH CONSULTANTS

NEW ORLEANS
510 CAMP STREET
ZONE 12
CANAL 1294

Aviation Associates

Aviation Research Consultants

DIRECTORS
Floyd O. Johnson
V. C. Rasmussen

664 NORTH MICHIGAN AVENUE
CHICAGO 11, ILLINOIS
Phone: SUPerior 9315

March 17, 1945

Mr. Francis R. Meisch
4532 Bryant Avenue, South
Apartment #3
Minneapolis 9, Minnesota

Dear Mr. Meisch:

We are enclosing under separate cover the preliminary drawings for the airport program. We agree that they fill our needs quite well with one suggestion. The office section of the first drawing, we would like to have drawn two alternatives that an operator might consider when building his first unit.

I am enclosing a rough sketch what we believe one of these alternatives might be. As you can see it allows a view of the airport from both managers office and small lobby. At the same time any customers in the lobby will be able to see the display of merchandise in the display counter immediately in front of the general office space and also in the actual designated store space. The stockroom has two places of entrance, from the general office and from the shop. There is an opening from the stockroom containing a display counter and facing the store area. Our reasoning in this layout is that the whole office operation and stockroom could, if necessary, be handled by one person and at the same time allows for flexibility in size of the various spaces. You can no doubt improve on this outline in marking up a second alternative.

In writing your commentary on the project and its expansion do not be afraid to go into some detail in suggesting various alternatives in layout. Our main problem is to have the reader visualize the necessity for proper planning and construction in the first unit so it will fit in as expansion takes place. In other words it would be much better to have a much smaller first unit and use better material and workmanship.

We have an idea that we would like to include in the final drawing, a combination aircraft and automobile filling station located at the point marked "X". The Socony-Vacuum Company have developed some very interesting drawings on this and we are now attempting to get them here. You might let us know how this change would hold up your production and if it is going to cause too much of a delay forget it. You might let us know what you expect your schedule will be on this so we can plan accordingly.

Very truly yours,

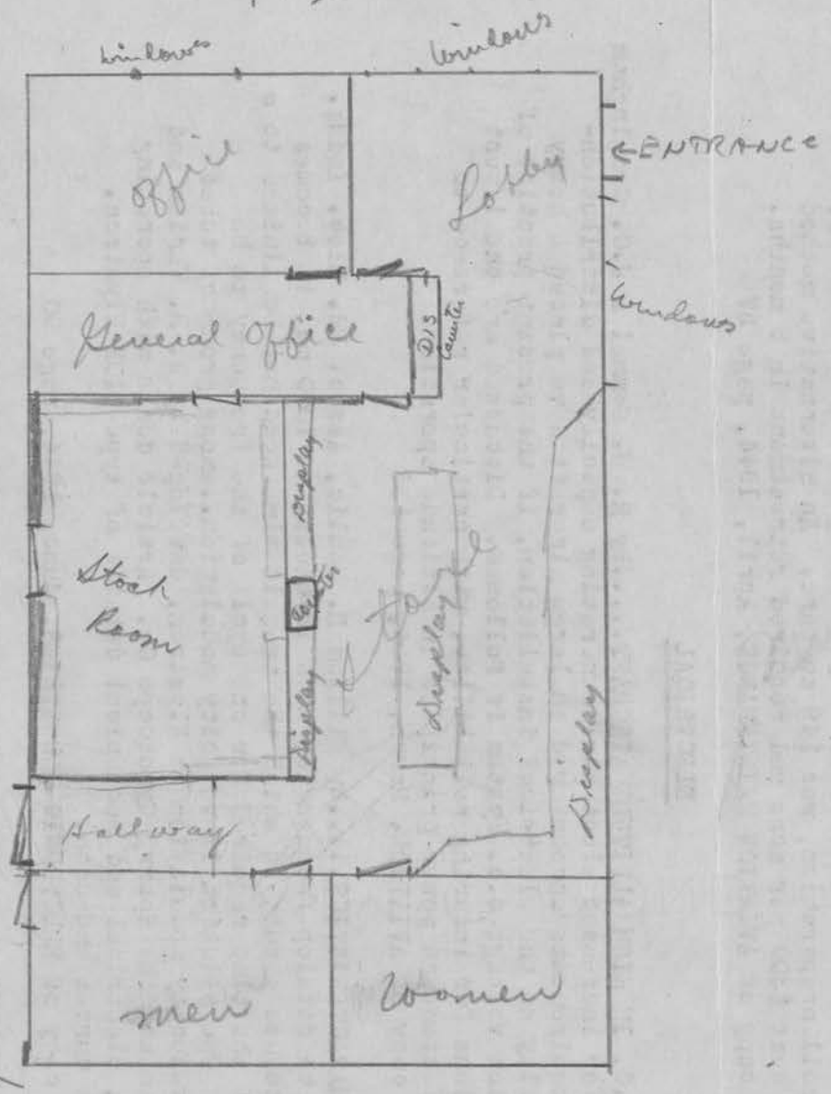
AVIATION ASSOCIATES

V. C. Rasmussen

V. C. Rasmussen
Director

VCR/b
enc.

FIELD



Shop

Alternative 1.

DUST CONTROL

238 "INDIAN" AERATING COOLS PLANT AIR, CURBS DUST.....by Kneeland Jenkins
Years ago, the Southwest desert native hit upon the "Olla" as a means of freshening his drinking water. Today, hangar-conditioning based on the same simple principle speeds "Liberator" output. Eight aerating pent houses have been built around hangar roof. Their front-facings comprise hangings of excelsior padding. Perforated pipes at top keep pads moist, evaporation cools air drawn in by fans, and dust is eliminated.
See your copy of AVIATION, March, 1944, page 150

239 COMBATING DUST SABOTAGE.....by Dr. John Monteath, Jr.
A good turf helps control the dust menace at its source and reduces airfield and aircraft maintenance. Illustrations show successive stages in preparing the turf covering at Moore Field, Mission, Texas, Auxiliary No. 3. Entire cost of dust control by mulching the field with hay, and including soil preparation, was $49 an acre. An alternative method would have cost $300 per acre and required retreatment in 8 months.
See your copy of AVIATION MAINTENANCE, April, 1944, page 57

ELECTRICAL

240 A.C. vs. D.C. IN HIGH ALTITUDE AIRCRAFT.....by R. W. Gemmel & J.C. Cunningham
Demands for increased electrical generating capacity and distribution-distance requirements encountered on large aircraft have placed a heavy weight penalty on the electrical installation, if the present practice of using the low voltage d.c. system is followed. Discussed are the latest considerations for insuring reliability, with particular reference to adoption of standard power principles in altitude operation.
See your copy of AVIATION, March, 1944, page 138

241 KLYSTRON CHARACTERISTICS.....by William E. Moulic, Assoc. Ed. Elec. Indus.
In order to develop frequencies much in excess of 1000 mc. it becomes necessary to use a tube in which the transit time need not be limited to a fraction of the time required for one cycle of the frequency to be generated. One solution is velocity modulation..among group of tubes employing velocity modulation is Klystron, developed by R. H. Varian and S. F. Varian and the Sperry Gyroscope Co. Article deals with operating principles, electrical and mechanical details of type 410R Klystron. Performance curves and data.
See your copy of ELECTRONIC INDUSTRIES, June, 1944, page 90

242 PERTINENT PROBLEMS IN ELECTRIC CONTROL DESIGN.....by F. W. Hottenroth
Power is useful only when it is controlled, and an increasing amount of electric power now used on planes requires many forms of controls to employ this power properly. Constantly facing designers of aircraft electric controls are the prime questions of vibration (how curb it?), weight (how lower it?), size (how cut it?), and atmospheric changes (how accomodate for them?). The formula for a suitable control must tackle all four factors at once.
See your copy of AVIATION, March, 1944, page 144.

ENGINES-GAS, JET, DIESEL

243 TEST CELLS KEY ENGINES FOR FULL-POWER PERFORMANCE.....by staff writer
Aircraft engines have to run at full power as soon as put to work; therefore, the engine must be thoroughly tested and ready for operation before it is installed in the airplane. Saving both engines and man-hours, new automatic cells determine that power plants are "right"--assuring dependable operation. Description of installation, procedure & types.
See your copy of AVIATION, March, 1944, page 164

March 19,1945
Apartment 3,
4532 Bryant Avenue South,
Minneapois 9, Minnesota.

Mr. V. C. Rasmussen, Director,
Aviation Associates,
Suite 630,
664 North Michigan Avenue,
Chicago 11, Illinois.

Dear Mr. Rasmussen:

Received your letter and the preliminary drawings which you returned under seperate cover today. I am sorry that you and Mr. Johnson were out of the city when I was last in Chicago. However, I did have a nice visit with Mr. Holmgren.

I have just spent some time studying the sketch you enclosed for an alternate layout for the initial stage of the sales and service building. Your sketch has a great deal of merit from the planning view point if the building were never to be developed beyond that stage. A transition to the second stage of the plan would be expensive because of the cost of relocating the toilet rooms. Partitions can be built so that they are easily moved and relocated with a minimum expenditure but mechanical installations are very expensive to alter. I am going to give the matter of alternate layouts for the initial stage some study and see if I cant develope some plans that would be less expensive to carry into the second stage of the development. I will send you some sketches first before incorparting them in the final drawings.

In regard to combination aircraft-automobile gassing facilities, I feel that while it might be possible to develope such a function on the plans that I proposed; it would be difficult to illustrate it on the perspective (aerial) without redrawing the entire illustration which is an expensive item as well as time consuming. Actually I think it advisable to keep aircraft and automobile gassing seperate. Motorists are faretoo careless in their smoking habits to safely combine the two functions without a great deal of segragation or more education of the general public in regard to the fire hazzards of high octane aviation gasoline. In addition I think that a automobile service station at an airport should be located nearer to the main entrance of the sales and service building or the spectator area. There are also good arguments for having the service station between the car parking area and the highway from a purely automobile gas sales standpoint. Locating it near the aircraft apron would require a number of usually unattractive signs to direct attention to it. From automobile gas it is only one more step and you have automobile service and repair. While this might be attractive to the motorist who would like to have an aircraft mechanic work on his car, I wonder if the flying public might not feel that the plane sales and service was being run by some 'broken down' automobile mechanic.

The combination of automobile and aircraft gas sales and service is a method of giving an operator a dual source of income - but headaches as well for it will require more capital investment in stock parts, tools, facilities, etc. Insurance rates will be up and the operator will not be providing merely an additional service at the airport but will be competing with established firms in his own community. Outside of automobile gas service I think you are trying to set up the operator as an aircraft man and not as a competitor for the local automobile trade.

I have been hoping that by the end of this month I would have all the material in your hands but since being at the office today I am a little doubtful as to my ability to do that. I have to go to New York tomorrow night and probably will be there several days. I am going to take my manuscript material with me in the hope that I can find time to work on it while traveling. Since turning the preliminary prints over to you, I have completed a 'T' Hangar plan (two schemes) and have completed eight building cross sections, two of which illustrate paint shop ventilation methods. I started to do some sheet titling but my Wrico pen broke on me and now I am searching for repair parts. Actually there was not too much to do in the way of titling until I had your reaction to the preliminary drawings. What do you think we should call the the 'second building'? 'AIRPORT COMMUNITY CENTER' 'PUBLIC CENTER' 'AIRPORT ADMINISTRATION BUILDING' 'FLYING CLUB' or 'SKY CLUB'.

I now have underway several sketches not all of which I intend to make into final drawings. But I do wish to present several perspectives of the buildings and their interiors. One perspective will be from the spectators area looking at the sales and service building and on into the sales room. Another perspective will probably be from the field looking into the lounge area and toward the fireplace of the Admin. Bldg. Still another perspective might play up the entrance to the spectators area and the Admin. Bldg. These will help to add life and interest to the bare plans.

Let me know what your schedule is on this project so that I will not be the delaying factor. Perspectives take time but I want to get the best possible views of the buildings developed because they are the illustrations that 'sell' the ideas.

Yous truly,

Francis R. Meishh,
Registered Architect,

Aviation Associates

Aviation Research Consultants

DIRECTORS
Floyd O. Johnson
V. C. Rasmussen

664 NORTH MICHIGAN AVENUE
CHICAGO 11, ILLINOIS
Phone: SUPerior 9315

April 14, 1945

Mr. F. R. Meisch
4532 Bryant Avenue So.
Minneapolis 9, Minn.

Dear Mr. Meisch:

Thanks for your letter of the 12th, addressed to Mr. Rasmussen.

Our plans are to be in the office next week, at least until Friday or Saturday, at which time it is possible we may have to be away.

We shall look forward to seeing you Wednesday or Thursday.

Sincerely,

AVIATION ASSOCIATES

Floyd O. Johnson
Director

/o

April 16, 1945,
Apartment # 3,
4532 Bryant Avenue South,
Minneapolis 9, Minnesota.

Mr. Floyd O. Johnson,
Aviation Associates,
664 North Michigan Ave.,
Chicago 11, Illinois.

Dear Mr. Johnson:

Received your letter of April 14th today and regret that I must reply thusly. My plans to be in Chicago Wednesday or Thursday have had to be cancelled. I am leaving tomorrow for New York to attend meetings there on Wednesday and possibly Thursday. So I do not expect to return until Friday or Saturday and of course I have no idea what sort of a layover period I will have in Chicago. However I still am anticipating that I will have to attend a meeting of the Chicago Terminal Building Committee in the near future.

Since it is unlikely that I will see you personally this week , I am sending you under seperate cover two (2) sets of nine (9) prints each of the illustrations for the Airport Operator's Handbook. One set which is stapled together is for your office use or submission to the Aeronca Aircraft Corporation. The other set which is not stapled together is for the use of the photo engraver and consists of the best prints obtainable out of several sets.

I am retaining in my possession the original drawings from which these prints were made. I desire to retain the right to have any number of prints made from the original drawings and to circulate them as I see fit for my own personal use. Such publicity as would be derived from such action should not be objectionable to the Aeronca Aircraft Corporation and may result in requests for copies of the Handbook that you are putting out for them . I can furnish you with additional sets of prints at a cost of from $ 2.00 to $ 3.00 per set for your own use depending upon printing and shipping costs and quanity ordered.

I have just completed the text in longhand to go with the illustrations but will not have time to get it typewritten before I leave town. My best estimate of when I will have it in your hands is the first part of next week. I regret that the work has to drag out like this but as I told you previously my first responsibility is to Northwest Airlines and work like this must necessarily be subject to what time I can find to perform it in.

Sincerely,

F. R. Meisch

Francis R. Meisch, A. I. A.
Registered Architect.

P.S. Will you be in Chicago the first of next week?

April 23, 1945,
Apartment # 3,
4532 Bryant Avenue South,
Minneapolis 9, Minnesota.

Mr. Floyd O. Johnson,
Aviation Associates,
664 North Michigan Avenue,
Chicago 11, Illinois.

Dear Mr. Johnson:

Enclosed herewith find the manuscript for the Plant Facility portion of the Airport Operator's Handbook. You will undoubtedly desire to make some corrections or changes or even omissions. If you wish I will be glad to proof read for you your final manuscript on this item of plant facilities so as to be sure that all statements are correct.

I am sorry that I passed through Chicago early Friday morning in such great haste that I had no time to call you to get your reactions to the illustrations. I am not too sure of my plans for this week other than the fact that I have a meeting around the 26th in New York and one on the 27th in Minneapolis. My next scheduled visit to Chicago is a tentative meeting date set for May 2nd. I may make my contact at Kenosha before that and therefore spend some time in Chicago but it is beginning to look rather difficult.

While in New York on my last trip I showed a set of prints of the illustrations I did for you to Frank Lopez, who is one of the Editors of Pencil Points. He was quite interested in them and felt that Pencil Points might desire to publish them. So I referred him to you and told him that I did not know what you or Aeronca were doing about copyrighting such material but that I felt that permission for any publication of this data had to come from both you and Aeronca. Actually I see no objection to Pencil Points publishing such material as both you and Aeronaa will get some publicity that way and I don't believe that Aeronca would object to that. I do feel though that publication of such material in Pencil Points should be delayed until the Handbook is out so that they don't steal your thunder. On the other hand you might consider it good advance publicity for the Handbook. At any rate I would like to hear your reaction to this situation.

Sincerely,

F. R. Meisch

Francis R. Meisch A.I.A.
Registered Architect.

NATIONAL AERONAUTIC ASSOCIATION

The
ANDREW J. HAIRE
Airport Awards
for 1945

Rules of eligibility and
entry, and conditions of
judging in the
conferring of thirteen awards
totalling $7500.00

☆

Awards created by Andrew J. Haire,
publisher of "Airports" magazine.
Sponsored and
administered by
The National Aeronautic Association.

Purposes

of the

ANDREW J. HAIRE

Airport Awards

for 1945

The ANDREW J. HAIRE AIRPORT AWARDS for 1945 have been established to stimulate progressive thinking and action in the development of the nation's landing facilities. One of the primary purposes of the awards is to encourage ingenuity and initiative at the "grass roots"—for the planners, for the private or municipal operators of the landing facilities and for their employees.

No achievement or idea, however insignificant it may seem to its originator, is excluded from consideration. It may be a simple idea, successfully applied, for runway maintenance; it may be a broad, sweeping plan for a great airport terminal development. Both would get consideration on an equable basis.

The sound and orderly development of civil aviation in the postwar years will necessitate the creation of thousands of additional landing facilities; and improvement in management and operation of the existing fields.

Both the donor of the awards and the National Aeronautic Association firmly believe that the setting up of special awards to those contributing toward the realization of this goal will speed its fulfillment. Therefore, in formulating conditions of eligibility and the basis on which judging will be conducted, every effort has been made to break down the classifications of achievement in such a way that all new work

pertaining to airport operation and development may be entered.

Andrew J. Haire is the publisher of AIRPORTS and AVIATION EQUIPMENT, national aviation monthlies, and AVIATION EQUIPMENT RED BOOK and the AIRPORT DIRECTORY, year books. During his thirty-five years as a publisher of business magazines he has been associated continuously with constructive movements for the betterment of the industries which his publications serve.

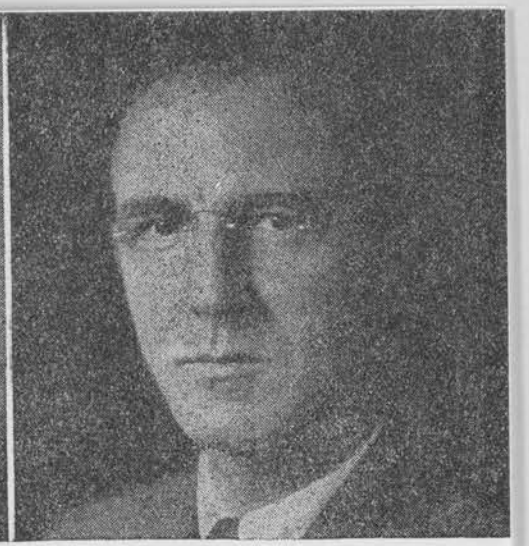
THE AWARDS

The Andrew J. Haire Airport Awards for 1945 comprise a total of $7,500.00. In his desire to reach every bracket of endeavor, the donor broke up the total amount into 13 prizes as follows:

First —— $5,000.00 and plaque
Second — $1,000.00 and plaque
Third —— $ 500.00 and plaque
Fourth to thirteenth — $100.00 each
with individual certificates of merit.

WILLIAM R. ENYART
President, National Aeronautic Association, Administrator of The Awards

ANDREW J. HAIRE
President, The Haire Publishing Company, Donor of The Awards



ROBB C. OERTEL
Manager, Aviation Dept., Standard Oil Co. of N. J., Chairman of Awards Committee

BASIS OF JUDGING

In arriving at their decisions, the Awards Committee will consider accomplishments in the whole airport development and management field, being guided but *not limited* by endeavors in the general classifications listed below. These classifications have been established as suggested guides to both Committee and eligibles and do not exclude from consideration meritorious achievements in categories other than those listed.

As a rough index of the scope of work to be appraised under the heading of creation of new landing facilities, the following classifications are suggested:

AIRPORT DEVELOPMENT

Planning	Financing	Engineering
Promotion	Construction	Material & Equipment

For management and operation of existing landing facilities, the suggested classifications are:

MANAGEMENT

Field Operations	Personnel Management
Flight Operations	Community and Customer Relations
Field and Building Maintenance	Merchandising (products)
Financial Operations	Advertising and Publicity
Service	Revenue Producing Ideas

ELIGIBILITY

Eligible for consideration for the awards is any individual or organization, except employees and their immediate relatives of the Haire Publishing Co.; paid employees of the National Aeronautic Association; and employees of the United States Government.

Members of the armed forces, both in the United States and overseas, are eligible to compete wherever the achievements qualify under these rules.

HOW TO SUBMIT ENTRIES

Entrants should submit complete detailed descriptions of their accomplishment, on 8½ x 11 white paper, preferably typewritten. If any illustrative material will aid in the description of their entry it should accompany the entry. Judging will not be based on elaborateness or physical decoration of this submitted entry. Readability is the only requirement. Entries should be postmarked not later than September 1, 1945 and addressed to:

ANDREW J. HAIRE AIRPORT AWARDS FOR 1945
National Aeronautic Association
1025 Connecticut Avenue, N.W.
Washington 6, D. C.

THE AWARDS COMMITTEE

As administrator of the Andrew J. Haire Airport Awards for 1945, the National Aeronautic Association will appoint a committee of impartial, expert judges who will make their decisions

independently of and without consultation with Andrew J. Haire, the Haire Publications or the National Aeronautic Association. The decision of the Awards Committee will be final and binding upon all entrants and upon the Haire Publications and the National Aeronautic Association.

OPENING AND CLOSING DATES

The Andrew J. Haire Airport Awards for 1945 will be bestowed by the Awards Committee for achievements or work entered into and completed in the period beginning January 1, 1945 and ending September 1, 1945.

ANNOUNCEMENT OF WINNERS

Winners of the awards will be announced not later than November 1, 1945 and will be personally notified. The place of public presentation will be announced later.

Members

of Andrew J. Haire Airport Awards for 1945 committee of the National Aeronautic Association:

ROBB C. OERTEL, Chairman
Manager, Aviation Department
Standard Oil Co. of New Jersey

COL. EDGAR S. GORRELL, Pres.
Air Transport Association

COL. ROSCOE TURNER, Pres.
National Aviation Trades Assn.

MAJOR CHARLES B. HANST, President
American Association of Airport Executives

SHELDON B. STEERS, Pres.
National Association of State Aviation Officials

RICHARD C. PALMER, Sec.
National Aeronautic Association

L. P. SHARPLES, Chairman, Board of Directors
Aircraft Owners and Pilots Association

JOHN E. P. MORGAN, Mgr.
Personal Aircraft Council
Aeronautical Chamber of Commerce

T. P. WRIGHT
Civil Aeronautics Administrator

MAJOR GENERAL PHILIP P. FLEMING, Administrator
Federal Works Agency

THOMAS DUGGAN, President
Aircraft Distributors & Manufacturers Association

COL. A. B. BARBER, Manager
Transportation Department
United States Chamber of Commerce

CHARLES M. UPHAM, Engineer-Director
American Road Builders Assn.

WILLIAM MUIRHEAD, Pres.
Associated General Contractors, Inc.

H. O. PENN, President
Association Equipment Distributors

DEVON FRANCIS, Secretary
Aviation Writers Association

THE HAIRE PUBLISHING COMPANY, INC.
1170 BROADWAY NEW YORK 1, N. Y.

AVIATION DIVISION

Airports

•

The Airport Directory

•

Aviation Equipment

•

Aviation Equipment Red Book

National Aeronautic Association
FOUNDED 1922

NATIONAL HEADQUARTERS 1025 CONNECTICUT AVENUE

WASHINGTON 6, D. C.

AN IMPORTANT INVITATION TO YOU!

The attached brochure is self-explanatory, but we do want to add a personal word about the ANDREW J. HAIRE AIRPORT AWARDS, administered by the National Aeronautic Association, which it describes.

FIRSTLY, we want to emphasize that ANY accomplishment, from a seemingly small idea that improves turf maintenance, to a broad plan for a terminal airport is welcome in this competition.

SECONDLY, we want to state that there is no obligation of any kind incurred either to the National Aeronautic Association or to Airports magazine.

THIRDLY, that the method of entry is extremely simple - just describe your achievement in straightforward language on 8-1/2 x 11" white paper, accompanied by illustrations if it requires them, and send it to the National Aeronautic Association before September 1, 1945.

These awards are outright cash gifts and they are a sincere endeavor to stimulate thinking and action, from the ground up, for the advancement of our country's airport program.

Yours very truly,

NATIONAL AERONAUTIC ASSOCIATION

Lowell H. Swenson

Lowell H. Swenson - Manager

National Aeronautic Association
FOUNDED 1922
NATIONAL HEADQUARTERS 1025 CONNECTICUT AVENUE
WASHINGTON 6, D. C.

September 7, 1945

Mr. Francis R. Meisch
Registered Architect
740 South Syndicate St.
St. Paul 5, Minn.

Dear Mr. Meisch:

This will acknowledge receipt of your communication enclosing your entry for competition in the Andrew J. Haire Awards for 1945.

We shall pass your entry on to the chairman of the Awards Committee for consideration, when it meets to decide the winners of the contest.

Cordially yours,

Jack Frost

Jack Frost,
Assistant Manager

JF:VR

August 28, 1945

Andrew J. Haire Airport Awards for 1945
National Aeronautic Association
1025 Connecticut Avenue, N.W.,
Washington 6, D. C.

Gentlemen of the Awards Committee:

The enclosed project consisting of illustrations and an explanatory manuscript was undertaken for Aviation Associates, 664 North Michigan Avenue, Chicago 11, Illinois. They intend to use this material as part of an Airport Operator's Handbook which they are preparing for Aeronca Aircraft Corp., Middletown, Ohio.

This project, 'Plant Facilities for Airplane Dealers' was concerned with the design and planning of an ideal airport building group for the airplane dealer and private flying activities. Its use is as a source of ideas and as a guide for the planning of similar projects. The main principals upon which the design is based are expansibility, (by stage construction), flexibility, workability, and appearance. The main object was to develope not only ideas but to illustrate how proper planning by competent professional men would allow the airplane dealer, fixed base operator, or municipality to start a building development on a modest scale and parallel the increase in airport activity with a corresponding increase in facilities as there was an economic justification for same.

If private flying activities are ever going to attract investment capital, they must present a 'good front and solid background' before they can become big business. Soundly financed, well designed plant facilities, in other words - architecture not mere building is the appropriate background for flying activities.

It is felt that this project is worthy of consideration by the Awards Committee because in the past little has been done to promote well planned functional and integrated building developments for airplane dealers and private flying activities, whereas much progress has been made in the design field of building development for scheduled air transport.

Respectfully submitted,

Francis R. Meisch

Francis R. Meisch, A.I.A.
Registered Architect
740 South Syndicate Street,
St. Paul 5, Minnesota.

Note: Permission to reproduce the enclosed illustrations must be secured from Aviation Associates, Chicago, Ill., and Aeronca Aircraft Corp., Middletown, Ohio.

PLANT FACILITIES FOR AIRPLANE DEALERS

Francis R. Meisch
Registered Architect,
Minneapolis, Minnesota.
(now St. Paul, Minn)

I BACKGROUND FOR PLANNING

Progress in the airplane business depends on a broad national program of airport development for the private flyer and on the efficient production, distribution, and servicing of the airplane. Responsibility for production rests with the manufacturer but the distribution and service functions are performed by the manufacturer and his dealers jointly.

The efficient performance of distribution and service functions by airplane dealers, fixed base operators, or airport operators, is essential not only to the success of the manufacturer's business but to that of the dealer's or operator's business as well.

The facilities which dealers possess influence their ability to perform the functions for which they are responsible. These facilities should also help to promote an interest in aviation and in the use of the airplane by the general public. The dealer's physical plant affects his ability to display, condition, and stock new airplanes, to recondition and sell used airplanes, to maintain and repair airplanes for customers, and to distribute replacement parts and accessories.

More and more attention must be focused on the distribution because the end of World War II will find the manufacturers collectively able to produce more airplanes than the market will be able to absorb. This also points to the importance of service as an income for dealers and to the need for additional sources of income to eliminate seasonal slumps in the business. Other sources of income are flight instruction, airplane mechanic training, gasoline and oil sales, aerial taxi service, sightseeing flights, aerial photography, and hangar rental for local and itinerant airplane storage. Facilities and conveniences for the spectator as well as the flyer can provide additional sources of income and increase interest in aviation.

Since the airplane business is a growing industry with a broad future, the limits of which are not yet defined, the dealer must proceed with caution in the planning and construction of his physical plant. To this end the dealer will promote his own interests by securing the services of a competent architect who is familiar with local building conditions, materials, labor, and costs. The architect can assist the dealer in solving many of the problems that pertain to the physical plant, its site, utilities, financing, construction, insurance, maintenance, etc.

Dealer establishments which are functional in design and adequately suited to the multiple needs of the dealer are rare. The past is no

guide for the future. In the past the design of hangars and airport buildings governed the conduct of the dealer's business. In the future, however, the design of the dealer's facilities should be determined by the functional requirements of the retail plane sales and service business. These functional requirements are mainly as follow:

1. Management and Administration.
2. New and Used Airplane Display and Sales.
3. Repair and Maintenance.
4. Parts and Accessories Stock, Display, and Sales.
5. Gasoline and Oil Storage and Sales.
6. Airplane Storage Hangars.
7. General Service and Convenience Facilities.

This functional plan of organization is common to many dealerships whether large or small. The functions can all be conducted in one building but wise planning dictates that there be some segragation to allow for efficiency, flexibility, and expansion.

The over all layout of a planned functional airport building group is illustrated in the aerial perspective, Figure I (Sheet 1.). This perspective shows groups of Tee Hangars, Gasoline Pits, Garage Facilities, Airplane Sales and Service Building, Spectator's Area, Airport Public Center, and Car Parking Area. The detailed planning of specific facilities is shown in other illustrations that follow. The illustrations presented herewith are ideas which can serve only as a starting point for the solution of the individual dealer's problem.

II THE MASTER PLAN

The essential basic feature of the overall layout is the development of a master plan which will serve as a guide for initial construction and stage development of plant facilities. It is 'planning insurance' and the only safeguard that can be found for a business which requires expanding plant facilities and flexible functional solutions. Such a plan, though it may be changed to accord with the times, serves as a control in preventing inadequacy, obsolesence, and planning shortsightedness. The master plan is concerned with site planning or the relation of the project to the airport, to the community, to utilities, to access roads and transportation, to topography, to soil conditions, to finances, etc. The master plan allows the dealer to start out in a modest way with a minimum investment in plant facilities. When necessary, the master plan allows the dealer to expand his plant in successive stages to parallel business developments requiring increased facilities and his economic ability to finance additional plant investments.

III SALES AND SERVICE BUILDING - INITIAL STAGE

The initial stage of development of a Sales and Service Building is illustrated in the plan, Figure II (Sheet 2.). Also shown are alternate schemes for the layout of the office-lobby, parts sales, display, and stock room end of the building. Schemes A and B are predicated upon a 'one man establishment' or a very limited staff. Schemes C and D are based upon having more personnel emplyed in the initial stage thus allowing a greater decentralization of functions. Certain functions are

thus segragated initially so that with expansion they will be properly related at a later stage of development. How such a development can logically occurr is illustrated in the plans (based on Scheme DO for the intermediate and advanced stages of the Sales and Service Building.

The size of the initial development is governed by local business conditions. The character of the development is largely determined by the finances available and local building conditions. The ingenuity of the architect is a big factor in determining the ultimate result. Some dealers, for example, might find the plans proposed under the intermediate stage of development best suited for the initial stage of their plant facilities.

The hangar area proper for sales and service work is designed for cantilever roof construction so as to always allow for unit expansion on one side. Examples of cantilever roof construction are illustrated in the sections, Figure III (Sheet 7.). This type of hangar is limited in depth but follows the idea of the stall arrangement in automobile service stations. In this type of planning automobiles are readily moved into stalls for work and readily removed when work is completed. This same pattern of planning and operation in an airplane service hangar can increase efficiency by eliminating the 'pocketing effect' of the standard type hangar. This 'pocketing effect' causes much loss of time and often results in damage to airplanes when many planes must be moved in order to bring just one plane out of the hangar.

Proper door selection and design in conjunction with the cantilever truss will produce a hangar that can be expanded to provide almost any width of continuous door opening. The proper door design will also allow the door to be opened at any required point to a width sufficient for the passage of one airplane.

Trusses can be located any number of feet center to center that is consistent with good planning and structural design. In the plans presented here the dimension of ten feet (10' - 0") was used as a repeating modular unit for planning purposes.

Specific shop area requirements and subdivisions are a matter of over all service policy and working procedures which will be determined by the dealer.

IV SALES AND SERVICE BUILDING - INTERMEDIATE STAGE

The intermediate stage of development is illustrated in the plan, Figure IV (Sheet 3.). This stage of the Sales and Service Building shows increased facilities for service as well as a public lounge with lunch counter. This lounge and lunch counter area can be used in a later stage of development (or even in this stage) as an airplane display and sales and as a parts display and sales room. But until a seperate Airport Public Center with food servive and lounging facilities is provided, such a unit in the Sales and Service Building will not only attract sales and service business for the dealer but will provide an additional source of revenue.

This stage shows an increase in the size of the heating and mechanical plant and the provision of a locker room for mechanics and shop personnel. The work of mechanics, shop personnel, and parts men is such that they must change from street clothes to work clothes making adequate locker facilities necessary. In conjunction with the lockers it is very desirable to provide shower stalls.

V SALES AND SERVICE BUILDING - ADVANCED STAGE

The advanced stage of development is illustrated in the plan, Figure V (Sheet 4.). Shop and service facilities are increased and a paint shop is included. This paint shop with its paint storage vault and the adjacent oil storage vault for the gasoline and oil sales function should be of fireproof or fire retarding construction. Paint shops or areas require special treatment to reduce the hazzard of fire and explosion and correspondingly keep insurance premiums to a minimum. In the early stages of development the 'paint shop area' can be curtained off from the rest of the service hangar, but extreme caution is required in its operation.

The best plan, if justified by business volume, is the seperate paint shop. This shop should be equipped with mechanical ventilation which positively removes dangerous vapors through a floor grill (such vapors are heavy and flow down to the floor) and delivers them to the building exterior through a penthouse on the roof. The large volume of clean fresh air required for such a purpose must be brought in from the exterior, heated during cold weather, and filtered free of dust and dirt which would mar paint work. A diagramatic picture of the air flow through a paint shop is illustrated in the cross sections, Figure III (Sheet 7.).

Keeping the air dust free requires that all the doors to the paint shop be furnished with weather stripping and made as air tight as possible. Where fire doors are required between the paint shop and other facilities, it may be necessary to install a double door arrangement since it is difficult to make fire doors air tight without impeding their free operation. In order to reduce the hazzard of vapor explosions in the paint shop it is essential that the floor be spark proof (wood or zinc sheet - not concrete). All electrical switches, fixtures, lights, motors, etc. in the paint shop should be of the vapor proof or explosion proof type underwriters approved.

Other shops have specific requirements which may or may not be economically justified depending upon the volume of business. Specific requirements on which the safety of flight depends must be included without exception. The instrument shop requires air conditioning to help maintain a constant temperature and to keep the air dust free. In reference to eliminating dust from the air an electrical precipitron used in conjunction with the air conditioning unit is the specific answer to the problem. The radio shop may require a 'screen room' for the accurate testing of radio equipment. The battery shop requires acid proof benches, acid proof sink and plumbing fixtures, excellent lighting and

excellent ventilation. Shops such as the engine shop can make good use of a hoist. This hoist can be either a portable unit or an overhead track traveling hoist. Propellar shops, if expected to process metal blades, will be better designed if provided with wood floors.

As sales business increases special sales rooms or customer conference rooms will be required. These rooms provide privacy for the customer and the salesman in arranging the final details of the purchase. Such rooms should be convenient to the display room and free from distractions.

An attractive display of new planes is extremely important in airplane merchandising. The new plane or planes on display should be the focal point of the establishment. Spectators should have as unobstructed a view of the airplane or planes on dislay as possible. Because of the size of airplanes this will probably mean that the display area or window will have to be combined with the regular show room exhibit. Where space for the display of more than one or two planes is unobtainable or uneconomical, the use of scale airplane models in display windows may prove to be the answer to the space problem. The inherent beauty of the airplane should be supplemented by the design of its setting when on display. Lighting effects can be of great assistance in display work. Facilities for customers attracted to the display room should include comfortable seating, toilet facilities, telephone booths, and other conveniences. Desks for sales personnel can be located in the display room. It is possible to capitalize on the attraction value of the new airplanes on display by locating the parts and accessories sales and display adjacent to or opening off of the airplane display.

VI PUBLIC CENTER BUILDING

Plans for an Airport Public Center Building are illustrated in Figure VI (Sheet 5.). It is possible to start this building as a smaller structure that illustrated, and then expand it as required. The facilities included in this building will be determined by local requirements.

The structural system can be similar to the one used in the Sales and Service Building (thus maintaining the continuity of roof line) and expansion can be carried out on a repeating modular unit basis. The construction of a control tower and office space for the Civil Aeronautics Administration (if any) and the Weather Bureau (if any) is also subject to local conditions and requirements. No attempt is made to provide facilities for scheduled air transport operators in this building although such facilities could be easily added. Rather, it is felt that a clear cut seperation between private flying activities and scheduled air transport is very desirable. If this is not possible through the use of seperate airports, at least seperate sides or areas of the same airport should be used to provide the desired segragation.

An idea of how the Club Lounge and Lobby of the Public Center Building might appear is illustrated in the perspective, Figure VII (Sheet 9.)

This type of building is largely a public service structure or else a

private flying club if limited to the local flyers and their guests. Such a building if planned for the general public, could be municipally owned, financed, and operated or it could be leased to the dealer for operation in conjunction with the Sales and Service Building. If financed by the dealer, it could be operated as either a public or private structure. If the local flyers as a strong group are determined to have good facilities on their airport, they may even promote and finance such a structure themselves. In any case the Public Center or the Private Club is a multiple purpose building which the dealer can use to promote the welfare of his business or in the conduct of various phases of his business.

VII SPECTATOR'S AREA

Between the Sales and Service Building and the Public Center is located a Spectator's Area which features a view of the airport and its activities. A portico connecting the two buildings seperates the Spectator's Area from the access road and the car parking area. An idea of how this area might appear to anyone at the airport is illustrated in the perspective, Figure VIII (Sheet 8.) This illustration shows the Sales and Service Building with its display window opening up the airplane display and sales room to the public. This advertising element fronting on the Spectator's Area is thus located where the greatest number of people who are interested in aviation will congregate.

The Spectator's Area should be adequately paved with walks, landscaped with lawn and treets, and neatly maintained. It serves as the 'front' for the dealer's business establishment and gives the aerial touriast or transient their first impression of the municipality to which they have arrived. Additional refinements for this area such as reflecting pools, benches, night lighting, etc. are also desireable.

VIII TEE HANGARS

Hangars can be either of the standard type which have the fault of burying airplanes in their depth or of the Tee variety whivh provide individual stalls for aircraft storage. Two schemes of Tee Hangar planning are illustrated in Figure IX (Sheet 6.). Tee Hangars can be completely seperated from one another as illustrated or the partitions forming the seperate stalls can be eliminated except for the necessary structural supports. Tee Hangars can be built as individual units or as groups of units and expansion can take place in the same manner. Hangars of this type can be built by the dealer for monthly rental to local flyers or for overnight storage of itinerant airplanes. They can also be used by the dealer for new and used airplane storage. However, this is the only exception where the standard type hangar might under an economic analysis appear more desirable. The standard type hangar has an advantage in the bulk storage of airplanes where there is no day to day use of all the airplanes in storage.

IX GASOLINE AND OIL SALES

Facilities required for aviation gasoline and oil sales and disburse-

ment will vary with local requirements and conditions. Representatives of the oil companies can give reliable advice on the size and type of facilities desirable. The location, though, of such facilities in regard to the over all plan is very important. Such facilities should preferably be between the Tee Hangars and the Sales and Service Building. Here they will be far enough from the Spectator's Area so as to reduce the danger of fire resulting from the cigarette smoking public. Gasoline and oil facilities should be capable of expansion. They should not be so located as to block building expansion or cause increased insurance premiums. Disbursement pumps or pits should be as close as practical to an office from which sales can be readily made. The facilities should be adequately lighted for night operation. All of this may not be possible in all stages of a stage development program, but here is where the master plan helps to produce the best end results.

X GARAGE

Garage facilities may be required for a number of vehicles depending upon local standards and requirements. A probable list follows:

1. Sales and Service Equipment.
   a. Trucks.
   b. Tractors.
   c. Private Cars.
2. Maintenance Equipment.
   a. Field Service Truck
   b. Snowplow
   c. Mower and Turk Machinery.
3. Emergency Equipment.
   a. Crash Truck
   b. Ambulance.
   c. Fire Truck.

The garage facilities on the plans illustrated in Figure V (Sheet 4.), are extremely limited. Individual operating requirements will determine to what extent garage facilities should be provided and whether they should face the field or the access road. The question of heating the garage is one for local decision.

XI COST AND FINANCING

In this consideration of cost it is assumed that the land is either leased on a long term basis or is purchased outright. If the airport is municipally owned, it may even be desirable to turn the title to any plant facilities built on the airport over to the municipality in exchange for a long term contract allowing use of the facilities rent free. In this manner it is possible to avoid heavy taxes which a new business might find an irksome burden. Many factors affect the cost of plant facilities. Such factors are site, topography, soil conditions, available materials, labor costs, and utilities. These all play an important part in determining the over all cost no matter what the size of the project may be. The first cost is that of design and construction, but there are additional costs such as charges for financing, depreciation, insurance premiums, maintenance and repair, heating, and

lighting. These secondary costs are governed largely by what is planned for construction; hence, their control or reduction must be made when the project is in the planning stage.

Much help in the matter of cost and financing can be obtained from the architect and the local banker. The architect realizes that a low first cost very often means high secondary or operating costs. The banker or those who finance building construction know that architect designed multiple-purpose buildings are a good protection for their investment. Soundly financed plant facilities or capital investments are the basis of all good business.

The architect will make a preliminary estimate of the cost after completing preliminary studies or plans. But not until working drawings and specifications have been completed and bids have been submitted by reliable contractors, can the architect name a cost figure that is accurate to the last dollar. Even then unforseen circumstances and contingencies can arise.

XII INSURANCE AND FIRE PROTECTION

These two factors go hand in hand in the design of airport building facilities. Because airports are usually on the edge os or far from a municipal center, fire protection is poor if not wholly inadequate. Either adequate protection must be established at the site or higher insurance premiums must be paid. This question of high cost financial protection versus the cost of adequate fire fighting facilities is one for the dealer, his architect, and his financier to decide.

One form of protection is fireproof or fire retarding construction. Another form of protection is adequate water supply coupled with a hydrant or sprinkler (automatic) system. Still another form is the use of special chemical extinguishers. Alarm systems which either warn of fire by setting off a siren or by turning on sprinkler or chemical systems are additional protection. All of these protective systems affect the rate to be paid for financial protection. Items such as the proximity and classification of buildings to the insured building affect the rate. The quality of building materials used as well as the construction detail and physical plant layout also affect the rate. In some cases it is possible that a sprinkler system , for example, may pay for itself in ten to twelve years on the basis of savings in insurance premiums. This phase of the plant facility deserves serious study and consideration.

XIII SPECIAL CONSIDERATIONS

As in the case of fire protection, utilities such as water, gas, electricity, telephone, telegraph, and sewage disposal may be entirely lacking at the airport. Each operator may be expected to provide his own utilities or have them extended to his plant site. The initial cost of securing various utility services will vary with local conditions. The greatest danger lurks in securing an inadequate service or one that can

not be readily or economically expanded to handle anticipated future demands. This is especially true of water supply and reservoirs and sewage disposal plants.

Heating, electrical, mechanical, and structural problems are best solved by a competent architect and/or engineer. Such a person should know thoroughly the conditions involved, the initial and the long term costs.

Airplane traffic in and out of the hangar service area creates a special heating problem because of the large door area involved. Drafts are a common complaint; mechanics can not work efficiently if they must wear heavy clothes. Radiant heating may prove to be the answer to this problem. Comfortably cool temperatures are also desired in work areas. The mechanics often work in confined spaces and comfortable temperatures do much to increase efficiency and aid in attracting and holding good men.

Lighting, both natural and artificial, for merchandising appeal, office efficiency, hangar servicing operations, and shop production, varies too greatly to be the subject of any all over formulae. It must be solved on the basis of specific requirements.

All in all the special conditions arising out of planning a plant facility are best solved through the aid of specially trained professional men - the architect and the engineer.

September 28, 1945

Dear Mr. Swenson:

We herewith give permission to the National Aeronautic Assn. to release to Airports Magazine the material we entered in the Andrew J. Haire Airport Awards for 1945. It is our understanding that we will hear further from Airports Magazine with special arrangements for its editorial use.

Francis R. Meisch
740 E. Sycamore St.
St. Paul 5, Minn.

THIS SIDE OF CARD IS FOR ADDRESS

National Aeronautic Association
1025 Connecticut Avenue, N. W.
Washington 6, D. C.

Att: Mr. Lowell Swenson

AIRPORTS

1170 BROADWAY • NEW YORK 1 • MUrray Hill 3-8700

AIRPORT AND AIRPARK DEVELOPMENT • MANAGEMENT • MAINTENANCE • AVIATION SALES AND SERVICE

January 10, 1946

Mr. Francis R. Meisch
Registered Architect
740 S. Syndicate St.
St. Paul 5, Minn.

Dear Mr. Meisch:

We are pleased to send you this certificate as a remembrance of the cash honorarium which has previously been sent you for your contribution to the Andrew J. Haire Airport Awards for 1945.

We felt that this certificate would serve as a permanent keepsake of your successful entry in the competition.

With all best wishes for your continued efforts toward the development of airports and aviation, I am

Cordially yours,

AIRPORTS

Thomas B. Haire

Thomas B. Haire
Publisher

TBH:K

A HAIRE *Specialized* PUBLICATION

PUBLISHERS OF AVIATION EQUIPMENT • AVIATION EQUIPMENT RED BOOK • THE AIRPORTS DIRECTORY

AIRPORTS

1170 BROADWAY • NEW YORK 1 • MUrray Hill 3-8700

AIRPORT AND AIRPARK DEVELOPMENT • MANAGEMENT • MAINTENANCE • AVIATION SALES AND SERVICE

September 28, 1945

Mr. Francis R. Meisch
Registerd Architect
740 South Syndicate Street
St. Paul 5, Minn.

Dear Mr. Meisch:

We are very happy to add our congratulations to those you have already received from the National Aeronautic Association and from Andrew J. Haire on your winning of honorable mention in our 1945 Airport Awards.

From an editorial standpoint, there is a wealth of wonderful material contained in your entry and we would like your permission to allow the National Aeronautic Association to forward your material to us for editorial use.

We will contact you further at that time with the details of just how we might make use of it and when.

As creator of the Awards, we are naturally tremendously interested in publicizing the results of your efforts in our pages.

If you will simply sign the enclosed card, that will do the trick.

Yours very truly,

AIRPORTS MAGAZINE

John Regan

John Regan
Editor

JR:K
Enc.

A HAIRE *Specialized* PUBLICATION

PUBLISHERS OF AVIATION EQUIPMENT • AVIATION EQUIPMENT RED BOOK • THE AIRPORTS DIRECTORY

October 10, 1945
740 South Syndicate St,
St. Paul 5, Minnesota.

Mr. John Regan, Editor,
Airports Magazine
1170 Broadway,
New York 1, New York.

Dear Mr. Regan:

I wish to acknowledge receipt of your letter of September 28th and to thank you for the congratulations. I regret that several business trips prevented me from answering your letter sooner.

I can understand your interest in publicizing the the results and the entries in the Andrew J. Haire Airport Awards for 1945. I have no objection to your using the material which I submitted and which won one of the honorable mentions. However, the material submitted was originally prepared for Aviation Associates, 664 North Michigan Ave., Chicago 11, Illinois, for publication in an Airport Operator's Handbook for Aeronca Aircraft Corp., Middletown, Ohio. Consequently you will have to obtain publication rights from the aforementioned. In a previous instance where the architectural magazine, Pencil Points, desired to publish the material, Aviation Associates and Aeronca stated that they did not wish the material published prior to the release of their handbook. However they might be interested in its publication in connection with its value as advanced publicity for their handbook. On the other hand you may not need this material for publication until after the handbook is released.

The manuscript which I sent to Aviation Associates and a copy of which was entered in the awards, I believe has been considerably revised by Aviation Associates to maintain the editorial continuity of the handbook. I wish you success in obtaining their permission for publication. Please let me know what success you have and if I may be of any assistance,

Sincerely yours,

Francis R. Meisch
Registered Architect.

Enc.

October 10, 1945
740 South Syndicate St.
St. Paul 5, Minnesota

Mr. Lowell H. Swenson
Manager
National Aeronautic Association
1025 Connecticut Avenue, N.W.,
Washington 6, D. C.

Dear Mr. Swenson:

I wish to acknowledge receipt of your telegram of September 28th notifying me as a winner of an honorable mention in the Andrew J. Haire Airport Awards for 1945. I also wish to thank you for the congratulations.

At the present time I am in receipt of a letter from Mr. John Regan, Editor of 'Airports' in which he states that they would like to obtain the material I entered for editorial use. I have no objections to your releasing this material to 'Airports' except that as I noted in my letter of submission with the material entered the following: 'Permission to reproduce the enclosed illustrations must be secured from Aviation Associates, (664 North Michigan Avenue) Chicago, Ill., and Aeronca Aircraft Corp., Middletown, Ohio.' Previously Pencil Points Magazine was interested in the publication of this material and at that time Aeronca and Aviation Associates did not desire that it be released until they had fist published it in their Airport Operator's Handbook. I understand now that they hope to publish this handbook sometime this fall. You may consider this letter as my permission to release the material that I entered in the Andrew J. Haire Airport Awards for 1945 to Airports Magazine with the understanding that Airports Magazine will have to contact Aviation Associates and Aeronca Aircraft Corp. for publication rights.

Sincerely yours,

Francis R. Meisch
Registered Architect.

Copy to John Regan
Airports Magazine

NATIONAL AERONAUTIC ASSOCIATION

1025 CONNECTICUT AVENUE, WASHINGTON 6, D. C.

UNITED STATES WING INTER-AMERICAN ESCADRILLE

UNITED STATES REPRESENTATIVE FEDERATION AERONAUTIQUE INTERNATIONALE

December 6, 1945

Mr. Francis R. Meisch
Registered Architect
740 South Syndicate Street
St. Paul 5, Minnesota

Dear Mr. Meisch:

As winner of one of the Andrew J. Haire Airport Awards for 1945, the donor of the awards, the Haire Publishing Company, joins with us in inviting you to be our guest at a dinner of the Aero Club of Washington, commemorating the 42nd anniversary of aviation, to be held at the Statler hotel in Washington, December 17.

The program will include formal presentation of the Robert J. Collier Trophy, the Brewer Trophy and first prize in the Haire competition. We should consider it both a privilege and a pleasure to have you attend this important aviation function as our guest.

If it is possible for you to be in attendance, please advise us by collect wire at once so we may reserve space for you.

We are enclosing our check in the amount of $100.00 which represents payment in full of the prize money you won in the 1945 Haire competition.

Sincerely yours,

Lowell H. Swenson

Lowell H. Swenson
Manager

LHS:sr
enc.

CLASS OF SERVICE

This is a full-rate Telegram or Cablegram unless its deferred character is indicated by a suitable symbol above or preceding the address.

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A. N. WILLIAMS
PRESIDENT

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YOU WERE ADJUDGED THE WINNERS OF ONE OF TEN HONORABLE MENTIONS , WHICH CARRIES WITH IT A CASH PRICE OF $100. IN CASH, IN THE ANDREW J HAIRE AIRPORT AWARDS FOR 1945 BY THE AWARDS COMMITTEE YESTERDAY AFTERNOON. CONGRATULATIONS. IT WAS RICHLY DESERVED . DATE AND PLACE FOR PRESENTATION OF THE AWARDS WILL BE ANNOUNCED LATER=

LOWELL H SWENSON MANAGER NATIONAL AERONAUTIC ASSOCIATION.

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FRANCIS R MEISCH, REGISTERED ARCHITECT=

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I WANT TO OFFER MY PERSONAL CONGRATULATIONS ON YOUR WINNING HONORABLE MENTION IN OUR AIRPORT AWARD COMPETITION ADMINISTERED BY NATIONAL AERONAUTIC ASSN, THE CONSTRUCTIVE EFFORT REPRESENTED BY YOUR ENTRY IS A DEFINITE CONTRIBUTION TO THE DEVELOPMENT OF OUR COUNTRY'S AIRPORTS=

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THE COMPANY WILL APPRECIATE SUGGESTIONS FROM ITS PATRONS CONCERNING ITS SERVICE

NATIONAL AERONAUTIC ASSOCIATION

1025 CONNECTICUT AVENUE, WASHINGTON 6, D. C.

UNITED STATES WING INTER-AMERICAN ESCADRILLE

UNITED STATES REPRESENTATIVE FEDERATION AERONAUTIQUE INTERNATIONALE

October 15, 1945.

Mr. Francis R. Meisch,
Registered Architect,
740 South Syndicate St.,
St. Paul 5, Minnesota.

Dear Mr. Meisch:

Thank you for your letter of October 10, addressed to Mr. Swenson, which has been handed to the writer for attention during his absence from the city.

We appreciate your cooperation in releasing this material to Airports Magazine for their use. We will forward your entry to them immediately.

Very truly yours,

Jack Frost

Jack Frost
Assistant Manager

JR:em

NATIONAL AERONAUTIC ASSOCIATION
1025 CONNECTICUT AVE., N. W.
WASHINGTON 6, D. C.

District 2808

RELEASE: MORNING NEWSPAPERS
WEDNESDAY, September 26,1945

A small town Southerner,who installed telephones between his gas pumps and his airport office to make his customers happier, was announced today as the winner of a $5,000 prize in a national competition to stimulate the development of the nation's landing facilities.

The award was announced by the National Aeronautic Association which sponsored and administered the competition for Andrew J. Haire, New York, publisher of "Airports" magazine.

The first place winner was Beverly Howard of Orangeburg, S. C., an air show stunt flier, who parlayed pocket money into a major business. He is the president of the Hawthorne Flying Service and of the Hawthorne School of Aeronautics. He operates airports also at Rocky Mount, Greensboro-High Point, Fayetteville and Columbia, S. C. and Albany, Ga.

He cheerfully fires any employee who fails to wipe airplane windshields and check the oil without being asked to. The telephones were installed so attendants could tell the cashier what the customer's bill was and so cut down the time between an airplane's landing and its takeoff. Entering into the decision of the committee that made the awards were other aspects of Howard's operations. He created a lounge and other facilities at Columbia for local and transient airplane pilots that are as attractive as a fine living room. At Fayetteville he took over a run-down airport and made it into a better-class field. Among Howard's other interests is Air Services, Inc., on Washington's National Airport, of which he is president.

Second place in the competition, which carried $1,000, was won by Horner & Shifrin and Smith, Hinchman & Grylls, Inc., of Detroit, engineering consultants. Their entry was a study of the airport needs of that city. Third place and $500 was won by the City of Bradford, Pa., Aviation Commission for a merchandising job on their airport facilities and the conversion of a military field into a civil operation.

Ten other awards of $100 each were made. Winners were Grattan English, San Francisco; R. E. Flynn, Miami, Fla.; R. J. Reed and E. V. Fryhoff, Eldon, Mo.; Alfred B. Bennett, Middletown, Ohio; Everett V. Hogan, Mitchell, Nebr.; Ralph T. Zook, Bradford, Pa.; Francis R. Meisch, St. Paul, Minn.; Hart Bowman, Dallas, Tex.; M. R. Blattner, Dayton, Ohio, and Mrs. Margaret T. White, Avalon, Santa Catalina Island, California.

The awards, for originality or achievement, were designed "to encourage ingenuity and initiative at the 'grass roots'," and were selected from 170 entries.

Chairman of the judging committee was Robb C. Oertel of New York, manager of the aviation department of the Standard Oil Company of New Jersey and vice-president-airports division, NAA. His committee members included Theodore P. Wright, federal administrator of civil aeronautics.

##########

Airstrip Radiophone Autophone Autoplane Trainphone Dalco

JOSEPH C. LENIHAN
Engineering Specialist
RADIO • COMMUNICATIONS • AIRCRAFT

Telephone: Midway 1927

1958 SELBY AVENUE
ST. PAUL 4, MINNESOTA

September 27th. 1945.

Mr. Francis R. Meisch,
Architect & Planning Engineer.
740 Syndicate Street,
St. Paul Minnesota.

Dear Mr. Meisch;

May I extend my congratulations to you upon your outstanding achievement in the field of Aeronautics Engineering.

I will appreciate the name of the aircraft manufacture to contact for a copy of your article, "proposals for aviation facilities".

My best wishes for your continued success, I am,

Yours very truly,

Joseph C. Lenihan

Joseph C. Lenihan President,
Autoplane Engineering Co.
Autoplane Modelcrafts Co.
Airstrip Engineering Co.

August 28, 1945

Andrew J. Haire Airport Awards for 1945
National Aeronautic Association
1025 Connecticut Avenue, N.W.,
Washington 6, D. C.

Gentlemen of the Awards Committee:

The enclosed project consisting of illustrations and an explanatory manuscript was undertaken for Aviation Associates, 664 North Michigan Avenue, Chicago 11, Illinois. They intend to use this material as part of an Airport Operator's Handbook which they are preparing for Aeronca Aircraft Corp., Middletown, Ohio.

This project, 'Plant Facilities for Airplane Dealers' was concerned with the design and planning of an ideal airport building group for the airplane dealer and private flying activities. Its use is as a source of ideas and as a guide for the planning of similar projects. The main principals upon which the design is based are expansibility (by stage construction), flexibility, workability, and appearance. The main object was to develope not only ideas but to illustrate how proper planning by competent professional men would allow the airplane dealer, fixed base operator, or municipality to start a building development on a modest scale and parallel the increase in airport activity with a corresponding increase in facilities as there was an economic justification for same.

If private flying activities are ever going to attract investment capital, they must present a 'good front and solid background' before they can become big business. Soundly financed, well designed plant facilities, in other words - architecture not mere building is the appropriate background for flying activities.

It is felt that this project is worthy of consideration by the Awards Committee because in the past little has been done to promote well planned functional and integrated building developments for airplane dealers and private flying activities, whereas much progress has been made in the design field of building development for scheduled air transport.

Respectfully submitted,

Francis R. Meisch

Francis R. Meisch, A.I.A.
Registered Architect
740 South Syndicate Street,
St. Paul 5, Minnesota.

Note: Permission to reproduce the enclosed illustrations must be secured from Aviation Associates, Chicago, Ill., and Aeronca Aircraft Corp., Middletown, Ohio.

PLANT FACILITIES FOR AIRPLANE DEALERS

Francis R. Meisch
Registered Architect,
Minneapolis, Minnesota.
(now St. Paul, Minn)

I BACKGROUND FOR PLANNING

Progress in the airplane business depends on a broad national program of airport development for the private flyer and on the efficient production, distribution, and servicing of the airplane. Responsibility for production rests with the manufacturer but the distribution and service functions are performed by the manufacturer and his dealers jointly.

The efficient performance of distribution and service functions by airplane dealers, fixed base operators, or airport operators, is essential not only to the success of the manufacturer's business but to that of the dealer's or operator's business as well.

The facilities which dealers possess influence their ability to perform the functions for which they are responsible. These facilities should also help to promote an interest in aviation and in the use of the airplane by the general public. The dealer's physical plant affects his ability to display, condition, and stock new airplanes, to recondition and sell used airplanes, to maintain and repair airplanes for customers, and to distribute replacement parts and accessories.

More and more attention must be focused on the distribution because the end of World War II will find the manufacturers collectively able to produce more airplanes than the market will be able to absorb. This also points to the importance of service as an income for dealers and to the need for additional sources of income to eliminate seasonal slumps in the business. Other sources of income are flight instruction, airplane mechanic training, gasoline and oil sales, aerial taxi service, sightseeing flights, aerial photography, and hangar rental for local and itinerant airplane storage. Facilities and conveniences for the spectator as well as the flyer can provide additional sources of income and increase interest in aviation.

Since the airplane business is a growing industry with a broad future, the limits of which are not yet defined, the dealer must proceed with caution in the planning and construction of his physical plant. To this end the dealer will promote his own interests by securing the services of a competent architect who is familiar with local building conditions, materials, labor, and costs. The architect can assist the dealer in solving many of the problems that pertain to the physical plant, its site, utilities, financing, construction, insurance, maintenance, etc.

Dealer establishments which are functional in design and adequately suited to the multiple needs of the dealer are rare. The past is no

guide for the future. In the past the design of hangars and airport buildings governed the conduct of the dealer's business. In the future, however, the design of the dealer's facilities should be determined by the functional requirements of the retail plane sales and service business. These functional requirements are mainly as follow:

1. Management and Administration.
2. New and Used Airplane Display and Sales.
3. Repair and Maintenance.
4. Parts and Accessories Stock, Display, and Sales.
5. Gasoline and Oil Storage and Sales.
6. Airplane Storage Hangars.
7. General Service and Convenience Facilities.

This functional plan of organization is common to many dealerships whether large or small. The functions can all be conducted in one building but wise planning dictates that there be some segragation to allow for efficiency, flexibility, and expansion.

The over all layout of a planned functional airport building group is illustrated in the aerial perspective, Figure I (Sheet 1.). This perspective shows groups of Tee Hangars, Gasoline Pits, Garage Facilities, Airplane Sales and Service Building, Spectator's Area, Airport Public Center, and Car Parking Area. The detailed planning of specific facilities is shown in other illustrations that follow. The illustrations presented herewith are ideas which can serve only as a starting point for the solution of the individual dealer's problem.

II THE MASTER PLAN

The essential basic feature of the overall layout is the development of a master plan which will serve as a guide for initial construction and stage development of plant facilities. It is 'planning insurance' and the only safeguard that can be found for a business which requires expanding plant facilities and flexible functional solutions. Such a plan, though it may be changed to accord with the times, serves as a control in preventing inadequacy, obsolesence, and planning shortsightedness. The master plan is concerned with site planning or the relation of the project to the air port, to the community, to utilities, to access roads and transportation, to topography, to soil conditions, to finances, etc. The master plan allows the dealer to start out in a modest way with a minimum investment in plant facilities. When necessary, the master plan allows the dealer to expand his plant in successive stages to parallel business developments requiring increased facilities and his economic ability to finance additional plant investments.

III SALES AND SERVICE BUILDING - INITIAL STAGE

The initial stage of development of a Sales and Service Building is illustrated in the plan, Figure II (Sheet 2.). Also shown are alternate schemes for the layout of the office-lobby, parts sales, display, and stock room end of the building. Schemes A and B are predicated upon a 'one man establishment' or a very limited staff. Schemes C and D are based upon having more personnel emplyed in the initial stage thus allowing a greater decentralization of functions. Certain functions are

thus segragated initially so that with expansion they will be properly related at a later stage of development. How such a development can logically occurr is illustrated in the plans (based on Scheme DO for the intermediate and advanced stages of the Sales and Service Building.

The size of the initial development is governed by local business conditions. The character of the development is largely determined by the finances available and local building conditions. The ingenuity of the architect is a big factor in determining the ultimate result. Some dealers, for example, might find the plans proposed under the intermediate stage of development best suited for the initial stage of their plant facilities.

The hangar area proper for sales and service work is designed for cantilever roof construction so as to always allow for unit expansion on one side. Examples of cantilever roof construction are illustrated in the sections, Figure III (Sheet 7.). This type of hangar is limited in depth but follows the idea of the stall arrangement in automobile service stations. In this type of planning automobiles are readily moved into stalls for work and readily removed when work is completed. This same pattern of planning and operation in an airplane service hangar can increase efficiency by eliminating the 'pocketing effect' of the standard type hangar. This 'pocketing effect' causes much loss of time and often results in damage to airplanes when many planes must be moved in order to bring just one plane out of the hangar.

Proper door selection and design in conjunction with the cantilever truss will produce a hangar that can be expanded to provide almost any width of continuous door opening. The proper door design will also allow the door to be opened at any required point to a width sufficient for the passage of one airplane.

Trusses can be located any number of feet center to center that is consistent with good planning and structural design. In the plans presented here the dimension of ten feet (10' - 0") was used as a repeating modular unit for planning purposes.

Specific shop area requirements and subdivisions are a matter of over all service policy and working procedures which will be determined by the dealer.

IV SALES AND SERVICE BUILDING - INTERMEDIATE STAGE

The intermediate stage of development is illustrated in the plan, Figure IV (Sheet 3.). This stage of the Sales and Service Building shows increased facilities for service as well as a public lounge with lunch counter. This lounge and lunch counter area can be used in a later stage of development (or even in this stage) as an airplane display and sales and as a parts display and sales room. But until a seperate Airport Public Center with food servive and lounging facilities is provided, such a unit in the Sales and Service Building will not only attract sales and service business for the dealer but will provide an additional source of revenue.

This stage shows an increase in the size of the heating and mechanical plant and the provision of a locker room for mechanics and shop personnel. The work of mechanics, shop personnel, and parts men is such that they must change from street clothes to work clothes making adequate locker facilities necessary. In conjunction with the lockers it is very desirable to provide shower stalls.

V SALES AND SERVICE BUILDING - ADVANCED STAGE

The advanced stage of development is illustrated in the plan, Figure V (Sheet 4.). Shop and service facilities are increased and a paint shop is included. This paint shop with its paint storage vault and the adjacent oil storage vault for the gasoline and oil sales function should be of fireproof or fire retarding construction. Paint shops or areas require special treatment to reduce the hazzard of fire and explosion and correspondingly keep insurance premiums to a minimum. In the early stages of development the 'paint shop area' can be curtained off from the rest of the service hangar, but extreme caution is required in its operation.

The best plan, if justified by business volume, is the seperate paint shop. This shop should be equipped with mechanical ventilation which positively removes dangerous vapors through a floor grill (such vapors are heavy and flow down to the floor) and delivers them to the building exterior through a penthouse on the roof. The large volume of clean fresh air required for such a purpose must be brought in from the exterior, heated during cold weather, and filtered free of dust and dirt which would mar paint work. A diagramatic picture of the air flow through a paint shop is illustrated in the cross sections, Figure III (Sheet 7.).

Keeping the air dust free requires that all the doors to the paint shop be furnished with weather stripping and made as air tight as possible. Where fire doors are required between the paint shop and other facilities, it may be necessary to install a double door arrangement since it is difficult to make fire doors air tight without impeding their free operation. In order to reduce the hazzard of vapor explosions in the paint shop it is essential that the floor be spark proof (wood or zinc sheet - not concrete). All electrical switches, fixtures, lights, motors, etc. in the paint shop should be of the vapor proof or explosion proof type underwriters approved.

Other shops have specific requirements which may or may not be economically justified depending upon the volume of business. Specific requirements on which the safety of flight depends must be included without exception. The instrument shop requires air conditioning to help maintain a constant temperature and to keep the air dust free. In reference to eliminating dust from the air an electrical precipitron used in conjunction with the air conditioning unit is the specific answer to the problem. The radio shop may require a 'screen room' for the accurate testing of radio equipment. The battery shop requires acid proof benches, acid proof sink and plumbing fixtures, excellent lighting and

excellent ventilation. Shops such as the engine shop can make good use of a hoist. This hoist can be either a portable unit or an overhead track traveling hoist. Propellar shops, if expected to process metal blades, will be better designed if provided with wood floors.

As sales business increases special sales rooms or customer conference rooms will be required. These rooms provide privacy for the customer and the salesman in arranging the final details of the purchase. Such rooms should be convenient to the display room and free from distractions.

An attractive display of new planes is extremely important in airplane merchandising. The new plane or planes on display should be the focal point of the establishment. Spectators should have as unobstructed a view of the airplane or planes on dislay as possible. Because of the size of airplanes this will probably mean that the display area or window will have to be combined with the regular show room exhibit. Where space for the display of more than one or two planes is unobtainable or uneconomical, the use of scale airplane models in display windows may prove to be the answer to the space problem. The inherent beauty of the airplane should be supplemented by the design of its setting when on display. Lighting effects can be of great assistance in display work. Facilities for customers attracted to the display room should include comfortable seating, toilet facilities, telephone booths, and other conveniences. Desks for sales personnel can be located in the display room. It is possible to capitalize on the attraction value of the new airplanes on display by locating the parts and accessories sales and display adjacent to or opening off of the airplane display.

VI PUBLIC CENTER BUILDING

Plans for an Airport Public Center Building are illustrated in Figure VI (Sheet 5.). It is possible to start this building as a smaller structure that illustrated, and then expand it as required. The facilities included in this building will be determined by local requirements.

The structural system can be similar to the one used in the Sales and Service Building (thus maintaining the continuity of roof line) and expansion can be carried out on a repeating modular unit basis. The construction of a control tower and office space for the Civil Aeronautics Administration (if any) and the Weather Bureau (if any) is also subject to local conditions and requirements. No attempt is made to provide facilities for scheduled air transport operators in this building although such facilities could be easily added. Rather, it is felt that a clear cut seperation between private flying activities and scheduled air transport is very desirable. If this is not possible through the use of seperate airports, at least seperate sides or areas of the same airport should be used to provide the desired segragation.

An idea of how the Club Lounge and Lobby of the Public Center Building might appear is illustrated in the perspective, Figure VII (Sheet 9.)

This type of building is largely a public service structure or else a

private flying club if limited to the local flyers and their guests. Such a building if planned for the general public, could be municipally owned, financed, and operated or it could be leased to the dealer for operation in conjunction with the Sales and Service Building. If financed by the dealer, it could be operated as either a public or private structure. If the local flyers as a strong group are determined to have good facilities on their airport, they may even promote and finance such a structure themselves. In any case the Public Center or the Private Club is a multiple purpose building which the dealer can use to promote the welfare of his business or in the conduct of various phases of his business.

VII SPECTATOR'S AREA

Between the Sales and Service Building and the Public Center is located a Spectator's Area which features a view of the airport and its activities. A portico connecting the two buildings, seperates the Spectator's Area from the access road and the car parking area. An idea of how this area might appear to anyone at the airport is illustrated in the perspective, Figure VIII (Sheet 8.) This illustration shows the Sales and Service Building with its display window opening up the airplane display and sales room to the public. This advertising element fronting on the Spectator's Area is thus located where the greatest number of people who are interested in aviation will congregate.

The Spectator's Area should be adequately paved with walks, landscaped with lawn and treets, and neatly maintained. It serves as the 'front' for the dealer's business establishment and gives the aerial touriast or transient their first impression of the municipality to which they have arrived. Additional refinements for this area such as reflecting pools, benches, night lighting, etc. are also desireable.

VIII TEE HANGARS

Hangars can be either of the standard type which have the fault of burying airplanes in their depth or of the Tee variety whivh provide individual stalls for aircraft storage. Two schemes of Tee Hangar planning are illustrated in Figure IX (Sheet 6.). Tee Hangars can be completely seperated from one another as illustrated or the partitions forming the seperate stalls can be eliminated except for the necessary structural supports. Tee Hangars can be built as individual units or as groups of units and expansion can take place in the same manner. Hangars of this type can be built by the dealer for monthly rental to local flyers or for overnight storage of itinerant airplanes. They can also be used by the dealer for new and used airplane storage. However, this is the only exception where the standard type hangar might under an economic analysis appear more desirable. The standard type hangar has an advantage in the bulk storage of airplanes where there is no day to day use of all the airplanes in storage.

IX GASOLINE AND OIL SALES

Facilities required for aviation gasoline and oil sales and disburse-

not be readily or economically expanded to handle anticipated future demands. This is especially true of water supply and reservoirs and sewage disposal plants.

Heating, electrical, mechanical, and structural problems are best solved by a competent architect and/or engineer. Such a person should know thoroughly the conditions involved, the initial and the long term costs.

Airplane traffic in and out of the hangar service area creates a special heating problem because of the large door area involved. Drafts are a common complaint; mechanics can not work efficiently if they must wear heavy clothes. Radiant heating may prove to be the answer to this problem. Comfortably cool temperatures are also desired in work areas. The mechanics often work in confined spaces and comfortable temperatures do much to increase efficiency and aid in attracting and holding good men.

Lighting, both natural and artificial, for merchandising appeal, office efficiency, hangar servicing operations, and shop production, varies too greatly to be the subject of any all over formulae. It must be solved on the basis of specific requirements.

All in all the special conditions arising out of planning a plant facility are best solved through the aid of specially trained professional men - the architect and the engineer.

ment will vary with local requirements and conditions. Representatives of the oil companies can give reliable advice on the size and type of facilities desirable. The location, though, of such facilities in regard to the over all plan is very important. Such facilities should preferably be between the Tee Hangars and the Sales and Service Building. Here they will be far enough from the Spectator's Area so as to reduce the danger of fire resulting from the cigarette smoking public. Gasoline and oil facilities should be capable of expansion. They should not be so located as to block building expansion or cause increased insurance premiums. Disbursement pumps or pits should be as close as practical to an office from which sales can be readily made. The facilities should be adequately lighted for night operation. All of this may not be possible in all stages of a stage development program, but here is where the master plan helps to produce the best end results.

X GARAGE

Garage facilities may be required for a number of vehicles depending upon local standards and requirements. A probable list follows:

1. Sales and Service Equipment.
   a. Trucks.
   b. Tractors.
   c. Private Cars.
2. Maintenance Equipment.
   a. Field Service Truck
   b. Snowplow
   c. Mower and Turk Machinery.
3. Emergency Equipment.
   a. Crash Truck
   b. Ambulance.
   c. Fire Truck.

The garage facilities on the plans illustrated in Figure V (Sheet 4.), are extremely limited. Individual operating requirements will determine to what extent garage facilities should be provided and whether they should face the field or the access road. The question of heating the garage is one for local decision.

XI COST AND FINANCING

In this consideration of cost it is assumed that the land is either leased on a long term basis or is purchased outright. If the airport is municipally owned, it may even be desirable to turn the title to any plant facilities built on the airport over to the municipality in exchange for a long term contract allowing use of the facilities rent free. In this manner it is possible to avoid heavy taxes which a new business might find an irksome burden. Many factors affect the cost of plant facilities. Such factors are site, topography, soil conditions, available materials, labor costs, and utilities. These all play an important part in determining the over all cost no matter what the size of the project may be. The first cost is that of design and construction, but there are additional costs such as charges for financing, depreciation, insurance premiums, maintenance and repair, heating, and

lighting. These secondary costs are governed largely by what is planned for construction; hence, their control or reduction must be made when the project is in the planning stage.

Much help in the matter of cost and financing can be obtained from the architect and the local banker. The architect realizes that a low first cost very often means high secondary or operating costs. The banker or those who finance building construction know that architect designed multiple-purpose buildings are a good protection for their investment, Soundly financed plant facilities or capital investments are the basis of all good business.

The architect will make a preliminary estimate of the cost after completing preliminary studies or plans. But not until working drawings and specifications have been completed and bids have been submitted by reliable contractors, can the architect name a cost figure that is accurate to the last dollar. Even then unforseen circumstances and contingencies can arise.

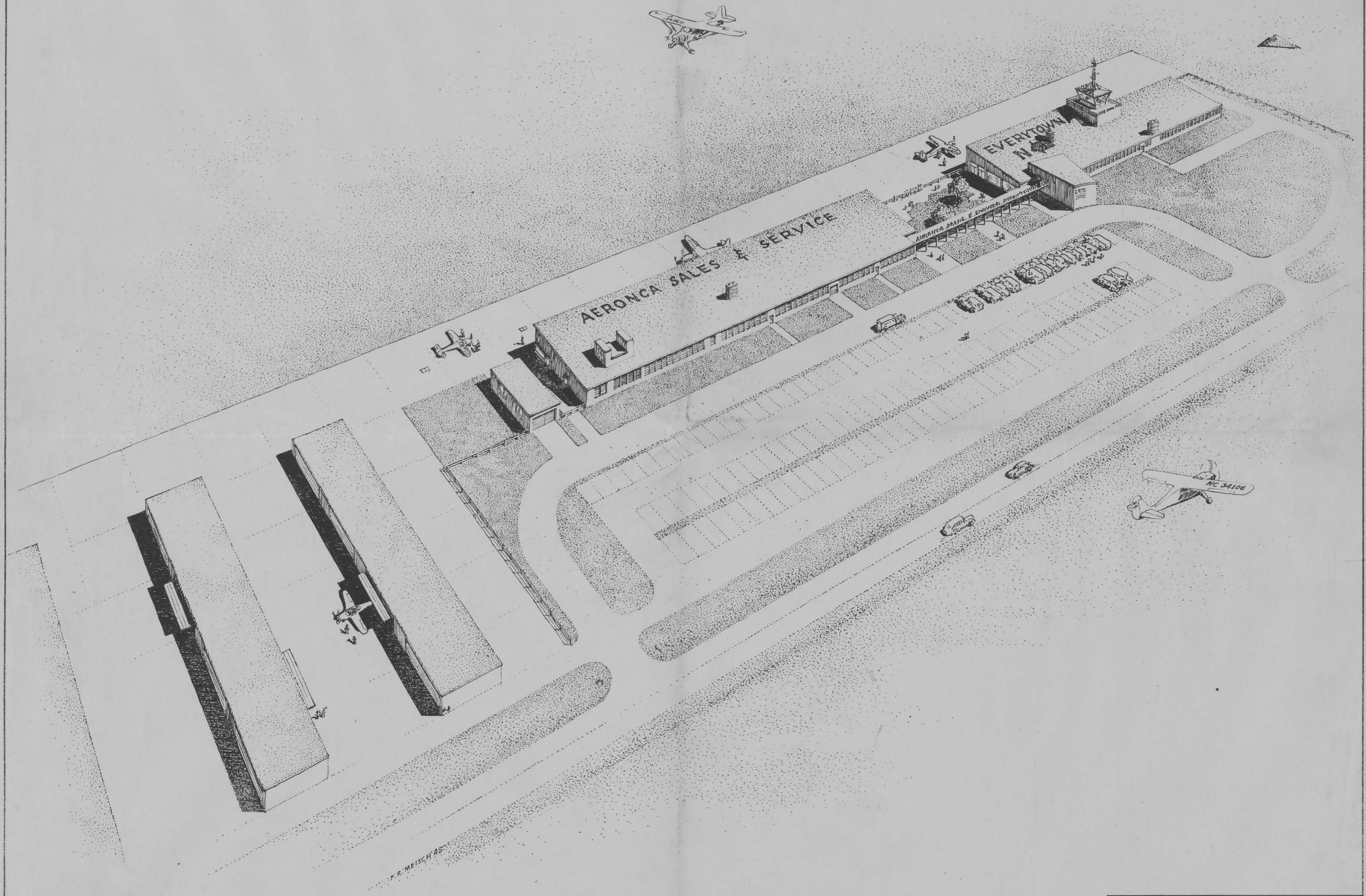
XII INSURANCE AND FIRE PROTECTION

These two factors go hand in hand in the design of airport building facilities. Because airports are usually on the edge os or far from a municipal center, fire protection is poor if not wholly inadequate. Either adequate protection must be established at the site or higher insurance premiums must be paid. This question of high cost financial protection versus the cost of adequate fire fighting facilities is one for the dealer, his architect, and his financier to decide.

One form of protection is fireproof or fire retarding construction. Another form of protection is adequate water supply coupled with a hydrant or sprinkler (automatic) system. Still another form is the use of special chemical extinguishers. Alarm systems which either warn of fire by setting off a siren or by turning on sprinkler or chemical systems are additional protection. All of these protective systems affect the rate to be paid for financial protection. Items such as the proximity and classification of buildings to the insured building affect the rate. The quality of building materials used as well as the construction detail and physical plant layout also affect the rate. In some cases it is possible that a sprinkler system , for example, may pay for itself in ten to twelve years on the basis of savings in insurance premiums. This phase of the plant facility deserves serious study and consideration.

XIII SPECIAL CONSIDERATIONS

As in the case of fire protection, utilities such as water, gas, electricity, telephone, telegraph, and sewage disposal may be entirely lacking at the airport. Each operator may be expected to provide his own utilities or have them extended to his plant site. The initial cost of securing various utility services will vary with local conditions. The greatest danger lurks in securing an inadequate service or one that can



AERIAL PERSPECTIVE OF AIRPORT BUILDING GROUP.

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REGISTERED ARCHITECT
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SHEET **1**

MARCH 20, 1945

not be readily or economically expanded to handle anticipated future demands. This is especially true of water supply and reservoirs and sewage disposal plants.

Heating, electrical, mechanical, and structural problems are best solved by a competent architect and/or engineer. Such a person should know thoroughly the conditions involved, the initial and the long term costs.

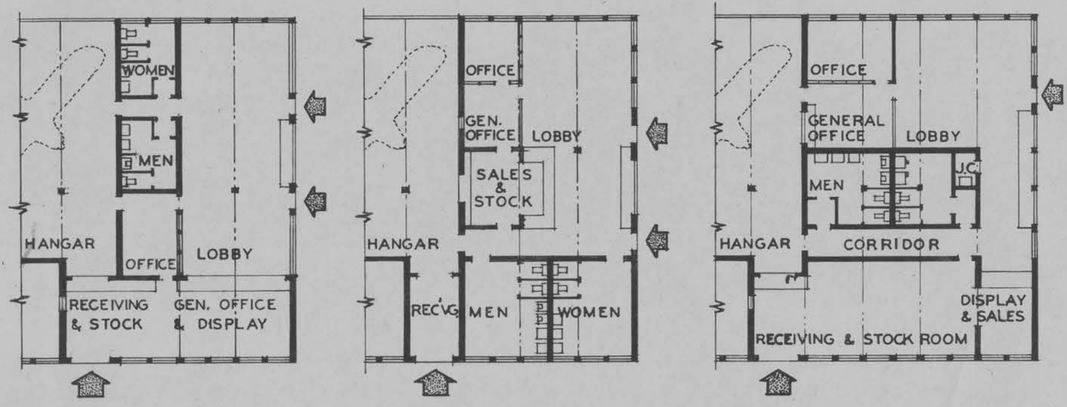
Airplane traffic in and out of the hangar service area creates a special heating problem because of the large door area involved. Drafts are a common complaint; mechanics can not work efficiently if they must wear heavy clothes. Radiant heating may prove to be the answer to this problem. Comfortably cool temperatures are also desired in work areas. The mechanics often work in confined spaces and comfortable temperatures do much to increase efficiency and aid in attracting and holding good men.

Lighting, both natural and artificial, for merchandising appeal, office efficiency, hangar servicing operations, and shop production, varies too greatly to be the subject of any all over formulae. It must be solved on the basis of specific requirements.

All in all the special conditions arising out of planning a plant facility are best solved through the aid of specially trained professional men - the architect and the engineer.

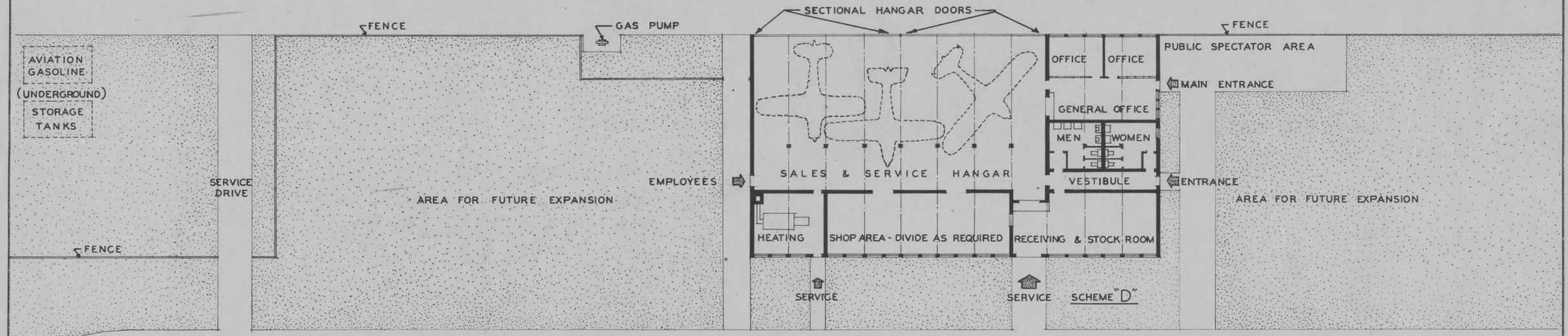
GAS PITS OPTIONAL DURING THIS STAGE

FIELD - SURFACED APRON OPTIONAL DURING THIS STAGE



SCHEME "A" SCHEME "B" SCHEME "C"

ALTERNATE PLANS FOR OFFICE - LOBBY - PARTS SALES DISPLAY AND STOCK ROOM END OF BUILDING.



SALES AND SERVICE BUILDING - INITIAL STAGE OF DEVELOPMENT.

SCALE IN FEET 0 5 10 15 20 25

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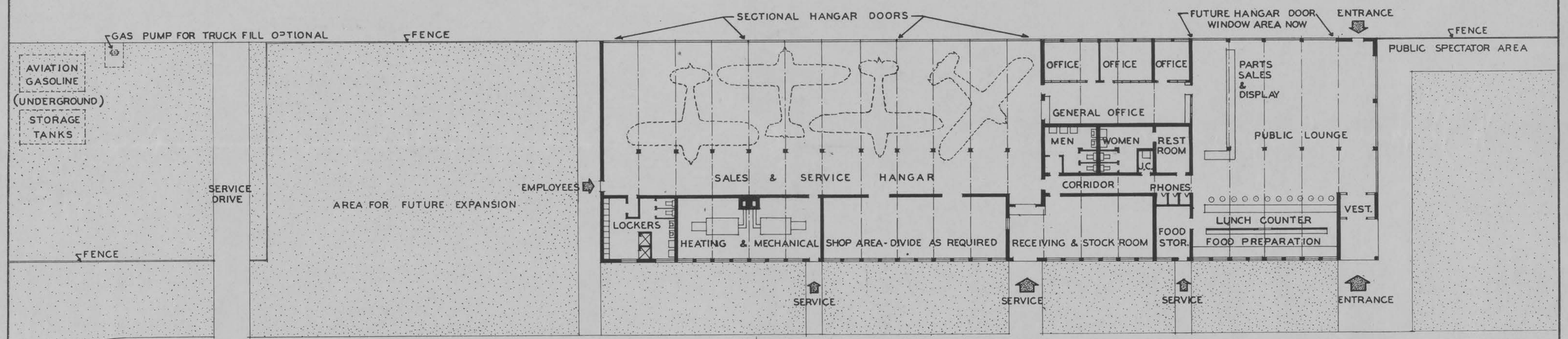
GAS PITS - NUMBER DETERMINED BY SALES

FIELD - SURFACED APRON DESIRABLE DURING THIS STAGE.



SALES AND SERVICE BUILDING - INTERMEDIATE STAGE OF DEVELOPMENT.

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GAS PIT

GAS PIT

GAS PIT

FIELD - SURFACED APRON ESSENTIAL AT THIS STAGE

GAS PUMP OPTIONAL

ENTRANCE

HANGAR DOOR

SECTIONAL HANGAR DOORS

REPLACE WINDOWS WITH HANGAR DOOR

ENTRANCE

FENCE

PUBLIC SPECTATOR AREA

AVIATION GASOLINE

(UNDERGROUND)

STORAGE TANKS

FIELD SERVICE TRUCK & CRASH TRUCK

SERV.

GAS SALES

OIL STOR. VAULT

VEST.

EMPL.

TRUCK GARAGES

PAINT SHOP

EXHAUST DUCTS

FILTERS

HEATING AIR INTAKE

PAINT VAULT

(ACCESSORIES)

(STRUCTURAL)

(ENGINE OVERHAUL)

SERVICE HANGAR - CIRCULATION AREA

RADIO - INSTRUMENT - TRIM & TIRE WOOD & FABRIC SHOP AREA - DIVIDE AS REQUIRED

LOCKERS

HEATING & MECHANICAL

ENGINE OVERHAUL & MACHINE METAL & WELDING SHOP AREA - DIVIDE AS REQUIRED

RECEIVING & STOCK ROOM

MANAGER OFFICE

SALES OFFICE

SALES OFFICE

GENERAL OFFICE

MEN

WOMEN

REST ROOM

J.C.

CORRIDOR

PHONES

AIRCRAFT DISPLAY & SALES

PARTS DISPLAY & SALES

VEST.

PORTICO TO PUBLIC CENTER

FENCE

ENTRANCE

SERVICE DRIVE

SERVICE

SERVICE

SERVICE

ENTRANCE

TO "TEE" HANGARS FOR AIRCRAFT OWNERS

ACCESS ROAD

TO PUBLIC CENTER BUILDING

CAR PARKING AREA

SALES AND SERVICE BUILDING - ADVANCED STAGE OF DEVELOPMENT.

SCALE IN FEET 0 5 10 15 20 25

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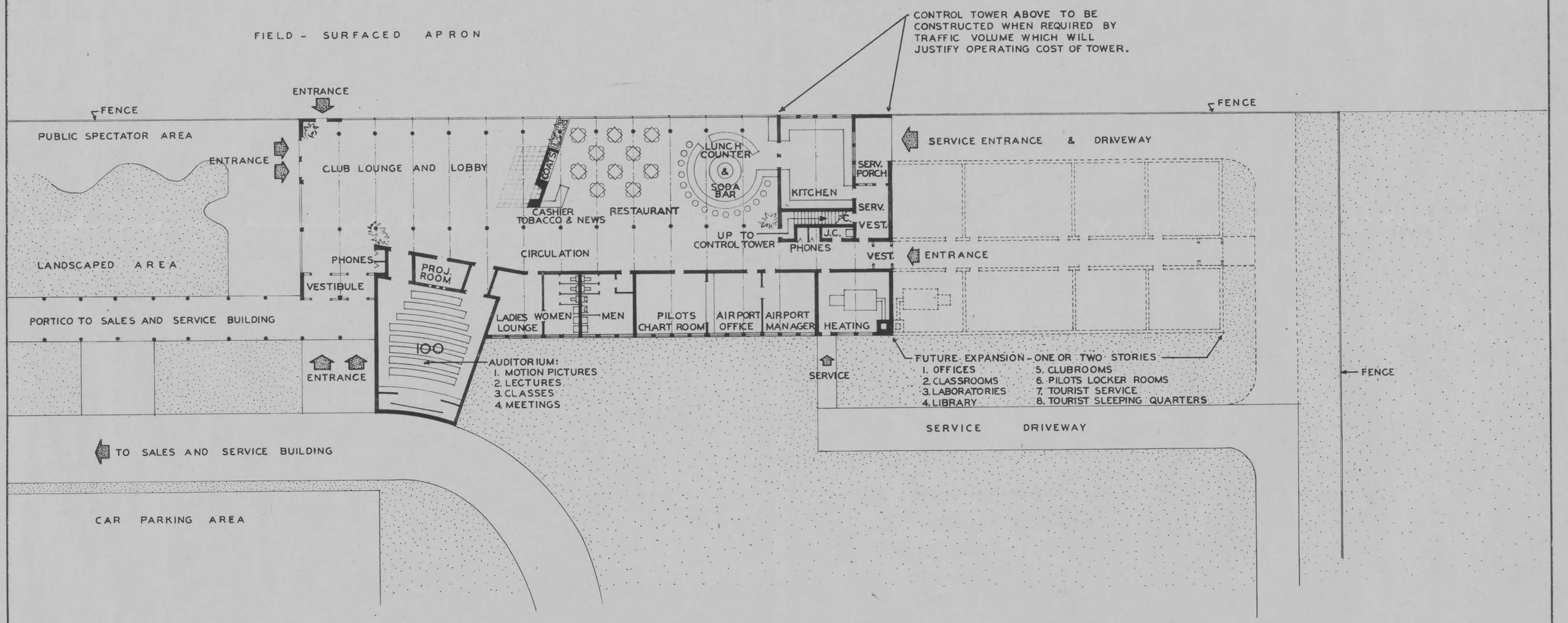

AIRPORT PUBLIC CENTER BUILDING - TWO STAGES OF DEVELOPMENT ILLUSTRATED.

SCALE IN FEET 0 5 10 15 20 25

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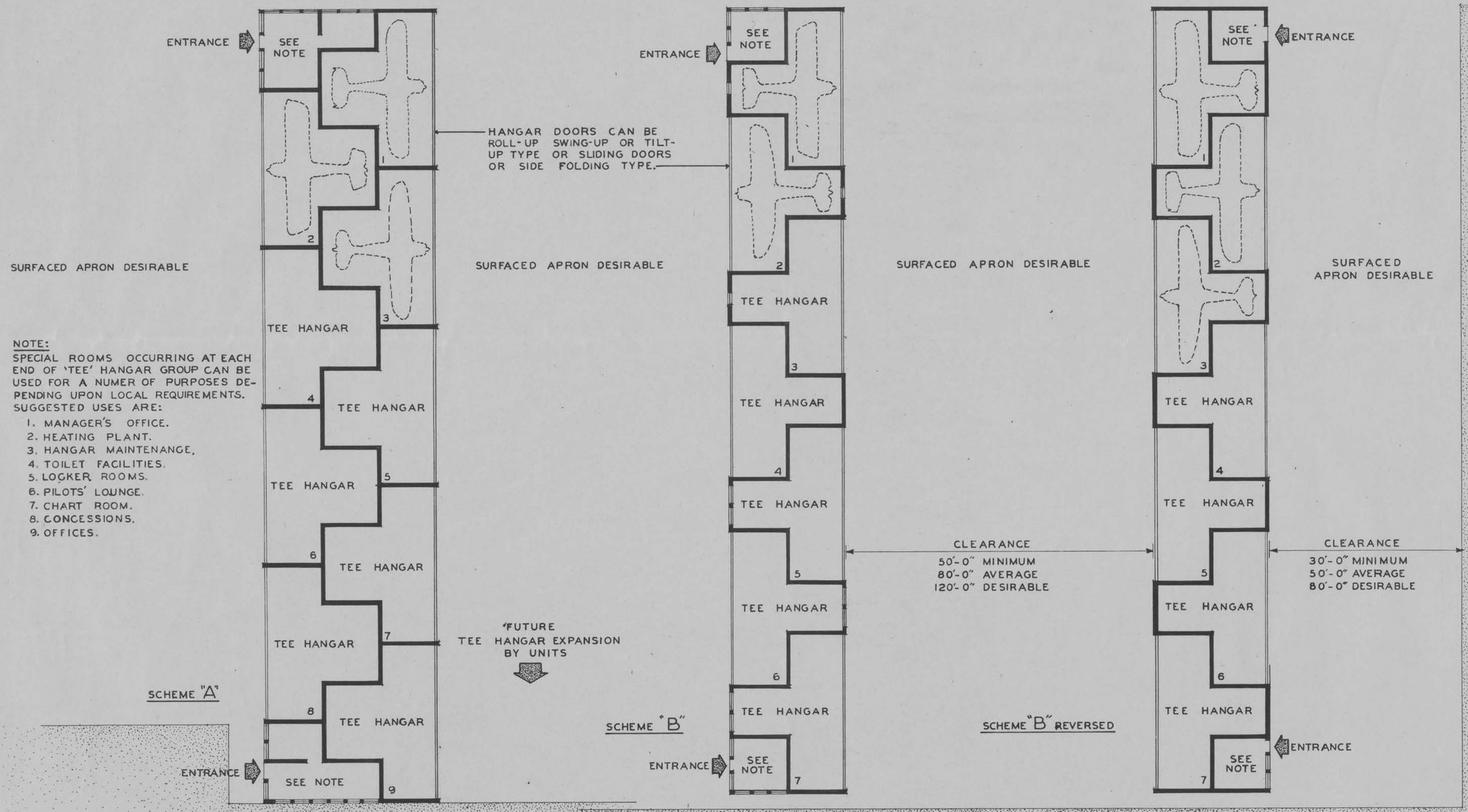
FIELD

FUTURE "TEE" HANGAR EXPANSION BY GROUPS OF UNITS

TO GAS PITS:
SALES AND SERVICE BUILDING:
AIRPORT PUBLIC CENTER BUILDING:



NOTE:
SPECIAL ROOMS OCCURRING AT EACH END OF 'TEE' HANGAR GROUP CAN BE USED FOR A NUMER OF PURPOSES DEPENDING UPON LOCAL REQUIREMENTS.
SUGGESTED USES ARE:

1. MANAGER'S OFFICE.
2. HEATING PLANT.
3. HANGAR MAINTENANCE.
4. TOILET FACILITIES.
5. LOCKER ROOMS.
6. PILOTS' LOUNGE.
7. CHART ROOM.
8. CONCESSIONS.
9. OFFICES.

"TEE" HANGAR PLANS - TWO SCHEMES - INDIVIDUAL AIRCRAFT STORAGE UNITS.

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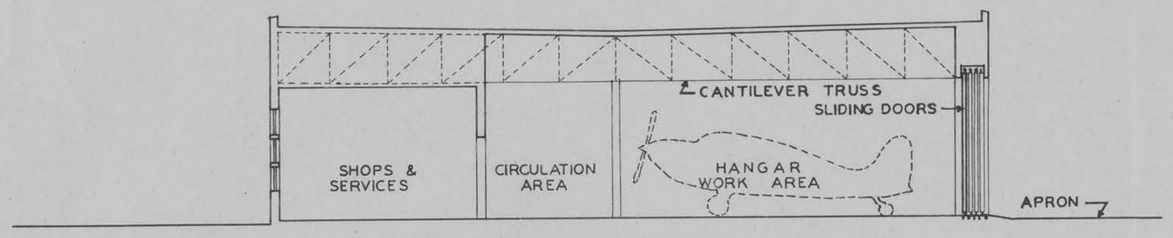
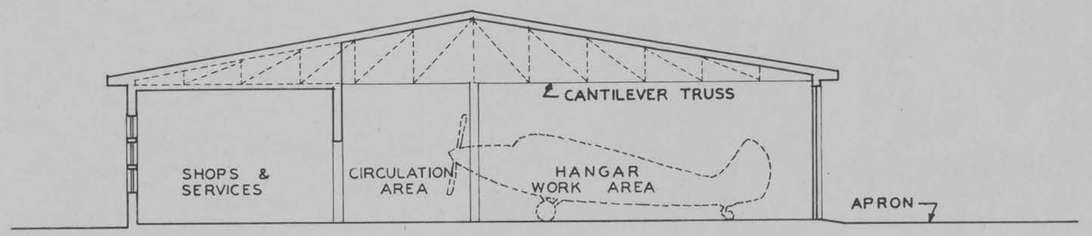
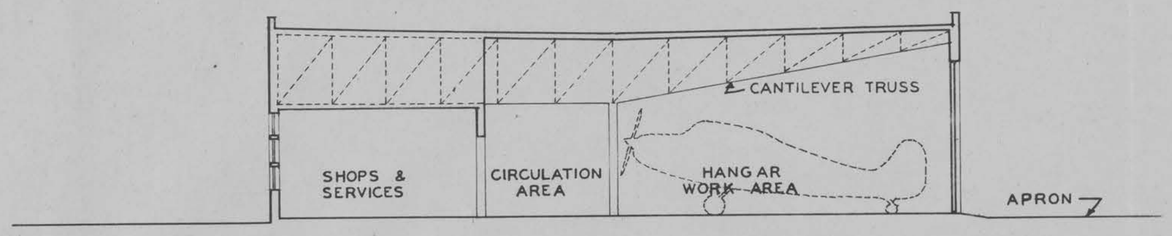


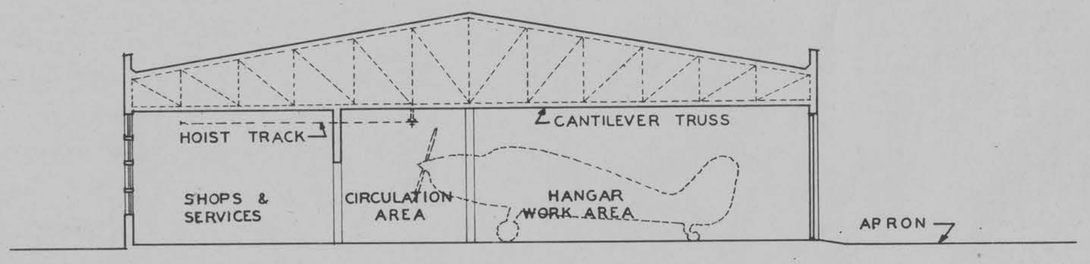
SCHEME "A" ROOF CONSTRUCTION



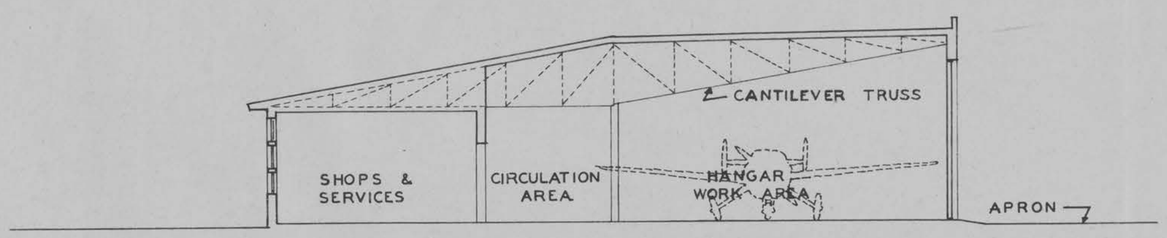
SCHEME "B" ROOF CONSTRUCTION



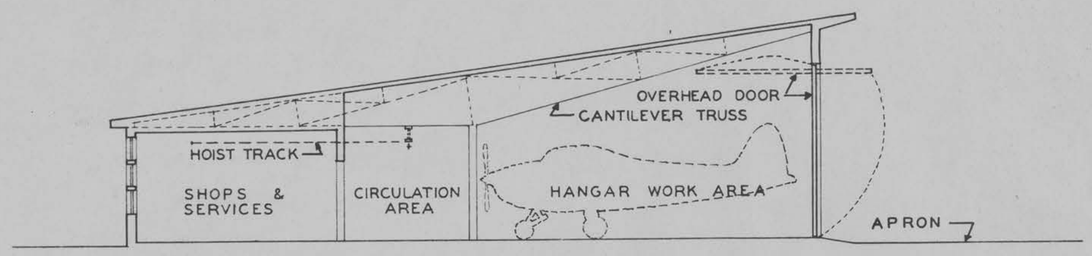
SCHEME "C" ROOF CONSTRUCTION



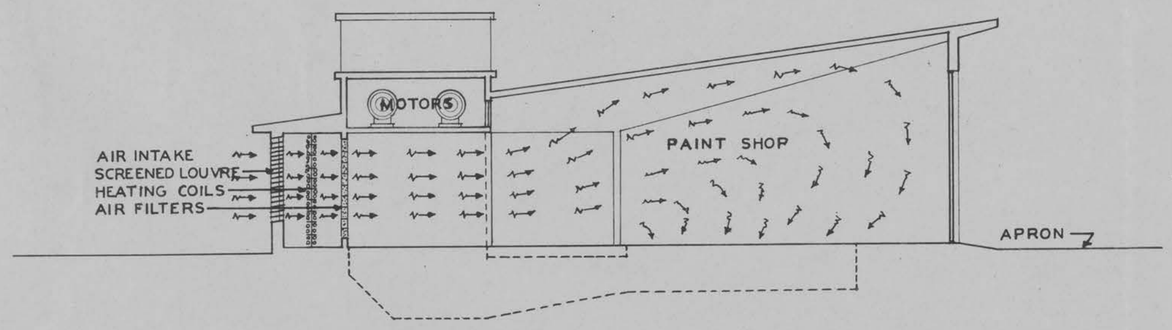
SCHEME "D" ROOF CONSTRUCTION



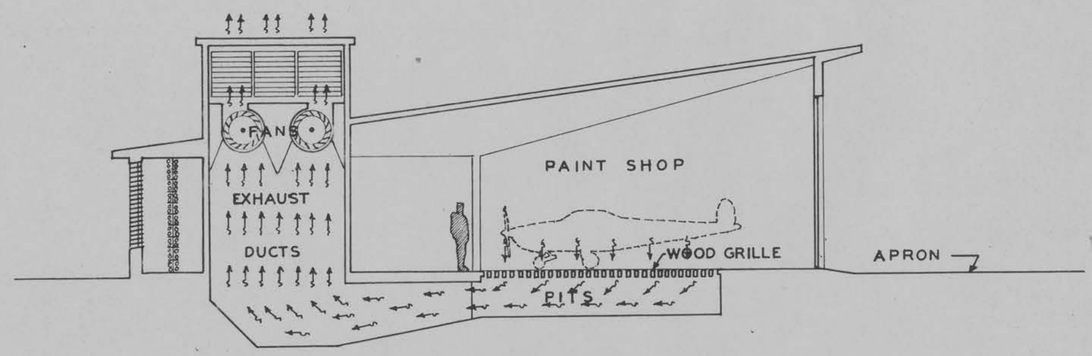
SCHEME "E" ROOF CONSTRUCTION



SCHEME "E" ROOF CONSTRUCTION



CROSS SECTION THRU PAINT SHOP SHOWING FRESH AIR FLOW



CROSS SECTION THRU PAINT SHOP SHOWING EXHAUST AIR FLOW

TYPICAL CROSS SECTIONS THROUGH SALES AND SERVICE BUILDING.

SCALE IN FEET 0 5 10 15 20 25

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PERSPECTIVE OF SALES AND SERVICE BUILDING FROM SPECTATORS' AREA.

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REGISTERED ARCHITECT
4532 BRYANT AVENUE SOUTH
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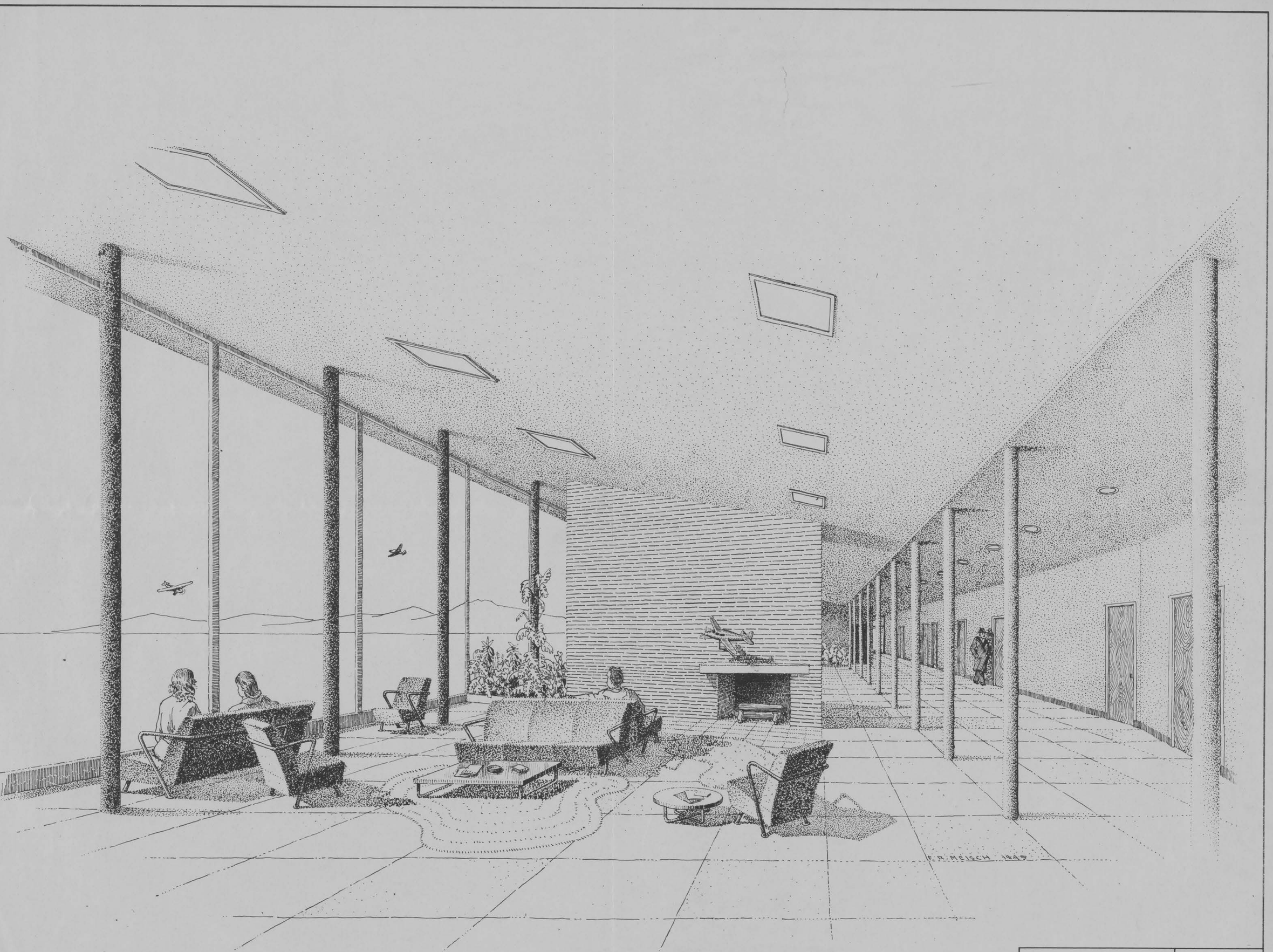
MARCH 20, 1945



PERSPECTIVE OF AIRPORT PUBLIC CENTER CLUB LOUNGE AND LOBBY.

FRANCIS R. MEISCH
REGISTERED ARCHITECT
4532 BRYANT AVENUE SOUTH
MINNEAPOLIS 9, MINNESOTA

SHEET 9

MARCH 20, 1945