

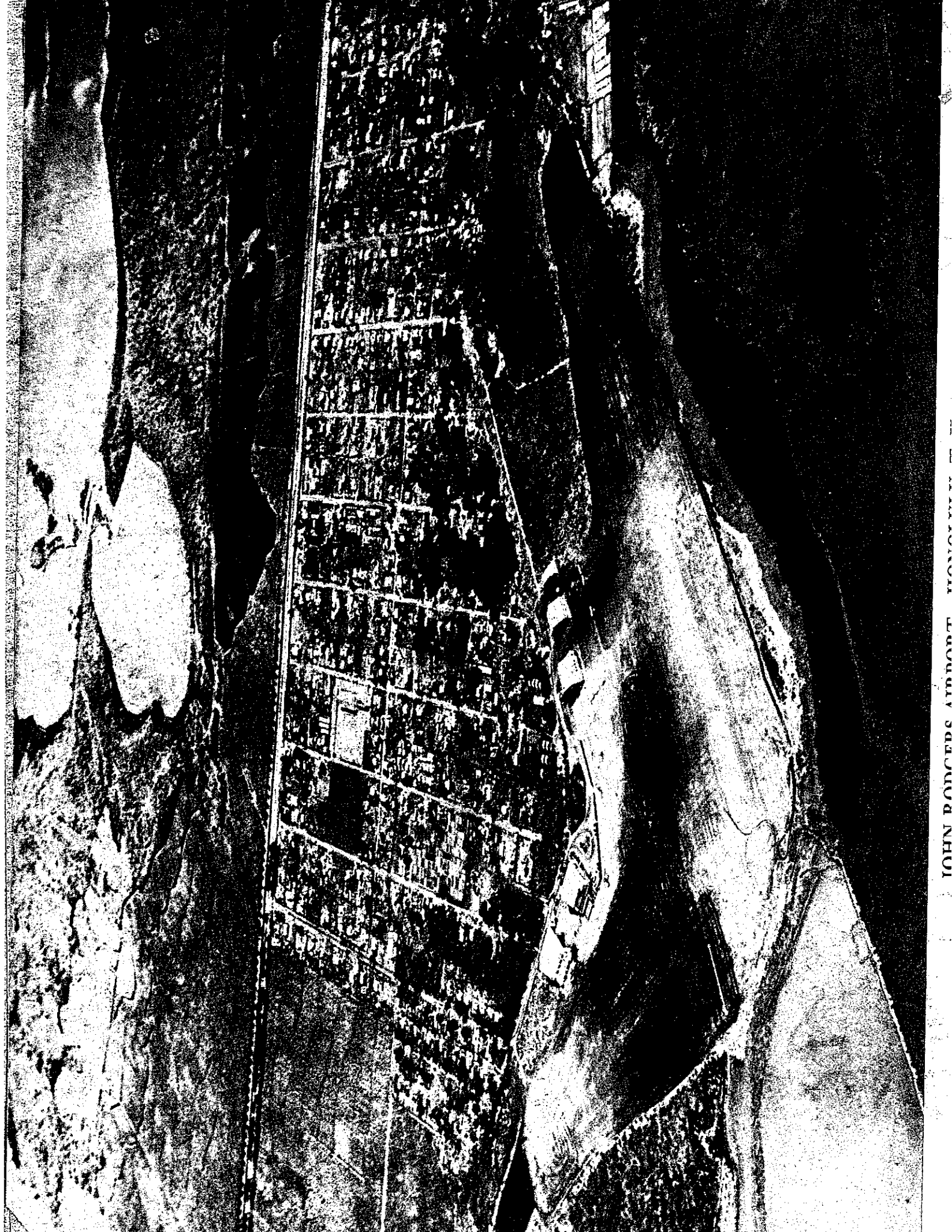
**MASTER PLAN**  
FOR THE  
**HONOLULU INTERNATIONAL**  
**AIRPORT**

**HONOLULU, HAWAII**

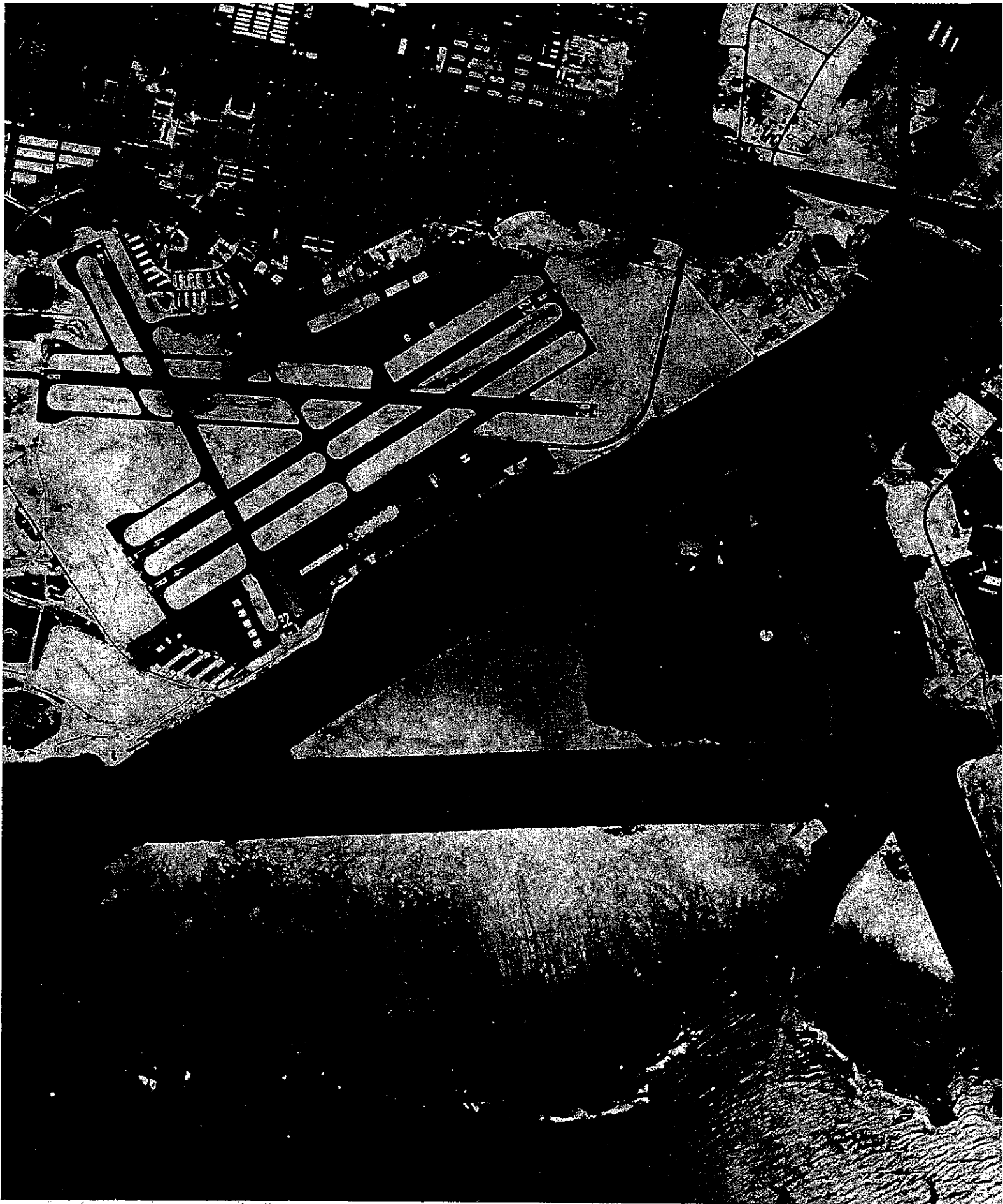
**FEBRUARY, 1951**

**CLARK M. KEE**  
**CONSULTING ENGINEER**

**HONOLULU, T. H.**



JOHN ROBERTS AIRPORT



HONOLULU INTERNATIONAL AIRPORT, 1951

HONOLULU INTERNATIONAL AIRPORT  
HONOLULU, T. H.



HAWAII AERONAUTICS COMMISSION



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CLARK M. KEE  
Consulting Engineer  
Honolulu, T. H.

The Hawaii Aeronautics Commission  
Honolulu, T. H.

Gentlemen:

In accordance with the contract between us, dated December 31, 1949, I have prepared and am pleased to submit herewith my Report and Master Plan for the expansion and stage development of your Honolulu International Airport, together with its related projects.

After preparing a Master Plan, it is inevitable that you arrive at certain conclusions, and that these conclusions, in time, lead to specific recommendations. These taken together with the suggested plans, all of which are discussed in complete detail in the body of this report, are based upon realistic experience and in actual operation, the practical concept of the uses which the completed facilities will be required to provide, always keeping in mind, the financial aspects as well as the operating functional characteristics. The relationship of the Airport to the greater Honolulu and Territorial area, as an integral part of the Commercial life of the community has received due and careful consideration.

All anticipated growth of air transportation in the future, as far as such growth can be foreseen, and of the development in commercial and military aircraft, especially as to their size, type (land and sea planes) and their flight characteristics, have been covered in the designs and plans.

All government agencies such as Public Health, Immigration, Agriculture and Customs have signified their approval of the plans in writing. The design conforms to the rules, regulations and ordinances of such government bodies as may have jurisdiction.

I most earnestly urge the early approval of this report and Master Plan so that development can proceed rapidly in order to take advantage of aid from the Civil Aeronautics Administration and others.

The Federal Airport Act requires that allocation of funds and appropriations be approved by Congress, for fields of the class of Honolulu International Airport. Until the Civil Aeronautics Administration has approved the preliminary plans and estimates, the allocations for Honolulu are uncertain. Speed, thus, becomes an important factor.

The consummation of this plan, as I have designed it, will provide Honolulu with the facilities it so greatly needs and deserves, and will place the Airport in the position of becoming one of the leading Airports of the World.

I have enjoyed working with you on this program and have appreciated the help and understanding that I have received from the Commission.

I also commend to your attention the wholehearted cooperation given to me by your Director and his entire staff. I cannot speak too highly of the aid and assistance so freely rendered me by all of the members of your staff.

I wish you every success in the early completion and fulfillment of the plans and ambitions looking towards making Honolulu a leader among airports.

Very Truly Yours,

CLARK M. KEE  
Consulting Engineer  
HONOLULU, T. H.

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## FOREWORD

This report covering the Honolulu International Airport represents the thinking and planning of the Consulting Engineer, employed by the Hawaii Aeronautics Commission to prepare a Master Plan and construction project for the orderly development of this Airport.

It is in no way mandatory upon the Commission to accept all of the items reported upon or, in fact, any particular item. Rather this report should be used as a guide for the Hawaii Aeronautics Commission and the various items should be approved and implemented when their need becomes apparent in the best judgment of the Commission.

## INTRODUCTION

From the earliest days of the sailing ships, with canoes antedating the sailing ships, Hawaii has been recognized as one of the world's most important traffic points. Not without cause was it given, years ago, the name of "The Crossroads of the Pacific." A name more deserved today than when it was bestowed over a century ago.

Every world happening has only served to increase the importance of this Crossroads of the Pacific. It often happens that a new form of transportation renders valueless and obsolete some locality or facility so valuable to former modes of travel.

The latest form of transportation, the movement of peoples and cargo by air has not rendered Hawaii obsolete, but on the contrary, has enhanced its place in the transportation world some tenfold, perhaps even a hundredfold.

After a most careful study of the present facilities and the future needs, as far as can reasonably be foreseen, I have prepared and present in this my report, a Master Plan which embodies the design criteria and the recommended development, stage by stage, to be followed to guide you in the proper development of the Honolulu International Airport in order to meet all anticipated future requirements.

The exterior appearance of all buildings and the ability to secure Hawaiian type structures will be the sole responsibility of whatever architect you may employ. It is recommended that great care be exercised in your choice of architects.

## SUMMARY OF CONCLUSIONS AND RECOMMENDATIONS

While aircraft have increased in speed, comfort, quietness and are more luxurious, many air terminals remain inadequate, inefficient, downright shabby, and can only render the very minimum of service to the passengers and general public. Runways and field installations are obsolete, in poor condition, and not adequate for the anticipated growth in air traffic and the newer aircraft. Honolulu is no exception. The above conditions are in effect here to a marked degree.

The last war gave air transportation a terrific impetus and dramatically brought home that air transportation is a vital part of our national economy and an important adjunct to the nation's transportation system. The Berlin and Korea airlifts have further demonstrated the real and vital part air transportation plays in our daily lives.

This impetus, through necessity, made possible in a short period of time aircraft developments which under normal circumstances would have taken many years, and in many instances would not have reached the practical stage even at this date.

Consequently, the spread between ground services and air services has widened and the public are demanding that the ground services catch up with the air services.

There has been a strange apathy in the exploration and development of revenue to be derived from non-aeronautical sources. Such revenue properly exploited will not only provide the necessary funds with which the projects can be amortized, but by modernizing and increasing the efficiency of the facilities for handling aircraft, passengers and cargo, can help reduce the cost of air transportation to a point where it will be brought within the reach of a much greater

range of people, thus increasing one of the sources of non-aeronautical revenue to the airport operator, and increasing the load factor on the airplanes. This could all add up to an increasing prosperity to both airport operators and airlines operators, all without increased cost to the taxpayer.

My examination of Honolulu's needs have been thorough and conscientious. The volume of passengers and cargo traffic and the revenues to be derived from aeronautical and non-aeronautical sources are very conservative, and I have no doubt will all materialize if the facilities, as designed, are constructed.

It is necessary that the operations at Honolulu International Airport be established upon a sound economic basis, both from a financial and an efficiency standpoint. To achieve this much desired result, it is therefore recommended that:

1. The Hawaii Aeronautics Commission approve this report and master plan.
2. Application be made at once to the Civil Aeronautics Administration, looking towards their approval of this project as presented in this report and master plan, in order to insure their financial participation under the Federal Aid Airport program.
3. The Hawaii Aeronautics Commission to take the necessary steps, with the Legislature, to obtain that degree of autonomy necessary so that negotiations can be inaugurated relative to a Revenue Bond issue to meet the Commission's share of the capital contribution necessary to make this project a reality.
4. The terminal area to be developed to include the Terminal or Administration Building, the service station and garage, International House, the terminal parking area, Hawaiian Island Village in Keehi Lagoon, the hotel to be considered when needed and all other related items as shown on the First Stage Development Plans.
5. That plans be made at once for developing additional revenues from concessions and other non-aviation sources, and for a complete revision of aviation fees and rental incomes.
6. Necessary steps be taken to procure the needed land from the Damon Estate, both the 100-foot buffer strip, Ewa-side of the present number one entrance highway and all of the land belonging to the Damon Estate lying on the Diamond Head side of the above mentioned entrance highway.
7. Immediate steps to be taken to secure title to the balance of the land areas necessary to implement the Master Plan. These areas are as follows:
  - Parcel No. 1—From the Air Force
  - Parcel No. 2—From the Army
  - Both shown on Hawaii Aeronautics Commission Drawing Title "Honolulu Airport—Showing Airport Boundaries," Drawing No. 1148.3, dated January 6, 1949.
  - Areas Nos. 2, 5 and 6 from the Navy, shown on Navy Drawing, Title "Land Acquisition," Drawing No. OA-NI-1775, dated July 13, 1948.All drawings are on file in the Hawaii Aeronautics Commission Engineering files, Honolulu Airport.
8. Plans to be developed by the Department of Public Works for the bridge and traffic interchange between our new access entrance highway that runs parallel to the golf course along the Lagoon, and the Nimitz Highway. Also the same department to develop plans for the new access entrance highway mentioned above. All as shown on our Master Plan.

9. Service facilities to be developed in accordance with the plans as outlined in the Master Plan. Such service facilities to include the necessary extensions to water service, drainage, sewerage, power and light, field lighting, communications, fire protection, gasoline storage and dispensing, ramp service trench, to contain 110V, 220V and 440V current, gasoline dispensing system, water lines, compressed air lines, telephone lines and allied facilities.
10. Proper protective zoning ordinances to be enacted or modernized as the case may be.
11. Proper long range financial management program be set up together with a long distance maintenance program plans. Economic surveys of each existing airport, together with contemplated future airports.
12. Long range plans be prepared looking towards implementing Stages Two and Three, when conditions warrant.

### HONOLULU TRADE TERRITORY

The Honolulu Trade Territory area, not only is comprised of the City of Honolulu, but the entire Island of Oahu, plus all of the neighboring Islands. The entire group of islands, making up the Territory of Hawaii are of such closely knit entity that it is impossible to separate each island's sphere of influence. Consequently, to establish the ultimate use of the Honolulu Airport, it is necessary to consider the islands as a group together with the growth and economic characteristics of the entire Territory of Hawaii and not just the City of Honolulu alone.

In addition to the permanent population of the Territory of Hawaii, the population of the Islands is augmented by an annual influx of approximately 50,000 visitors. That this figure will undoubtedly increase is shown by comparisons compiled by the Hawaii Visitors Bureau, said comparison showing 9,676 visitors in 1922, increasing to 45,396 in 1949 and indications that 1950 may show up to 60,000 visitors when the year's end makes all figures available.

We must also consider the vast potential market of the Far East which will undoubtedly re-open one of these days. It is hoped in the not too far distant future.

Bank clearings for the Territory of Hawaii have risen from \$470,828,166.91 in 1940, to \$1,642,926,878.93 in 1949. During the same 10-year period Post Office receipts for the Honolulu Post Office alone, increased from \$1,363,341.27 in 1940, to \$2,843,939.93 in 1949.

Many other figures could be quoted to indicate the same steady, sure increase in the financial strength of this area.

To the Territory, air transportation has played a more vital part in the growth and economic development than it has for the majority of other communities, and must and will continue to play an increasingly important part in the life of this community. Today 68% of all peoples arriving or departing from the Territory are using air transportation. A few years hence this figure will increase to between 85% and 90%. However, this entails a responsibility on the part of the Hawaii Aeronautics Commission and the people of the Territory, and makes it mandatory upon the part of all concerned here in the Territory, to see to it that the Airport and aviation facilities not just keep pace, but actually lead this growth and community activity.

## THE PRESENT AIRPORT

### Description and Location

The Honolulu International Airport is located in the City and County of Honolulu on the Island of Oahu, some 5.5 miles WNW from the Aloha Tower in the City of Honolulu proper.

Of particular note is the strategic location of the Honolulu International Airport with respect to the entire Pacific Area. Its geographic location makes it an important factor in Pacific Air defense.

Prior to the War, John Rogers Airport (now Honolulu International Airport) was being developed by the U.S. Engineers as a seaplane base and airport, under the sponsorship of the Civil Aeronautics Administration as a National Defense project.

By mid-1943, the land plane area had been filled by spoil from seaplane channel dredging and then runways completed.

The Airport today comprises some 4,107.283 acres, making it one of the largest in the United States. As presently constituted the Honolulu International Airport consists of the old John Rogers Airport, enlarged as described above, plus the Keehi Lagoon seadrome.

### Existing Pattern

The existing conditions are shown on drawing number two entitled "Plan Showing Existing Conditions and Property Acquisition."

The present runway system follows the standard six-way layout, with the main runway laying East and West, 7,650 feet in length by 200 feet in width. The secondary main consists of two parallel runways laying Northeast and Southwest, 7,000 feet in length by 200 feet wide. This pair of runways are probably a bit truer prevailing wind runways than the main runway and have a larger volume of take-offs and landings due to their use by the inter-island carriers. The storm quadrant runway lays North-Northeast by South-Southwest and is 6,150 feet long by 200 feet wide. A fairly adequate taxiway system is provided by short stretches of taxiways supplemented by the ramp areas which lie on both the northerly and southerly sides of the Airport.

All of these lengths are barely adequate and their lengthening has been recommended and so shown on the Master Plan.

The fill material placed beneath the runway system was of select coral, which had been well compacted during the course of construction and later by years of compaction in place. Consequently, recent evaluations of the bearing power of the present pavement plus tests made using the B-36 bombers, lead us to believe the runways have adequate bearing power and will not have to be strengthened in the foreseeable future.

This condition is further bolstered by the fact that aircraft manufacturers are becoming more cognizant of the economics involved in the continual indiscriminate increase of unit wheel loading. There is a trend in thought now towards multi-wheel, caterpillar treads and similar type landing gear to keep the unit wheel load pressures within reasonable limits and within limits now imposed by the runway systems now in use.

### Buildings

Hangars, nose hangars and kindred buildings are scattered indiscriminately around the perimeter of the airport, without much thought or planning having entered into their location.

The airport is presently served by two terminals, located on opposite sides of the airport, neither of which is adequate nor designed for the purposes they are now being put to.

The facilities on the North side (mauka) are used by one of the local certificated carriers for an exclusive operation. The building being used for the overseas terminal is a wooden wartime structure, and was never designed for use as a passenger terminal, nor for an airport administration building.

It is felt no time should be wasted in getting the planned modern Administration Building under construction. One bad fire, with the resulting loss of the Control Tower and allied equipment would constitute a serious blow to aviation, the tourist visitors and to Hawaiian business in general.

Numerous wartime barracks and other installations are scattered along the north side of the Airport. The Master Plan takes into account the re-modeling of these buildings, together with use for many of them in an "As Is" condition.

The electrical utilities, sewage and water systems had been well installed by the Army and Navy during the war and would seem adequate for many years to come, with some minor additions and modifications being made from time to time as conditions may warrant.

## AIR TRAFFIC

### Trends

All transportation trends now favor air travel, the growth of which is vividly shown in the following table No. I, covering the United States.

TABLE NO. I

		<i>Annual Number Of Passengers</i>
At the practical start		
of Commercial Aviation.....	1927.....	5,782
Twenty Years Later.....	1947.....	12,890,208
	1948.....	13,096,045
	1949.....	14,777,436

This shows generally increased acceptance air travel by the general traveling public.

TABLE NO. II

Shows the number of passengers carried by air between the islands comprising the Hawaiian Group. (See Plate I.)

1938.....	28,611
1939.....	21,861
1940.....	28,624
1941.....	48,855
1942.....	82,397
1943.....	107,945
1944.....	110,242
1945.....	159,807
1946.....	293,597
1947.....	436,034
1948.....	376,258
1949.....	389,227

TABLE NO. III

Shows passengers carried by air between Hawaii and the mainland. I have omitted the war years as such traffic is not a true criterion. (See Plate 2.)

1938.....	232
1939.....	520
1940.....	639
1941.....	1,153
War Years	
1946.....	27,886
1947.....	63,005
1948.....	93,000
1949.....	116,652

TABLE NO. IV

Shows the monthly gasoline consumption in gallons for all gasoline dispensed at the Honolulu Airport. (See Plate 3.)

1945	Gallons	1948	Gallons
January .....	77,969	January .....	1,130,845
February .....	41,864	February .....	787,654
March .....	41,864	March .....	914,976
April .....	41,864	April .....	862,604
May .....	56,716	May .....	948,765
June .....	50,635	June .....	984,072
July .....	58,214	July .....	1,115,252
August .....	64,686	August .....	1,087,442
September .....	72,832	September .....	1,151,257
October .....	77,613	October .....	1,160,531
November .....	52,838	November .....	930,777
December .....	71,352	December .....	986,606
1946	Gallons	1949	Gallons
January .....	112,132	January .....	1,317,610
February .....	41,629	February .....	906,815
March .....	209,753	March .....	969,702
April .....	326,387	April .....	943,335
May .....	97,204	May .....	1,060,046
June .....	246,846	June .....	1,027,463
July .....	451,254	July .....	1,331,051
August .....	385,675	August .....	1,054,353
September .....	320,416	September .....	1,255,732
October .....	413,316	October .....	1,274,201
November .....	508,731	November .....	1,202,330
December .....	651,520	December .....	1,159,013
1947	Gallons	1950	Gallons
January .....	1,021,525	January .....	1,374,072
February .....	510,320	February .....	1,034,377
March .....	611,306	March .....	1,094,501
April .....	563,440	April .....	1,049,333
May .....	690,211	May .....	1,262,026
June .....	765,094	June .....	1,230,254
July .....	1,100,646	July .....	1,392,287
August .....	805,656	August .....	1,593,321
September .....	987,085	September .....	2,434,871
October .....	981,408	October .....	2,582,782
November .....	939,334	November .....	2,433,118
December .....	931,637	December .....	2,104,958



*Totals*

1945.....	708,447
1946.....	3,764,863
1947.....	5,745,766
1948.....	12,060,781
1949.....	13,501,833
1950.....	19,575,900

TABLE NO. V

Shows the monthly fuel tax collections in dollars. (See Plate 3.)

<i>1945</i>		<i>1948</i>	
January .....	\$ 3,118.76	January .....	\$56,542.25
February .....	1,674.56	February .....	39,382.70
March .....	1,674.56	March .....	45,748.80
April .....	1,674.56	April .....	43,130.20
May .....	2,268.64	May .....	47,438.25
June .....	2,025.40	June .....	49,203.60
July .....	2,328.56	July .....	55,762.60
August .....	2,587.44	August .....	54,372.10
September .....	2,913.28	September .....	57,562.85
October .....	3,104.52	October .....	58,026.55
November .....	2,113.52	November .....	46,538.85
December .....	2,854.08	December .....	49,330.30
<i>1946</i>		<i>1949</i>	
January .....	\$ 4,485.28	January .....	\$65,880.50
February .....	1,665.16	February .....	45,340.75
March .....	8,390.12	March .....	48,485.10
April .....	13,055.48	April .....	47,166.75
May .....	3,888.16	May .....	53,002.30
June .....	9,873.84	June .....	51,373.15
July .....	18,050.16	July .....	66,552.55
August .....	15,427.00	August .....	42,181.40
September .....	12,816.64	September .....	50,229.28
October .....	16,532.64	October .....	50,988.79
November .....	20,349.24	November .....	48,093.20
December .....	26,060.80	December .....	46,360.52
<i>1947</i>		<i>1950</i>	
January .....	\$40,861.00	January .....	\$54,962.88
February .....	20,412.80	February .....	41,375.08
March .....	24,452.24	March .....	43,780.04
April .....	22,537.60	April .....	41,973.32
May .....	27,608.44	May .....	50,481.04
June .....	30,603.76	June .....	49,210.16
July .....	44,025.84	July .....	55,691.48
August .....	40,046.75	August .....	63,732.84
September .....	49,337.85	September .....	97,394.84
October .....	49,064.70	October .....	103,311.28
November .....	46,948.42	November .....	97,324.72
December .....	46,581.85	December .....	84,198.28

*Totals by Years*

1945 .....	\$ 28,337.88
1946 .....	150,594.52
1947 .....	442,491.25
1948 .....	603,039.05
1949 .....	615,654.92
1950 .....	783,435.86

The foregoing Tables and their accompanying Plates, show conclusively the increasing, and definitely rising, trend in the aviation industry with an attendant rise in the number of people using the Honolulu Airport, and greater demand for increased services of the various types now generally demanded by the public as being necessary for major airports.

**AIR TRANSPORTATION FORECASTS**

**General**

In attempting to forecast the amounts of air traffic that may come into being during the next ten years, a thorough study was made of all foreseeable conditions plus studies of reports, forecasts and trends prepared by various individuals, airline companies and agencies that had been retained by various sections of the air industry.

This study brought out one fact that there are so many intangibles present, so many variables which could affect the future, either favorably or unfavorably, that any forecast based on usual methods is only an intelligent guess at the best and very misleading at its worst.

To illustrate: Many forecasts were predicated upon a passenger fare reduction to three cents per mile. This has not occurred, nor is it apt to in the foreseeable future. The average fare now being six cents per mile for standard service, and four and one half cents per mile for coach services, where such service exists. Other variables are the inflation or deflation of costs, general economic and world conditions, and last, but not least, whether the Government will continue aid and subsidies, and if so, to what extent. The repeal of the 15% transportation tax would greatly stimulate travel and for a time it looked as if this repeal would become a reality, but now such repeal has been put off indefinitely.

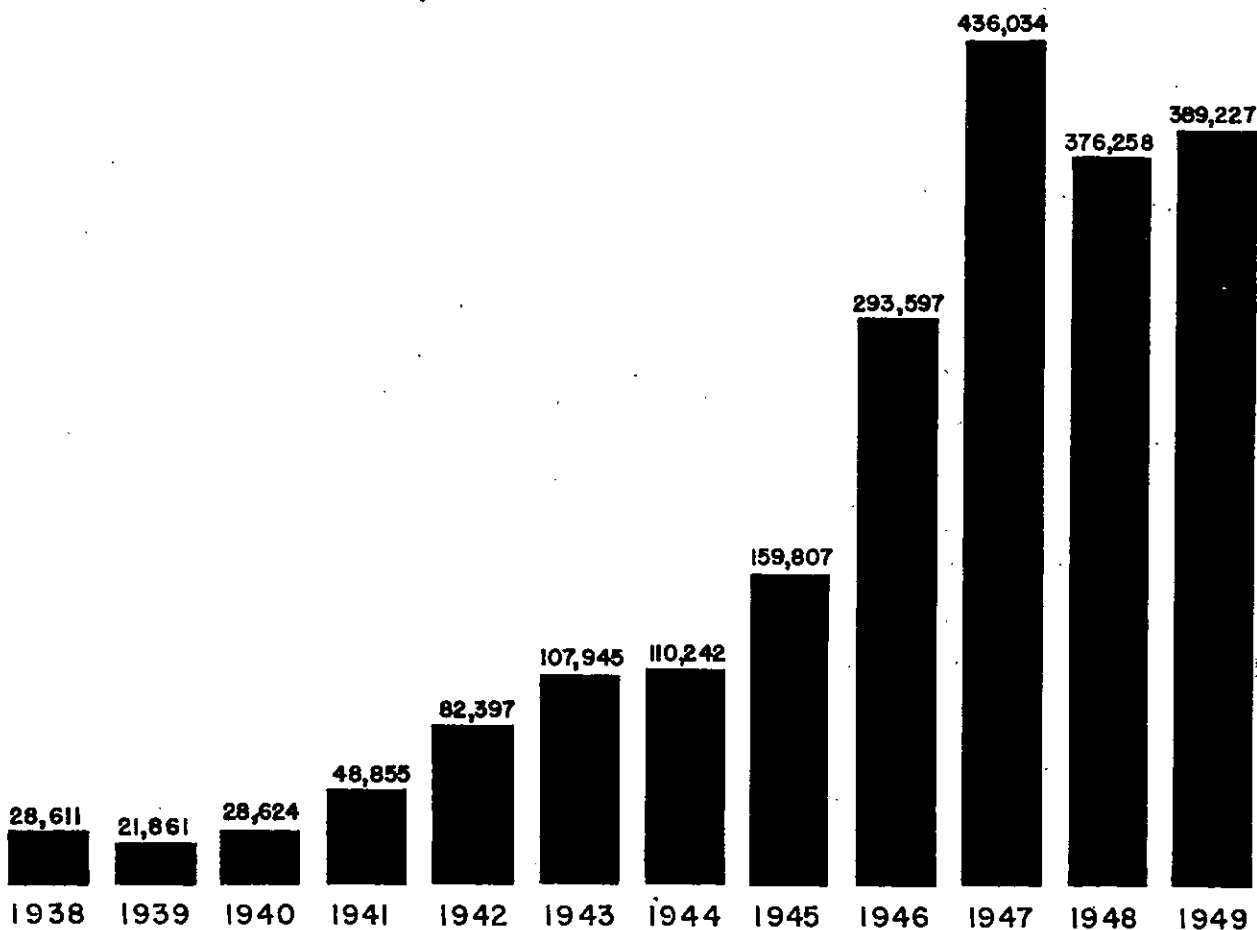
In spite of the difficulties involved some type of forecast, and future thinking must occur if we are to plan ahead with any degree of foresight and confidence. To achieve this result and assist our planning and thinking, it was decided to use the gasoline gallonage figures and charts covering the amount of gasoline actually dispensed upon the Honolulu Airport, for as many years back as accurate figures are available.

The gallonage was plotted upon a chart (see Plate III) and an average line laid out thereon. This average gallonage line indicated approximate annual increases of 50%-33½%-25%-20% and 12½%. To be conservative in all of our planning and thinking and to take into account the leveling off process, apparently underway, an annual increase of but 5% was adopted.

This 5% annual increase was used in the preparation of the "Potential Revenue Report" which is incorporated into the latter portion of this report. It is believed that this 5% annual increase, while on the conservative side, will prove remarkably accurate during the course of the years, for the percentage of annual increase is undeniably slowing down. For example, let us briefly examine the first two decades of the industry. In 1927, the first real year of Commercial Aviation, there were approximately 5,800 passengers carried. In 1937, the number

# HAWAII AERONAUTICS COMMISSION

## AIR PASSENGERS CARRIED BETWEEN ISLANDS

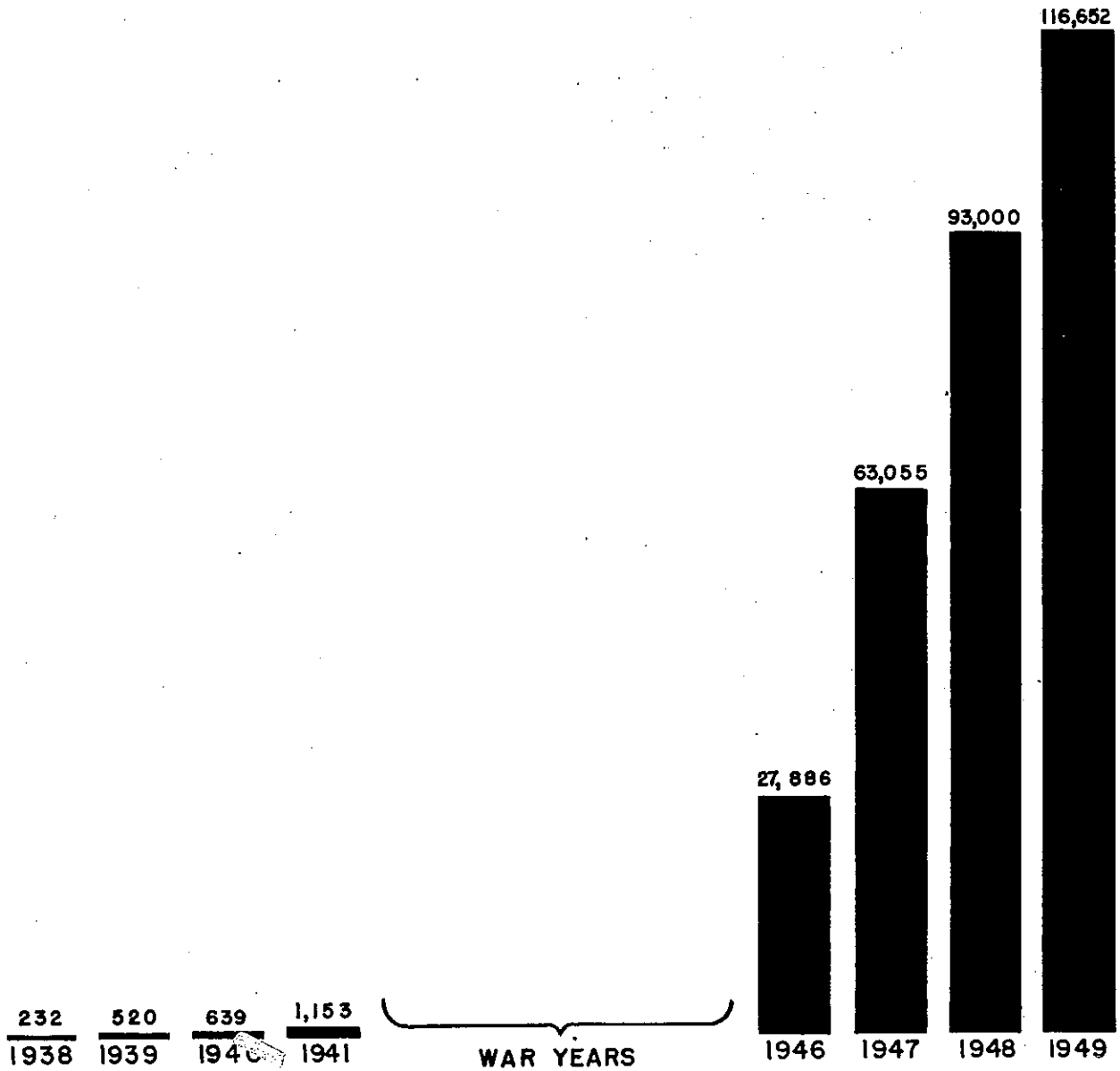


**SOURCE**  
HAWAII AERONAUTICS COMMISSION

**CLARK M. KEE**  
CONSULTING ENGINEER  
HONOLULU, T. H.

# HAWAII AERONAUTICS COMMISSION

AIR PASSENGERS CARRIED BETWEEN  
HAWAII & MAINLAND  
(Both Directions)



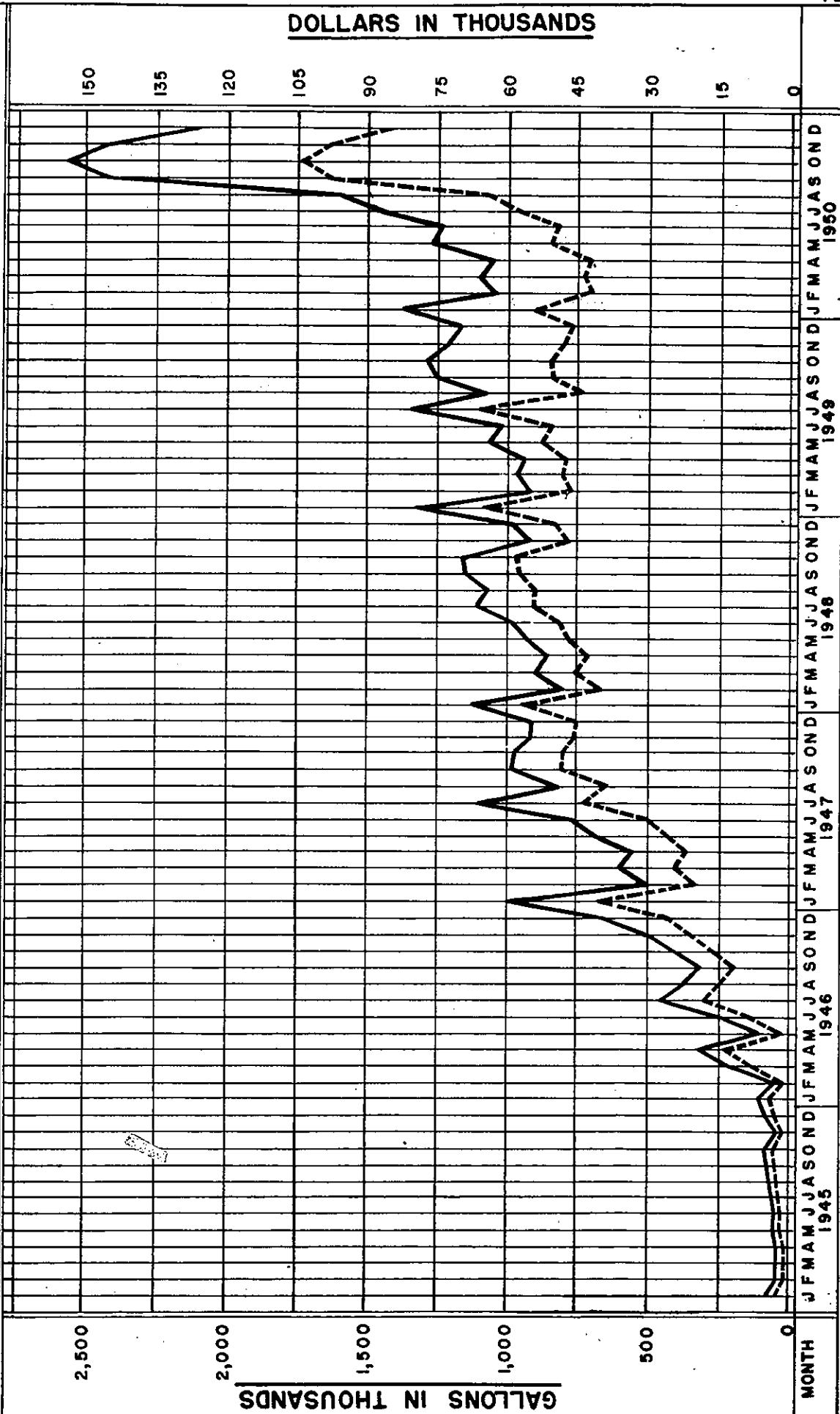
SOURCE  
HAWAII AERONAUTICS COMMISSION

CLARK M. KEE  
CONSULTING ENGINEER  
HONOLULU, T. H.

# HAWAII AERONAUTICS COMMISSION

## AVIATION FUEL CONSUMPTION AND TAX COLLECTIONS

PLATE 3



**CLARK M. KEE**  
CONSULTING ENGINEER  
HONOLULU, T. H.

**LEGEND**

FUEL CONSUMPTION  
 FUEL TAX COLLECTIONS

**SOURCE**  
HAWAII AERONAUTICS COMMISSION

had risen to the neighborhood of 1,200,000 and had soared to 12,890,208 in the year 1947. In other words, the first decade showed approximately a 2000% increase, or an annual average increase of 200%. The second decade showed a 1200% increase, or an annual average of 120%. The third decade, for which only the 1947 figures of 12,890,208, and the 1948 figures of 13,168,105 passengers, are available, would indicate that a radical leveling off process is taking effect and thus the annual increase between 1947 and 1948 shows only some 2.16% increase. Doubling figures for the first half of 1949 (7,235,129) which are all that are available, we get the figures of 14,470,358 passengers for 1949, or an approximate increase of 10% between 1948 and 1949. This 10% figure bears out the 5% annual estimated increase that we achieved by using the average gasoline dispensed line on our chart, Plate III.

Consequently, it is felt that an average annual increase of 5% in the volume of business and revenue is conservative and well justified.

## MASTER PLAN DEVELOPMENT

### Basic Design

There have been in existence, for many years, numerous specifications which have been issued by various agencies having jurisdiction and by many others interested in aeronautical development.

The Civil Aeronautics Administration published an Airport Manual, and a manual entitled "Airport Management" in 1944. In 1945, a comprehensive publication was issued under the title "Airport Planning for Urban Areas." In 1946, "Airport Buildings" was published, followed in 1949 by "Airport Design." In June, 1950, "Effective Community Air Traffic Potential" was published, followed in July of the same year by "Airport Terminal Activities and Space Utilization." All of the above are Civil Aeronautics Administration publications, and were used freely as reference aids, to make certain all of our design would conform to Civil Aeronautics Administration regulations.

The Air Transport Association of America issued a series of recommended standards for airline airports entitled "Airline Airport Design Recommendations" in 1946. These recommendations conveyed the opinions of the Air Transport Industry.

All such recommendations and standards as described above are very general in character and must only be considered as a guide. They are not specific and cannot be applied as requirements for all sites. Also costs must always be commensurate with results.

To attempt to apply these published and existing standards to the problems involved in the modernization of an airport and the design of a large, efficient modern administration building, they must be evaluated and modified to fit the circumstances as found to exist at the particular airport under examination. To properly effect such an evaluation, an intimate, detailed knowledge of, and first hand experience with, all phases and requirements of air transport airports is required, as a modern airport is a very complex entity. All of the design, both for airport and buildings must lend itself to possible future military occupancy as well as lend itself to normal commercial expansion.

In preparing this report and plans, there has been applied all of the experience and knowledge gained in some twenty-three years of aviation activities, both in operations and engineering and in the light of this experience, the conclusions reached, in this report and plans, represent a balanced conservative design, which is as well suited to airlines' needs as it is to its Territorial owners. It also meets that standard which satisfies all aeronautical and operating requirements, plus, and what is more important, financial feasibility.

The Master Plan of the airport, embracing the landing area proper, the terminal areas, industrial sites, hangar, shop areas, and certain revenue producing recreation facilities were developed from the following basic factors.

Honolulu is presently served by three American Flag carriers, only one of which furnishes international services. All three furnish domestic services between Hawaii and the Mainland, supplemented by the services given by non-scheduled airlines.

Two local American Flag carriers furnish regularly scheduled inter-island service. This inter-island service is supplemented by the services of two non-scheduled operators, plus a third certificated cargo only, operator.

There are three foreign flag carriers regularly calling at Honolulu.

Domestic air parcel post has recently been inaugurated and there is a real possibility that all first class mail over a minimum distance of 400 miles, will soon be carried by air. All of which adds up to the orderly increase in the potential use of the Honolulu Airport and all of the facilities planned.

One thing, perhaps favorable, is the thought that the peak movements of cargo aircraft will not coincide with passenger plane schedules, for the factors governing the two classes of services are widely different.

Cargo pick-ups should all be made after the close of a business day and deliveries made at the beginning of a day. Therefore, cargo planes should be scheduled to both depart and arrive by night. It is to be hoped such scheduling may result in a higher utilization of terminal facilities.

In terminal design, care must be exercised to take all such factors into account and never lose sight of flexibility and expansion possibilities. Only in this thorough knowledge of design can the Territorial interests and investment be safeguarded and proper and reasonable charges be rendered to the airline tenants.

A study of this report together with its plans and designs will show this much to be desired result has been obtained.

Ramp and apron services and facilities have been given careful and complete study looking towards the best, safest and fastest results possible to achieve. It is felt that all requirements will be best met by the use of a ramp service trench so designed as to carry all services needed, such as gasoline dispensing systems and the gasoline return system. This gasoline system will be covered more fully a little farther on in this report, 110V, 220V and 440V current both single and three phase, compressed air lines, telephone circuits, water lines, air conditioning ducts and other facilities which may be necessary to add from time to time.

Aircraft now servicing Honolulu are various types among them being the DC-3, DC-4, DC-6, Constellations and Boeing 377, stratocruisers. The gross weights range between 25,200 pounds for the DC-3 with a 21-seat cabin to approximately 135,000 pounds for gross take-off load of the Boeing 377. Occasional military aircraft will exceed this figure, for example the B-36s which this airport has handled.

It is believed that dual wheel aircraft of the future will not exceed 180,000 pounds gross take-off weight. Aircraft exceeding this figure will undoubtedly have dual tandem or caterpillar type main landing gear, thus keeping weight per square inch of landing gear foot print within the limits as expounded above. The runways and present taxi ways and aprons have been designed to meet the above requirements. All new runways, taxiways, etc., will be similarly designed.

Turbo prop powered aircraft and Jets are not expected to present untoward heat problems. The tail pipe temperatures fall very rapidly with distance and the distribution is such that usually only nominal temperatures are experienced

at the point of contact with the pavements. It is felt that no special runway pavement treatments will be required for such aircraft, even for bituminous surfaces. At present such aircraft require substantially longer runways but no longer than those we have planned for this airport.

Should any aircraft come into regular commercial use that are substantially larger than those now in service, it is my considered opinion that it must be a requirement that such planes be towed in and out of final position at the terminal loading gate positions. Many planes are now being designed for nose or tail loading. Turning circle diameters at the gates cannot go on being increased indefinitely for by so doing only results in necessitating larger building and ramp construction, with a corresponding increase in distances for passenger, cargo and baggage movement, all to the point of impossibility. Towing would also naturally result in being able to more precisely locate the plane position upon the ramp. Some airlines will argue that towing slows aircraft handling. Any airline that finds itself slowed down by towing has not yet worked out a proper operating procedure. I have assumed an average turning circle diameter of 200 feet.

In the Master Plan design, the several economic factors involved have been carefully considered, such as the burden placed upon the taxpayer as well as the airlines. This burden cannot be increased indefinitely and consequently, this design has stayed within the boundaries and realm of common sense and non-aeronautical revenue producing possibilities, and if the results reflect a compromise which is admitted will probably not suit everyone, it must always be remembered that no commodity or service should price itself out of existence. The law of diminishing returns takes effect.

Of equal importance and possibly the most important single consideration, is that of revenue to be produced by *non-aviation* activities. If air transportation is to be brought within the reach of the general public, something which has not been achieved to date, its cost must be substantially reduced. Consequently every effort has been made in this Master Plan and design to incorporate, to increase and to utilize to the fullest extent, every source of non-aeronautical revenue that seems to be practical or feasible.

Looking towards this goal and to make the Administration Building not only self-amortizing, but to enable it to make a contribution to the general overall plan of a reduction of terminal operating costs to the airlines, a maximum exploitation of concession revenue has been planned and provided for. In some cases conflict with other uses is unavoidable, but in such few cases the problem has been solved by a balancing of costs and income against results.

A great deal of attention has been given to maintenance and operating costs. The design is all premised upon keeping these items as low as possible. All possible present pavement has been utilized and incorporated into the design and Master Plan. Present sewers and utilities have also all been retained and incorporated into the Master Plan.

## TECHNICAL DESIGN

### General

The Civil Aeronautics Administration has designated the Honolulu International Airport as an inter-continental Express Airport, Class 7. Therefore, the conclusions, dimensional needs and operational factors have all been taken into account for an airport of this classification, which by the way, is the highest classification possible.

In a close examination and study of the existing runway pattern, it was decided that the pattern as presently laid out could not, within practical limitations, be improved upon and should be accepted as the basic runway pattern for



the Master Plan. There has been a considerable amount of thinking on the part of the Civil Aeronautics Administration and attendant publicity of the standardization upon one-runway airports. The successful development of the cross-wind landing gear possibly makes such standardization feasible in the not too distant future. However, there is a school of thought that feels a "One Runway" deal might prove too radical and that there is considerable merit to this line of thought is acknowledged by some Civil Aeronautics Administration authorities who have modified their thinking somewhat to include a two runway "V" system as more closely answering all requirements. Fortunately the Honolulu Airport's present runway pattern, for all practical purposes, is a two runway "V" system with a storm quadrant runway added laying NNW-SSE.

In studying the existing runway pattern to determine its suitability or shortcomings, all factors were considered. Experience has shown that many factors enter into the picture for consideration other than the simple item of "prevailing winds." The runway configuration with respect to existing and future runways must receive earnest consideration, since this relationship governs, to a large extent, the flight paths in and out of the airport. This also carries over into and is felt along the airways beyond the zone of the Control Tower. A proper runway pattern expedites aircraft movement on the ground and in the air and is the important factor in determining the practical capacity of an airport runway system.

The above becomes increasingly important during instrument conditions, and it cannot be ignored completely at Honolulu even though instrument conditions are rather rare. This instrument factor still must receive consideration. Fortunately my studies have convinced me as stated above, that there would be no practical purpose served by any major change in runway pattern. Some minor changes and improvements in the existing pattern did seem warranted, however, and will be discussed where they fit into this report a bit farther along.

#### Basic Technical Factors

The basic design has, in the main, adhered to the design standards as set forth in the Civil Aeronautics Administration publication entitled "Airport Design, January 1949." This represents the latest thinking and of course must be complied with in order that this project would be eligible for Federal Aid under the Federal Airport Act.

These standards are tabulated below:

#### Airport Design Standards

Class of Airport	Inter-Continental Express Class 7
Runway Length (1) (Minimum).....	7001-8400 feet
Landing Strip Width (Minimum).....	500 feet
Runway Width (Minimum).....	200 feet
Taxiway Width (Minimum).....	100 feet
Effective Maximum Grade (2).....	1%
Longitudinal Maximum Grade (3).....	1½%
Transverse Maximum Grade (4).....	1½%
Pavement loading per wheel (single wheel).....	100,000 lbs.
Pavement loading per wheel (dual wheel).....	125,000 lbs.

1. Designed for sea-level elevation, standard sea-level temperature of 59°F and zero per cent effective gradient.
2. Maximum effective gradient obtained by dividing the maximum difference in runway center-line elevation by total length of runway.

3. Where necessary longitudinal taxiway grades may be as high as 3%.
4. Percentages shown are for pavement. To improve runoff, the slopes of unpaved areas may be increased to 2% and 7.5% for a distance of 10 feet from the edge of the runway.

**Minimum Clearance Standards on Airports  
Inter-Continental Express Class 7**

Runway Center Line to Taxiway Center Line.....	450 feet
Center Line of Parallel Runways for Contact Operations (1).....	500 feet
Center Line of Parallel Runways for Instrument Operations.....	750 feet
Center Line of Taxiways to Aircraft Parking Area.....	280 feet
Center Line of Runway to Building Line (Instrument).....	650 feet

**Design Corrective Procedures**

1. Runway length to be increased for airport elevation at the rate of 7% for each 1,000 feet elevation above sea level.
2. Runway length to be increased at the rate of 1/2 of 1% for each degree, which the mean temperature of the month of the year, averaged over a period of years, exceeds the standard temperature.
3. Runway length should be increased to correct for runway gradient at the rate of 20% of the length corrected for altitude and temperature, for each 1% of effective runway gradient.

No correction needed at Honolulu for elevation or gradient. Applying the temperature correction for Honolulu, which for the hottest month is 79° F. (Mean temperature furnished by the Weather Bureau), indicates a desirable minimum runway length of 8600'. However, a runway length of 10,000' is being planned so that the NE-SW runway will be classified as a "Tandem Dual" runway. This is a permissible Civil Aeronautics Administration classification. The main Hickam Field-Honolulu runway will be some 15,000' in length when the Air Force widens out their portion to runway width. This also will be a Tandem Dual runway. With these two main runways classified as Tandem Dual runways, it is felt it will be many years before increased traffic will necessitate any additional runway construction over that shown in the "First Stage Program" of the Master Plan.

**FIELD PATTERN**

Preliminary studies revealed there were two basic questions of Design or Field Pattern to be solved in connection with the development of the Honolulu Master Plan. These were:

1. Should there be one administration building, housing all activities, or should there be two, one for overseas airlines and the other for inter-island operations?
2. If it was decided that one large administration building, to house all activities, was the proper solution to problem one, then problem two immediately presented itself and the question in everyone's mind would be "upon which side of the airport should the one terminal be located, the northern or mauka side, or the southern or makai area."

These two problems had to be settled before anything else could be undertaken. Consequently, the first order of business was to undertake thorough and comprehensive studies of all features and angles entering into this picture. When such comprehensive studies are entered into from a completely disinterested, detached standpoint, free from any local prejudice and pressure that may

exist and all factors are carefully examined, weighed and evaluated, very often the solution of an apparently obscured issue, stands forth clearly. The results of this study and the steps taken to achieve the conclusions arrived at, are as follows:

1. The first and basic step was to lay out the runway pattern, complete with dual runways, taxiways, parking aprons, etc.
2. The second and very important step, was to place the clearance lines upon the basic runway plan. These clearance lines are in accordance with standards as set up by the Civil Aeronautics Administration and permit of no argument nor deviation.
3. After steps one and two have been laid out the designer is then in a position to examine the areas outside of the clearance lines for size, suitability, future expansion possibilities, general utility and many other standpoints.
4. The question of one or two terminals was then examined. All aviation authorities and several prominent economists who have made studies of all airport problems, including financing, taxation, airport users charges, etc., are unanimous in their recommendations and conclusions, that a well designed airport administration building is the greatest single source of non-aeronautical revenue, and to be a success must have as large a permanent building population as it is possible to achieve and also as numerous a transient population passing through the building for as many hours daily, as possible. That these two items are axiomatic and a "must" no one can deny.

Then one must examine every proposal from the very important standpoint of cost. It is equally axiomatic and beyond argument that a single building containing the same number of square feet of floor space as the sum of the square feet of floor space in two smaller buildings, will be constructed at an appreciable savings over the cost involved in the erection of the two smaller buildings. It would, therefore, seem that one large building, built at very much less cost than two smaller ones, but containing the same amount of square foot floor area as the sum of the floor areas of the two smaller buildings, is the true solution and the answer to Problem One.

Consequently, from the increased revenue standpoint and the lesser construction cost involved, it was decided to plan upon one major administration building to house all activities, overseas, inter-island airlines, concessionaires, office facilities, the housing of governmental agencies, and the Hawaii Aeronautics Commission staff offices.

5. With one terminal thus indicated, the solving of problem Two became paramount. To examine this problem it was decided to tentatively place the terminal first upon one side and list all resulting conditions and then repeat the operation by placing the terminal tentatively upon the other side of the airport. The resulting comparison brought out some interesting results and, as hoped, resulted in the solution of the problem.

#### **Terminal Located Upon Northern or Mauka Side of Airport**

- a. There was a certain relation in regards to the clearance lines that limited the area wherein an Administration Building could be located. Locating the building within this area it became apparent, if the proper access highway system were to be developed, proper parking areas provided, terminal area facilities erected and developed (garage and service station, international house, concession building for small shops, landscaping, etc.), that the following would be an immediate result:
- b. Almost all the present hangars and buildings housing our paying tenants, small manufacturers, aeronautical schools, etc., presently located around the

northern perimeter of the airport, would all have to be torn down to make room for the administration building and its allied facilities as described in "a" above.

- c. This meant the enormous outlay of money for the erection of temporary quarters elsewhere to house all tenants pending the erection of permanent quarters, and what was of far more importance would require an immediate outlay of capital investment to erect these permanent new hangars and needed structures to house the tenants.
- d. With all the demolition described above, sufficient area still would not have been achieved and it would have necessitated the purchase of approximately one half million square feet of private property at somewhere in the neighborhood of 50 cents per square foot.
- e. A terminal located upon the mauka side would not be able to provide seaplane facilities should there be a revival of such services. That such a revival will never take place cannot be dismissed in any such casual or careless manner for many people in the aviation industry are predicting a strong comeback for seaplane equipment in the light of the successful performance of such types, equipped with the new Turbo-prop power plants.

The president and high officials of KLM, the world's oldest airline and one of the greatest and most successful international airlines in the world are considering a return to seaplane equipment, and they so advised about two years ago in Bangkok, during the course of a meeting there. The plans and thoughts of aviation people such as the officials of KLM are not to be disregarded nor dismissed lightly. British Overseas Airlines are also planning to place the new type seaplane upon their "backbone" run within the next two years.

- f. Being on the mauka side and away from the sea, it would not be as easy to achieve proper Hawaiian atmosphere through landscaping and general beautification.

#### **Terminal Located Upon Southern or Makai Side**

- a. After studying the sea side area, it was decided it would be possible to change the present Runway 4R into a taxiway, whenever the construction of passenger loading fingers become necessary in order to provide additional plane loading positions at the Administration Building, consequently the Master Plan shows Runway 4L being extended to 10,000 feet and thus becoming a Tandem Dual Runway. This will enable Runway 4R to have its category changed to that of taxiway, when necessary, without impairing the efficiency of the runway system. As a matter of fact this change would tend to improve the overall efficiency of the runway system as a tandem dual runway will handle practically as much traffic as a parallel dual plus the added advantage of lower maintenance cost, less costly lighting installation and an easier, cheaper drainage set-up. With this change, possible when necessary, and applying the limitation imposed by the Civil Aeronautics Administration clearance lines, it became apparent that ample area had been achieved.
- b. There was sufficient area to permit the erection of the garage and service station, the International House and the concession building for small shops if desired. Ample space was available for administration building parking area and employee parking lots. All without the necessity of purchasing any additional land.
- c. The access highway could sweep right along the shores of Keehi Lagoon with the blue waters of the Lagoon on one side and our proposed golf course on

the other side. A truly beautiful and spectacular entrance parkway boulevard, the like of which does not exist upon any airport within the range of the writer's experience.

- d. Planning the entire terminal area installation upon the sea side of the airport achieves an extremely vital and important result. When a tentative layout was made to examine the possibilities, it became apparent that the entire installation could be constructed without the necessity of demolishing any buildings, except the removal of the old NATS wooden hangar and its adjacent cluster of small buildings. This building is unoccupied, an eyesore and an extreme fire hazard and its demolition should be undertaken in any event.

This one factor alone, if there were nothing else in its favor would almost make the sea side location mandatory. Think of what this means, that the entire terminal area installation complete to include the administration building could all be 100% erected without disturbing any occupied buildings on the sea side or the opposite side of the airport. This means all buildings and their respective tenants on the northerly or mauka side could remain undisturbed for as long as economically justified. That no building would have to be demolished until it had become unsafe with its useful life completed. At such time new structures would be erected in locations provided for on the Master Plan and then only as economically justified. Thus, through a gradual process of obsolescence and necessary replacement, we will slowly approach the completed airport as called for on the Master Plan. All without an undue outlay of capital expenditure in a lump sum and in an orderly proper manner as necessity and economic need dictates.

The present occupied structures upon the southerly or sea side can continue their present functions until the new administration building and most allied terminal area facilities have been constructed 100% complete and when this has been accomplished, some weekend we can close the doors on the present fire hazard, obsolete structures and open the new facilities for business. All without loss of personnel time or loss of the use of any present structure.

As a side issue, which has no bearing upon the terminal area location question, but is interesting nevertheless, is the fact that all additions to the runway and taxiway system, ramp areas, etc. can all be accomplished without having to close any runway or taxiway.

It is believed this marks the first project where a major construction program can be carried through to completion without disturbing any operations of the existing airport. This means a great deal from an expense standpoint, as no money will have to be spent to provide temporary quarters or temporary landing facilities. It would therefore appear that laying out the project in the manner it has been laid out, avoiding all interference, could easily save an appreciable sum of money for the Territory.

- e. Having the building and terminal area upon the ocean front, with Diamond Head in the background, makes the landscaping efforts far more effective than if the terminal area had to be placed upon the mauka side. Landscaping is very desirable at any airport, but it assumes far more importance here than elsewhere, for it is by the lavish use of landscaping that we will be able to capture the traditional Hawaiian atmosphere, an atmosphere expected by all visitors and an atmosphere which must be obtained and then preserved, by all means possible.
- f. Last and not least, the placing of the terminal area upon the sea side, insures ample facilities and accommodations should there be a revival in seaplane equipment. That this day may not be far off is borne out by the developments announced within the past thirty days, namely, plans of a great foreign airline to ultimately return to Flying Boat equipment.

## Summation and Conclusions

Summing up Land Side vs. Sea Side terminal area locations we have:

### LAND SIDE

1. Necessity of purchasing additional land possibly running into costs from \$500,000 up to a million.
2. Necessary demolition of occupied buildings around the perimeter of the northerly edge of the airport and the majority of the buildings now located upon the northern side of the field.
3. Immediate capital expenditure to provide either temporary or permanent quarters for tenants displaced under "2" above.
4. Inability to achieve as striking landscape effects as could be achieved upon the Sea Side.
5. No provision possible for seaplane revival, should it occur.

### SEA SIDE

1. Ample space available for administration buildings, terminal areas facilities, parking, etc., all without purchase.
2. Possible to construct entire administration building, etc., without having to raze one single occupied structure on the Honolulu Airport.
3. No necessity to erect any temporary structures.
4. No need to include any new hangars, structures for schools, or any other structures now occupied by our paying tenants in the "First Stage" planning, nor any other stage until such time as said structures have completely outlived their usefulness, and must of a necessity be replaced.  
At such time, they can be easily replaced, one or two at a time, and in their new location as provided on the Master Plan, with no financial strain on anyone, as by replacement time they will have amortized themselves.
5. Seaplane operation can be handled in the one and same administration building structure.
6. Beautification possibilities along the ocean front are so obvious, which taken with the island possibilities, would give us such striking features that the resulting publicity would be more than worth the cost and effort.

### Conclusions:

Taking all of the foregoing into consideration the choice of the Sea Side for the Administration Building and Terminal Area would seem inescapable. Consequently, all plans, designs, etc., are being predicated upon:

- a. One Administration Building
- b. Located upon the southern or sea side (makai)

## TERMINAL AREA

### General

Terminal area design, as now established in many locations, is justifiably criticized as being too inflexible to meet changing conditions and the impossibility of expanding without prohibitive costs. This criticism is applied where the usual design is to have the administration building flanked by hangars and other operational buildings and this inflexibility is also applied to various administration buildings themselves.

Poor and insufficient planning and lack of knowledge and confidence as to the growth of the air transport industry are leading factors in this condition.

All design must assume certain criteria, most of which are reasonably easy to determine. The complete long range plans must retain a certain amount of elasticity so that changing conditions cannot cause obsolescence.

The majority of airport consultants and designing engineers have long been opposed to the flanking of the administration building by hangars, shops, line maintenance facilities and all such kindred buildings. These buildings and their allied activities have no place within the terminal area or possibly even upon the same side of the airport.

It is confidently felt that the concept of the terminal area as a whole, as shown on drawing Number 5 and the administration building in particular, as shown on drawings numbers 7, 8, 9 and 10 meets the requirements of flexibility, expansion possibilities and necessary elasticity. It is based upon a realistic appreciation of service to the passengers and general public, operational needs, and in addition, meets all obligations in regards to the economics of administration buildings and their function to produce as much non-aeronautical revenue as possible.

### Access Highways

The main access boulevard will join Nimitz Highway at the Diamond Head end of the airport property as now planned and shown on the Master Plan Drawing Number I. The access highway is to be a four-lane boulevard with a center separation parkway. This beautiful highway will sweep down towards the Administration Building between the golf course on one side and the blue waters of Keehi Lagoon on the opposite side. The planting strips along both shoulders and the center parkway separation area should be lavishly landscaped with flowering shrubs and coconut palms.

The highway from airport entrance Number I, will join the above boulevard at the Ewa, makai end of the golf course. This highway is also of four-lane construction with a center separation parkway. The landscaping treatment should be similar to that described above for the access boulevard from the main entrance.

When this system enters the terminal area proper, there is a separation roadway to the right. This separation roadway serves and gives access to the concession building, International House and the garage and service station. Cars can then proceed through an underpass, on around to the Administration Building parking lot, or on into town via the access boulevard.

Vehicles desiring to discharge passengers at the Administration Building would hold the left hand highway at the separation point and would proceed up a rampway to the second floor, or main entrance level of the Administration Building. These vehicles can then proceed directly back to Honolulu or enter the Administration Building parking lot or circle to the ground level main exit of the Administration Building to pick up "incoming" passengers.

The entire access roadway system together with the terminal area roadway system has been most carefully studied to provide the utmost in traffic movement; with no bottlenecks and providing the utmost in service for a very complicated problem. The points to be served are: employee parking lot, concession building International House, garage and service station, main entrance of Administration Building on second story level, main exit of Administration Building on the ground floor level, the International exits and seaplane base, both on the ground floor level and the main parking lot.

A close perusal of the terminal area plans will show that all of the required service to these various locations has been well provided for with a smooth traffic flow pattern being established by the roadway system itself.

It is believed that this design presents one of the smoothest, most successful solutions yet to be encountered upon many mainland airports and that it will well serve the traffic needs of the Honolulu Airport Terminal area in a smooth, effortless manner.

## TERMINAL AREA STRUCTURES

### General

In discussing the structures that comprise the terminal area, the priority and order of erection is not taken into account. Some will be built during the First Stage construction program, some during the Second Stage, and many not until the Third Construction Stage. Drawings numbered 3 and 4 show the various items planned for each stage. Again these can be entirely flexible. Changing conditions might move some project from the Third Stage up to the First Stage and vice versa. There is nothing rigid nor fixed about what projects constitute each stage, the exception being, of course, certain projects that are a "must" in the First Stage program.

## ADMINISTRATION BUILDING

This building design, as developed for the Honolulu Airport, is predicated upon the two-level, centralized main unit principle, which we developed some time back in administration building studies for a mainland International Airport. These studies and the principle involved were considered to be the correct principle to achieve the ultimate in administration building design in order to retain a completely functional building type for efficient, economical airline use and yet incorporate non-aeronautical revenue producing possibilities in the distribution of restaurants, drug store, soda fountain and numerous other concessions, properly locating these facilities in full view and with easiest accessibility to the traveling and visiting public, all without impeding travel flow nor impairing of any airline operating functional quality of said building.

That this basic design principle would seem to be the correct principle is further proven by similar plans embracing this principle, developed for Philadelphia, Seattle, Washington, Miami, and many other major air terminals, so with all of this in mind, this basic two-level design for the Honolulu Administration Building has been adhered to and all expansion will be achieved laterally.

The design provides a well-balanced functional layout from the airlines standpoint, yet exposes the greatest possible number of people to the service and concession units.

Passengers and their baggage arrive and are delivered to the second floor via an upper level, one direction ramped up driveway. The upward slope of the entrance roadway ramp is a gentle rising gradient and the degree of curvature is such as to permit busses to negotiate them with ease and safety. The passengers are discharged from their conveyances at a marquee covered unloading lanai, entering the building through the entrance lanai. Once inside this entrance lanai the Department of Agriculture plant inspection counter is plainly visible. This counter is located in strict accordance with the need and desires of the Department as expressed in conferences and by letter.

After passing plant inspection, and immediately confronting the passengers, along the field side of the passenger ticketing lobby, are located the ticket counters and baggage check-in positions. These counters are connected to the ground



level baggage rooms by shutes, properly designed as to slope and curvature to handle fragile baggage and parcels with no resulting damage.

You will note that the counters have all been staggered in order that each airline's counter signs and location will be plainly visible to all passengers as they enter the ample passenger ticketing lobby. Office space has been provided immediately to the rear of the ticket counters. These offices are served by a private corridor, with the corridor being connected to the ground floor baggage rooms by stairs. This connection is provided for quick private, physical inter-communication, enabling any errors in baggage checking, etc., to be rectified, baggage returned, etc.

After arriving passengers have all been ticketed and checked in, they are directed to the spacious tropical Hawaiian Aloha Lanai, which extends across the entire front face of the building. The spaciousness will be realized when you know this Aloha Lanai can accommodate 1320 people allowing 20 square feet per person. (These are accepted standards of spacing.) The Aloha Lanai will have Hawaiian plants, tree ferns and appropriate flowering shrubs in proper containers, scattered around the Lanai, while planting boxes around the entire outer railing would be planted with shrubs and with trailing vines, hanging down the outside of the building, to provide the exotic, tropical, Hawaiian atmosphere. Built-in planting boxes are also planned around each column. This great Aloha Lanai being at passenger eye level while seated in arriving or departing planes, should provide the much desired Hawaiian touch. This will be further enhanced by the ground level planting strips which are located all along the ramp side of the building and concourse, and also between the concourse and the building proper. No effort should be spared in the lavish and generous use of landscaping in order to register the fullest favorable impact possible upon arriving passengers; and departing passengers will leave with a tropical Hawaiian paradise as their last impression.

Visitors will take leave of or greet friends upon this tropical Aloha Lanai and then, if desiring a final view, can proceed to the upper, or observation deck, by stairways, conveniently located.

At this point, please take note of the concession placement. There are two general classifications of concessions. First, the "quick" concession, second, the "leisure" concession. You will notice that the "quick" concessions, consisting of the coffee shop, soda fountain, etc., have been placed on each side of the great entrance lobby which connects the entrance lanai with the spacious ticket counter area. This was done in accordance with good concession practice which reasons as follows: An entering passenger is intent upon checking in and relieving his anxiety regarding his space, getting rid of his baggage, etc. He then has a certain amount of time on his hands for a soda, a cup of coffee or a quick bite to eat. He remembers that he saw these concessions on his way in and thus knows immediately where to go.

On the other hand you will note that upon each end of the ticket lobby, waiting room space is provided, complete with ample seating accommodations. In these areas are placed the "leisure" concessions. Concessions where a person can spend some time in browsing around making purchases and selections. Haberdashery, book shop, jewelry shop, game rooms, etc., are all excellent examples of this type of concession. These concessions require different spacing and treatment within the building than do the "quick" concessions.

Ample toilets, lounges and roomettes are provided in what is deemed the proper location in the building and with reference to all other facilities.

A study of this second floor or passenger level floor will bring out these various points. Each location has a definite reason for it being placed where it is, all coordinated with every other feature of the building in an effort to bring forth a well integrated whole.

Passengers will move from their gate position on the concourse directly across, and at the same level upon a swinging covered gangway.

There has been designed, and shown at one gate position, this swinging, covered gangway which would enable a passenger to board his plane without descending to ramp level and then up the plane loading steps. This method is recommended until such time as planes become "bottom loaders," a move that is understood may be on its way. It is this change in plane loading that has caused the consideration of the stairs and escalators as an alternate to the swinging gangway. These stairs and escalators are also shown on the drawings, as the second choice alternate.

So much for passenger movement for the moment. We will now consider baggage.

As stated previously, baggage reaches the ground level baggage gathering room from the check-in positions by means of properly designed chutes. Baggage then moves from the outgoing ground level baggage rooms directly to the plane involved by means of a baggage tractor train.

In reverse, deplaning passengers move across the second floor level gangway (plane door height being within inches of the second floor level) or up the escalator, through the building to the roadway side and thence down one flight of stairs to the incoming baggage room, where they pick up their baggage and proceed at this ground floor level, to their transportation awaiting on the lower level, one-direction, driveway.

This routing of deplaning passengers is necessary in order to preserve traffic segregation.

To allow passenger traffic to enter the building at ground level and proceed through the building at this level would mean interference with both incoming and outgoing baggage trains, incoming and outgoing food service trains, and interference with mail, express and freight traffic, thus losing the effectiveness of the "Two-Level" design, said design being the only one that can provide all necessary traffic segregation and safety.

Certain "quick" concessions, such as a lunch counter, baggage checking lockers, telephones, cable services and display cases are located within this ground floor public baggage pick-up area.

Baggage, of course, is moved by tractor trains from its plane to the incoming baggage room all at ground, ramp level. In this design, no baggage ever has to be raised a story within the confines of the building, the only point of raise being into the plane proper from the ramp. You will note "trip traffic control" switches are provided so that tractor baggage trains will have traffic right-of-way in both directions at all times, stopping the service driveway vehicle traffic.

The movement, both incoming and outgoing, of air mail, air express and air freight, is self-explanatory, and is centrally located as far as international and mainland plane positions are concerned.

You will note that the building design is very carefully worked out to accommodate the three classes of service now in existence at Honolulu, namely; first, strictly inter-island service, provided by two local certificated airlines; second, domestic mainland service, using four-motored equipment; and third, international service, using four-motored equipment.

Provision is also made for the potential fourth class of commercial service, using seaplane equipment.

The space in the East wing and the ramp fronting it, has been designed for inter-island domestic carriers and their customers. The main portion of the build-

ing and the northern half of the South wing, with their fronting ramp area, has been planned for domestic mainland carriers and passengers, while farther south the international land planes will dock. The extreme southern end of the South wing, fronting the seaplane channel will be available should seaplane equipment come back into the picture. This does not seem to be a too remote possibility.

Gate position expansion can be provided, when it becomes necessary by concourse fingers. Their tentative location is shown dotted in on the ground floor plan.

A study of the plans will immediately make clear this division of services.

A word in connection with the international facilities. Passengers proceed into any one of three second floor waiting rooms, directly from their second story level gangway, via the passenger concourse. These waiting rooms are each equipped with toilet facilities. The passengers then proceed into one of two public health offices, each of which is provided with a private examination room. Thence by way of a distribution lobby, to any one of six immigration offices. After completing public health and immigration requirements, passengers descend one flight of stairs into the ground floor customs area. Baggage is moved from the planes directly into customs at ground floor ramp level, by means of tractor trains. After completing customs inspection, passengers step immediately outside to a marquee-covered lower level pick-up point and there on the ground level driveway, connect up with their ground transportation.

You will notice the crew routing provision so that crews by-pass immigration and proceed to a private crew customs inspection area, thus permitting crews to clear in a minimum length of time and enabling them to proceed at once to their hotels.

As you can readily see from the plans the sea side access highways to the hotel and sea side hangar area are carried right through the South wing of the Administration Building at ground level.

Arriving seaplane passengers and baggage movement will, therefore, be as follows: International passengers will be carried up to the second floor by means of an escalator (stairs for emergencies) and by means of an accordion type movable partition, will be guided into waiting room Number 3, thence, in the same manner as arriving land plane international passengers, through public health, immigration and downstairs through customs. Their baggage will be placed on the international baggage escalator and conveyed by this escalator and conveyor belt up and across the portion of the ground floor occupied by the highway, passing through the building to baggage chutes, discharging into the customs area.

Arriving domestic passengers and baggage follow the same movement, except domestic passengers are guided, by folding back the accordion partitions, to stairs leading down into the domestic incoming baggage room, where they immediately pick up their luggage and step out to their ground level, ground transportation point. Their baggage reaches this domestic ground level baggage room by means of the domestic baggage escalator, conveyor belt system, discharging into a chute leading down into the domestic baggage room.

It is believed the plans show all this movement clearly.

The Federal agencies involved in this building all have their own requirements, security regulations and many other features that enter into designing space for their highly specialized requirements. Each Federal agency involved has been contacted and after numerous conferences each agency's space and requirements have been carefully worked out to the point that their respective space as now shown on the plans meets with their entire approval and each agency has so stated their satisfaction in letters of approval now in our hands.

The various requirements being rather technical in character will not be discussed at length in this report. It suffices, I believe, that all agencies concur in the plans as they now stand after incorporating all suggestions and requested changes.

Going back to the main portion of the building, you will notice the operation offices provided at ramp level and facing the ramp, thus placing these facilities in the exact location for utmost efficiency possible.

On the third floor are located the main dining room, terrace cafe and terrace cocktail lounge, together with other concessions grouped around the mezzanine overlooking the main lobby.

Above the main dining room are located the penthouse dining and dancing terrace, airline club rooms and office space, if tenants are available.

All floors above the second can be expanded or contracted as conditions may warrant at the time of construction.

Ample additional office space has been provided on the third and fourth floors, only limited by the various airlines' requirements and desires, with sufficient expansion possibilities to meet all requirements for many, many years to come.

All government agencies will also be accommodated on the third and fourth floors in accordance with their wishes and with any partitions they may desire. They will be requested to furnish their desired layouts in regards to space, prior to construction.

The airlines will also be requested to do this. All ticket counter divisions and office partitioning behind the ticket counters are only provisional and will be altered to suit the tenant. This holds true for space divisions in the operating offices area down on the ramp. Each airline can have ticket counter, ticket office and operations office space to suit its needs. Three hundred ninety lineal feet of operations office space has been provided. This is deemed to be ample for many years to come.

The floors above the fourth are all within the control tower and will be built in accordance with tower requirements.

On the ground level, you will notice the main kitchen area. Meals can be prepared and provided for all plane food service, if desired. You will note the food distribution area and facilities are so arranged that food service tractor trains can pick up food and distribute same to any and all planes. All at ramp level. This kitchen could be divided, and is so shown, should the carriers be unable to agree upon a common caterer. It would be hoped that a high class caterer and restaurant chef could be installed, preparing meals in strict accordance with menus furnished by each airline, and in strict accordance with quality and specifications issued by each airline, in order that each airline could have whatever class of meal service that particular airline desired, prepared in accordance with its own menus and in accordance with its own specifications regarding quality and quantities. This phase deserves your most earnest consideration for it would seem as if a much higher standard at lower cost, could be achieved by the installation of one exceedingly high class caterer. This resulting combined volume of all airline food service requirements would enable the installation of the highest class of caterer and chefs.

However, this consolidated food service is a matter for airline consideration as two flight kitchens have been provided for on the plans.

Now leave the functional portion of the building and briefly look over the balance of the non-aeronautical revenue producing facilities offered.

Immediately to the right, upon entering the second floor, have been placed the soda fountain, cosmetics, pharmacy and allied terms. To the left, is the coffee shop and lunch counter. This choice of location has been explained in a preceding paragraph.

The Ladies' Lounge, just off the main foyer, has ample toilet facilities. The lounge leads into a small nursery which in turn is adjacent to the pharmacy. Again leading from the lounge are 12 roomettes, each provided with shower, toilet, wash bowl, daybed and easy chair.

The demand for such facilities here, makes such an installation desirable. You will note the same number of roomettes provided adjacent to the Men's Lounge on the opposite side of the main foyer. These roomettes are now in use at several mainland airports and are in popular demand.

Shoe shining and "While-You-Wait" valet service has been placed near the Men's Lounge.

At the far end of this wing you will note a larger nursery, complete with automatic washers, dryers, equipment for preparation of formulas, play pens, cribs, etc. This nursery is immediately adjacent to the first aid room where a doctor and nurse should be in attendance.

You will see that the game areas have been located close to the waiting room positions. These game rooms will house coin-operated devices, which will be plainly visible to passengers, visitors, etc., but being recessed will not impede any traffic flow, nor in any manner be an annoyance to people who do not desire to use them.

Coin-operated baggage and parcel lockers are provided at strategic points, as are telephone booths, telegram and cable counters, etc.

Dispensing machines will also be placed where they will be visible and handy, but forming no obstruction to traffic flow. This free flowing of *all* functional traffic will be preserved and provided at all costs.

The distribution of other concessions and revenue producing facilities are self-evident. An employees' cafeteria is also provided on the ground floor.

Your attention is called to "Club Room" space available on the fourth floor. Should any airline desire to establish a company clubroom in the new building such as they now have in the present terminal, space is available, and is served by ample elevator capacity.

Immediately opposite the Administration Building will be the main public parking lot of 3,000 car capacity. Employee parking will be provided, as will parking lots at the hotel, yacht club and golf club.

While this is quite comprehensive, a careful study of the plans will bring out the whole general picture and it is felt certain that here is one building that will truly meet all airline requirements, that is of course, as much as any one building can ever meet the diversified requirements of some seven airlines, and basically, it is believed the design is sound, functional from an airline standpoint, and yet exploiting revenue possibilities from non-aeronautical sources to the utmost.

In connection with the above description of the Administration Building it is desired to quote the viewpoint of one of the airline presidents, brought forth during the course of his address at the Third Annual Meeting of Airport Operators Council, held at Cleveland, April 24-26, 1950. It is believed Commissioner Ralph C. Honda was present and undoubtedly heard the following address, and I quote: extracted from "An Airline Operator's Analysis of Terminal-type Airport Requirements Today and Tomorrow" by Mr. C. E. Woolman, President, Delta Airlines, Inc. (An A. T. A. Director).

“ . . . The airlines will need sufficient ramp positions to permit the loading and unloading of passenger aircraft with a minimum of double parking during peak hours. The ramp positions must be so located that passengers will not be subjected to excessive walking distances to ground transportation or to connecting carriers. The passenger concourse leading to the loading position should be covered. At most future terminal airports the movement of passengers and cargo will be separated by the use of “two-level” concourses permitting the movement of cargo and baggage at ramp level and the movement of passengers at a level above the ramp. Multi-level buildings should be designed, however, in such a manner as to insure that passengers will not be required to change levels more than once. When the volume of passenger movement is great, escalators should be used.

“Terminal buildings should be designed so that incoming passengers may claim their baggage on the street level of the building at a point convenient to surface transportation facilities. A passenger should not be forced to accept his baggage at a point in the passenger concourse and then be faced with the alternative of carrying his bag a considerable distance or hiring a porter to carry it for him.

“It is a little bit ridiculous for passengers to go from a deluxe terminal into a deluxe airplane, but in so doing to have to wade through water, suffer blowing dust, risk the possibility of tripping over one of the various pieces of ramp equipment which the airlines use, and run the danger of being struck by the propellers of taxiing aircraft. When a two-level passenger concourse is used, we have the further absurdity of the passenger having to walk down a flight of stairs to the ramp only to be faced with the prospect of ascending a swaying set of passenger steps. While some airlines have sought to hide this blemish by rolling out fifty feet of red carpet, we think a better solution to the problem is a loading bridge which will permit the passenger to enter the aircraft directly from the passenger concourse. Most attempts to design such a bridge have been unsatisfactory in that they were either too expensive to build or required too much manpower in their operation. Mr. Ralph Burke of Chicago has designed a passenger loading bridge which it is estimated can be built for \$20,000 or less and which can be operated by one man. We are hopeful that this design will be successful. . . .”

The above represents the thinking of a successful President of a successful airline and I wholeheartedly concur in the same line of thought.

## **STRUCTURES: ON DIAMOND HEAD SIDE OF ADMINISTRATION BUILDING**

### **General**

It was indeed fortunate that here in Honolulu the Terminal area loaned itself perfectly and conformed to good design practice.

For obvious reasons it was necessary to start the Administration Building at the sea's edge, continuing this structure along the Ewa end of the terminal area, crossing the northwest corner diagonally and continuing the building along the mauka or northerly boundary of the terminal area, in the direction of Diamond Head.

After placing this main building into proper location, the balance of the units planned for the terminal area, automatically fitted themselves into position as neatly as the various pieces of a completed jig-saw puzzle.

Continuing towards Diamond Head, are located the garage-service station building, International House and the concession building in that order. All planned as two-story buildings.

The airport face of all of these buildings has been kept on the prolongation of the main administration building line and each building is separated from one another by courtyard patios. These patios are necessary to reduce the fire hazard and comply with fire regulations pertaining to garage and service station structures.

Fortunately these patios perfectly adapt themselves to our overall plan of Hawaiian atmosphere and they should all be landscaped to accomplish this effect.

Each building in this group will be inter-connected by a second floor level, covered arcade. Thus while each unit is separate, they will still be an integral part of the whole, joined by this attractive convenient arcade system. The use of an arcade raised above ground level enhances the architectural and beautification possibilities, besides its utilitarian value in increasing customer convenience.

All of the above is being planned with expansion possibilities in mind. Expansion of the main Administration Building, any one or all of the three subordinate buildings, can be readily consummated by the closing in of the proper patio area involved.

All buildings in the terminal area should have an exterior treatment that blends in and harmonizes with the treatment used on the main Administration Building.

#### **Garage and Service Station**

The need for this facility has been demonstrated upon numerous mainland airports and such installations are currently being planned at several others.

The garage and service station planned for the terminal area at the Honolulu Airport is located on the Diamond Head end of the Administration Building just far enough removed to comply with fire protection regulations. As described above this building is connected on one side to the Administration Building by a second floor level covered arcade and by a similar arcade, to International House, lying still further towards Diamond Head.

The garage is a two-story affair with car ramps to the second floor level, while on the sea side, facing the entrance highways and the main parking lot, are located the gasoline pumps. These pumps should be housed in low stone structures, similar to those used on the Grand Central Parkway on Long Island, so as to harmonize with the exterior treatment of the buildings in the Terminal Area.

This location makes the pumps perfectly accessible to entering patrons as well as to the parking lot customers.

Many local businessmen have ventured the hope that such a garage facility will be provided on the new project, saying they would like to have some garage where they could leave their car during a several day, or even a single day, trip to the neighboring islands, and have it serviced, washed, polished, oil changed, grease job, etc., thus being able to pick up a completely serviced car upon their return. The garage should be equipped to handle all such work in addition to offering storage facilities under cover. That such a facility would be well patronized would seem to be indicated.

#### **International House**

The next building, proceeding towards Diamond Head, is International House, connected to the buildings upon both sides by the second floor level arcade.

International House, it is believed, was first tried out at the New Orleans Airport. It was such a signal and instantaneous success that duplication upon

various airports, that are "Ports of Entry," became almost mandatory and many now either have or have under construction "International Houses."

Briefly, International House is a building, housing importers, exporters, multi-language stenographers, interpreters, display rooms, auditorium for commercial moving pictures, etc., convention hall and everything possible to facilitate and foster interchange of trade, plus facilities for making foreigners feel "at home" particularly businessmen who are unable to talk or read and write English.

International Houses are also "Free Port" areas wherein goods can be displayed without having to be cleared through customs.

That Honolulu is the logical outpost for the great Far Eastern trade is undeniable. To make Honolulu the true outpost for this trade, a facility such as International House upon the airport will provide the necessary impetus.

#### **Concession House**

The most easterly building along "Building Row" and connected to International House on the West by the arcade, is designed to house such branch stores as the downtown merchants might care to establish in our airport terminal area community.

Prospective tenants could be canvassed prior to construction and the need for this facility established at that time. Should there be insufficient advance renting to warrant construction, then this facility could be postponed until some future date. That it will ultimately be needed seems assured. The timing being the only point in doubt.

#### **Hawaiian Village**

It is planned to ultimately construct an artificial island in the center triangle area formed by the seaplane lagoons and opposite the main entrance of the Administration Building. Grass shacks, handicraft shops, small boat harbor, beach, etc., are all planned for the island.

A ferry, consisting of outrigger canoes, will transport passengers and visitors from the yacht club docks to the island and return, for a nominal fare.

Visitors would see "Old Hawaii," the villagers would sell their handicraft to the Administration Building concessionaires and/or direct to the visitors to the island. This prospect not only would be a great visitors' asset, but would provide work for many local people. The word of mouth advertising that this island would produce is of incalculable value.

It is planned to floodlight the island by night and have it connected to the public address system of the main building so passengers could be paged in plenty of time to return and board their plane.

Think of a plane load of through passengers with perhaps several hours of layover time on their hands, being directed to make a visit to the Hawaiian Village by the airline personnel, their fears of missing their plane being allayed by being informed they will be paged in plenty of time. Think of the impression such a facility will make and of the good will and ensuing publicity that will be engendered by the Village.

Again, think of the visual impact this Island will have on visitors as they step out of our administration building. It is sincerely believed this Island is one of the more important features that can and should be developed here, in an all-out effort to make Honolulu Airport one of the World's outstanding and best publicized of Airports.



## **Parking Lots**

### **MAIN ADMINISTRATION BUILDING PARKING LOT**

Immediately adjacent to the Administration Building and lying between this building and the sea side, will be noted the main public parking lot. This lot has a capacity of some 3,000 cars.

All separation strips and planting areas should be heavily landscaped with the use of coconut palms predominating. It is planned and desired to make the parking lot look like a grove of coconut palms.

In addition to the highway system, this main parking lot is connected to the Administration Building by a pedestrian underpass, and pedestrian walkways are also placed along the sides of the various driveways.

### **EMPLOYEE PARKING LOT**

Close to the entrance of the terminal area you will note on the Master Plan (Drawing Number 1) the location of the employees' parking lot. This, naturally, is to be a free lot with access to be gained by a windshield sticker or card pass, whichever is deemed most convenient.

### **GENERAL PARKING PLANS**

Again, you will note on the Master Plan that each unit or facility has its own parking lot immediately adjacent. This, in an effort to eliminate the "problem" of car parking and to thus make each unit attractive and convenient to the prospective users. A study of the plans will show how this parking has been handled. It is believed that no other Airport will offer as conveniently located parking lots, nor ones with such adequate capacities.

This disposition and segregation of parking lots per facility, is deemed of greatest importance and should enhance the value and public acceptance of the various features offered upon the Airport. That a policy of providing numerous and adequate parking facilities, all conveniently located adjacent to their individual units, will pay big dividends in increased usage of said facilities, goes almost without saying and that this policy will reflect itself favorably upon the Airport balance sheet is also undeniable. Consequently, let the Master Plan be adhered to and not attempt to economize by the elimination of any planned parking lot, whether they be "Pay Parking" or "Free Parking." All will have their place in the general welfare of our program as a whole.

## **LAND UTILIZATION**

The matter under this heading is of such importance that it was made the subject of a separate report to the Commission under date of July 20, 1950. Proper airport land utilization is of such importance that it warrants the inclusion here of the portion of the above mentioned report that is pertinent to land utilization.

### **Special Report on Land Utilization**

"A major modern airport is expensive to construct.

"A major modern airport is expensive to operate.

"A major modern airport is expensive to maintain.

"In this modern day and age, the complexities and expense of a huge airport have far outstripped the ability of airline users to pay the entire cost of operation and maintenance. By the same token airports can soon become an intolerable burden to the taxpayers.

"Fortunately the very entity that has created the above problem, contains within itself the remedy and cure for these problems. It is only necessary that the remedy be recognized and the cure be implemented and applied. If this condition were not true, we would be up against a hopeless situation.

"Basically and primarily an airport consists of a runway system. Due to natural causes, such as prevailing wind directions, heavy storm and high velocity wind directions, obstructions both man-made and natural, a runway system ordinarily consists of from three to four runways which generally converge or cross each other at angles from 45° to 60° and once in a while 90°.

"Primarily due to clearance necessities, and various other reasons, each runway has to have appreciable marginal strips of land adjacent to each side of said runway. Then we must have apron areas, taxiway areas, terminal areas, hangar and workshop areas.

"In addition, each runway must have sufficient space at each end to keep the approach zones clear and to insure that no obstruction can, or will, be erected which encroaches upon the limits of clear approaches as set forth under the various C.A.A. regulations pertaining to approach zones.

"To acquire or develop such a tract of land needed for such complex purposes and to meet such complex requirements, requires the purchase of large acreage. Acreage far beyond that required for the actual area involved in the runways and other paved aeronautical necessities.

"For example: An airport with four runways consisting of two 7,000 foot runways, and two 5,000 foot runways together with taxi strips, aprons, etc., would require approximately 150 acres of paved area, but to achieve that result, at least 640 acres of land area would be necessary.

"Now, we begin to glimpse a portion of the remedy mentioned above, wherein each airport, within itself, contains its own cure.

"Many of the apparent surplus of the above 490 acres must never be touched or used for any other purpose than marginal safety zones and clearance zones. But there are many acres left that can and should be put to revenue producing possibilities wherein these uses in no way interfere or jeopardize the functional properties of the airport.

"In some localities these areas are farmed in certain high revenue producing crops. Certain airports in the past, then under the jurisdiction of the writer, made more than enough, after threshing out the clover seed and selling it, to pay their entire operating costs. Another raised alfalfa and helped defray expenses.

"There are several metropolitan airports today that derive revenue from what is commonly known as a Farm Crop.

"To bring the picture closer to home, it is necessary to keep the Diamond Head side of the Airport approach zone clear of obstructions. To accomplish this it is necessary to purchase a small tract of land from the Damon Estate on the Diamond Head side of the intersection of airport entrance highway number 1, and Nimitz Highway. The additional land necessary in this area is already Airport property.

"In its present condition, not only is it practically useless from a revenue producing standpoint, but worse it is an actual eyesore and detriment to the Airport and the community. One solution, that has received serious consideration, would be to convert this area into a public park. This solution solves several of the problems, but has two serious drawbacks. First and foremost, it will produce no revenue to help defray the expensive necessities of the Airport; and second, what is more serious, not only would it produce no revenue, but through mainte-

nance and upkeep, would measurably add to the Airport expense. So on two counts, no revenue and increased expenses, the park idea has been discarded.

"However, fortunately for the Airport and its administrators, we have conditions here in Hawaii that give us the perfect solution. The condition that there are some 4,000 golf club members and others of the public who have no home club course, hence over-crowding such public golf links that are presently operating.

"Careful checking has shown the need of additional public golf courses in the vicinity of Honolulu. Hence, our plans as shown on our Master Plan, to develop this area into a public golf course, neatly solves several urgent problems.

"First—It keeps the Diamond Head approach zones safely and legally clear. This is a must.

"Second—It gives the public use of a portion of their land that otherwise must of a necessity remain idle.

"Third—The normal standard greens fee charged by municipal links will insure that the course will be self-amortizing and once paid for, the profits, above maintenance, can be used to help defray the costs of maintaining the airport runways, which runways necessitate the keeping of this area as an approach zone.

"In this one concrete example we have the perfect picture of what was discussed in the opening portion of this report, namely; that the very body causing the ills of expense, contained within itself the cure. If only the cure is applied.

"Runways need clear approach zones, clear approach zones require certain land areas. Convert these certain idle approach zone land areas from useless eyesores to a beautiful, revenue producing, public-pleasing golf course and use the revenues thus produced to pay for and maintain the runways which in turn started all the trouble and expense.

"Now, again, we have the perfect solution in that this expense is not chargeable against the general public in the form of taxes, but is paid for only by the people who like golf, who play golf, and who use the facility. A more fair and equitable arrangement cannot be achieved by any form of taxation.

"Following this same principle, all dead spots, in the airport area, have been carefully examined and you will see on your Master Plan, hotel area, yacht club area, motor boat club area, automobile race track (midgets) area, airplane motor test stand area, picnic grounds, areas for garage and service station, areas for automobile parking, areas for shops, an International House, hangars, housing areas, shops, small manufacturing shops, etc. Every square foot of area which is required in the acreage making up the great Airport has been utilized, that is not required for actual runway, taxiway, aprons, etc., in such manner that the areas involved will not only maintain themselves, but contribute directly to their just portion of defraying the great cost of the airport plant itself, which by its nature cannot within itself produce enough revenue for maintenance.

"In all studies pertaining to your airport and evaluation of the proposed projects you must keep in mind the unique position in which you find yourselves in regards to your airport.

"The majority of airports have been constructed upon land which had to be retired from productive enterprise in order to be made over into an airport. Therefore, the airport property has a double burden to carry. The ordinary burden of its construction cost, its operating cost and its maintenance cost *plus* what it would have produced in its pre-airport state.

"In your case this is not true, your airport which contains some 1,450 acres of land in its present stage, was not achieved by taking cane land or pineapple

land, or other productive areas, in fact 770 acres, more or less, represent made land. Land which has been added to the area of Oahu, land which you never had before, land which figured on the cost of dredging, etc., is worth \$9,700 per acre, or based on adjacent asking land values in the Damon Tract, of 50c per square foot, make the fantastic sum of \$21,780 per acre.

"On the \$9,700 per acre figure, the airport is worth the sum of \$14,065,000. On the subdivision price the value would be in the neighborhood of \$31,581,000.

"In any event you have an asset, placed in your hands, at relatively little or no cost to the Territory, worth conservatively 15 millions of dollars, based on unimproved land values. Considered as a going concern with hundreds of thousands of dollars worth of utilities, underground and above ground, and with potential revenue producing power, in the neighborhood of \$2,000,000 annually, you have an airport today worth at least \$25,000,000 by the most conservative of estimates.

"To realize your Master Plan complete might cost \$10,000,000 of which the Territory would be obligated for one half, or some \$5,000,000.

"In view of all of the above facts, the values involved, and in view of the fact, that the entire project can be self-liquidating in the course of some 10 years, it is not asking too much that an investment of \$5,000,000 more or less, be made in order that Honolulu can have one of the World's Outstanding Airports. An airport which would truly be a credit to the Paradise of the Pacific, an airport which would then be able, not only to maintain itself, but amortize the five million in probably less than 10 years.

"The answer is in your hands."

#### MAIN ADMINISTRATION BUILDING

Aviation authorities and well known economists who have studied aviation's problems, are unanimously agreed that a properly designed Administration Building is any airport's single greatest source of non-aeronautical revenue.

These opinions are well founded and well documented, and the Hawaii Aeronautics Commission has been furnished with this documentary evidence from time to time through the medium of special reports which, not only extracted the pertinent information, but also showed the source.

This entire question is of vital importance, as the entire concept of project financing revolves around the non-aeronautical revenue possibilities of any given airport, and consequently, *this importance warrants the inclusion of the following extracts from one of the highest authoritative sources.* (The items shown in italics in the following extract are planned for Honolulu.)

*Extracted from "Airport Management," Department of Commerce-Civil Aeronautics Administration.*

#### Concessions

"The airport to show a profit, must encourage non-aeronautical concessions. They not only bring in added revenue but at the same time stimulate increased interest in aeronautical activities, which are dependent on the general public for support. Most of the non-aeronautical activities should be located in and adjacent to the administration building.

"At the San Francisco Municipal Airport, the concessions are awarded on a licensing basis. According to officials this method has proven highly satisfactory in view of the fact that when a concessionaire fails to meet the requirements set forth in his agreement, the license can be terminated immediately.

"In some locations the municipalities handle the concessions, which are operated under the direct supervision of the airport managers, while at other places the concessions are leased to one individual or firm who in turn, sublets the various activities to individual operators.

"The source of revenue at an airport depends to a great extent upon its location and accessibility to the center of population, its size and attractions, service, ability to produce patronage, and many other factors. It is realized that every airport cannot possibly use all types of concessions, however, the more facilities provided at an airport the greater will be the public's patronage and consequently, the greater the revenue.

"One very important item should not be overlooked in a lease agreement. A clause should be included in every lease making it mandatory for the lessee to maintain his place of business in a clean and sanitary condition, subject to rigid inspection at all times. Failure to comply with such rules and regulations will immediately make the lease subject to cancellation.

"Here are some of the non-aeronautical concessions recommended by leading airport managers which are paying dividends at many locations.

"A first-class dining room and coffee shop will attract hundreds of visitors to the airport, besides accommodating the traveling public and the personnel employed at the airport. Sky-view dining rooms affording a full view of the entire airport operations have proven extremely successful at LaGuardia Field, N. Y., Washington National Airport, Washington, D. C., Lockheed Air Terminal, Burbank, California, and at many other places. These concessions can be operated by the airport owner, or leased to individuals or corporations.

"The immediate areas adjoining the administration buildings and observation grounds of an airport are highly desirable for *parking automobiles*. Parking space at an airport is costly and should be made to pay its own way. Many airports, municipal and private, have established parking lots with regular fees. Some furnish free space to holders of air carrier tickets and space to holders of tickets that are validated by firms doing business at the airport.

"Charging for parking space on municipal airports is no different than charging for space on downtown public streets; both are legitimate and are not objected to by the general public.

"Some thought should be given to reaching equitable agreement with the fixed-base operator on his use of the airport area. The air carriers are required to pay for the use of the runways, ramps and other facilities, in addition to the charges made for hangars, shops and space in the administration buildings, yet in most cases, the fixed-base operator merely pays for hangar rental which entitles him to the use of the field and all its facilities.

"Other well-paying concessions include *telephone booths* and *telegraph office*. At some of our larger airports, the telegraph company pays, in addition to office space, a percentage revenue charge on all teleprinters operated by the company on the airport.

"Electric power is master-metered on many airports and purchased at the volume rate. The electricity is then metered to the various companies and concessionaires at the regular rate which they would ordinarily pay if purchased direct from the power company. This method of handling current has proved a great revenue producer.

"The spectator ramps at La Guardia Airport and Washington National Airport have proven splendid revenue producers. Ten-cent turnstiles are used. Thousands of dollars are paid annually into the turnstiles permitting visitors to view the entire operations on the field. The ramps run along the front of the administration buildings and over the air carrier loading platforms.

"*Baggage lockers* have proven very successful in a number of airports, both for the accommodation of the traveling public and for the revenue accruing from their use.

"*Vending machines for candy, cigarettes and soft drinks*, placed in convenient locations, are good revenue producers. *Weighing and photo machines* also pay big dividends for the space used.

"A number of sports have been suggested for the amusement of airport patrons, visitors and employees. Possible revenue amusement facilities include tennis and badminton courts, golf driving ranges and putting greens, shuffle board alleys, polo billiard and ping pong tables and bowling alleys.

"*Beauty, barber and tailor shops*, as well as *shoe shining stands* are doing a nice business at a number of airports.

"Many city officials are considering plans for the inclusion of a portion of the airports in the park and recreational systems. The purchase of land adjacent to many airports has already been made, with the thought in mind of building a public playground with swimming pools, tennis courts, baseball and football fields, handball alleys, and in some localities, even a *golf course and picnic grounds*. Areas around the administration buildings and other office structures are to be developed in harmony with the playground area.

"Aggressive business management can increase all types of airport revenue, especially that derived through the operation of airport concessions, which according to many of the country's leading airport managers, is the surest and quickest means of placing the nation's airports on a self-supporting basis.

#### Miscellaneous Airport Income

"The actual sources of income vary according to the airport, its size, location and existing conditions. The majority of terminal airports, those served by the air-carriers have been the best revenue producers. Whether this will be true in the future remains to be seen. In any event, there are very few concessions or places of business located on a terminal airport that cannot be conducted equally as well on a non-terminal airport.

"There is a trend, which will be accelerated in the post-war period, toward segregating the various types of flying operations, especially in the large metropolitan areas. If this continues and private non-scheduled flying is conducted from certain airports and air carrier operations from others it is an assured fact that most revenue producing items now found on the terminal airport will be required on the commercial or private airports.

"Here are a few of the outstanding revenue producing items found to be paying big dividends on a number of the major airports.

"The airport offers many other opportunities which may be termed 'business privileges.' Included among these are sales agencies for airplanes, with showrooms, similar to downtown automobile salesrooms. Aviation supply stores, *small manufacturing plants* and various other types of business which fit into the general scheme of things connected with the operation of an airport. Business houses of this nature are not actually considered concessions, but independent firms leasing airport property or acquiring property adjacent to the airport for business purposes.

"When consideration is given to the number of privately owned airplanes predicted for the post-war era the possibilities for airplane sales agencies at airports appeared unlimited.

"The same is true with aviation supply stores dealing in all kinds of aviation equipment repairs, tools, tires, wearing apparel for pilots, etc.

"During the present emergency, hundreds of small manufacturing plants making various types of aeronautical tools, parts and equipment, have sprung up all over the country. Since the early days of the automobile, right up to the present time, there have been hundreds of such factories making parts and accessories for automobiles. The same condition will be true for the airplane, and every airport in the country is a potential site for small parts or accessory manufacturing plants not requiring large buildings or high smokestacks. Distance to the big markets is overcome in the very beginning in the aviation business, hence, such a factory can be located in Tucumcari, New Mexico, just as conveniently as in New York City."

(Please take particular note of the following on "Hotels.")

"The major airport of the future is either going into the hotel business or the demand will be so great that individuals, or corporations will build hotels or chains of hotels serving every major airport in the United States. There is hardly a large airport today which could not support a hotel, inn or cottages. Consider the volume of board and lodging business which could have been done by a hotel at your own airport during the past few years if such services had been available. It is true that circumstances have altered conditions and hotel accommodations everywhere have been taxed to capacity, but once private flying is resumed and civilians are permitted to use the air carriers at their convenience, scores of people will be coming into the major airports daily who are potential hotel customers. Aeronautical exhibitions and aviation shows will draw thousands of people to the airports over the weekends, bringing in additional business.

"Plane crew members are always in need of rooms. Representatives from the air carriers, manufacturers, oil companies and many others whose business is at the airports are assured customers. Workers at the airport, private pilots and others who fly into the airport are prospective customers. The hotel business is certainly one of the most attractive investments to be made on the modern airport. At small airports an inn or moderate-sized hotel or tourist camp is suggested.

"Just about as important as the hotel, is the modern garage. Here again consider the business that could have been done in the past by a combination garage and filling station at your airport. The same will be true in the future. *A garage for the storage of cars* owned by airline passengers, visitors to the airport, persons employed on the airport and others should be located close to the administration building for their convenience while on trips. Facilities should be provided in the garage for automobile repairs, washing and greasing. A public filling station serving both automobiles and personal airplanes should be operated in conjunction with the garage, and a drive-yourself system would pay dividends.

"There is hardly a downtown business enterprise which could not be operated at or near the airport. Bear in mind there is no intention of luring the merchants away from their present downtown locations. During recent years, however, there has been a decided tendency toward establishing neighborhood shopping centers away from the congested business districts. The busy airport offers a splendid opportunity for a shopping center.

"Recent surveys by the CAA have disclosed that large parcels of land in the vicinity of many of the major airports throughout the country have been acquired by option or purchased outright by persons interested in establishing subdivisions adjacent to the airport property.

"Much has been said about the enormous amount of air cargo which will be handled in the future. If these predictions come true, the airport will furnish great possibilities for warehouses, delivery service, and other facilities connected with the receiving and shipping of freight.

"Building sites are leased on a number of municipal airports for the construction of hangars, buildings, shops, concession stands, etc. Various methods are

employed in arriving at proper rental fees. In most cases, however, the price charged depends upon the activity on the airport, plus the actual value of the land used. At some of the metropolitan airports, where the leased land lies in congested areas of the airport, prices are based on comparable leased warehouse sites in the downtown business district. On a number of airports, municipalities have leased land for a period of years at a nominal annual rental fee with the understanding that the building constructed will become the property of the municipality following a certain number of years as specified in the contract.

"Arrangements should be made with local taxi and drayage firms for transporting persons and property to and from the airport. This can either be let out on a concession basis or the airport paid a commission on the gross business done each month.

"Some airport owners receive a commission for every charter or sightseeing flight made from the airport. Commissions as a rule amount to about 10 per cent of the sale price of a passenger ticket.

"A great number of items have been included on the airport's gratuity list which should be accounted for in dollars and cents. Among these are many which actually cost the airport owners considerable time and expense as well as being a great responsibility.

"Taxation has developed into a big revenue producing item at some airports where such items as gasoline, oil, airplanes, various concession privileges, etc., have been placed under a municipal tax system to help defray the operating costs of the airport."

Again, it is pointed out that the above represents the thinking of one of the best informed sources in our country.

## ADMINISTRATION BUILDING DESIGN

Many studies have been made and reports written about Administration Buildings and the proper methods of operation and design. It is quickly apparent, from a study of various designs, that no uniformity has yet been developed.

In an effort to keep up and continually improve upon their high standards of service, the airlines have consistently advocated a specialized functional type of building which has led to emphasis upon a solely functional type of structural design wherein ground transportation delivers passengers and accompanying visitors directly to the ticketing areas. Arriving passengers and their greeters are handled in the same manner, rushed through passageways to a baggage distribution room and from there to ground transportation, again by-passing all concession areas.

In the average airline's design, operational offices are located adjacent to each airplane loading gate, which requires of course, assigned gate positions for each individual airline. This in turn requires that each airline have assigned to it the number of gates required for its peak operations. This again, offers but little opportunity of interchange. Consequently, the number of gate positions and areas of building and apron are far in excess of the actual requirements.

This functional design criteria offers certain conflicts when economic factors are considered. It is firmly believed, however, that proper consideration of the problems as a whole can result in the retaining of all functional characteristics, so desirable from an airline viewpoint and also incorporate the economic characteristics so necessary from the owners' or operators' standpoint. That these two apparently diametrically opposed design criteria, can be successfully adjusted into one harmonious whole, is entirely possible and feasible, and a close study of



the submitted design will show that this much desired result has been accomplished.

In the development of our Master Plan, this entire problem of the main administration building has been most carefully thought through, in order to recommend a type of building containing the proper system of passenger, baggage, cargo and mail circulation, together with a functional airline operation pattern, best suited to the needs of the Honolulu Airport, not only for the present, but for the future requirements as well.

Consequently, numerous studies were made in order to solve the various problems inherent in such a building, such as space requirements, locations of the various types of concessions, basic structural and mechanical design and last, but not least, the general type of building. It must always be remembered that economical design requires that basic standard structural and mechanical requirements should be adhered to. To disregard these factors, means a structure away out of proportion as far as construction costs are concerned.

Conclusions derived from the above studies have resulted in the design and plans herein submitted. These plans, if adhered to, will result in a building, correct from a functional standpoint and also one that can maintain and amortize itself from non-aeronautical revenue produced within the building.

This design is predicated upon the assumption that no fixed assignment of gate positions by airlines be permitted. This procedure is recommended. Community use of gates, assigned by the Tower at time of flight or arrival, appreciably reduces the number of gate positions required. Airlines can usually be directed to gates within a general area which permits a communication set-up without duplication.

The general plan of the building provides necessary space for each airline individually. It is not believed that consolidation of services is desirable where handling the public is concerned and consequently, all ticketing, baggage checking and other check-in activities should always be handled by the airline involved.

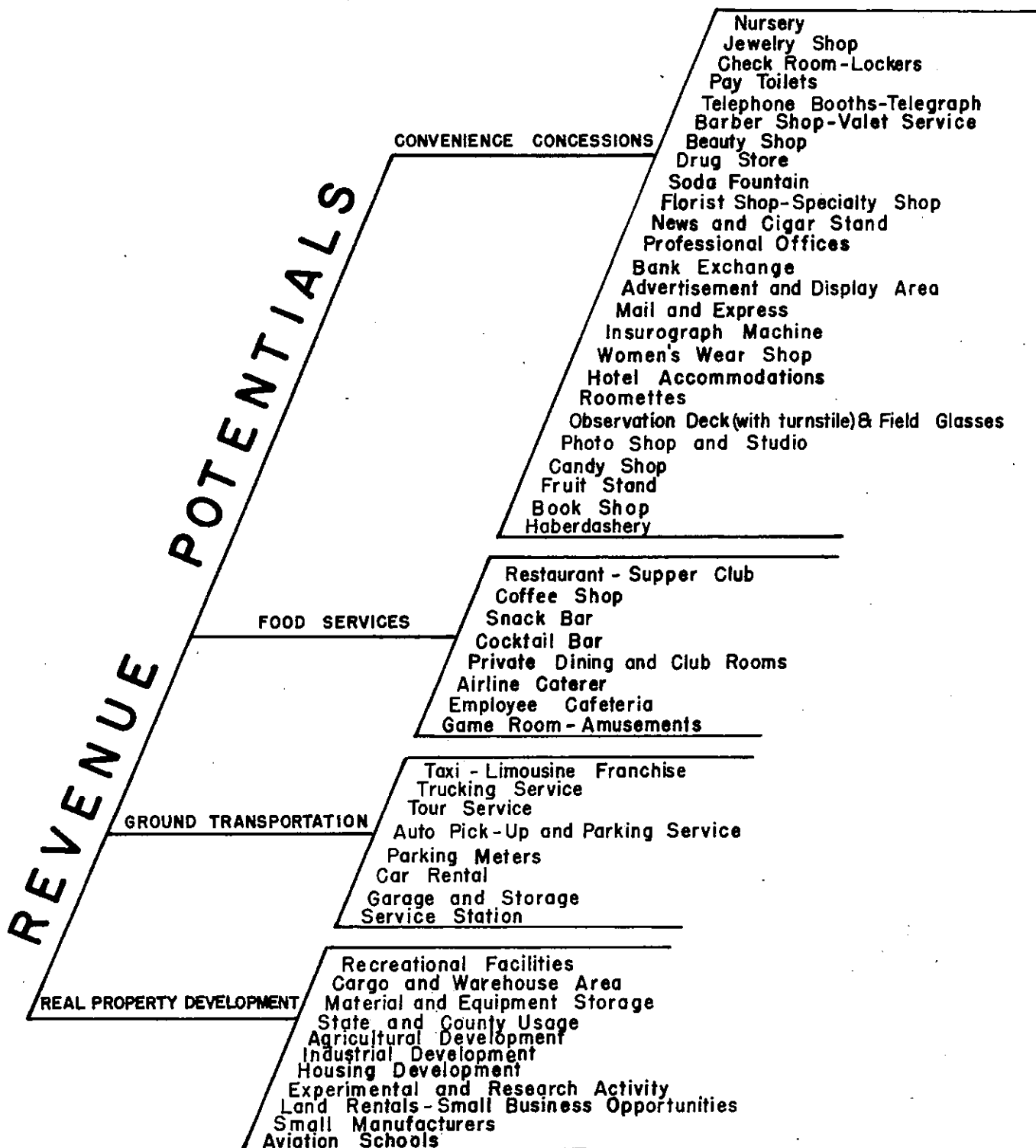
The consolidation possibilities for services, wherein the handling of the public is not involved, such as the distribution of both incoming and outgoing baggage to and from the main baggage gathering points or rooms, cargo handling, loading and unloading of aircraft, fueling, servicing, manifesting, dispatching, plane meal services, etc., all should be subject of intense study on the part of the airlines. Should the airlines be able and willing to agree to consolidation of such items, as listed above, prior to construction, a very appreciable savings in building cost could be effected with a corresponding reduction in rental figures, it would otherwise be necessary to obtain. However, this is only being mentioned as a responsibility of the airlines. Should complete individuality be retained, the increased cost to obtain this result should be borne by the airlines without complaint.

The basic design is that of the two-level principle as providing the best possible segregation of the various lines of traffic, incoming and outgoing passengers, incoming and outgoing baggage, incoming and outgoing mail, air express and cargo, all covering both national and international classification. It is axiomatic and basic that these various channels be permitted to flow through the building without one crossing the other and with no bottlenecks nor obstructions caused by a counter-flow of traffic. This two-level design permits the closest approximation to the ideal situation, consequently, it was adopted.

The second feature is to design the building around the central portion or "Heart." This building heart contains the functional and vital portions of the structure and due to its very nature is not susceptible to expansion. Hence, it must receive and did receive, most careful study and consideration, for once built, it can hardly be altered without prohibitive expense.

# HAWAII AERONAUTICS COMMISSION

## PLANNING NOTATIONS FOR INDIVIDUAL AIRPORT REQUIREMENTS



SOURCE

U.S. DEPARTMENT OF COMMERCE  
CIVIL AERONAUTICS ADMINISTRATION





CLARK M. KEE  
CONSULTING ENGINEER  
HONOLULU, T. H.

# HAWAII AERONAUTICS COMMISSION

## CHART SHOWING TYPICAL REVENUE PRODUCING FUNCTIONS "RATINGS"

REVENUE ITEMS	AIRPORT CHARACTERISTICS				
	Personal Flying	Feeder Line Fixed Base Operation	Scheduled Airline Limited Operation	Commercial (Honolulu) Over 300 Passengers At Peak - Hours	
Check Room - Lockers	Essential	Essential	Essential	Essential	
Pay Toilets	Feasible	Feasible	Feasible	Feasible	
Telephone Booths	Essential	Essential	Essential	Essential	
Telegraph	Feasible	Feasible	Recommended	Essential	
Barber Shop - Valet Service	Feasible	Feasible	Feasible	Recommended	
Beauty Shop	Not Required	Not Required	Feasible	Recommended	
Drug Store	Not Required	Not Required	Feasible	Recommended	
Specialty Shops	Not Required	Feasible	Feasible	Recommended	
News and Cigar Stand	Feasible	Feasible	Feasible	Recommended	
Professional Offices	Not Required	Feasible	Feasible	Recommended	
Bank Exchange	Not Required	Not Required	Not Required	Feasible	*Note: Important at airports of entry.
Advertisement - Display Area	Recommended	Recommended	Recommended	Recommended	
Mail and Express	Not Required	Feasible	Feasible	Recommended	
Insurograph Machine	Not Required	Feasible	Feasible	Essential	
News Reel Movie	Not Required	Not Required	Not Required	Feasible	
Motel Accommodations	Feasible	Feasible	Feasible	Feasible	*Note: Air tourist cabins are feasible
Restaurant	Feasible	Feasible	Recommended	Essential	
Coffee Shop - Employees' Cafe	Feasible	Feasible	Essential	Essential	
Snack Bar - Game Room, Amusement - Cocktail Bar	Recommended	Recommended	Recommended	Recommended	
Private Dining - Club Room	Not Required	Feasible	Feasible	Recommended	
Airline Caterer	Not Required	Not Required	Feasible	Recommended	
Taxi - Limousine Franchise	Feasible	Feasible	Feasible	Recommended	
Trucking Service	Not Required	Feasible	Feasible	Feasible	
Tour Service	Not Required	Not Required	Feasible	Feasible	
Auto Pick-Up and Parking	Not Required	Not Required	Feasible	Feasible	
Parking Meters	Not Required	Feasible	Feasible	Recommended	
Car Rental Service	Feasible	Feasible	Feasible	Feasible	
Garage and Storage	Not Required	Not Required	Feasible	Recommended	
Service Station	Feasible	Feasible	Feasible	Recommended	
Recreational Facilities	Feasible	Feasible	Feasible	Feasible	
Land Rentals	Recommended	Recommended	Feasible	Recommended	
Agricultural Development	Recommended	Recommended	Feasible	Feasible	
Industrial, Etc.	Feasible	Feasible	Feasible	Recommended	

**KEY**

-  Not Required
-  Feasible
-  Recommended
-  Essential

\*Note: Important at airports of entry.

\*Note: Air tourist cabins are feasible

SOURCE

U.S. DEPARTMENT OF COMMERCE  
CIVIL AERONAUTICS ADMINISTRATION

CLARK M. KEE  
CONSULTING ENGINEER  
HONOLULU, T. H.

Two wings project from both sides of this central or heart portion. The expansion possibilities are well taken care of in the design of these wings. Expansion areas are provided to take care of any future needs for many years to come, all without interfering in any manner with portions already built or occupied.

## CONCESSIONS

### Concession Location

All concessions have been carefully located in accordance with the principle as dictated by years of experience accumulated by several of the largest concessionaires on the mainland. Concessionaires who have millions invested in their businesses and who handle millions of customers annually. These concessionaires all know what people in the mass will or will not do even though they may not know why certain mass habits prevail. Consequently it is pretty definitely known where certain types of concessions should be placed within an Administration Building and all of our concessions are so placed that the planned circulation will expose these concessions to the greatest number of people possible and in the proper location to produce the maximum customer results, all for the good of the concessionaire, the Commission and the convenience of the public and also to the airlines.

Plate IV, opposite this page, shows the concessions planned for the building and Plate V, opposite this page, their respective rating in accordance with the manual entitled "Non-Aviation Revenue Producing Functions for Airports," U. S. Department of Commerce Civil Aeronautics Administration, November, 1947.

### General Concept

The largest portion of the non-aeronautical revenue return is that derived from the various concessions located upon the airport or within the Administration Building.

Often, local merchants and businessmen have opposed the concession plans of their airport through the fear that said concessions would detract from their respective business enterprises.

Time and experience have proven these fears to be groundless and have shown that in the majority of cases, far from detracting from their businesses, the airport concessions actually augment business in general in their locality. (Bear in mind this report and the studies herein referred to only apply to the International Class Airport.)

Why should this be true? Potential revenue studies covering the "Spending Behavior Pattern" of airport customers has shown, and experience has borne out the conclusions reached by these studies, that over 75% of the amount spent at the airport is derived from two sources.

One—The outgoing passenger.

Two—The hold-over passenger.

In the case of the local merchant and businessmen the amounts spent by the outgoing passenger is money they have already missed. Money they would never get a chance at, in other words, money gone as far as they are concerned. In the second case, that of the amounts spent by the "hold-over" passenger, again those amounts represent money that under no circumstances would be spent in any local establishment that was any distance from the airport.

The sum of these two amounts, which is appreciable, represents money that thus remains in the community which otherwise would be a total loss to the local merchants and businessmen *if it were not for the airport concessions.*

A little thought demonstrates the truth of the above findings and also experience has borne out these facts.

### **Concession Operation**

It is definitely felt and so recommended, that neither the Commission nor the airport management should undertake the operation of any concession, nor in any way enter into competition with private enterprise. Only in very rare circumstances might there be justification in deviating from this general principle.

Rather, specifications covering each concession should be carefully drawn up to cover the exact scope of the concession involved, what the concessionaire will be required to furnish in the way of stock and equipment, the terms and length of time involved. This should then be advertised for open competitive bidding, thus in no way entering into any competition with free private enterprise.

### **Concession Rentals or Revenue Return**

It is recommended that all concessions be let on a sliding scale based on a percentage of the concession's gross revenue, above an upset figure.

To arrive at an upset figure per concession it is recommended that an average percentage be taken, of the particular concession involved, in accordance with the percentages in existence at the airports comprising the membership of the Airport Operators Council and apply this percentage to an estimated fair gross at the time the concession is due to be let. The resulting figure is the monthly upset basic rental price, and the bid percentage of gross applies to all gross in excess of that amount used to secure the upset price.

For example: The average percentage for Concession "A" turns out to be 10% of the gross. It is estimated that concession "A" will do an annual gross at Honolulu of \$120,000. Applying the 10% we have \$12,000 annual rental or \$1,000 per month as the upset monthly rental figure used in the specifications.

The high bid is for say 8% of the gross over and above the upset price. It then works out that as long as the gross is \$10,000 per month or less the concessionaire pays \$1,000 per month but as soon as the gross rises above \$10,000 in any month, the concessionaire pays \$1,000 plus 8% on the amount his gross exceeds \$10,000.

## **BUILDING IN GENERAL**

### **Overseas Portion of Building**

Seven stratocruiser positions are provided for in the "First Stage." Expansion necessities will be taken care of as needed, through the construction of loading fingers. These fingers can each be up to 500 feet in length providing five stratocruiser positions each. These fingers could carry the passenger concourse deck one story above the ramp, the roof of which would form extensions of the spectator observation deck. Expansion of operations office space, utility space and for general storage space can be secured by closing in such portions underneath the fingers as deemed necessary or desirable. Thus it can readily be seen that the expansion possibilities of the functional areas of the building are practically without limit.

The stratocruiser positions can be augmented up to 18 additional positions at such time as simultaneous scheduling warrants. This augmentation plus the seven original positions makes a total of 25 gate positions possible for stratocruiser class equipment.

Again, expansion possibilities of this design as far as additional office space is concerned has tremendous latitude.

## DOMESTIC OR INTER-ISLAND PORTION OF BUILDING

The ground floor of the easterly wing, which is separated from the main or "Heart" portion of the Administration Building by baggage train passageways, has been designed to house the activities of the two local inter-island certificated scheduled operators. This area has been divided into two equal portions and it is my thought that these areas should be subdivided in strict accordance with the desires of the particular airline involved.

It is hoped that these two inter-island carriers will see fit to use the two easterly counter positions of the main ticket counter and check-in row, using the common outgoing baggage gathering area and thence to their airplanes.

However, if this procedure is deemed undesirable, it is planned to convert the semi-circular concession space in the East wing, immediately adjacent to the women's wear section, into a staircase to serve the inter-island passengers, visitors, etc. It is also desired to handle this traffic in this manner to preserve the circulation flow past as many concession areas as possible.

It is this circulation flow and the concessions that will provide the needed non-aeronautical revenue which will make it possible to maintain, operate and amortize this building and still only charge the various airline users a nominal going rental rate per square foot. Destroy or handicap this feature of this building and it will only result in a many times increase in the unit airline rental figure per square foot. It would, therefore, seem the airline users would cooperate to the fullest extent possible to preserve all such traffic flow and non-aeronautical revenue producing possibilities.

### Building Expansion

As stated elsewhere in this report, the general basic expansion possibilities will be additions in the easterly direction and to the East wing, closing in the patio between the present eastern building limits and the garage, and so forth, always in an easterly direction. However, it is not believed that this expansion will ever become necessary. However, with an investment of this magnitude, expansion possibilities must be shown even though not probable.

Inter-island carriers' gate positions can also be expanded in an easterly direction practically as far as desired.

## IN GENERAL

### Building Areas

The sizes, shapes and locations of all component areas of the building have received the most careful study. Study not only from the viewpoint of the airline users, to make every unit as functional as possible, but also from the standpoint of the building owners (Territory of Hawaii, as administered by the Hawaii Aeronautics Commission), who have the responsibility of securing necessary capital investment and to make the building produce the ultimate in non-aeronautical revenue, and last, but by no means least, from the viewpoint of the traveling public, their accompanying friends, visitors and the public in general, also to the people of the Territory in particular, all to make the building a truly beautiful place, raised to the highest level of convenience and containing features to suit every taste and every pocketbook.

It is believed that all of these much desired results have been obtained in this design, all balanced so that no one feature is stressed to the detriment of any other, truly a well balanced sound design, each unit inter-dependent upon each other unit to make the harmonious whole.

## **Hawaiian Atmosphere**

Here we have probably as important a feature as any item of our plans.

The exterior treatment should be in accordance with the best architectural traditions that have been developed to take advantage of the unique conditions found in Hawaii.

This effect should be enhanced by lavish use of landscaping. The plans show many thousands of square feet of planting areas. Along the ramp face of the building, along the opposite face, in the patios between the buildings, within all parking areas and along both sides of all entrance parkways and in the center separation strips. The parking areas should look like palm groves, the parkways as great palm-shaded avenues, set off by flowering shrubs, flowering trees and every device of skilled landscaping possible.

One of the outstanding features, to create this Hawaiian atmosphere, will be the great Aloha Lanai, open across the airport side of the building at eye level to the arriving and departing passengers, while seated in their plane. It will be a never-to-be-forgotten sight. This Aloha Lanai has been designed with ample sized planting boxes along the entire perimeter of the airport side. This great planting box should contain flowering shrubs and trailing vines. The vines to drape out and over the outside edges and trail down the airport face of the building towards the ground, giving an effect much the same as an ivy-covered wall. Around each column base, planting boxes have been planned. Vines can be trained to entwine the columns. Additional tree ferns and similar plants can be grown in ornamental tubs and specially built containers and placed and clustered in strategic points around the Aloha Lanai, wherever the landscape architect and decorator may deem fitting and most advantageous to secure the Hawaiian atmosphere and tropical setting.

It is believed this luxuriant tropical Aloha Lanai and its exotic setting will make the Honolulu Airport world famous. At least no other airport in the world possesses such a feature at this writing.

The Aloha Lanai, the great entrance and exit lanais, all landscaped, the Hawaii Island Village in the midst of Keehi Lagoon, the landscaping of all parkways, roads and the parking lots, all against the backdrop of Diamond Head, will make an unforgettable picture and a pleasant and lasting impression upon all those who use the Honolulu Airport, whether they be first time visitors, or persons making their one hundredth visit to the Airport. Such beauties never grow old. In fact, they are enhanced by repetition. The opportunity is here to achieve the world's most beautiful, most outstanding and one of the finest airports from an aeronautical standpoint of any developed to date. This opportunity must not be missed. No compromise with beauty should be permitted.

It is hoped the plans will be approved in their entirety and then carried out stage by stage as conditions warrant, but with no major deviation at any point from the plans as herein conceived and presented.

## **Emergency Power and Air Conditioning**

Should more space be needed to house emergency power units, air conditioning units and other equipment needs over that provided in the main building, ample additional space can be developed underneath the entrance roadway ramps. This area is so designated upon the plans.

## **Special Building Features**

It is planned to air-condition the building office space, the restaurants and lunchrooms, the soda fountain, roomettes, clubrooms and main dining room.

It is further planned to connect each ticket counter and check-in position, baggage gathering area, dispatch office and each gate position by a selective automatic pneumatic tube system as developed for airports. This system was developed by the Mix and Genest Company. The International Standard Trading Corporation, 67 Broad Street, New York, are the agents.

The system in some respects, operates like an automatic telephone system in that communication can be established between any two points without the intervention of a central operator. On each carrier there are two rings stamped with numbers 0 to 9. These rings are adjusted to the number corresponding to the receiving station and the carrier inserted in the transmitter of the station of departure. It travels by suction through the sending line to the automatic control installation. Upon arrival at the automatic central station, the carrier stops briefly while contact fingers touch contact strips on the carrier and through the operation of relays and selectors establish, by means of magnetic mechanical switches, the path for the carrier to follow to reach its destination. The capacity is up to 1,200 carriers per hour. This system provides 24 hour per day operation without any central operators or human control. This eliminates the disadvantages of the old pneumatic tube systems. Also by using one line the old bulkiness disappears. This system has unlimited possibilities and its use should make this terminal outstanding from an efficiency standpoint.

A building-wide, and to include the garage and Hawaiian Village, public address system also should be installed.

Baggage chutes, connecting the passenger lobby check-in positions with the outgoing baggage gathering area, will be installed. In fact, scales with tilt platforms, electrically controlled, can be installed should the airlines desire. These permit one counter operator to tilt the baggage from the scale bed, after baggage checks have been attached, into the chute by mere pressure of the hand or foot upon a control button, thus permitting his undivided attention to his manifesting duties.

Trip switches controlling traffic lights on the service driveways will insure right-of-way for the baggage and cargo trains at all times while serving the incoming baggage gathering area. These can be installed at additional points should usage so dictate.

Covered swinging gangways are an innovation which will be tried soon at the Miami International Airport and most certainly should be used here. There is every advantage to be gained in using this innovation and no disadvantages that can be foreseen. They can instantly be swung into position, more quickly and easily than the present bulky and awkward step set-ups, presently used by the airlines, can be man-handled into place. A use of this covered gangway simply means that after the passenger is ramped up to the second floor, he then moves through the building and onto his plane all at this one level, protected in inclement weather, is up and over the congested, dangerous ramp area, all at one level and is not subjected to the arduous ordeal of climbing up or hazardously descending what is charitably called "loading equipment." The average passenger of today arriving at or departing from Hawaii is usually encumbered with packages and a variety of hand luggage. The trip up or down the narrow uncertain piece of equipment now provided most certainly can be improved upon by a covered swinging gangway.

Passenger safety and convenience should be of primary consideration, consequently, it is recommended that the Commission make the use of the swinging gangway mandatory. There is no use in adhering to a procedure whose only favorable point is that it is in present use, even now it is old, obsolete and presents certain elements of inconvenience, not to mention danger.



## UTILITIES RAMP TRENCH

It is planned to install a ramp trench along the entire length of the ramp and out from the building line to a position underneath the plane spotting areas. This trench will be of water tight construction, large enough so service men can pass through it and containing the following: 110V, 220V and 440V electrical lines and connections; water lines; telephone lines and connections; air conditioning ducts for plane air conditioning; compressed air lines and connections; gasoline dispensing lines, one for each octane; gasoline return lines, one for each octane. An extra dispensing and return line should also be installed to handle jet fuel.

## GASOLINE STORAGE AND DISPENSING SYSTEM

The dispensing of gasoline upon an airport is the exception that proves the rule and it is not deemed wise in this specific case to attempt to limit the rights to furnish gasoline to any one supplier through the medium of an exclusive concession, all airlines should be free to purchase their gasoline and oil from a supplier of their own choice. However, this is the only case wherein such a course is recommended. All other concessions should have proper specifications set up, covering the concession in question, and be advertised for open bidding by all who can meet the necessary qualifications. The concession then should be let to the highest qualified bidder. Gasoline dispensing excepted, however.

There are three well known and generally accepted methods of dispensing gasoline upon modern airports. The first, and perhaps the most commonly used, is that of the well-known truck system. Its primary advantage is its flexibility. The principle disadvantages are: increased number of schedules and the greatly increased fuel capacity of the larger airplanes now in general use, have required more and more and larger trucks of greater capacity, resulting in serious ramp congestion at many airports. Bulk storage plants must be located at a considerable distance from this apron. All leading to greatly increased costs in the handling of aviation fuel.

The increased capacities of the trucks has greatly increased the fire and explosion hazard and also this size has decreased the mobility of the unit. Generally overlooked is the increased indirect cost to the taxpayers in that these great trucks cause more wear and tear on the public highway system, again, not to mention the increased explosion and fire hazard, which would result from any collision upon the public highway. This is a hazard which is increasing daily, due to the increased volume of general public traffic upon the highway system. Any plan that will reduce the movement of these trucks upon the general highway system, as well as apron areas, will prove a boon to everyone concerned.

The second method is a multi-underground pipe system, delivering each supplier's product to the loading position of its own particular customer. This system is not only costly, but requires an assignment of gate positions. Each supplier's pipe lines, therefore, are only connected to a portion of the plane loading positions. Changes in plane assignments can only be achieved by considerable cost. This entire type of system is highly inflexible, costly and makes gate assignments mandatory. This in turn reduces the efficiency of the entire building and ramp layout with attending gate congestion, plane delays and increased cost, during all peak periods. This system is not recommended.

The third method is that generally known as the single pipe system in which all fuels of like grade and specifications are co-mingled in a common set of tanks and piped through a single underground system to the service trench of each plane position as may be decided upon. This system is the simplest and cheapest of the three systems, not only for installations, but in addition, for operation.

If proper quality controls are maintained there are no legitimate technical objections to co-mingling. Occasional spot checks, analysis of deliveries at uneven periods would at all times safeguard quality, but the greatest safeguard is in the integrity of the vendors. Again, deliveries could be isolated by the expedient of extra tanks although this is usually considered unnecessary.

As stated at the beginning of this section, each airline should be permitted to purchase from the vendor of its choice. Since all fuel dispensed is metered at the plane position, the meter record is all that is needed to permit any user to purchase its needs from any oil company, losses being prorated in accordance with prior agreements. Possibly for legal reasons, the oil companies might be prohibited from participating in the installation cost of any co-mingling system, however, such a system eliminates their present investments in storage systems and fueling tank trucks and such savings should be reflected in lower prices of their products.

Both of the pipe line systems have two methods of making the final dispensing into the aircraft. One through the fuel pits at the service trench for each plane position, or second, by means of a self-powered vehicle containing pumping plant, reels of hose and meters, connecting to flush type hydrants in the pipe line system. While such a mobile unit apparently adds flexibility to the system, still it means one more vehicle upon the ramp, plus the fact that the hose connections to the hydrant always imposes a serious obstruction to other vehicular movement upon the apron. Such a mobile unit is expensive, complex and is still more or less in the experimental stage. More time should elapse and more of these units be placed into general use in order to insure that problems of safety and operation have been successfully solved. It is not believed that these units will ever receive wide acceptance.

The majority of operations at the Honolulu Airport are terminations and originations. At the moment the bulk of the fuel is dispensed at the hangar and aircraft maintenance areas as Honolulu Airport operations are largely termination and origination. Through schedules, however, should increase. The convenience of a modern dispensing system, will automatically tend to increase the quantities taken on at the plane loading positions, and this condition will be augmented by additional through schedules. Consequently, dispensing pits at both locations should be provided. It is recommended that the entire storage and dispensing system be installed as a "Terminal Facility" and a reasonable use charge made, based on amortization, operating cost, and a figure to allow for waste, leakage, etc.

It is recommended that the gasoline dispensing system be of the co-mingling type with a single underground pipe line service for each grade of fuel to the fueling pits, located on the apron, at the plane servicing areas and/or hangars. This pipe line system will contain provisions for three grades of gasoline, namely, 90, 100 and 115 octane, plus an additional pipe line for jet fuel. This additional line should by all means be installed at the same time the balance of the system is constructed. De-fueling lines will also be installed for each grade of gasoline and jet fuel.

It is further recommended that negotiations be entered into looking towards the taking over of at least one-half of the present tank farm, located on the Hickam Field area immediately adjacent to the western boundary of Honolulu Airport, for bulk storage purposes. It is further recommended that an unloading wharf be constructed on Keehi Lagoon and connected to the bulk storage plant by pipe line. A barge channel would have to be dredged to service this wharf. This dredged material could be used to fill the area necessary for the extension of Runway 4, consequently, making this phase of the project economically sound. This is all shown on the Master Plan Drawing Number 1.

It is considered beyond the scope of this report to enter into a technical comparison covering the merits of the mechanical pumping system vs. Aqua Floation, or hydraulic displacement system. It would seem sufficient to say, that unless abnormal conditions are present, the installation cost of the two systems are about equal. It is the opinion of the writer that the Aqua Floation system has many advantages, including fire safety, elimination of evaporation loss (this alone will pay for the system in a few years), delivery of full strength fuel and many other advantages. Delivery rate is flexible and automatic, since throttling the water control valve determines this. Many installations at civilian and military airports, as well as many industrial plants all testify to the satisfactory service of the Aqua system, consequently this type of installation is recommended.

### MISCELLANEOUS TERMINAL SERVICES

In addition to the gasoline dispensing system, all modern air terminals should provide the various utilities at the ramp. It is proposed at Honolulu to carry these utilities in a ramp utility trench. Such a ramp utility trench carrying these services, frees the apron from a multitude of vehicles which now usually consist of battery carts or portable generators, lavatory service carts, air conditioning trucks, fuel trucks and a miscellany of other mobile units. Such a ramp service trench carrying these services eliminates a substantial equipment investment by all of the airlines, and also should materially increase the efficiency of the entire operation. As a consequence, a use charge should be made based on sound and reasonable amortization and operating costs. Communications, water and sewers are a part of the general terminal building facility and their installation costs together with their operating costs should be included in the rental charges for building space when the time comes to price the various classes of building rental areas.

Low voltage direct current for engine starting purposes will be provided at each plane position. This is a necessity and will be achieved by rectifier units which are supplied by high voltage alternating current. Other electrical supply will be 110/220 and 440 volt, single and three phase, all in the ramp service trench.

Apron flood lighting will be provided, designed and shielded to prevent pilot glare. All terminal area roads, access parkways and the parking lots will be illuminated by luminaires spaced on about 150 foot centers.

### FIELD LIGHTING

It is planned to install high intensity runway lights upon Runway 8. The balance of the runway system should be modernized by the installation of the high tip-over type runway contact light, equipped with brightness control. All taxiways should be equipped with an approved type of taxiway lights. These taxiways should all be on separate circuits, so that the tower can set up the proper taxiway pattern to control both inbound and outbound taxiway traffic.

The design of runway lighting, naturally, is based upon the requirements of the airport to assist in achieving a continuous all-weather operation during night time landing and takeoffs. Equally naturally, all lighting installation will be designed, specified and installed to meet all requirements of "Airport Lighting Design" as set forth by the Civil Aeronautics Administration, and the recommendations of the Air Transport Association.

Briefly, these design criteria are: For a runway 200 feet in width, the runway lights are to be located upon a line 10 feet outside of the pavement edge and spaced at 200 foot intervals. Those lights, in the first 1500 feet at each end of each runway, are to have two-color split filters, yellow and clear, arranged so that the

last 1,500 feet of a landing run will show yellow in either direction. The central portions show clear color. Six green threshold lights are to be placed transversely at each end of each runway. Taxiway intersections are to be marked by portal lights. The taxiway lights as described above are vital to assure the safe and expeditious movement and control of taxiing aircraft and to release the tower controller of as much burden as possible. This portion of the lighting system is a "Must." All taxiway fixtures are to be equipped with blue filters.

### GRADING AND DRAINAGE

There is no need to make any revisions in the present existing runway grades or to the drainage system. Established runway grades and the existing drainage system has proven satisfactory and all first stage new construction and contemplated second and third stage items will all be tied into the existing pattern as to runway grades and the drainage system.

### PAVING

The Civil Aeronautics Authority recommends that runways, taxiways and aprons all be designed to withstand stresses induced by single tire wheel load of 75,000 pounds, or a dual tire wheel load of 100,000 pounds, for Class 7 Airports, or the International sized fields. Since the load of the nose wheel is thus neglected, the designs are conservative for airplanes having a gross weight of 150,000 to 200,000 pounds respectively and with no limits upon the frequency of use. The present pavement system of the Honolulu Airport when analyzed and load tested, was found to meet the requirements.

Normal runway design, here, to meet the standards and specifications of the Civil Aeronautics Administration, would require a pavement to consist of 4 inch sub-base course, a 9 inch crushed rock base course, a prime coat, a 3 inch bituminous concrete surface or armor coat and finally a seal coat. Ramp areas at the runway ends have similar sections except that the crushed rock base course should be increased to 11 inches. The existing taxiways and runways, retained in the Master Plan are capable of carrying the above recommended loads, and while they may not be identical sections as described above, their load carrying capacities are at least equivalent.

Parking lot paving should consist of a 6 inch crushed rock base course or compacted selected coral, a prime coat, a 1 inch thick bituminous concrete armor or surface course and seal coat. Street and access parkway pavement should be the same except that the armor or surface course should be increased to 2 inches because of heavier traffic. All parkway and roadway lanes should be a minimum of 12 feet in width.

### TELEPHONE AND PUBLIC ADDRESS SYSTEM

Separate from the ordinary public telephone system, it is planned to install a comprehensive airport interphone system, which will inter-connect all pertinent airport activities. Among others the Bell System type 711 would provide a satisfactory installation and is recommended.

All buildings in the terminal area will be provided with a normal public telephone system. While all tenants of the buildings might well want to arrange for their own service, still a PBX system to service all of these buildings might provide a better class of service and is well worth consideration.

The centralized public address system will be provided throughout the main buildings, the passenger concourse, apron areas, the Hawaiian Village on the Island and the Aloha Lanai. All announcements are to be handled only by trained personnel for only in this manner can intelligible announcements be made. Again, the automatic push button system for uniform and routine announcements will be studied and such studies may well show the advisability of installing such a system.

Should any tenant need or desire a public address system within his own area, such installations are to be made at such tenant's own expense and only with prior authorization of the Director of Aeronautics.

### **ELECTRICAL DISTRIBUTION, SEWER AND WATER SYSTEMS**

After a careful study, no radical changes are contemplated in any of the three systems under this heading. Improvements, betterments and necessary additions will all have to be undertaken from time to time as needs dictate but these are only natural functions of a continually expanding industry.

The construction of the planned terminal area will require additions to the present system, but again, only the normal requirements will be shown on the working plans of each installation.

### **FIRE PROTECTION**

A well trained and well equipped crash fire department is maintained and supported by the Airport. This department will be increased and its equipment augmented from time to time as conditions might require such increases and additional equipment. The greatest present requirement is for a new crash fire station which should be located as shown on the Master Plan. This location was very carefully chosen after long study. It is the closest possible point to the area of densest landings, and close enough to the National Guard area to afford them adequate protection.

As a part of the water distribution system, fire hydrants will be provided in the Terminal area. Standpipes and hose racks throughout the building and at convenient intervals around the apron and parking lot areas, will provide fire protection. This will all be supplemented with strategically placed portable fire extinguisher equipment of approved types. It is believed the above together with the Honolulu Fire Department will provide fire protection for the Honolulu Airport far above the national average, with a corresponding reduction in fire insurance rates for not only the Territory of Hawaii, but for all tenants. This can be a great drawing card to induce new tenants into leasing space within the buildings. Low insurance rates have proven themselves to be great inducements in filling a building.

### **STAGE CONSTRUCTION**

#### **General**

A Master Plan is one that is exactly what its name denotes. A Master Plan is long range planning in an effort to anticipate the needs of the airport and community it serves, together with the requirements of the airlines and other companies providing the aeronautical services to the said airport and to foresee these services for as many years to come, as is humanly possible. Only by such planning and the placing of said planning upon record in the form of this report and its accompanying drawings, can these much desired results be obtained. In this

manner, and this manner only, can assurance be given that adequate facilities will be available, and will become available, when traffic and public demands require them. To permit the orderly establishment of a sound, economic fiscal policy and program also necessitates the preparation of the "Master Plan" method to justify and support such a program.

It is realized that, in most cases, it is economically unwise and usually impossible to construct an airport in its entirety in one huge project. Consequently, the Honolulu Airport project and Master Plan has been broken down into a three stage program. This is necessary to insure an orderly scheduled construction program. Generally speaking the stages have been most carefully planned so that no new construction will ever have to be abandoned or even materially modified in proceeding to any subsequent stage. Each succeeding stage is a logical and continuing development of all that has preceded, and is a practical continuation until the ultimate development has been achieved.

A study of the plans and stage development will show that at no time is it necessary to destroy or abandon any present facility or building until such time as that unit has become obsolete or unsafe structurally. Each item, making up the Master Plan development, can be undertaken at any time, and in no way interfere with any structure or operation presently in use or now underway. This is a very unique condition, and one that is very fortunate for this community, in that no extra expense is necessary to provide temporary quarters or facilities pending the completion of permanent units. All expenditures can thus go into the construction of the finished product. No inconvenience to any present tenants, airline operators or general public will result from the activating of any one of the stages or any individual unit of any stage of this Master Plan.

Forecasts and surveys show the present Administration Building to be totally unfit, inadequate and a dangerous fire hazard. In consequence, a new Administration Building should be the first step in the Number I stage, that is this building, plus its attendant facilities. Due to this almost emergency condition, the program covered by this report and Master Plan has been scheduled to start in mid-1952 and it has been assumed this will indeed be the case as it could be physically and financially possible to place the project under construction, say by July 1, 1952. This entire program should be vigorously prosecuted and proceed without delay or interruption, if Honolulu is to continue to provide the class of service and facilities its position as the "Crossroads of the Pacific" obligates it to provide. The fact that some 68% of all persons arriving and departing from Hawaii, now do so by air travel, and the fact that this percentage is increasing yearly, makes it mandatory upon the Territory that its aviation facilities and policies keep pace, as the very economic life blood of the Islands demands that this be accomplished.

While the project start has been planned for mid-1952, the inauguration of the succeeding second and third stages has not been scheduled as to starting dates. It would seem wiser to let economic needs and increased demand dictate the starting date for the subsequent stages.

One thing must be made exceedingly clear and that is the flexibility concerning the various units that go into the make-up of each stage. There is nothing arbitrary nor ironclad that each unit must stay in the stage wherein it is now planned. Many factors and changed conditions could quickly alter the situation as it exists at this writing, making a unit that is now planned for third stage of sufficient importance to warrant it being moved up to possibly first stage and some units that now seem important enough to be planned for first stage, might through some shift in circumstances, be moved back into the second or third stage. This program has deliberately been kept flexible for it is not believed that anyone of us possesses sufficient wisdom to make rigid commitments for years to come, covering such a fluid medium as the air industry.

Therefore, this program and Master Plan have been set up to our best ability to foresee the problems and needs as they exist under the present circumstances.

There is one thing, however, that is rigid and susceptible to no changes, and that is the location of the various units as shown on the Master Plan, if, as and when such units are activated. The order of construction and the placing in First, Second or Third Stages have a certain degree of flexibility, the location of the various units is fixed by the Master Plan and no deviation can be permitted. If such deviation is permitted the effectiveness of the entire Master Plan has been lost and sooner or later some item of new construction will have to be demolished, at great financial loss, to make room for some more vital unit. The approval of the Master Plan freezes it as such. The stages, whereby the Master Plan is realized, remains flexible and subject to change, with units being added to, or subtracted from, the various stages or even eliminated entirely, if conditions so warrant. It is recommended, however, that no unit ever be eliminated from the Master Plan, but rather be permitted to lay dormant. These dormant items seem to have a habit of suddenly coming to life and becoming important. After all, it costs nothing to let an item remain upon the Master Plan. In the following detailed description of the Stages, the items are listed as closely as possible in their relative order of importance.

The placing of the various items in their respective stages, is in the nature of recommendations only. Recommendations, however, that have only been made after the most careful study and consideration of all factors that enter into a project of this magnitude.

Each of those recommendations are only made for the guidance of The Hawaii Aeronautics Commission, to be accepted and implemented at such times as The Hawaii Aeronautics Commission deems fit and proper.

### **RECOMMENDED FIRST STAGE**

#### **THE ADMINISTRATION BUILDING AND TERMINAL AREA—Item 1 on Master Plan and Sheet 3**

The need for this new Administration Building is so obvious that no more time will be used to develop this theme. The reasons, for locating this building in the site as shown on the Master Plan, have been gone into in great detail in a foregoing portion of this report. More and more data is coming to hand relative to the probable come-back of the seaplane. Hence, the soundness of the building being located adjacent to Keehi Lagoon is becoming much more apparent.

The necessity of demolishing the old NATS hangar which occupies a portion of the Administration Building site is not considered a demolition of an existing facility in the strictest sense of the word, as this building is presently unoccupied and has been vacant for a number of years. It is of wartime construction, a serious fire hazard and of no practical value, to anyone or any agency. This structure really should have been torn down for such salvage as possible, many years ago. Its demolition could well be undertaken at once in order to clear the Administration Building site.

#### **GARAGE AND SERVICE STATION—Item 2 on Master Plan and Sheet 3**

There is a well developed demand for a service station and garage for the Honolulu Airport. Numerous suggestions have been received requesting such facilities and stating that many people would like to have a garage, where their car could be stored under cover, washed, greased and polished while making a short trip to the neighbor islands. This demand seems well enough established and the customer potential great enough to warrant this item being placed in the "First Stage."

#### **TERMINAL PARKING AREA—Item 5 on Master Plan and Sheet 3**

The necessity for the early construction of this item is so obvious as to need no further discussion. It should also be called to your attention the important part this parking area plays in the overall landscaping plans. That point must not be overlooked. The non-aeronautical revenue producing potential is also exceedingly high.

#### **EMPLOYEE PARKING AREA—Item 6 on Master Plan and Sheet 3**

Too often this item is overlooked entirely during the course of airport planning, or if not overlooked, there seems to be a tendency always, to scrimp when it comes to employee facilities. It is deemed important that adequate and convenient employee parking be provided in accordance with the Master Plan, both as to capacity and location. This does not mean Hawaii Aeronautics Employees only, but also, those employees of all airlines and all others working on the airport.

#### **NATIONAL GUARD LOCATION—Item 30 on Master Plan and Sheet 3**

It is usually the responsibility of a State or Territory to provide adequate space for any National Guard Squadron on any State or Territorially owned airport. In considering the problems of the local squadron, the area shown on our Master Plan seemed to fulfill all requirements to the best advantage of all concerned and while this area is on the Hickam Field Air Base, still it was felt necessary to include the Guard location on our Master Plan in order to show their relation to our whole pattern. The National Guard and Hickam Air base concur in this location.

#### **CRASH FIRE STATION—Item 31 on Master Plan and Sheet 3**

The location for the crash fire station as shown on the Master Plan is considered a "must." The majority of landings on the Honolulu Airport, whether made on Runways 4 or 8, take place in the immediate vicinity of the Fire Station located as shown on the Master Plan. While protective service to this touchdown area is of primary consideration, fire protective service to the balance of all installations must also be kept in mind. A study of the location will show that it is almost equi-distant from the various structures around the perimeter of the Airport, including the National Guard area, and thus the crash Fire Station, erected in the location as shown, can render the maximum service to the entire airport as well as afford the best protection to the critical landing areas of the airport. The construction of this crash Fire Station should be one of the priority items of the "First Stage."

#### **GASOLINE TANK FARM—Item 32 on Master Plan and Sheet 3**

Negotiation should be undertaken at once with the proper Air Force Authorities looking towards their deeding the present tank farm on Parcel 1, to the Hawaii Aeronautics Commission. If the Air Force felt it necessary to retain say fifty percent of the installation for their reserve use, the Commission should interpose no objection as it is felt 50% of the present installation would serve the needs of the Honolulu Airport traffic for many years to come. As stated elsewhere in this report, such an acquisition would relieve the dangerous and highway-deteriorating practice of trucking all aviation gasoline over the present highway system which connects the suppliers' bulk plants to the Airport. Aside from this, Nimitz Highway is essentially a boulevard and every effort should be made to reduce truck traffic upon boulevard systems to the minimum possible. Any reduction of truck traffic that can be achieved with no resulting hardship to the parties involved would be most desirable. For these reasons, as well as the increase in efficiency that would result, necessitate the recommendation for a tank farm or bulk plant adjacent to the Airport.



#### **GASOLINE LOADING PIER AND CHANNEL—Item 34 on Master Plan**

In order to achieve maximum efficiency, with a corresponding reduction in the cost of gasoline, from a tank farm located at the Airport, the cheapest methods of delivering bulk gasoline to said tank farm has been studied and considered. It is believed that this maximum efficiency could best be achieved by providing necessary facilities whereby gasoline in bulk could be handled by barge, as the intermediate delivery unit between a tanker and the tank farm. To make this a reality would require a gasoline unloading pier located approximately as shown on the Master Plan. It would then be necessary to dredge a short channel connecting one of the seaplane channels of Keehi Lagoon to the unloading pier. The dredged material would be used to provide necessary fill for the extension of Runway 4, consequently, this feature fits into the overall picture, providing not only increased efficiency to the gasoline dispensing system, but also becoming a source for much needed fill material.

#### **MISCELLANEOUS UNITS—Items 38, 40, 42 and 43 on Master Plan and Sheet 3**

Item 38, Airport Maintenance Department; Item 40, Public Parking; Item 42, Highway Traffic Lights, and Item 43, Cyclone Fencing, need no further explanation as to their necessity. A study of the plans show very plainly why they are included in the "First Stage."

#### **HIGHWAYS—Shown Cross-hatched on Sheet 3 of Master Plan**

That portion of the new highway system, necessary to construct during the "First Stage," is clearly shown on Sheet Number 3 of the Master Plan, entitled "Plan Showing First Stage Developments" and needs no real comment.

#### **GRADING AND FILL—Shown Cross-hatched on Sheet 3 of Master Plan**

The necessary fill area for the extension of Runway 4 and its taxiway, planned for this "First Stage" is shown on Sheet Number 3 of the Master Plan. This fill must be obtained by the dredging of selected coral and should be undertaken during the early portion of the "First Stage" construction program in order that proper settlement and compaction may be obtained prior to the paving portion of the program.

#### **RUNWAY PAVING—Shown Cross-hatched on Sheet 3 of Master Plan**

It is planned to extend present Runway 4L an additional 3,000 feet in order to bring the completed runway to a total overall length of 10,000 feet. This will enable this runway to be classed as a "Tandem Dual Runway," thus acting in the capacity of dual runways for the smaller transport airplanes, and also providing the length necessary and desirable for the largest class of airplanes now contemplated. Runway 4R would remain as it is at present, but would change over to a taxiway classification, whenever it becomes necessary to add the loading fingers to the Administration Building to secure additional airplane loading and disembarking positions. This additional length is shown cross-hatched on Sheet 3 of the Master Plan drawings.

That portion of Runway 8, laying within the boundaries of the Honolulu Airport, that is now classified as a taxiway would be changed into Runway classification by the addition of paving 50 feet in width along each side, as shown cross-hatched on Sheet 3 of the Master Plan drawings. However this widening project will not be undertaken until Hickam Field Air Forces are ready to widen out their portion of the present taxiway which is a prolongation of Runway 8.

**TAXIWAY PAVING—Shown Cross-hatched on Sheet 3 of Master Plan**

The additional taxiways necessary to construct during the "First Stage" program are those serving the addition to Runway 4L, Runway 8 and present Runway 14, and are all clearly delineated by cross-hatching on Sheet 3 of the Master Plan.

**RAMP PAVING—Shown Cross-hatched on Sheet 3 of Master Plan**

Additional ramp paving will be necessary immediately north of the Administration Building and the units numbered 2, 3, and 4. This area is clearly shown cross-hatched on Sheet 3 of the Master Plan and really needs no further comment, the necessity being quite obvious.

**COMBINATION TAXIWAYS AND FIRE SERVICE WAYS—Shown on Sheet 3 of Master Plan**

These combination strips are necessary to provide quick and easy access for the fire equipment, but they can also serve as taxiways and holding points for aircraft preparing for a take-off. These two combination strips are shown cross-hatched in the immediate vicinity of the crash station, Unit 31, on Sheet 3 of the Master Plan.

**PARKING AREA PAVING—Shown Cross-hatched on Sheet 3 of Master Plan**

Additional parking lot paving for item 30 and the parking lot listed as item 40 are shown cross-hatched on Sheet 3 of the Master Plan. Paving of the parking lot for item 36 will only be undertaken, of course, whenever the hotel goes under construction. Item 40 is designed as a free public parking lot to accommodate anyone who does not care to avail themselves of the more convenient pay parking lot adjacent to the Administration Building.

**ADDITIONAL FACILITIES REQUIRED—Listed on Sheet 3 of Master Plan**

- High intensity runway lights for Runway 8 (Instrument approach runway).
- Modern tip-over type runway lights, 5 stages of intensity, for all other runways.
- Taxiway lights, by units—units operated from the Control Tower to guide incoming and outgoing airplane ground traffic.
- Ramp and building flood lights.
- Flood lights for parking areas.
- Modernize all obstruction lighting.
- Modernize gasoline dispensing system for loading ramp.
- Utilities ramp trench carrying:
  - 110/220/440 V electrical current
  - Water supply lines
  - Telephone lines and connections
  - Air-conditioning ducts for airplane air-conditioning
  - Compressed air lines and connections
  - Gasoline dispensing and return lines, one set of lines for each Octane rating of gasoline and one spare set of lines for jet fuel.
- Control Tower, to be placed upon the Administration Building as shown on the building plan Sheet 10, of the Master Plan.

**RECOMMENDED SECOND STAGE**

**INTERNATIONAL HOUSE—Item 3 on Master Plan and Sheet 3**

That this unit be constructed during the Second Stage would seem very desirable and necessary. It would also add measurable prestige and advertising value to your airport and the entire community. The publicity value of this item is very great.

**CONCESSION BUILDING (Small Specialty Shops)—Item 4 on Master Plan and Sheet 3**

I hesitated in placing this item in the Second Stage, but believe the revenue producing possibilities warrant the construction during the latter portion of the Second Stage program.

**HAWAIIAN VILLAGE—Item 8 on Master Plan and Sheet 3**

The conception of this village has been discussed elsewhere in this report. It is felt on the tangible side, that as far as construction costs and maintenance are concerned this facility will produce enough direct revenue to amortize its cost and to maintain it. On the intangible side the ensuing publicity would more than pay for this item through advertising value.

**YACHT CLUB WHARF AND YACHT CLUB PARKING—Shown on Sheet 4 of Master Plan**

It is believed that sufficient interest and demand for an airport Yacht Club will make such a facility economically sound during the late period of the "Second Stage" and thus could well take its place during the "Second Stage" development. It is believed that the water adjacent to the airport offers a small boat sailing site equal to any locality on Oahu. If such is truly the case a Yacht Club would be a sound venture and should receive all encouragement possible on the part of the Hawaii Aeronautics Commission and your Director of Aeronautics.

**AIR FREIGHT TERMINAL—Item 22 on Sheet 5 of Master Plan**

It is visualized, that in due time, air cargo to and from the Territory will reach a volume sufficient to warrant Air Cargo airplanes. At such time a separate air freight terminal would be justified. In fact, would almost be a "Must." During the period of combination airplanes when all air express and air cargo are being carried upon the units primarily designed for passenger service, naturally the entire cargo operation will have to be handled through the main administration building and such space has been designed into the said building, of sufficient capacity to handle this class of traffic until that time comes when the volume is so great as to warrant the "Air Cargo" carrier.

As this time approaches, plans should be undertaken to construct the air freight terminal at the location shown on the Master Plan. This terminal was located upon the opposite side of the airport from the main Administration Building in order to provide a segregation in airplane ground traffic and not add to the traffic difficulties of the Administration Building side with attendant delay to passengers. The location as shown would also relieve the ramp congestion that is almost certain to occur in the vicinity of the Administration Building loading ramps. Briefly, the two classes of service, passenger and cargo, do not readily mix and should be as widely separated as possible. This desired separation cannot be accomplished before the advent of the "all cargo" airplane, but when such development becomes imminent, the separate freight terminal should be planned and no time nor money wasted upon trying to remodel or further adapt the Administration Building in an effort to continue handling such widely divergent services from a building primarily designed for passenger handling.

**AIR FREIGHT TERMINAL—Expansion Area—Item 23 on Sheet 4 of Master Plan**

It seems almost impossible to foresee, with any degree of accuracy, the future needs and developments of any given facility pertaining to aviation. Designers are often accused of "Over Design," but history and experience has shown, almost

without exception, that few, if any, buildings have been large enough to meet the needs, by the time construction has been completed. Facing this condition the experienced designer can only make certain that each and every unit is susceptible to expansion, said expansion to be achieved without unduly disturbing previous construction, and always provide the necessary area in which to expand. There would seem only one thing certain in this business and that is expansion will be necessary sooner or later, and it is almost always sooner. It is for this reason that you will note how expansion possibilities has been stressed throughout this report.

#### **HANGARS FOR INTER-ISLAND Airlines—Item 39 on Sheet 4 of Master Plan**

While all three of the certificated inter-island airlines are presently adequately hangared upon the northerly side of the airport, still it is felt the time may come when they would want hangar facilities closer to the main administration building. It would be a matter of Commission policy as to who would actually construct such facilities, however, the general trend would indicate that all facilities upon the airport should be Territorially constructed and maintained, and fair rentals thereof be set by negotiation between the principals involved. The planning of this item in the "Second State" is just an arbitrary one and its final placing to be dictated by conditions, economic necessity and the desire of the airlines involved.

#### **PRIVATE PARKING FOR INTER-ISLAND COMPANY EMPLOYEES—Item 41 on Sheet 4 of Master Plan**

This item to be undertaken as a portion of the hangar project listed just above in this report and at whatever time such project may be implemented.

#### **SMALL BOAT RACING—Item 35 on Sheet 4 of Master Plan**

There is some demand for a power boat club upon the airport area, adjacent to Keehi Lagoon. While such a facility will, in all probability, not be much of a direct revenue producer for the Airport, still it would be a source of indirect revenue in that the more people who are attracted to the airport and Administration Building area, the more people there are who would use the restaurant and cocktail lounge facilities, not to mention the other concessions. Any legitimate attraction, that brings people to the airport should be encouraged for all such visitors are potential customers. It is for this reason the power boat clubhouse was included in our planning.

#### **RUNWAY PAVING—Shown Double Cross-hatched on Sheet 4 of Master Plan**

It is felt that by the time the First Stage has been completed, some five years may have passed and that by then traffic will have increased to the density warranting the construction of a dual runway for the instrument runway 8. This is shown, double cross-hatched as Runway L8 on Sheet 4 of the Master Plan set of drawings. Again, conditions must justify this facility before activating this item. The exact timing cannot be predicted.

#### **ADDITIONAL PAVING IN SECOND STAGE—Shown Double Cross-hatched on Sheet 4 of Master Plan**

Should the conditions justify the construction of Runway L8 as described above, additional paving will become necessary. The taxiway between the end of Runway R22 and item 20, the bleeder strips opposite items 21 and 22 connecting the hangar ramp and Runway L8, the taxiway connecting Runways L26 and R26, and the cross taxiway at the West end of Runway L8, which connects the end of Runway L8 and Runway 8, and its main longitudinal taxiway.

This also provides fire equipment passageway. This additional paving is predicated upon the construction of Runway L8 and needs no consideration until Runway L8 is programmed.

**PUBLIC GOLF COURSE—Items 10, 11 and 12 on Master Plan and Sheet 3**

The necessity for this golf course and the reasoning leading up to its inclusion on the Master Plan has been thoroughly studied and discussed under the heading of "Land Utilization" and is included elsewhere in this report.

A brief resume shows that such a facility is necessary to keep the Diamond Head approaches open and free of obstructions, it is further needed as a beautification project and finally, for the non-aeronautical revenue it will produce.

**RECOMMENDED THIRD STAGE**

**AIRLINE MAINTENANCE HANGARS—Item 20 on Sheet 4 of Master Plan**

Admittedly it may be many years before the airlines feel the need of maintenance and overhaul hangars. This need may arise sooner than anyone anticipates and on the other hand it may never materialize. However, no Master Plan could be called complete without showing where the ultimate hangar rows should be constructed, if and when they are needed. These units have therefore, been relegated to the Third and Ultimate Stage.

**AVIATION SCHOOL HANGARS—Item 21 on Sheet 4 of Master Plan**

The construction of aviation school hangars will only become necessary when the useful life of their present buildings has become exhausted. It is quite impossible to set any date when their construction will become necessary, as there are too many intangible factors involved. However, ultimately such units will have to be erected so they must have their potential sites located and made a part of the Master Plan.

**HANGARS FOR PRIVATE PLANES—Item 24 on Sheet 4 of Master Plan**

Within the past few weeks, as of December 18, 1950, there seems to be building up somewhat of a demand for additional hangar facilities for private planes. The present thinking indicates a certain number of "T" hangars might well be provided. A study will be undertaken and this item or portion thereof might well move up into the "First Stage" program. It would probably be well in order to construct a row of "T" hangars of say 10 units as a step to relieve the present shortage of hangar space for this class of aircraft.

**PICNIC GROUNDS—Items 13, 14, 15, 16, 17, 18 and 19 on Master Plan and Sheet 3**

The change in conditions since the Master Plan was completed would indicate that the above items should be removed from the "First Stage" and replaced in this "Third Stage." It is so recommended and will be included among the items listed for "Third Stage" construction.

**AVIATION SCHOOLS—Item 26 on Master Plan and Sheet 3**

These schools, that are now in existence should be permitted to remain in their present quarters as long as the buildings are satisfactory. Whenever said buildings become structurally unsafe, it is recommended that the new units housing these schools be constructed by the Hawaii Aeronautics Commission in the locations shown on the Master Plan and all to be of uniform appearance, type and construction. They should then be rented to the operators at a reasonable rate as mutually agreed upon.

**SMALL MANUFACTURERS—Item 27 on Master Plan and Sheet 3**

The same comments and procedure, as outlined above for "Aviation Schools" should be carried out for the small manufacturers who are now tenants and for such future tenants as may move into the present facilities.

**MODERATE PRICED HOUSING—Item 28 on Master Plan and Sheet 3**

This program is gradually being implemented and should receive all encouragement possible from the Commission, even to the extent of making some capital investment in the remodeling of the various structures that will readily lend themselves to such remodeling. All of which would increase their revenue producing possibilities.

**MIDGET AUTO RACE TRACK AND TEST STAND AREA—Item 29 on Master Plan and Sheet 3**

Hawaiian Airlines filed an application many months ago, seeking permission to establish their motor test stands in this area and we have applications from three different racing associations seeking a lease, in this area, for sufficient grounds upon which to establish an automobile race track. The revenue that would accrue to the Airport from such activities should prove substantial. It is recommended that every effort be made to secure title to Parcel I, so as to make these items a reality, in addition to the fact that portions of our present runway system is contained within the borders of said parcel I.

**AIRPLANE MANUFACTURING AND OVERHAUL BASES -- Item 25 on Sheet 4 of Master Plan**

While there is nothing in sight at the moment for any units under this classification, their need is always a possibility. As long as any feature is a possibility, even though very remote, space must be allocated upon the Master Plan.

**RE-LOCATION OF THE NOSE HANGARS—Item 37 of Sheet 4 of Master Plan**

It will only become necessary to re-locate the five nose hangars and place them where shown as item 37 on Sheet 4 of Master Plan, when the construction of Runway R14 becomes necessary as a dual to present Runway 14. It is felt that the need for this Runway is an extremely remote possibility and consequently may never have to be considered. However, the principle of a well designed Master Plan requires it to be shown and so designated upon said Master Plan.

**PAVING RUNWAYS AND TAXIWAYS—Shown Cross-hatched on Sheet 4 of Master Plan**

Traffic conditions several years hence, may warrant the construction of the dual runways 4L and 14R. If that time should ever materialize, their location and how they would fit into the general field pattern are clearly shown on Sheet 4 of the Master Plan set of drawings. The legend under "Third Stage" indicates the runways and their accompanying taxiway, referred to. It is believed, however, many years will have elapsed before these facilities will become necessary.

**GRADING—Shown Cross-hatched on Sheet 4 of Master Plan**

Inasmuch as all grading contemplated for the "Third Stage" would be necessitated by the need for the construction of the above mentioned runways and therefore no consideration of this item is required until such runway need may arise.

**AIRPORT HOTEL, BATHING BEACH AND PARKING--Item 36 on Master  
Plan and Sheet 3**

Many communities have found an airport hotel to be a necessity. Several are now in operation and more are presently under construction. It is felt such a facility is needed at the Honolulu Airport. Studies have shown that the larger hotels of Honolulu cater generally to those visitors brought to the Territory by surface carriers. With this condition existing, it would seem an aviation airport hotel would well be in order. The majority of the clientele of such an airport hotel would be made up of crew members, transient air passengers and a sprinkling of the visitor class with limited time at their disposal. Such a hotel at the airport would not offer competition to the great Waikiki Hotels, but rather would aid and supplement them. As it is the Waikiki hotels are forced to turn away many a visitor and refuse accommodations during the height of the visitor season. This condition is not an asset to the Territory. It is suggested that this phase be investigated, at once, and interested parties be canvassed as to their needs and desires. For example, the airlines could be contacted to see if they might desire quarters at such a hotel for their lay-over crews and if so, how many rooms they would be willing to contract for. Various tour agencies could likewise be contacted and their needs evaluated into numbers of rooms. During the course of this survey and study various hotel groups could undoubtedly be interested in the project. If advance contracts could be secured covering the occupancy of a sufficient number of rooms to make the project economically sound, and any reputable hotel management corporation signified interest in entering into a management contract, then a hotel project should be implemented as a part of the "Third Stage." If these conditions were not fulfilled, then this unit could be indefinitely postponed and replaced in the project only when conditions might warrant. In this connection, management contracts have been entered into with the building's owners whereby the hotel management corporation furnished the hotel and paid the owners a percentage of the gross receipts. In such cases the management corporation lays down certain standards which the building plans must meet, such as the minimum number of square feet per guest room, arrangement of the space requirements for other units, their location in the building, etc. Therefore, it is best to have the management contract arranged and consummated prior to starting construction. Following such a procedure usually produces better results for both owner and operator.

**PRELIMINARY COST ESTIMATES**

**General**

To make an accurate estimate of construction costs in the face of rising prices, shortages of material and the general unsettled conditions that now exist, is utterly impossible.

Under these circumstances the following preliminary estimate is only presented to give a general over-all view as to the scope of the project.

**RECOMMENDED FIRST STAGE ONLY**

Items of Work	Federal Portion (CAA)	Territorial Portion (HAC)
<b>1. Demolition</b>		
7 Quonset huts adjacent R/W 14		
Nose Hangar #148		
NATS Hangar		
Cluster 5 buildings, adjacent NATS hangar		
Present Admin. Bldg.		
Cluster 6 bldgs. adjacent present Admin. Bldg.		
Total Cost Item 1. ....	\$ 100,000	\$ 50,000
		\$ 50,000
<b>2. Fill</b>		
Area for extension of R/W 4, taxiway and Area East of Entrance Roadway number one		
1,186,000 cu. yd. @ .30.....	\$ 355,800	
Additional Fill to be placed during dredging		
800,000 cu. yd. @ .25 .....	200,000	
Total Item 2 .....	\$ 555,800	\$ 277,900
		\$ 277,900
	\$ 327,900	\$ 327,900
<b>3. Field Paving</b>		
Exten. R/W4 (3100 Lin. ft.)		
70,000 sq. yds. @ 4.50 .....	\$ 315,000	
Taxiway exten. R/W4 & R/W4 taxiways		
78,500 sq. yds. @ 4.50 .....	353,250	
Bleeder strips at Ad. Bldg. ramp		
12,000 sq. yds. @ 4.50 .....	54,000	
Ramp Paving at Ad. Bldg.		
90,500 sq. yds. @ 4.50 .....	407,250	
Total Item 3 .....	\$1,129,500	\$ 564,750
		\$ 564,750
<b>4. Highway Paving</b>		
Parkways along Lagoon		
25,000 sq. yds. @ 3.50 .....	\$ 87,500	
Fire Station Roadways		
38,000 sq. yds. @ 3.50 .....	133,000	
Club Grounds Roads		
6,500 sq. yds. @ 3.50 .....	22,750	
Parking Lots (Public)		
21,500 sq. yds. @ 3.50 .....	75,250	
Total Item 4 .....	\$ 318,500	\$ 159,250
		\$ 159,250
Total Carried Forward .....	\$1,051,900	\$1,051,900



**RECOMMENDED FIRST STAGE ONLY - Continued**

Items of Work	Federal Portion (CAA)	Territorial Portion (HAC)
Brought Forward .....	\$1,051,900	\$1,051,900
<b>5. Buildings</b>		
<b>Administration Building</b>		
Ground Floor		
128,080 sq. ft. @ 12 .....	\$1,536,960	
Second Floor		
116,580 sq. ft. @ 15 .....	1,748,700	
Third Floor		
90,270 sq. ft. @ 12 .....	1,083,240	
Fourth Floor		
31,100 sq. ft. @ 12 .....	373,200	
Fifth, Sixth & Seventh (Tower)		
800 sq. ft. @ 10 .....	8,000	
Seaplane Section		
10,400 sq. ft. @ 12 .....	124,800	
Building Underpass		
4,480 sq. ft. @ 15 .....	67,200	
Passenger Concourse		
24,500 sq. ft. @ 7 .....	171,500	
<b>Total Ad. Building .....</b>	<b>\$5,113,600</b>	
<b>Garage &amp; Service Station</b>		
24,000 sq. ft. @ 12 .....	288,000	
<b>Total Item 5 .....</b>	<b>\$5,401,600</b>	
	<u>\$2,700,800</u>	<u>\$2,700,800</u>
	\$3,752,700	\$3,752,700
<b>6. Lighting</b>		
Runway Contact Lights		
16,150 lin. ft. (cable in Conduits)		
@ 20.00 .....	\$ 323,000	
Taxiway Lights		
29,220 lin. ft. (Cable in Conduits)		
@ 20.00 .....	584,400	
Ramp Lights (Flush type)		
8,100 lin. ft. (cable in Conduits)		
@ 20.00 .....	162,000	
Ramp Flood Lights		
20 units (cable in Conduits @ 20.00....	4,000	
<b>Total Item 6 .....</b>	<b>\$1,073,400</b>	
	\$ 536,700	\$ 536,700
<b>7. High Intensity Lights R/W 8</b>		
7650 lin. ft. (Cable in Conduit).....	\$ 150,000	\$ 112,500
		\$ 37,500
<b>8. Ramp Service Trench</b>		
Ramp & Service Installations		
5,000 lin. ft. @ .30 .....	\$ 150,000	\$ 75,000
		\$ 75,000
<b>Carried Forward .....</b>	<b>\$4,476,900</b>	<b>\$4,401,900</b>

**RECOMMENDED FIRST STAGE ONLY – Continued**

Items of Work	Federal Portion (CAA)	Territorial Portion (HAC)
Brought Forward .....	\$4,476,900	\$4,401,900
<b>9. Gasoline Dispensing System</b>		
Tank Farm, Pipe Lines, Pumps, etc.		
Total Item 9 .....	\$ 400,000	\$ 200,000
<b>10. Administration Building Equipment</b>		
Air Conditioning equipment .....	\$ 150,000	
Pneumatic tube system .....	100,000	
Concourse escalators or swinging covered gangways, 10 units @ 20,000 .....	200,000	
Public address system .....	50,000	
Elevators, Admin. Bldg. 8 banks @ 20,000 .....	160,000	
Total Item 10 .....	\$ 660,000	\$ 330,000
<b>11. Landscaping</b>		
Terminal Area and Parkways .....	\$ 150,000	\$ 75,000
Grand Total, First Stage, Honolulu.....	\$5,081,900	\$5,006,900

**RECAPITULATION**

Items	Federal Portion (CAA)	Territorial Portion (HAC)
1. Demolition .....	\$ 50,000	\$ 50,000
2. Fill .....	277,900	277,900
3. Field Paving .....	564,750	564,750
4. Highway Paving .....	159,250	159,250
5. Buildings .....	2,700,800	2,700,800
6. Lighting .....	536,700	536,700
7. High Intensity Lights .....	112,500	37,500
8. Ramp Service Trench .....	75,000	75,000
9. Gasoline Dispensing System .....	200,000	200,000
10. Administration Building Equipment .....	330,000	330,000
11. Landscaping .....	75,000	75,000
Grand Total, First Stage, Honolulu .....	\$5,081,900	\$5,006,900

## FINANCIAL STUDY

### TERMINAL AREA

#### ESTIMATED ANNUAL REVENUE (Based on Estimated 1955 Returns)

##### Administration Building

Concession revenue (See Potential Revenue Report for Details—Based on 1955 estimated Revenue).....		\$ 539,518
Space Rentals—Other than concession areas.....		347,450
		\$ 886,968

##### Buildings—Other than Administration Building

Garage and Service Station.....	\$ 14,400	
	\$ 14,400	14,400
		\$ 901,368

#### ESTIMATED ANNUAL EXPENSES

##### Administration Building Schedule

Concession Manager .....	12,000	
Building Manager .....	10,000	
Attendants, Janitors, Matrons.....	65,000	
Ramp Supervisors and Attendants.....	72,000	
	\$159,000	
Supplies .....	25,000	
Light and Power.....	61,000	
Building Maintenance Cost.....	30,000	
Proportionate Cost, HAC Administration.....	26,150	
Air Conditioning .....	60,000	
Insurance .....	10,000	
	\$212,150	
<b>Total Operating and Maintenance Expense.....</b>		<b>371,150</b>
Annual Interest on (\$2,700,800 + \$330,000) \$3,030,800 at 4% .....		121,232
Annual Amortization of \$3,030,800, 30-year period.....		101,027
Reserve for Contingencies.....		100,000
		\$ 693,404
Total Estimated Annual Expense.....		693,404
Total Estimated Annual Gross Revenue.....		901,368
Total Estimated Annual Expense.....		693,404
		\$ 207,964
Apparent Annual Surplus Terminal Area.....		\$ 207,964

**FINANCIAL STUDY**

**COMPLETE PROJECT THROUGH FIRST STAGE**

**ESTIMATED ANNUAL REVENUE (Based on 1955 Returns)**

**Operating Revenue**

Gasoline Tax .....	\$835,350	
Other Operating Revenue (See Potential Revenue Study for Details).....	<u>309,588</u>	
<b>Total Annual Operating Revenue.....</b>		<b>\$1,144,938</b>

**Administration Building Revenue**

Space Rentals, Other Than Concessions (See Building Rental Estimates).....	<u>\$347,450</u>	
<b>Total Annual Administration Building Revenue.....</b>		<b>347,450</b>

**Buildings—Other Than Administration Building**

Garage and Service Station.....	<u>\$ 14,000</u>	
<b>Total Annual Other Building Revenue.....</b>		<b>14,000</b>

**Concession Revenues—Ad. Bldg. and Other Concessions**

Concessions (See Potential Revenue Study for Details).....	<u>\$432,834</u>	
<b>Total Concession Revenues .....</b>		<b>432,834</b>

**Service Revenues**

Service (Less Utilities Revenue, see Revenue Report).....	<u>\$182,788</u>	
<b>Total Service Revenues.....</b>		<b>182,788</b>

<b>Grand Total Estimated Annual Gross Revenue.....</b>		<b>\$2,122,010</b>
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## FINANCIAL STUDY

### COMPLETE PROJECT THROUGH FIRST STAGE – Continued

#### ESTIMATED ANNUAL EXPENSE

##### Operating Expense

Terminal Building .....	\$335,000
Fire and Safety Department.....	110,000
Engineering Department .....	50,000
Insurance .....	40,000
Light and Power—Field Only.....	20,000
Miscellaneous .....	15,000
Total Estimated Operating Expense.....	\$ 570,000

##### Administrative

Executive Office .....	150,000
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##### Maintenance

General Maintenance .....	484,000
Contingencies 5% .....	24,200

Total Estimated Operating, Administrative and Maintenance Expense .....	\$1,228,200
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New Equipment, Estimated.....	25,000
Reconstruction of H.A.C. Property, Estimated.....	150,000

##### Financing Expense

Amortization on the Hawaii Aeronautics Commission investment of \$5,006,900 covering Administration Building and all First Stage construction, based on a 30-year amortization period.....	\$166,897
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Interest on \$5,006,900 at 4%.....	200,276
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Total Estimated Financing Expense.....	367,173
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Reserve for Contingencies .....	250,000
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Total Estimated Annual Expense.....	\$2,020,373
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Total Estimated Annual Gross Revenue (from Potential Revenue Study Less Golf Course).....	2,176,410
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Total Estimated Annual Expense.....	2,020,373
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Apparent Annual Surplus After All Charges.....	\$ 156,037
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**FINANCIAL STUDIES  
COVERING  
RECOMMENDED FIRST STAGE COMPLETE**

**General**

You will note that separate financial studies were made covering, first Terminal Area alone and second, the First Stage of the project as a whole.

This, to enable the Commission to properly evaluate the two main component parts of this entire project.

The two financial studies would seem to indicate that the proposed project covered by this report, is economically feasible and financially sound. It is felt that a study of this report should convince any financial group of the soundness of underwriting an issue of Revenue Bonds. For a Revenue Bond issue, the proceeds of which are to defray construction costs, is the method recommended for financing this project.

It is believed that the estimate of Potential Revenue and earnings has been made up ultra-conservatively and only requires a business management to become a reality. Further, it is believed that the estimates of construction cost are equally conservative and are a reasonable criterion of ultimate costs, unless prices go appreciably higher than they are at this writing.

The construction of Stage One in its entirety will almost certainly stimulate business at the Honolulu Airport which will result in an appreciable surplus which can then be applied against the operating expenses of the outer island airports. That this surplus will increase with the years is undeniable.

Above all, the completion of Stage One of the project will achieve greatly increased services to the traveling public which in turn will bring favorable feelings and reactions on the part of the traveling public, all rebounding to the credit of the Territory of Hawaii.

That all of this beneficial program can be achieved by a self-liquidating project is very much the good fortune of the people of Hawaii and particularly the taxpayer. The conclusions reached from Financial Studies are all predicated upon a businesslike administration of the properties.

**POTENTIAL REVENUE STUDY**

**Of Probable**

**Gross Annual Revenue to the Airport**

Item	1949 Actual	1951 See Note 1	1955 See Note 2	1960 See Note 2
<b>Operating Revenues</b>				
Aviation Fuel Tax.....	\$632,841.80	\$ 696,125.	\$ 835,350	\$1,044,187
Airline Hangar Rental.....	635.21	9,744	11,692	14,616
Aircraft Service Companies'				
Hangar Rentals .....	9,436.49	10,380	12,456	15,570
Mfg. Co.'s Bldg. Rentals.....		5,000	6,000	7,500
Rental, Unpaved Areas.....	27,356.62	27,357	32,828	41,035
Rental, Paved Areas.....	20,613.50	20,613	24,736	30,920
Mfg. Co.'s Lease of				
Ground Areas .....		5,000	6,000	7,500
Transp. Co.'s Lease				
of Ground Areas.....		500	600	750
Auto Serv. Co.'s Lease				
of Ground Areas.....		6,541	7,849	9,831
Oil Co.'s Lease of				
Ground Areas .....		7,150	8,580	10,725
Gov't Agencies, Lease of				
Ground Areas .....		1	1	1
Shop Storage and Misc.				
Building Rental .....		12,500	15,000	18,750
Warehouse Space Rental.....	93,071.44	102,378	122,854	153,567
Major Scheduled Airlines				
Landing Fees .....	26,853.50	29,538	35,446	44,307
Other Airlines—Passenger				
Landing Fees .....	5,850.51	6,435	7,722	9,653
Other Airlines—Cargo				
Landing Fees .....		1,175	1,410	1,762
Non-Scheduled Passenger				
Landing Fees .....		7,307	8,767	10,960
Non-Scheduled Cargo				
Landing Fees .....		58	70	87
Parking of Aircraft.....	1,194.23	1,313	1,576	1,970
Miscellaneous Aviation				
Revenue .....		5,000	6,000	7,500
<b>Total Operating Revenue.....</b>	<b>\$817,853.30</b>	<b>\$ 954,115</b>	<b>\$1,144,938</b>	<b>\$1,431,191</b>
<b>Administration Building Rental Revenues</b>				
Space Rentals, other				
than Concessions .....	\$ 22,321.85	\$ 347,450	\$ 347,450	\$ 347,450
<b>Total Administration</b>				
Building Rentals .....	\$ 22,321.85	\$ 347,450	\$ 347,450	\$ 347,450
<b>Concession Revenues—Administration Building</b>				
Bus and Limousine .....	\$.....	\$ 1,000	\$ 1,200	\$ 1,500
Taxicabs .....	15,650.00	24,593	29,512	36,890
U-Drive Service .....		3,594	4,313	5,391
Restaurants				
Dining Room, Lunch				
Room, Cafeteria, Two				
Cocktail Lounges, Restau-				
rant and Cocktail Lounge ..	9,650.84	72,070	86,484	108,105

POTENTIAL REVENUE STUDY — Continued

Item	1949 Actual	1951 See Note 1	1955 See Note 2	1960 See Note 2
Newsstands .....	\$ .....	\$ 9,904	\$ 11,885	\$ 14,856
Refreshment Stands				
on Grounds and Ramps.....		309	381	476
Vending Machines .....		6,060	7,272	9,090
Barber Shop .....		699	839	1,049
Baggage Lockers .....		1,117	1,340	1,675
Pay Telephones .....		5,692	6,830	8,534
and Telegrams .....		5,692	6,830	8,534
(one source for estimate, so split figure)				
Photo Shop and Studios.....		2188	2,626	3,282
Flower Shop .....	2,729.44	3,001	3,601	4,501
Advertising Concession (Public Address System).....		2,900	3,480	4,350
Dioramas & Display Cases.....		20,000	24,000	30,000
Soda Fountain .....		1,500	1,800	2,250
Candy Shop .....		250	300	375
Parking .....		136,326	163,591	204,489
Spectator Deck .....		44,452	53,342	66,677
Bank .....		300	360	450
Haberdashery .....		900	1,080	1,350
Women's Wear .....		600	720	900
Beauty Shop .....		699	839	1,049
Drug and Cosmetics.....		900	1,080	1,350
Fruit Shop .....		300	360	450
Lei Stand in Lobby.....		1,000	1,200	1,500
Music Shop—Ukuleles, Hawaiian Records .....		600	720	900
Book Shop .....		1,005	1,206	1,507
Jewelry Shop .....		1,851	2,221	2,776
Field Glasses on Spectator Deck .....		200	240	300
Insurance Office and Machines .....		600	720	900
Golf Course .....		88,903	106,684	133,355
Roomettes .....		1,800	2,160	2,700
Gift Shop and Novelty Stands .....		1,703	2,044	2,700
Sight Seeing Tours.....		877	1,052	1,315
Pay Toilets and Boot Black.....		5,000	6,000	7,500
Radio Communications .....	914.00	1,005	1,206	1,507
<b>Total Concessions Revenue.....</b>	<b>\$ 28,944.28</b>	<b>\$ 449,590</b>	<b>\$ 539,518</b>	<b>\$ 674,388</b>
<b>Service Revenues</b>				
Aircraft Service—				
Supplying Gas, etc.....	\$ .....	\$ 81,029	\$ 97,235	\$ 121,544
Ramp Service .....		38,038	45,646	57,057
Jobbing and Contract Work.....		20,463	24,556	30,695
Equipment Rentals .....	699.94	770	924	1,155
Flying and Ground Schools.....		877	1,052	1,315
Miscellaneous Revenue .....	10,132.70	11,146	13,375	16,719
<b>Total Service Revenues.....</b>	<b>\$ 10,832.64</b>	<b>\$ 152,323</b>	<b>\$ 182,788</b>	<b>\$ 228,485</b>
<b>GRAND TOTAL</b>				
<b>Gross Revenue.....</b>	<b>\$879,952.07</b>	<b>\$1,960,478</b>	<b>\$2,283,094</b>	<b>\$2,767,014</b>



**Note 1**

1951 revenue was predicated upon having the new Administration Building and all items called for in the "First Stage" completed. This might be possible in 1952. However, 1955 Potential Revenue was used as being closer to probable completion date.

**Note 2**

Past reports show that an annual increase of 10% is very conservative, however, in an effort to forecast potential revenue during the next decade, an annual increase of only 5% was used. The 1955 forecast being 20% above 1951 and the 1960 forecast is 25% above 1955. This is believed ultra conservative.

**Note 3**

As no one airport had concession figures available for all of our contemplated concessions, it was necessary to go to several mainland airports for their concession figures in order to cover the entire field.

To make these figures applicable to Honolulu, ratios were worked out between the number of annual operations at each airport involved and the number of annual operations at the Honolulu Airport during the same years. These ratios were then applied to the various concession revenue figures and the weighted result used to build up the above "Potential Revenue Study" for the Honolulu Airport.

It is believed the above method produces as accurate a potential revenue report as any method can, short of several years' records of actual figures. That this assumption is correct is further borne out by computing concession revenue possibilities by an entirely different method.

The Miami Realty Board advises that concession space in thousands of locations in Miami, Florida, is valued at, and rents for, from \$5.00 to \$8.00 per square foot annually. In the Administration Building as presently designed we have 72,000 square feet of concession space. Applying the figure of \$7.50 per square foot, we have:

Concession Area, 72,000 sq. ft. @ \$7.50.....	\$540,000 annually
Concession Revenue from above Potential Revenue Study..	543,000 annually

This would indicate that our Potential Revenue Study is a good index as to the amount of annual revenue that can be produced by the various items entering into the Honolulu Airport project.

I am informed by local realty experts that the figure of \$7.50 per square foot annual rental is a fair and conservative figure.

**ADMINISTRATION BUILDING  
TENTATIVE RENTAL SCHEDULES**

Used for Base of Annual Building Rental Estimate

	Sq. ft. Area	Rate* per sq. ft.	Annual Rent
<b>Administration Building Rental Areas</b>			
1. Airline Space .....	82,300	\$2.50 av.	\$205,750
2. C.A.A. Space .....	2,550	2.00	5,100
3. Equipment Areas .....	9,000	Included in Main. Cost	
4. Freight and Express Areas.....	8,000	1.00	8,000
5. H.A.C. Staff Offices.....	7,100	1.00	7,100
6. General Office Space for Rent.....	27,400	2.00	54,800
7. Post Office Area.....	4,800	1.00	4,800
8. Sea Plane Section.....	12,400	3.00 av.	37,200
9. U. S. Agencies—Immigration, Public Health, Customs, Agriculture.....	21,000	1.00	21,000
10. U. S. Weather Bureau.....	3,700	1.00	21,000
<b>Total Estimated Annual Revenue</b>			
Administration Building .....			\$347,450
<b>Total Building Area.....</b>	<b>406,210</b>		
<b>Rental Area .....</b>	<b>176,250</b>		
<b>Public Area, includes:</b>			
Lobbies, Concessions, Waiting			
Rooms, Aloha Lanai, Entrance			
Lanai, Corridors and Toilets.....			
	229,960		

\* The above tentative schedule was used for the Potential Revenue Study and is deemed to be conservative. Before this or any other schedule could become official, it would be necessary for it to be approved by the Hawaii Aeronautics Commission.

## ACKNOWLEDGMENTS

I am very indebted to those individuals and firms who have so generously given their time and help in assisting me in the preparation of this report.

These include: The members of the Hawaii Aeronautics Commission; the Director of Aeronautics and his staff; the Civil Aeronautics Administration personnel of the Ninth Region; the commercial airline operators; the United States Government Agencies; the Honolulu Chamber of Commerce and many others.

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## APPENDIX

After completing the design drawings of the proposed new Administration Building for the Honolulu Airport, prints of these drawings and a complete written description of the building, its functions, traffic lanes, etc., were sent to each airline user of the Honolulu Airport and to each Government agency involved. They were all mailed on August 9, 1950.

On August 24, 1950, a presentation of these plans was made to the Honolulu Chamber of Commerce aeronautical committee in the Chamber's public meeting room. Those present expressed themselves as well satisfied with our presentation.

Later on, we received warm approbation from certain airlines, one in particular stating these plans depicted the best thought-out set of plans they had ever seen.

After conferences and minor changes, the officials in charge of the U. S. Customs, the U. S. Department of Agriculture, the U. S. Immigration Department and the U. S. Department of Public Health, all expressed themselves as, not only approving our plans, as far as their respective interests went, but further expressed themselves as being very pleased and that they felt our plans were superior to anything that had heretofore come to their notice. Each of these United States agencies confirmed their verbal commendation by letters of approval. These letters are all on file here in our office, together with the letters of approval from several airlines.

On November 15, 1950, some four months after the plans had been submitted to them, the Airlines Joint Technical Committee set up a meeting for that date, to discuss their findings with the Commission and to make their recommendations.

Our plans were specifically criticized on three counts:

First, that our entrance vestibule was too shallow.

Second, that the 60-foot wide passageway connecting this entrance vestibule to the ticket counter and the check-in lobby was too narrow, and that it might prove a bottleneck, and

Third, that the ticket counter check-in lobby itself was too narrow. They felt that the building size as a whole was satisfactory, and so stated.

It was felt the criticism of the three points mentioned, had some foundation in fact, so our plans were revised to remedy these defects. The revisions specifically were as follows:

First, the entire entrance was opened up and converted into a spacious entrance lanai, in keeping with the best Hawaiian tradition.

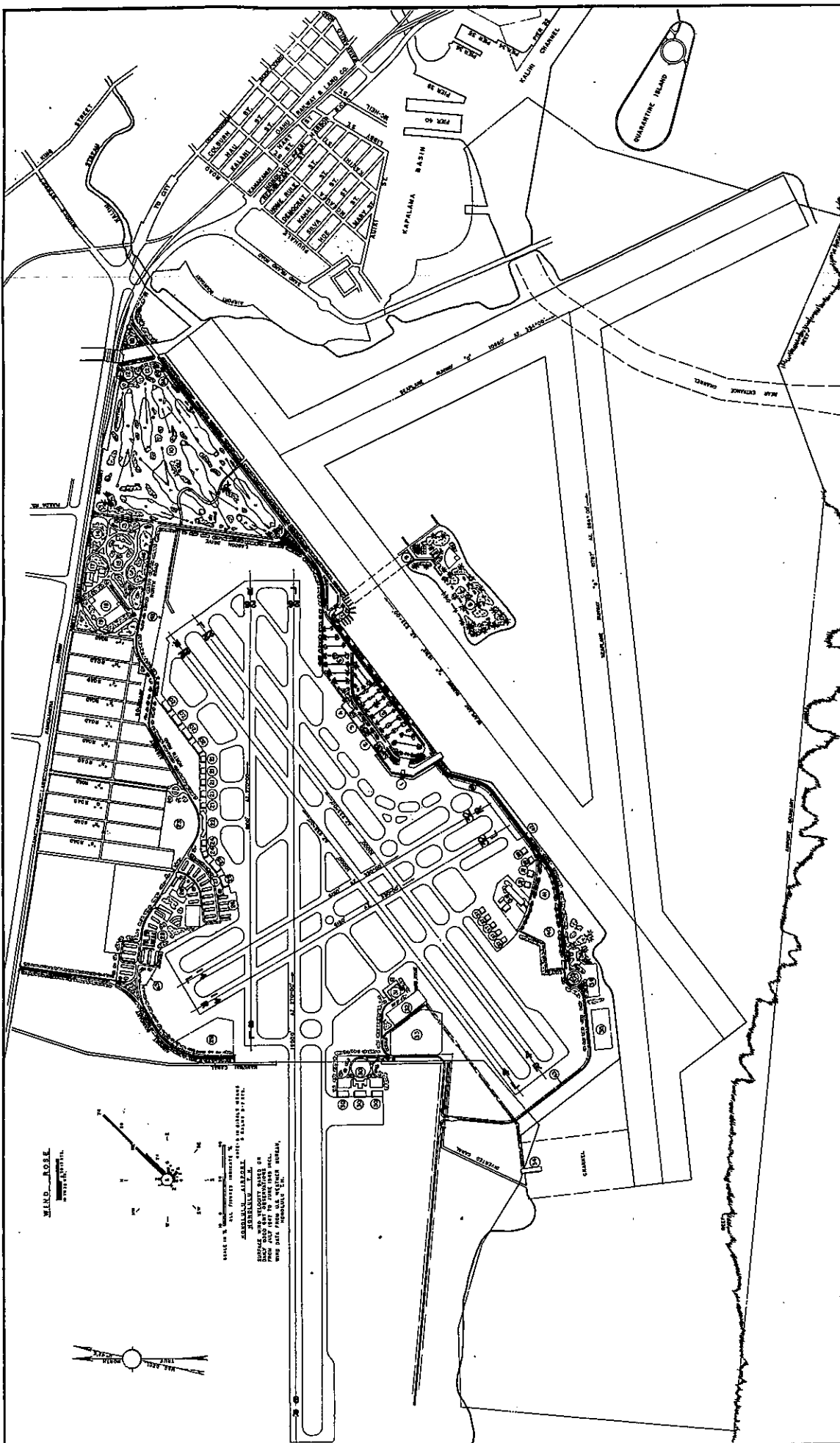
Second, the connecting passageway between this entrance lanai and the ticket counter, check-in lobby, was widened from the criticised 60-foot width to a width of 80 feet. This extra space was achieved by a corresponding reduction of space in the drug store-soda fountain area on one side and the lunch room area on the opposite side.

Third, to overcome the criticism that the ticket counter check-in lobby was too narrow, we achieved an additional 10-foot width, for the entire length of the lobby, adding some 4,000 square feet additional public lobby area to that section.

In addition to the changes mentioned above which were made to overcome the specific airline criticism of those three points, an Aloha Lanai was added to the second floor which greatly enhanced the building and preserved the good features of the Aloha Court idea, without its disadvantages of cross traffic and the by-passing of concession areas. This Aloha Lanai was discussed in the main body of this report.

It is felt that, with these changes as described above, plus the addition of the Aloha Lanai, the points of criticism have now been corrected.

**THE DRAWINGS  
OF THE  
MASTER PLAN**



DESIGNED FOR HAWAII AERONAUTICS COMMISSION  
 HONOLULU, OAHU, T.H.  
 BY CLARK M. KEE, CONSULTING ENGINEER

HAWAII AERONAUTICS COMMISSION  
 HONOLULU, OAHU, T.H.  
**HONOLULU AIRPORT**  
**MASTER PLAN**

SCALE: 1/4" = 100' FT.  
 DRAWN BY: [Signature]  
 CHECKED BY: [Signature]  
 APPROVED: [Signature]  
 OCTOBER 10, 1930  
 DIRECTOR

① HIGH INTENSITY LIGHTS FOR RETRIEVAL APPROACH RUNWAY  
 ② HIGH INTENSITY LIGHTS FOR TAXIWAYS AND CONTACT LIGHTS - 5 STRIPS  
 ③ LIGHTS TO INDICATE THE POSITION OF THE AIRCRAFT ON THE AIRFIELD  
 ④ LIGHTS TO INDICATE THE POSITION OF THE AIRCRAFT ON THE AIRFIELD  
 ⑤ LIGHTS TO INDICATE THE POSITION OF THE AIRCRAFT ON THE AIRFIELD  
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 ⑩ LIGHTS TO INDICATE THE POSITION OF THE AIRCRAFT ON THE AIRFIELD

**ADDITIONAL FACILITIES REQUIRED**

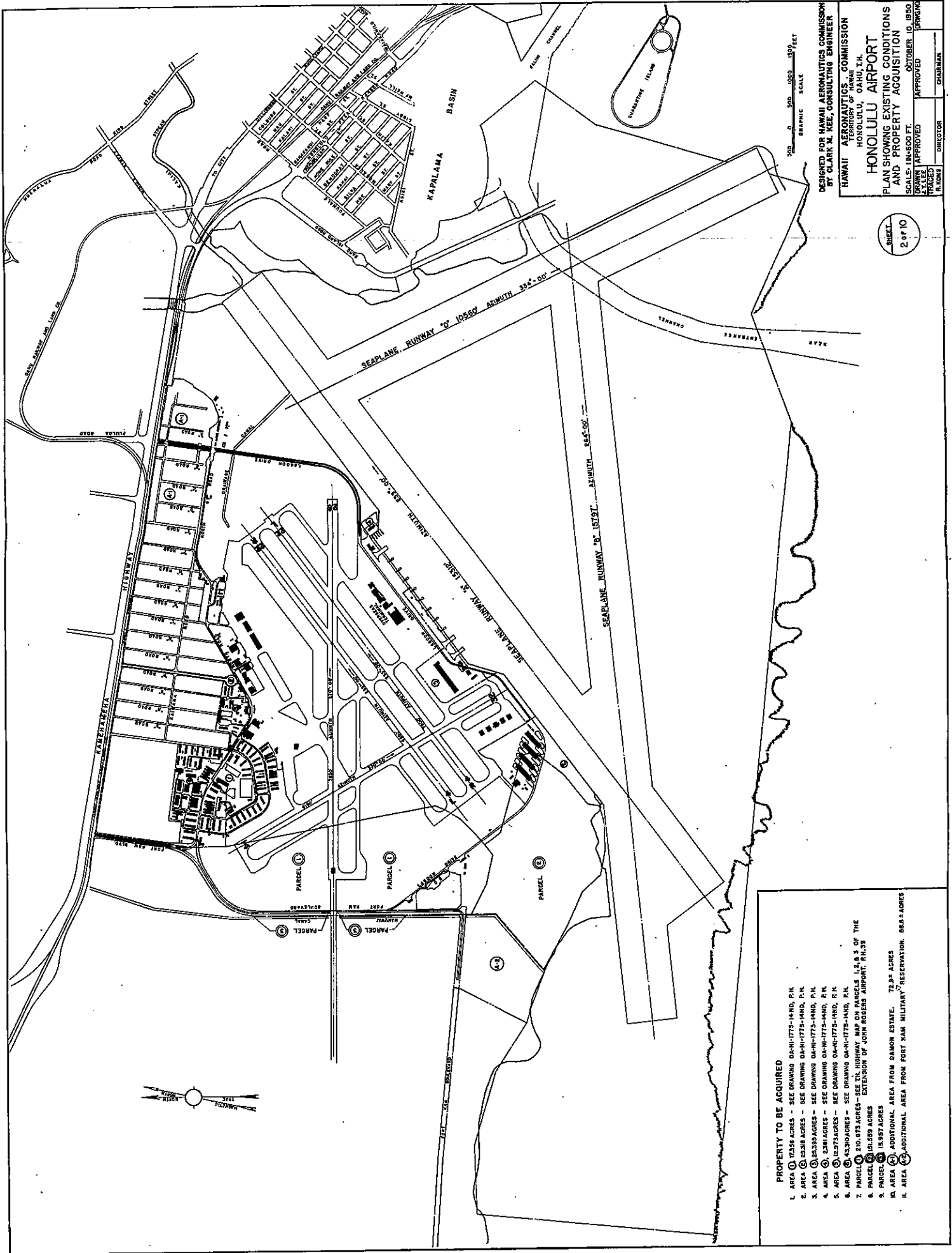
① HIGH INTENSITY LIGHTS FOR RETRIEVAL APPROACH RUNWAY  
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 ⑩ LIGHTS TO INDICATE THE POSITION OF THE AIRCRAFT ON THE AIRFIELD

**LEGEND**

① ADMINISTRATION BUILDING AND CONTROL TOWER  
 ② GARAGE AND SERVICE STATION  
 ③ INTERNATIONAL HOUSE  
 ④ SMALL SPECIALTY SHOP  
 ⑤ TERMINAL PARKING AREA  
 ⑥ EMPLOYEES PARKING AREA  
 ⑦ TRACT CLUB-WHARF AND YACHT CLUB PARKING  
 ⑧ BUILDING, SMALL BOAT MARINA CONCESSION  
 ⑨ AIR FREIGHT TERMINAL  
 ⑩ AIR FREIGHT TERMINAL  
 ⑪ AIR FREIGHT TERMINAL  
 ⑫ AIR FREIGHT TERMINAL  
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DESIGNED FOR HAWAII AERONAUTICS COMMISSION  
 BY CLARK M. KEE, CONSULTING ENGINEER

HAWAII AERONAUTICS COMMISSION  
 HONOLULU, OAHU, T.H.

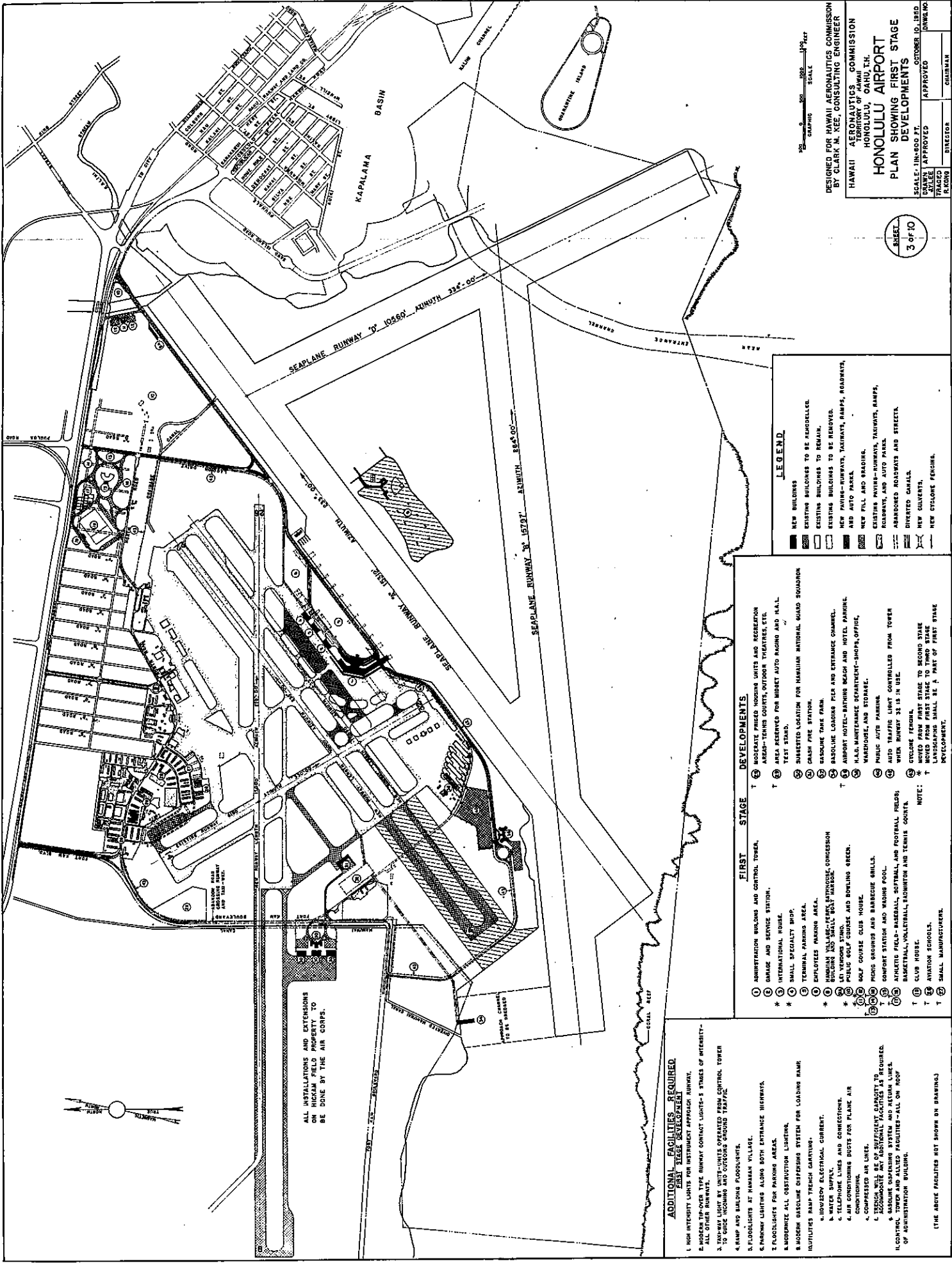
HONOLULU AIRPORT  
 PLAN SHOWING EXISTING CONDITIONS  
 AND PROPERTY ACQUISITION

SCALE: 1"=500 FT.  
 DATE: [ ]  
 DRAWING NO. [ ]

APPROVED: [ ] DIRECTOR  
 CHECKED: [ ] ENGINEER  
 DRAWING: [ ]

SHEET  
 2 of 10

- PROPERTY TO BE ACQUIRED**
1. AREA ① 1234 ACRES - SEE DRAWING DA-NH-1775-14-ND, P.H.
  2. AREA ② 2345 ACRES - SEE DRAWING DA-NH-1775-14-ND, P.H.
  3. AREA ③ 3456 ACRES - SEE DRAWING DA-NH-1775-14-ND, P.H.
  4. AREA ④ 4567 ACRES - SEE DRAWING DA-NH-1775-14-ND, P.H.
  5. AREA ⑤ 5678 ACRES - SEE DRAWING DA-NH-1775-14-ND, P.H.
  6. AREA ⑥ 6789 ACRES - SEE DRAWING DA-NH-1775-14-ND, P.H.
  7. PARCEL ⑦ 210.073 ACRES - SEE DRAWING DA-NH-1775-14-ND, P.H.
  8. PARCEL ⑧ 123.456 ACRES - SEE DRAWING DA-NH-1775-14-ND, P.H.
  9. PARCEL ⑨ 145.678 ACRES - SEE DRAWING DA-NH-1775-14-ND, P.H.
  10. AREA ⑩ ADDITIONAL AREA FROM DAMON ESTATE. 72.8 ACRES
  11. AREA ⑪ ADDITIONAL AREA FROM FORT HAN MILITARY RESERVATION. 58.4 ACRES



DESIGNED FOR HAWAII AERONAUTICS COMMISSION  
 BY CLARK M. KEE, CONSULTING ENGINEER  
 HAWAII AERONAUTICS COMMISSION  
 HONOLULU, OAHU, I.H.

**HONOLULU AIRPORT  
 PLAN SHOWING FIRST STAGE  
 DEVELOPMENTS**

SCALE: 1/8"=30'-0"  
 DRAWN: APPROVED: APPROVED: APPROVED: APPROVED:  
 JULIE: RUDOLPH: RUDOLPH: RUDOLPH: RUDOLPH:  
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 DIRECTOR: CHIEFMAN

SHEET  
 3 OF 10

- LEGEND**
- NEW BUILDINGS
  - EXISTING BUILDINGS TO BE REMOVED
  - EXISTING BUILDINGS TO REMAIN
  - NEW PAVING—ROADWAY, TAXIWAYS, RAMPS, ROADWAYS, AND AUTO PARKS
  - NEW FILL AND GRAVING
  - EXISTING PAVING—ROADWAYS, TAXIWAYS, RAMPS, ROADWAYS, AND AUTO PARKS
  - ABANDONED ROADWAYS AND STREETS
  - DIVERTED CANALS
  - NEW CULVERTS
  - NEW CYCLOPE FENCING

- FIRST STAGE DEVELOPMENTS**
- 1 ADMINISTRATION BUILDING AND CONTROL TOWER
  - 2 GARAGE AND SERVICE STATION
  - 3 INTERNATIONAL HOUSE
  - 4 SMALL SPECIALTY SHOP
  - 5 TERMINAL PARKING AREA
  - 6 EMPLOYEES PARKING AREA
  - 7 BUSHING AND SMALL STORES, CONCESSION
  - 8 AIR VENDOR STAND
  - 9 PUBLIC GOLF COURSE AND BOWLING GREEN
  - 10 HOCKEY COURSE AND BARBECUE GRILLS
  - 11 GOLF COURSE CLUB HOUSE
  - 12 GOLF STATION AND WADING POOL
  - 13 TENNIS STADIUM, BASEBALL, SOFTBALL AND FOOTBALL FIELDS
  - 14 BASKETBALL, VOLLEYBALL, BASKETBALL AND TENNIS COURTS
  - 15 CLUB HOUSE
  - 16 WINDMILL SCHOOLS
  - 17 SMALL MANUFACTURE

- ADDITIONAL FACILITIES REQUIRED**
- 1 HIGH INTENSITY LIGHTS FOR INSTRUMENT APPROACH RUNWAY
  - 2 MODERN TRUCKS TYPE, RUNWAY CONTACT LIGHTS—5 STRIPS OF INTERMITTENT LIGHTS—ALL OTHER RUNWAYS
  - 3 TAXI-WAY LIGHT BY UNITS—UNITS OPERATED FROM CONTROL TOWER TO GUIDE INCOMING AND OUTGOING GROUND TRAFFIC
  - 4 RAMP AND BUILDING FLOODLIGHTS
  - 5 FLOODLIGHTS AT HAWAIIAN VILLAGE
  - 6 PARKWAY LIGHTING ALONG BOTH ENTRANCE HIGHWAYS
  - 7 FLOODLIGHTS FOR PARKING AREAS
  - 8 MODERN GASOLINE DISPENSING SYSTEM FOR LOADING RAMP
  - 9 UTILITIES RAMP TRENCH CARTRIDGE
  - 10 110/220V ELECTRICAL CURRENT
  - 11 WATER SUPPLY
  - 12 TELEPHONE LINES AND CONNECTIONS
  - 13 AIR CONDITIONING DUCTS FOR FLAKE AIR CONDITIONING
  - 14 COMPRESSED AIR LINE
  - 15 GASOLINE DISPENSING SYSTEM AND RETURN LINE
  - 16 220V/440V AC "INDUSTRIAL FACILITIES" AS REQUIRED
  - 17 UTILITIES RAMP TRENCH CARTRIDGE—ALL ON ROOF OF ADMINISTRATION BUILDING

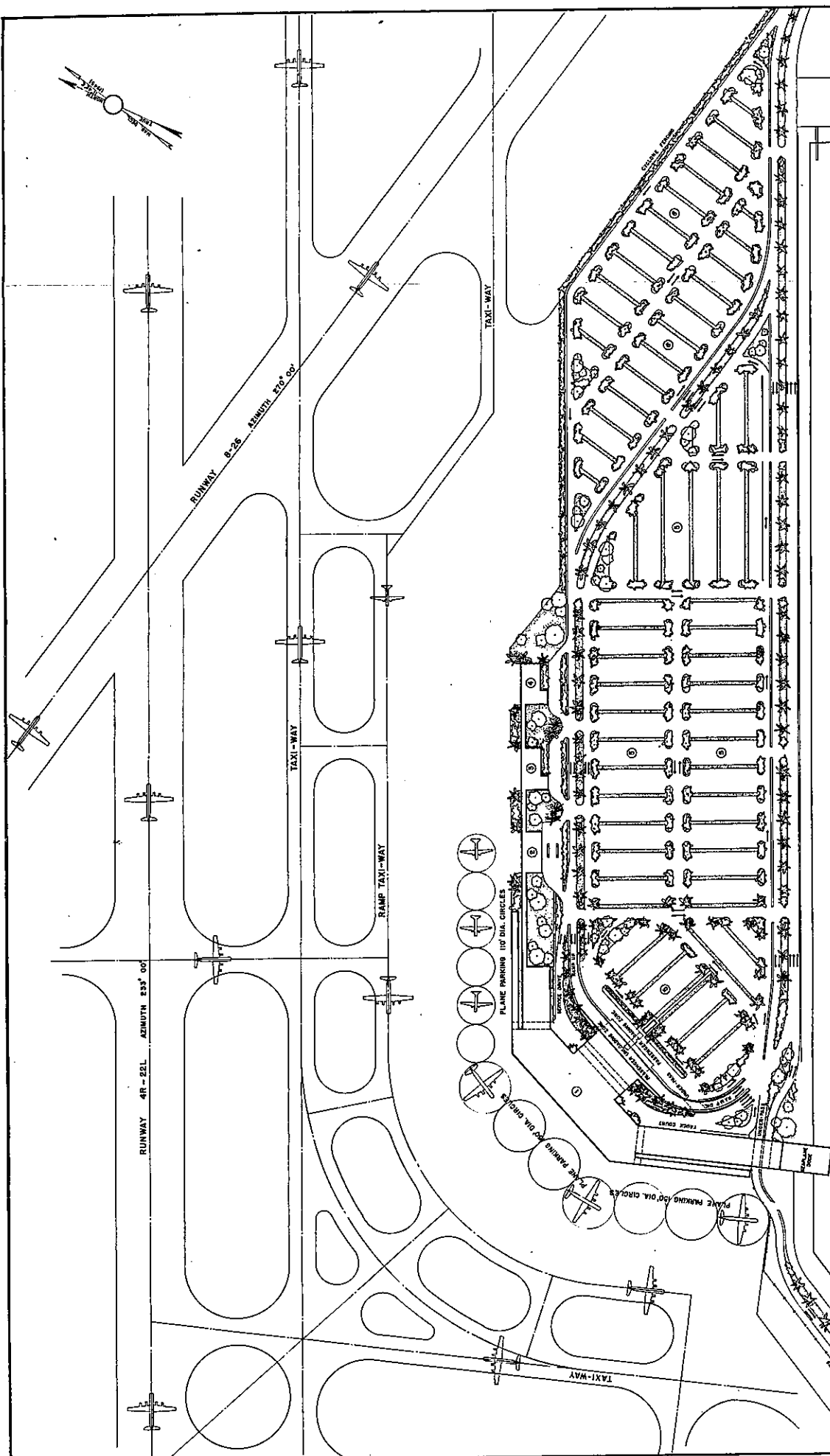
ALL INSTALLATIONS AND EXTENSIONS ON HICKAM FIELD PROPERTY TO BE DONE BY THE AIR CORPS.

LOCAL REF

NOTE:  
 \* WORK FROM FIRST STAGE TO SECOND STAGE DEVELOPMENT.  
 † LANDSCAPING SHALL BE A PART OF FIRST STAGE DEVELOPMENT.

(THE ABOVE FACILITIES NOT SHOWN ON DRAWING)





- LEGEND**
- ① ADMINISTRATION, BUILDINGS AND CONTROL TOWER.
  - ② GARAGE AND SERVICE STATION.
  - ③ INTERNATIONAL HOUSE.
  - ④ SMALL SPECIALTY SHOP.
  - ⑤ TERMINAL PUBLIC PARKING AREA.
  - ⑥ TERMINAL EMPLOYEES PARKING AREA.

GRAPHIC SCALE  
 0 100 200 300 400 FEET

DESIGNED FOR HAWAII AERONAUTICS COMMISSION  
 BY CLARK W. KEE, CONSULTING ENGINEER

HAWAII AERONAUTICS COMMISSION  
 HONOLULU, OAHU, I.H.

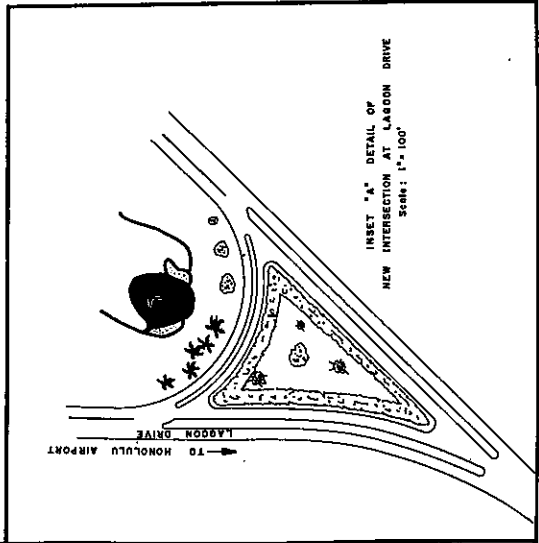
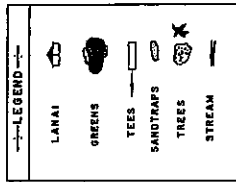
**HONOLULU AIRPORT**  
**PLAN SHOWING TERMINAL**  
**AREA DEVELOPMENT**

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 CHECKED BY: [Name]  
 APPROVED: [Name] DIRECTOR  
 CHAIRMAN: [Name]

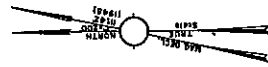
OCTOBER 10, 1950  
 SUBJECT: 5 OF 10

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2	410	4	11 430 4
3	170	3	12 165 3
4	350	5	13 500 5
5	220	3	14 235 3
6	395	4	15 410 4
7	425	4	16 420 4
8	400	4	17 410 4
9	540	5	18 530 5
OUT 3580 37		IN 3640 37	
TOTAL 3580 37		TOTAL 3640 37	

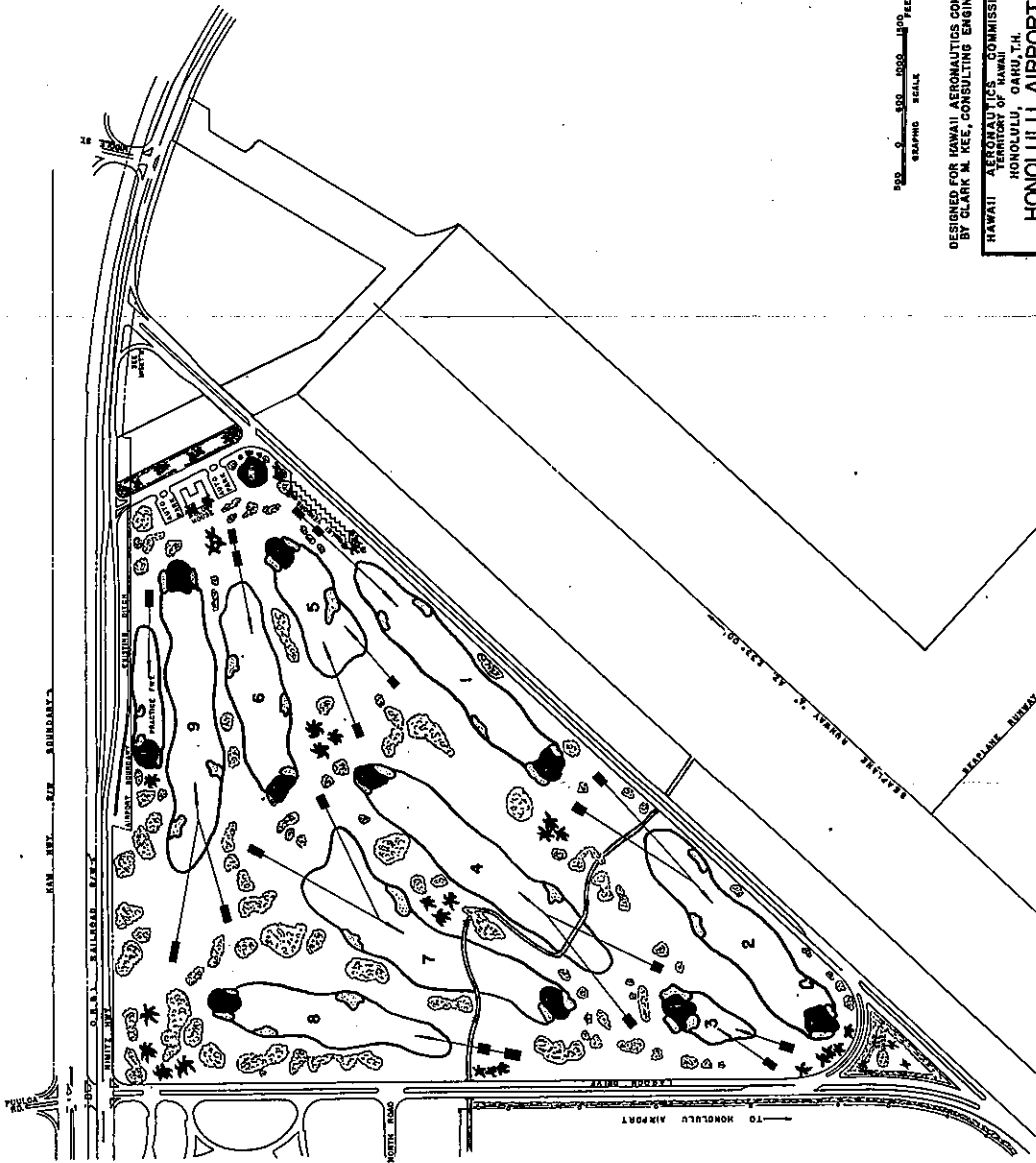
GOLF COURSE DESIGNED  
BY  
W. G. WILKINSON  
GOLF COURSE ARCHITECT  
FOR THE  
HAWAII AERONAUTICS COMMISSION



INSET "A" DETAIL OF  
NEW INTERSECTION AT LAGOON DRIVE  
Scale: 1" = 100'



HAWAIIAN RAILROAD DEPT. OF PUBLIC WORKS



SCALE: 1" = 400 FT.  
GRAPHIC SCALE

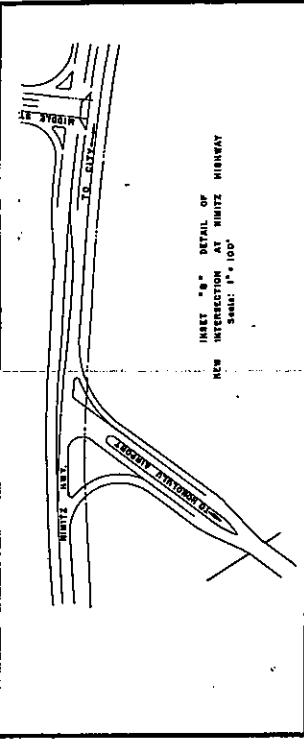
DESIGNED FOR HAWAII AERONAUTICS COMMISSION  
BY CLARK M. KEE, CONSULTING ENGINEER

HAWAII AERONAUTICS COMMISSION  
HONOLULU, OAHU, T.H.

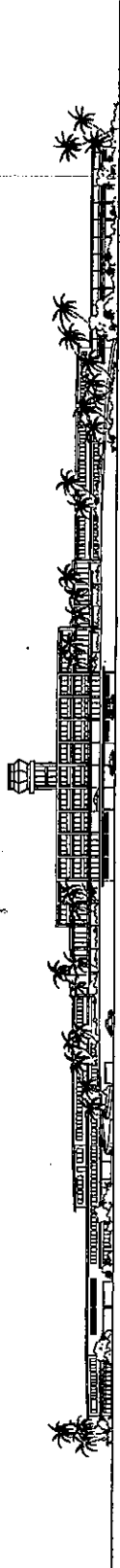
HONOLULU AIRPORT  
PLAN SHOWING GOLF COURSE  
AND NEW INTERSECTIONS

SCALE: 1" = 400 FT.  
APPROVED OCTOBER 10, 1950  
APPROVED  
DIRECTOR  
CHAIRMAN

SHEET  
6 OF 10

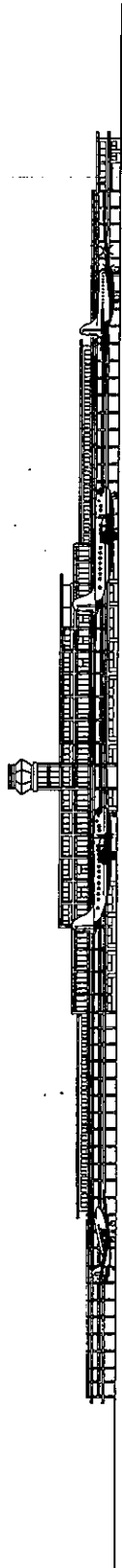


INSET "B" DETAIL OF  
NEW INTERSECTION AT NIMITZ HIGHWAY  
Scale: 1" = 100'



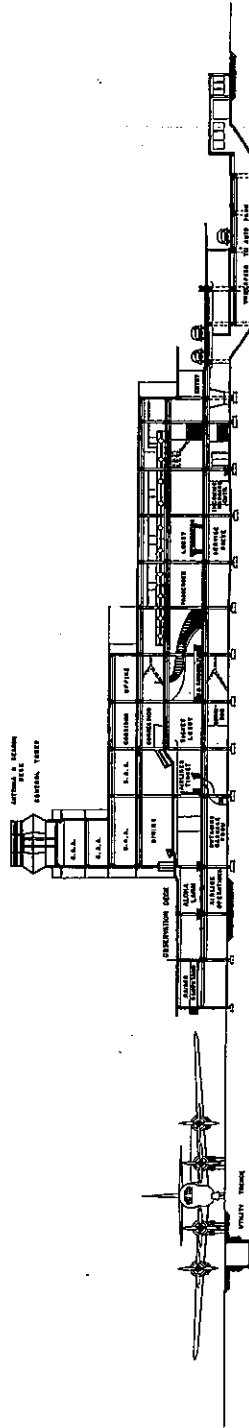
ELEVATION FROM AUTO PARK

SCALE: 1 INCH = 40 FEET



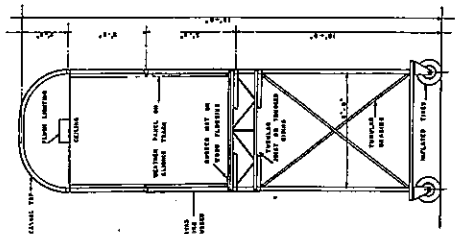
ELEVATION FROM FIELD SIDE

SCALE: 1 INCH = 40 FEET



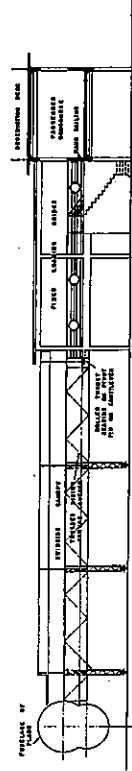
SECTION A-A THRU & OF BUILDING

SCALE: 1 INCH = 80 FEET



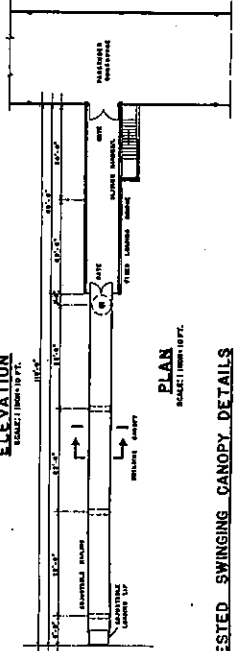
SECTION I-I

SCALE: 1/8 INCH = 1 FOOT



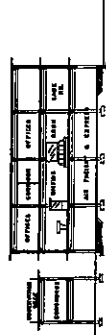
ELEVATION

SCALE: 1 INCH = 10 FT.



PLAN

SCALE: 1 INCH = 10 FT.



SECTION B-B THRU LEFT WING

SCALE: 1 INCH = 80 FEET

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BY CLARK W. KEE, CONSULTING ENGINEER

HAWAII AERONAUTICS COMMISSION  
HONOLULU, HAWAII

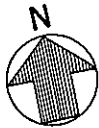
HONOLULU AIRPORT  
TERMINAL BUILDING & DETAILS

SCALE: AS NOTED  
DRAWN BY: [Name]  
CHECKED BY: [Name]  
APPROVED: [Name]  
OCTOBER 10, 1938

ENGINEER  
DIRECTOR  
CHAIRMAN

7 of 10  
SHEET

SUGGESTED SWINGING CANOPY DETAILS



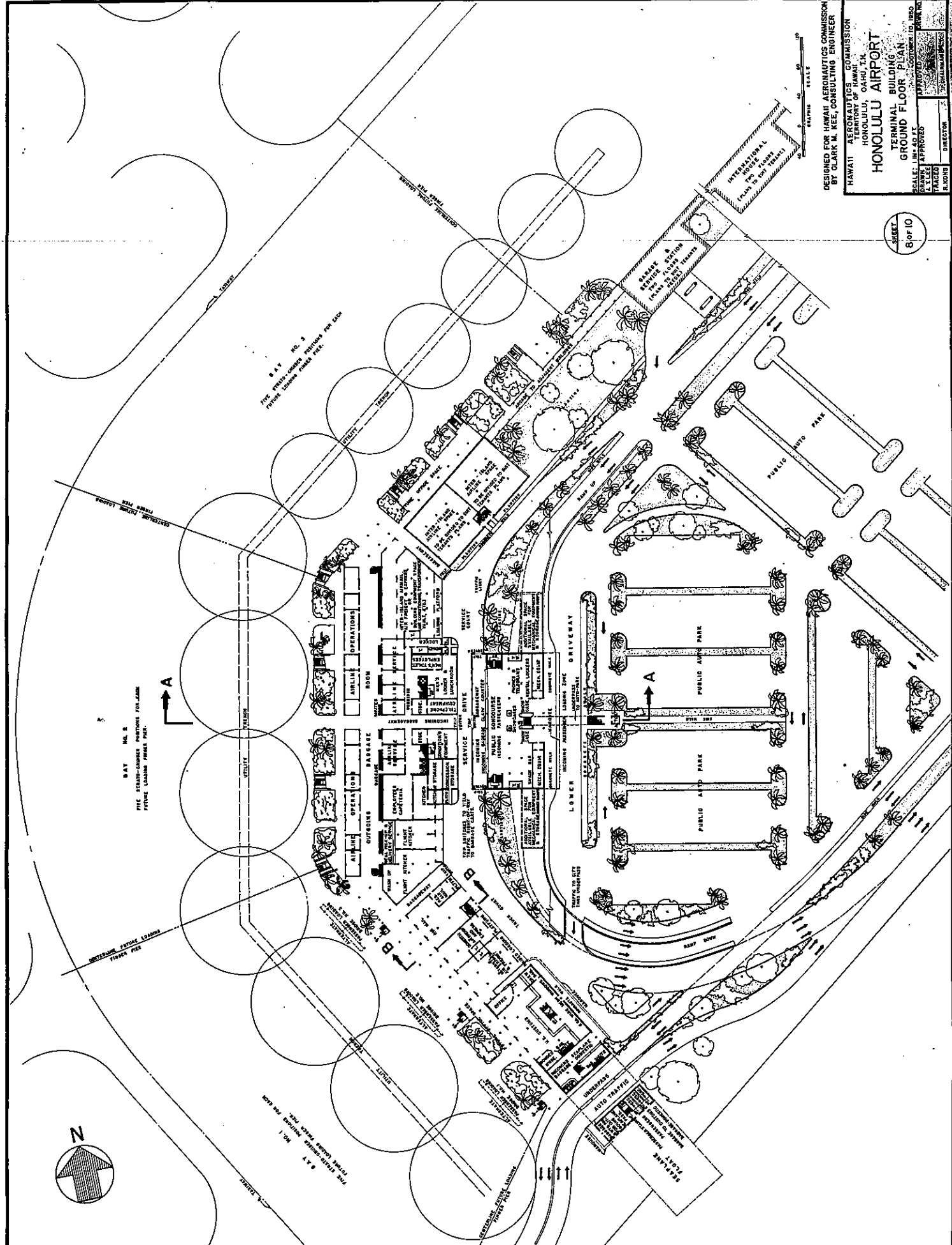
BAY NO. 2  
FIVE STAIR-CARRIAGE PORTIONS FOR LANE  
FUTURE LANDING PRIMER PIER.

A

POTENTIAL FUTURE LANDING  
PRIMER PIER

BAY NO. 3  
FIVE STAIR-CARRIAGE PORTIONS FOR LANE  
FUTURE LANDING PRIMER PIER.

BAY NO. 1  
FIVE STAIR-CARRIAGE PORTIONS FOR LANE  
FUTURE LANDING PRIMER PIER.



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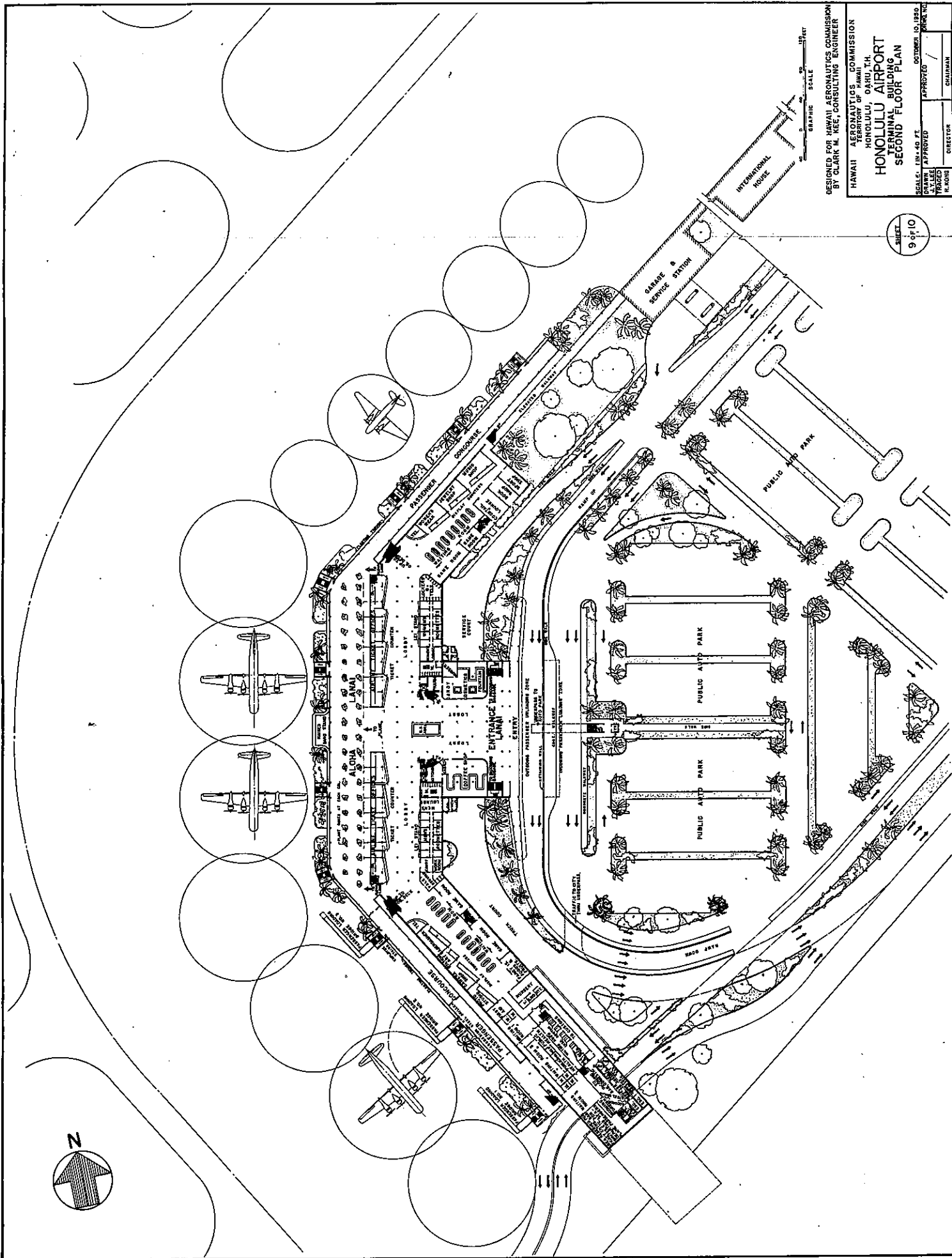
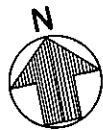
HAWAII AERONAUTICS COMMISSION  
HONOLULU, OAHU, I.H.

**HONOLULU AIRPORT**  
TERMINAL BUILDING  
GROUND FLOOR PLAN

SCALE: 1/8" = 4'-0"

APPROVED: OCTOBER 10, 1950  
DRAWN: [Name]  
CHECKED: [Name]  
DIRECTOR: [Name]

SHEET  
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BY CLARK M. KEE, CONSULTING ENGINEER

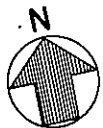
HAWAII AERONAUTICS COMMISSION  
HONOLULU, OAHU, T.H.

**HONOLULU AIRPORT  
TERMINAL BUILDING  
SECOND FLOOR PLAN**

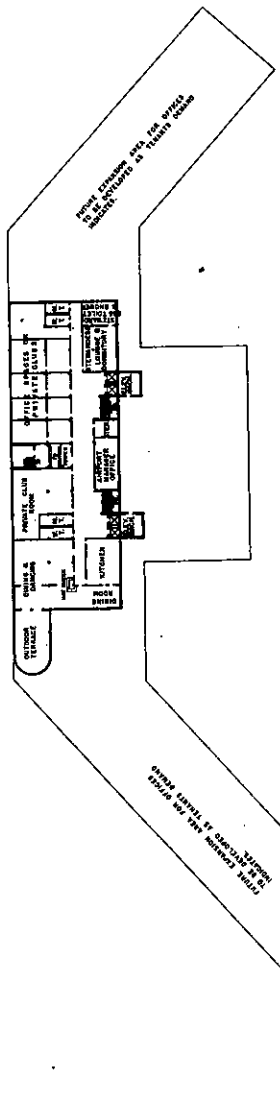
SCALE: 1/8" = 40 FT  
DRAWN BY: [ ]  
CHECKED BY: [ ]  
APPROVED BY: [ ]  
DATE: OCTOBER 10, 1950

CHAIRMAN: [ ]  
DIRECTOR: [ ]

SHEET  
9 OF 10

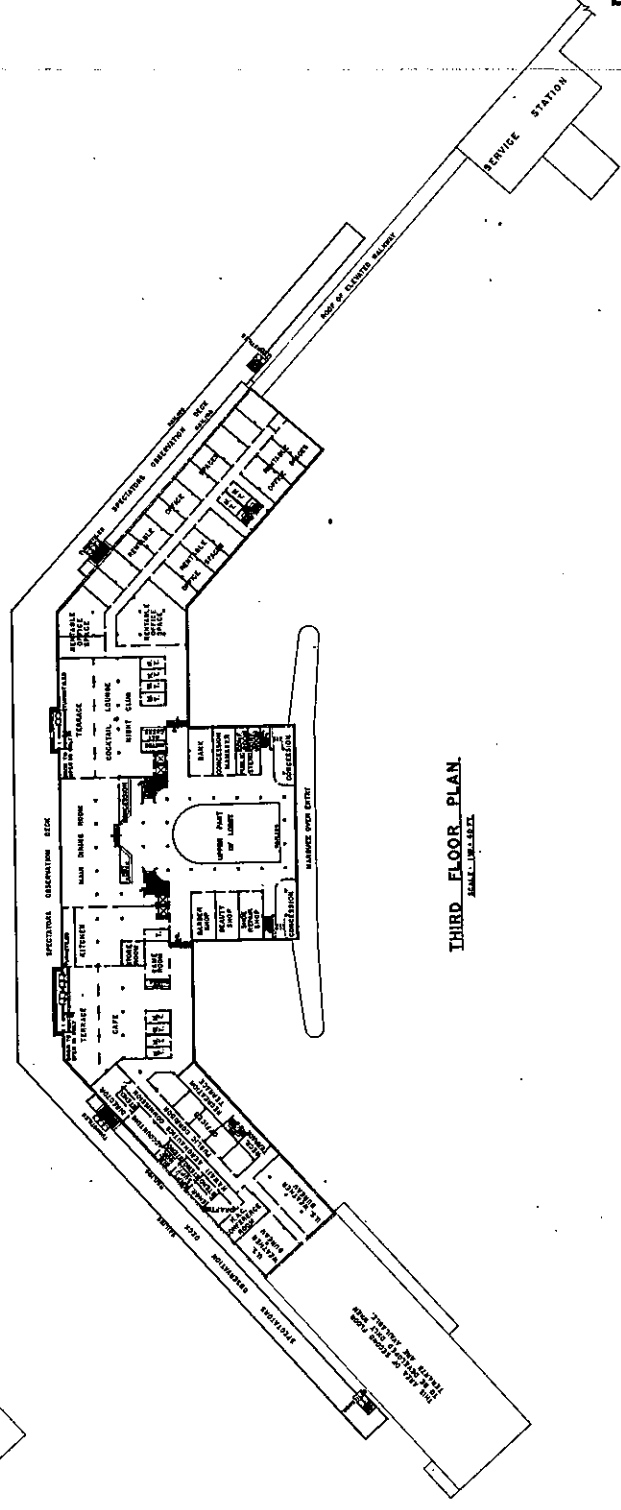


5th FLOOR  
 5th FLOOR  
 5th FLOOR  
 CONTROL TOWER FLOOR PLANS  
 SHEET: TIR-200T



FOURTH FLOOR PLAN  
 SHEET: TIR-200T

NOTE:  
 ALL STAIRS SHALL BE LOCATED  
 IN CORNER AND STAIRS ON  
 SIXTH FLOOR BE UTILIZED FOR OFFICE  
 EQUIPMENT ROOM AND TOILETS-ALL TO  
 BE LAYED OUT BY C.A.A.



THIRD FLOOR PLAN  
 SHEET: TIR-200T



DESIGNED FOR HAWAII AERONAUTICS COMMISSION  
 BY CLARK M. KEEL, CONSULTING ENGINEER

HAWAII AERONAUTICS COMMISSION  
 HONOLULU, OAHU, HI.  
**HONOLULU AIRPORT**  
 TERMINAL BUILDING FLOOR PLANS  
 3<sup>rd</sup>, 4<sup>th</sup>, 5<sup>th</sup>, 6<sup>th</sup>, & 7<sup>th</sup> FLOOR PLANS  
 SCALE: 1/4" = 10'-0" FT.  
 DRAWN BY: [Name] CHECKED BY: [Name] APPROVED BY: [Name]  
 R. JONES DIRECTOR [Name] CHAIRMAN [Name]

SHEET  
 10 OF 10