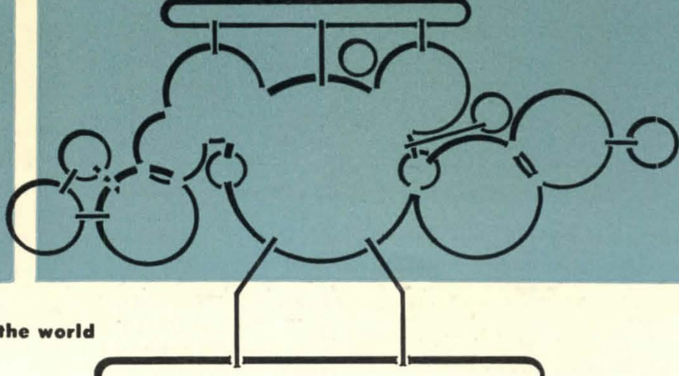
pa PROGRESSIVE ARCHITECTURE

5

may 1953

airport terminal buildings



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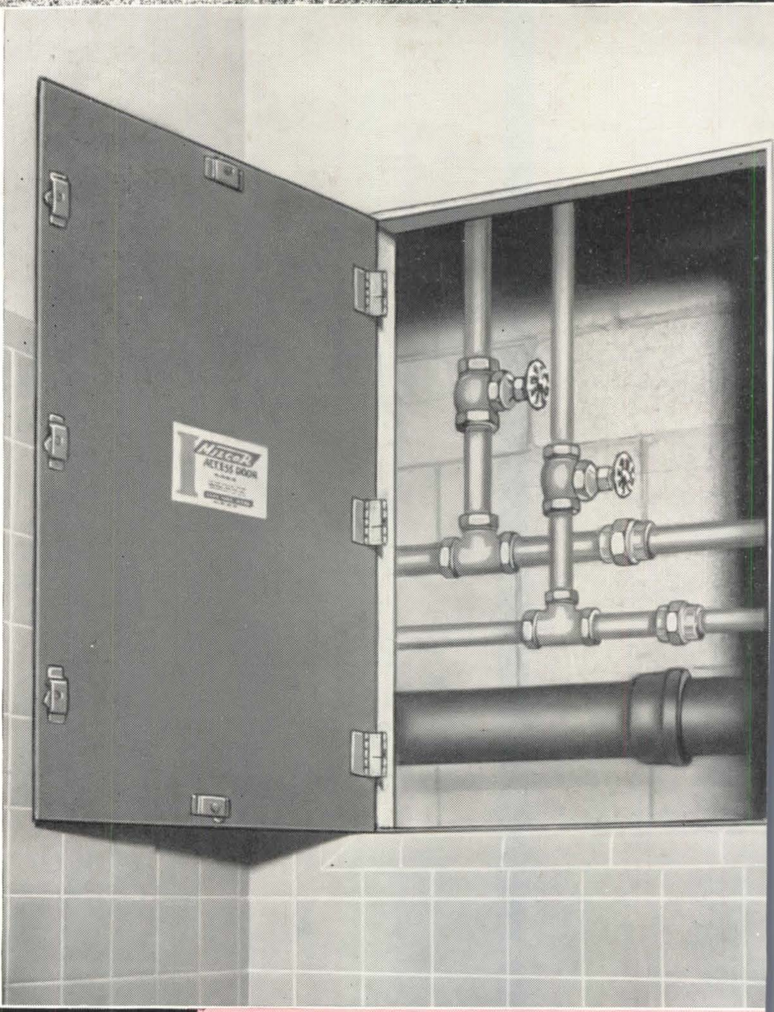

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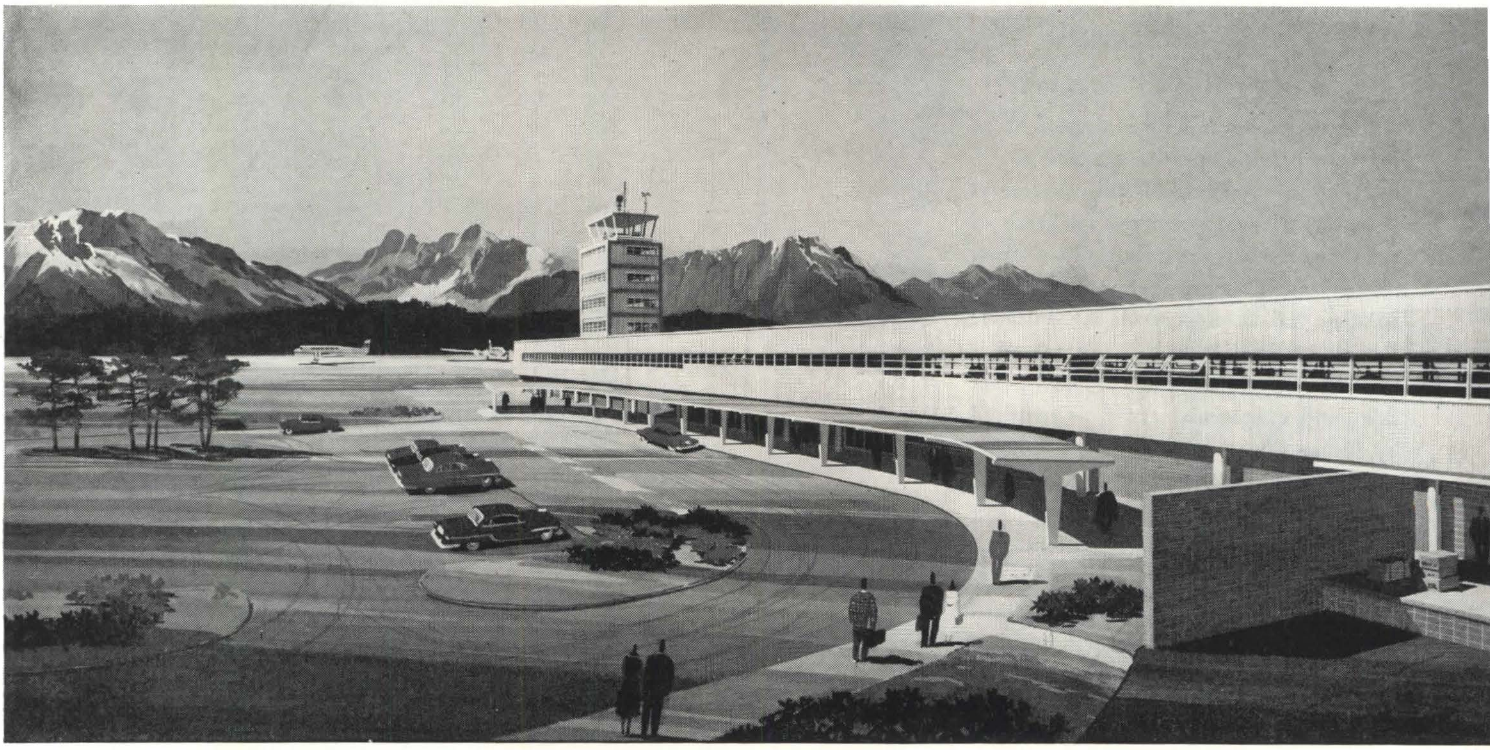
PROGRESSIVE ARCHITECTURE

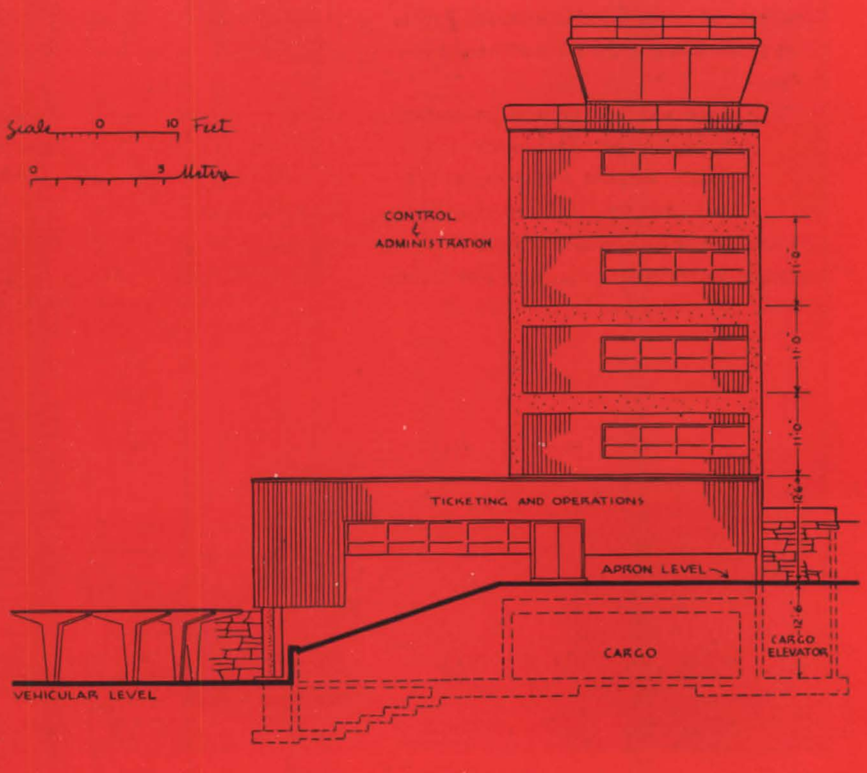
May 1953

international express air terminal for Alaska

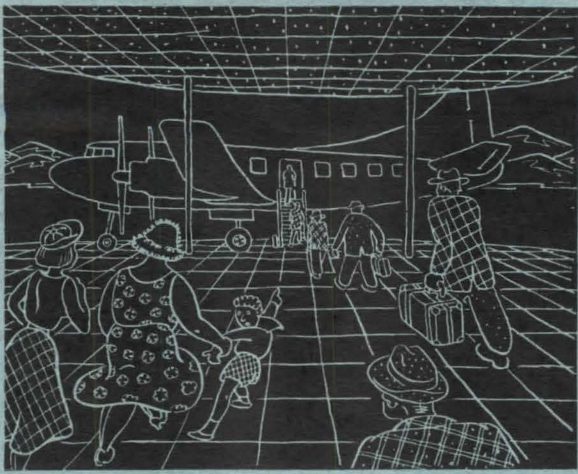


Architectural design of the International Express Air Terminal now nearing completion at Anchorage, Alaska, was based on a site selection that provided vehicular approach to the building a level below the airport apron. The designers, Thomas B. Bourne Associates, Inc., Architects-Engineers, Washington, D. C., and Anchorage, were guided in their analysis of the location by the CAA office in Alaska. Marcel Breuer, New York architect, was Consultant on the design.

As a result, efficiency and economy dictated provision for ticketing and baggage handling on the upper, or field, level. Passengers must get their baggage from the entrance level to the field level themselves, but this inconvenience is to be minimized by installation of escalators. Concentration of these activities on the field level makes it possible for the airlines to handle the operation with a single terminal crew, desk personnel also serving as field operational personnel during off-peak hours.



Elevation



TWENTIETH CENTURY BUILDING TYPE

airport terminal buildings

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

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

Air transportation is a factor in American life which has gained in importance since the last war at a rate greater than—but in a direction different from—estimates of five years ago. Private "cub" flying has not reached the proportions anticipated. Commercial flying has so far exceeded expectations that estimates of passenger volume for 1955 were passed in 1951. The use of company "executive" planes has increased to unexpected proportions. There will be much architecture related to aviation in the years ahead; to aid the architect and the engineering consultant who become involved, P/A offers this study.

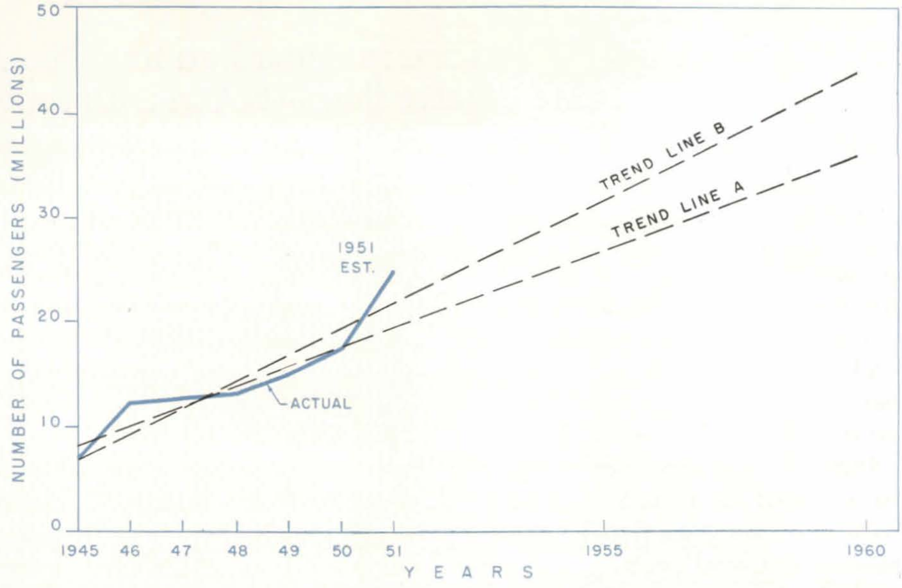
The architect or engineer who approaches this field of design will find it interesting, challenging—but extremely complicated. The confusion lies in the economic position of the airlines: not all of them can pay their way, even with unsated demand for air travel. Government support through air-mail payments keeps many lines in business and makes possible the feeder lines, contact points for thousands of small communities. And even despite difficulties in finding decent terminal facilities, the "non-scheds" seem to point to the possibility of a profitable business enterprise in this field without subsidy. Cargo handling has reached proportions which make it a major activity, but it is still bound to passenger operations in most instances. Terminals are needed, but difficult to finance. Commercial activities, then, related only incidentally to air travel, are given major importance. The designer's desires to solve functional circulation problems for the passenger and for the operations staff are often impeded and frustrated by these facts.

Airports should be related to community and regional planning—but the planner will find that most airport sites are already in operation with capital investments that make change of locations unlikely. The airlines, federal government agencies, city, county, and state governments, and private economic consultants all must be satisfied; hence the designer has a multiplicity of "clients" to satisfy. Even among the airlines there is often disagreement; and when competitive demands of concessionaires and needs of management are added to the planning turmoil, it is not easy to avoid a compromise solution. Difficulties blocking the standardization of aircraft design, such as manufacturers' competition and the varied problems of the airlines, make facilities elaborate and more complex. Developments in the use of helicopters and the growth of jet-plane transportation for passengers and cargo are still difficult to assess.

After studying hundreds of airport terminal buildings, the Editors of P/A conclude that very few of them solve well the fundamental problem of getting the passenger from ground transportation to air carrier with as little inconvenience and expense as possible. Simple circulation patterns become inexplicably complicated. The terminal building develops into a shopping center instead of a traffic station. A monument grows where it has no meaning; design appropriate to air travel, often found in the hangars on the field, is seldom attained in the terminal building. Flexibility and provision for expansion—prime criteria in a building type whose future no one can predict accurately—are lost because of structural or planning rigidity.

The National Airport Plan for 1953, of the Civil Aeronautics Administration in the Department of Commerce, indicates a need over a three-year period for 2232 airports and improvements at 2583 others, for a total expenditure of $650 millions. Some projects are under way; many are not yet started. Here is a real challenge to the design professions to restudy the entire problem, to produce airport structures which will be efficient and imaginative. In the pages that follow the problem is discussed, and the best of the work to date is reviewed.

PROGRAMMING



GROWTH PATTERNS OF AIRLINE PASSENGERS. *Trend line "A" indicates 1945-51 "peacetime" pattern; marked rise in "B" reflects spectacular expansion of economy during 1951.* Illustrations: see page 189

community needs

The planning approach to airport terminal buildings is similar to any architectural problem in that the stages are:

- Program development;
- Site selection and master planning;
- Circulation and functional relationship studies;
- Preliminary planning and necessary approvals;
- Final planning and detailing.

It differs from other building types in emphasis of time allotment. Programming is of major importance, because an overambitious terminal is a drain on the community; and yet an understated program will soon become apparent in a crowded and inefficient building. Time spent on preliminary design and approvals at that stage will be more than saved later. Master planning and structural and functional planning for future and intermediate expansion are of major importance in an activity growing and changing so rapidly.

The various factors that are important in the development of the program are outlined in the following pages. No matter what the character of the airport, no matter how isolated it may appear to be, community-need studies come first. Their purpose is to discover, as accurately as possible, the community's airline-traffic potential. This can be arrived at almost by formula, and Civil Aeronautics Administration has excellent data for the planner to consult (*bibliography on page 196*). In actual practice, it is largely a matter of counting noses at the present terminal facility, projecting present activity on the curve of estimated national growth (CAA's projection factor for 1960 is 2.3 times 1950 traffic) and making adjustments because of certain community characteristics.

Basic community economic types which CAA has discovered to have very different air travel needs are: (1) marketing centers; (2) industrial cities; (3) "balanced" cities; (4) institutional cities. Each group represents a difference in per capita purchasing power. Each provides a unique pattern of income distribution and business travel habits. There then exists a different potential for aviation goods and services. Within these groups there may, of course, be further important peculiarities. A resort community, a town in which there is a famous medical center—these have typical needs which must be evaluated. Further adjustments must be made for possible changes in the community economic type; for type and condition of local airline service; for the possible local promotion of airport facilities, and probable efficiency of airport management; and for the aid to or the drain upon air travel from local travel facilities, by rail, bus, or car. Out of this study comes a statement: (1) of the needs of the community; and (2) of the economic ability of the population to fulfill those needs.

A further preliminary study must be made to determine the community's ability to finance the airport and terminal building program. To achieve the desired passenger potential, the community must develop and support a workable financial program. The federal government currently provides up to 50% of the cost of the terminal building as a part of its activities under the Federal Airport Act (Public Law 377, 79th Congress). The remainder is provided by an instrument (usually a commission or an authority) of city, county, state, or a combination of these.

Revenue sources helping to balance initial financing, operation, and expansion, are the airlines (ironically, often themselves subsidized), various government agencies (whose participation is discussed later in this issue under OFFICE PRACTICE), and private concessionaires. To provide a rational economic program as well as a farsighted one, an attempt must be made to project the future growth and long-term economic capacity of the community to support these revenue-producing media.

air traffic

After studying the community's needs and potentialities, the program planner must relate the community's air-traffic pattern to national developments. Quantitatively, CAA regards an estimate of 40 million airline passengers by 1960 (more than twice the air traffic of 1950) as conservative. As a figure toward which to project, this is the starting point for determining the future traffic of a community. Actually, however, national and local analyses may differ markedly. The local *character* of air-passenger traffic, in terms of relationship with other points on the national network map, is of primary importance. Factors which must be considered include the following:

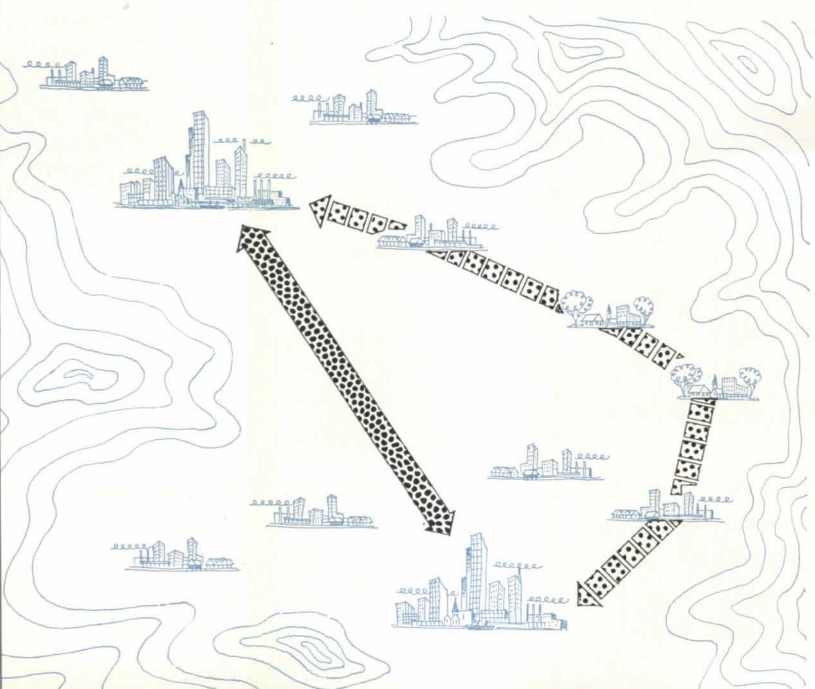
Adequacy of service. It may be that for some reason beyond the control of the community, air-traffic potentials are not being met by airline service. Can this be changed? Will improved airport facilities and demand for service stimulate such changes?

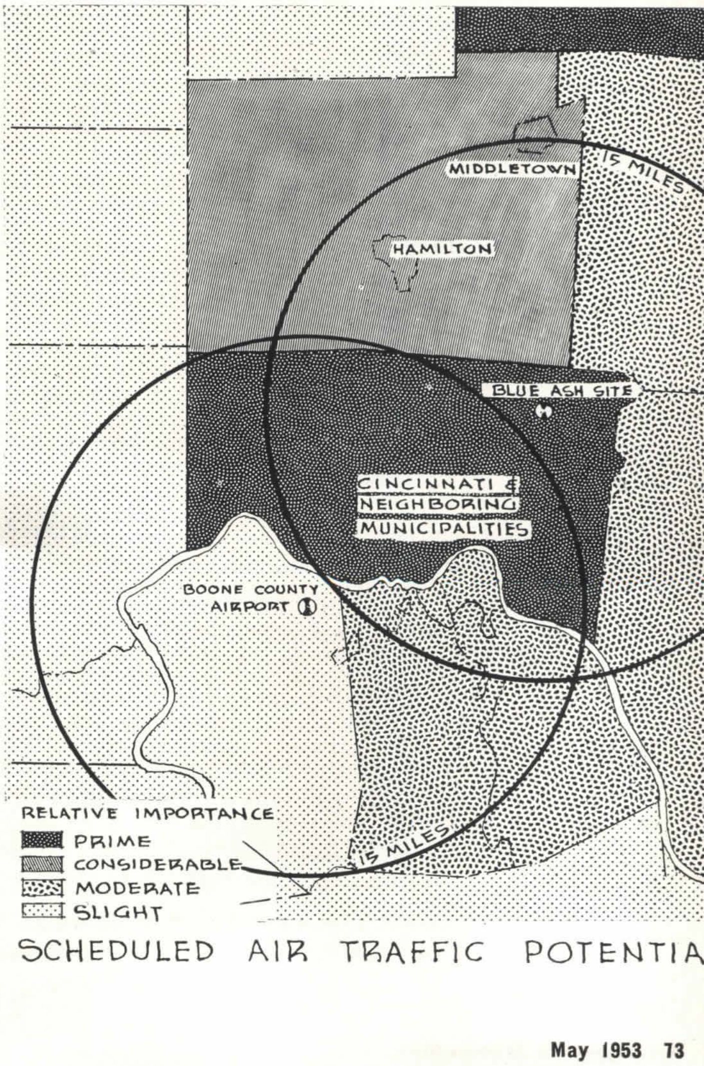
Population and air service in surrounding areas. Is there a regional potential in addition to a community need? Will improved or new facilities draw from other existing neighborhood airports?

Relationship by distance to other communities. Will common interests increase air traffic? Is distance too small (less than 100 miles) to generate *air* traffic relationships? Is present service—or will future be—sufficiently good to insure these traffic relationships? There are certain proven facts and workable formulas that apply. For instance: a city's greatest air traffic is with its nearest neighbor more than 100 miles away; traffic between two cities that far apart will vary inversely with the distance between them.

There are many valuable guides for studies of this sort. Methods of evaluation worked out through experience by planners with CAA are available. Plans of the airlines themselves can be consulted. The possibilities of expansion in other, related communities can be estimated from the National Airport Plan (reissued each year). In most instances such programming studies are made by the community's Commission or Authority, in consultation with specialists. It is most valuable, however, for the architect and his consultant-engineers to understand the basis of traffic programming, so that he can intelligently plan terminal facilities for present traffic needs and for expansion to meet future potentials. Ideally, these studies should be made by a team which at least includes an architect-planner, so that each airport with its terminal facilities can be part of a planned regional and national traffic network in the air.

Cincinnati's metropolitan Master Plan (right) *is part of a study of population, economics, and accessibility—to determine which of two existing fields should be developed as major airport (terminal at Blue Ash site is now under construction). Such metropolitan centers provide greatest proportion of air traffic with smaller communities* (below) *and planners know that supplementary feeder lines, to be successful, must connect to major population points.*





the carrier

One of the major pitfalls facing the airport planner is a lack of standardization of equipment—the most important being the aircraft itself. Efforts toward standardization would permit speeding up airport schedules and allow the programmer and planner to estimate more accurately the airport needs. In the first place, runway acceptance and departure rates are reduced when aircraft with widely varying performance characteristics are in operation. An unexpected opportunity to study this problem was provided by the Berlin "Airlift." According to official reports, formulas for arrivals and departures on schedule did not work until only one performance-type of aircraft was used. Then time lost between arrival and departure of aircraft could be reduced if design characteristics of planes were similar. Fueling as well as baggage and passenger loading could be simplified, if not standardized. But no two aircraft types have even passenger doors at the same location. No two are the same height above ground, and baggage ports are in various positions on the plane.

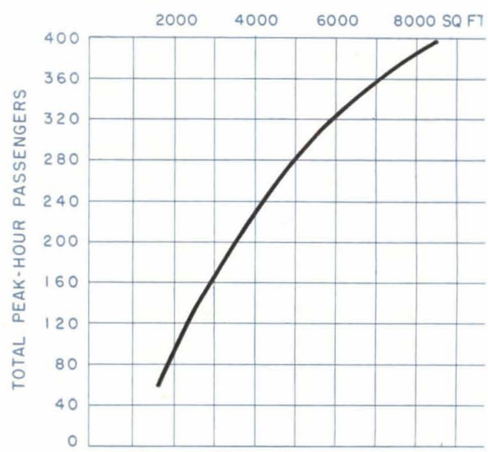
Apparently there are no moves toward this sort of standardization, and apparently the planner will have to use his own best judgment as to what future developments may be. He knows, for sure, only that commercial transport planes are becoming larger and faster; that helicopter services may increase for short hauls and taxi service; that jet-propelled transports are now operated regularly by B.O.A.C. and being rapidly developed by U.S. manufacturers; and that there may be a change in volume of private flying.

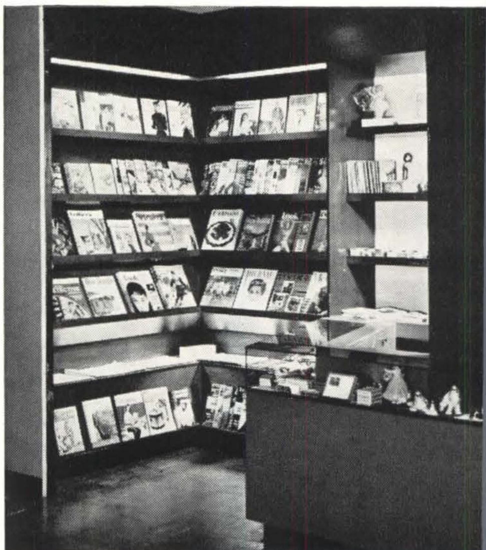
The Korean War has illustrated some of the military potential of the helicopter. Its future commercial use is indicated by airmail services already instituted in some places. No longer does the future of the helicopter lie only in survey, mapping, spraying, and police work—experts feel it may well complement the fixed-wing aircraft in short-haul cargo handling, even short-haul passenger traffic (commuting service, for instance) and become most helpful in taxi service between airports and population centers. The President's Airport Commission last year considered that these possibilities would become realities when rotary-wing aircraft carrying 40 passengers are produced, capable of operating on a favorable cost per ton-mile. At that point, they recommended that "flexible provisions for helicopter operations should be incorporated into airport and air-traffic pattern planning."

Private "cub-type" planes are now a factor in airport planning, largely in their nuisance aspect in traffic control at some of the busier airports. The additional revenue their use may bring to the airport management is limited. Immediately after the war, it had been thought that private flying would reach proportions warranting special airports (such as the one illustrated on page 120), but this has not happened.

On the other hand, what are known as "executive" planes, operated by private companies for their own use, have increased in number until they almost equal the commercial carrier fleet—and they will affect much airport capacity planning in the future.

NEWSPAPER AND NOVELTY CONCESSION *needs are solved by CAA graphing. In the Monterey Airport, Calif. by Architect Robert R. Jones* (below), *it is out of the stream of passenger circulation, but still integrated.*





economics

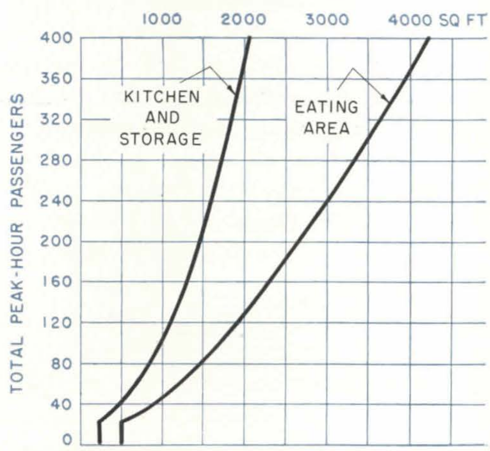
One of the experts consulted on this issue observed, "the architect has not concerned himself sufficiently with the economic problems in airport planning." It is true that the architectural planner should be thoroughly familiar with all of the economic problems involved; it is also true that economic considerations often interfere with functional planning for passenger and airline convenience, and good circulation for purely air-travel purposes. Since the airport cannot be supported financially by the airlines, it must somehow be paid for and operated on a basis that costs the taxpayer as little as possible. The simplest method, and the one most commonly used, is the issuance of revenue bonds—promoted to the bond dealer as a public service and a profitable item, and sold on the basis of economical operations and a demonstrable continuing demand for the facilities at the airport (including the income-producing facilities).

Thus these income-producing spaces are an important part of the program. Their character and size must be realistically established along with other terminal building facilities. In addition to the airline space—which can be accurately determined—they include government-rented offices (comparatively minor income sources); non-airline aviation activities, such as rented hangar space, flying schools, parts dealers; what might be called fee-earning public spaces, such as toilets and rest rooms (so avid are some managements for income that *no* free toilets are provided); and observation-deck space (we have heard of one economic consultant who wanted to paint over the windows looking onto the field, so visitors would *have* to pay to use the observation deck); and finally, various rented concession spaces, from signboards to hotels.

It is in this last category that airport economic programming can go so far from the problems of air travel that it comes in conflict with other economic interests in the community. There seems to be an indecision in some quarters as to whether the airport should be developed as a community center or an air station. Some economic thinking asks "if the regional shopping center can successfully run movies, open auditoriums to the public, and even bring hotels into the grouping, why can't the airport?" Some entrepreneur may prove differently some day, but it seems now that, because the airport is usually in a relatively inaccessible and often an undesirable location from the point-of-view of normal community use, revenue producing concessions must be related to passenger traffic, and cannot easily compete with similar and equal facilities in the population center. Once in a long while, an unusual restaurateur can pull regular dinner business to the airport, away from the downtown restaurants; but many who thought they could do that have found that their business is directly related to air passenger activity.

The concessions which have been proved popular and successful are listed in CAA literature. Eating places and taxi service are of course necessities. But all categories of services from specialty shops to beauty parlors and banks are included. They produce revenue only when they are related to the needs of the visitor and the embarking or arriving passenger—and when the architect understands their functions and proper placement. Thus participation in the economic survey takes on the greatest significance.

KITCHEN AND DINING FACILITIES *are charted against peak-hour passengers* (below). *The restaurant at South Bend, Ind., adjoins observation deck and private terrace to utilize fully the attractions of aircraft operations. Roy Worden and Vincent Fagan, Associated Architects; Frank Montana, Consultant.*

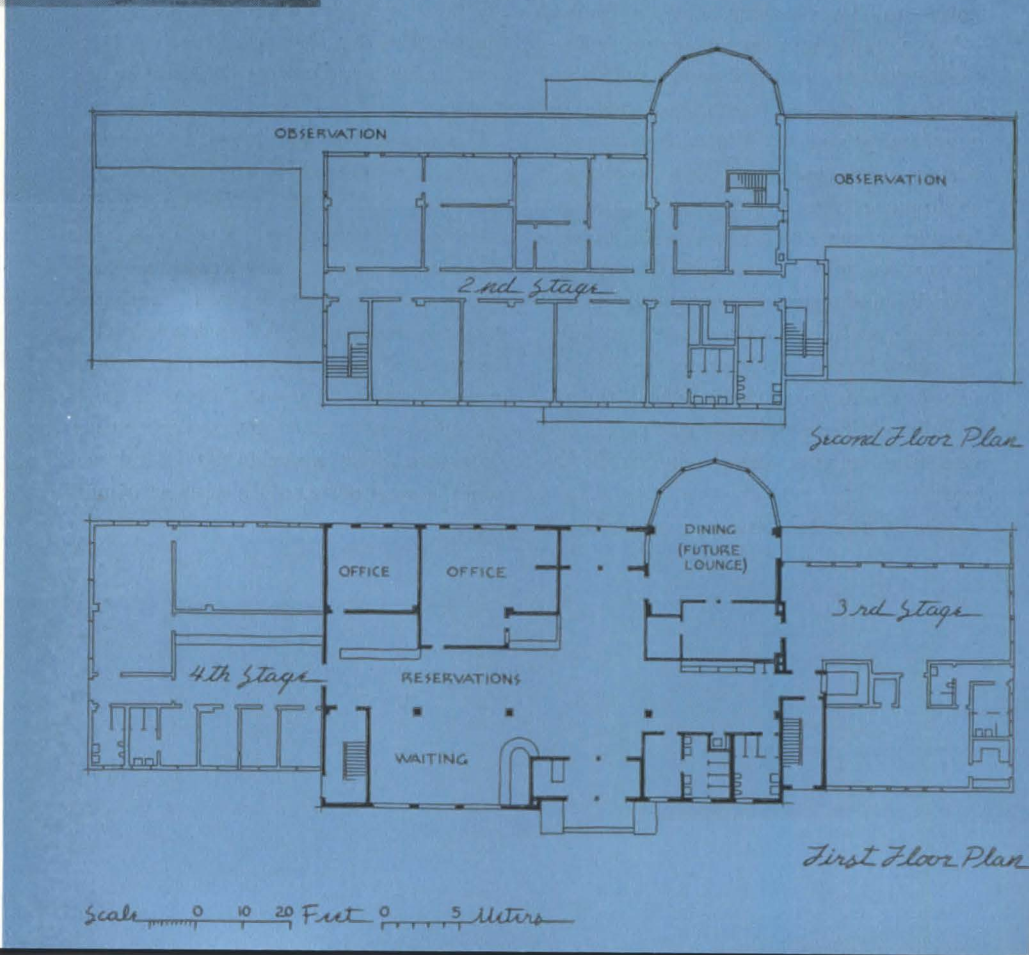


terminal building space

After community needs, air traffic, and economic considerations have been studied, the program planners will finally come to the great question: how large should the terminal be? The key to the answer and all its parts (how many aircraft loading stations; how much passenger waiting space; how much space for toilets, restaurants, concessions; how much additional space for visitors and sightseers) lies in an estimate of *peak-hour traffic*, according to presently accepted planning methods. The number of passengers utilizing services in the busiest hour of the week also will indicate the activity in the various parts of the air terminal building. In actual practice, this estimate is usually shaved, with a figure more closely approaching average, hourly traffic or "normal," peak-hour traffic used as the key—when for instance, an unusual activity raises the true peak-hour count too far above other busy hours, and the management is willing to face the fact that on some occasion in the future the terminal may be crowded.

As in all rule-of-thumb calculations, various unusual factors will affect the final figures, and the *methods* of calculations are not all agreed upon. In general, here is the way peak-hour passenger traffic is translated into *aircraft* space requirements. Peak-hour passenger traffic is divided by average aircraft-seating capacity (a variable, depending on type of airport; consult CAA and the airlines for this figure) the result represents the number of peak-hour runway operations. Remember that runway operations include take-offs and landings, a plane coming in, taking a normal time on the apron, and taking off has accomplished two runway operations. Studies indicate that *average* commercial aircraft operations at a busy airport require between 30 minutes and 42 minutes ramp-time for each plane. Providing leeway for aircraft ingress and egress, this means that each plane-loading station can handle two to two and one-half runway operations each hour. This is perhaps an over-simplification for planning, but it does seem to be true that, as an average, the maximum number of loading positions in use at any one time is equal to between 40% and 45% of peak-hour runway operations. To state this in

Municipal Airport, Bradford, Pennsylvania (left), *plans to inter-relate future air-cargo docks, light-plane storage, and airplane parking in its four-stage master program over a 20-year period* (below). *Joseph F. Bontempo, Architect for Michael Baker, Jr., Inc., Engineers.*

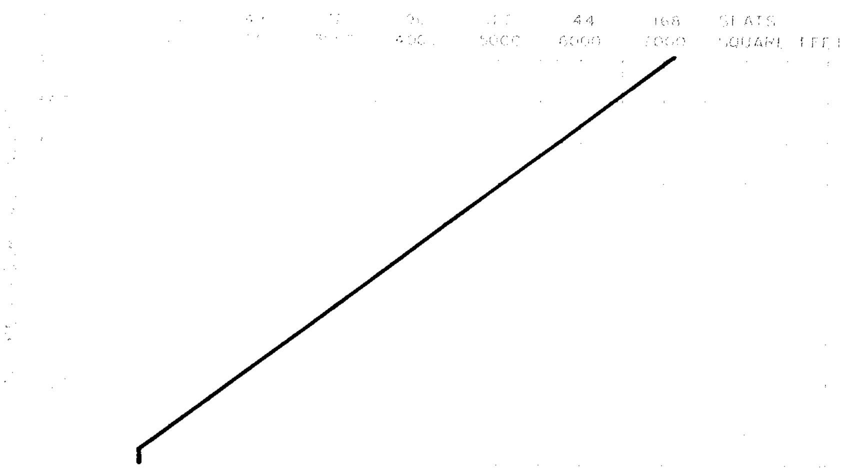


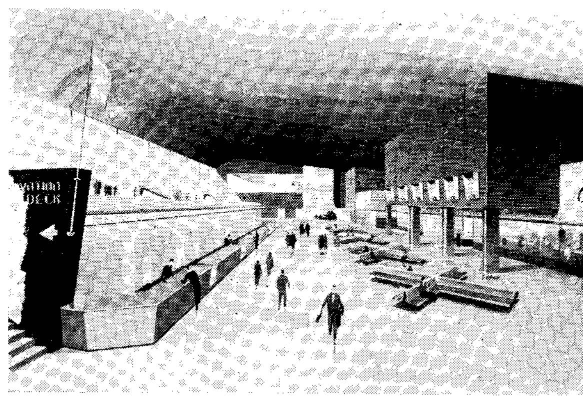
practical terms, 12 peak-hour runway operations would require 5 loading positions; 25 would require 11 positions, 40 would require 18 positions, etc.

This rule should determine the size of the apron and the number of gates, but the "average" figure must be balanced against runway capacity (a balanced single-runway system is estimated to take 40 operations per hour, optimum, under instrument-landing conditions) because it is possible that more take-offs may occur in some periods, and other airlines operational factors may enter to alter the final figure.

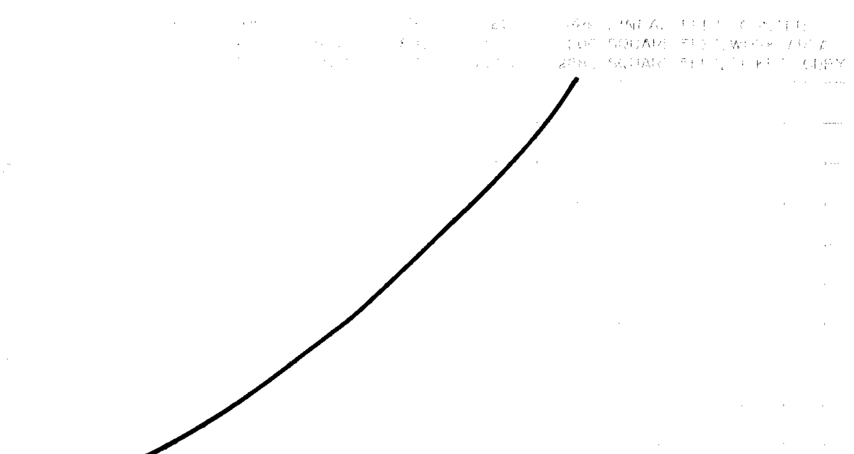
Passenger space requirements can be almost directly translated from the peak-hour passenger figure. Although passengers and visitors mingle in some spaces, the ticket counters and the baggage pick-up space are related directly to the traffic count. Space used also (or exclusively) by *visitors and sightseers*—waiting rooms, toilets, concessions, observation deck—are related to the passenger total by an intermediate factor. CAA indicates that a total of persons somewhere between 1.5 and 4 times the number of passengers actually *enters* an airport terminal building—the median being 2.3 and the variance being differences between small ports (high visitor count) and large. Until now, the planner has been on his own once these figures were obtained; but studies by CAA architects have translated persons to *probable* and *average* space requirements, as in the charts on this spread.

The program, now ready, should be approved by all concerned. Equally important, for the master plan, is a projection of needs into a more distant future, so that planned expansion can take place. Two sets of data should be incorporated into the program—present needs (usually meaning a projection for 10 years) and long-range expectations. The eventual size can then be broken down into units, to be built at several stages of construction. Typical planning today provides the first stage to meet needs for the next 10 years, and an additional stage to meet estimated needs beyond this. The problem for the master planner is to design with sufficient flexibility so that changes in estimates can be accommodated, and yet allow completely efficient operation at each stage.

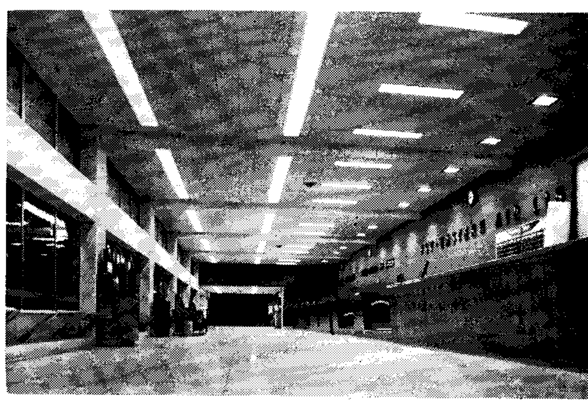




CAA graph (left) *translates waiting-room traffic into seats per square feet. Limitations of expansion are offset by internal flexibility, as three circulations—waiting, ticketing, and concessions—intermingle within the great volume of The Port of New York Authority Building at Newark, New Jersey, Airport* (above); *A. Gordon Lorimer, Consulting Architect.*



Passenger volume is plotted against square feet of service counters (left) *to determine ticket- and baggage-counter requirements, as at the International Airport, Tampa, Florida* (below); *Eliot Chapin Fletcher, Architect.*



THE SITE

external development

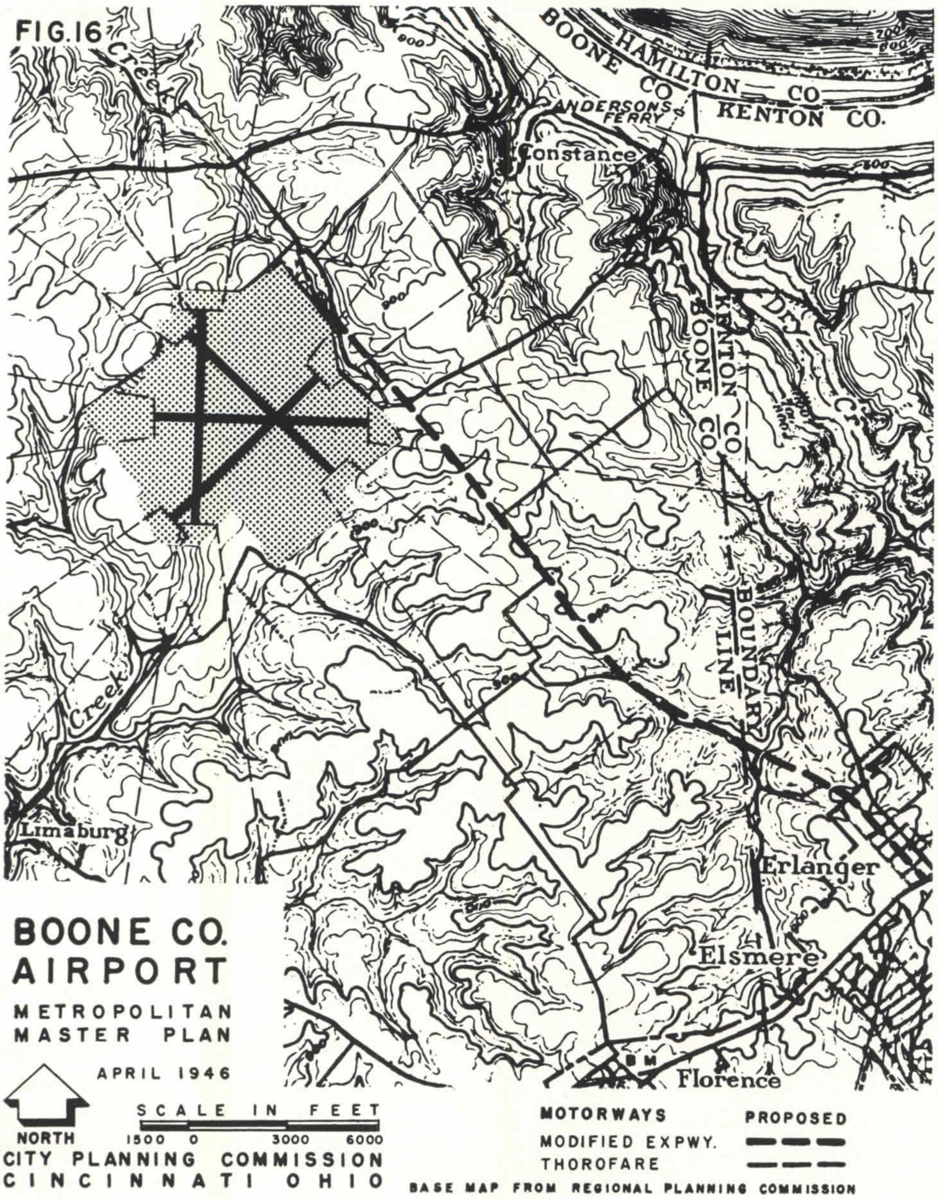
While it is true that few planners of major airports will have the opportunity or the need to choose new airport sites (most *new* airports in the National Airport Plan will be in small communities and of a "feeder" character), there may be instances when a choice between two partially developed sites, for future major expansion, is indicated. The studies made at Cincinnati (*illustrated here*) are a case in point. Factors first considered are principally those of relationship to the community to be served, and regional considerations. Then come matters of visibility and weather characteristics, internal studies of surrounding terrain affecting approaches, soils, and drainage.

The airport must be tied into the city and regional plan. In its report last year, the President's Airport Commission wisely said, "Planning is a tool for bringing about an effective control of the forces (which determine environment). It does this by creating a physical framework in which communities may eventually achieve a desired environment . . . Since airports and airways are an important part of a community's transportation facilities, consideration must be given to the problem of incorporating them into the framework." The airport and air terminal planner, then, must examine the airport site in relation to time-distance to population and commercial centers, relation to ground transportation, noises and dangers to occupied areas, and the relationship to other airports and city growth-patterns.

Accessibility is of prime importance in site selection, and in town planning accompanying site development. Time is the basis of air travel, and time lost getting to or from the airport must be counted as part of the passenger's trip. Time-distance is the factor to consider—not distance alone. A busy approach artery, or one which is likely to be clogged when the airport is fully developed, can dampen its operations as much as an economic drop in the community or poor management at the airport. A regional plan control is important because airports are likely to be located in undeveloped areas. Building will likely take place as the airport activity increases, and traffic will become heavier, increasing the *time* in the time-distance multiple, unless something in the nature of a limited-access highway is developed between town and airport.

Sites should be selected and development around the site restricted, to keep nuisance characteristics of the airport at a minimum. These include noise (which will become greater as jet planes are used) and hazards from plane accidents. Figures show that more people are killed by bicycles than air accidents, but this fact did not restrain the residents of Elizabeth, N. J. from closing Newark Airport after a series of accidents. Yet, unless there is zoning control, property around the airport will continue to be developed, even as residential neighborhoods. The problem is something of a paradox, for land adjacent to airports is usually out of the domain of the city government, and zoning would fall into an area which is usually an administrative never-never land. State control, a clearly defined regional plan, the purchase or condemnation of sufficient land to protect approaches, and finally, the planning of runway and air-traffic patterns to avoid present or foreseeable risks and nuisances, seem the only possible answers at the moment. At this point, a study of the traffic pattern in relation to other airports in the area is important; if there is interference, unconventional flight patterns and distributions may be required, and the best-laid plans for local approach safety may be vitiated.

Just what the criteria should be in this respect, the planner will find it hard to determine. As planes become faster, their approach is at a flatter angle. Not only longer runways are needed, but longer and wider clear-approach areas. The President's Commission last year recommended that no new airport should be planned without clear and, if possible, level approaches at least 1000 feet wide for one-half mile at each dominant runway. But.

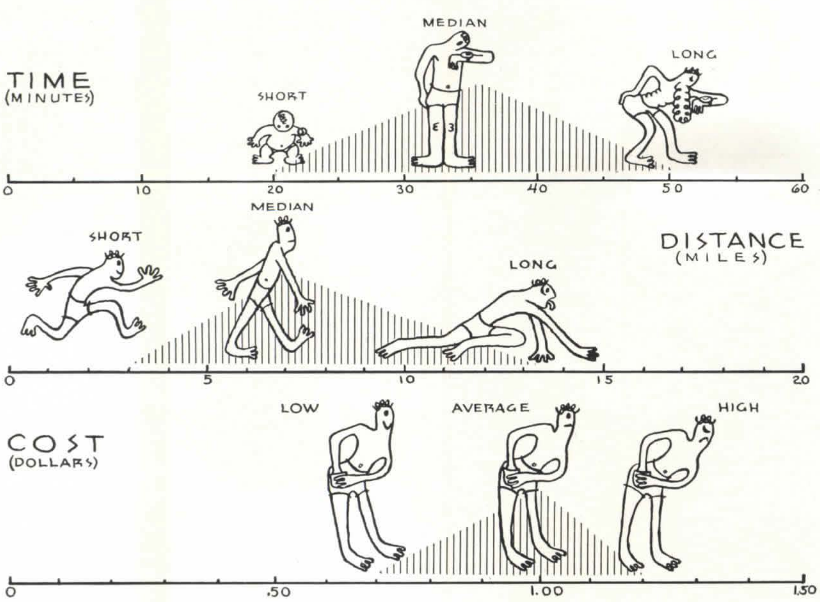


Boone County Airport (left) *serving Cincinnati, was too far separated from residential and industrial areas, despite closeness to city center, and faced risk of floods on approach roads. Master plan studies (see page 73) favored other site.*

certainly future planning should far exceed today's minimum requirements.

Weather studies, though not within the province of the architect, may strongly affect air terminal planning requirements, since maximum utilization of utilities depends on the ratio of instrument landings to clear weather landings. Weather data can be obtained without difficulty by consulting the meteorologist. Wind roses can be devised from this data; and incidence of rain, fog, snow, and other weather hazards can be estimated; but in addition to this, completely local, microclimatological observations should be made. In a very limited sense, it is possible that trees, slopes, swamps, and bodies of water may affect both temperature and wind, producing thereby undesirable climatic results.

For the master plan, then, the airport designer will determine the runway pattern (key to the whole planning process) and locate, in relation to it, the airport buildings. Here fundamental decisions will have to be made which will affect operation of the airport for all time, and here, unfortunately, there may be differences of opinion among experts and consultants. Very recently, many runway configurations which were standard have become obsolete. On the assumption that few planes can land safely in crosswinds of components greater than 15 miles per



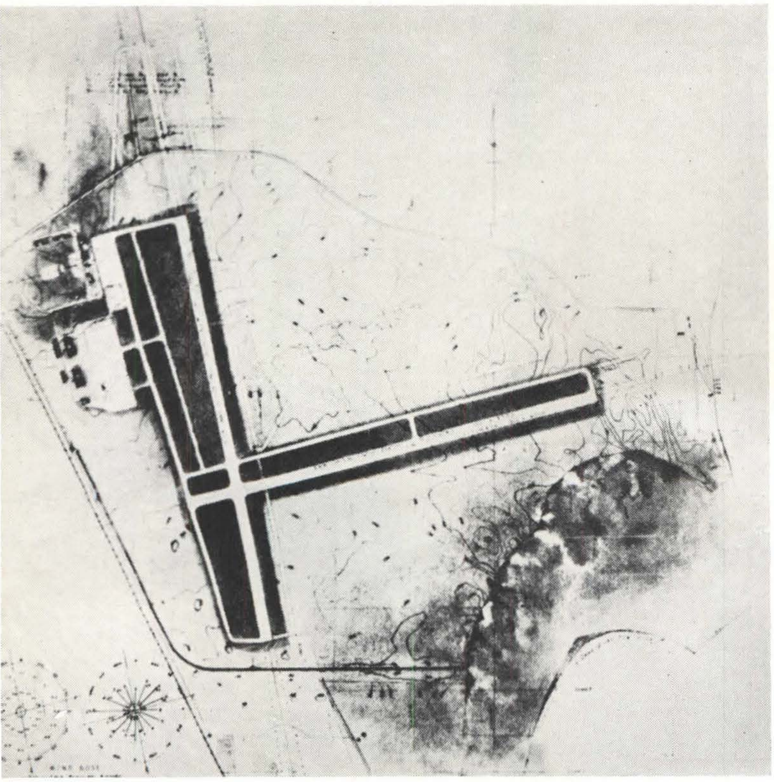
TIME-DISTANCE-COST *charts of ground transportation from airport to typical city centers of the United States* (left). *Prime factor is time—not distance.*

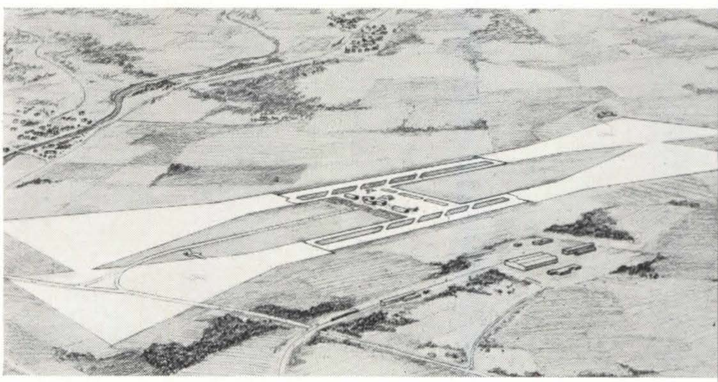
runway patterns

hour, airports have been laid out with runways so variously oriented that this "safe" landing situation would always prevail on one of them. Now, with faster landing speeds and higher wing loadings, the crosswind effect is less. With more general use of tricycle landing gear and the recently certified "crosswind landing gear," most aircraft can now accept crosswind components of up to 30 miles per hour. The President's Airport Commission last year encouraged, ". . . single or parallel runway principles to be applied to most existing airports as well as to future installations." When local wind conditions are so variable that a second directional runway is required, it can be perpendicular and usually shorter than the main one. The benefits are that less acreage is needed for the field, and the approach and departure zones are limited to one direction and relatively narrow corridors. And since the air-traffic pattern is simplified, the possibility of air and ground accidents is reduced. A disadvantage is that simultaneous instrument landings on two parallel runways require that they be some distance apart.

Runway-length requirements have been sharply increased in recent years, and many airports now find their facilities almost unusable: as landing speeds rise, landing requirements increase. Larger turning radii and flatter approach paths make it more difficult to avoid overshooting. Whether this trend may change as jet planes become more prevalent is debatable. Catapult take-off or jato (jet-assist take-off) schemes and parachute drag landings may mean that present runway lengths are adequate, but authorities now strongly urge bringing all airport runway lengths to present standards (8400 feet for intercontinental ports) and planning for expansion to greater lengths (10,000 feet for the larger airport). An interesting variable here is that the "standards" are for sea level, with 59° F. temperature and zero gradient. When elevation is higher, temperature greater, and gradient more, these lengths must be increased.

Whatever the configuration, the location and the design of the terminal building must be related to the runway pattern. In the first place, the number of runways to be planned depends upon the number of aircraft operations anticipated which, in turn, is based on passenger traffic, cargo to be handled, and the volume of private, executive, and military flying expected. In the second place, extension of the building must be inter-related to possible expansion of the runway system. Finally, since aircraft must taxi from runway to apron, and back to runway (and sometimes must taxi to hangar or storage space) and since taxiing aircraft is expensive, the relationship of building to runway is important. There are times—admittedly few—when an obviously desirable location for the terminal building



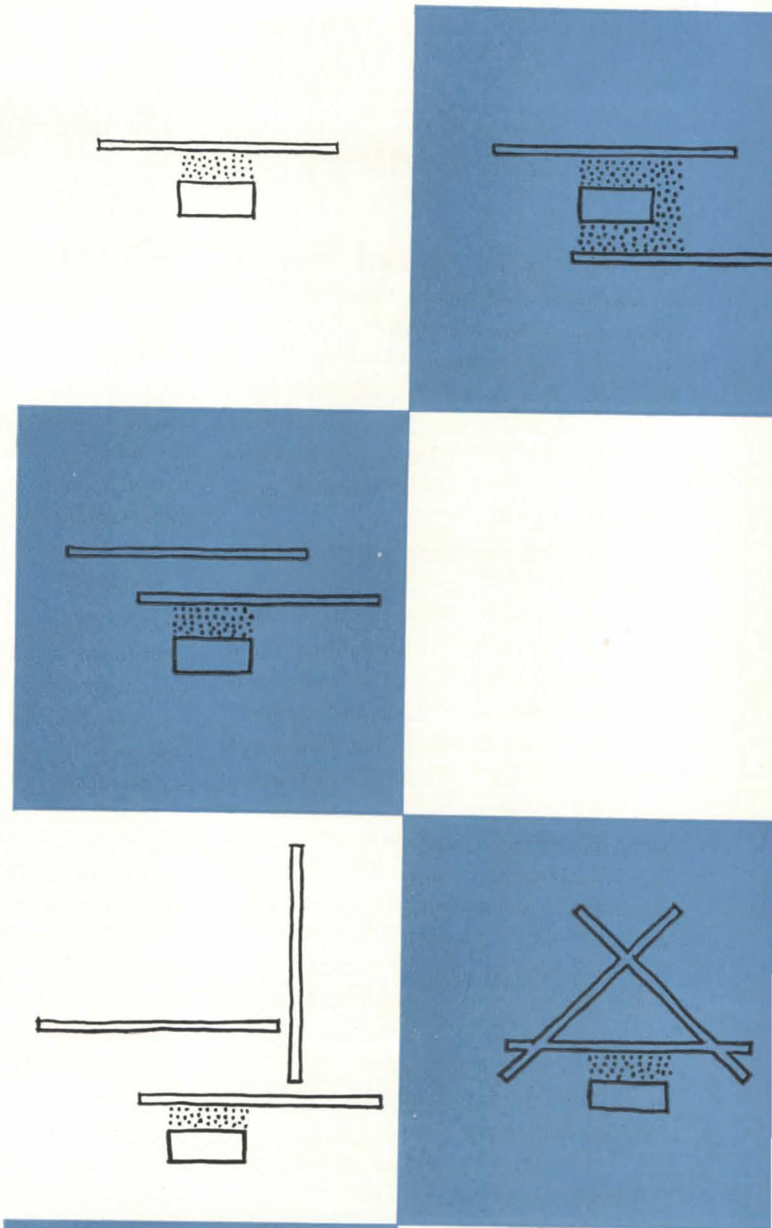


Master plan for Bush Field, Augusta, Georgia, Municipal Airport (left), *prepared by Kuhlke & Wade, Architects, shows major runway parallel to apron which fronts building, at upper left; secondary runway perpendicular to it. Theoretical parallel scheme for two runways* (above) *prepared by CAA architects shows terminal building between runways, apron on one side, approach from community on other.*

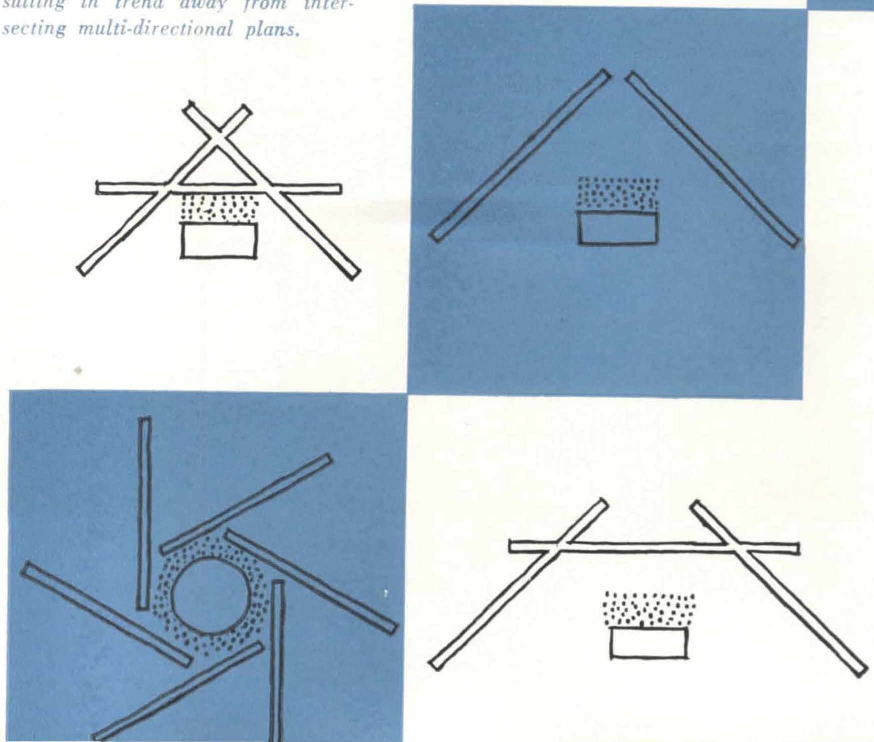
will be the first consideration, and runway location and configuration will follow from that. Since the terminal building faces two ways in its function—to the field for contact with the air carriers and also to the approach road for contact with ground transportation—its location in the master plan involves more than relation to a desirable runway pattern.

Physical characteristics of an airport site are important. Slope should be sufficient for good surface drainage, otherwise as nearly level as possible. Water table should be low, so that subsoil drainage is natural or easily accomplished. Soil-bearing capacity should be sufficient to receive, under all weather conditions, the peculiar load characteristics of aircraft, static and dynamic.

Since the master plan will indicate ultimate foreseeable expansion, these site characteristics are important not only in the presently used area, but also in the area set aside for future expansion.



Possible runway configurations are shown diagrammatically, with terminal buildings and apron locations suggested. Higher landing speeds and new landing-gear devices are resulting in trend away from intersecting multi-directional plans.



terminology

The ideal airport terminal would be a smoothly functioning machine. But what should flow with machine precision, too often has become overelaborate and complex. The actual functions, space requirements, and other bases of the program are apt to be forgotten. It seems worthwhile, therefore, to examine some basic definitions.

The success of airport planning hinges upon many elements. The design group must be part architect, part financier, and all wizard. The infinity of forecasts, projections, traffic trends, and estimates may be misleading. Even the word "terminal" is, in itself, deceptive. If our thinking is really in terms of a building as a starting and stopping place and a transit point, a word signifying a conclusion and an ending is misleading; however, to be consistent with common usage and to avoid confusion, P/A employs the words "air terminal" rather than "air station."

For further understanding of the inherent problems of design (and to clarify thinking on the subject), the specialized vocabulary of airport architecture is defined on this page:

traffic

enplaned passengers: a count of all revenue passengers boarding the carrier's planes at each on-line station.

airline passenger potential: the estimated number of airline passengers which could be developed under conditions of reasonable service.

community potential: the estimated number of passengers which could originate at a given city or town during that year.

air cargo: the enplaned tonnage figures for scheduled air lines, as reported for freight and express combined.

air cargo potential: the estimated enplaned tonnage which could be developed under conditions of reasonable service.

site-areas

airport: a landing area used regularly by aircraft for receiving or discharging passengers or cargo.

air terminal: a building or group of buildings used for the unloading or the loading of aircraft and the transfer of cargo to or from ground transportation, usually including as well offices for private and public administration, operation, and control functions.

approach zone: the area leading to the end of each landing strip, within which the approach paths should be kept clear of obstructions.

landing strip: a portion of the usable area of an airport, which is suitable for the landing and taking-off of aircraft under all ordinary weather conditions.

runway: the paved surface of an airport used for the landing and the taking-off of aircraft.

apron (sometimes called ramp): the portion of an airport, usually paved, immediately adjacent to the hangars and the terminal building, used for parking, loading, unloading, and servicing of aircraft.

taxiway: the connecting link, usually paved, between the apron and the runways.

control tower: a structure so situated and equipped as to allow control of air traffic in the immediate vicinity of the airport.

heliport: an airport for helicopters.

touchdown pad: a square or circular area having a contrasting-color safety area for the landing of helicopters.

passengers

passenger index: the number of passengers enplaned at a station annually per each 1000 of the community's population in the previous year.

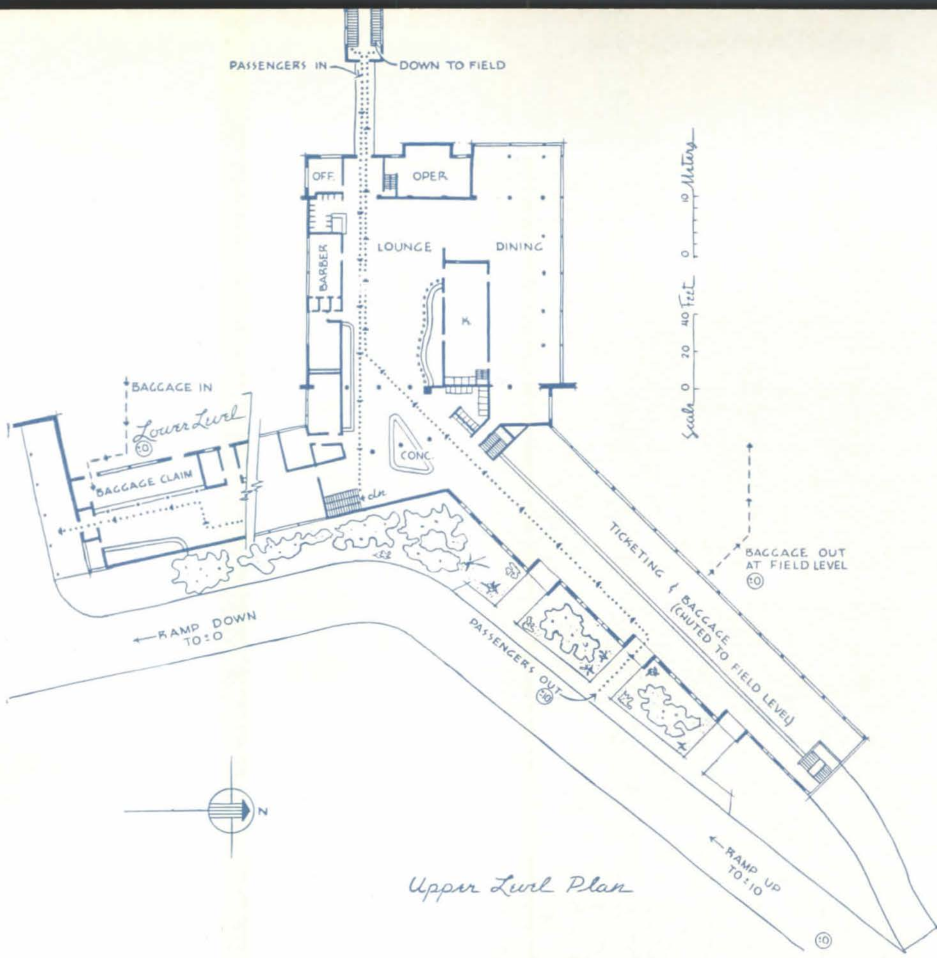
peak-hour passenger activity: the number of passengers (enplaning and deplaning) using airport facilities in a typical busy hour; higher than average hourly activity, but not an unusual absolute peak.

originating and terminating passengers: passengers whose route of flight is beginning or ending.

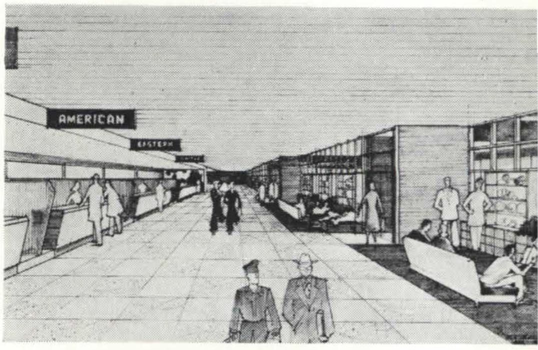
in-transit passenger: passengers whose route of flight has been interrupted because they are transferring to another plane, because they are waiting while the aircraft is refueled or serviced, because of weather conditions, or for other reasons.

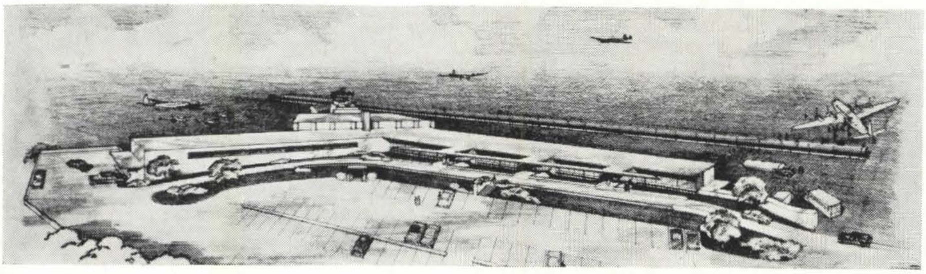
long-haul passengers: enplaned passengers traveling more than three hundred miles.

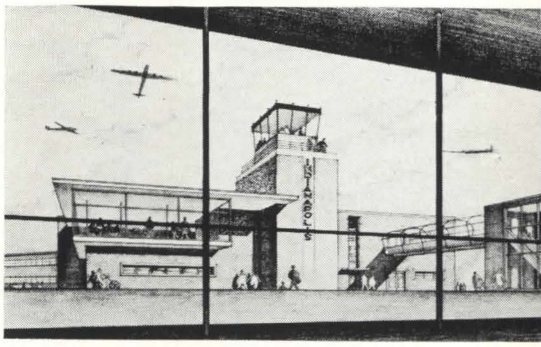
enplaning and deplaning passengers: those passengers in the process of loading and unloading from aircraft.



Two levels for passengers and one for baggage could accommodate the more than 500,000 volume of a proposed scheme for the Indianapolis Airport (left). *Preliminary sketches by Architect Edward James (Leigh Fisher & Assoc., Consultants) show airlines ticketing and baggage counters adjoining waiting areas; passage to apron level and cantilevered restaurant viewed from within loading station* (below).

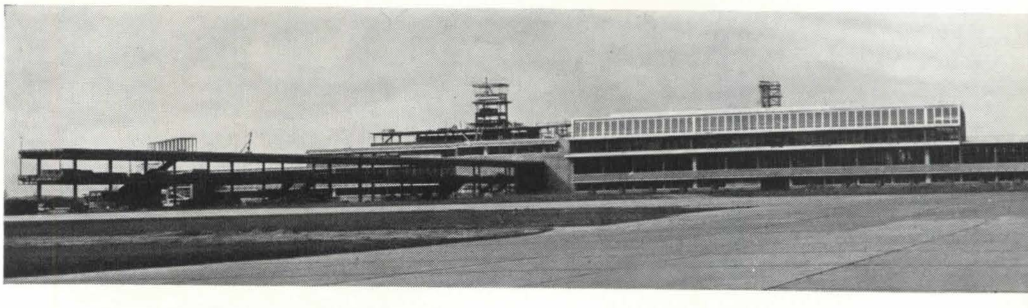






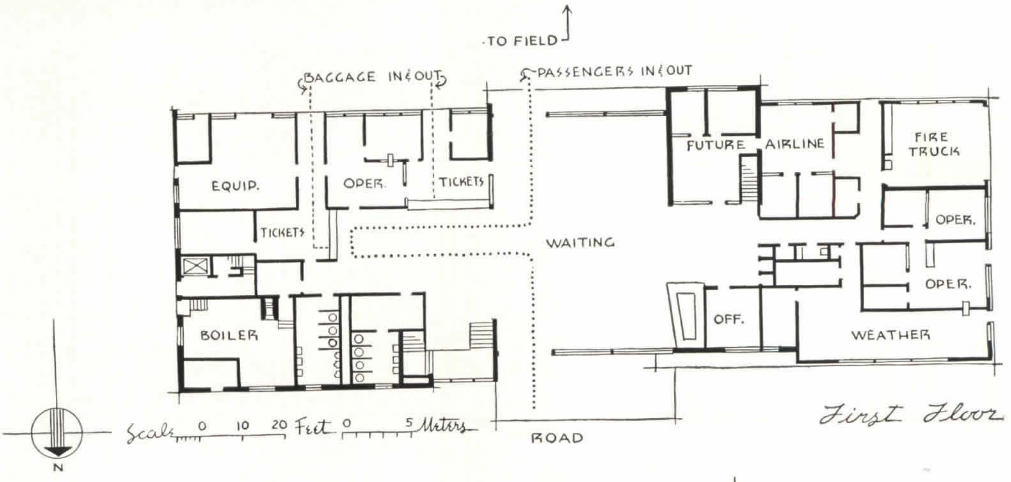
current projects

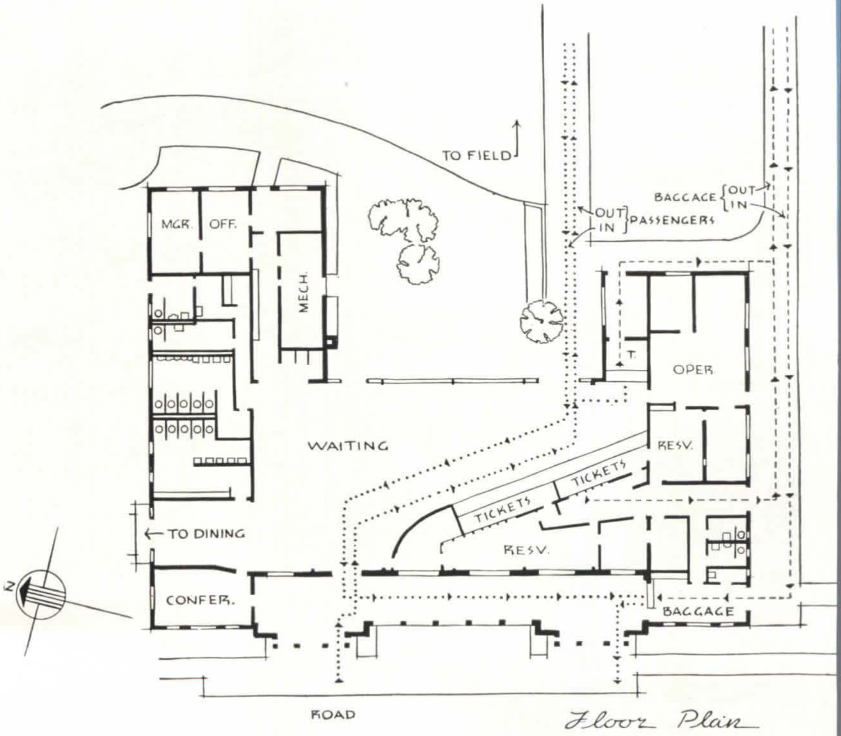
Glass wall of restaurant slopes in two directions between rigid frames of reinforced concrete for view of operations and planes in flight at Philadelphia International Airport (above). *Architects Carroll, Grisdale & Van Alen employ "fingers" to loading stations, separating baggage, passengers, and observers at different levels* (right).

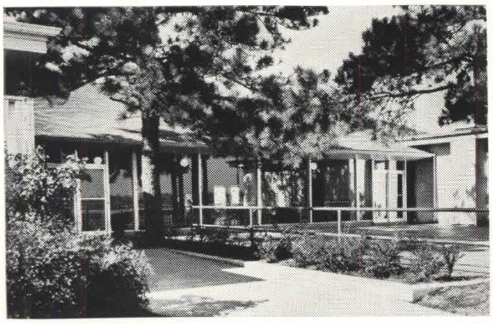


current projects

The Municipal Airport at Yakima, Wash. (left), has a core of public functions from which operations radiate. Within this almost monumental volume, giving unobstructed view from entrance to field, "floats" the restaurant, itself commanding a view of all aircraft for visitors and itinerant passengers. Architect John S. Villesvik provided ticketing and baggage counters for two airlines adjoining apron; additional airline facilities will convert existing office and reception areas (below).

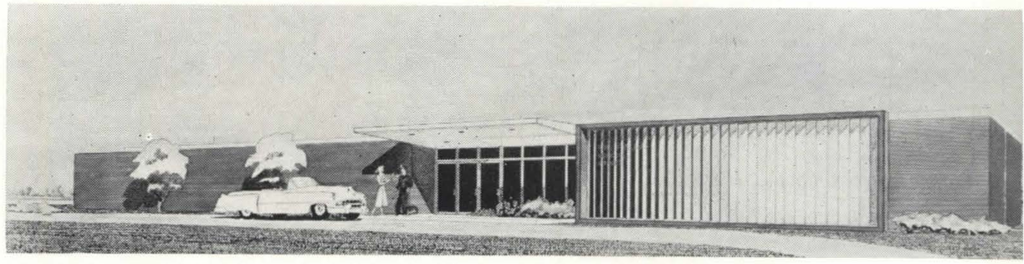


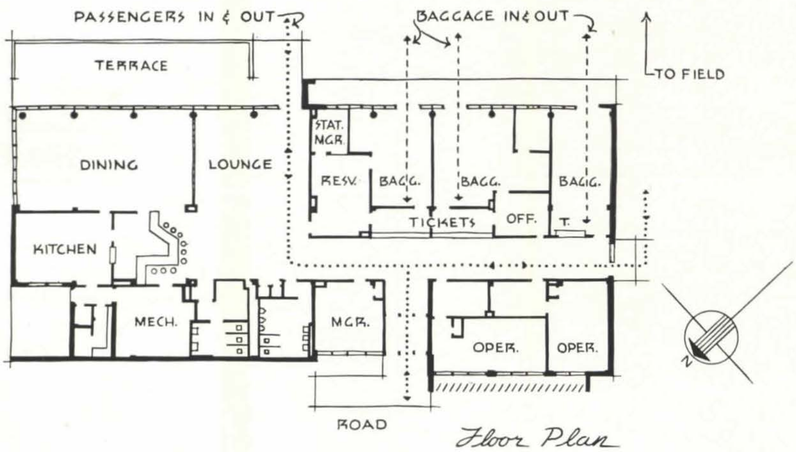


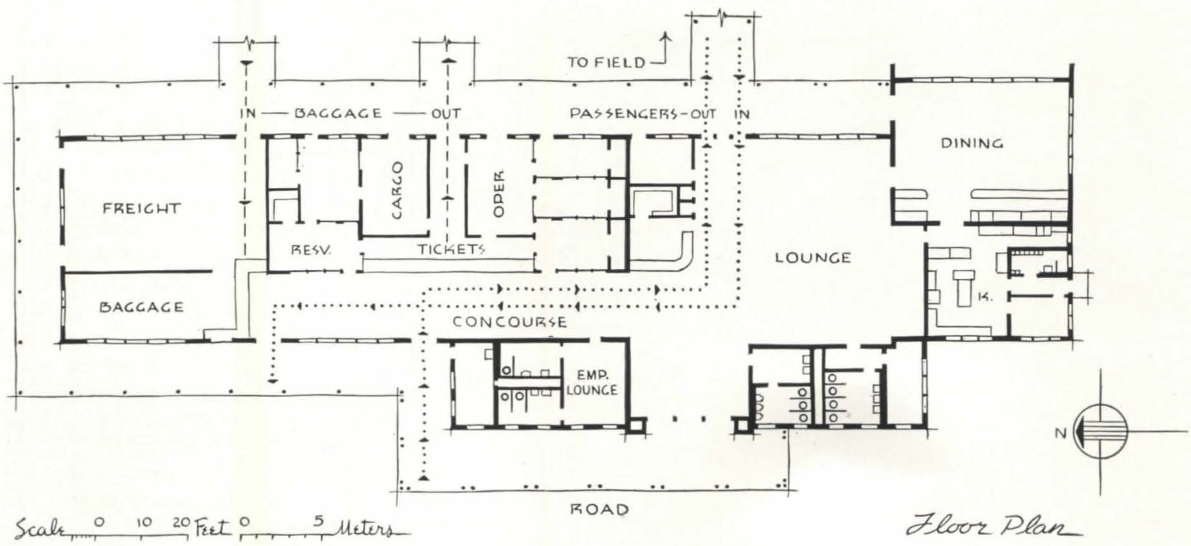


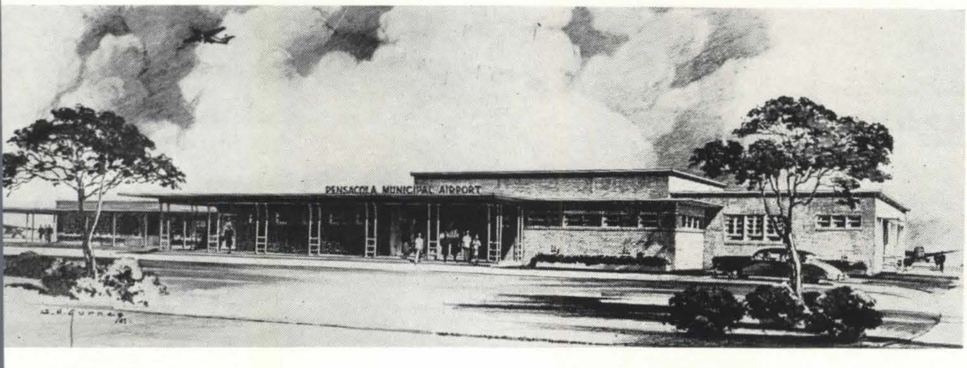
Formerly an Army mess hall, the conversion to this Airlines Terminal Building separated operations within the spans of the laminated arches, yet provided apron contact (above). Air-conditioned, acoustically-treated waiting area permits view of the field, easy thoroughfare for enplaning and deplaning passengers, and access to future outdoor dining terrace (left). Augusta, Ga., Municipal Airport; Kuhlke & Wade, Architects.

Passengers approach field past ticketing counters, while baggage is transmitted from rooms behind to apron. Lounge and restaurant adjoin ticketing areas but are independent of them (below). Phillip Billard Municipal Airport, Topeka, Kans. Architects, Lobeck & Williamson propose structure to reflect scale and character of midwest community by use of brick, louvers, and cantilevered entrance canopy (right).

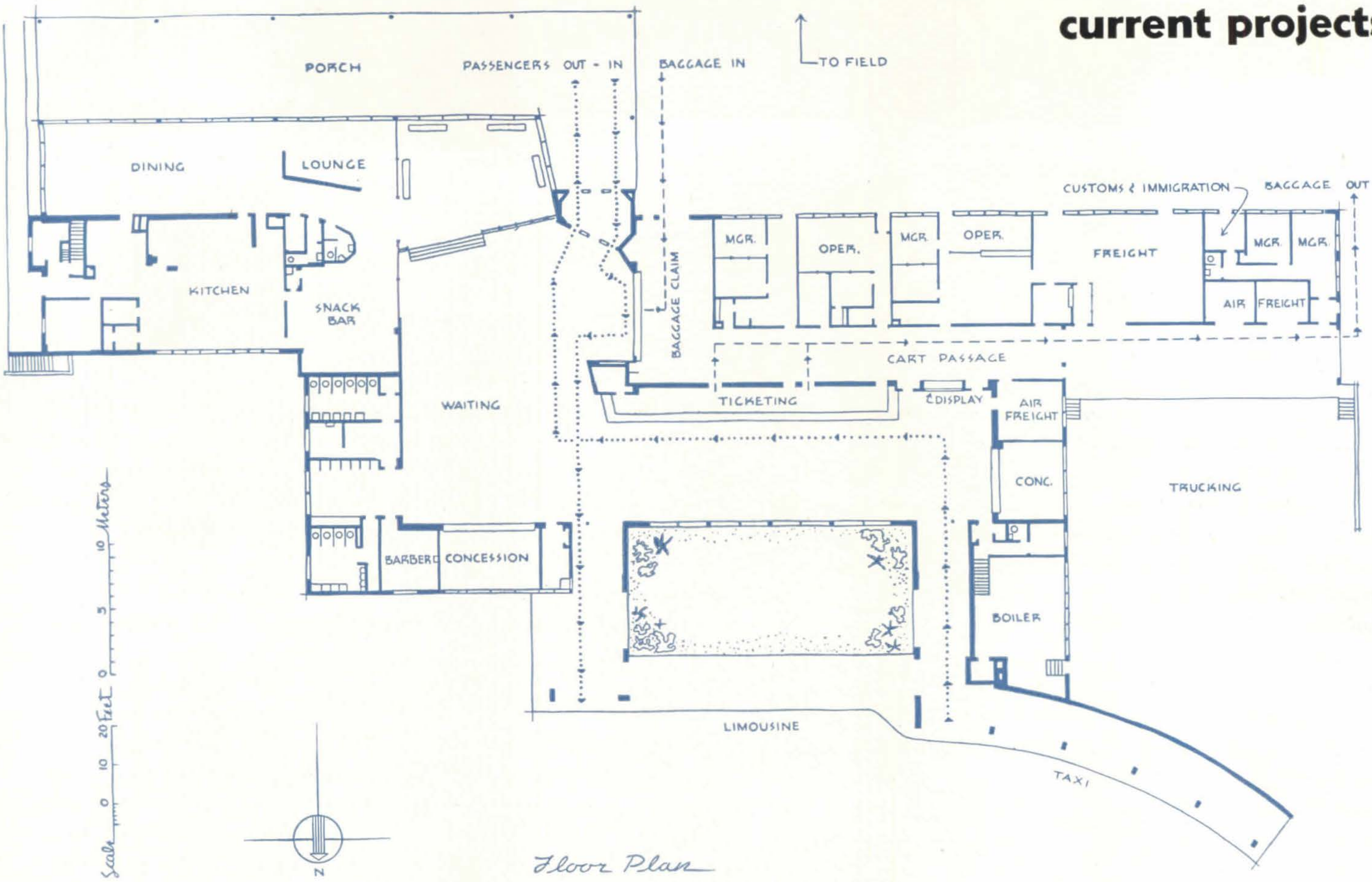






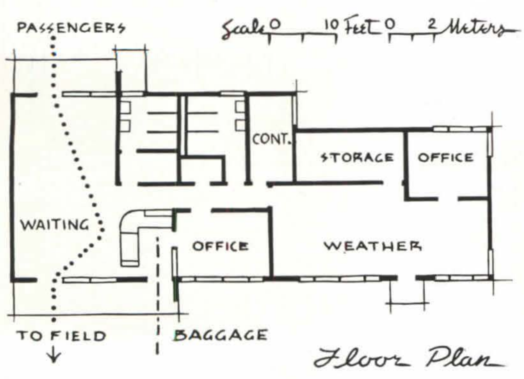


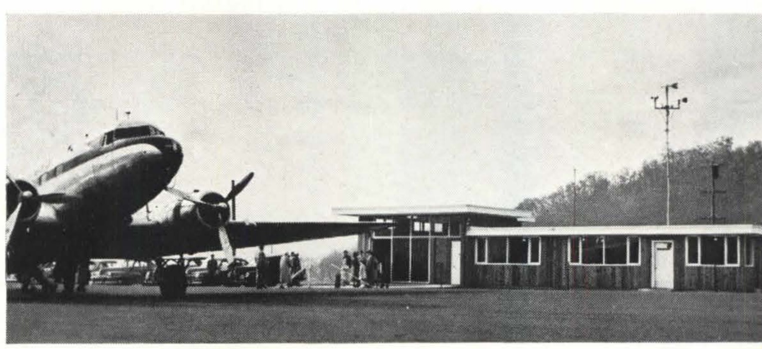
Ticket-and-baggage concourse routes passengers from buses and limousines to loading stations, with minimum interference from visitors. Pensacola, Fla., Municipal Airport (left) ; *Architect, Frank Sindelar.*



Two entrances around a garden at Rochester, N. Y., Airport (above) *permit visitors to enter waiting area while passengers are being ticketed. Ade & Todd, Architects, included a service-cargo court apart from the taxi-limousine entrance. Luggage and air freight are conveyed to apron loading stations by cart concourse. Renderings* (left) *show vehicular approach and clock tower, while visitors, looking through the garden, see passenger entrance and ticketing counters within.*

The Administration Building at Roseburg, Ore., Airport; (below) *is a feeder station in which passengers have through circulation, and operations have complete field control. Architects: Freeman, Hayslip & Tuft.*





basic airport types

While no airport will fall exactly into a typical classification, there are nonetheless broad type categories which the airport designer should understand.

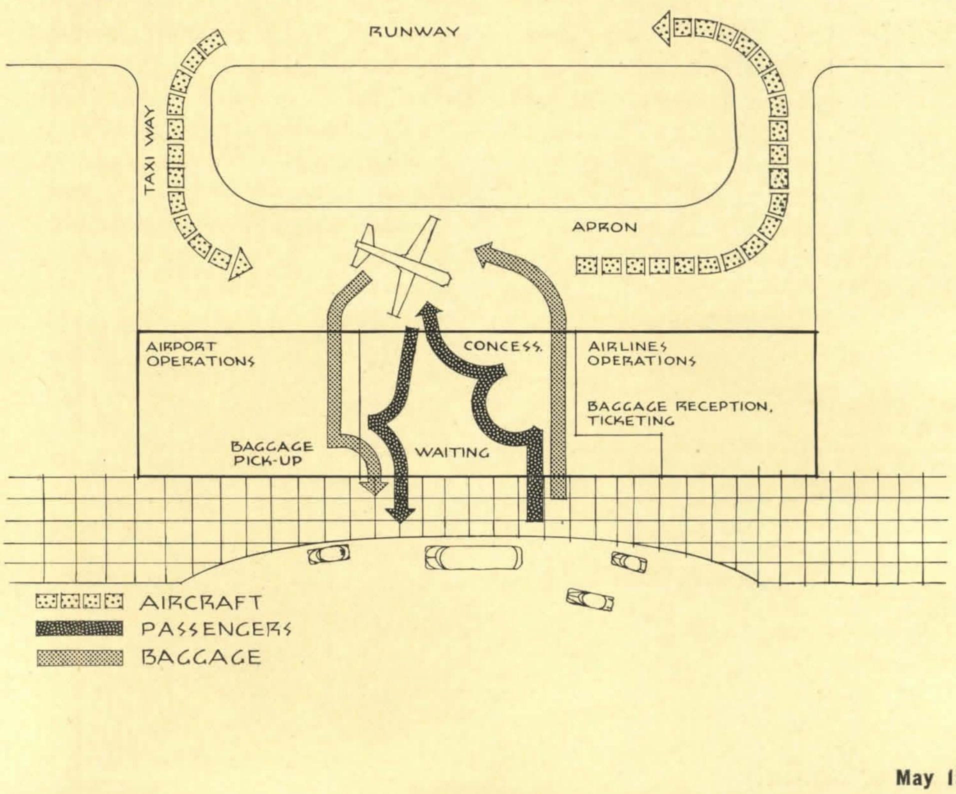
First is the classification by type of aircraft using the airport and the type of air service to be accommodated at the airport. CAA now recognizes seven types, instead of its former five classes: secondary, feeder, local, express, continental, intercontinental, and intercontinental express. These service types will, among other things, determine landing strip and paved runway dimensions.

Classification by operational system, though, is the one that will most affect planning of the building. Extremely controversial at the moment, this question must be settled at each airport at the earliest stage possible, after needs and potentials have been determined. Is it more convenient for the passenger, and is it more efficient for the airline, to operate the terminal as a series of individual unit stations related only in waiting and concession spaces, airport management and governmental office functions? Is it better to centralize similar operations as much as possible, and actually consolidate some common commercial activities? Most airport designs today fall into a sort of compromise solution, not completely satisfactory in any sense. CAA now favors a centralized system and some consolidation. Some airlines still hold out for a unit system—with, it seems to the Editors, an attempt at rationalization which conceals an understandable commercial rivalry.

The unit system, in its extreme form a series of individual stations connected by a corridor, provides each airline with its own waiting-room, ticketing space, offices, and baggage-handling area. There may be a central waiting lobby and concession space, or the only centralized function may be a restaurant. This is fine for the airline which wants to keep its passengers to itself; it is convenient for the passenger using only one airline. It is most inconvenient for the passenger changing planes or seeking information; it is not good for the concessionaire. Few airlines still want this scheme in its entirety, but many of them like its operational advantages. In a circulation sense (if it were not for the problem of changing among planes operated by different lines) it has its merits—enplaning passengers can be delivered directly to the unit station, near the apron. It also, by its very strung-out nature, makes expansion fairly simple. Individual airline operations are probably made easier by this scheme; airport management and maintenance are made more difficult.

The centralized scheme brings all airline counters, waiting space, and baggage-handling facilities into one major area. Although there is a certain loss of identity for the airlines, they may have their own ticket counters within the central concourse. The passenger still has to go from counter to counter to get full flight information, but his walking distances are less, and transferring from one line to another is simplified. Disadvantages are that airlines counters are some distance from the apron, and expansion may be difficult.

Further consolidation beyond the centralized scheme now used would seem de-



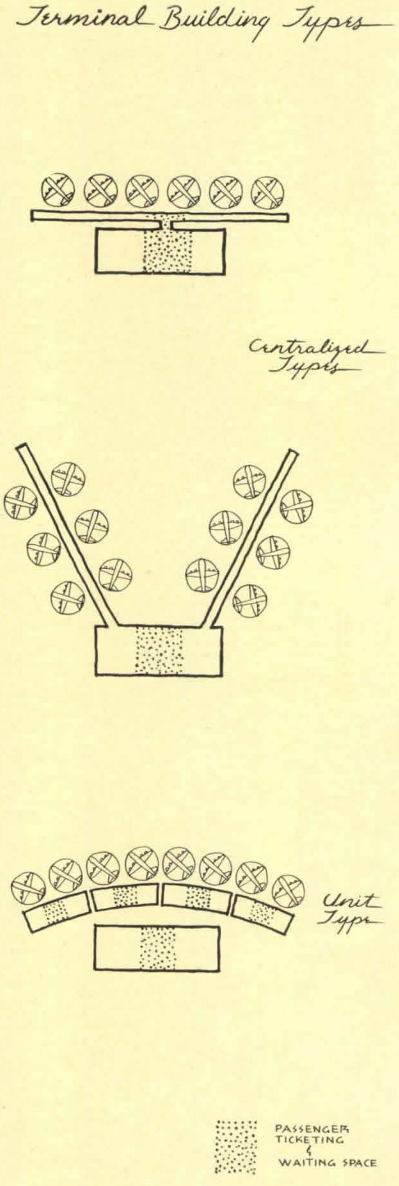
Terminal building planning is idealized in three categories at right. The passenger—enplaning and deplaning, using ticketing, waiting, and concession facilities; the baggage—transferred between weigh-in and loading station, pick-up and ground transportation; the airplane—taxiing between runway and apron loading station.

basic airport types

sirable in many instances — but it also seems to be almost impossible of attainment. One simple step would be a central flight-information board, maintained by all the lines using the terminal; this is planned in a few instances, but has been turned down in others. A further move would be consolidation of ticketing offices in one central agency arrangement. The economy in space and saving of personnel, directness of circulation flow in the terminal, and ease in expansion implied by such an operation are apparent; and it would seem that all this could be translated into terms of lower passenger fares. However, some airlines say operating experience shows this cannot be done efficiently and economically, and they feel that such planning would eliminate "competition and free enterprise." As an example of present thinking, while the new Philadelphia International Airport was being planned the unit plan at one point gave way to a centralized scheme, and some consolidation was considered. Now, however, the airlines have decided that they want to go back to a unit system. At La Guardia Field in New York, originally planned for centralized operations, most of the airlines are now using space along the apron for both ticketing and passenger waiting — and the huge second-floor concourse is almost deserted, partly because the original plan did not allow for the expansion now necessary.

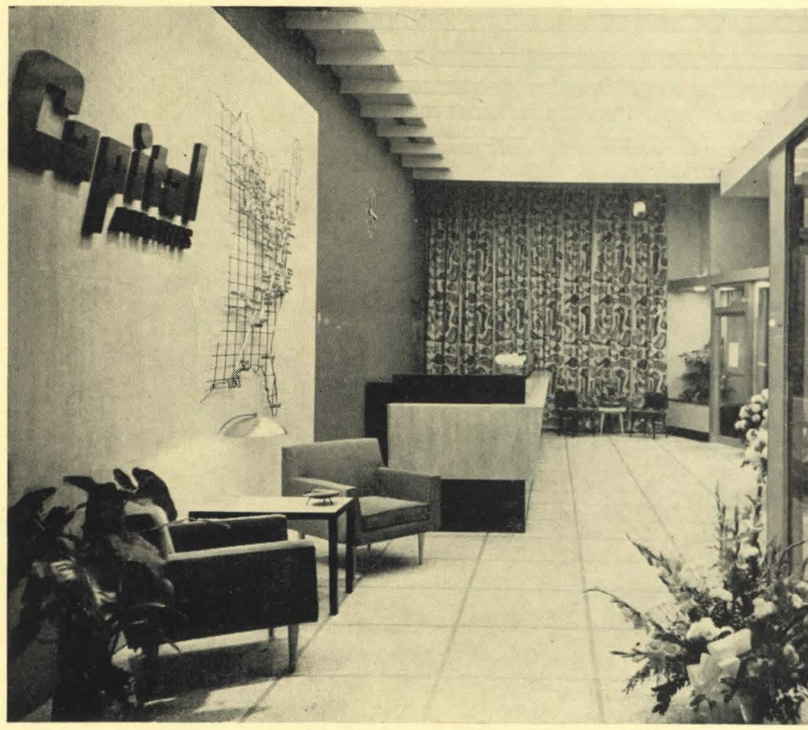
Another possible program seems even more questionable. The idea of eliminating all ticketing and most of the baggage handling at the airport and making fuller use of the in-town terminal, which already exists in many cities, has appealed to some planners. Enplaning passengers would buy their tickets, check their baggage, and board ground transportation in the city, then be taken directly to the plane at the port. Upon arrival, waiting at the airport station would be only for delayed flights and transfers. Deplaning passengers would directly board limousines, and pick up baggage at the city terminal. Aero-Gare des Invalides in Paris and several other European stations work in very nearly this way. Such a development would change air terminal planning concepts radically; although most of the income from concessions would be lost at the airport, space requirements, and construction cost would drop to compensate. The airlines feel that objections to the idea are too great to be overcome: there would be no direct contact between ticket office and the apron, control tower, and weather bureau station; there are many passengers who live closer to the airport than to the down-town office; and there will always be important revenue from the last-minute passenger who dashes to the field in his own car.

Whatever the operational system adopted, it is clear that the air station must function precisely—it is basically a machine to facilitate transfer of passengers from the ground to the air and vice-versa. Circulation through it must be smooth and efficient; if one indulges in an architectural metaphor, it should have something of the smoothly flowing quality of the flight it leads to, in its plan (and, one would think, in its appearance as well). Since circulation is so important, this next section of the magazine is devoted to a discussion of the three main circulation movements at the terminal — circulation of the aircraft, of passengers, and of baggage.

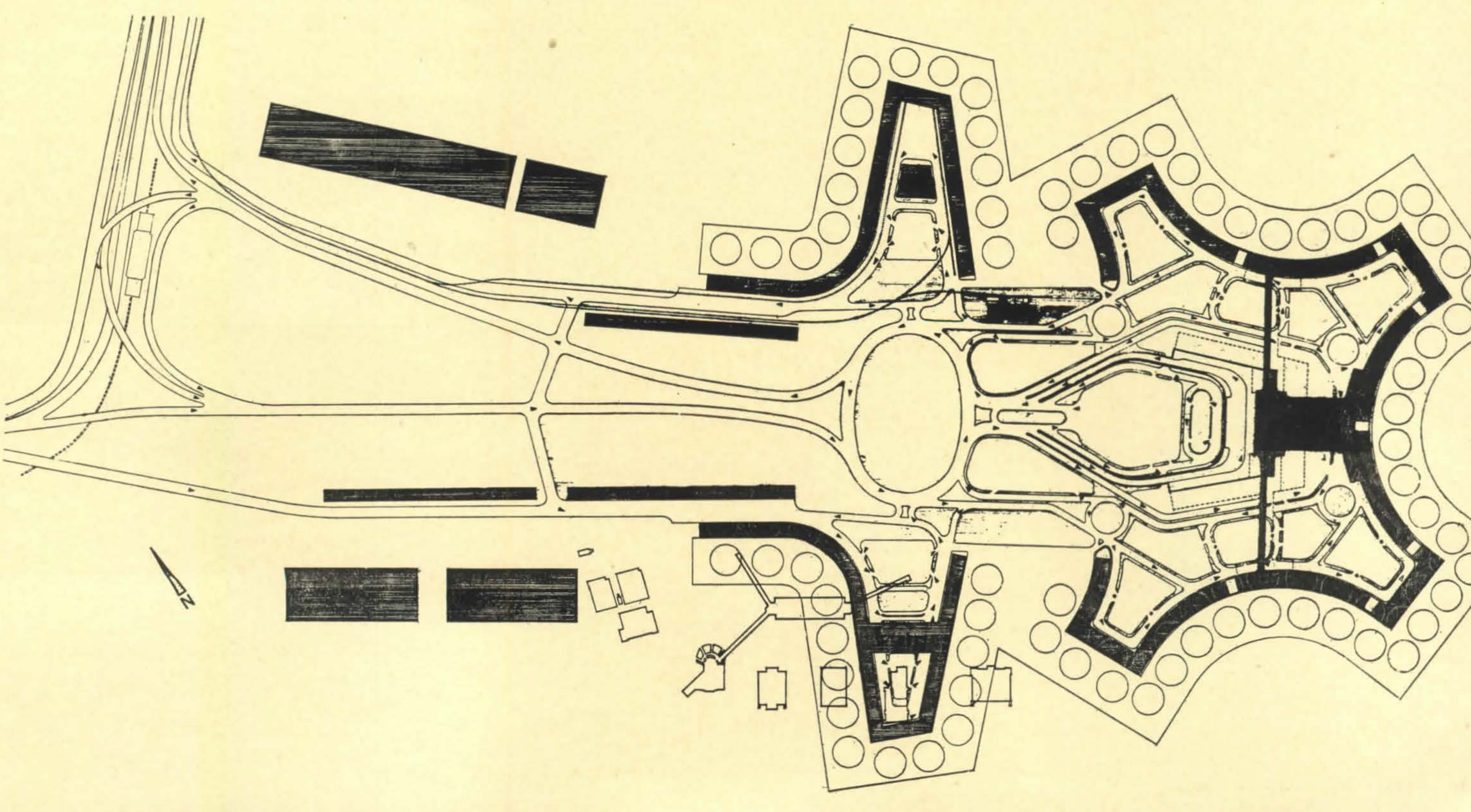


Terminal building types; the centralized and unit schemes.

B.O.A.C. Comet and coach are shown at London Airport (above). Direct communication between plane and ground transportation reduces time-distance factor. Capital Airlines downtown office in Chicago (right) eliminates necessity for passenger ticketing at airport. Architects: Frederich Moss and Joseph Baker.



Logan International Airport, Boston, Mass., is designed on a semifrontal-finger principle (below). Ultimately developed, it will provide 70 loading stations for passengers and air freight. Architects: Shepley, Bulfinch, Richardson & Abbott.



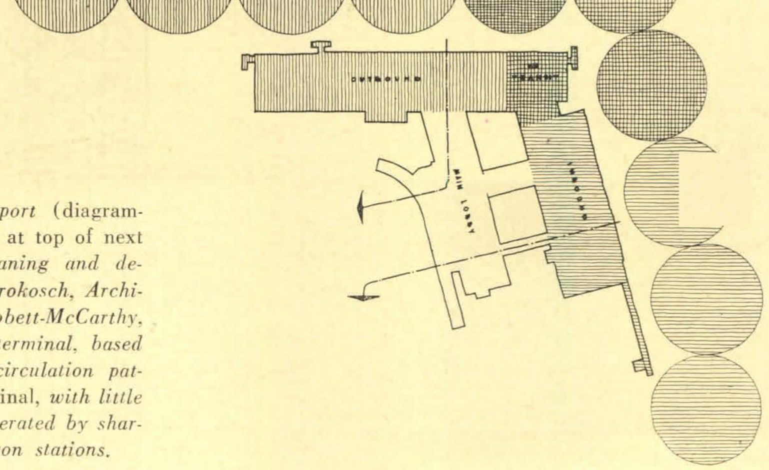
circulation: aircraft

The movements of the airplane on the ground are simple. On landing, under directives from the airport control tower, it arrives at one of the runways and taxies to a loading station on the apron in front of the terminal building. There it is serviced and loaded. On taking off, it taxies to its position on one of the airstrips and proceeds down a runway. Its only other maneuver might be to taxi to an off-apron position for inspection, servicing, or garaging. While most architects will be faced with a strong client determination about location of loading positions and servicing, it is well to know the pro and con aspects of some aircraft apron activities. The terminal building architect may adopt either of two currently accepted apron schemes. The smaller port, with its lower passenger volume, may use a frontal arrangement with aircraft strung out along the perimeter of the building. For the larger-volume terminal, a "finger" scheme, consisting of piers stretching onto the field, perpendicular or radial to the building, with planes grouped along these extensions, seems best. The finger plan adapts itself well to the unit operational scheme described earlier, as an individual airline may use all or a part of one finger. It also works perfectly well with a centralized ticketing and baggage handling operation, since walking time from the waiting room and loading distances from baggage and cargo rooms can be reduced.

Airport facilities must be "balanced" for perfectly economical and efficient procedure: air traffic; ground handling; runway capacity; loading; and passenger, baggage, and cargo flow must all accommodate the same number of schedules per hour. If one operation is a bottleneck, all others wait. If one can be speeded up, others must move more rapidly to compensate. To date, industry's efforts to save time by air travel have been directed toward increasing the flying speed of aircraft. Now there is agreement that greater attention must be paid to ground time—arrivals and departures, ticketing and waiting time, and (not the least by any means) loading time of aircraft on the apron. Time lost during the servicing and loading period is not due to passenger loading, but to the handling of cargo, fuel, and food. While navigational aids have increased runway acceptance rates, aircraft loads have also risen, and will continue at an upward rate for some time. Much of this problem must be approached as a time-and-motion study by the airlines. The architect's concern for servicing utilities (fuel lines, cabin heating and cooling devices, electrical, water, compressed air, sewage and telephone services) may well save cargo and loading time.

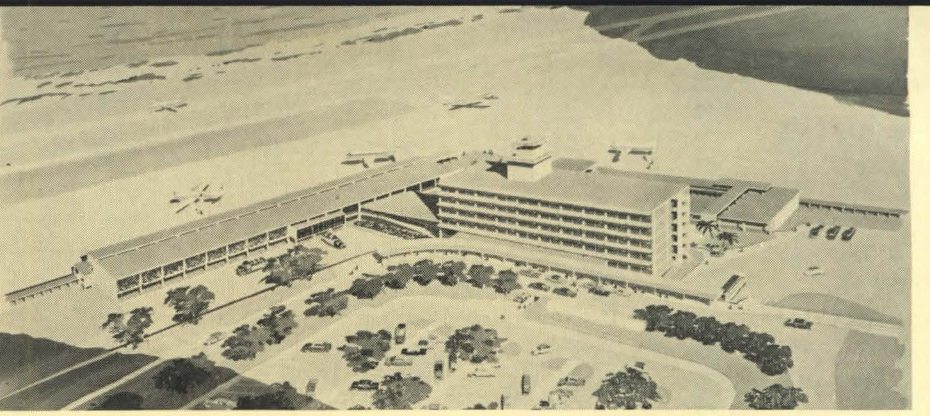
Mechanical airplane docking devices are appealing and may gain acceptance rapidly if their cost (between $30,000 and $40,000 a unit) can be reduced. The advantages gained in level loading (which has saved so much truck loading time in recent years) are defeated by the ever recurring problem of lack of standardization in aircraft design. Comingling of fuels for pit or hydrant fueling (so that a co-ordinated system of supply with various fuels of the same octane rating furnished at the same point by various suppliers) is favored by CAA, but not wholly accepted by the airlines or the oil companies. The lack of enthusiasm of the airlines and oil companies springs from taxes needed to amortize pipe lines. A one-half cent rise of a gallon of gasoline could result in added costs of hundreds of thousands of dollars in operating expenses. Mobile units or a multiplicity of supply lines and hose connections are today's unsatisfactory solutions. Refueling at runway ends instead of at the apron seems impracticable, not only due to the complications of comingling, but also because it requires stopping and restarting the aircraft.

There should be broader approaches to the improvement of circulation and loading of aircraft at the terminal. That these operations take place in the open, in all



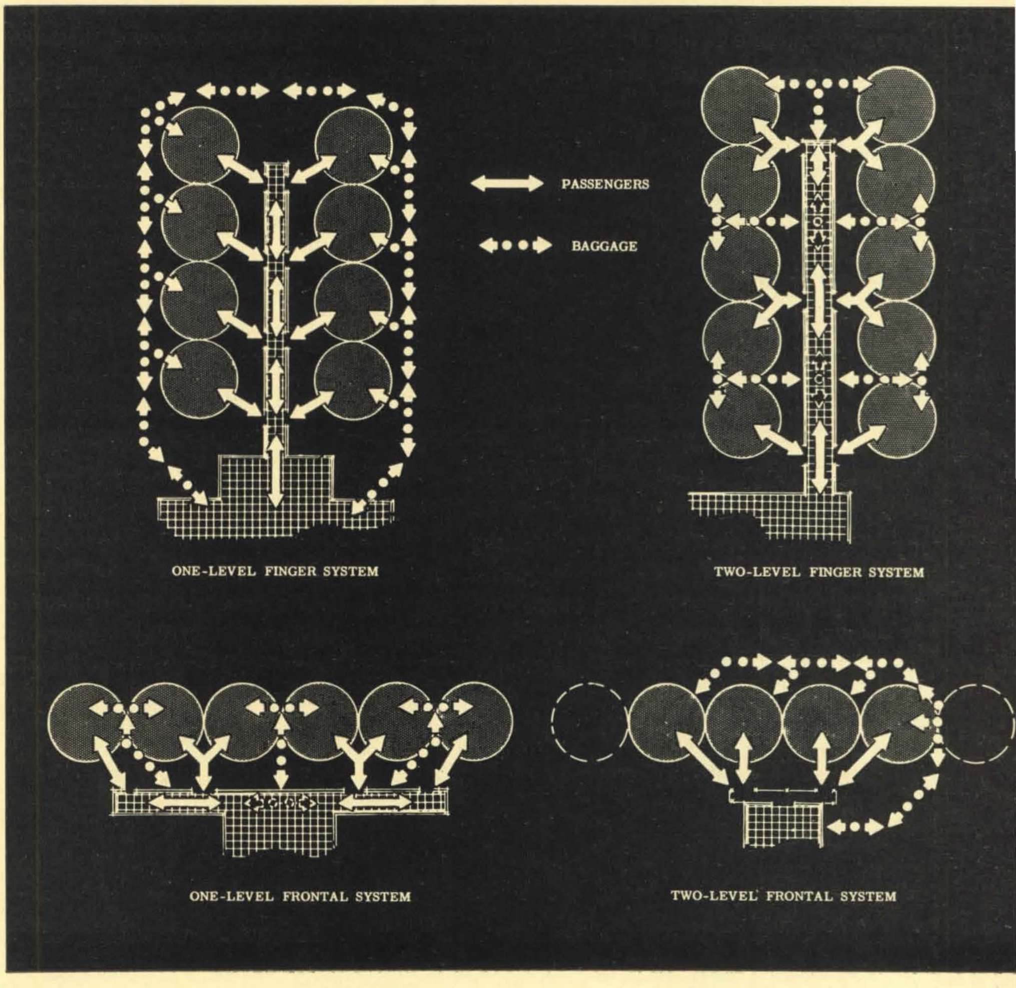
Puerto Rico International Airport (diagrammatic plan at right; rendering at top of next page) *entirely separates enplaning and deplaning passengers. Walther Prokosch, Architect for Knappen-Tippetts-Abbett-McCarthy, Engineers, who designed the terminal, based aircraft as well as passenger-circulation patterns on fact that it was a* terminal, *with little in-transit traffic. Airlines co-operated by sharing inbound and outbound apron stations.*

Frontal scheme for aircraft-loading positions works well at Puerto Rico International Airport. Diagrammatic comparison between frontal and finger-plan methods of parking planes at loading stations is shown below (right).



weather, is obviously inconvenient to crew and passengers. However, aside from Tempelhof Airport's ambitious scheme in Germany, which keeps all planes under a huge cantilevered canopy, no other solutions have been seriously tried. Projecting canopies at apron station points have been suggested from time to time, but are invariably abandoned when the budget is pared. There have been suggestions to treat the terminal building as a huge hangar, with the plane coming in one end, loading under cover, and going out the other. Except for a United Airlines experiment at Omaha, construction costs have prevented more serious trials. Perhaps as the airport program progresses, such imaginative schemes may be seriously investigated.

Each airline wants the most favored location, on the apron as well as in the terminal building. And many of them, having gained position, resort to doubleparking planes at peak periods instead of using stations not so well located. Another operational possibility is the procedure, recommended by CAA, of moving aircraft from the loading apron to planned parking positions for extended layovers. The only real solution to double parking, as to other problems of aircraft circulation, is basic study of the relation of the terminal building to other facilities at the airport.



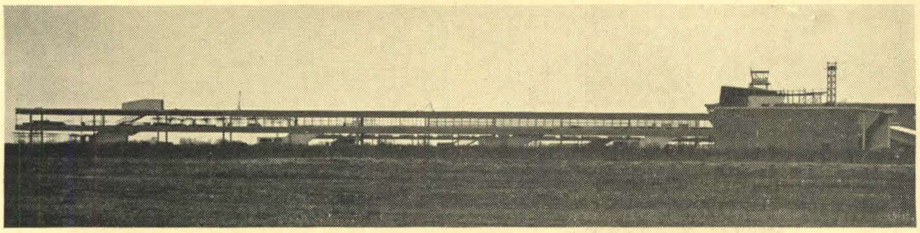
circulation: passengers

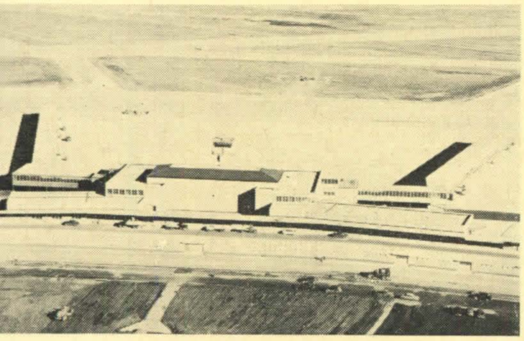
Aside from air-traffic control, the main function of a commercial airport terminal building is to facilitate the transfer of passengers. The passengers' circulation is, then, the primary basis for planning. In essence, it is (or should be) simple and direct. The enplaning passenger arrives by some ground vehicle; he may seek information; he purchases his ticket unless he has done so before arrival; he has his baggage weighed and taken from him; he waits until the announcement of his flight; he leaves the terminal building, passes through an apron gate, crosses the apron; and boards the plane.

The circulation of the deplaning passenger is simpler. Unless there are complications of customs and immigration, he leaves the plane; crosses the apron; enters the terminal building; picks up his baggage; and leaves to find ground transportation.

Since passengers may arrive or leave by private car, bus, or airlines limousine, the handling of any and all possibilities must be studied. A local study of ground-travel habits may be desirable; easy unloading and properly segregated parking facilities are important. Movement from the unloading point to information and ticketing areas should be swift and unobstructed. Except at the very small airport, it would seem wrong for the passenger to arrive in a general waiting area where he immediately mingles with others who are waiting, leaving, or visiting. Sources of information should be readily available; ticketing counters and baggage check-in spaces should be not only easy to find immediately but also preferably out of the main stream

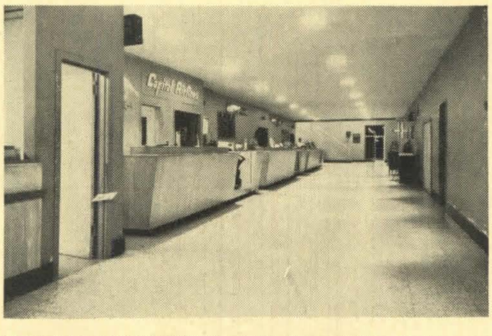
circulation: passengers

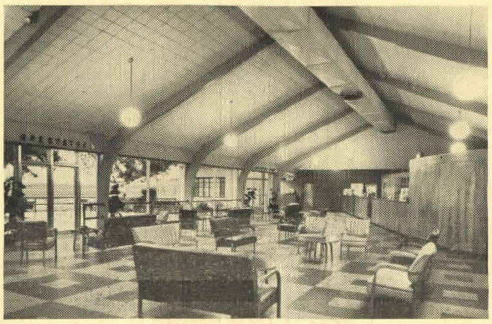


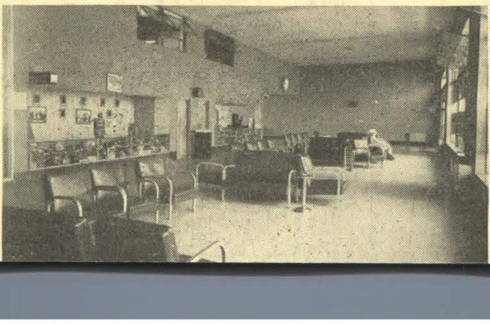


Two-level circulation is the basis of planning at Philadelphia, Pennsylvania, International Airport (above), *Carroll, Grisdale & Van Alen, Architects; and at Greater Fort Worth, Texas, International Airport* (left) *Joseph R. Pelich and Preston M. Geren, Associated Architects. Both utilize finger plans; passengers travel above and descend to plane apron; baggage is transported at lower level.*

Three focal points of passenger circulation within terminal are illustrated here: ticketing counter (below) *at Mobile, Alabama, Airport; John Carey, Architect; waiting room* (center) *at Bush Field, Augusta, Georgia; Kuhlke & Wade, Architects; concession spaces* (bottom), *again at Mobile Airport.*







of other circulation lines. A central flight-information board would be a great help since one of the circulation problems is having at the airlines counters passengers already ticketed but waiting and watching the individual posting boards, worried lest they miss an announcement. Some plans, recognizing this, provide sub-waiting areas directly in front of the counters. But this develops into a duplication of space usage inevitably resulting in crossed circulation lines.

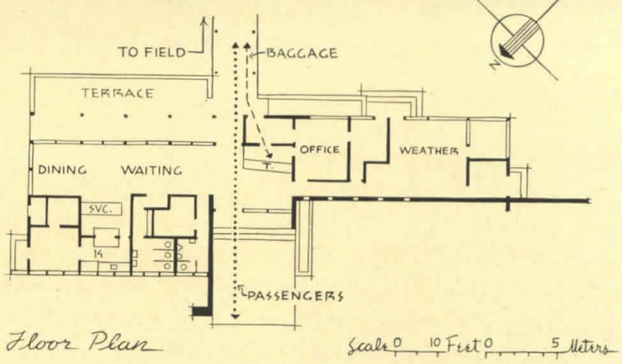
An aspect of airlines rivalry that the planner soon discovers is the matter of most-favored location for ticketing space. The most active carrier at a given port will get the best space (and no matter how counters are planned, one location will be considered "best") ; and if there are two of equal importance a desire for some sort of symmetry will probably result. If there were such a thing as a fully equitable arrangement, the bigger lines would consider this unfair to their prestige. Least consideration will be given to the non-scheduled carrier, whose passengers are looked upon as almost a class apart (they don't have so much money to spend!)

After ticketing and baggage weigh-in, the passenger will go on to a waiting space, perhaps for a long time in case of unavoidable delay, or perhaps for a very few minutes. During this period, it is hoped that he will patronize some of the concessions, or he may make use of washroom and toilet facilities, or he may want to make a phone call. In discussing the economic study, mention has been made of some of the concessions which may be profitable—and useful. Here, in considering planning, it should be pointed out that the concessions may become a functional hazard, since they may be placed in such a way that, for maximum revenue, they interfere with passenger circulation. There are airport buildings in which restaurants are placed where exits to the field obviously should be; there are newsstands, lighted displays, and other obstructions in the way of direct passage from waiting space to ramp gates. The balance between necessary income and passenger convenience must again be carefully weighed. Merchandising principles that many store planners understand—the difference between impulse, demand, and convenience buying, for example—might be applied after fundamental planning has been studied.

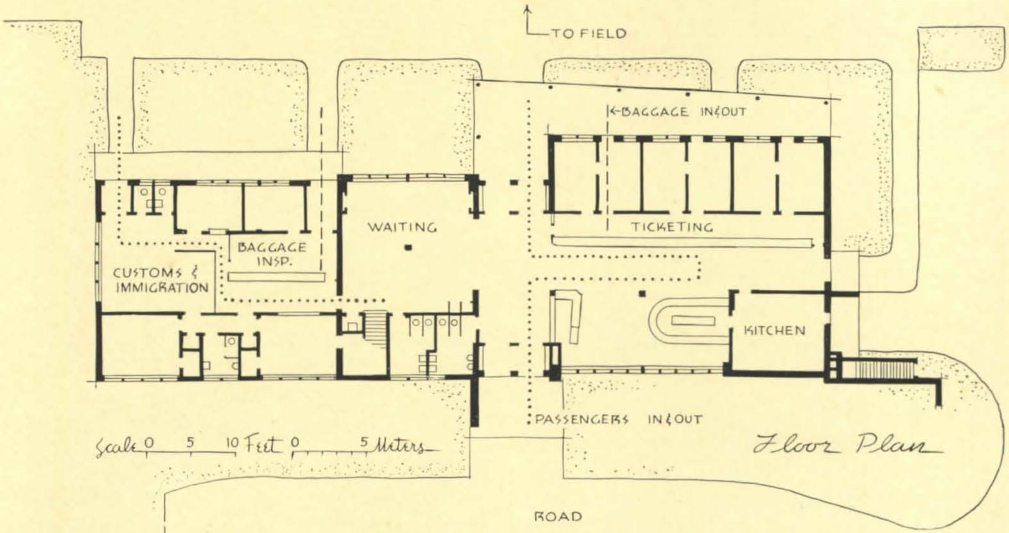
The fact that the enplaning and the in-transit passenger, in addition to the all-important visitor, are the ones who will use the waiting room almost entirely (and the concessions primarily) should also be recognized. The deplaning passenger is usually in a hurry to get away; he wants his baggage and transportation at once. This fact has led to solutions which attempt to separate incoming and outgoing circulation. The outstanding example, to date, is probably the airport being constructed at Puerto Rico, where the principal drawback to such planning—the fact that the in-transit passenger is both coming *and* going—is minimized because the port is almost literally a *terminal;* very little through traffic is anticipated. Though concessions must be duplicated, if there are separate arrival and departure lobbies, this is not necessarily a complication if there is sufficient volume in both places to justify newsstands, cigar counters, telephones, and other services designed to attract the visitor.

The final movement of the enplaning passenger (and the first of the deplaning) is to pass from waiting space to the plane on the apron, or vice versa. A final check, to make sure that visitors or unticketed persons are not moving to the apron, requires some sort of gate control at that point—and telephone communication for the agent stationed there. It is not a safe procedure to allow passengers to wander to the plane, perhaps through truck and baggage-cart traffic, where planes may be warming up, and where there is no protection from the weather. Elimination of this hazard seems almost impossible, except under a control system by which each passenger is escorted to the plane. A totally new approach to air terminal planning would solve this (delivery by limousine directly from the downtown office to the door of the plane; undercover transit of the aircraft through an enlarged terminal building; or mechanical docking.) But these do not seem likely in the foreseeable future. At this circulation point, the unit plan seems to work best for the passenger: he leaves a waiting room directly adjacent to the apron, for a plane immediately visible to him. In too many existing buildings, the location of gates and even access from building to field are difficult for the inexperienced traveler to discover.

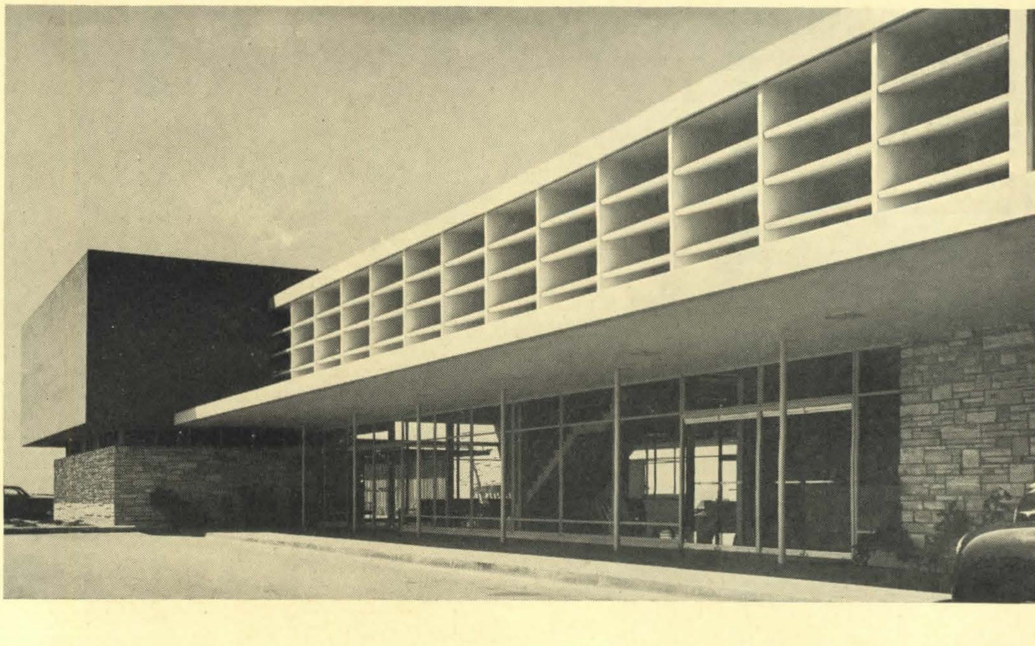
Baggage circulation, discussed later, requires a relationship between baggage spaces and passenger circulation. Conflicts can be avoided by a two-level scheme, justified in some cases in larger buildings. This would take the passenger immediately to an upper level, away from all baggage, cargo,



Municipal Airport at Flagstaff, Arizona (above), *Edward L. Varney, Architect, shows direct circulation through small terminal. Airlines counter is directly at hand; waiting room overlooks apron. Somewhat larger facility at Burlington, Vermont, Municipal Airport* (below), *Harold C. Knight, Architect for Fay, Spofford & Thorndike, Engineers, is further complicated by need for screening of international travelers. They are segregated* (at left of plan) *until after clearance; then pass into common waiting room.*



Beginning—or end—of passenger's trip through terminal building is contact with ground transportation. Ground-approach side of Monterey, California, Airport, Robert F. Jones, Architect (below).



service, and administrative activities. When he drops his baggage, it is chuted to the lower level, following his own movements at the apron level of the finger. The weakness of this system is that it involves many ups and downs—the passenger must descend to the plane apron, coming in conflict with other activities, and again climb up into the plane. Mechanical gangplanks, but for their prohibitive cost and the various locations of aircraft doors, would help solve this problem.

One further possible complication in passenger circulation should be mentioned: that is the handling of international travelers, and processing them through customs, immigration, and other agencies that are concerned with their movements or the contents of their baggage. If they are incoming, they must be segregated, and their baggage must be handled separately. Most international ports have a passenger volume large enough to justify a two-level scheme. This (as at Havana) permits a vertical separation of baggage and passengers, and a horizontal separation of domestic and international travelers. Provision, too, must sometimes be made for passengers technically not in the country, but enroute from one foreign land to another (someone going from Cuba to Canada, for instance, might not "enter" the United States even though he waited for some time at a New York airport).

Compared to some other complicated architectural planning problems (hospitals, for instance), the movement of *persons* through the terminal building is not especially complex. Its solution is made difficult sometimes by competition or conflicting interests among the many client groups involved; and by lack of determination by management of the relative importance of operations, revenue, and passenger convenience. These are the main problems which will have to be resolved, to achieve an efficiently working plan for passenger circulation.

circulation: baggage

The airline business recognizes seven types of passenger baggage: domestic, inbound and outbound; domestic transfer, inter-airline and intra-airline; international, intransit (usually in bond) and outbound and inbound (requiring customs inspection). However, basic criteria for handling all these categories of personal belongings are similar:

1. Passengers should handle baggage as little as possible.

2. On arrival, by ground transportation, baggage should go to a baggage room and thence directly to the plane, as soon as possible.

3. Unloaded from the plane, baggage should go directly and quickly to the passenger pick-up point.

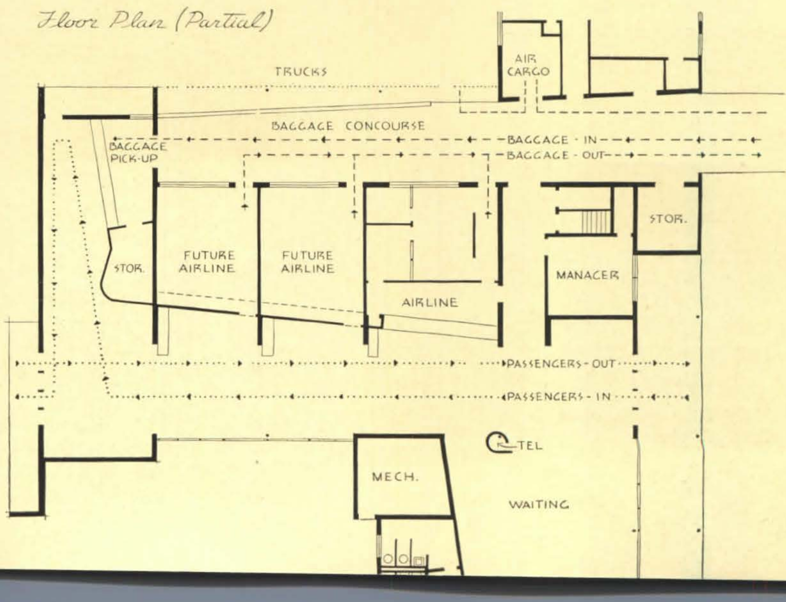
4. Baggage should be handled carefully.

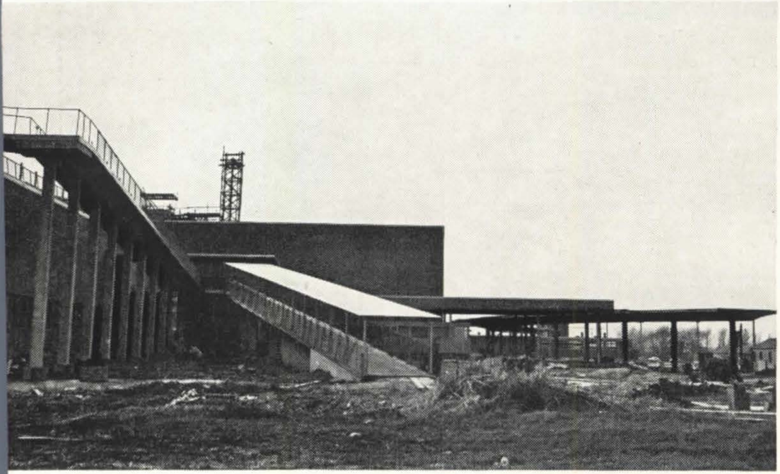
For enplaning passengers, the least damaging device for baggage handling (once it is left at the ticketing counter, is a mechanical conveyor. It is more expensive than the chutes often used, and budget limitations may militate against its use. Such a conveyor (or chute system) will deliver baggage to a central baggage room, or to the individual airlines' baggage rooms (depending on whether a unit or centralized operational system is used), and from there carts are used to take the baggage to the plane on the apron. At this point, it is very desirable to keep baggage items under cover as long as possible. A baggage cart concourse, indoors or at least under a canopy, and covered approaches within the fingers, if that plan is used, are partial solutions.

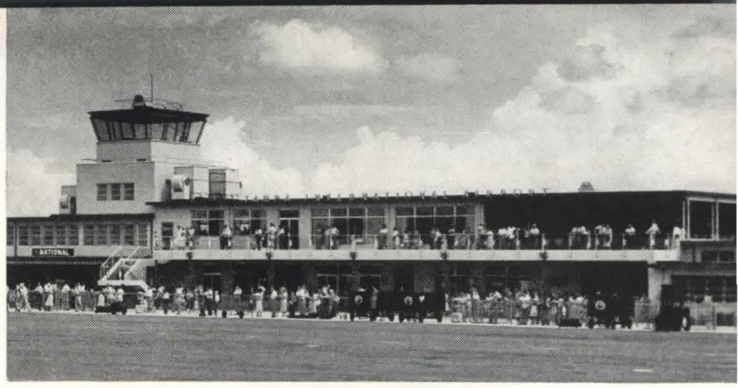
For deplaning passengers, the type of operational system will again determine whether pick-up is at individual baggage rooms for each airline, or at a central consolidated point. Cart concourses are again desirable for delivery from plane to this point. Baggage for international passengers is taken first to the customs inspections area, then to meet the passenger where ground transportation is loaded. Ideally, the normal pick-up spot should be near the exit, so that a departing passenger can quickly gather his bags and find bus or taxi. For smaller airports, this point can well be outside the building on the street side.

Relationship between baggage and passenger circulation has already been stressed. Vertical separation of the two lines of travel, where it can be justified economically, is as valuable for careful baggage handling as it is for passenger convenience.

At Meridian, Mississippi, Airport (Chris Risher, Architect), *baggage transfer and air-freight distribution are facilitated by a concourse* (right). *Outgoing baggage, taken from ticket counters, goes through passage to the waiting plane. While air cargo is filtered off, incoming luggage continue through concourse to baggage room for passenger pick-up.*



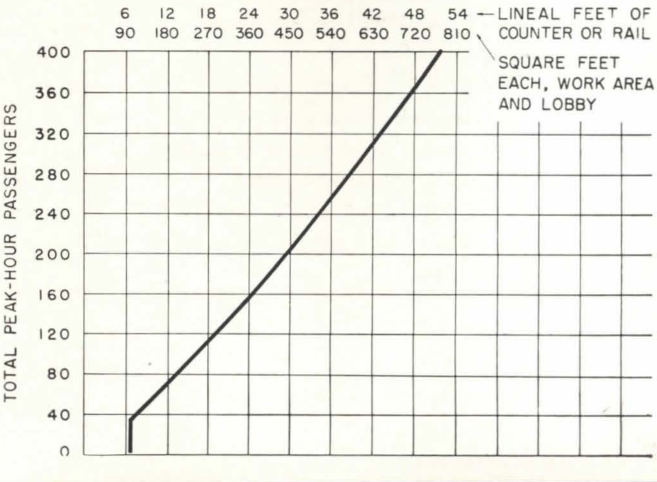


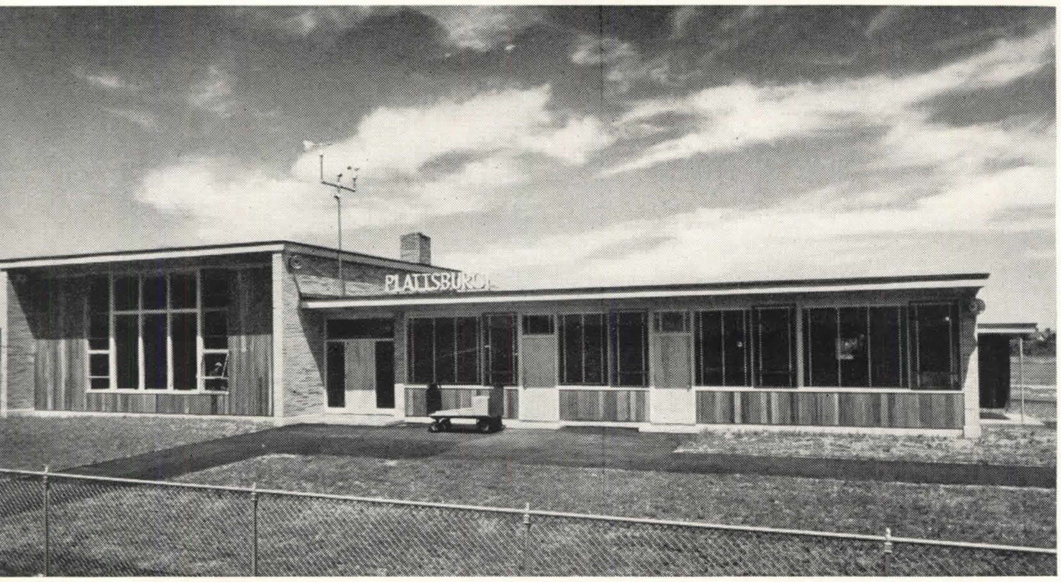


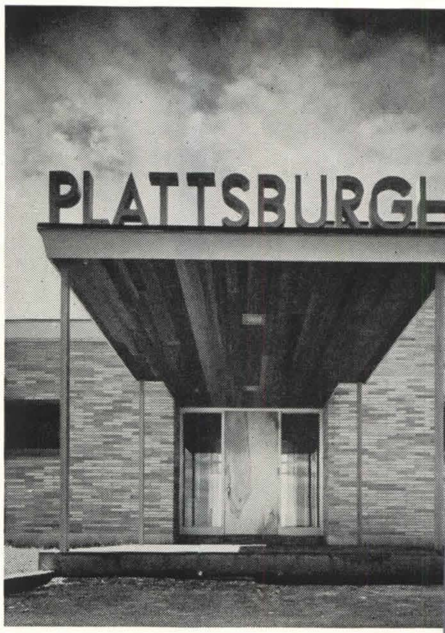
SIGHTSEERS *intermingle freely on two levels at the International Airport, Tampa, Florida* (above). *At Philadelphia, they are separated for control and revenue; Philadelphia International Airport; Carroll, Grisdale & Van Alen, Architects* (left).

BAGGAGE CLAIM *graph translates passenger traffic into counter space, lobby and work area requirements. Architects Roy Worden and Vincent Fagan with Frank Montana as Consultant provided recessed baggage-claim counter adjacent to incoming gates and lobby exit at Indiana's South Bend Airport. Though station-to-plane routing provides no overhead protection, once within the building, circulation is isolated; interference with passenger flow prevented* (below).

BAGGAGE *handling at Pittsburgh Airport provides circular chute for rapid vertical transfer of baggage to field level. As opposed to more costly (but less damaging) mechanical conveyors, Architect Joseph Hoover felt budget limitations dictated their use* (above). *Weigh-in platforms at South Bend, Indiana, Airport adjoin separate waiting areas. Direct access from road to individual airline ticket counter eases traffic pattern, but results in duplication of lounge facilities;* (left; also see right). *Typical baggage handling counter and scales are shown at International Airport, Tampa, Florida* (below left; also see above). *Symbol of airline commercial identity, zealously guarded, is information board behind; Eliot Chapin Fletcher; architect.*







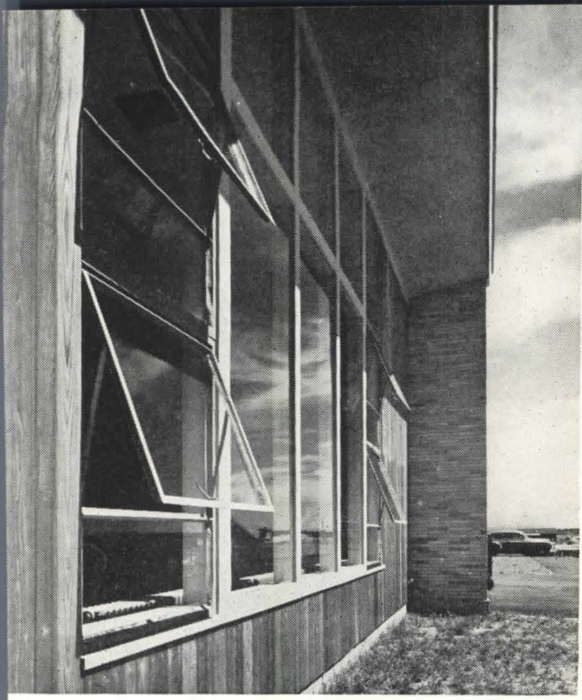
small airport terminal

location	Plattsburgh, New York
architect	William W. Freeman
consulting engineers	Jaros, Baum & Bolles
general contractor	Wright & Morrissey, Inc.

This small air station was built to serve one commercial airline, initially, but with the plan and structure so schemed that facilities can be added readily to accommodate other lines. The lounge is considered large enough for any likely future need, but as demands for new ticketing space or additional U. S. Customs and Immigration offices occur, they will be organized in a new wing to the east, continuing the present central hallway; when a full-scale dining room is needed, it will be accommodated in an addition at the west end.

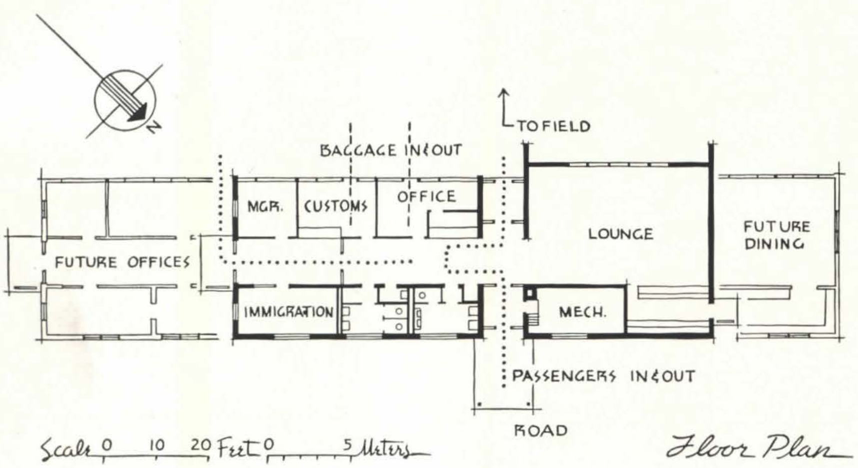
The perfectly flat site commands a view of the Adirondack Mountains across the field to the south. To protect the structure from the prevailing north winds, the front of the building is of brick, with small window areas; on the south or field side, large openings are used, and the walls are of natural cedar boarding on frame. The roof has a light-steel frame, with wood rafters and sheathing beneath the built-up roofing. Heating is by a hot-water system, with standing radiation; in addition, a unit heater is directed on the big lounge windows. All ceilings are finished with acoustic tile.

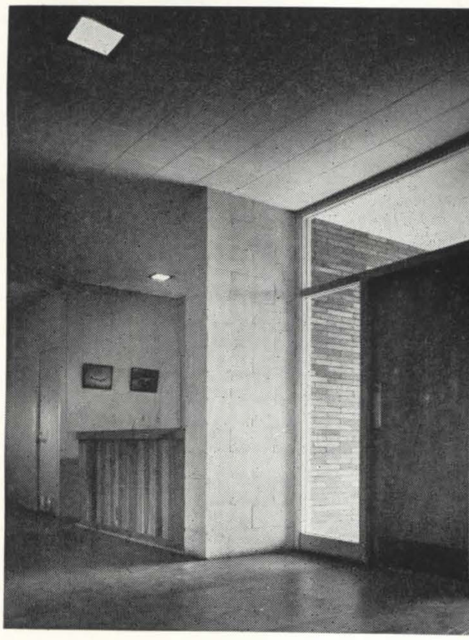
Doors to the building are natural wood, while wood trim is painted gray. Gray-beige-painted steel, mobile partitioning is used in the office space to simplify future changes. In general, interior color is a muted harmony of natural wood, buff brick, yellow-painted wall areas, and a warm-beige asphalt-tile floor; in back of the snack bar, however, a bright-red wall introduces a brilliant color accent.



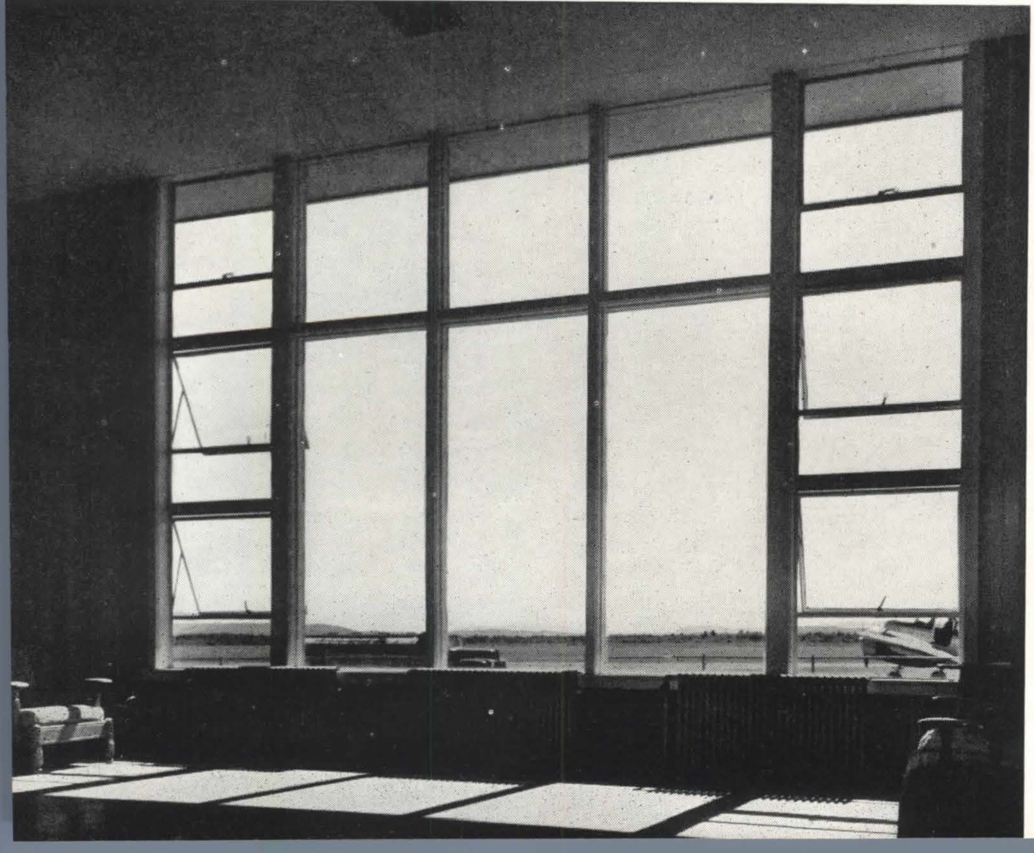
The view window in the south wall of the lounge combines fixed glazing with out-opening sash; soffit of the roof overhang is surfaced with asbestos-cement board. Artificial lights are mainly of the recessed type, selected to enhance a sense of space.

Photos: Richard Garrison





According to John C. Colver, Airport Manager: "The building is working out very satisfactorily. The commercial airlines people tell us that we provide better office facilities than they have in some large cities."



medium airport terminal

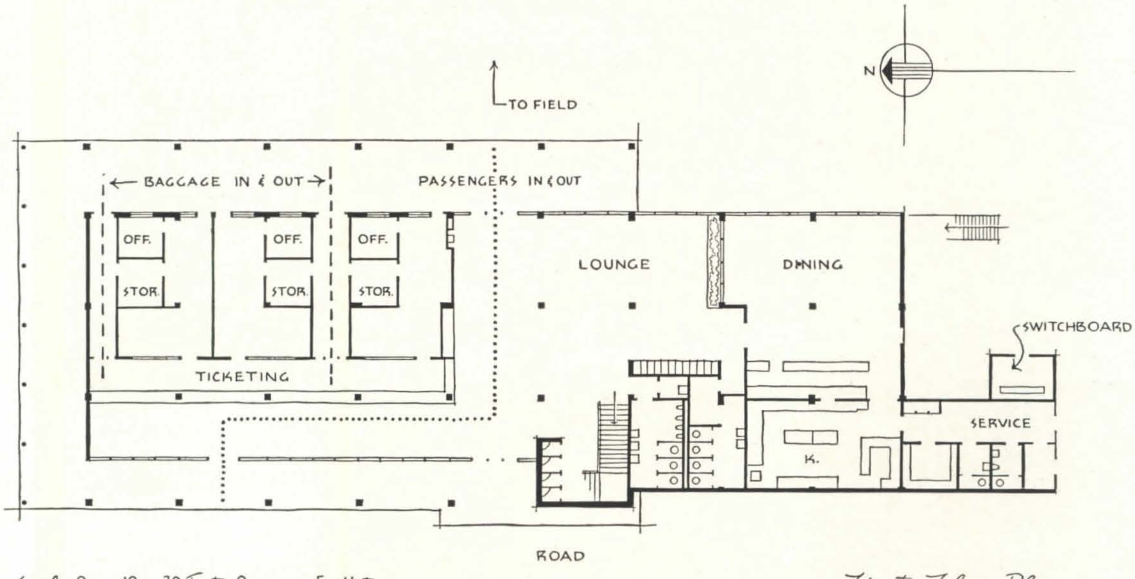
location	Baton Rouge, Louisiana
architect	A. Hays Town
consulting engineers	Ogden & Woodruff
structural-mechanical engineer	Thomas A. Lucy
general contractors	R. P. Farnsworth & Co., Inc. Robert Thibodeaux & Co., Inc.

In addition to providing customary passenger services and facilities as well as office space for the major airlines that use the port, this station also houses (upstairs) offices for CAA; the Interstate Airways Traffic Control Station; Tower Control Station; Airport Branch Division Maintenance Headquarters; U. S. Weather Bureau; U. S. Customs; and the Airport Manager.

The site, quite flat and bare of trees, was established by an existing airfield. Approach to design, says the architect, was "primarily economic—to provide the best possible solution within a fixed appropriation. The plan is such that airlines personnel have immediate access to ticket desk and field. Passengers have an excellent view of the field from both lounge and dining room." The north wall of the building is temporarily surfaced with asbestos-cement panels, in anticipation of eventual expansion at this end to accommodate additional airlines office space, the freight depot, and ticket concourse.

The building is a monolithic-concrete structure with concrete-slab roof over steel joists. In public spaces, terrazzo is the flooring; quarry and ceramic tile are used in service areas, and office floors are asphalt tile. Built-up tar-and-slag roofing occurs over glass-fiber insulation.

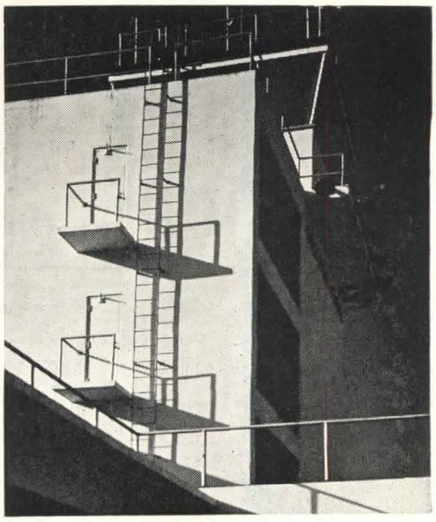
The plate-glass glazing is either heat-absorbing or clear; in the control tower, window areas have heat-absorbing glass outside, a $\frac{1}{2}''$ air space, and clear, polished plate inside. Interior doors are mahogany, solid-core type, while entrance doors are tempered *plate* glass. A year-round, zone-controlled air-conditioning system is used, with a special system in the control tower, where, because of the sun-heat load, cooling is needed even in winter.



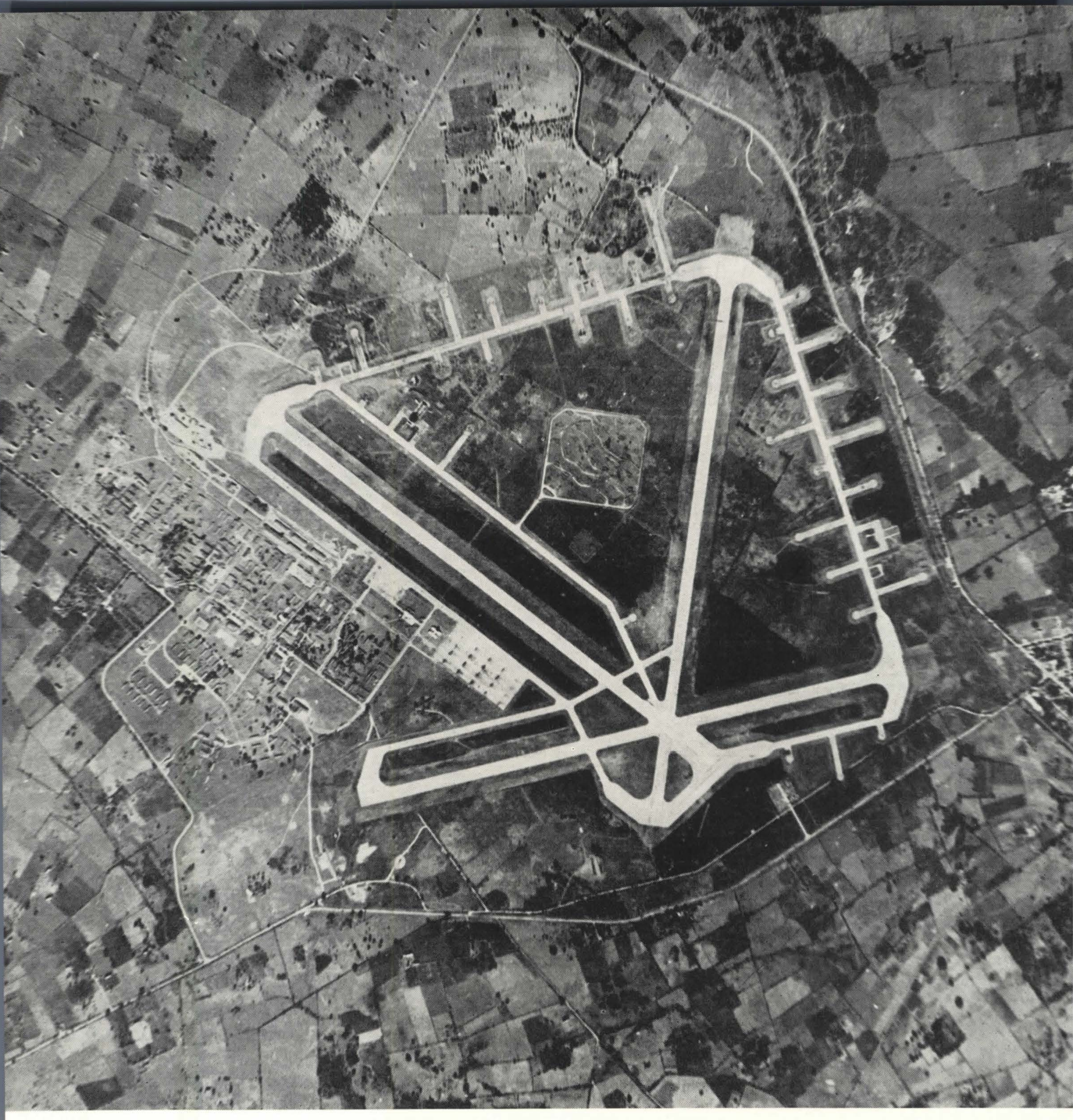
First Floor Plan

medium airport terminal

At each level of the control tower (right), *doors open onto cantilevered balconies alongside a wall ladder. The lounge* (below, top) *commands an unhindered view of the field, while the ticket concourse* (bottom) *has a wall of glass facing the approach drive.*
Photos: Elemore Morgan



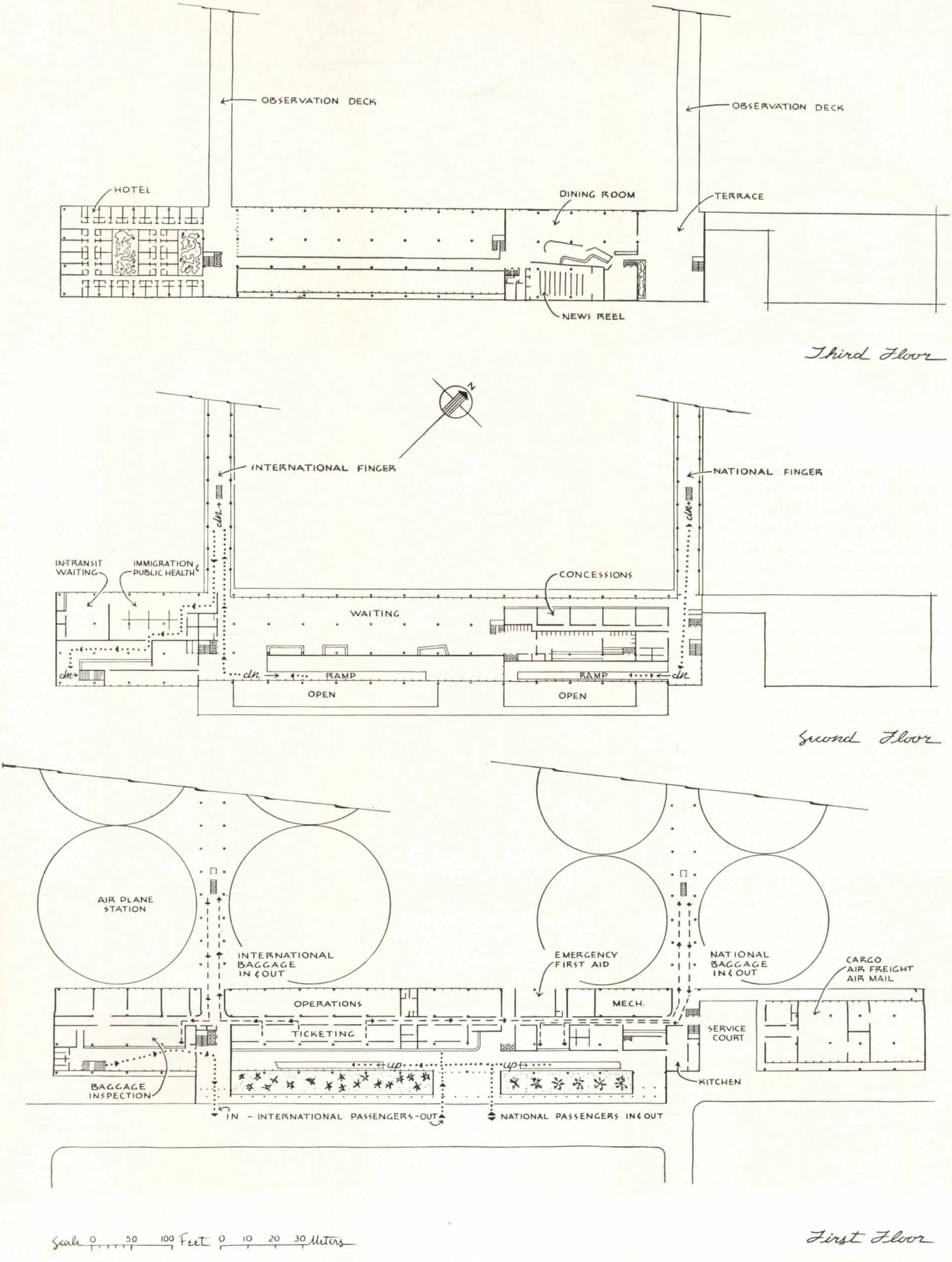
Throughout the public areas, walls are cool gray, with terrazzo floors of a darker gray; furred duct spaces are painted yellow; and the ticket counter is finished with dark-green vinyl-plastic sheeting. The acoustic-tile ceilings are off white.

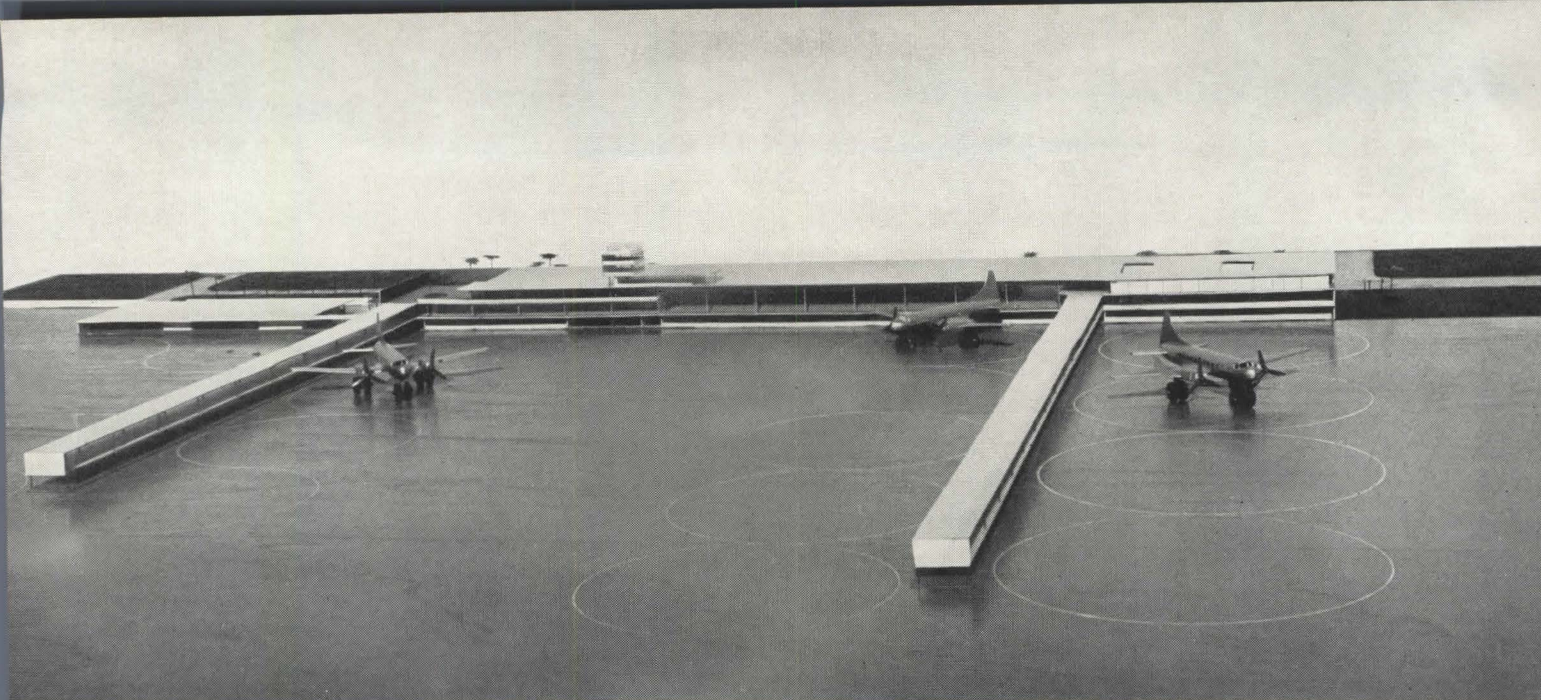


international airport terminal

location	Havana, Cuba
architects	Nicolas R. Arroyo & Gabriela M. de Arroyo

international airport terminal



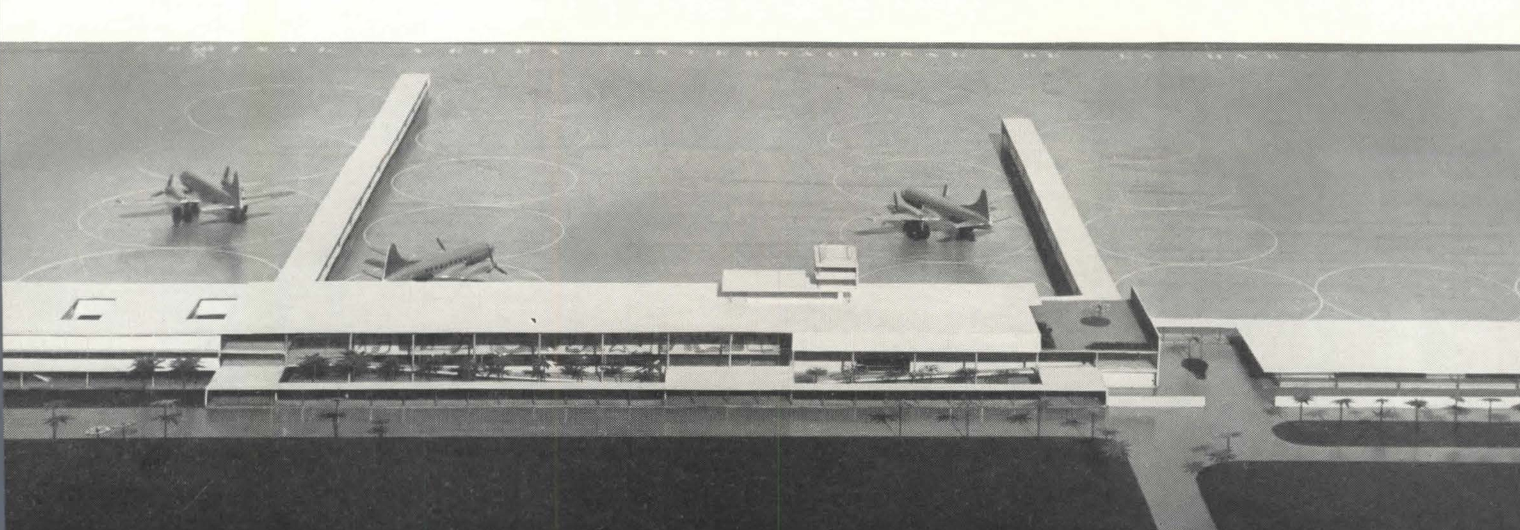


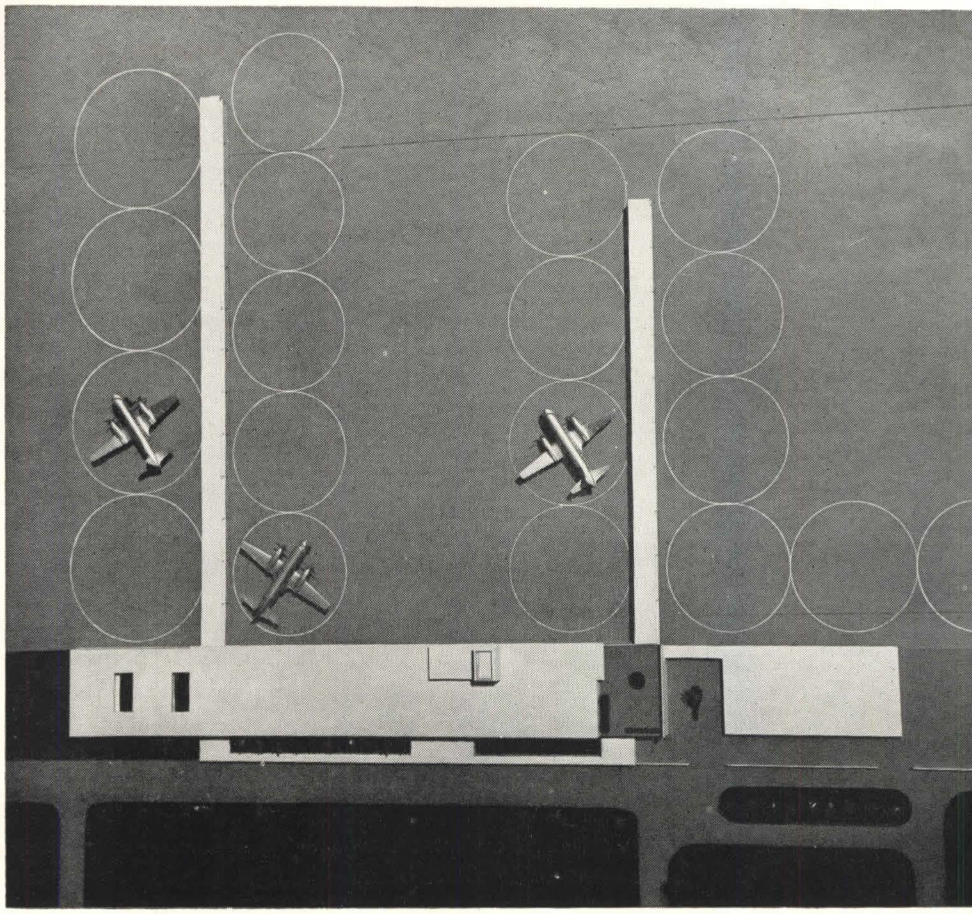
It is anticipated that about 90 percent of the passenger load at this projected terminal building will be international—and only 10 percent domestic. The present finger plan allots the finger toward the east to domestic flights and the one toward the west to international travelers, with attendant customs and inspection facilities. A future plan stage *(not shown)* includes an additional international finger and building unit to be added to the west end of the present scheme. At this eventual stage, one of these westerly fingers would be used solely for outgoing international passengers; the other for incoming international travelers. Such painstaking separation of various types of circulation is typical. For example, the *cargo air-freight air-mail* unit, with its own parking space, is entirely apart from the passenger facility.

Passengers arriving with their baggage at the ground-level entrance canopy enter directly in front of the ticket counters, and they and their baggage immediately proceed along independent flow lines. The baggage, after being weighed, moves back to an outgoing passageway where dollies haul it (always under cover) along the lower level of the finger, directly to aircraft. Passengers proceed from the ticket lobby up one of two broad ramps *(renderings, page 105)* to the waiting-room level, where they may go immediately along the upper level of the finger to the stairs that lead down to the plane stations; or, if they have time, they can wander into the big main waiting room *(rendering, overpage)*; or—if they choose—on up to the top level of the building, where they would find the main dining room, a newsreel theater, cocktail lounge, and observation decks.

At the west end of this top level is a small hotel facility, provided because Havana handles many passengers between North and South America who have extended waitovers; also, it is thought that many businessmen would use the airport hotel when catching early-morning planes.

After docking, incoming local or national passengers pass along the upper level of the east finger into the terminal building and

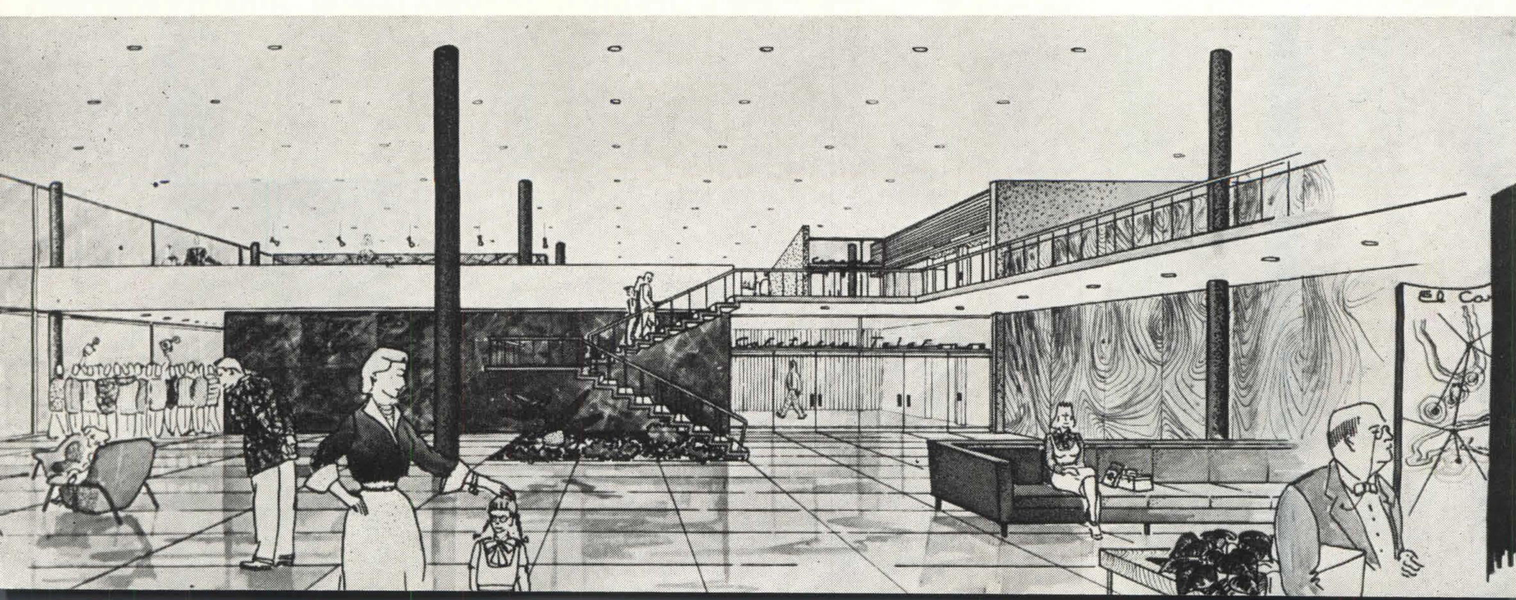


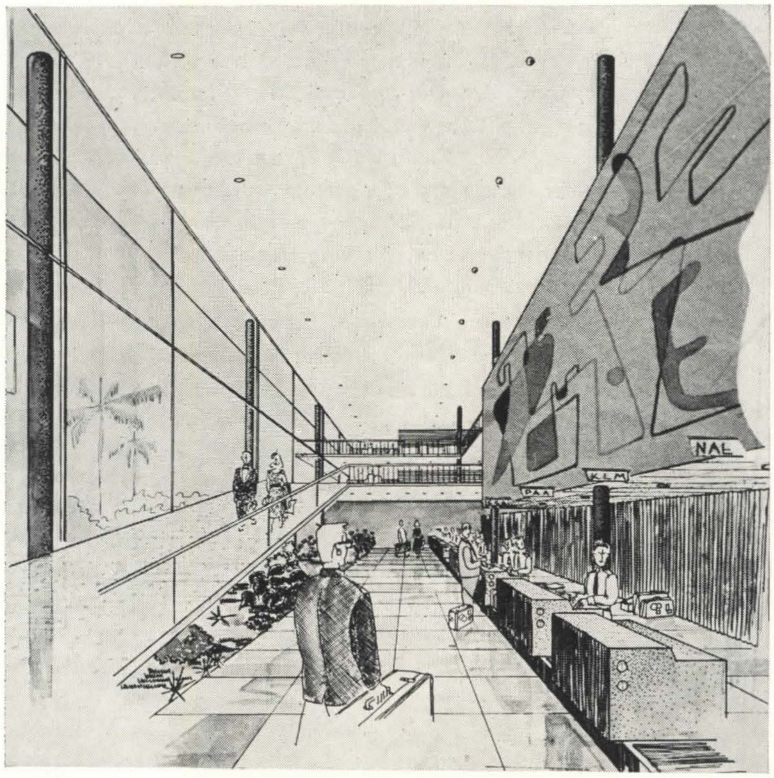


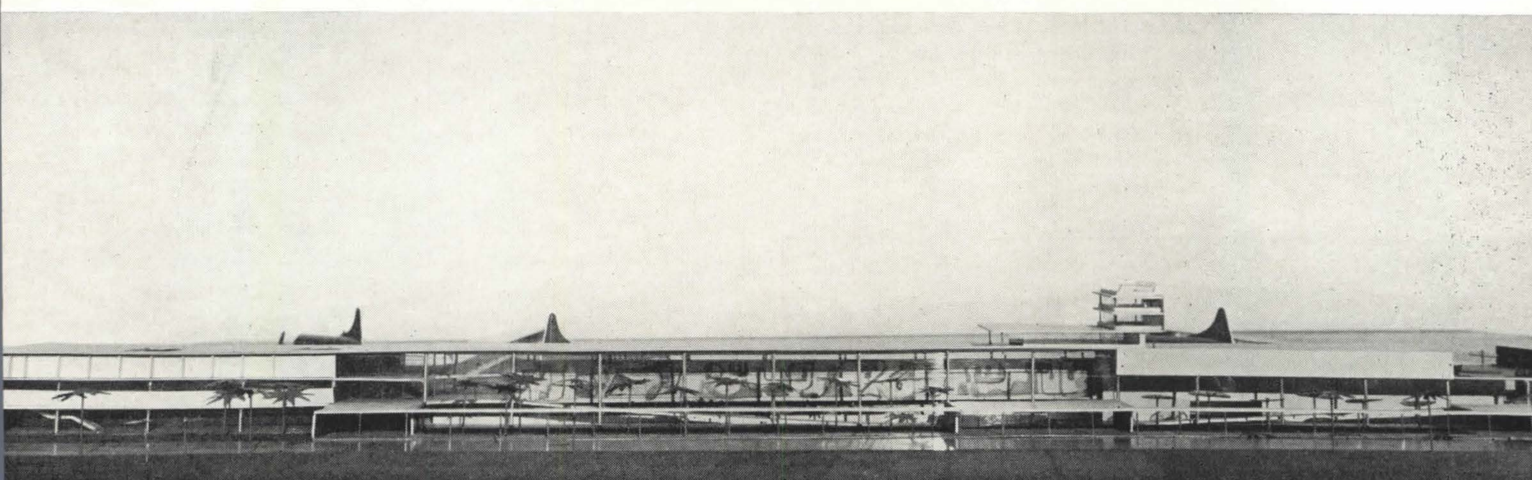
(since inspection is not required) directly down to an independent baggage-claim counter, then out to their own exit lobby and vehicle platform.

Incoming international passengers dock at the west finger, reach its upper level by stair or electric stairway, and proceed into a separate waiting room organized to handle simultaneously the immigration and public-health inspection of six flights. The passengers move along the inspection counter to an electric stairway that brings them down to their ground-level baggage-claim counter, at the end of which is a teller's cage that takes care of payment of duties, etc. From here, they pass through doors in a glass partition out to their separate vehicle-loading platform. At one end of the international passengers' waiting room is a special room provided for in-transit passengers awaiting a plane connection, who are technically not considered to be landed in Cuba. If they have the time and their papers are in order, they may follow the course of the "landed" passengers and, after clearance, make use of all of the terminal facilities; otherwise they remain in the special room until their outgoing flight is called.

The building will be a reinforced concrete structure, with floors of precast concrete joist and floor slabs to provide maximum flexibility for future changes.







Facilities to service planes, as well as all baggage- and cargo-handling, are on ground level, minimizing risk and increasing efficiency. Also at ground level are offices for airport management, emergency, and first-aid units. The kitchen and food-storage space are at the east end of this level, alongside a loading dock independent of other traffic. A basement under the center of the building houses air-conditioning equipment, pressure pumps for the water system, and various mechanical installations.

AUXILIARY FACILITIES

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

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

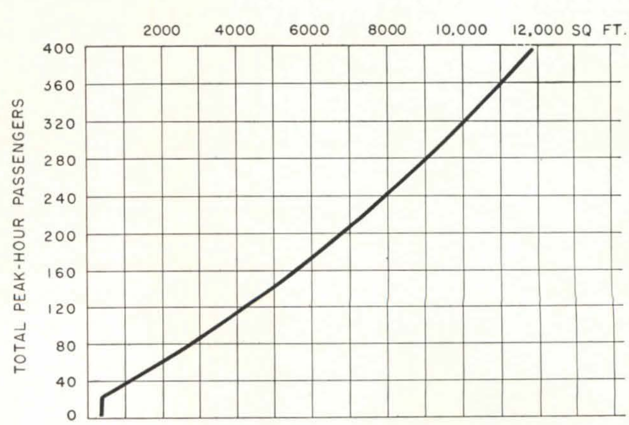
Airport Administration, Operation, and Maintenance Space: This too will depend on the size of the airport, the functions to be handled by the airport manager, and his own wishes and preferences. In its simplest form it is a single business office; in a more complex program it may be a suite of offices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

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

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

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

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



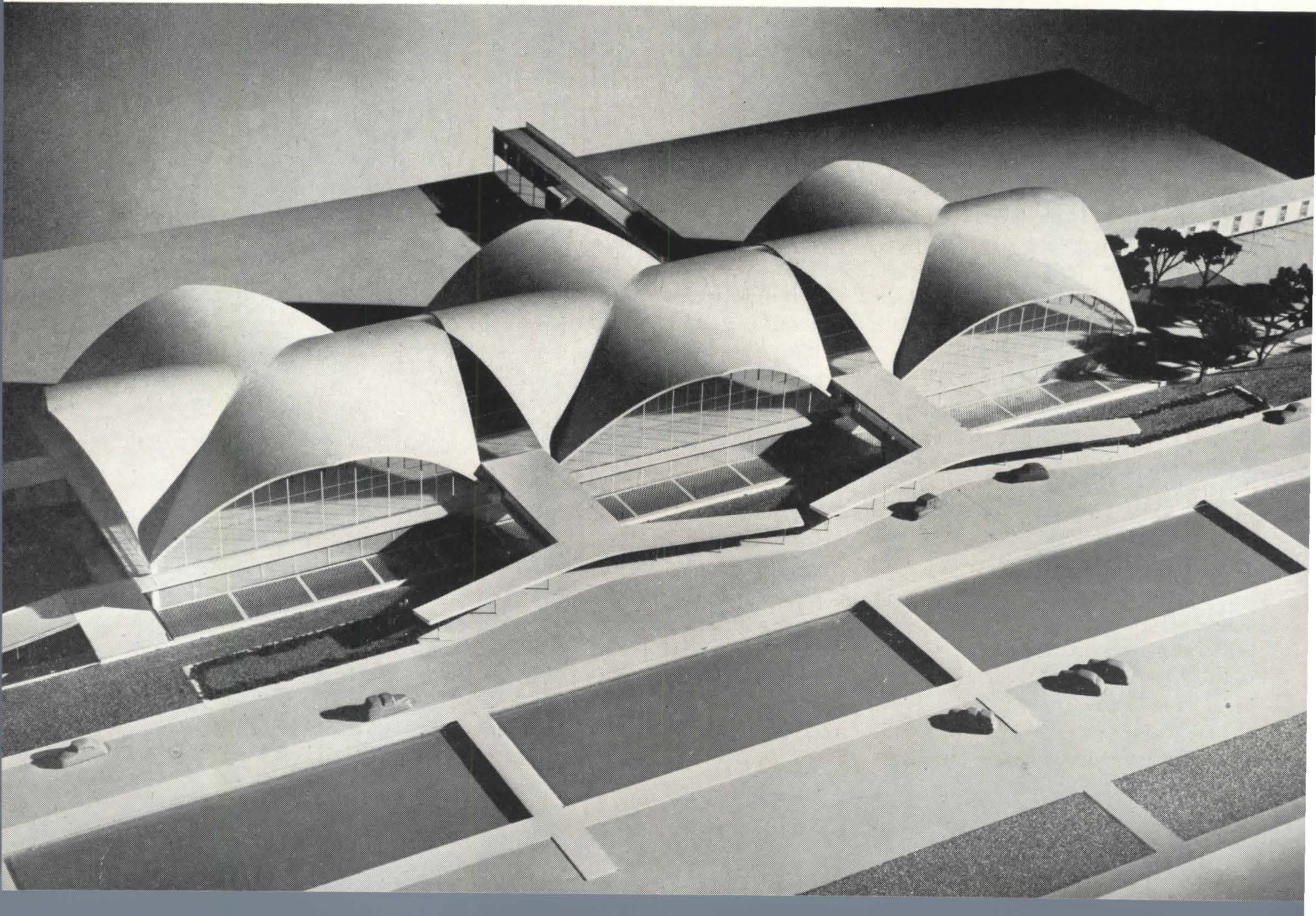
for equipment and circulation, and such important matters as height and visibility needs. Important general criteria include visibility of all air traffic operating within the airport's traffic pattern and of all aircraft traffic on the ground within the control area; equipment for mechanical control of aircraft in the air and on the ground; accommodations and conveniences for personnel so that nothing interferes with this necessary work. Space requirements will include the "cab" (glass-enclosed, 30 feet above the ground, surmounted by searchlight, radio, and weather instruments); office, toilet, equipment room, emergency engine generator space, and storage areas.

●

The spaces described above are often a part of a terminal building itself, for rapid co-communication, and because they are related to the major circulation flow in that

Observation deck and control tower of the Des Moines, Iowa, Municipal Airport (above). *Architect: William N. Nielsen; Keffer & Jones, Associates.*

How parking may relate to the terminal building is shown against concrete shells of the St. Louis Airport (below). *Architects: Hellmuth, Yamasaki & Leinweber.*



auxiliary facilities

Design of substation tower at the Missoula, Mont., Airport is a study of reinforced-concrete shapes (right). *All lighting and antennas for the field are centered in this counterpoint of short horizontals, against a strong vertical element. Architects: Fox & Ballas.*

building (although the control tower might be in a separate building). Other spaces or planning requirements which must be considered may be outside the terminal or in separate structures, and are related to broader airport operations. In this category would be included:

Roads and Parking: Approach roads to the terminal must provide easy access and departure, space for unloading and loading passengers and baggage, and sufficient parking space (which will have to be determined by studies of peak-hour traffic and travel habits of the passengers in a particular community). Parking facilities must also provide for taxis, limousines waiting for plane arrivals, service, and employe needs. It may be desirable to segregate long-term from short-term parking; passengers from service and employes. The public parking areas may be a source of revenue, or they may be provided as a public service. Other ground traffic needs might include a service station and a storage and repair garage.

Airport Maintenance and Protection Facilities: These will be determined by the size and character of the airport operation. The heating plant, for instance, may be in the terminal building, or may be a separate structure. Fire protection may require a fire house; police protection may call for a police station.

Cargo Terminal: The future of air cargo is now being seriously discussed and studied by many groups. The airport planner will find two schools of thought: a strong belief on the part of many that the growth and the obvious potential in air cargo will soon warrant separate cargo terminals with their own network and their own facilities; and those who point to the fact that often air cargo is now handled as top-off loading (bringing the plane's weight-load up to maximum when the passenger load is light) and who believe that this is a continuing problem which will require cargo-handling space to be very near passenger-loading stations at the apron. While the imaginative designer, looking to the future, should investigate studies made by Lockheed, the Air Cargo Advisory Committee of the National Security Industrial Association, and others, most architects will find that the airport management already has firm ideas on the subject. Truck delivery and pick-up, cargo handling, working areas, and office spaces are the prime requirements.

Air mail, air parcel post, and air express (really separate considerations) make up the bulk of the nonbaggage cargo handled at most airports. Since carrying mail is an important part of airline business, the interrelation between government spaces and airlines operational spaces must be studied for each terminal; there may be special considerations for transfer and inter- or intra-airline co-ordination. Air express is a different problem, since handling is by an independent agency, by the airlines, and by a consolidated service at various points.

Hotel Accommodations. Most controversial of the extra-service activities is the provision of sleeping space for passengers and crew at the airport. It is a tempting idea to gain this additional revenue, but a possibly dangerous business enterprise. Conflicts with downtown hotels have been mentioned. In addition, few passengers would willingly and voluntarily choose to stay at the airport—far removed from the town's activities and social life—and will do it only by necessity or for convenience under unusual circumstances. Several hours' layover between flights—which will be avoided if possible—or an unexpected delay in a flight are the main reasons for hotel accommodations at this spot. But one expert feels that, "with the airlines completing between 97% and 100% of their scheduled operations, you are attempting to build a business on the failure of the air carrier to maintain or complete its schedule. The air carriers are trying to lick even their present small percentage of failure. A 0% to 3% failure on their part, which presumably will be reduced, does not seem to be a sound premise on which to build a hotel business." Hotel space at the airport would be a convenience for flight crews, and this revenue might be steady, but fluctuation and high peaks (weather or mechanical trouble) would make other rentable rooms an unpredictable commodity. At some international ports, where overnight stays are not uncommon, hotel space for passengers seems to be more practicable.

Hangars. Separate hangar facilities may range from storage for private planes at a small airport to storage and repair areas for the largest type of aircraft at the big international port, plus space for such other aviation activities as flight schools and aviation clubs. Hangar design is based on specific requirements, and has progressed rapidly, in a structural sense, in the last decade. The next six pages are devoted to discussion and illustration of many advanced concepts in the United States and abroad.

Daring hangar constructed near Rome during World War II. Designed on the lamella principle, the structure is primarily composed of precast-concrete units. Size: 120' x 366'.
Pier Luigi Nervi, Engineer

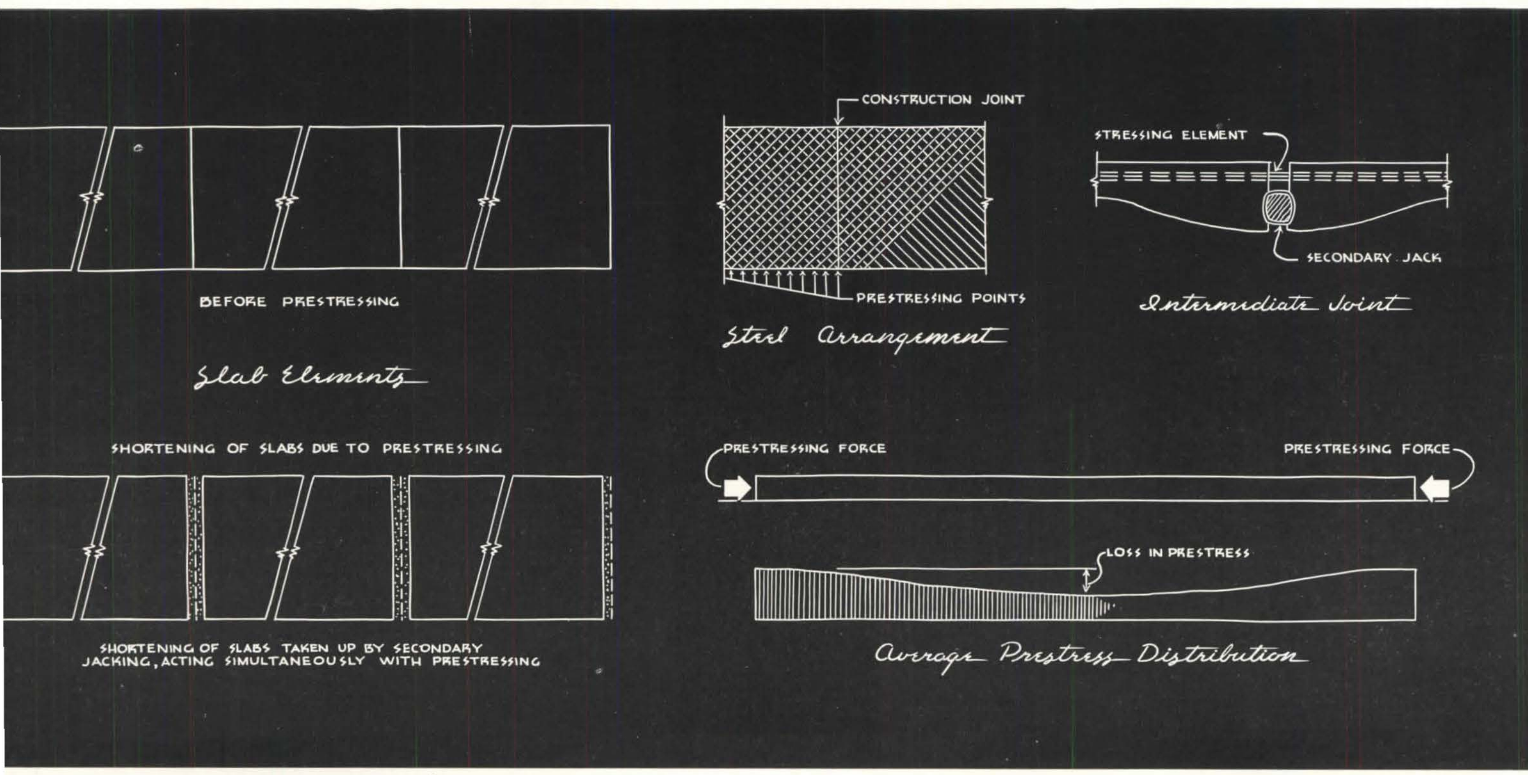
hangar design

prestressed-concrete floor construction

A major problem confronting airport designers has been to develop a slab for hangar floors (and runways) strong enough to support heavy loads, yet flexible enough to follow the local deformations of the supporting soil. An equally important problem for airport owners has been the costly maintenance of construction and expansion joints. The Preload Company, Inc. (New York), a firm of engineers specializing in prestressed design, believes that it has found a solution for both problems in a new-type, thin, prestressed slab which minimizes, if not altogether eliminates, expansion joints. This company's proposed solution utilizes a 4-in. slab prestressed by jacking in two stages. Their contention is that due to its extreme flexibility and high compressive prestress, the slab will be capable of following the uneven deformations of the soil and sub-base under load and will recover to be free from cracks after removal of the load. Such a slab, designed to be free from cracks normally leading to the deterioration of heavier reinforced concrete mats, will require minimum maintenance and will have a long life expectancy.

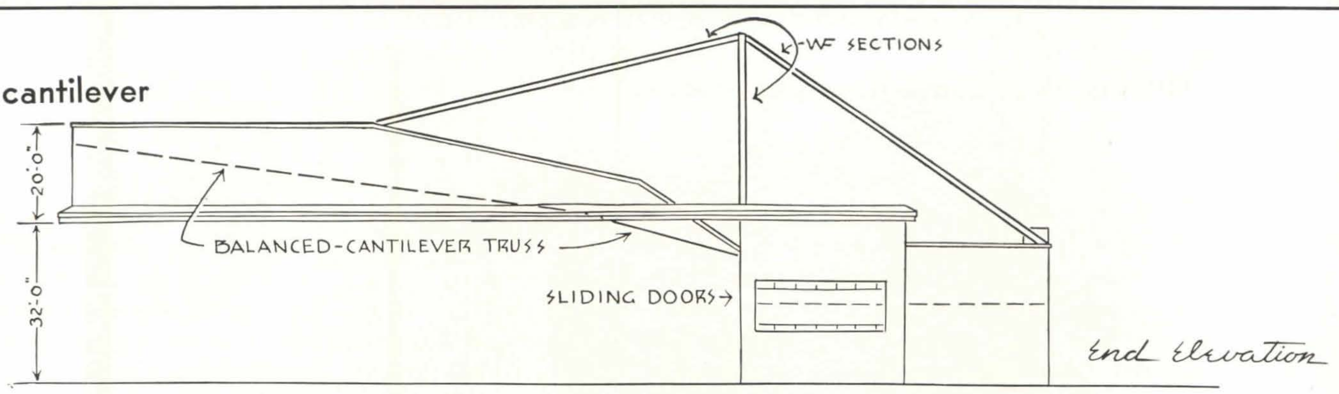
By this method, the prestressing bars, first coated to prevent bond with the concrete, are placed over the subgrade in a two-way diagonal pattern (*illustrated below*). The concrete is then poured and the bars allowed to extend slightly beyond the edge of the concrete. After curing, the bars are stressed and anchored; because of their diagonal pattern, they force the slab into compression both longitudinally and transversely. Due to the extreme length of the slab, however, this force is insufficient, as much of the compression is absorbed by friction on the sub-base as the slab attempts to shorten elastically under the stress.

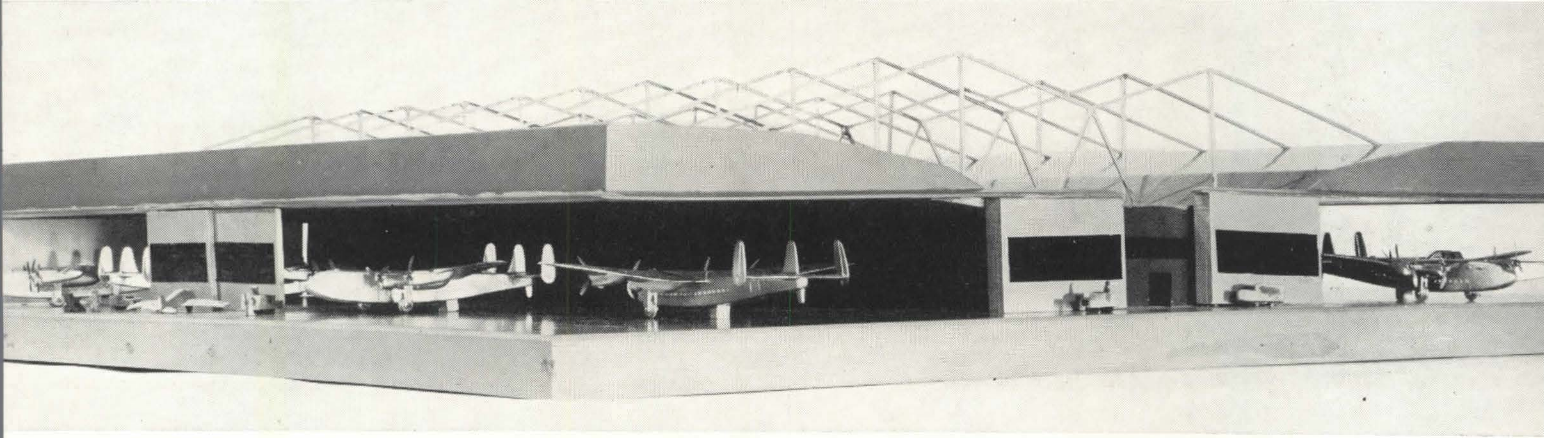
Here is the unique feature of this concept. To overcome the above loss and to maintain the slab in its original overall length, flat jacks are placed in convenient intermediate transverse construction joints and expanded simultaneously with the stressing of the diagonal bars. This confines the elastic shortening to the tranverse construction joints. The joints are then packed with mortar and after hardening of the mortar, the jacks are released. The action of the bars then keeps the joints under compression. As a result, one has, in effect, a completely monolithic slab without expansion or construction joints as such.

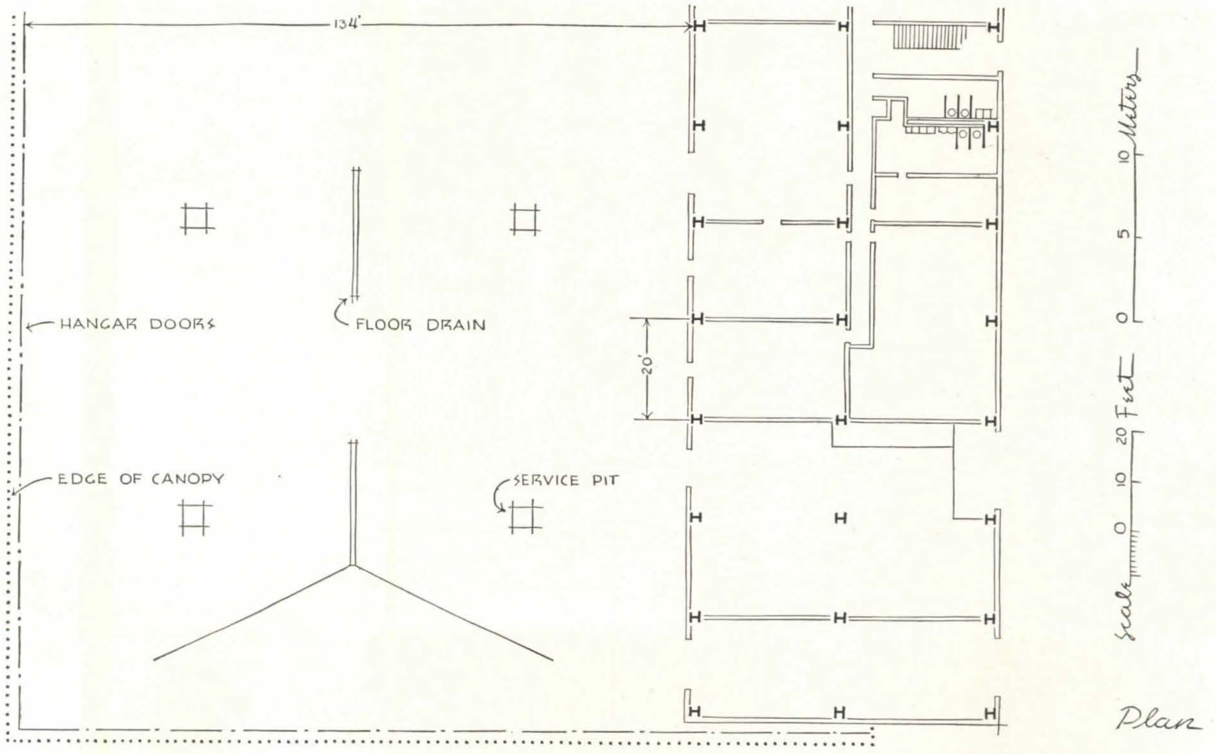


Sketches indicate slabs before and after prestressing, diagonal pattern of bars, location of secondary jack, and diagram of average prestress distribution.

balanced cantilever

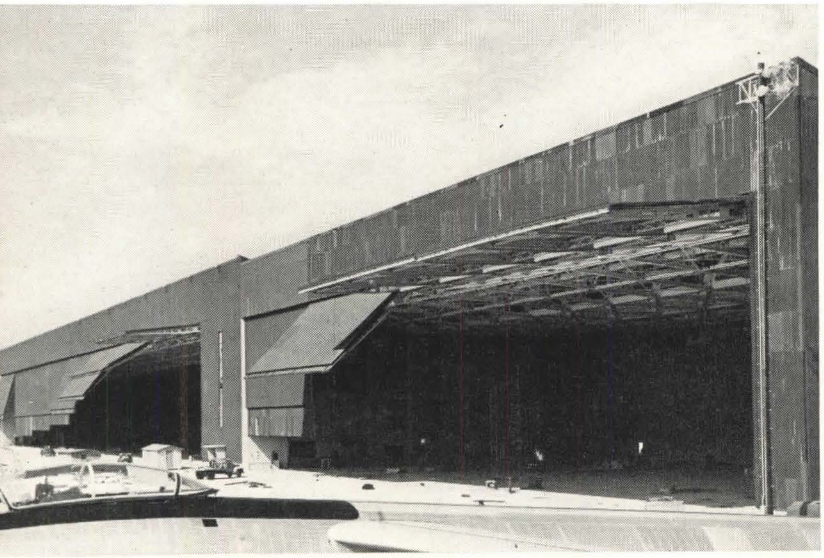




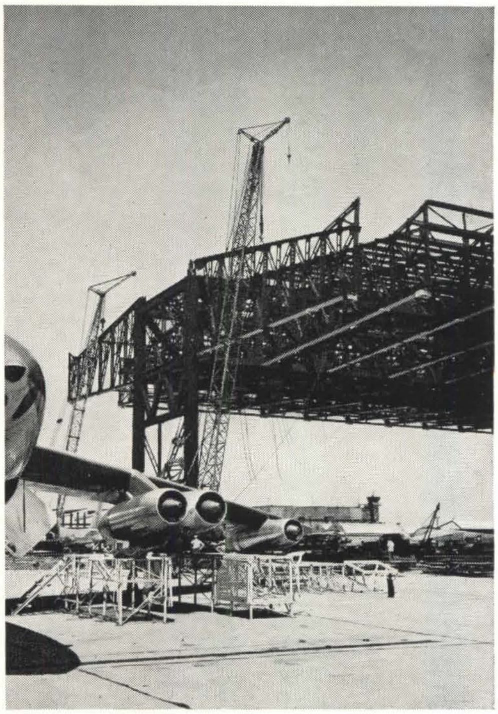


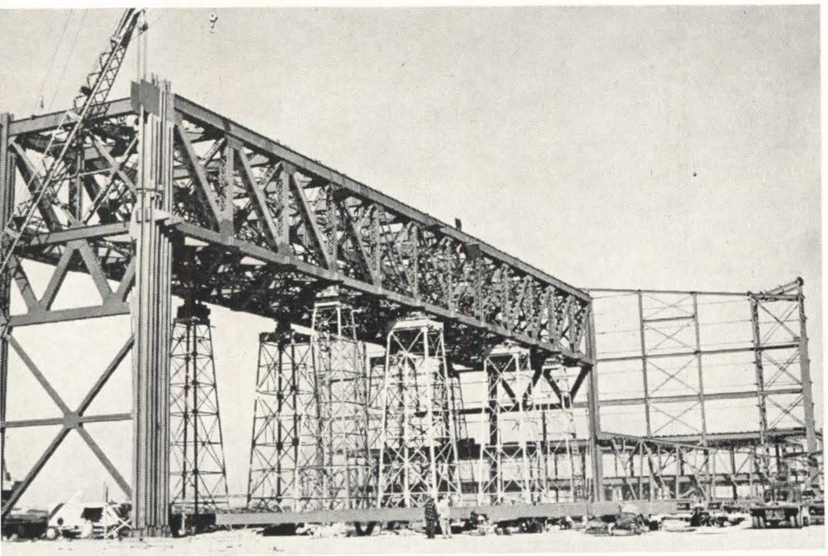
This balanced-cantilever construction system can roof an area 134 ft deep, of unlimited length, totally without interrupting columns—a major advantage for hangars, as planes can have unobstructed ingress on three sides. The roof is supported by specially designed cantilevered-steel trusses, 20 ft on center, hung from a steel framework extending above the roof surface (*drawings, above, illustrate single unit; photo shows model of double unit*). It has been reported that hangars of this type can be erected for $14 per sq ft, or less, and the first such structure is expected to be under construction soon at Idlewild Airport, New York. For that job, 4-in. prestressed-concrete floors that can support a single-wheel load of 60,000 lbs at any location are now being investigated. A radiant-heating system with an estimated heating cost of $0.17 per sq ft per year and a deluge-type sprinkler system representing 8½ percent of the total hangar investment have been specified. The Erwin-Newman Company, Houston, have patents pending for this balanced cantilever design and the first hangar to use this system will be erected by the Thompson-Starrett Company, Inc., New York.

steel

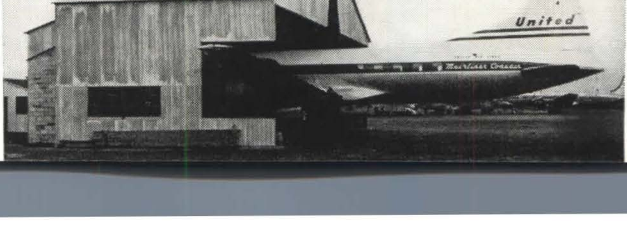


Designers of the Boeing Airplane Company hangar at Wichita used double-cantilever construction to provide 195' x 265' bays with 55' clearances from ground to bottom of steel trusses; three such bays house 12 B-47's (left and below). *Asphalt-asbestos-coated sheet-steel that requires no painting was specified for the siding. Doors, claimed to be the world's largest (each is 55' high, 66' wide, and weighs 47 tons), were produced by the International Steel Company.*

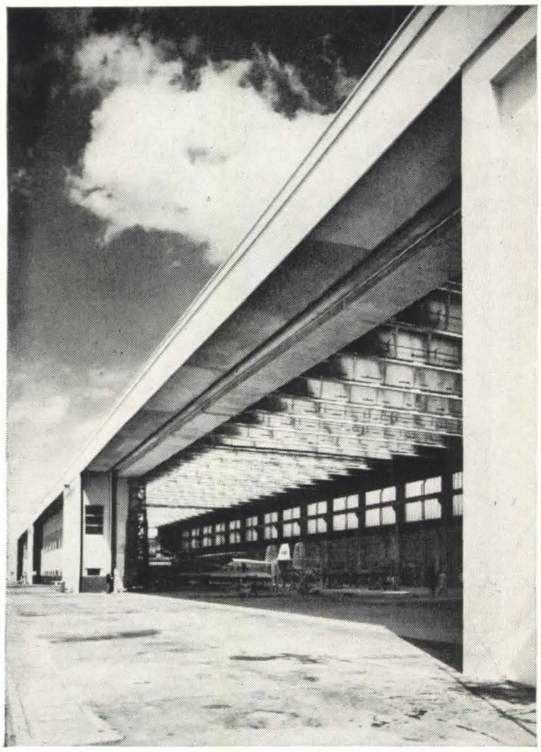


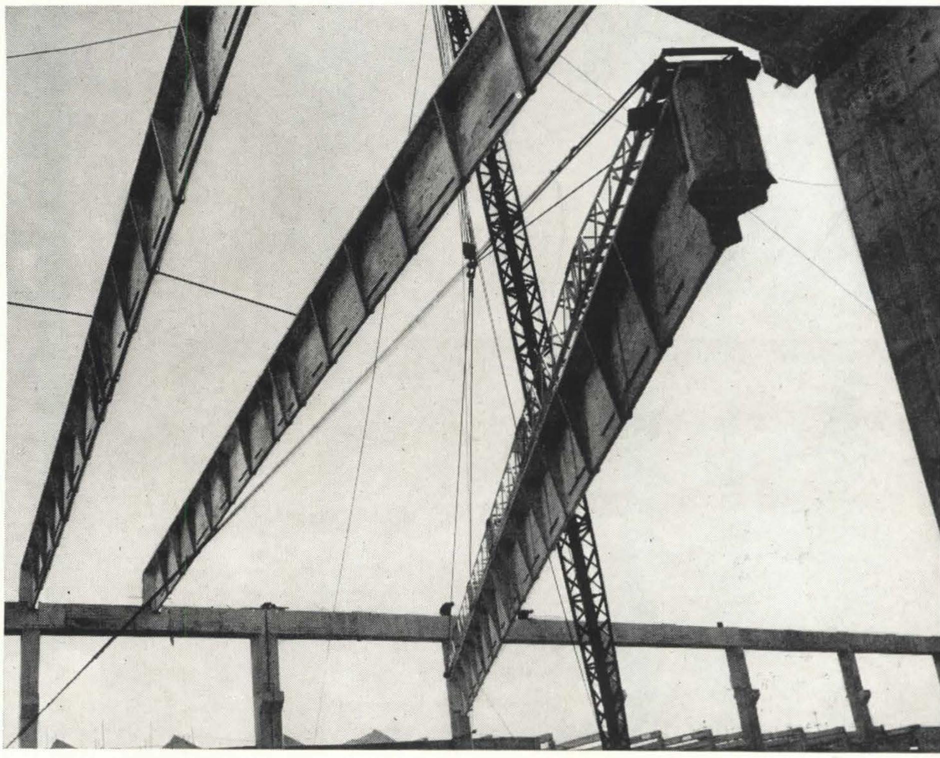


Standardized maintenance docks for commercial aircraft are used as economical maintenance and service facilities to supplement larger service hangars. This dock (below), *mass-produced by the Luria Engineering Company, consists of a rigid steel frame, measuring 70' x 50' and 18½' high to the eaves, a 20' x 20' lean-to, and a 15' x 10' masonry boiler room. Although siding and roofing* (in photo) *are galvanized-steel sheets, other materials may be substituted.*



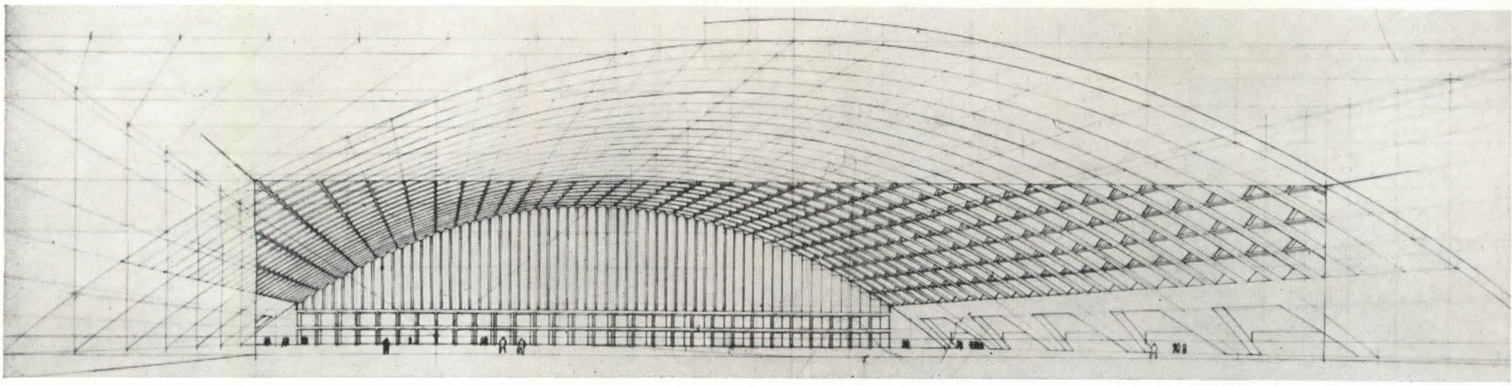
concrete



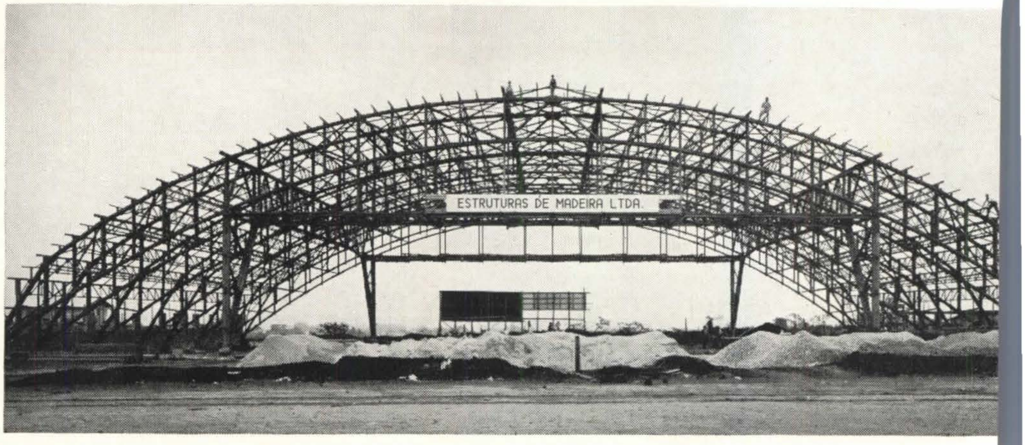


Hangar roof for British European Airways, London (above), *is supported by prestressed-concrete purlins, beams, and girders. T-shaped beams, 110′ long,* (above right) *were formed by joining 7′ precast sections with prestressing cables; top flanges are 3′ wide and 4″ thick. At front of hangar, T-beams are supported by 150′ long cast-in-place, prestressed, hollow-box girders. Each girder is 14′ deep and 5′-3″ wide and was prestressed by 41 parabolic cables. Ramsey, Murray & White, Architects; Scott & Wilson, Consulting Engineers.*

Proposed reinforced-concrete hangar for Buenos Aires Airport, that will have span of approximately 590′. Nervi & Bartoli, Engineers.



wood



Six elliptical, glued-laminated Douglas fir arches (below), *spaced 20' apart, span 180' at Continental Can Co.'s new hangar at Morristown, N. J. Each arch has a constant cross-section of 11" x 39", is 48' high at center, and weighs approximately 20,000 lbs. The three-hinged principle is employed with a pin connection at the peak and a rockerplate at the base. Wigton-Abbott Corp. designed and built the structure; Timber Structures Inc. fabricated the arches.*

Magnificent wood arches (above and upper right), *in a hangar at Congonhas Airport, São Paulo, Brazil, have a clear span of approximately 230'. The hangar was designed and erected by Estruturas de Madeira S. A., São Paulo; E. Hauff, Chief Engineer.*

radiant heating saves money

by John K. M. Pryke*

Inherently, an airplane hangar is a most difficult building to heat. In addition to the possibility of excessive air infiltration, due to the immense areas of exposed wall and roof, the structure possesses one or more removable sides in the form of the main hangar doors. The frequency of operation of these doors is unpredictable and, even with normal wind conditions, a partial opening for only a relatively short period of time may completely empty the building of all its warmed air, in a matter of minutes.

Conventional heat-loss calculations for hangars indicate that the air-warming heat required is at least twice as much as that needed to offset the normal heat transmission through the structure. Furthermore, an exact calculation of this air heat load is impossible due to the great variations which may be experienced due to door opening. A further problem encountered with larger hangars, due to their height, is that of warm-air stratification. That is to say, the heated air tends naturally to rise to the top of the hangar under the roof, with consequent movement of colder air to the floor level.

In an airplane hangar, if the main floor is used as the radiant source, the following advantages of radiant heating will at once be apparent in overcoming the problems of efficient heating: (1) The heat is where it is most needed—namely at the floor; (2) the heat medium, being largely independent of the necessity for warming large volumes of air for its transmission, is not greatly concerned with problems of infiltration and other air movements; (3) excessive heat loss is prevented when doors are opened, with consequent economy in fuel consumption. Savings in fuel up to 30 percent have been experienced.

As regards installation costs, the use of radiant heating presents problems which require careful analysis to be successfully overcome. The ratio of field labor to material cost for radiant-heating system in any type of building is quite different from that for a conventional radiator or hot-air system. The radiant-heating installation involves less material cost and greater field labor cost than does a conventional installation. This factor is the chief reason why so many of the earlier radiant-heating installations were so much more expensive than conventional systems. Fortunately today the situation has changed and with shop-fabricated pipe coils of standardized design available, it is easily possible to reduce field labor to reasonable dimensions.

For airplane hangars, due to the large areas of floor involved, it is doubly important that economy of design be achieved. It has been found that with well designed radiant-heating installations, savings in annual fuel costs can offset their greater initial cost in about five years; therefore, they become a worthwhile investment for the hangar owner.

* *Principal, Slocum & Fuller, Consulting Engineers, New York and Boston.*

fire protection

by Dawson Powell*

The airplane hangar brings together a structure of great value, planes that are often worth millions of dollars, and flammable materials that create fire hazards of the highest degree. These three factors call for and justify an investment in the best fire-protection equipment available.

The overwhelming majority of competent opinion, represented by such organizations as the National Fire Protection Association in the United States and the Air Ministry Fire Services in England, recommends automatic-sprinkler systems as the basic requirement in hangar protection. These should be supplemented by instantly available supplies of foam, to blanket spills of gasoline, or dry-powder projectors, to spray dry powder over sheltered or hard-to-reach hot spots where it can release carbon dioxide gas to mix with flammable vapors, diluting them to extinguish the flames.

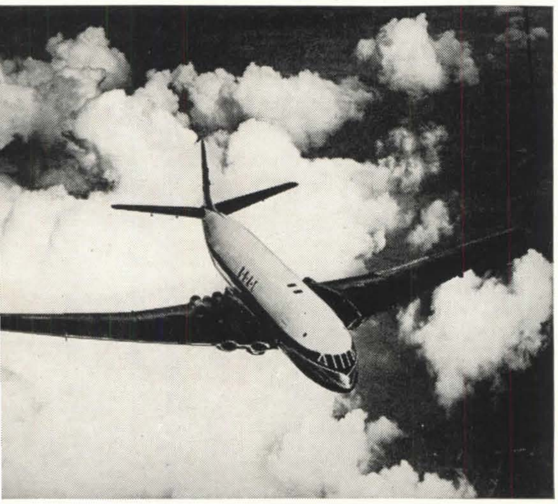
First place in adequate fire protection is given to deluge-valve controlled, open-head sprinkler systems; reasons for this selection are based upon the nature of the fire itself. A principal factor is that gasoline (though it vaporizes at temperatures far below zero) requires heat to change it from a liquid form in which it cannot burn, into a vapor form in which it will burn. High temperatures which feed huge quantities of vapor into the flame zone are reduced or prevented from developing by evaporation of water droplets from sprinklers. Solid combustible materials are prevented from reaching their distillation temperatures and tanks of gasoline in nearby planes are kept cool enough to prevent their overflowing or exploding to add to the flammable material involved in the fire, thus preventing its spread.

A factor often overlooked in the many hangar fires which have been successfully controlled by automatic sprinklers is the dilution of flammable vapors by water vapor from the sprinkler sprays. This dilution, while seldom adequate to produce complete extinguishment of gasoline fires, definitely reduces the fire's intensity, lessens chances of reignition, and permits closer approach by fire fighters with foam or dry-powder streams. No other fire control means competes with the effectiveness of spray from sprinklers in limiting fire spread.

The large areas and absence of subdividing fire walls call for exceptionally large water supplies to protect hangars properly. It can be provided, even at outlying airports such as the Westchester County Airport at White Plains, New York, where 400,000 gallons of water, enough to feed the sprinklers in any one hangar for an entire hour, has been provided. There, it is stored below grade in a hillside reservoir and delivered in adequate quantity and pressure by two 2000 gpm electric pumps—one of which is equipped with dual drive for operation by a manually started Diesel engine. Rate-of-temperature-rise controls for a deluge-type, open-head sprinkler system assure immediate attack upon and effective localization of any starting fire.

* *Technical Editor, Grinnell Company, Inc., Providence, R. I.*

the airport commission



In business practice, as in planning and design, the airport commission is likely to be a complicated one for the architect, as well as for the consulting structural, mechanical, and electrical engineers who work with him. P/A's Editors have talked to many architects and engineers experienced in this building type, and opinion seems to be unanimous; the multiplicity of "clients" to be satisfied makes approvals difficult and changes likely; relationships with consultants hired directly by the airport authority as experts on one phase or another of the problem are not always pleasant; fees, generally, are too low.

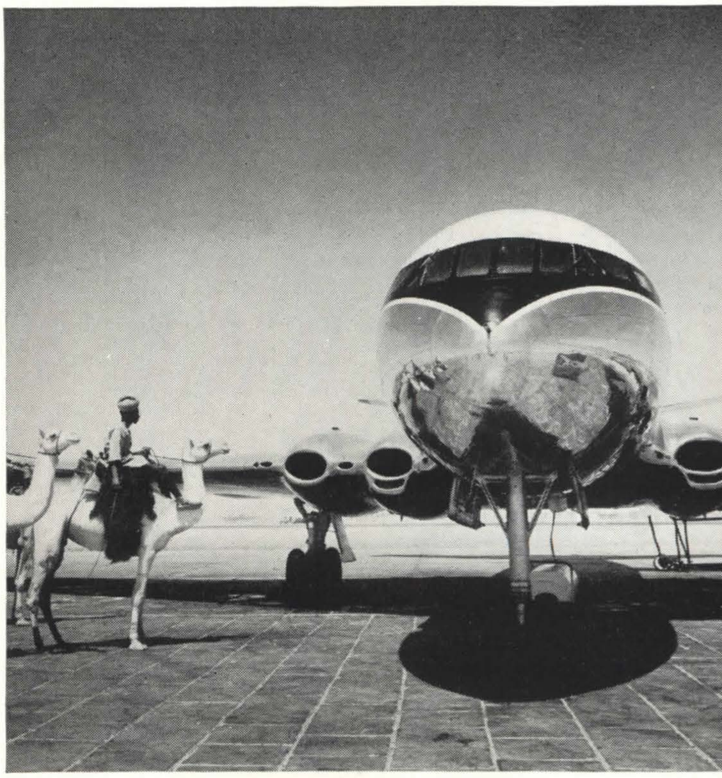
the client

The various agencies, groups and individuals who must be satisfied at each stage of programming, master planning, and designing have already been mentioned. There is the actual client, with whom the contract for architectural services is signed —an arm of a municipal government, in most cases. There are representatives of other local governments—state, county, and municipal. There are the airlines—the principal users of the buildings—but they are not always a uniform group. Even when they form themselves into a committee, they will not speak with one voice, or any consistency. There are many federal agencies and departments: primarily the CAA, which will be the most helpful, though sometimes the most rigid, subclient; also the U. S. Post Office Department; the U. S. Weather Bureau; and at some airports the U. S. Public Health Service; the Bureau of Customs; the Bureau of Immigration; the Department of Internal Revenue; and the Department of Agriculture. Local fire and police departments may have to be consulted. There may be specialists whose wishes have to be considered. If principal concessionaires are selected early, they may have a large voice in planning. It becomes the problem of the architect and his own team, then, to resolve conflicting claims and unco-ordinated interests, to think clearly through controversies where each side is dogmatic and assured, and to avoid the compromise that too often results from the attempt to satisfy everyone. Lessons that experienced architects would like to pass on to their confreres are: even though information must be gathered from many sources, the municipality is your basic client and its representative should make all final decisions, on the advice of the architect-planner-coordinator; always obtain approvals in writing, so that changes after an approval date are recorded as *changes*, not as mistakes or misunderstandings.

the expert

Since the airport and the airport terminal building together constitute a very specialized problem, specialist-consultants have become important. Some serve as a source of information for which the planner would otherwise have to search; they are experts in traffic analysis, economics, and airport management. Others are less helpful. As one architect expresses it, "The specialist-consultant, usually honest, but anxious to please and flatter the client, often adds to the confusion by presenting a voluminous report (bound in leather, with the mayor's name gold-leafed on the cover), that is somewhat unrealistic and over-optimistic. His fee is large; added instead to the architect's fee it could result in a less ornate but more realistic architectural study. Perhaps the pitfalls an architect risks in working with the specialist-consultant could be avoided if such an expert were to serve as part of the architect's team and be retained by the architect, rather than by the client directly."

Other experts, should be consulted freely and their advice carefully studied. These include CAA representatives (the architects and other specialists of the CAA are informed, helpful, anxious to advise without imposing standards or dictating design); technical representatives of the airlines; manufacturers and suppliers specializing in this field; and, if an experienced man is selected early enough, the airport manager. Most of this technical advice is free, related to local experience, and therefore as useful as that provided by outside sources. Aside from the CAA, the most helpful sources for *technical* information are the airlines. Their staff members can provide data on traffic, financing as it relates to airline operations, various aspects of engineering, and operational problems. Some major airlines have staff architects; it would be foolish not to take advantage of their experience and the studies they have made.



fees

The architect designing an airport will find that the most important difference between this problem and, let us say, a school or an office building, is the early and clear definition of the problem. Master planning must be based on ultimate needs, and the building program broken down into stages. This means double or triple research estimates during the programming period, and a clear indication on master plan and preliminary working drawings of the stage-by-stage construction program recommended. Other building types may require a similar planning-for-expansion approach; usually, however, such problems carry a separate fee for master-planning. In the case of the airport, growth is anticipated to be so fast that expansion and provision for expansion become basic parts of the original problem. Each line that is drawn must be drawn with a thought for its meaning in the immediate program and a further thought for its help or interference in the next stage and the ultimate program. There is general complaint that the normal charges even for "complicated public buildings" are woefully inadequate. "No architect should undertake a major airport planning program on a fixed fee," says one voice of experience. "A cost-plus arrangement is the only way he can possibly come out on top. He has many groups to deal with; he spends exhorbitant time on program studies and preliminaries; and he will meet change after change of mind, which he had no way of anticipating." Even an x-times drafting cost arrangement doesn't work well, for the time spent in conferences and interviews has no normal relationship to time spent in the drafting room.

In conclusion, airport planning and the design of structures related to airports is an interesting commission for an architect to get. We have not talked to one who did not enjoy the design problem and its unusual factors, but all advised others approaching the problem for the first time to understand and guard against the risks and difficulties involved.

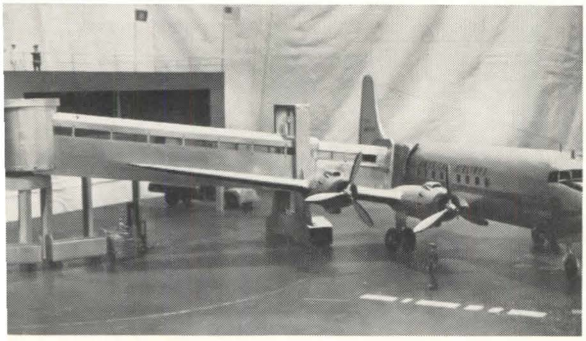
the future of airport design

Anyone speculating about, or attempting to plan for the airport of the future (let us say a period 25 years from now) comes up against a peculiar conflict. On the one hand, there is the unexpectedly great growth of the industry and an already apparent radical change in plane design (jets and helicopters now with us; atomic energy possibly applied to aircraft power; serious discussion of supersonic speeds in the thousands of miles per hours, despite the penalties of increased fuel costs for commercial operations). On the other, the airlines have a lack of investment capital plus an inherent conservatism with regard to the design of ground facilities. Someone is going to take some of the imagination which fires the students of space-flight and rocket travel, apply it to the routine problems of getting from New York to Chicago as quickly as possible, and come up with sensible plans for airports very different from the ones published in this issue. The Editors are not going to suggest what these solutions might be, but simply point to some of the factors which will both stimulate and limit future planning. And on the following two pages, we show an airport which never got built, one which was for a very specialized purpose but indicates some advances in planning that might immediately be made on a wider scale.

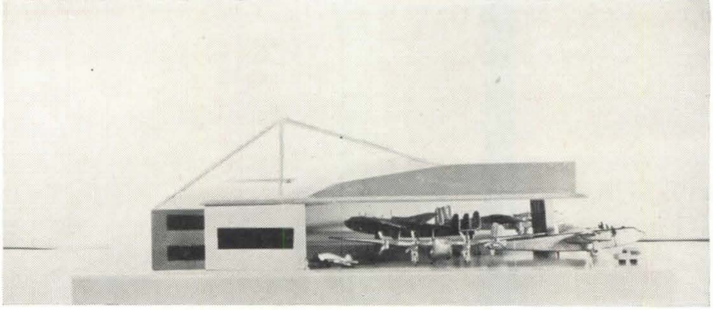
First of all, what would be the aims of future air-flight toward which planning might be directed? Throughout this issue, it has been repeated that one travels by air to get from one place to another quickly — and reduction of that time-distance factor will continue to be the principal aim of the industry and its planners. This means faster flight, less time lost on the ground, more efficient operations at the terminal. Related to this need is the knowledge that commercial air transport must be put on a more secure paying basis. This means more customers, reduction in fares, lessons learned from the presently orphaned "non-scheds" and, again, more efficient operations at the terminal. It also means the development of new untapped uses and therefore new clients for air flight. What changes in the pattern of American life are foreseeable which might affect or influence air travel? The moves toward decentralization—whether for defense or social-planning reasons—are the most obvious. Certainly, then, providing a service for a lesser distance factor than that which now limits air-travel business (cities under 100 miles apart are too close to generate sufficient air traffic for present carriers) would open up new fields of income, service, and planning.

What of aircraft developments which may have an effect of ground planning? At two extremes of travel, important possibilities are opening up. For long distances, the jet, the rocket, the atomic-fissure power plant—with their increased speeds and greater wing loads—are either here or are real possibilities. Their effect on airport planning—length of runways, loading and servicing facilities—is not clear yet. At the moment, the faster the plane, the greater the approach area and the longer the runway needed for landing. But the very speed of landing and take-off may stimulate further experiment and development of catapulting take-off and drag-landing devices, which could actually reduce the required runway length. At the other end of the travel scale, for short-distance passenger and cargo haul, the helicopter is approaching a development which will permit carrying of up to 40 passengers, making it commercially feasible and opening up two new air-travel markets — taxi service to bridge the time-distance gap between present airport and present commercial or residential areas; and commuter or short-distance travel between the suburb or satellite community to central city, or between two cities now considered too close to generate air travel.

These influences may not be realized for some time in planning, except in the



Mobile, covered gangplanks, as developed by the Airways Engineering Corp., provide protected passenger loading from finger to plane (above). *Fewer apron positions are required, and more passenger miles may be flown, since loading time is reduced.*



almost immediate need for helicopter port planning. A heliport can be a simple thing, so far as aircraft circulation on the ground goes; the substitution (or the addition, at existing airports) of the touch-down pad for the runway certainly eases planning for the airport designer, although the helicopter may complicate traffic in the air. For the passenger, baggage, and incidental requirements, there would not seem too much change indicated from circulation and space-need described in this issue. The larger and faster and heavier planes, no matter what ultimate runway requirement, will be certain to influence planning and zoning in the area around the airport—approach is flatter, radius of turn greater, and hazard and noise are both increased. At London, for instance, a sound barrier is being constructed to screen the neighborhood from the noise of the B.O.A.C. jet planes.

However, it would not be necessary to go far into the future to improve terminal planning, if certain limitations were removed. One of the greatest time consumers, and one of the sources of greatest inconvenience is the need for loading passengers and cargo into plane openings far above the ground. Level loading appears to be a prime requisite to expedite operations. No matter how efficiently a building is planned on a two-level scheme, the passenger must go up, down and up again; baggage must do the same. Time and manpower will be saved when we eliminate bottlenecks which today make level-loading devices too expensive for many airports. Loading of planes under cover, or at least close to cover, by using tracks and dollies to take them to favorable loading positions, will reduce service equipment, personnel, or both, and lessen the necessary width of the apron. Other improvements in planning which have been discussed under the various headings of this issue have to do primarily with possible consolidation of services.

Three changes, not within the architect's design scope, will have to occur before truly efficient air terminals are planned. We list them as follows:

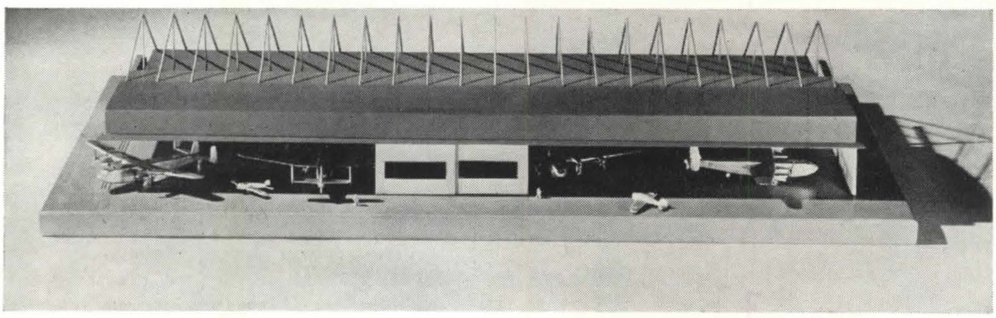
1. The airlines must stop letting commercial conflicts interfere with efficient planning. Many of them are not profitable enterprises, and yet they are in such a strong position, as users of the facilities, that they can prevent consolidation of services which would aid efficiency; they can cause a complete separation of other services which should, for the convenience of the passenger, be at least centralized and co-ordinated; they can cause planning problems by their insistence on privileges under the "most-favored" system; they can complicate the apron-loading process by their refusal to allow commingling of fuel.

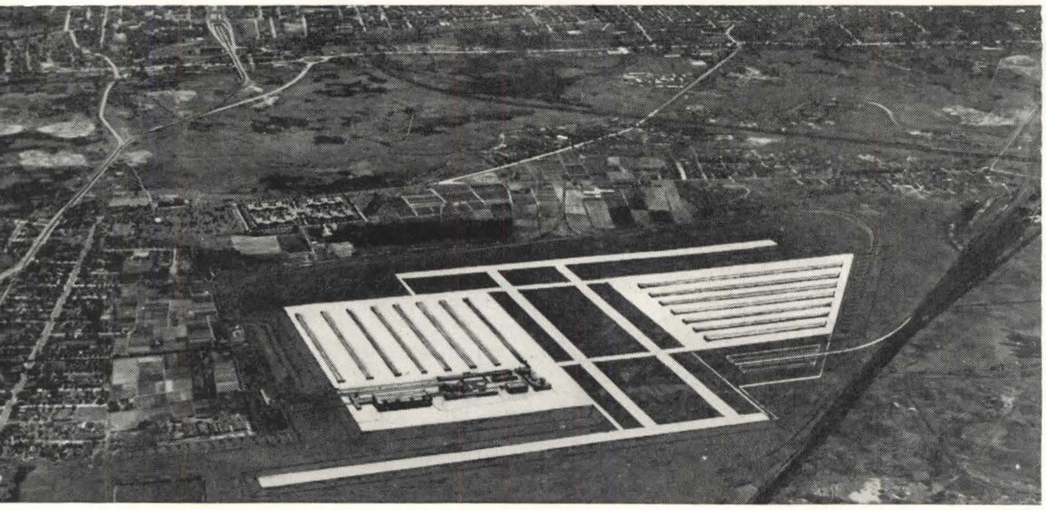
2. The aircraft manufacturers must reach some degree of standardization in design of planes, so that an equal degree of standardization of procedure and equipment can be applied at the terminal. An outstanding example of this problem is the expense of the loading device which has to reach all over the apron to find airplane doors at different levels.

3. The cities and other government agencies which build the new ports or improve present ones are going to have to decide whether they are in the supermarket business or whether they want to provide terminals as a public service. Certainly no one objects to *necessary* commercial facilities at the airport, and if they help the town pay for the building, fine. If carriers could afford to build their own stations, the public might be served first, and business enterprises provided second.

These improvements are beyond the province of the architect and the engineer in most individual cases, but perhaps agreement on their desirability and consistency of pressuring by all of the architects concerned with the problem, will help effect changes in the direction of ideal airport planning.

The balanced-cantilever truss of Dr. Paul Rongved and Cyral P. Erwin may be a potential solution for the huge terminal, free from interior obstructions for complete flexibility and infinite expansion (below and acrosspage; drawings on page 111).

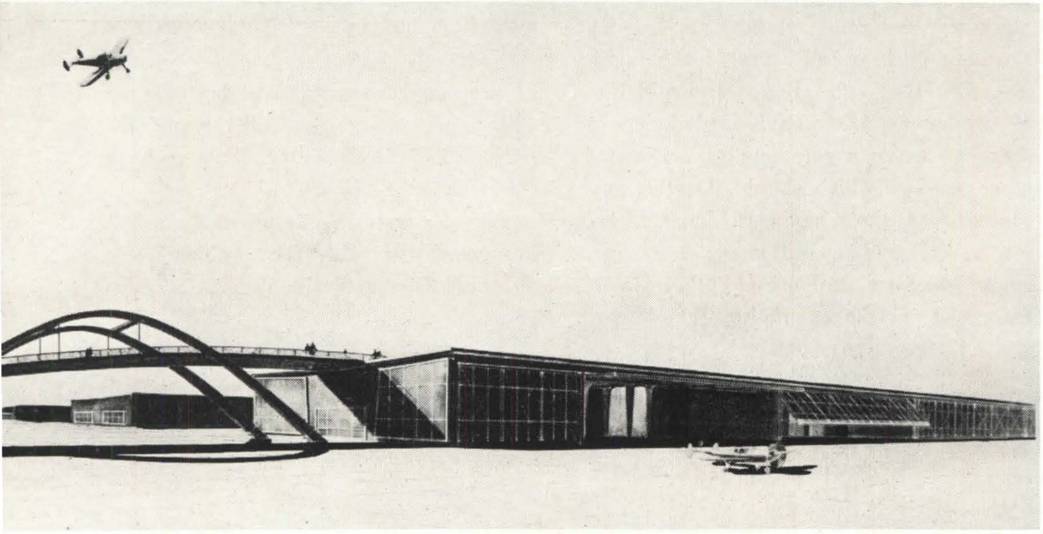


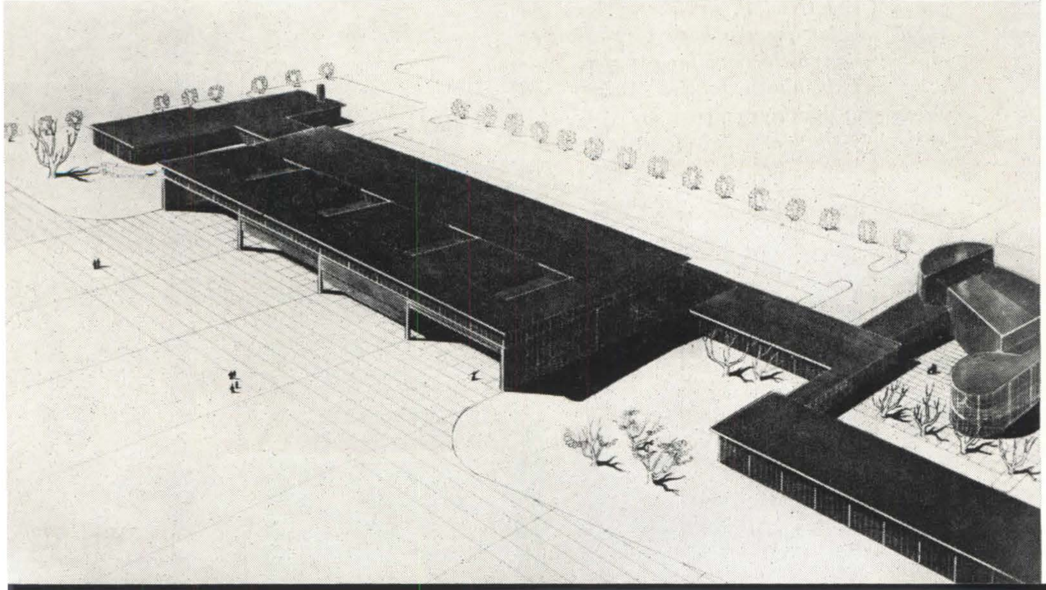


Secaucus Airport would have been well located in relation to the community, on property which is ten minutes distant from New York's Times Square. Aircraft circulation at the airport would be primarily to and from private storage hangars; building area is to the west (left foreground).

proposal for a private airport

location	Secaucus, New Jersey
architect	Charles M. Goodman



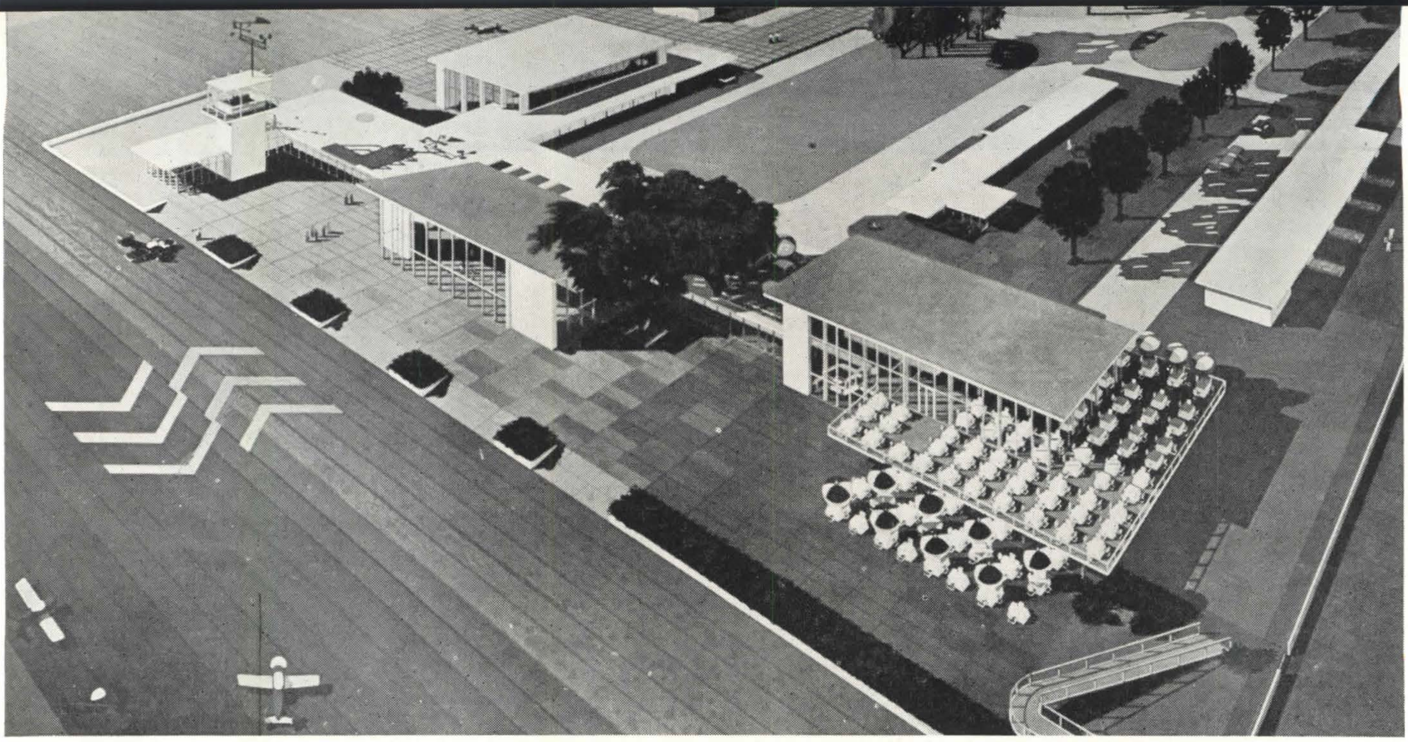


As World War II drew to a close, many aviation enthusiasts believed that private flying would reach a volume greater than has since developed; and the airport facility illustrated here, designed at that time, was a victim of exaggerated hopes. Although its program seemed sound then—and working drawings were carried to completion—it was never built. However, it is so advanced in some of its concepts that it is worth studying today.

There are two important types of private-plane operation—the individual "cub" activity; and what has come to be known as executive flying (business concerns using their own planes). The first, perhaps because it was oversold, has been disappointing to manufacturers and to those who based airport development hopes on its growth. Executive flying has reached important proportions, but terminal facilities for the company plane are usually included in the municipal airport program, and have not resulted in any special building construction.

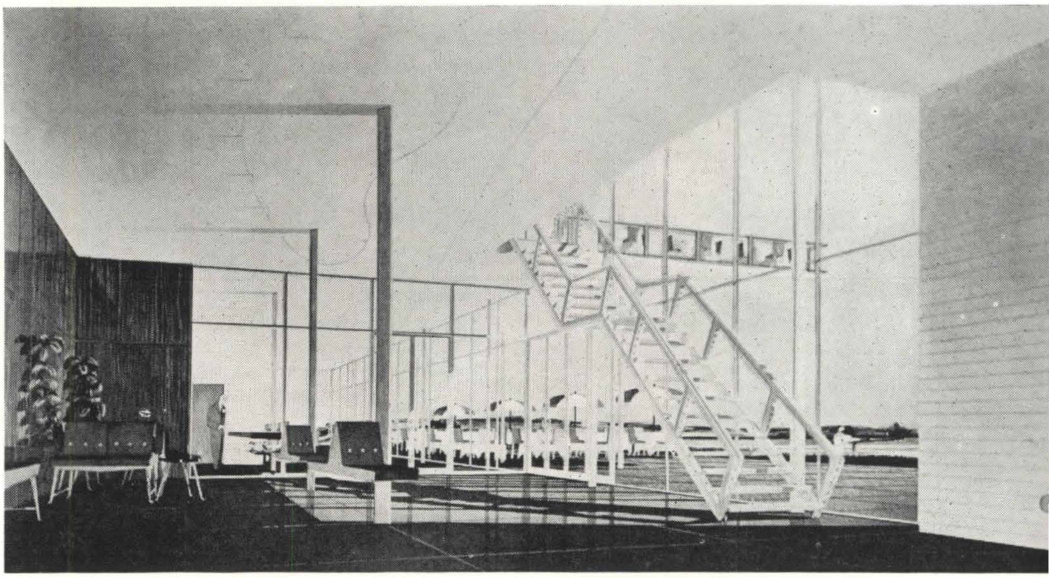
Secaucus Airport was conceived as a fa-

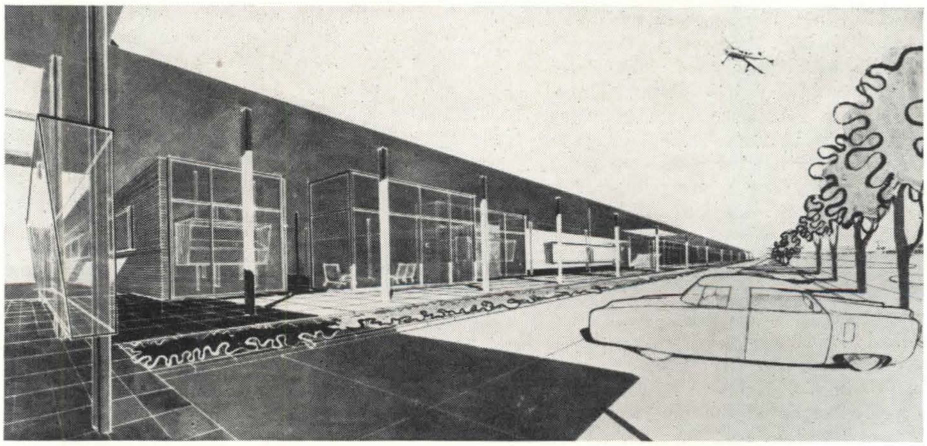
Aircraft storage hangars (above, left) *were designed for easy traffic of many private planes. Aircraft-maintenance area* (left) *would provide repair and check-up facilities, adjacent to ground school and accessory display and sales spaces.*



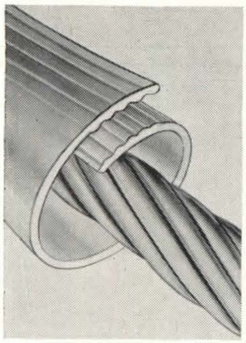
cility for both types of private flying. No ticketing spaces or commercial airlines requirements had to be considered. On the other hand, hotel facilities, restaurant space, aircraft storage and repair hangars for private owners, sale and display of parts, and flight instruction areas assumed unusual importance. Architect Charles Goodman solved his program by a series of connected and related structures planned with an openness that is lacking in any major airport today.

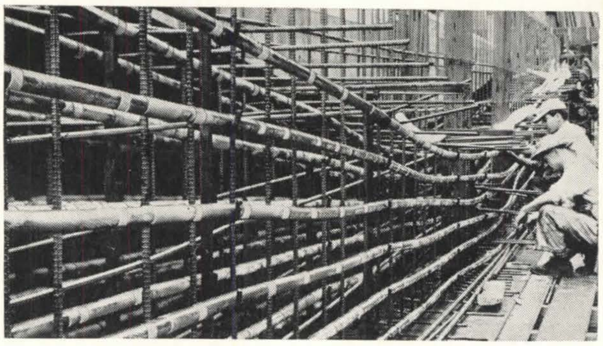
In the view at top of page, the main building in the foreground houses eating facilities *(right)*, flight service area *(center)*, and airport operations offices *(left)*. Stretching away to the right is a true shopping center; in the background *(left)* are ground school and maintenance spaces. The free, yet thoughtful, relationship of the units, opening up possibilities of landscaping and reducing scale to a human ratio, introduces a more intimate design approach—similar to that achieved in some contemporary school, shopping center, and community-recreation groups.





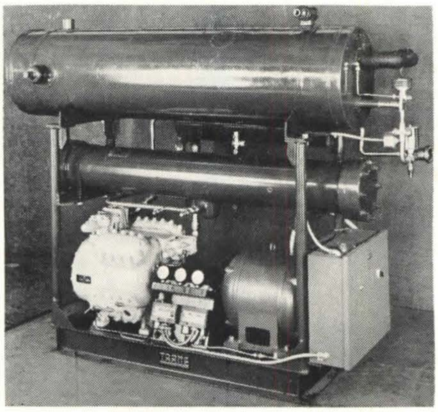
Illustrations above show the main dining space (top) *opening out to a terrace which adjoins the field; and the shopping center* (lower picture) *where, under normal shopping conditions, users of the airport could find specialty shops, drug store, and even a well-planned nursery. A hotel was designed for adjacent property.*





Plastic tubing (drawing, far left) *to prevent bond and provide a friction-free covering for cables or rods in prestressed-concrete construction has been successfully used. A ½" overlap, faced with interlocking longitudinal corrugations, combines with resiliency of plastic to prevent concrete mix from seeping into interstices of cable wire. Tubing being installed over wire strands of heavy prestressed-concrete girders is shown* (above). *Anchor Plastics Co., Inc., 36-36 36th St., Long Island City 6, N. Y.*

Visitors to the 11th International Air Conditioning Exposition were among the first to see a new cold generator designed to provide a single-unit source of large quantities of cold water for air-conditioning and refrigeration systems requiring between 10 and 50 tons of cooling. This self-contained unit requires only simple water and electrical connections and eliminates complex installation and maintenance problems formerly encountered in jobs in this range. The Trane Co., La Crosse, Wisc.



air and temperature control

Centrifugal Pump: built in sizes from ¼ hp to 5 hp, close-coupled centrifugal pump for air conditioning systems can be installed in any position. Leakproof operation; brass permanent-mold impellers prebalanced to give especially quiet operation. Also applicable to lawn sprinkler systems, swimming pools, and many industrial uses. Lancaster Pump & Mfg. Co., Inc., Box 778, Lancaster 1, Pa.

Combination Thermostat: new residential heating-cooling thermostat available this summer eliminates need for sub-bases or separate-control switch plates. Three built-in selector switches enable homeowner to choose either heating or cooling, to regulate fans, or to turn either system on or off. Sensitive, low-voltage type; two models: one for one-stage heating and one-stage cooling, the other for one-stage heating and two-stage cooling. Minneapolis-Honeywell Regulator Co., 2753 4 Ave. S., Minneapolis 8, Minn.

Liquid Contact Method: new spray method in equipment for drying or moistening atmospheric air. Relative humidity and temperature regulated independently to obtain closer control of results. Filtered fresh air enters spray chamber where spray (either refrigerated air or "Hygrol") either adds moisture or removes it by absorption or by condensation. Economical heating and cooling with room conditioners of any type. Niagara Blower Co., 405 Lexington Ave., New York 16, N. Y.

Hidden Heating: new baseboard convector for residential hot-water heating systems; also has extensive applications in apartment buildings, hospitals, schools, hotels, and offices where units may be used in conjunction with regular convectors. Concave-radius curve at base of unit eliminates dust-catching spot. May be installed free standing or partially recessed so that face is 1½" from wall. Continuous horizontal openings uninterrupted by joints or visible supports. The Trane Co., 2020 Cameron Ave., La Crosse, Wisc.

Evaporative Condensers: new line of evaporative condensers offered in six sizes with capacities from 7½ to 40 tons. Equipment is of heavy-gage steel construction, hot-dipped galvanized after fabrication. Can be readily disassembled in the field and reset in any of 16 arrangements to meet specific installation requirements. United States Air Conditioning Corp., 3300 Como Ave., S. E., Minneapolis 14, Minn.

Poweraire Ceiling Fan: 250 cfm ceiling fan for ventilating small kitchens and laundries. Equipped with specially designed plastic blades which are bendproof and warpproof. Removable one-piece steel grille finished with baked-on white enamel. Steel duct adapter permits easy assembly to a standard 8" duct if required. Brushless, 2-pole, induction-type motor. Westinghouse Electric Corp., 401 Liberty Ave., Pittsburgh 30, Pa.

construction

Microwood: new wood product imported from Europe consists of a finely-shaven layer of wood laminated to a thin paper backing; thickness of wood and paper combined is .005". A wall and ceiling covering for residential, commercial, and public buildings. Can be stamped, painted, varnished, punched, and polished. Available in ten African and European woods, ranging from light to dark shades and in rolls of standard widths and lengths. David Feldman & Assoc., Importers, 525 Walnut St., Cincinnati 2, Ohio.

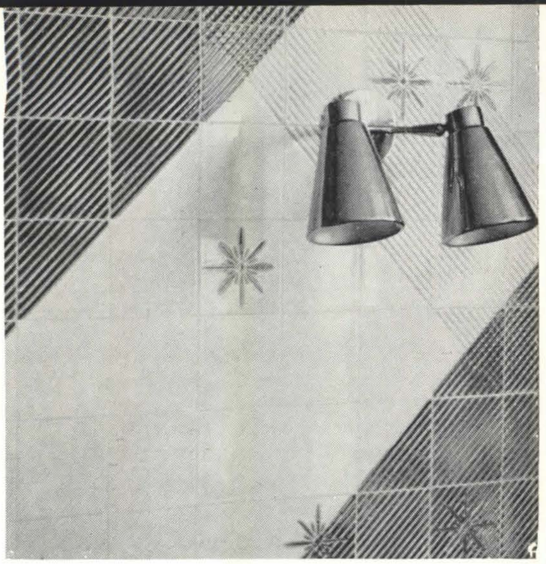
Ductile Iron: cast iron that can be twisted and bent and will also bounce on impact rather than breaking, has over 500 established and 200 experimental applications. A small amount of magnesium and nickel have been added to gray iron; wear- and heat-resistant. The International Nickel Co., Inc., 67 Wall St., New York 5, N.Y.

doors and windows

Spacemaster: a low-cost folding door for residences has steel frame with steel pantograph hinges at top and bottom and is covered with fire-resistant, washable, vinyl fabric. Available as a complete packaged unit in one neutral color and in three sizes. Installation time: 10 to 15 minutes. New Castle Products, New Castle, Ind.

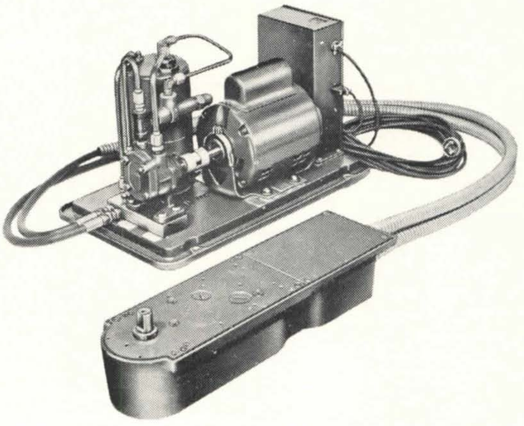
finishers and protectors

Weathercote: improved weathercoating to guard against warp, swell, and check in exterior paneling and doors and other types of natural unfinished lumber for outdoor use. Slow-oxidizing finish has high solid content plus a small amount of wax; water and moisture repellent. Available in 1-, 5-, and 55-gallon containers. Nelsonite Chemical Products, Inc., 900 Monroe Ave., N.W., Grand Rapids 2, Mich.



This new door opener (below) opens any type of door (glass, wood, or metal) the instant a person steps upon the carpet leading through the doorway; it remains open until the person has walked through, then closes with a two-speed action. The system, consisting mainly of the door-control mechanism (concealed in the floor) and the hydraulic-power unit, has a number of important safety features. Dor-O-Matic Division of Republic Industries, Inc., 4440 North Knox Ave., Chicago 30, Ill.

A new ceramic-surfaced clay tile causes the architect to re-examine the whole concept of the usefulness and practicability of tile as an architectural material. One outstanding feature of the new Ceratile process is the fact that company designers are available to co-ordinate and execute special designs. In this way an architect can obtain any tile pattern to fit his own special requirements. Pacific Tile & Porcelain Co., Paramount, Calif.



insulation (thermal, acoustic)

Thermo-Glare Shields: glass-adhering shields of tough, chemically inert, flame and acid-resistant vinyl-plastic filter out annoying sun glare and eliminate need for painted windows or blinds. Applications particularly suitable to window areas of factories, drafting rooms, airplane towers and hangars, schools, and store windows. Shields also provide thermal insulation. Can be secured permanently to glass and can be removed when desired without difficulty. Filterzone Autovision Co., 641 Lexington Ave., Brooklyn 21, N. Y.

Sanded Form Board: new preformed insulating board with smooth, sanded appearance designed for use in low exposed ceilings; provides a more attractive unpainted ceiling and affords a surface better adapted to painting. Board also provides an integral part of poured-in-place gypsum and lightweight concrete roof decks. Standard size: 32" x 48" x 1¼" thick. Owens-Corning Fiberglas Corp., Toledo 1, Ohio.

sanitation, water supply, plumbing

Burnall Incinerator: new low-priced home garbage incinerator reduces waste to fine ash. Operates with any kind of gas, requires 1½ sq ft of space. Burner spreads gas beneath and through grate, quickly drying and consuming garbage and rubbish. Ash pan will hold month's accumulation of fine ash. Comstock-Castle Stove Co., Quincy, Ill.

Shallow-Well Water System: pumping unit with rated capacities up to 915 gallons of water per hour. Includes complete pump and jet combination mounted in tank, capacitor-type ball bearing motor, pressure switch, pressure gage, built-in check valve, and automatic air-volume control. Can be installed under shelves and cabinets in basements, kitchens, or utility rooms. Crane Co., 836 S. Michigan Ave., Chicago 5, Ill.

specialized equipment

Tru-Angle: new adjustable protractor triangle permits drawing of accurate angles from base line; can be quickly set to precise graduations of one-half degree, then held in place with knobbed screw. Two rows of graduations: outer indicates angles from 0° to 45°, inner shows angles from 45° to 90° from the shorter base. Manufactured of clear optical shatterproof, heat-resistant plastic. Alvin Co., Windsor, Conn.

Fyre-Freez: new line of portable carbon dioxide fire extinguishers available in five sizes: 2½-, 5-, 10-, 15-, and 20-lb models. Feature squeeze-type valve which requires only normal hand pressure to actuate extinguisher after safety pin has been removed. Recharged by squeezing valve open to permit recharge gas to enter cylinder. Carbon dioxide approved for use on Class B (flammable liquid) and Class C (electrical equipment) fires; gas is noncorrosive and is absorbed into atmosphere following discharge. Walter Kidde & Co., Inc., 675 Main St., Belleville, N. J.

Drafting Pencil: push-button lead-holder-type pencil has lead sharpener concealed in top for consistently smooth, sharp drafting. Imported from Germany and competitively priced. Easy to disassemble; all parts completely replaceable. J. S. Staedtler, Inc., 53 Worth St., New York, N. Y.

surfacing materials

Conductive Floor Tile: electrically-conductive mosaic floor tile for use in hospitals. Recommended for all Class 1, Group C hazardous anesthetizing locations. Provides protection by dissipating static electricity, preventing accumulation of dangerous electrostatic charges, and providing electrical conductivity between persons and equipment in contact with floor. Unglazed, dust-pressed, vitreous ceramic tile in neutral brown; 1-9/16" x 1-9/16" x ¼" size with straight joint. The Mosaic Tile Co., Zanesville, Ohio.

Asphalt Roof Shingles: line of 12" tapered strip shingles now available in new green, gray, blue, and red shades created through use of pastel colored granules accented with white granules. Color blend, combined with shadow line, gives maximum contrast between shadow line and rest of shingle. Shingles are extra thick at butt. Flintkote Co., 30 Rockefeller Plaza, New York, N. Y.

Kenflex: new vinyl-asbestos tile available in 14 colors for use in residences and commercial buildings. Added variety of design possible with feature strip available in four colors. Colors go all the way through tiles. Tiles are greaseproof, alkali-proof, fire-resistant, and resistant to acids, cooking fats, oils, and gasoline. According to manufacturer they can be safely installed on concrete in direct contact with ground. 9" x 9" squares in standard and ⅛" thicknesses. Kentile, Inc., 58 2 Ave., Brooklyn, N. Y.

p/a manufacturers' literature

★ *Editors' Note: Items starred are particularly noteworthy, due to immediate and widespread interest in their contents, to the conciseness and clarity with which information is presented, to announcement of a new, important product, or to some other factor which makes them especially valuable.*

air and temperature control

1-9. Draftless Aspirating Air Diffusers (Selection Manual 45), 64-p. revised edition of a manual for the selection of air diffusers in air-conditioning systems. Technical data is supplied on how proper locations and correct number of required units are determined. Performance data charts are included with the description of each type of air diffuser along with dimension data and photos of the unit. Information on installation, photos of typical installations, price lists of diffusers and accessories. Anemostat Corp. of America, 10 E 39 St., New York 16, N. Y.

1-10. Industrial Controls (F-3941-2), 32-p. catalog describing control mechanisms which include thermostats, proportioning pressure switch, humidity controls, motor-operated valves, temperature regulators, control motors, relays, electrical accessories, and heating and air conditioning controls. Sections on control terminology, types of valve bodies, and valve capacities. Photos and charts. Barber-Colman Co., 150 Loomis, Rockford, Ill.

1-11. Char-Gale 1953 General Catalog, 30-p. booklet giving information on equipment for heating systems: aluminum package fittings, joist panning, galvanized perimeter fittings, registers, ceiling diffuser, vents, humidifiers. Sizes, weights, net prices. Charts, drawings, and photos. Char-Gale Mfg. Co., Minneapolis 6, Minn.

★ **1-12. A Simplified Design Procedure for Residential Panel Heating,** 26-p. brochure setting forth the procedure for determining the size of heating panels and the water temperature necessary to heat any room in a residence of normal construction. Heat-loss calculations have been eliminated. Tables on design factors for insulated and uninsulated structures, required panel areas, and approximate input to room in Btu/hr. Also installation details of piping for typical ceiling panels. Revere Copper and Brass Inc., 230 Park Ave., New York 17, N. Y.

1-13. Servel Air Conditioning (3ACP-79-300), 12-p. booklet listing a line of year-round air conditioners, air cooling units, evaporative water coolers, and a 25-ton water chiller. Photos and dimensional drawings of various units, specifications of air conditioning units. Air Conditioning Div., Servel, Inc., Evansville 20, Ind.

1-14. Equipment for Buildings and Institutions (WP-1099-B27M), 20-p. revised catalog of air conditioning and refrigeration units for commercial use. Sizes, dimensions, capacities, ratings, and features of units. Also oil, gas, and dual-fuel engines; deaerators and deaerating heaters; water conditioners; steam turbines and turbine generators; liquid meters; centrifugal pumps; and others. Worthington Corp., Harrison, N. J.

construction

2-16. Plastic Tubing for Prestressed Concrete, 4-p. folder giving specifications and other data on bond preventing split tubing used over wire rope or rods in post-tensioned concrete beams. Illustrations of method of applying the tubing; list of sizes. Anchor Plastics Co., Inc., 36-36 36 St., Long Island City 6, N. Y.

2-17. Alsynite for Modern Design, A.I.A. 26-A-9 (952), 4-p. booklet describing a translucent glass-fiber building panel of lightweight, shatterproof construction. Color photos of corrugated and flat panels serving various uses such as luminous ceilings, sidewalls, and partitions in residential, commercial, and industrial buildings. Data on standard sizes, colors, light transmission and diffusion, and fire resistance. Alsynite Co. of America, San Diego 9, Calif.

Two folders outlining basic information on the construction of stages which is given by firm's engineering service, including loads and moments, arrangement of mechanical equipment, flexibility of arrangement, roof heights, and specifications. Also information on curtain tracks and electrically-operated draw curtain controls. Photos of several stages. J. R. Clancy, Inc., 1020 W. Belden Ave., Syracuse 4, N. Y.

2-18. How to Build a Modern Stage, A.I.A. 35-A-1

2-19. Key to a Good Stage, A.I.A. 35-A

2-20. Flexa Steel Channels and Fittings (153), 40-p. engineering catalog. Dimensional drawings and engineering data for standard steel channels, fittings, fixture hanging components, beam clamps, brackets, pipe clamps, porcelain insulators, and concrete inserts. Channels and fittings furnished in machinery gray enamel, or galvanized finish if desired. Flexa Steel Products, Inc., 1348-50 W. Washington Blvd., Chicago 7, Ill.

2-21. Lightsteel Structural Sections, A.I.A. 13-G (SS-1), 12-p. booklet describing structural sections with range of studs, joists, and accessories for the erection of steel frameworks; suitable for single and multiple residences, schools, industrial and commercial structures, and load-bearing partitions and exterior curtain-wall framing in multiple story buildings. Drawings of typical residential and commercial framing, physical and structural properties for studs and joists, engineering data, details. Penn Metal Co., Inc., 205 E. 42 St., New York 17, N. Y.

2-22. Glass Blocks, A.I.A. 10-F (G81700), 40-p. booklet giving advantages of glass blocks and their applications in commercial, industrial, and public buildings. Performance data, available sizes and shapes, modular installation details, closed specifications. 18 pages of photos showing installations. Pittsburgh Corning Corp., 307 4 Ave., Pittsburgh 22, Pa.

doors and windows

3-16. Dor-O-Matic Invisable Dor-Man (I-52-12), 4-p. bulletin describing an automatic, concealed, and noiseless door control which can be applied to any standard stock door (glass, wood, or metal) without alterations. Economy and safety features, information on models, specifications. Drawings, photos. Dor-O-Matic Div. of Republic Industries, Inc., 4446 N. Knox Ave., Chicago 30, Ill.

3-17. Sun-Sash Air-Controlled Louvered Windows, 4-p. leaflet on louver-type window for residential, industrial, and commercial use. Sizes, installation details, specifications, and ordering instructions. Photos, drawings, and charts. Sun-Sash Co., 38 Park Row, New York 38, N. Y.

3-18. Aluminum and Steel Windows for the Home, 12-p. catalog describing line of aluminum and steel residential windows including double-hung, casement, and basement and utility types. Construction and installation details and standard dimensions. Also information on screens and storm sash. J. S. Thorn Co., 2009 W. Allegheny Ave., Philadelphia 32, Pa.

3-19. Presenting Truscon Aluminum Casements, A.I.A. 16-E (A-645), 4-p. booklet on residential casement windows. Information given on modular sizes, construction, hardware, screens, and storm sash. Drawings illustrate types, sizes, sections. Specifications, photos. Truscon Steel Div., Republic Steel Corp., 1315 Albert St., Youngstown, Ohio.

electrical equipment, lighting

4-10. Incandescent Lighting Folio, A.I.A. 31-F-2 (1-53), 16-p. brochure illustrating and describing over 30 incandescent lighting fixtures for commercial and institutional interiors including bell, reflector, and glass-enclosed type wall and ceiling brackets, new ventilated hinged drum corridor unit, ceiling bowl and cornice units, aluminum wall-mounting hospital bed light, and a variety of ceiling and pendant mounting molded glass bowl fixtures. Photos, drawings, specifications. Gruber Bros., Inc., 125 S. 1 St., Brooklyn 11, N. Y.

Two bulletins giving specifications and other information on two types of master clock and program systems; one, a synchronous, dual-motor, 3-wire manual reset, the other, an electronic automatic reset. Typical wiring diagrams of each, descriptions of program machines and suggested mounting instructions, electric secondaries, and elapsed time indicators and controls, audible signals. Drawings and photos. Simplex Time Recorder Co., Gardner, Mass.:

4-11. Three-Wire Manual Reset Master System (179A)

4-12. Electronic Master System (175A)

★ **4-13. Trumbull Electric General Catalog 1953,** 138-p. catalog of electric equipment including safety switches, circuit breakers, service entrance equipment, motor control equipment, open knife switches, lugs and connectors, panelboards, switchboards, and distribution systems. Detailed information on each unit with photos. General application data and numerical index with over-all dimensions. Trumbull Electric Dept. of General Electric Co., Plainville, Conn.

4-14. Planning the Modern Home Electrically (B-5853), 20-p. manual giving instructions on planning kitchens and laundries. Also design information on such home lighting developments as cove, cornice, valance, recess, pinhole spot, and automatic lighting for closets. Data on planning an adequate wiring system for residences: where to locate outlets, how many and what kind of circuits to provide for, and how to plan a service entrance for future as well as immediate needs. Photos, drawings, floor plan. Westinghouse Electric Corp., Box 868, Pittsburgh 30, Pa.

finishers and protectors

5-4. Brisk Catalog 1953, 4-p. folder describing preformed waterproofing units built in exterior masonry walls providing a continuous membrane barrier. Advantages, typical installation for 12" brick wall, typical details and sections. List of representative architects using the system. Brisk Waterproofing Co., Inc., 103 Park Ave., New York 17, New York.

5-5. Finishing Northern Hard Maple Flooring (31580), 8-p. folder discussing characteristics of northern hard maple flooring, prime requirements of a good service finish, special finishes for gymnasium floors, sanding suggestions, and information on the care of flooring. Photos. Maple Flooring Manufacturers Assn., 35 E. Wacker Dr., Chicago 1, Ill.

insulation (thermal, acoustic)

6-6. How to Select an Acoustical Material, A.I.A. 39-B (AD-S-53-B), 18-p. brochure giving information on the selection of acoustical materials and acoustical treatments. Also detailed descriptions of line of products: acoustical tile, metal pan units, asbestos board, and hardboard. Installation methods, mechanical suspension. Armstrong Cork Co., Lancaster, Pa.

6-7. Celotex Acoustical Materials, A.I.A. 39-B (5033C), 8-p. folder describing line of sound-conditioning products: cane-fiber tile, mineral tile, steel-faced units, panel and asbestos board, and material for lining ventilating and air-conditioning ducts. Information on suspension system, construction details on materials, application selection chart with sound absorption coefficients. The Celotex Corp., 120 S. LaSalle St., Chicago 3, Ill.

sanitation, water supply, plumbing

7-3. Plumbing Fixtures for Hospital Planning (326), 62-p. catalog showing various types of plumbing fixtures and fittings used in hospitals. First section has floor plans of hospital department with fixtures shown. Second section gives detailed descriptions of the units. Photos and drawings. American Radiator & Standard Sanitary Corp., Bessemer Bldg., Pittsburgh 30, Pa.

specialized equipment

8-7. Heavy Wire Mesh Products, Collapsible Folding Gates (51), 16-p. catalog showing woven wire partitions and window guards, roller bearing and in-wall folding gates. Specifications, drawings, typical grouping of partition sections, construction data, dimensions. Acorn Wire and Iron Works, Chicago 21, Ill.

Two folders describing school intercom system and central-control system for general administrative and industrial use. Information on basic units and operating features. Three basic-wiring plans and optional accessories. Executone Inc., 415 Lexington Ave., New York 17, N. Y.

8-8. Executone School Intercom System (327)

8-9. Executone Central Control System (278A)

8-10. Chalkboard Frames of Aluminum, 16-p. current catalog of extruded aluminum frames for chalkboards and corkboards. Also plastic and composition chalkboards and corkboards. Recommended specifications, full-size details and typical elevations, photos of installations. Gotham Chalkboard & Trim Co., Inc., 246-252 E. 125 St., New York 35, N. Y.

8-11. Troy Laundry Machinery (YG-8-52), 24-p. catalog covering line of laundry equipment including washers, extractors, tumblers, presses, flatwork ironers, flatwork folders, and accessory equipment. Illustrations, specifications, dimensions, and capacities of equipment. Troy Laundry Machinery Div., American Machine and Metals, Inc., 544 12 Ave., East Moline, Ill.

surfacing materials

9-6. Sloane Floors and Walls, 124-p. hardbound catalog. Color charts of tile and linoleum floorings, vinyl-plastic floor covering and countertop, rugs, tile wall covering, and installation accessories. Table of gages and shipping weights, price list. Request should be on letterhead stationery. Sloane-Blabon Corp., 295 5 Ave., New York 16, N. Y.

(To obtain literature, coupon must be used by 7/1/53.)

(We request students to send their inquiries directly to the manufacturers.)

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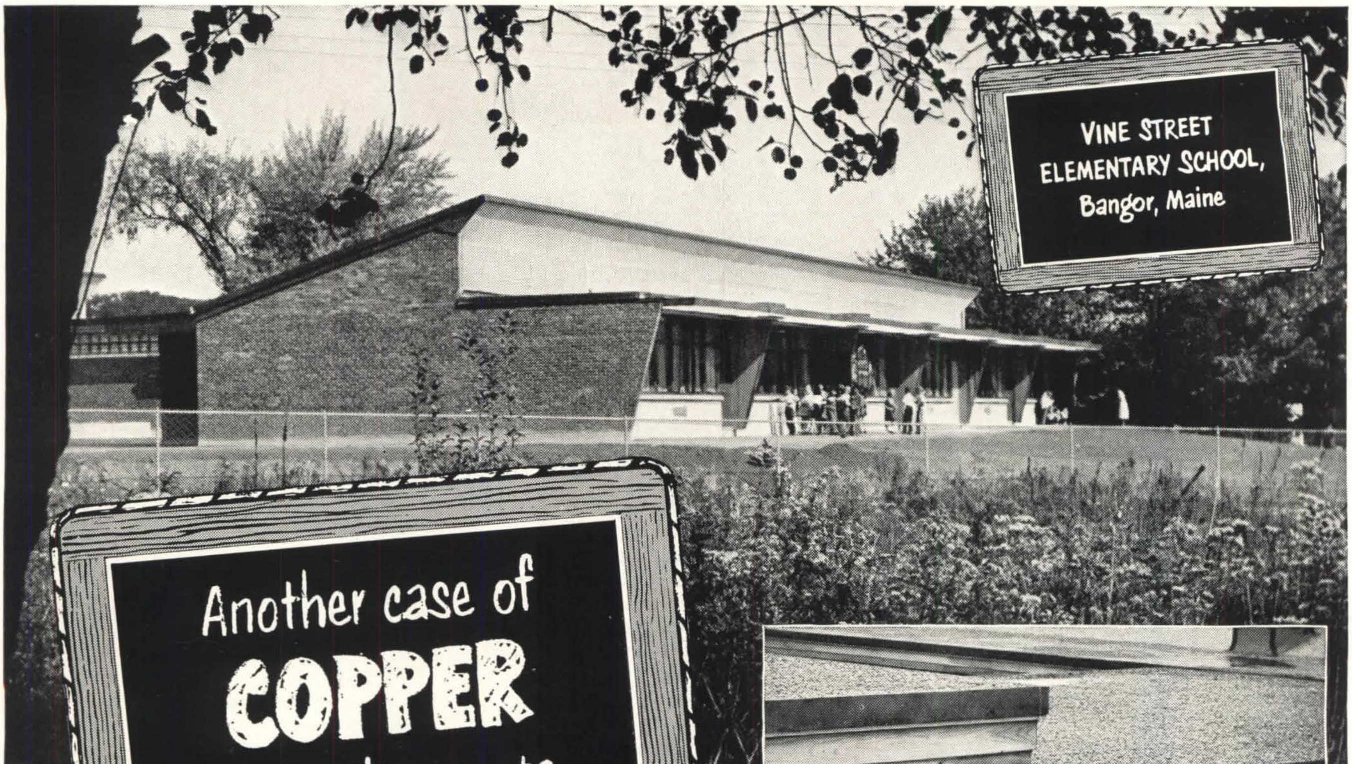

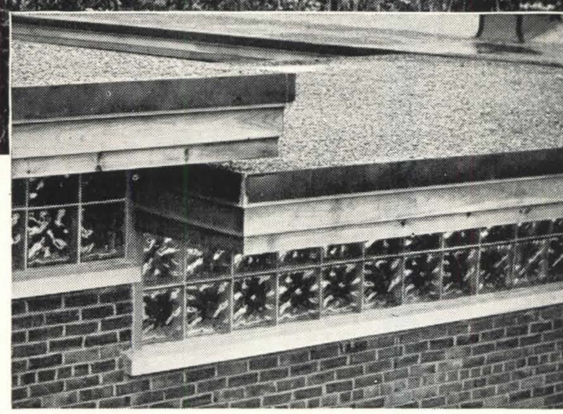

USING COPPER for fascia gravel stops made soldering a quick, certain operation. Note flange at base of strip for water run-off. Installation was made by the Bangor Roofing & Sheet Metal Company. Architects—Eaton W. Tarbell & Associates . . . both of Bangor, Maine.

The Vine Street Elementary School, designed by Eaton W. Tarbell & Associates was one of the five top winners in "The School Executive's" recent National Competition for Better School Design. It is an excellent example of the use of a limited amount of Copper where it counts most.

The Vine Street School, which has its own heating plant and covers about 10 times the area shown in the above photograph, used 5,270 lbs. of 16 oz. non-rusting Revere Copper for flashing and fascia gravel stops (see detailed photos at right). Said Mr. Tarbell, "Of all the materials available for the purpose, to my mind, copper was the one best for the job . . . both from a design as well as a utilitarian standpoint."

In addition to the Revere Sheet Copper the School used 2,500 ft. of Revere Copper Water Tube in sizes ranging from ½″ to 3″ for hot and cold water lines.

Architects like copper because this "ageless" metal has proved its enduring qualities through the centuries. It is non-rusting, lends itself to any kind of design treatment, builds prestige and protects reputations. Sheet metal contractors prefer it because it is readily worked and soldered; easy to handle.

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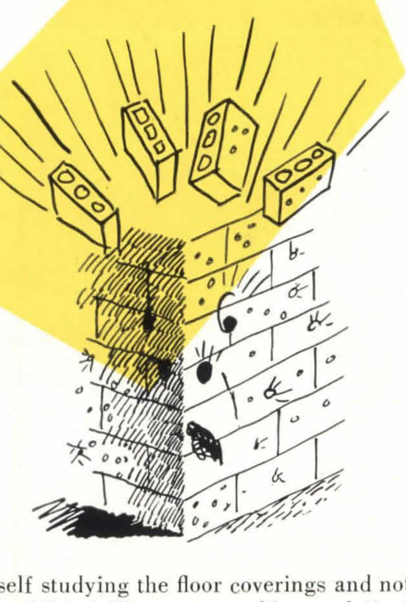
THIS NON-RUSTING 16 oz. Revere Copper Flashing shown at base of picture (right) will be around for a good many years and require little if any maintenance while it seals the weather out of the Vine Street Elementary School. Another section of Revere Copper fascia gravel stop may be noted at top of picture.

by Ben John Small

spec small talk



pop-outs

Did you ever hear of an unplastered cinder-concrete-block partition blowing its top in the form of pop-outs? This is a kind of psychiatric condition derived from unstable cinders. Back in 1948 the office did an alteration to a school wherein three stairs leading to the basement were enclosed with painted cinder-concrete-block partitions. A few months ago our attention was directed to the fact that these partitions appeared heavily pock-marked in terms of a liberal quantity of—how shall I put it—inverted cones of varying sizes. These cones, which pulverized to the touch, had bases varying in diameter from $\frac{3}{4}''$ to approximately $2\frac{1}{2}''$, a depth from $\frac{1}{4}''$ to $\frac{3}{4}''$ and projected, base first, from the partition face about $\frac{3}{8}$ of an inch. After fussing with several block manufacturers, the Portland Cement Association, the American Concrete Institute and even an entomologist (to rule out insects) the cause was ascribed to a peculiar form of hard burned lime in the cinders. It seems that free lime may be formed in cinders by the decomposition at high temperatures of calcite (calcium carbonate), gypsum, or anhydrite (calcium sulphate), any of which may be harbored in some types of coal. At high temperatures these impurities may produce small, hard-burned particles which react differently from ordinary lime. Now, here is the trouble maker. These particles hydrate so slowly that it is possible for them to pass through the mixer and become embedded in a block before hydration has proceeded to an appreciable extent. When it does take place, it is accompanied by a considerable increase in volume, developing high pressures in a restricted space and often resulting in a pop-out. Personally, I am off cinders as an aggregate in blocks where they are to be exposed. Pop-outs can also be caused in rare instances by free magnesia and calcium sulphate. Iron also causes pop-outs and is usually accompanied by some staining. Now that we are all so fully informed, who is responsible for rectifying this 5-year-old situation—the owner, architect, contractor? Does the statute of limitations apply here? The A.I.A. General Conditions were employed. No bond of any kind was required. Care to tell me of any similar experiences?

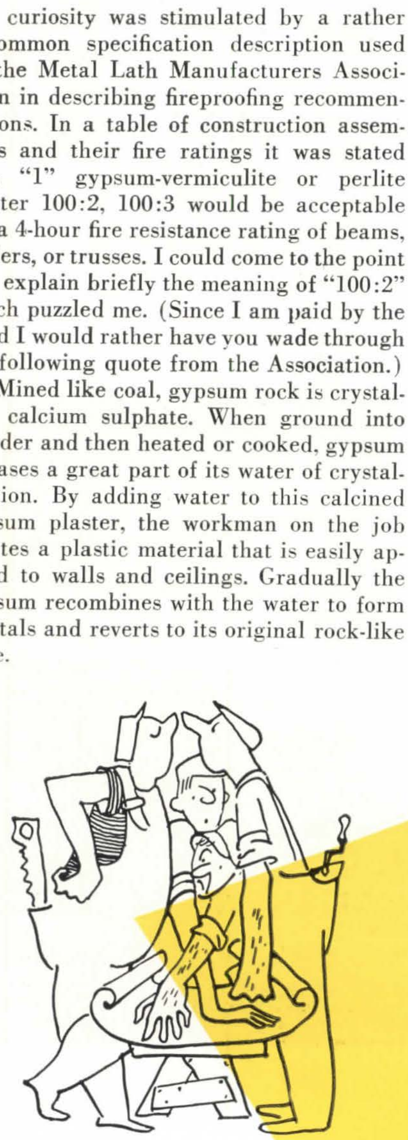
floor show

I wonder how many architects who visited the 20th National Power Show in New York last December got the same impression I did—that it had a good floor show. I did my utmost to sustain interest in steam generators, valves, packings, insulation, belting, dust collection units, gages, pumps, compressors, and power transmission equipment but, alas, my eyes were drawn consistently to an amazing variety of floor coverings in the exhibitors' booths. I found myself studying the floor coverings and not the exhibits! There were rubber and vinyl tiles, large and small, smooth and corrugated, solid and perforated, square edged and interlocking, monotones and jaspés, thick and thin, laid wet and dry. So much for the floor show. As for the furniture, well, now I know where all the Eames chairs go when they die.

100.2

My curiosity was stimulated by a rather uncommon specification description used by the Metal Lath Manufacturers Association in describing fireproofing recommendations. In a table of construction assemblies and their fire ratings it was stated that "1" gypsum-vermiculite or perlite plaster 100:2, 100:3 would be acceptable for a 4-hour fire resistance rating of beams, girders, or trusses. I could come to the point and explain briefly the meaning of "100:2" which puzzled me. (Since I am paid by the word I would rather have you wade through the following quote from the Association.)

"Mined like coal, gypsum rock is crystalline calcium sulphate. When ground into powder and then heated or cooked, gypsum releases a great part of its water of crystallization. By adding water to this calcined gypsum plaster, the workman on the job creates a plastic material that is easily applied to walls and ceilings. Gradually the gypsum recombines with the water to form crystals and reverts to its original rock-like state.



"This unusual ability of gypsum to release water when heated to high temperatures makes it an outstanding fireproofing material. In slowly going from 'dry' water to steam, water of crystallization actually absorbs heat from the flames. Meanwhile, the opposite side of the gypsum remains relatively cool until all the water is gone.

"Therefore, the more gypsum in plaster, the better 'sprinkler system' that is available to combat a fire. It is important in all membrane fireproofing that the plaster mix and thickness be specified.

"When sand aggregate is used, plaster is proportioned by weight. The accepted practice when light-weight aggregates are used is to specify the amount of gypsum by weight and the aggregate by volume. A mix of 100:2 means that 100 lbs. of gypsum, or one sack, is mixed with 2 cu. ft. of aggregate. Light-weight aggregates usually are packed four cubic feet to a sack.

"Neat wood-fibered gypsum plaster is a mill prepared base coat plaster containing a wood fiber aggregate and requiring the addition of water only on the job. It is from 50 to 100 percent more effective as a fireproofing material than standard mixes of gypsum sanded plaster."

Pretty neat, gypsum that is, eh?

union hassle

In the design of a large office building the architect located window heads quite close to the suspended ceiling line. He had a head pocket planned to conceal the Venetian-blind bundle. There exists a simple gripping device that looks in cross section like the familiar dovetail slot. This grip is continuous, of 18-gage steel, and wired customarily to the suspended ceiling runners. The Venetian-blind head box is then installed by clipping it to the grip. As originally designed, the head-pocket lining was to be plastered in its entirety, in which case the lather would have installed the grip. To minimize an awkward plastering problem in the pocket it was decided to extend one leg of the grip so that it would connect with the window head. This change in detail sparked a jurisdictional hassle among the lathers, carpenters, and sheet metal trades. The lathers claimed the installation of the extended grip because of its tie up with the lath; the carpenters because it was lighter than 18-gage metal and supported the Venetian blinds which they usually install and the sheet-metal workers because it is lighter than 10 gage. Had the upholsterers heard of it they too would have claimed something or other because traditionally Venetian-blind installation is theirs. In another project the grip, this time flush with the ceiling but also connected with the window head, was installed without a murmur by the ornamental-iron workers who installed the windows and claimed it because the grip became window trim!

airport waiting areas

In evaluating airport waiting areas, it is first necessary to consider their uses. The overwhelming thought comes to mind that the passengers are completely at the mercy of the space. People using the area may have appeared well ahead of flight time to be checked in, their flight may have been delayed, or they may be waiting between connecting flights without enough time to leave the airport, get into the city and back. Ideally, the waiting area should be equally efficient, attractive, and comfortable. Efficiency is at tops, of course, when ticketing and all administrative functions are divorced from the waiting areas. Space does not always permit the completely efficient operation, but there is absolutely no excuse for unattractiveness. In many cases, designers have taken advantage of the beauty which is at hand—the magnificence of planes in flight—and have incorporated large areas of glass, either in the waiting room or separate observation lounges to permit a view of the field's activities. This is certainly a good time passer for waiters. Concessions, such as magazine stands, luncheon counters, and many others are good business-wise and contribute to passenger convenience.

But passenger comfort is the greatest of desirable attributes, and attention to this all-encompassing feature is sorely needed in interior design. True, there are airports which have considered comfort carefully, but all too many have let it go by the board. For instance, just basically, seating is so often too uncomfortable for long periods of waiting. Arrangement of seating in more of a sort of informal living room arrangement is more desirable than the regimented rows of hard benches. How nice it would be if there were some place for passengers to rest while waiting for flights—some airports already have connecting hotels on the field. All of the desirable qualities of a waiting area depend on budget and space, but if the designer approaches his problem with the passenger's comfort in mind, he is certain to achieve a much more successful end product than the one who merely provides the absolute essentials without taking the passenger into consideration.

In the following section are three waiting areas that are fine examples of efficiency, attractiveness, and comfort.

airport waiting areas

location	Kanawha County Airport, Charleston, West Virginia
architects	Tucker & Silling
interior designer	Eugene Tarnawa

terrazzo

marble

Traffic flow has been very carefully considered in this terminal building. Eight minutes from the down-town section, the magnificent mountain view attracts sightseers as well as the passengers. The building is so arranged that the ticketing is separate from the waiting area, sightseers have separate decks and cantilevered terraces, and there is no cross-traffic between incoming and outgoing passengers. The waiting room has hickory brown walls, with photomurals in color, orange and white candy striped upholstery on the benches, black terrazzo flooring and a marble wainscot.

The airport is visible from the waiting room and dining room—an inspiring sight of runways on the leveled mountain tops.

Photos: Benson Studio

data

doors and windows

Doors: aluminum frame/ glass/ Pittsburgh Plate Glass Co., 632 Duquesne Way, Pittsburgh 22, Pa.
Windows: Adams Westlake Co., Safford St., Elkhart, Indiana/ glass/ Pittsburgh Plate Glass Co.

furniture and furnishings

Reading-study Table: custom-built/ designed and executed by Knoll Planning Unit, Knoll Associates, Inc., 575 Madison Avenue, New York, N. Y.

Chairs and sofas: #21, #66OU, #35, #37 sofa/ Saran upholstery/ Knoll Associates, Inc., 575 Madison Avenue, New York, N. Y.

Fishnet: Knoll Associates Fabric Division.

lighting

Lighting Fixtures: Curtis Lighting, Inc., 6135 W. 65 St., Chicago, Ill./ Sylvania Electric Products Co., Inc., 1740 Broadway, New York, N. Y.

flooring

Asphalt Tile: Thomas Moulding Floor Mfg. Co., 165 W. Wacker Dr., Chicago, Ill.

Settees: #4022 SU27 BU6 and #6034 SU27 BU6/ bent-ply/ natural maple finish/ upholstery: Naugahyde, heavy-weight, Royal Antique, #3305 Yellow and Boltaflex 20 ga. #2563 SC Sherwood Green/ Thonet Bros.

Tables: #94208/ bent-ply/ natural-finish maple top, edged with gray Formica/ 30" x 30" x 22"/ 18" x 36" x 16"/ Thonet Bros.

airport waiting areas

location	Airport Terminal Building, Monterey Peninsula, California
architect	Robert R. Jones
interior designer	Walter Brude
furnishings consultant	Verna Dunlevy

tempered-glass doors

rubber-tile flooring

Uncovered building structure was used here as part of the interior design. Where walls or ceiling flow from the exterior, they carry the same colors on the interior—French gray and light lemon yellow. Deep bright blue is used on the high ceiling, and bright blue-green on the drop ceiling over the ticket counter, adding drama to its architectural form. The waiting area was designed to achieve an "open pavilion" feeling, enabling visitors to observe the activities of the airport from wherever they might be sitting. The view opposite the airfield is composed of gardens. Furnishings were chosen for their practicability to public use and are arranged in an informal living room type of seating rather than the usual regimented rows of seating.

Photos: Morley Baer

data

lighting

Ceiling: #1154/ spun aluminum/ 6-5/8" diameter/ recessed 2"/ C. W. Cole Co., Inc., Los Angeles, Calif.

Ticket Counter: custom fixture/ continuous painted metal housing/ double row of 200 M.A. Slimline/ K. Von Hacht, 90 Tehema St., San Francisco, Calif.

walls, ceiling, flooring

Walls: 1/4" polished plate glass/ Pittsburgh Plate Glass Co., 632 Duquesne Way, Pittsburgh 22, Pa./ local native stone, "Carmel", lt. beige with rust and brown veins/ natural finish redwood.

Partitions: (behind ticket counter) deep grille, alternating "T"s of redwood.

Ceiling: acoustic plaster.

Flooring: "Amtico"/ gray marbleized rubber tile/ American Tile & Rubber Co., 3 Assunpink St., Trenton, N. J.

doors and windows

Doors: "Herculite"/ Pittsburgh Plate Glass Co., 632 Duquesne Way, Pittsburgh 22, Pa.

Windows: Fixed aluminum sash.

furniture and furnishings

Upholstered Benches: designed by Roger King/ upholstery: orange and white candy stripe "Saran" woven plastic/ Knoll Associates, Inc., 575 Madison Ave., New York, N. Y.

lighting

Ceiling: #2240 "Punchy"/ Curtis Lighting Co., Inc., 6135 W. 65 St., Chicago, Ill.

Indirect Cove Lighting: 4 ft. sections, continuous wiring channels; double rows of 40-watt fluorescent lamps.

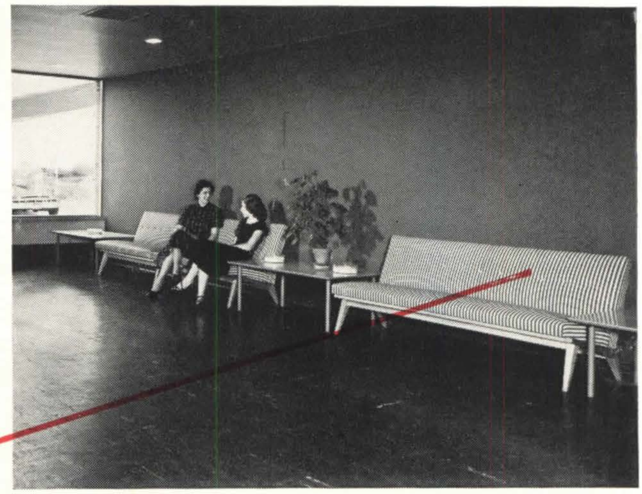
murals

Photomurals: color photographs on linen applied to plaster/ Drix Duryea, Inc., 221 E. 38 St., New York, N. Y.

Ceiling Mural: oil painted on plaster/ Robert Lepper, Pittsburgh, Pa.

redwood see-through grille

airport waiting areas



plastic upholstery

data

walls, ceiling, flooring

Walls: plaster/ painted/ "Nu-Hue" deep tones/ The Martin-Senour Company, 9 East 56 St., New York 22, N. Y.

Wainscot: "Granox Royal Rouge Fleuri"/ Gray Knox Marble Co., Knoxville, Tenn.

Ceiling: acoustic plaster.

cabinet work

Showcases, Natural Finish Redwood Magazine Rack, Shelving, Red Birch Weldwood Ticket Counter with Black Formica Bulkhead: custom designed/ executed by Millwork Contractor.

doors and windows

Doors: ¾" Herculite tempered glass Type P/ Pittsburgh Plate Glass Co., 635 Duquesne Way, Pittsburgh 22, Pa.

Windows: custom sash, 1-7/16" "Griston" intermediate horizontally pivoted/ fired sash in steel frame/ Michel & Pfeffer Iron Works, Inc., South Linden & Tanforan Ave., South San Francisco, Calif. glass; ½" polished plate/ Pittsburgh Plate Glass Co.

furniture and furnishings

Sectional Units: #6002 SU27 BU6 Center and #4002 SU27 BU 6 Left and Right/ bent-ply, natural maple finish/ upholstered in Kalistron #129 Chartreuse, Boltaflex 20 ga. 2563 SC Sherwood Green, Naugahyde, heavyweight Royal Antique, #3307 Vermillion.

Arm Chairs: #4002 SU27 BU6 and #3007 SU27 BU6/ bent-ply/ natural maple finish/ upholstery; Kalistron #129 Chartreuse/ Thonet Bros., 1 Park Ave., New York, N. Y.

asphalt-tile flooring

Entirely divorced from ticketing and official circulation, this waiting area is simple yet pleasant in execution. Ideally, it invites relaxation and by-passes all confusion. Lunch rooms, restaurant, and shopping sections adjacent contribute to the pleasant passing of time for waiting passengers. No attempt has been made to have draperies, except for the fishnet, because the important feature is the airport view. Carpeting helps to avoid the look of "public waiting area."

Photos: Hedrich-Blessing Studio

location	St. Joseph County Airport, South Bend, Indiana
architect	Roy A. Worden
associate	Vincent Fagan
consultant	Frank Montana

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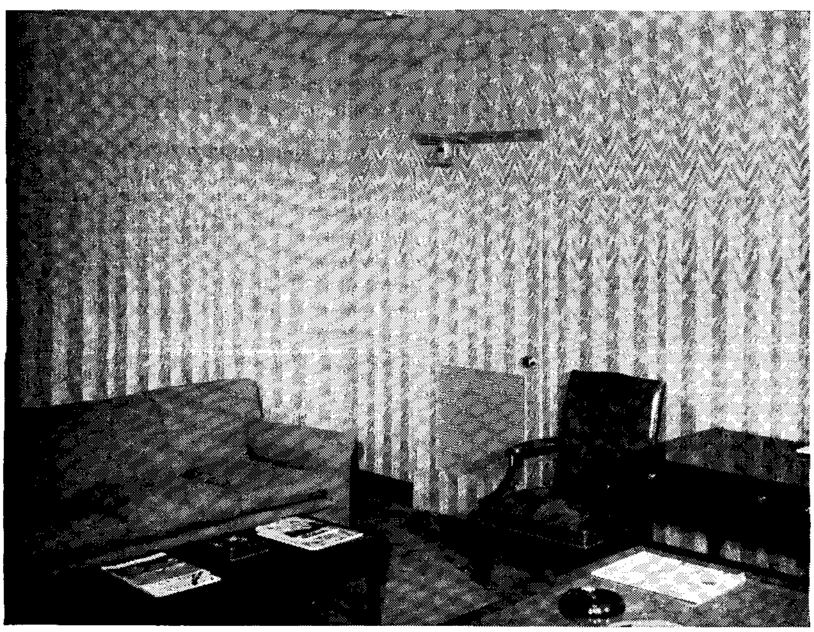

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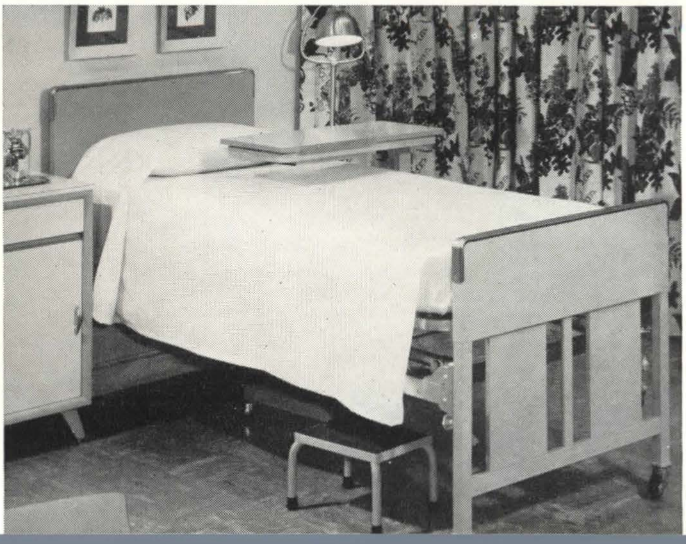
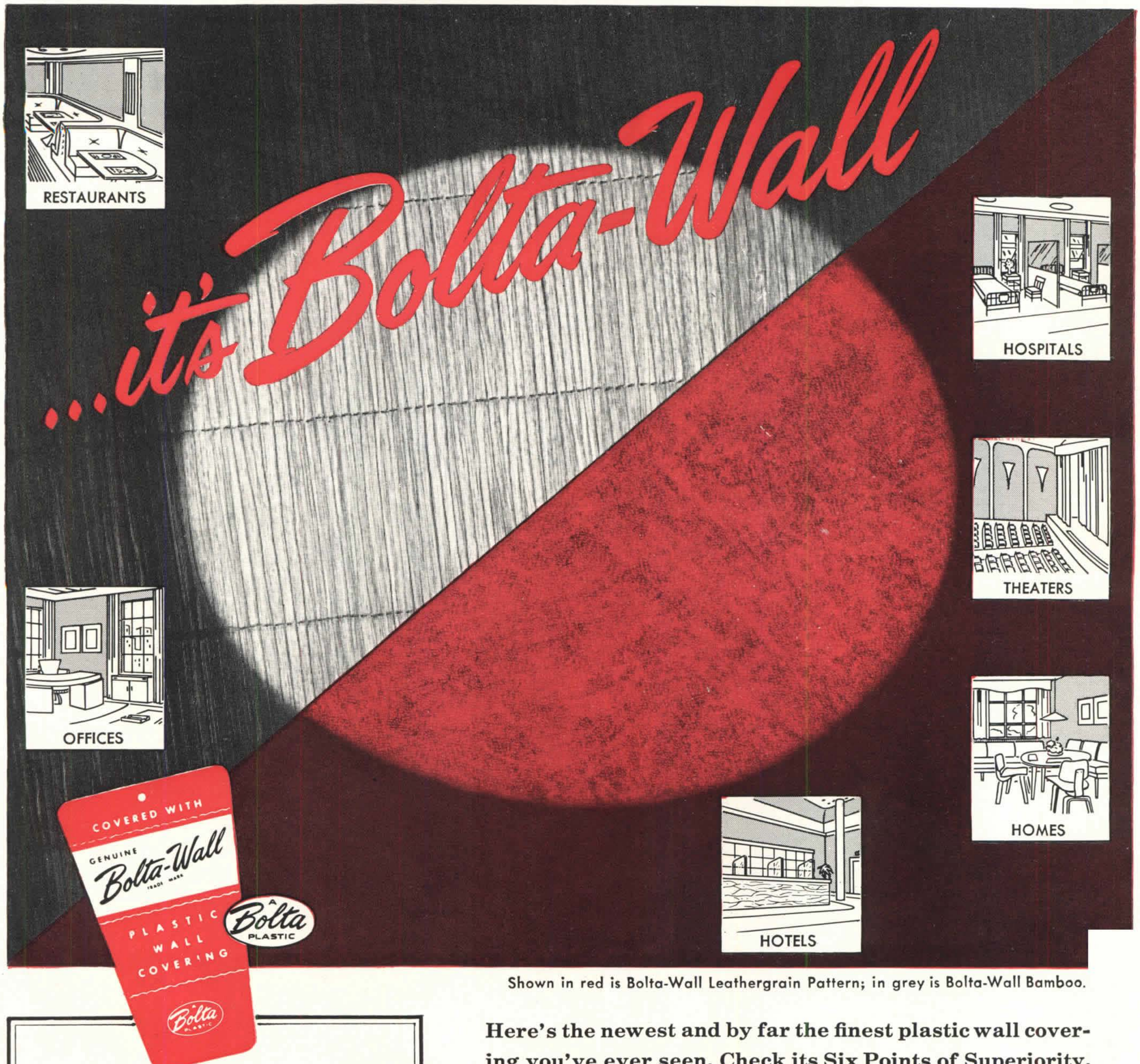
Hospital Furniture: #155 Group/ steel/ two-tone "Dulux" enamel finish in pastel colors or wood grain finish/ "Pictura"/ no handles or pulls to catch clothing/ **Simmons Company, Contract Division, Merchandise Mart, Chicago, Ill.**

Classroom Chair: body-contoured seat and back/ basic chair easily convertible to tablet armchair, chair-desk, a lounge chair/ stackable/ **Brunswick-Balke-Callender Co., 623 S. Wabash St., Chicago, Ill.**





Shown in red is Bolta-Wall Leathergrain Pattern; in grey is Bolta-Wall Bamboo.

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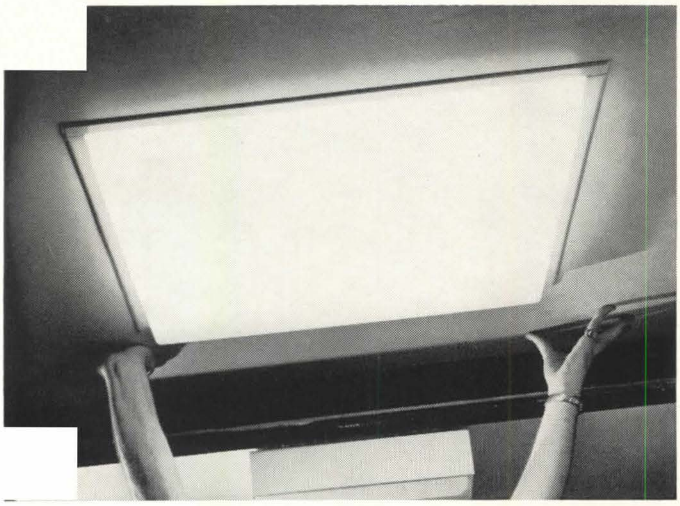
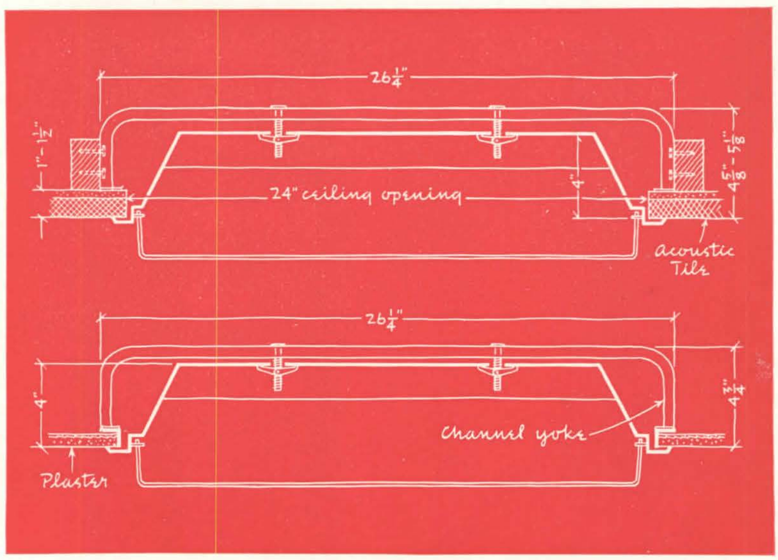
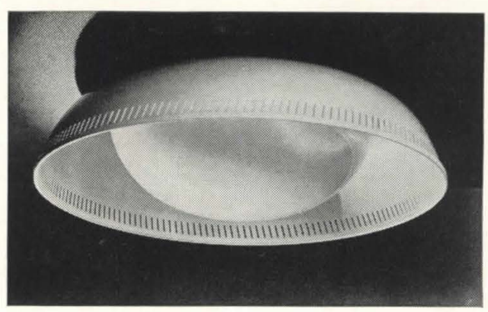
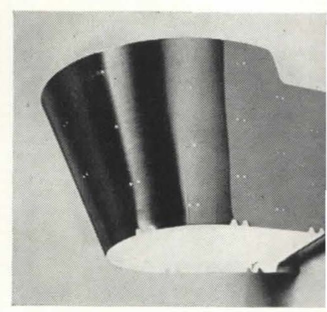


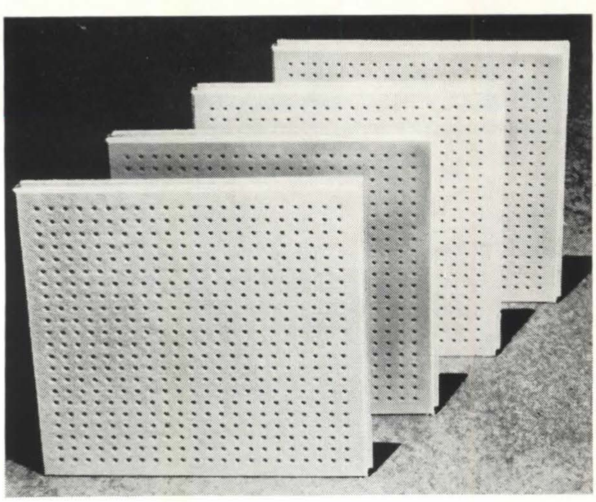
Ceiling Fixture: #11526/ "Optiplex"/ Plexiglas diffuser/ recessed depth, 4", exposed depth, 1-11/16"/ 24" long, 23-9/16" wide/ baked white-enamel finish/ snaps in and out of position with finger-tip pressure/ **retail:** $93/ **Lightolier, 11 E. 36 St., New York, N. Y.**



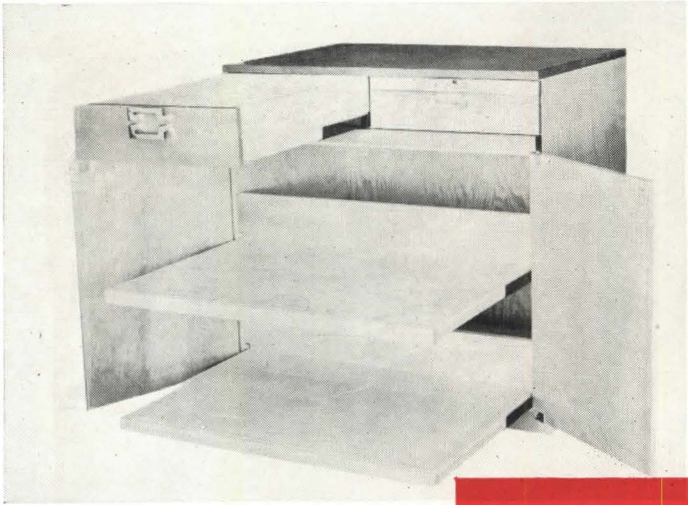




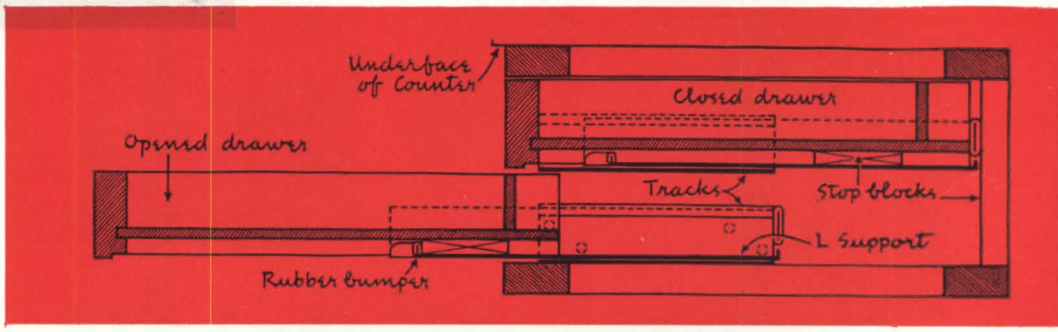
Acoustical Tile: "Kolor-Fast Variegated"/ available in four blending tawny shades of tan plus white "Sta-Lite"/ applicable with patented Nu-Wood clips, Adhestik, nails, or screws/ tongue and groove edges/ 12" x 12", ½" thick/ **Wood Conversion Company, First National Bank Building, St. Paul, Minn.**

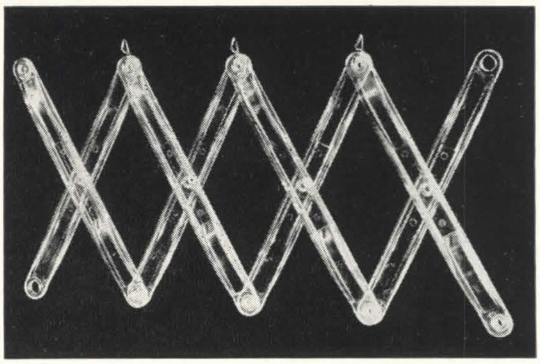


Lighting Fixtures: #2088/ glass ceiling fixture with white aluminum shade/ 18" diameter, 4½" high/ **retail:** $42/ #9464/ brass wall bracket/ 8" diameter, 5½" high/ **retail:** $59/ both designed by Paavo Tynell/ **Finland House, 41 E. 50 St., New York 17, N. Y.**



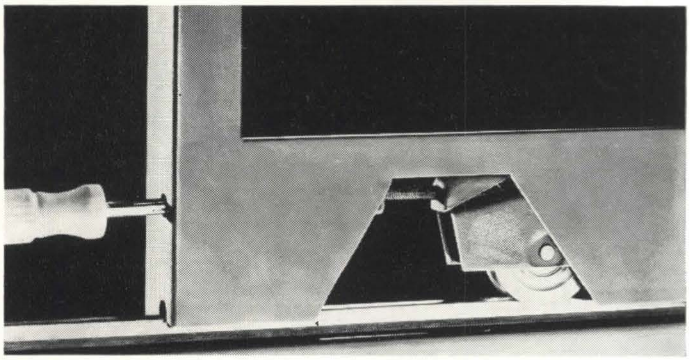
Extension Drawer Support: "New Standard"/ eliminates need for framing between drawers, saves space, permits full extension/ 18-gage cold-rolled steel/ 10 standard sizes—7" to 30", to fit drawers 7'-3/4" to 36"/ **The Extension Drawer Support Co., 2319 W. Washington Blvd., Los Angeles 18, Calif.**

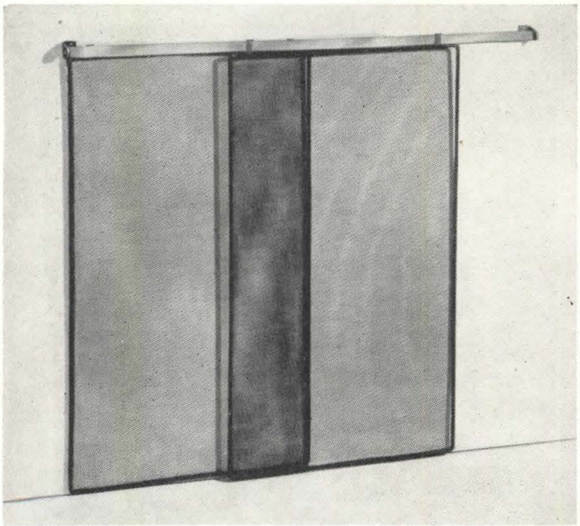




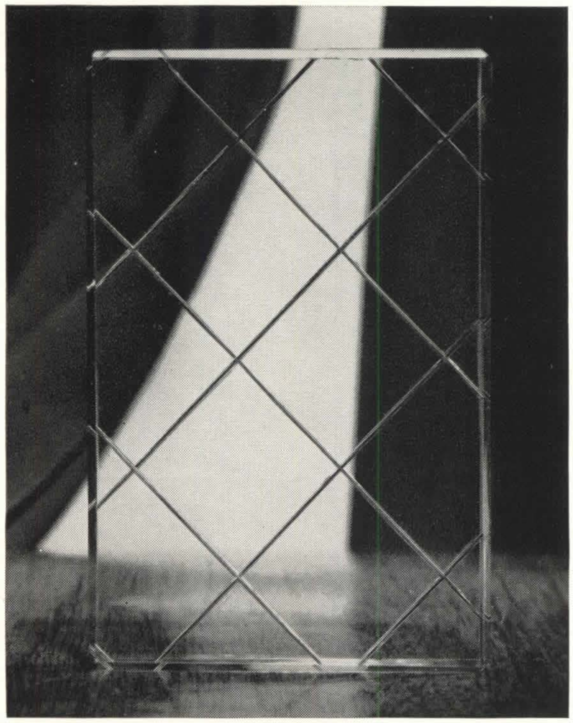
Draw-Drapery Spacing Device: "Kirschspacer"/ automatically all slides are powered directly by the pull-cord/ each pleating space between slides can be up to 5½" in width/ polystyrene transparent plastic/ **Kirsch Company, Sturgis, Mich.**

Adjustable Sliding-Door Rollers: brass roller incorporated in steel-framed glass doors/ may be adjusted with a screw-driver to raise or lower door without removing from frame/ **Arcadia Metal Products, P. O. Box 657-32, Arcadia, Calif.**





Firescreen: #H615/ panels slide full length of track, saving space and effort/ panels of steel and steel mesh painted black, track of brass/ 30" high, 38" wide/ manufactured by Howard Miller Clock Co./ designed by George Nelson/ **retail:** $25/ **Richards Morgenthau Company, 225 Fifth Ave., New York, N. Y.**



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- It is non-combustible . . . won't burn.
- It is rigid . . . doesn't sag or warp.
- It has a permanently hard, impervious surface, not affected by time, abrasion or exposure to the elements.
- It won't corrode or stain.
- It resists chemicals—acids, solvents, etc.
- It retains its original clarity, brilliance and lustrous beauty.
- It is easily installed, maintained and cleaned by conventional methods.

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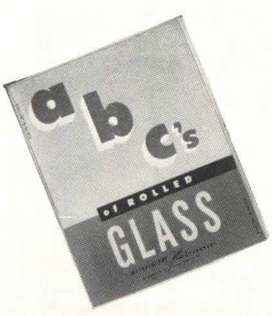

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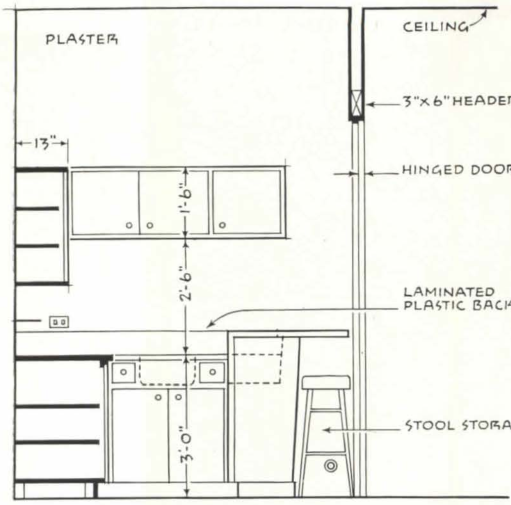
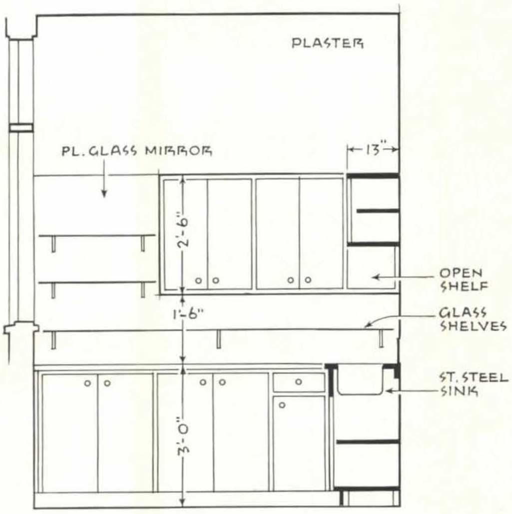
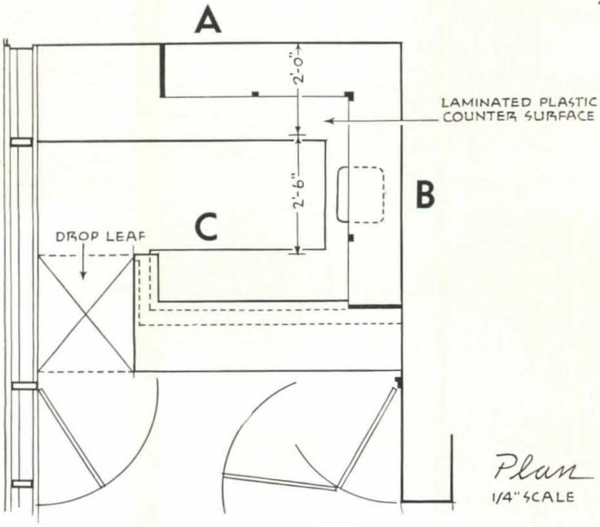


Elevation **B** 1/4" SCALE

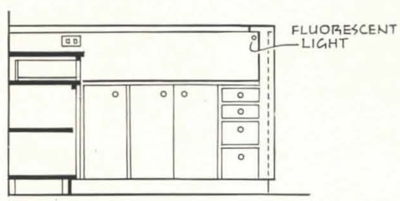
MORLEY BAER



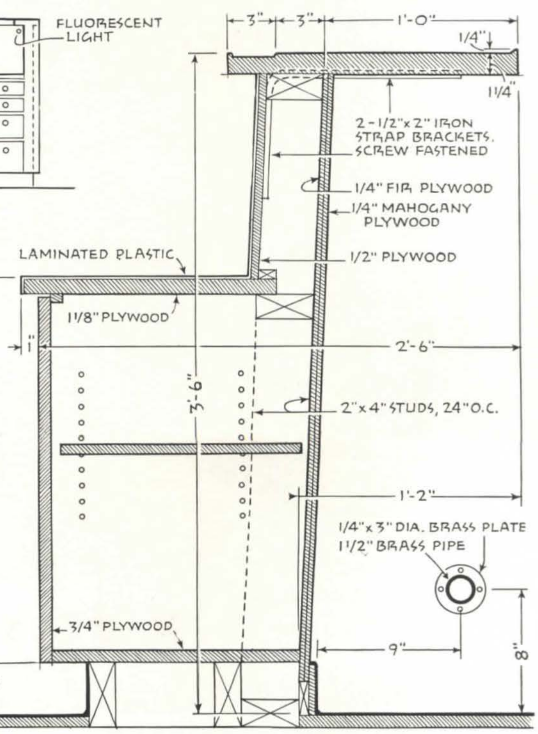
Elevation **A** 1/4" SCALE



Plan 1/4" SCALE



Elevation **C**



Section 1" SCALE

COSMAS HOUSE, Marin County, Calif.

Henry Hill, Architect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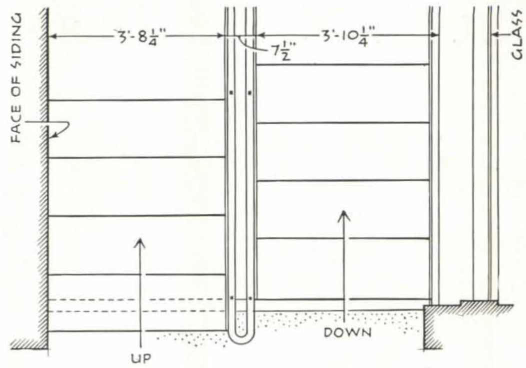
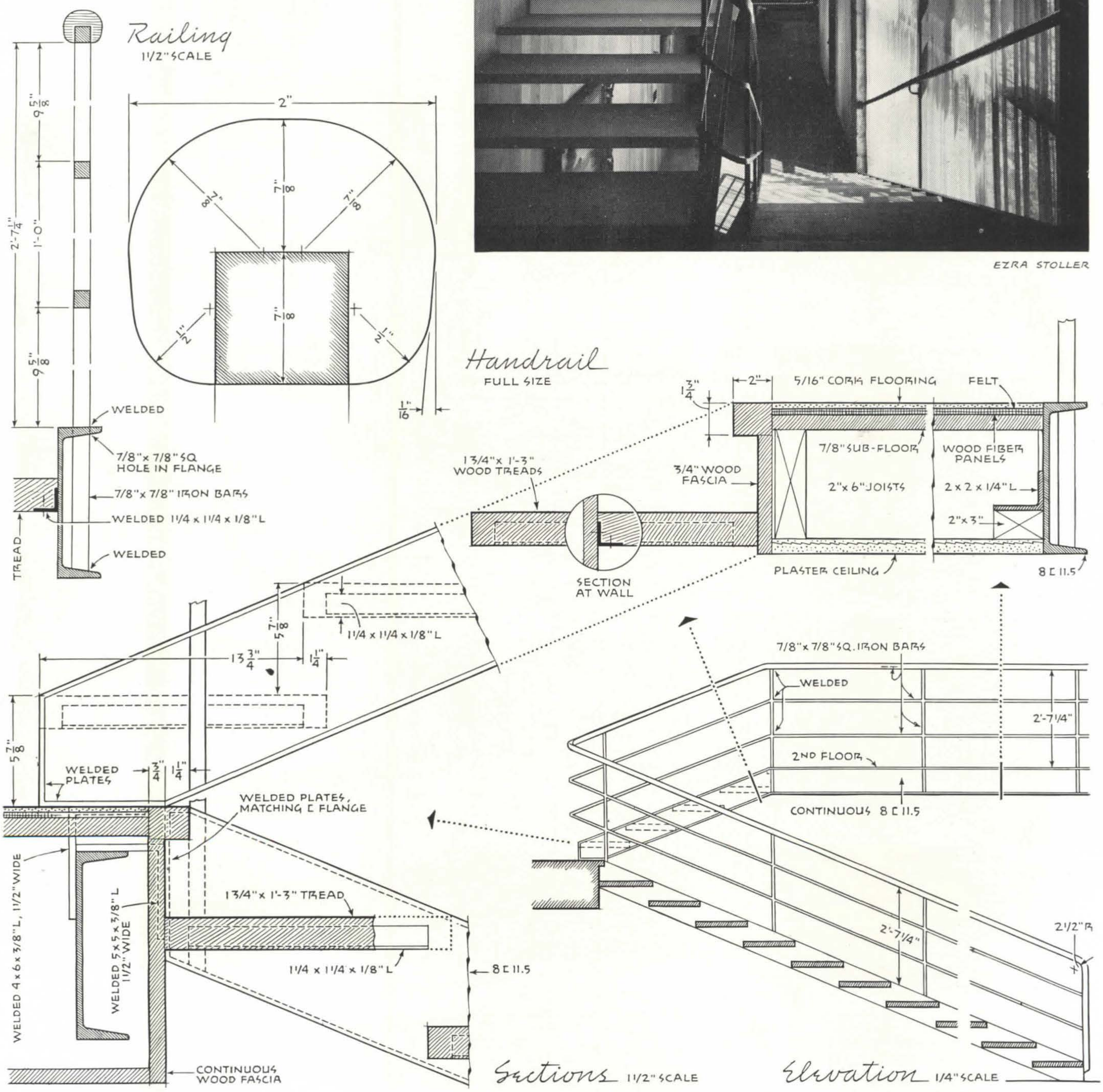
Cooling?
Air Conditioning?
Process?
ASK THE AEROFIN MAN
About Practical Heat Exchange
There is a competent Aerofin heat-transfer engineer near you—qualified by intensive training and long experience to find the *right* answer to your own particular heat-exchange problem—and backed by the research and production facilities of the pioneers in light-weight extended surface.
Ask the Aerofin Man.

house: stairway



Landing Plan
1/4" SCALE

EZRA STOLLER



Sections 1/2" SCALE

Elevation 1/4" SCALE

REID HOUSE, Purchase, N. Y.

Edward L. Barnes, Architect

10 ways CECO steel joist construction is better... **prove it to yourself!**

+ Every day you hear claims of how one method of construction is better and cheaper than all others. We at Ceco believe that facts and only facts should be given the building industry—so we offer a check list which covers the important requirements for light occupancy building. We have checked each point where Ceco meets the need. Make your own comparison with any other method of construction

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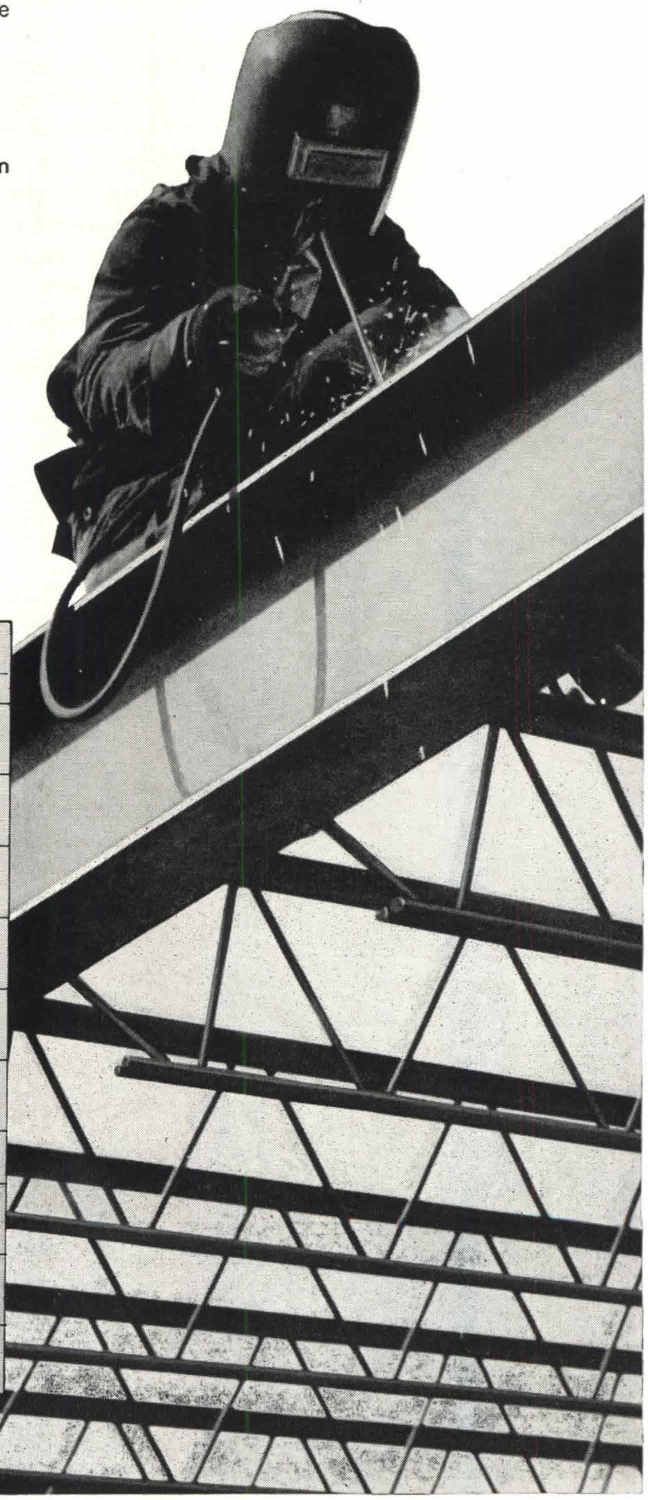

Check building methods Use this PROOF chart	Ceco Steel Joist Construction		Building Method A		Building Method B	
	Yes	No	Yes	No	Yes	No
Lightweight . . . the "dead load" is low yet strength is not sacrificed	√					
Fast and Easy to erect . . . no special equipment or false-work necessary	√					
Self Centering . . . form work rests directly on joists . . . no additional support needed	√					
Conceals Conduits . . . saves space. Ceilings attach to joist, eliminating suspended ceiling	√					
Fire Resistive . . . ideal with incombustible top slab and metal lath plaster ceiling	√					
Sound Resistant . . . with concrete slab above and plaster ceiling below	√					
Non-shrinking . . . no warping, cracking, sagging or shrinking	√					
Termite Proof . . . cannot be damaged by rodents, termites or insects	√					
Versatile . . . designed for office buildings, schools, stores, hospitals, apartments, plants	√					
Low Cost . . . light-weight construction reduces weight of supporting beams, columns and footings	√					

Periodically this column supplements Tomson's *Architectural and Engineering Law* (Reinhold 1950) by reporting briefly summaries of cases decided and other matters of interest occurring since the publication of the book. The last such summary appeared in April 1952 P/A. A number of cases that merit more than a capsule treatment will continue to be discussed in more extensive fashion.

PRACTICE STATUTES

Statutes regulating the practice of architecture, professional engineering, land surveying, and building construction are in the interest of the public health, safety and welfare, and are therefore upheld as a valid exercise of the state police power.

Michigan. (U. S. Dist. Ct.) *Lowey v. A. Rosenthal, Inc.*, 104 F. Supp. 496 (1952). In an action to recover for services rendered by industrial designers in connection with the proposed modernization of defendant's store to increase the volume of business, the Court found that the services consisted of industrial design work and not architectural work within the meaning of the Michigan statutes requiring a license to engage in the practice of architecture but making such requirement inapplicable to the practice of any other legally recognized profession.

The Court cited with approval *Teague v. Graves*, 261 App. Div., 692, 27 N. Y. S. 2nd 762, which stated in part:

"Industrial Designing as a separate field of endeavor has been developed recently . . . it is now recognized by many institutions of learning . . . The graduates from the universities, institutes and schools who will have scholastic degrees as Industrial Designers doubtless will be regarded as professional men . . ."

•

Illinois. *Gastaldi v. Reuterman*, 345 Ill. App. 510, 104 N.E. 2d 115 (1952). Plaintiff submitted a bid for construction of defendant's salesroom and garage based upon plans drawn by a licensed architect retained by the defendant. Defendant refused to proceed with the project after numerous conferences. The Court determined that the defendant dealt with plaintiff knowing that he was a general contractor and that the contract did not call for the rendition of architectural services by the plaintiff so as to preclude recovery for services rendered on the ground that he was not a licensed architect. The Court declared that under the act defining the practice of architecture and under Section 4 which provides that the act shall not prevent the employment of superintendents of construction, etc.. it was not the intent of the legislature that supervision of construction by a licensed architect should necessarily preclude any other supervising of the construction.

On P. 117, the Court quotes an earlier Illinois case as follows:

"The object of this statute was not to protect architects merely by limiting the work to those that possessed a license. The real purpose of the statute is the protection of the public against incompetent architects, from whose services damage might result to the public by reason of dangerous and improperly constructed buildings and by badly ventilated and poorly lighted buildings."

•

New York. *D'Lubosch v. Andros*, 200 Misc. 400, 109 N. Y. S. 2nd 491 (1951). In an action for work, labor, and services rendered in drawing plans and specifications for a dwelling which defendants had contracted to have constructed the court held that the licensed engineer was entitled to recover for drawing the plans and specifications even though he was not a licensed architect. In view of the fact that the practice statutes make no distinctions between the services which may be legally rendered by a licensed engineer and an architect, it is not contrary to the fundamental purpose of licensing which is to protect and safeguard life, health, and property.

PRACTICING WITHOUT A LICENSE

The failure of an architect, engineer, surveyor, or general contractor to procure a license as required by statute may constitute a misdemeanor subjecting him to criminal prosecution, and render the contracts he has entered into for the performance of professional services illegal and void.

California. *Walter M. Ballard Corp. v. Dougherty*, 234 P.2nd 745 (1951). Where the practice statute made the practice of architecture by an unlicensed person a misdemeanor, the Court held that an unlicensed corporation, engaged in the business of hotel decoration, was not lawfully precluded from hiring a licensed architect for the preparation of the plans and specifications pursuant to a contract between the hotel owner and the plaintiff.

POWERS OF LICENSING BOARDS

Licensing Boards created by statute may grant and revoke licenses as empowered by statute. Courts will generally overrule their determination only in clear cases of abuse of discretion.

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Nebraska. State ex.rel. *Binty v. Nebraska State Board of Examiners For Professional Engineers and Architects et al.*, 155 Neb. 99, 50 N.W. 2nd 784 (1952). The statute requires the board to examine the evidence and exercise its discretion with reference to every application for a certificate of registration as an engineer or architect that is filed. The Court held that mandamus would not lie to control the exercise of discretion vested by the board and require it to issue a certificate of registration where the board had already denied the application.

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Nebraska. *Downs v. Nebraska State Board of Examiners of Professional Engineers & Architects*, 139 Neb. 23, 296 N.W. 151 (1941). Plaintiff was held entitled to mandamus directing Board of Examiners to issue a certificate of registration to practice engineering without an examination where statutory provisions of residence, good character, payment of registration fee were complied with and plaintiff was a professional engineer of good standing holding two engineering degrees.

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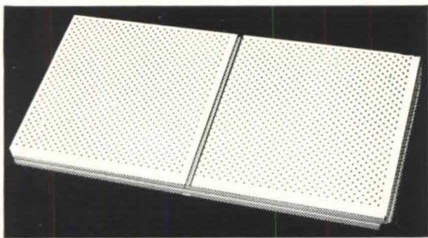
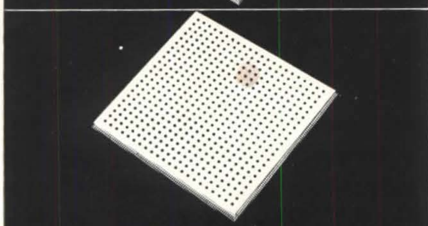
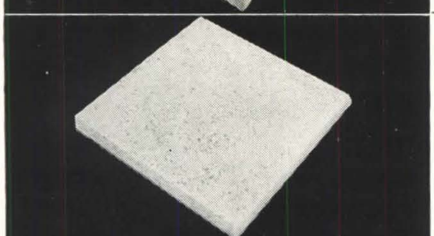
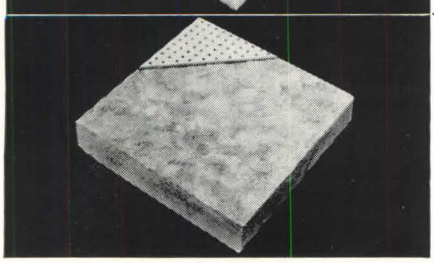
		Noise Reduction Coeff.	Thickness	Sizes	Finish
	**ACOUSTIMETAL** Low maintenance cost. Can be washed or painted any number of times. Panels quickly removed for access to plumbing and wiring. Incombustible, permanent, salvageable. High acoustical efficiency.	.85	$1\frac{9}{16}$"	12" x 24"	Alkyd resin enamel finish. Baked on by infra-red light. Bonderizing of metal assures greater adhesion of paint.
	**TRAVACOUSTIC** Beautiful mineral tile resembling natural travertine stone. Fissures vary in size, depth and arrangement. Incombustible, sanitary, acoustically efficient. Resistant to mold and vermin.	.65 .70 .70	$\frac{11}{16}$" $\frac{13}{16}$" $\frac{7}{8}$"	6" x 12" 12" x 12" 12" x 24"	Non-glaring white finish applied at the factory gives high light-reflection. Repaintable with brush or spray gun.
	**ACOUSTIFIBRE** Repaintable wood fibre tile. Einhiple-drilled for round, clean holes deep into porous core. Finish resistant to mould and fungus. Sanitary, washable.	.55 .65 .70	$\frac{1}{2}$" $\frac{5}{8}$" $\frac{3}{4}$"	12" x 12" 12" x 24" 24" x 24"	Factory-applied, washable shell-white Restex or Flame Resistant finish on face and bevels results in high light-reflection.
	**ECONACOUSTIC** Low cost wood fibre tile. Distinctive brushed texture surface offers unusual natural beauty. Cleanable with vacuum cleaner.	.55	$\frac{1}{2}$"	12" x 12" 12" x 24"	Prepainted white. May be spray-painted when other colors are desired.
	**THERMACOUSTIC** A mineral wool product especially adaptable to irregular surfaces. Spray-applied to any desired thickness. Rotproof. Also provides thermal insulation and fire protection.	.80 at $\frac{1}{2}$" thickness on metal lath	As desired	Monolithic	Fissured texture can be repainted to harmonize with the decorative scheme without destroying its acoustical properties.
	**PERFORATED ASBESTOS-ZEROCEL WOOL SYSTEM.** Durable, incombustible acoustical system. May be "custom built" to job requirements. Inorganic composition. Will not retain moisture.	.80	1"	12" x 12" 12" x 24" 24" x 24" 24" x 48"	Furnished unpainted in natural gray color. Can be painted any color and repainted any number of times.

Lath, Plaster, Lime, Sheathing, Gypsum Roof Decks, Wall Paint, Textures, Rock Wool Insulation, Metal Lath, Roofing, Siding, Sound Control Products, Fireproof Wallboards