OAHU TRANSPORTATION STUDY

SUMMARY REPORT

1985

RAPID-TRANSIT AND FREEWAY—ARTERIAL PLAN

1967

THE PREPARATION OF THIS DOCUMENT WAS FINANCIALLY AIDED THROUGH A FEDERAL GRANT FROM THE DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT, UNDER THE URBAN PLANNING ASSISTANCE PROGRAM AUTHORIZED BY SECTION 701 OF THE HOUSING ACT OF 1954, AS AMENDED, AND BY FEDERAL AID HIGHWAY PLANNING AND RESEARCH FUNDS AUTHORIZED BY THE BUREAU OF PUBLIC ROADS OF THE DEPARTMENT OF TRANSPORTATION AND THE DIVISION OF HIGHWAYS, HAWAII DEPARTMENT OF TRANSPORTATION.

CONTENTS

INTRODUCTION

The Oahu Transportation Study was undertaken to establish a long-range, continuing, cooperative, comprehensive transportation-planning process for coping with one complex phase—*transportation*—of the explosively expanding economy of the Island of Oahu. This effort was to be coordinated with the interrelated facets of comprehensive planning for the State of Hawaii and the City and County of Honolulu. In addition to the transportation-planning process to be developed, the Study was to result in the design of a recommended transportation system for the Island of Oahu for the target year 1985.

The overall objective of the Study was to provide for the Island of Oahu a transportation system designed for the future movement of people and goods, fully coordinated with public and private land-development plans, and economically feasible to construct and use.

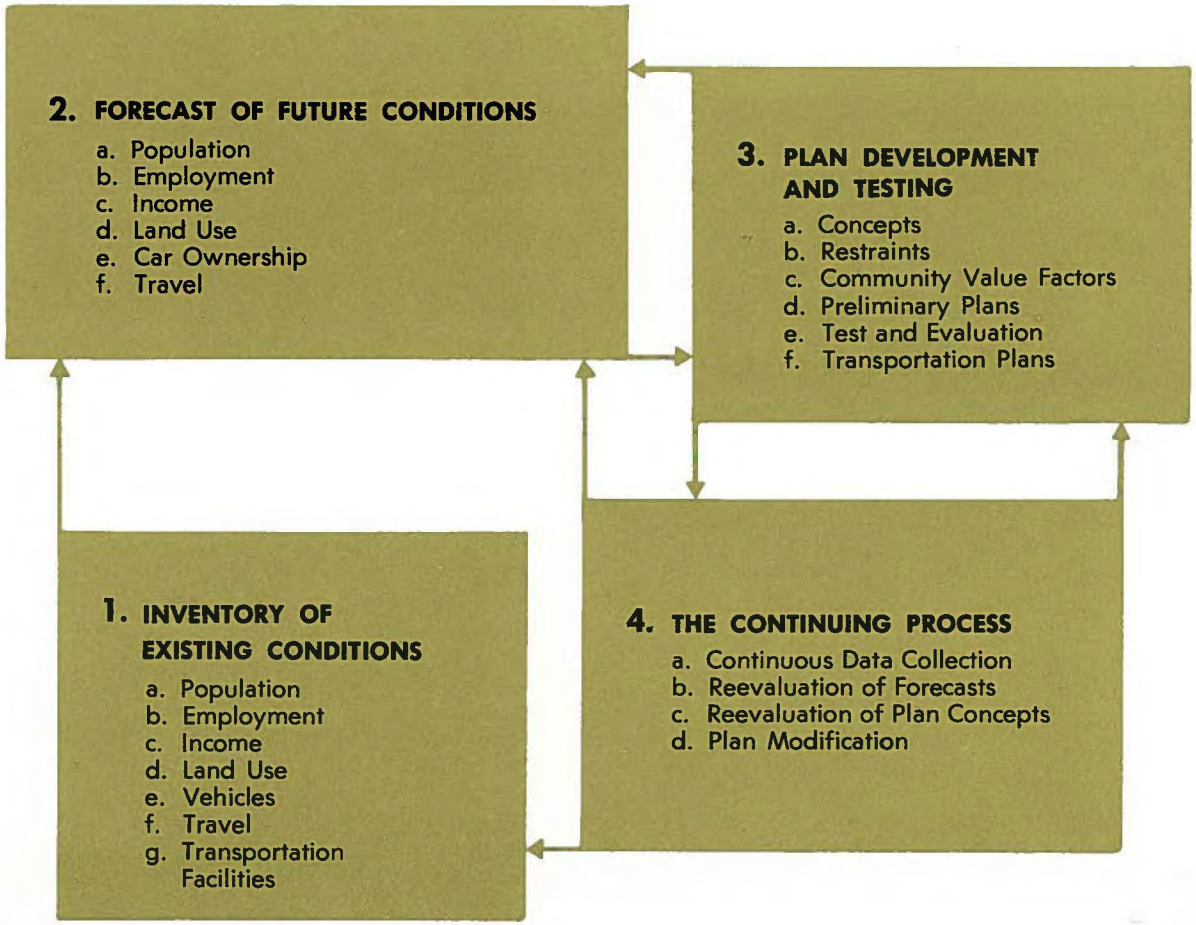
An island society is faced with certain problems and restrictions that few if any mainland communities need consider. Basically, there is an absolute limit to the land area within which the islander can plan—in Oahu's case, this area is only 381,310 acres, 596 square miles. Of nearly equal importance is the fact that, of this area, only 240,106 acres (about 63 percent) is usable. Because of its insular status, all persons and goods coming to or leaving the Island do so by one of only two possible vehicles—ship or airplane—and Oahu has but one harbor, one airport.

Thus many of Oahu's problems are unique, and it is essential not only to consider and evaluate every conventional approach and possible solution to its transportations situation, but to apply imagination and ingenuity to devise new and possibly daring solutions.

In the past 25 years—a mere generation—Honolulu has exploded from a languorous, gracious, subtropical paradise to a skyscrapering metropolis bursting at all its seams. From a thread of a city clinging to miles of shoreline to a potential giant forcing its way farther and farther up the mountainsides above the shore. From a population of 251,725 to one of 618,000 persons. This new population needs more dwellings, more jobs, more stores, more services, and more mobility to get from one to the other.

The initial task of the Oahu Transportation Study staff was to project the growth patterns of all phases of Oahu's economy to the 1985 target date—the numbers of people, where they live, where they work, where they shop, where they go to school, where they play, and how they get from one to the other. These bits of data, when gathered, organized, and subjected to statistical analysis, yield patterns; further analyses of the changes in these patterns through the past 20 years provide reasonably accurate projections of the patterns for the next 20 years, to 1985.

The general approach to the long-range transportation-planning process has evolved over the past 20 years or so as a consequence of recognition of the need for cooperation among the road builders, the land-use planners, the community-planning agencies, the industrial and commercial planners, and citizens' groups, as well as state and federal agencies. It has seemed, at times, that these groups' frequently opposing demands could never be articulated into a coherent system, but realistic evaluation of overall objectives by all usually results in adjustments that do permit the definition of satisfactory and attainable goals, always subject to continuing re-evaluation and modification as the area's conditions change.



THE TRANSPORTATION PLANNING PROCESS

The process moves in an orderly fashion through four major phases —Inventory, Forecast, Plan Development and Testing, and the Continuing Process—as shown on the chart. The Inventory is a fact-gathering-and-analysis phase concerned with existing travel and the elements that generate it—the population, economy, and land-use factors of the Study Area—to determine present trip-generation characteristics. The Forecast phase develops and applies prediction techniques that will extrapolate the results of the Inventory phase to provide realistic forecasts of population, industry, land-use requirements, trip making, and modes of travel in 1985. Plan Development analyzes the relationships of the forecast values to design a plan that will provide adequate facilities for future traffic demands and an improved level of service and will promote better land development. The fourth phase—the Continuing Process—is an analysis-and-feedback cycle that updates all conditions and solutions on a continuing basis.

The first three phases constitute the present Study. The fourth phase was not included in this Study but should be initiated as soon as possible to realize the continuing aspects of the process.

The detailed report, of which this is a summary, is presented in three volumes. The first outlines the past, present, and projected growth patterns for the population, the economy, and the land uses. The second discusses past, present and potential transportation facilities, travel patterns and volumes. The third enumerates the transportation goals and evaluations, and details the recommended transportation plans.

This Study—sponsored by the State of Hawaii and the City and County of Honolulu in cooperation with the U.S. Department of Housing and Urban Development and the U.S. Department of Transportation, Bureau of Public Roads—was officially started on March 1, 1963, when the Application for Urban Planning Grant was approved by the Regional Director of Urban Renewal, HHFA. In the course of the work, the Study staff was advised by a Policy Committee and aided by a Technical Advisory Committee, a Citizen Advisory Committee, and Special Consultants and Expert Advisors, all of whom contributed significantly to the resolution of the numerous aspects of the problem.

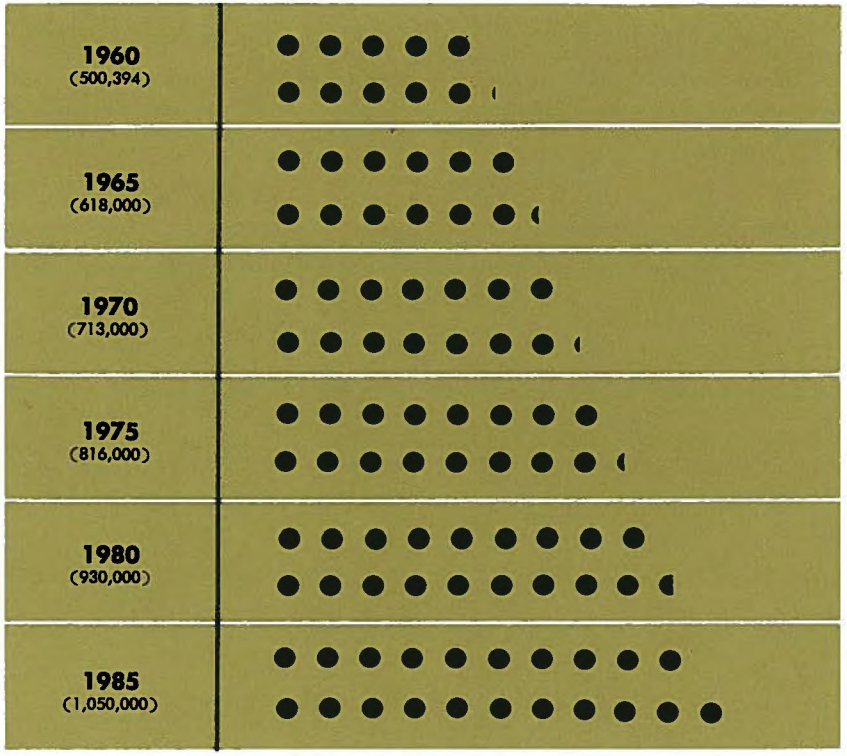
INVENTORY ANALYSIS AND FORECAST

These "How do we stand?" and "Where are we going?" aspects of the Study are essential to the continuing transportation-planning process, and they must be re-evaluated periodically.

POPULATION

Population forecast is fundamental to all measures of urban activity. The population and economic forecasts together form the basis for estimating future land use and travel demands, since the numbers of people and jobs are the major factors in trip making. Separate analyses of births, deaths, net migration, and migration patterns of members of the armed forces and their dependents point to a 1985 population of 1,050,000 on Oahu.

Population Growth on Oahu



EMPLOYMENT

The Economic-Planning Model developed for this Study simulates mathematically the critical relationships among the many facets of the economy to yield the pattern and direction of growth and forecast the levels of economic activity at given points of time in the future—for this Study, 1985. The approach begins by establishing certain goals for the economy and then asks what levels of the various sectors of economic activity will be required to realize these goals—the anticipated levels of activity that are capable of realization as a result of appropriate decisions in both the public and private sectors of the economy.

The population's chances to work—the job potential—and thus the types and intensities of commercial and industrial activities are critical elements. The pattern of employment in the private sector of Oahu's economy is expected to be increasingly oriented toward the service and trade categories and to continue to account for approximately three-fourths of the total civilian employment, with the remaining jobs generated by Federal, State, and County Governments.

These factors lead to total and per-capita income values and expenditure values for major categories in the economy, as shown on the charts.

Existing and Future Job Potentials

Sector of Economy	No. of Persons 1965	1985
Private		
Agriculture	12,200	8,500
Manufacturing	8,500	12,400
Construction	15,600	13,300
Trade & Transp	66,500	115,400
Utilities & Commun.	4,300	6,800
Services	38,500	102,700
Sub total	145,600	259,100
Government	96,500	126,700
Total	242,100	385,800

■ 25,000
▲ 5,000
● 1,000

Income and Expenditures on Oahu

INCOME	1965	1985
Personal	1,600,000,000	4,700,000,000
Per Capita	2,700	4,600
OUTPUT OF MAJOR PRIVATE SECTORS OF OAHU'S ECONOMY		
Agriculture	282,700,000	678,300,000
Manufacturing	174,600,000	664,200,000
Construction	349,400,000	881,000,000
Trade and Transp	694,600,000	2,943,900,000
Utilities and Commun.	110,700,000	536,200,000
Services	380,300,000	1,119,700,000
Total	1,992,300,000	7,823,300,000
EXPENDITURES OF SELECTED MAJOR ECONOMIC CATEGORIES		
Visitors	219,000,000	1,981,900,000
Exports	118,500,000	164,200,000
Private Investments	284,900,000	838,800,000
Public Investments	89,300,000	168,600,000
Federal Defense	455,000,000	590,000,000
Household	1,135,600,000	3,620,600,000
Total	2,302,300,000	7,364,100,000

IN DOLLARS

◆ 1,000,000,000
● 500,000,000
■ 100,000,000
▲ 50,000,000
○ 25,000,000
△ 10,000,000
□ 1,000

LAND USE

Forecasts of the level of employment in major industries provide inputs to the Land-Use Model, which then forecasts where the new employees will work and live. In addition, the Land-Use Model simulates the evolution, step by step through time, of the interdependent variables that determine land development. The usefulness of simulation is that it provides hindsight in advance of action.

A complete and detailed inventory of land use is essential to realistic transportation planning, which, in turn, influences future land use. The quantitative relationships between land use and travel—trip generation of each subarea—together with knowledge of past development patterns, provide one of the best bases for evaluating urban activity and for determining future land-use patterns and transportation requirements.

The Oahu General Plan, adopted by the City and County of Honolulu in 1964 as an official set of land-use policies, guides overall development of the Island on the basis of long-range objectives. Designed to assure the coordinated development of the City and County, and to promote the welfare and prosperity of its residents and the enjoyment of its visitors, the General Plan defines the most desirable uses of land for residence, commerce, industry, agriculture, recreation, and other necessary purposes. Although the basic philosophy and major components of the General Plan will endure, it is reasonable to expect that adopted policies will undergo changes based on more current data.

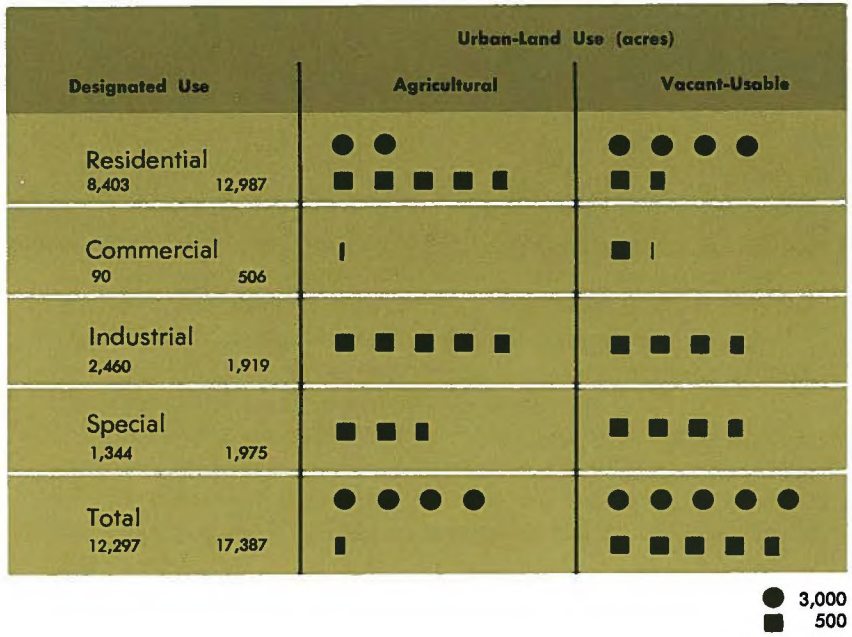
Agricultural and vacant-usable lands designated for urban use by the General Plan are the two principal sources of space available for future development. Under current designation, the General Plan allocates the major portions of these lands to residential use.

The total housing requirement of 261,961 dwelling units to shelter the anticipated 1985 civilian population (vs. 145,510 in 1964) presents a need for an additional 12,181 acres for single-family development and 844 acres for multi-family development in the next 20 years.

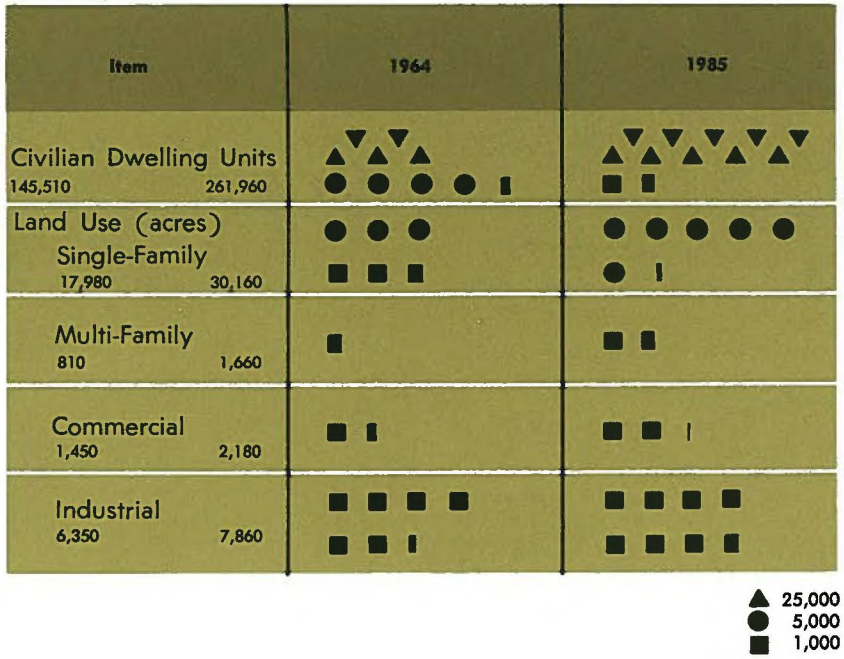
Oahu's commercial land represents a source for approximately 45 percent of the Island's employment and 32 percent of its output-dollar volume, despite the fact that it occupies less than 1 percent of the total developed-land area. In terms of transportation planning, commercial land is thus a major traffic generator.

Industrial land, occupying approximately 3 percent of the developed land on Oahu, is also a traffic generator. The largest user of industrial land in the Honolulu District, and a major traffic generator, is the Honolulu International Airport; in the outlying districts, the Campbell Industrial Park occupies the most land. These two represent more than 43 percent of the land in industrial use on Oahu today.

General Plan Allocation



Housing Requirements

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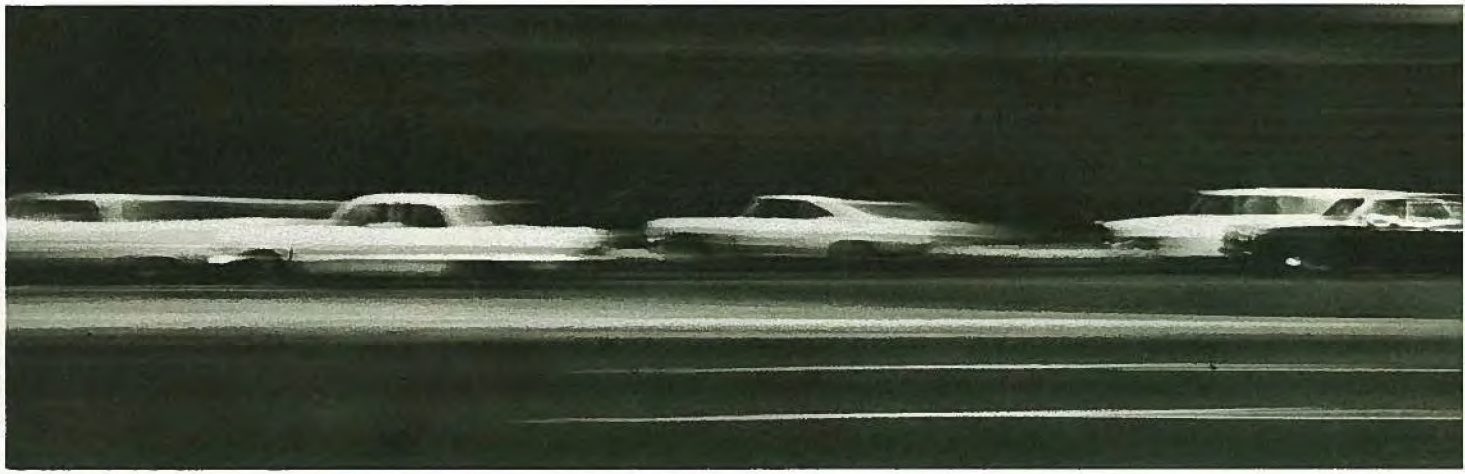


AUTOMOBILE OWNERSHIP

The number of automobiles garaged at residences on Oahu in 1960 was 134,427; in 1985, the number is expected to reach 360,350, about 268 percent of the 1960 level. Car ownership is closely related to household income bracket—at incomes under $4000 per year, 0.5 car per household; at incomes of about $5000, 1.0 car per household; at higher incomes, more than 1.4 cars per household. There should eventually be a saturation point, but present data indicate that it will not occur before 1985. Therefore, there will be no lessening of the need for new and better transportation facilities to alleviate the increasing congestion and slowdowns on our already overcrowded highways and streets.

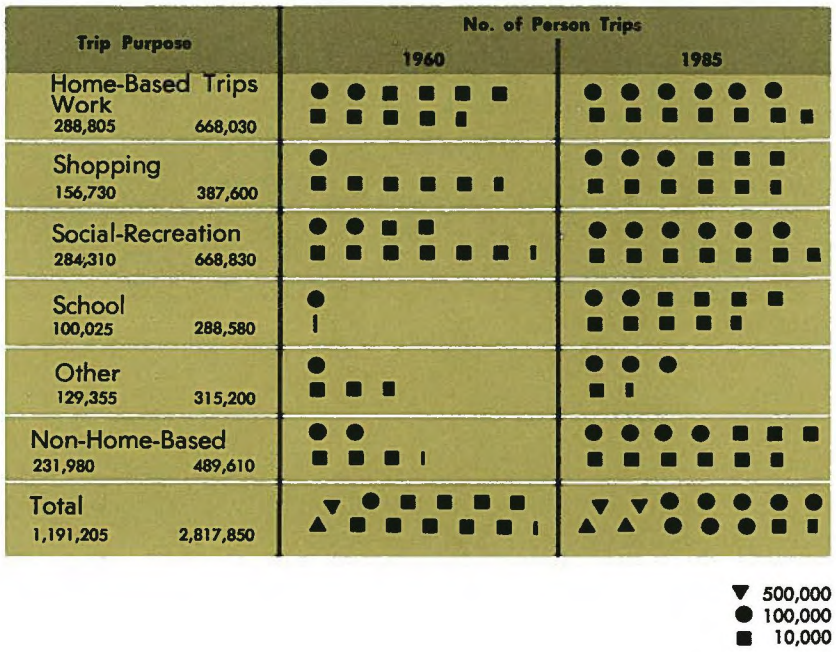
TRAVEL MODES, PATTERNS, AND VOLUMES

Repetitive patterns occur in traffic flow in any metropolitan area—hourly cycles, weekly, and monthly or seasonal cycles. Monthly variations in traffic volumes on Oahu are minor—within +10 percent of the average for the year; weekly peak volumes occur predictably on Friday; and the hourly peaks appear in all locations between 7 and 9 a.m. on weekdays.

There is a strong relationship between trip purpose and land use. The distribution of residential development is without question one of the strongest single forces shaping the travel patterns of Oahu—the home of the trip-maker was involved in over three-quarters of all trips in 1960. Of these homebased trips, work and social-recreational travel constituted the most important trip categories.

Honolulans are estimated to make 2,817,850 daily trips in 1985. This daily travel by persons will present a total increase of daily travel of 137 percent of that made in 1960, an average of about 2.68 trips per day per person in 1985 as compared to 2.38 trips per day per person in 1960.

Number of Person Trips



The modes by which these trips will be made will depend not only on the socio-economic status of the people within the community and the availability of the automobile, but also on the extent of the transportation system to be provided. Mathematical expressions exhibiting the best ability to estimate the trip-maker's choice between auto and mass transit relate percent transit usage to auto ownership, travel-time difference between auto and mass transit, and average workday (9-hour) parking cost.

The utilization of transit is estimated to increase from 125,440 in 1960 to 363,100 in 1985, while auto-driver trips are estimated to increase from 644,175 in 1960 to 1,296,775 in 1985.

Oahu has at present no school-bus service for transporting children to and from school, although the HRT provides "school specials." Proposed policies for such transportation are now before the Board of Education for public hearings; the resulting decision will determine the extent to which public mass transit is to be utilized for school trips.

Growth of Transit Utilization

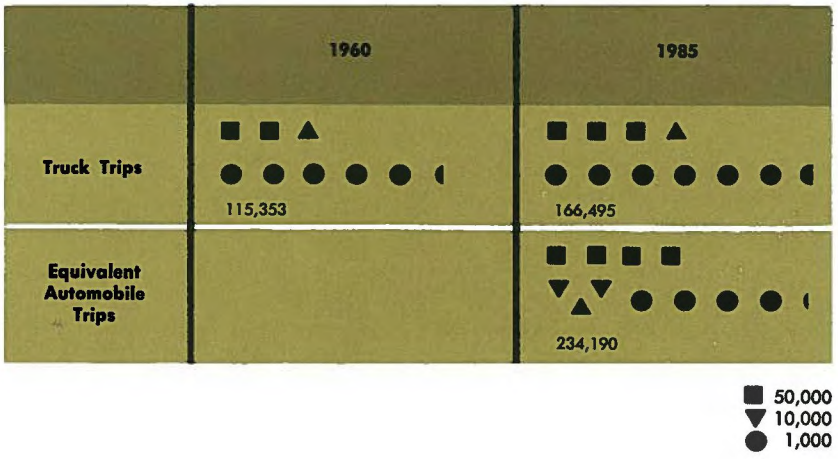
Trip Purpose	No. of Transit Trips		% of Total Person Trips		Auto-Driver Trips	
	1960	1985	1960	1985	1960	1985
Home-Based Work	45,990	162,685	16.4	24.4		348,875
Home-Based School	39,760	*29,275	39.4	10.1		20,230
Home-Based Other	30,520	131,610	5.4	9.6		644,590
Non-Home-Based	9,170	39,545	4.0	8.1		283,080
Total	125,440	363,115			644,175	1,296,775

*Excludes riders on nonscheduled and private buses.

■ 100,000
▲ 10,000
● 1,000
○ 5%

The forecasting of truck trips is also an integral part of trip-making prediction, in the movement of goods on the roads and streets. Although truck trips are not considered heavy on Oahu, their effect on traffic flow is approximately equivalent to that of four automobiles. Truck trips are estimated as about 166,500 in 1985, an increase of about 44 percent over the number of trips in 1960.

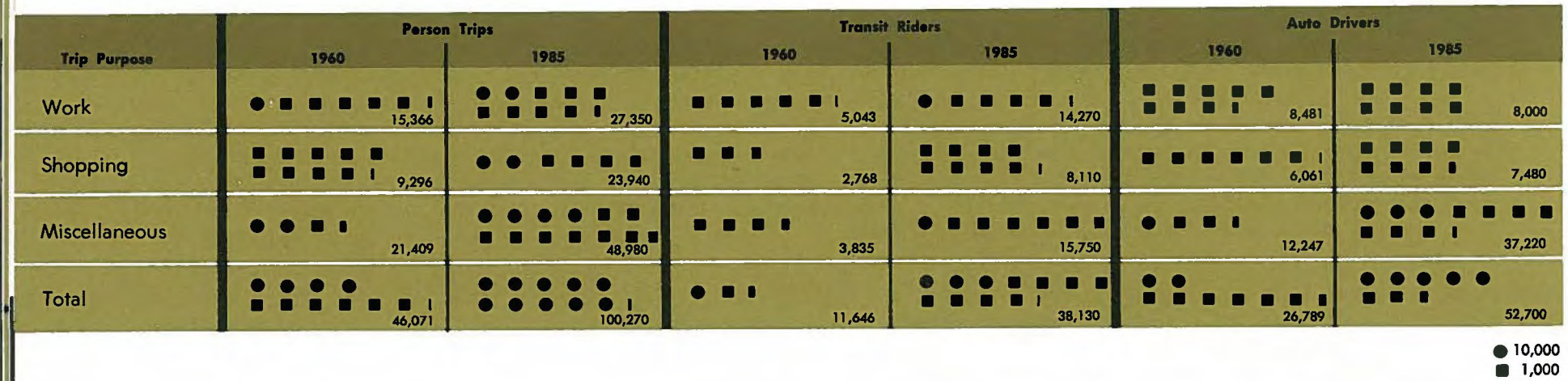
Truck Trips



TERMINAL FACILITIES

The effectiveness and efficiency of an urban transportation system depends heavily on the availability of adequate terminal and transfer facilities at trip origins and destinations.

Trips to Central Business District



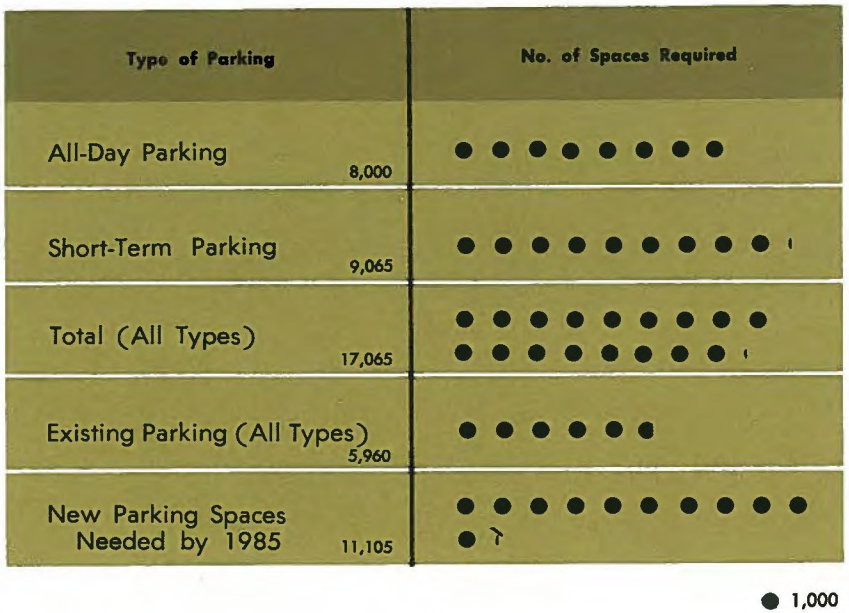
THE CENTRAL BUSINESS DISTRICT

Downtown parking terminals should be planned concurrently with urban freeways and major downtown developments and their design and rate schedules of core-area parking, facilities should encourage short-term parking, with facilities for all-day parkers located on the fringes of downtown. The Central Business District presently has 5960 parking spaces of all types.

The magnitude and the nature of the trips to the Central Business District must be considered because, as basic trip characteristics differ by trip purpose, so do the parking characteristics. Since work trips require all-day parking, sufficient space should be provided for them. For shopping and miscellaneous trips to the downtown area, parking-turnover factors should be applied to obtain future space requirements.

Rapid transit has a great impact on parking requirements. With an improved mass-transit system, the 1985 parking-space requirements in downtown Honolulu are estimated at 17,065. If transit service were maintained only at its present level, approximately 10,000 more parking spaces would be required in 1985—a total of 27,000 spaces.

1985 Parking Requirements



OTHER TERMINAL POINTS

The Honolulu International Airport, the new Honolulu Municipal Stadium, and any other major public terminus of auto-driver trips must also be provided with adequate parking facilities, determined by appropriate inventory, analysis, and forecast.

RECOMMENDED TRANSPORTATION-SYSTEMS PLAN

LOGIC OF PLAN DEVELOPMENT

Transportation facilities should be planned to fulfill people's wishes —where they want to travel and how and when they wish to go. The kind of city its citizens want to create should determine the type and design of transportation services they select.

Any statement of urban-transportation goals must be made within the framework of basic goals for comprehensive planning—desirable places to live, work, and pursue happiness with maximum service, amenity, economic opportunity, and safety. Thus the transportation goals must include: ease of movement of people and goods, integration of the transportation system with land use, the availability of various modes of travel, preservation of Oahu's beauty and amenities, safety, and balance between facilities for both individual and mass movement.

The achievement of these transporation goals requires a clearly defined set of transportation-planning objectives to provide a system that will:

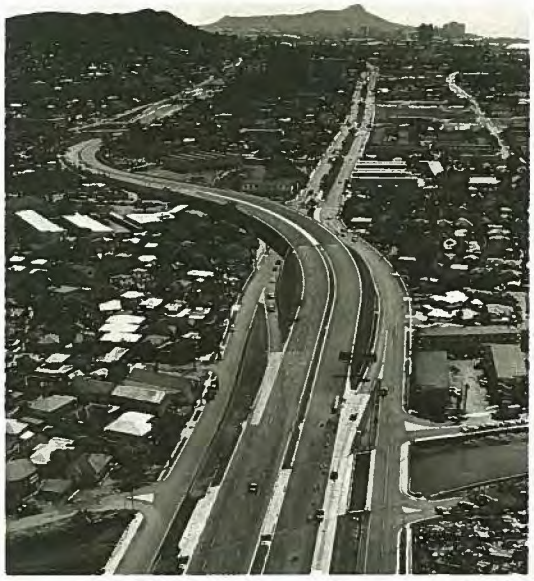
1. Provide for adequate present and future traffic demands and land-service requirements
2. Furnish an improved level of service
3. Promote better land use

In addition to the goals and objectives, transportation planning is bound by certain restraints that limit the avenues of approach in solving the long-range transportation problems of Oahu, such as:

1. Planning scale—the magnitude of the need for future travel demands
2. Target dates
3. Existing and committed conditions
4. Financing

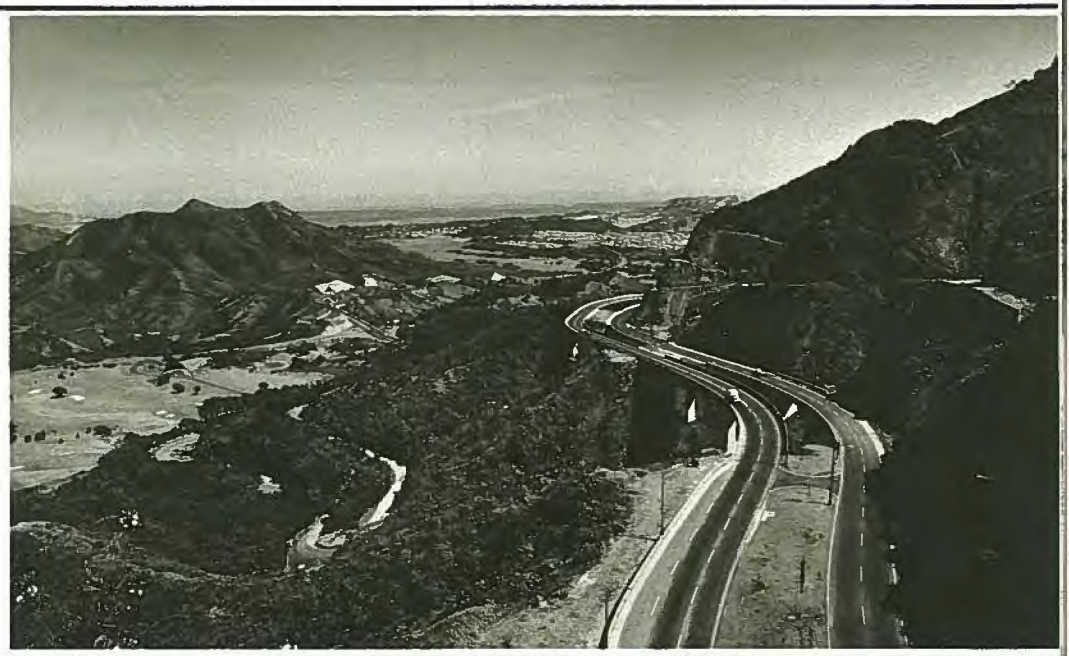
Transportation of people and goods is not an end in itself, but rather a means to satisfy human needs—and these needs go far beyond mere utility. To live the good life that people expect, particularly in Hawaii, they want: pure air; clean and spacious beaches; clear, clean water for swimming and surfing; magnificent vistas, generous open areas and parks; and the preservations of natural and historic landmarks.

The rapid growth of Oahu to its present level has already strained the existing transportation system beyond its capacity. Plans for future movement of people and goods must provide a mass-transit system that will be efficient, safe, comfortable, and economical, and it must be compatible with the anticipated population growth, land development, and economic expansion. The plans must involve the entire system—not just a hodgepodge of bits and pieces planned by different groups for different purposes at different times. The transportation system must be planned and tested as if it could be built "overnight," in effect, although actually it must be constructed in integrated increments over a number of years. And, finally, it must be realistic in terms of implementation—be economically feasible, have characteristics that lend themselves to staging and programming, and comply as closely as possible with the social and community values already established.



Existing facilities impose restraints on planning, as they must be incorporated into the system in the most efficient manner possible. In addition, the Oahu General Plan, the Interstate Highway System, existing land use and street networks, and approved Civic Center and Urban Renewal Plans and commitments must be integrated into the overall concept and plans.

The transportation plan recommended in this report is not an ultimate system but is rather one to which either changes or additional improvements could be made. The plan is to be considered as a structural element of the community, serving as a guide for future developments and improvements to the transportation system. It is a skeletal system providing a framework within which neighborhoods and land uses may be developed. It is not to be taken as a final geometric design of specific major streets, freeways, interchanges, or precise positioning of the network.



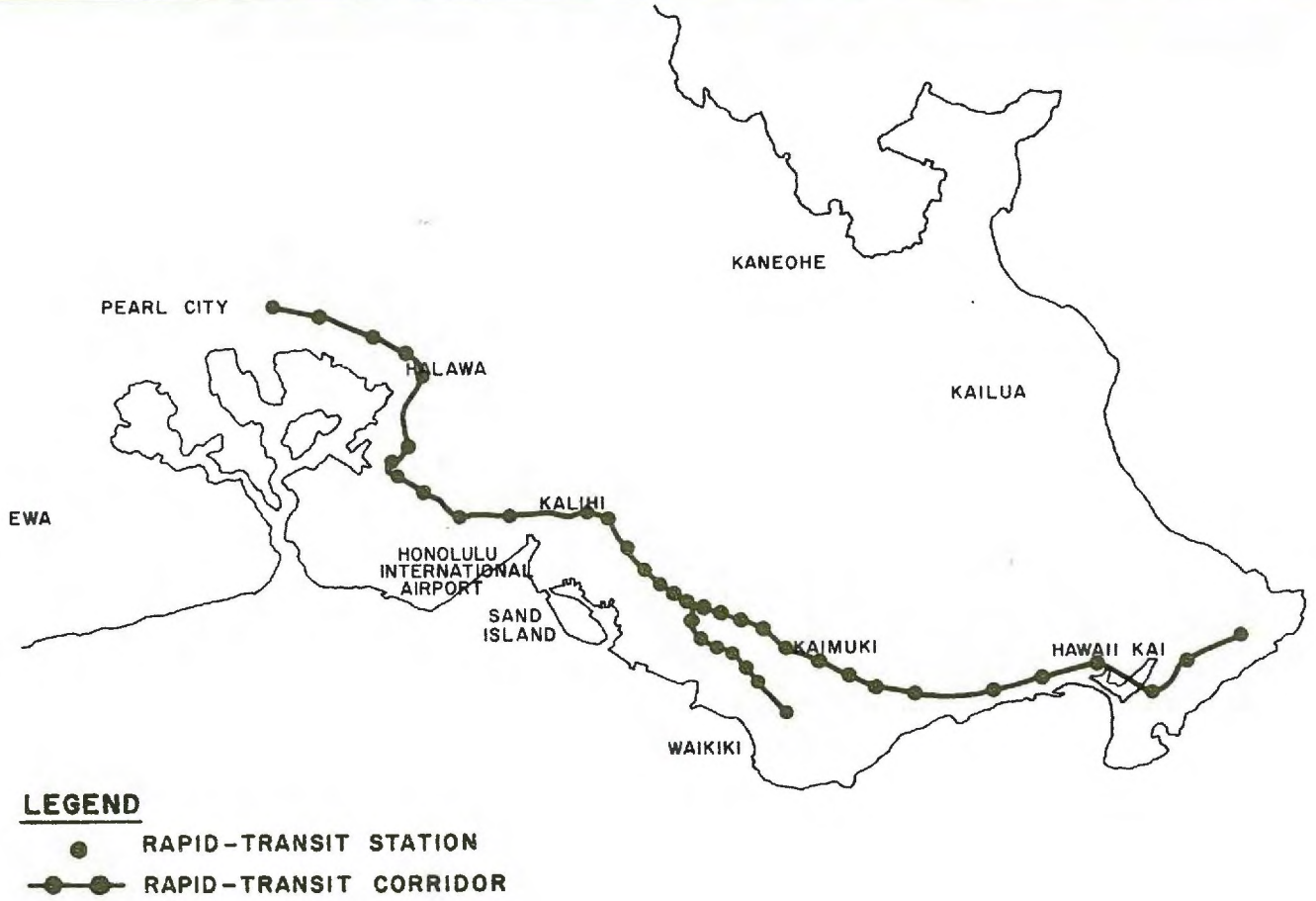


FIG. 12.20. RAPID TRANSIT CORRIDOR OF RECOMMENDED MASS TRANSIT SYSTEM.

RAPID-TRANSIT

The corridor of the recommended rapid-transit plan forms a "Y", with an intersection near the eastern side of the Civic Center. The leg of the Y crosses the Civic Center and the Central Business District along Beretania Street, follows North King Street westerly, turns southerly along Kalihi Stream to cross Kamehameha and Nimitz Highways near Middle Street, and progresses westerly to provide service to Honolulu International Airport, Hickam Air Force Base, Pearl Harbor, the proposed Honolulu Stadium, and Pearl City. The mauka arm of the Y proceeds easterly along Beretania Street to its intersection with King Street at University Avenue, then along King Street and Waialae Avenue to the Waialae Shopping Center, and terminates at Kalama Valley in Hawaii Kai. The makai arm of the Y proceeds southeasterly along Ward Avenue to Kapiolani Boulevard at the Honolulu International Center, then easterly along Kapiolani Boulevard to Kalakaua Avenue and along Kuhio Avenue to a terminal at Kapahulu Avenue.

Extension of this transit service to the outlying areas would be accomplished by express buses. Service to the Barbers Point area would be by express bus on Interstate Route H-1 between Campbell Industrial Park and the rapid-transit terminal at Pearl City, with intermediate service to Makikilo. Express buses would be operated on Interstate Route H-2 to serve Wahiawa and the Schofield Barracks area; feeder buses would extend this line to other towns beyond Wahiawa and Schofield. Two express-bus routes would serve Windward Oahu: the Central Business District—Kailua line, using the Pali Highway, and the Halawa—Kaneohe line using Interstate Route H-3. These routes would also be served by local feeder buses in Kaneohe, Kailua, and Waimanalo. The accompanying table presents some statistical information on the system.

Statistical Aspects of the Recommended 1985 Mass-Transit System

Item	Magnitude
Mileage	
Fixed Route	
Grade Separated	26
Subway	3
Flexible Route (bus)	180
Rolling Stock	
Number of Rapid-Transit Vehicles	230
Number of Buses	197
Daily Patronage	
Total, Mass-Transit System	363,100
Percent of Total Mass-Transit System with Respect to Total Person Trips	13
Total Capital Cost ($)	278,876,000
Annual Operating Cost ($)	22,668,000
Annual Passenger Revenue ($)	24,726,000

Statistical Aspects of the 1985 Recommended Highway-Freeway Plan

Item	Magnitude
Street Mileage	
Freeways and Expressways	67
Major Highways, Streets, and Collectors	476
Daily Vehicle Travel (miles)	
Freeways	2,894,300
Expressways	427,000
Arterials	5,117,000
Average Estimated Speed (mph)	
Freeways	43.7
Expressways	27.0
Arterials	15.2
Improvement Cost between 1965 and 1985 ($)	
Total	734,295,000
Annual	67,178,000
1985 Daily User Cost ($)	1,124,000
Average Daily Cost per Vehicle Mile ($)	
Improvements, 1965-1985	0.0264
User Costs, 1985	0.1332
Combined Average Daily Improvement and User Cost per Vehicle Mile ($)	0.1596

FREEWAY AND ARTERIAL PLAN

The recommended network of freeways and arterial streets is shown on the accompanying maps, which also show the major and collector streets on which improvements would be required by the plan. The table provides a statistical summary of the recommended freeway and arterial-street plan.

The Federal Interstate Highway network—H-1, H-2, and H-3—which is considered committed in this plan development, provides the foundation on which the freeway system was developed. Adequate freeway service to the Leeward, Schofield, and Windward areas can be provided by these existing or committed freeway networks. The portion of Interstate Route H-1 between Middle Street and Aina Koa will be the most critical traffic-volume section in the committed network.

The most urgent need for freeway service was established by forecast volumes on east-west major streets in the makai corridor between Middle Street and Kapahulu Avenue. The Study recommends that this makai facility be built at grade level and not as an elevated structure; this route would include two tunnels, under the two entrances to Honolulu Harbor, and a surface crossing of Sand Island. This arrangement in this area permits unobstructed vistas from the Civic Center and the Central Business District to the harbor and provides service to a more diversified area, a detour when Nimitz Highway is upgraded, and a fast and scenic route for tourist movement between Waikiki and the airport.

The north-south circumferential connectors between Interstate Route H-1 and Nimitz Highway along Liliha and South Streets are basic requirements for the recommended extensions of the existing freeway network. The provision of the north-south service is vital to permit the circulation of local traffic in the contemplated development plans of the Civic Center and the Central Business District.

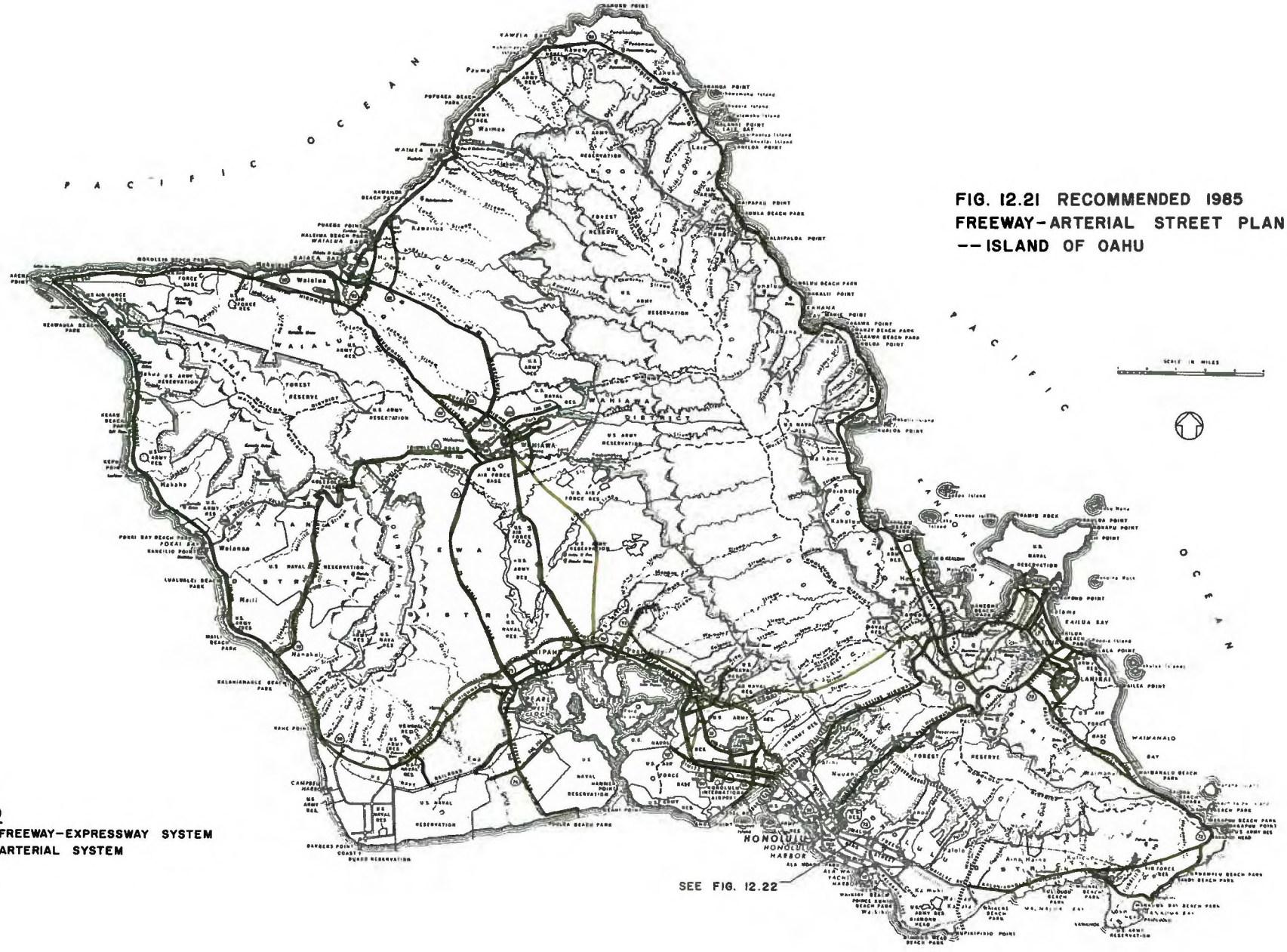


FIG. 12.21 RECOMMENDED 1985 FREEWAY–ARTERIAL STREET PLAN --ISLAND OF OAHU

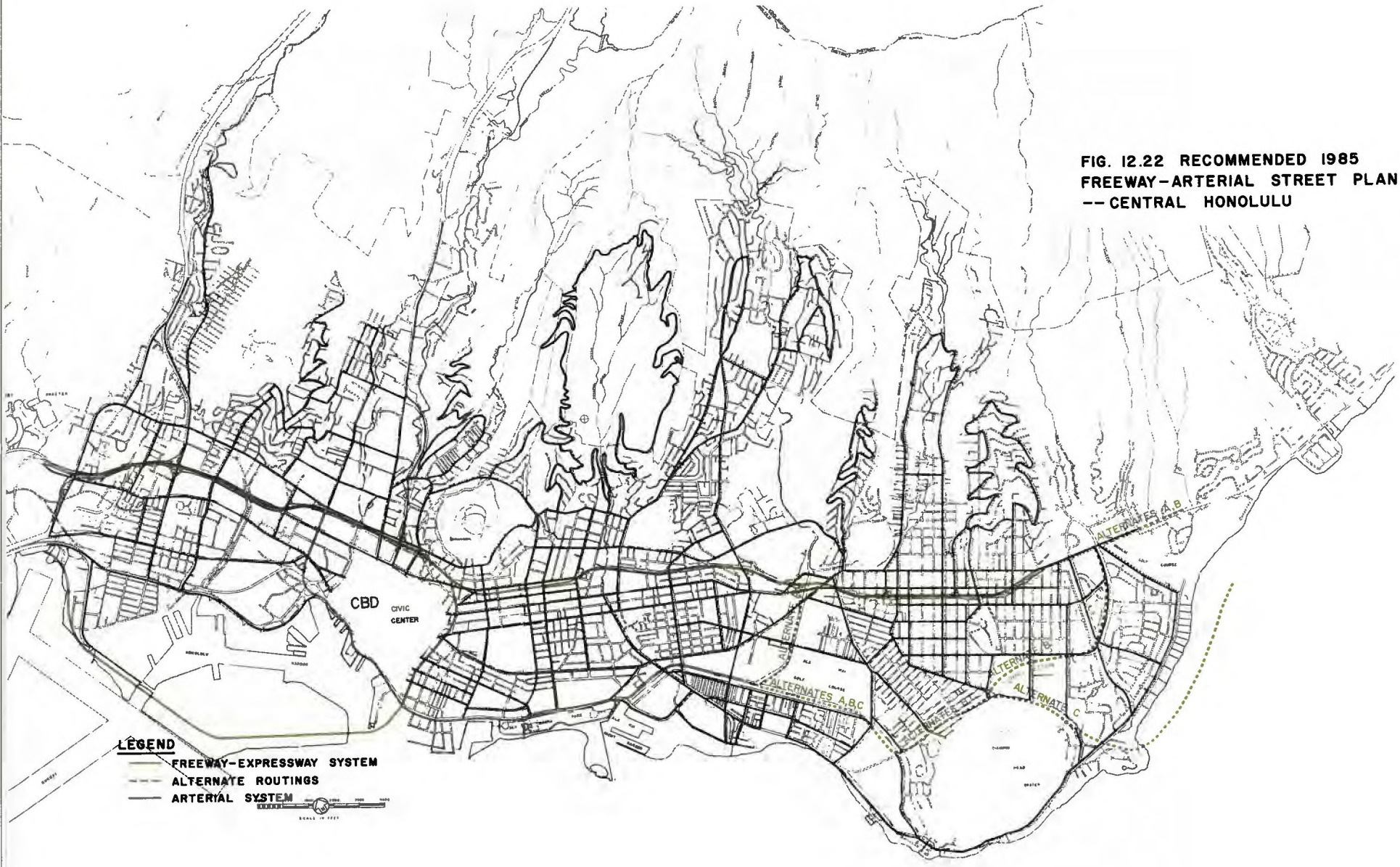


FIG. 12.22 RECOMMENDED 1985 FREEWAY-ARTERIAL STREET PLAN -- CENTRAL HONOLULU

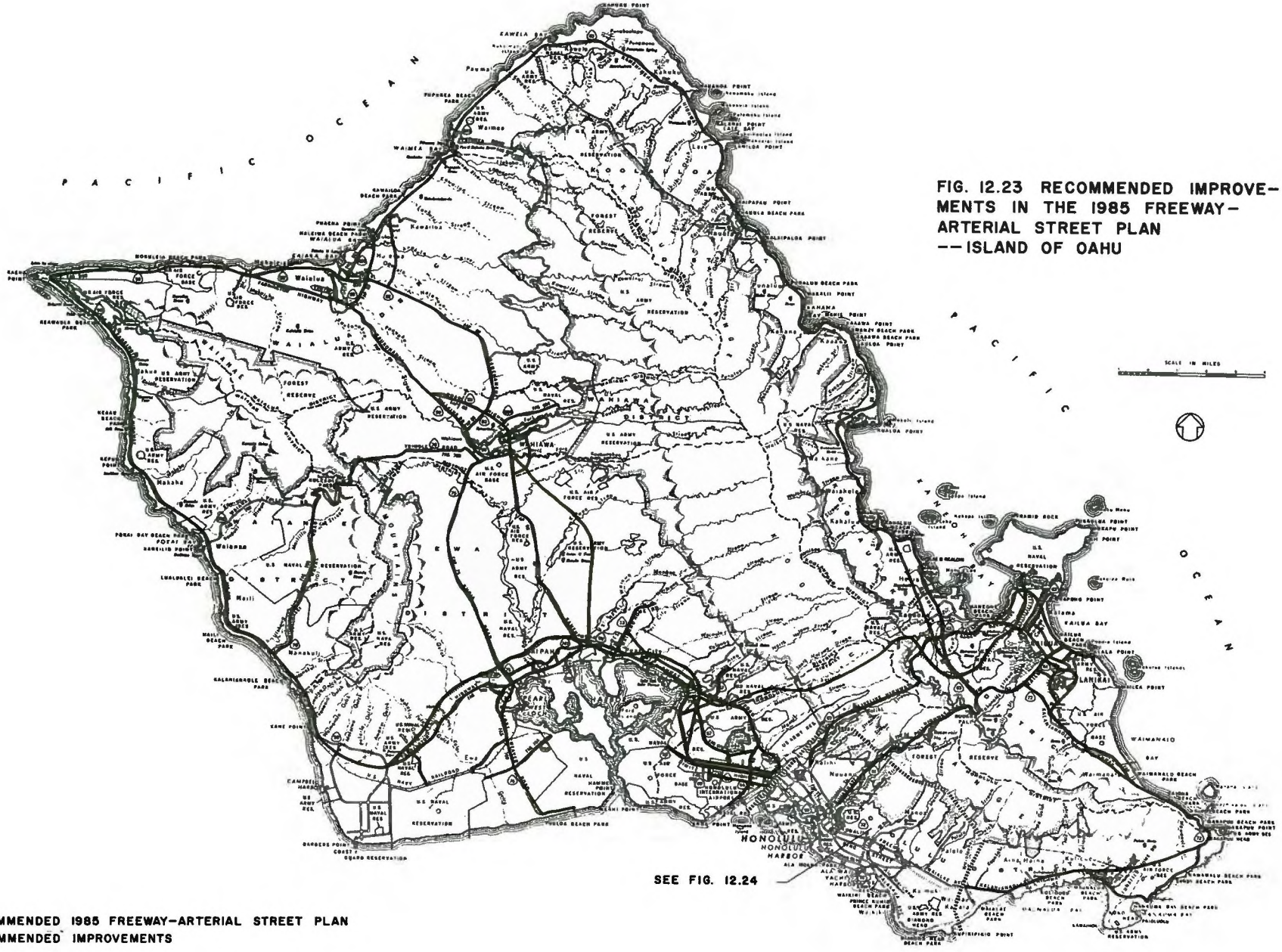


FIG. 12.23 RECOMMENDED IMPROVEMENTS IN THE 1985 FREEWAY-ARTERIAL STREET PLAN --ISLAND OF OAHU

LEGEND

- RECOMMENDED 1985 FREEWAY-ARTERIAL STREET PLAN
- RECOMMENDED IMPROVEMENTS

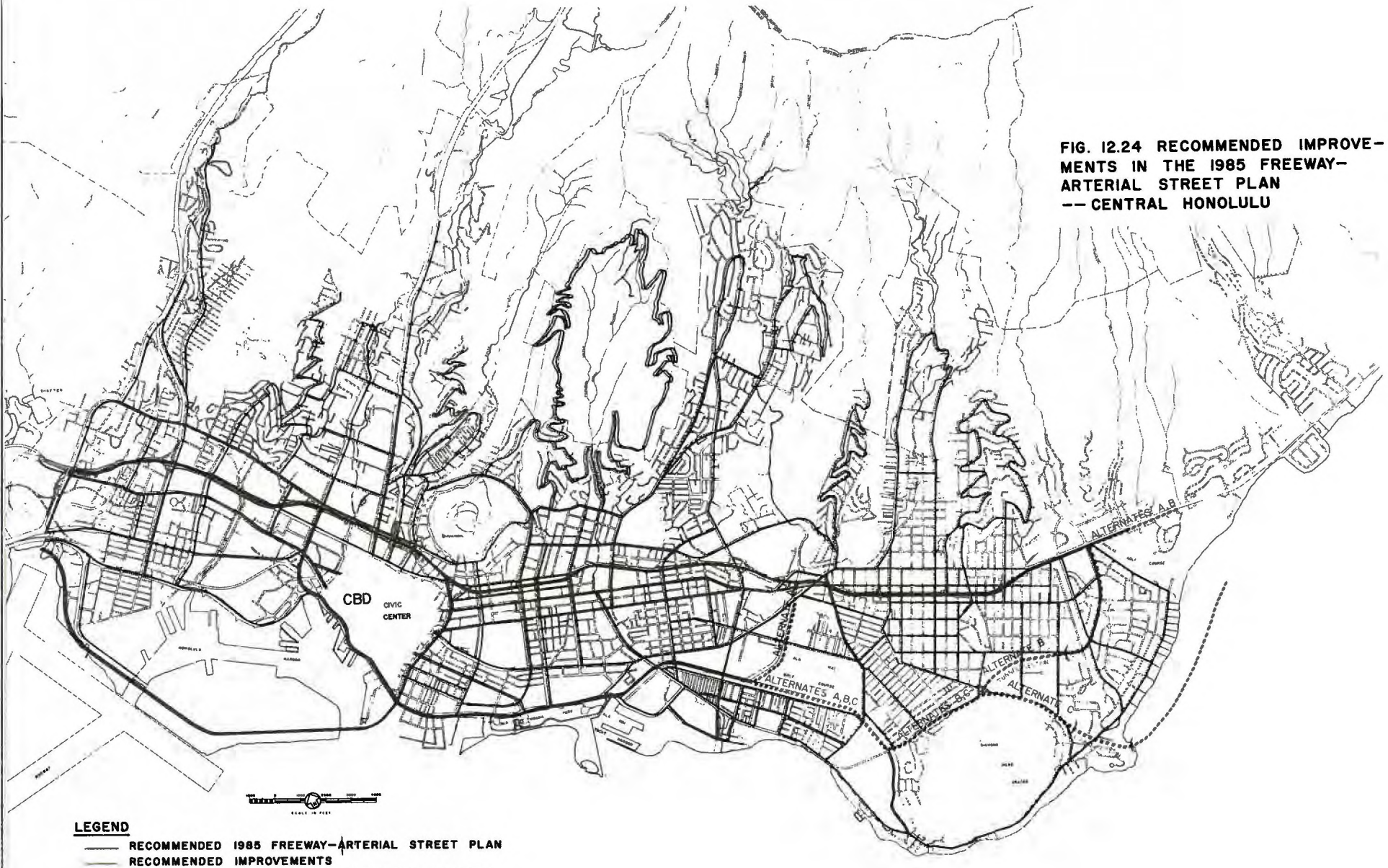
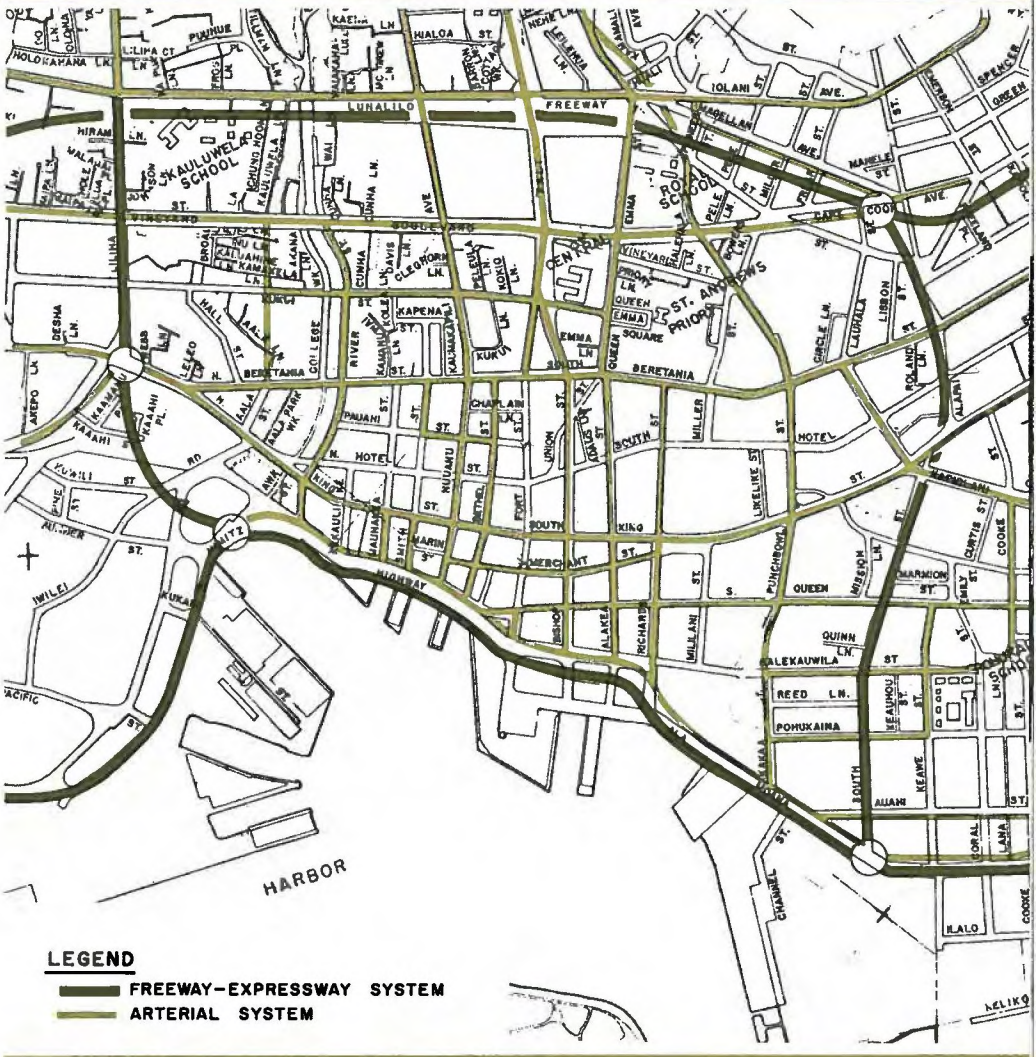


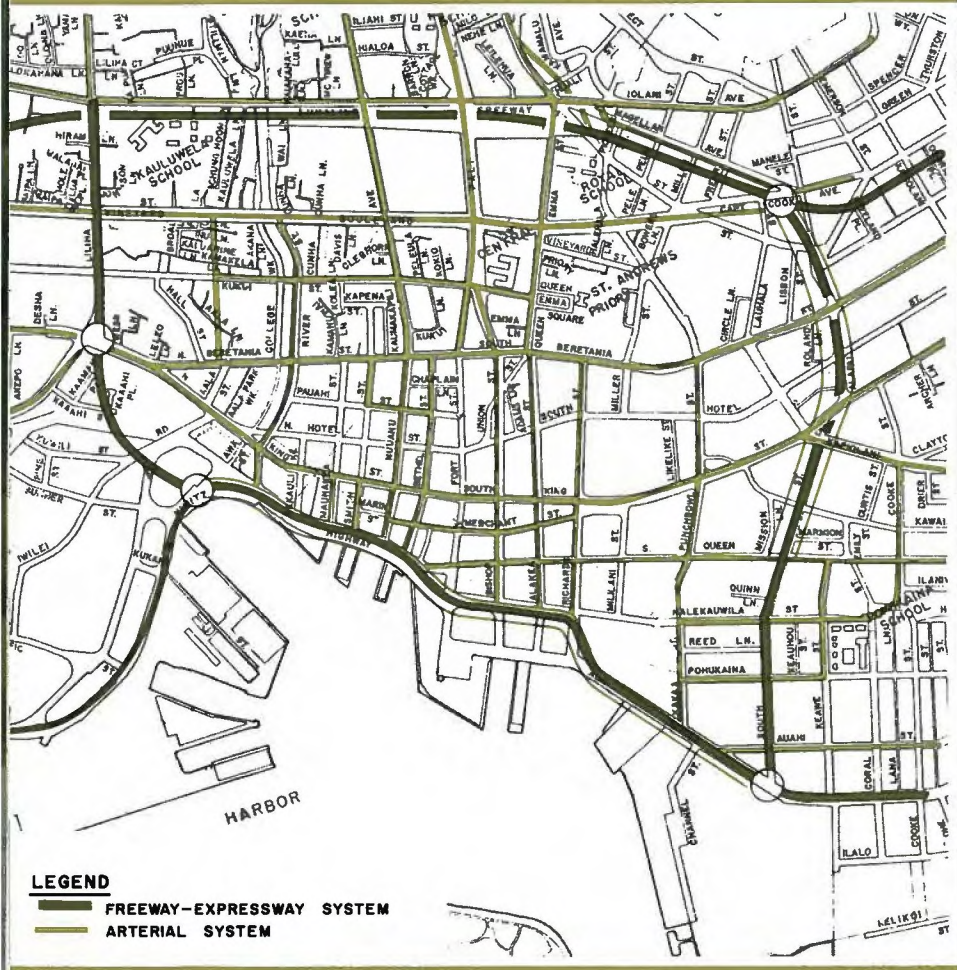
FIG. 12.24 RECOMMENDED IMPROVEMENTS IN THE 1985 FREEWAY-ARTERIAL STREET PLAN -- CENTRAL HONOLULU

Three alternate plans, each providing a circumferential freeway-expressway route around the Central Business District—Civic Center complex, were evaluated for effectiveness, capacity, safety, esthetics, and cost. As shown on the maps, all three cover essentially the same routes, the only differences being in the makai and Diamond Head portions, on which elevated, parallel, or subway sections were provided to test the effect of the enlarged capacities available thereby without having to increase right-of-way width.

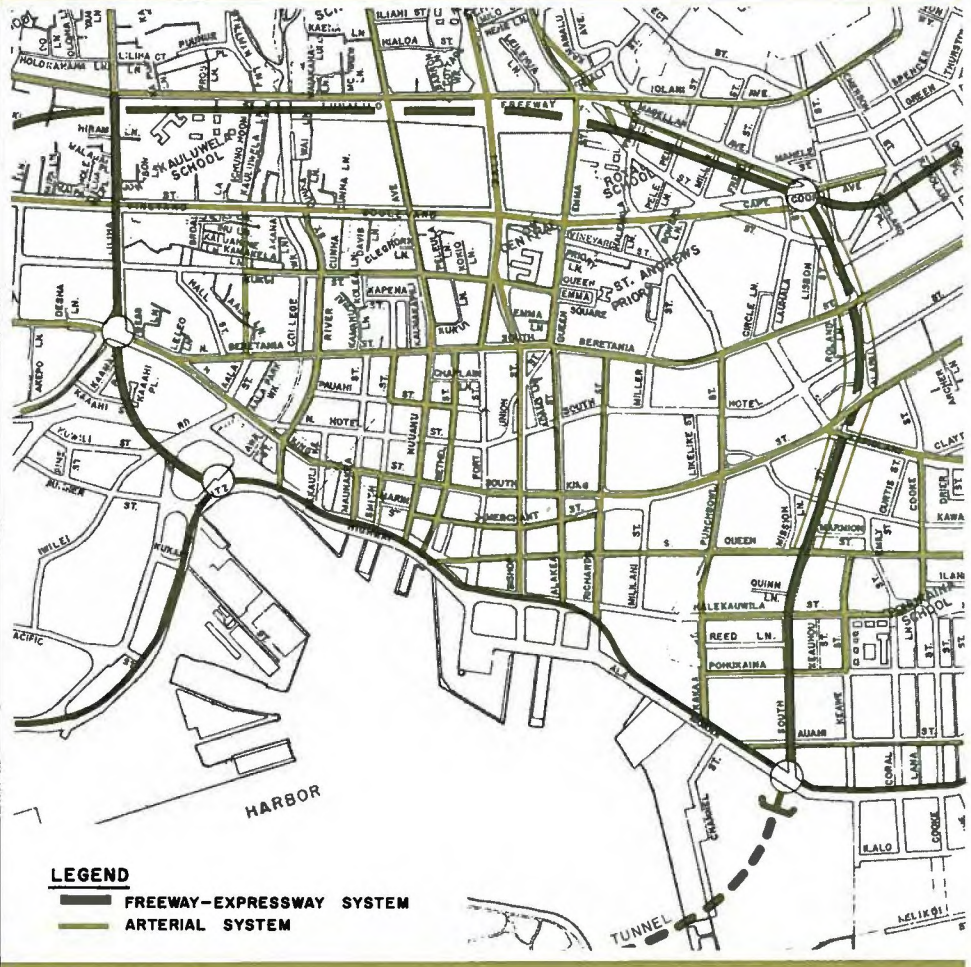
Tests and evaluations indicated that Plan 1.1 is the most efficient of the three circumferential systems, although each is generally adequate in serving the Central Business District and the Civic Center.



PLAN 1.1



PLAN 1.2



PLAN 1.3

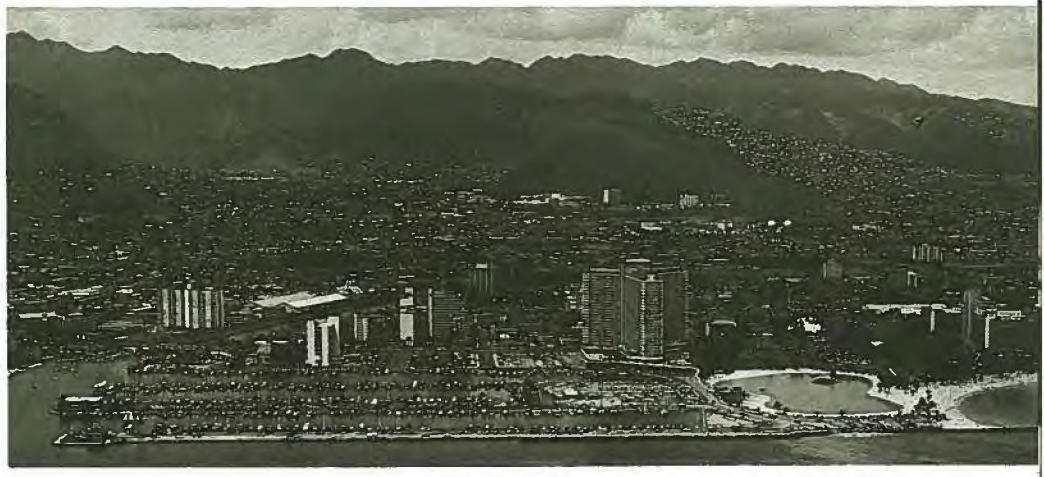
MAKAI FACILITY

The alignment of the makai facility along the Ala Wai Canal is considered vital to protect the social and economic integrity of Waikiki. Tests indicate that the provision of this facility successfully removed through-traffic from this area.

Forecasts of volumes on Kalanianaole Highway establish that rapid-transit and roadway capacities equivalent to 12 lanes would be required to satisfy the 1985 travel demands for this corridor. The terrain of this route presents major construction and expansion difficulties. There are alternate solutions for providing added roadway capacity:

1. An off-shore reef highway along the shore of Maunalua Bay, together with a six-lane Kalanianaole Highway facility.
2. A viaduct with a maximum of six lanes, and six lanes on the road below it, to follow the present route of Kalanianaole Highway. This would be combined with an upgrading of Interstate Route H-1 between Aina Koa and Kapiolani Interchange. A major connecting highway link would be built between Interstate Route H-1 and the makai facility, following the alignment of the Manoa-Palolo drainage canal.
3. Instead of upgrading that section of H-1 and the Manoa-Palolo drainage-canal route, a link could be made by having the makai facility extend along Kilauea Avenue, into H-1.

A variety of special studies—such as inshore and reef ecology—would be required before an alignment can be recommended for this East Honolulu area. Thus the solutions to the problems of this area are subject to further engineering study.



PROBLEMS IN FUNDING THE RECOMMENDED PLAN

One of the more critical factors influencing programs to implement an urban-transportation-system plan is the availability of adequate financial resources.

The plan must be coordinated with planning in the other sectors of public responsibility, because other competing public facilities—such as schools, water, sanitation, and parks—are also essential and are also financed with public funds.

The construction of a transit system of the type recommended in this report requires a strong public commitment to transit for public projects, and debt limits may be strained in the process. Borrowing funds needed for the system takes careful planning and consideration of priorities but appears possible with close cooperation between the State and Honolulu.

General Obligation Bonds are the least expensive and most flexible financing method available and offer promise for the mass-transit plan. The City and County of Honolulu, however, has a constitutional debt limit of 10 percent of net taxable assessed valuation, with new debt incurred in any one year limited to 2 percent. On the basis of recommendations of a Financial Advisory Committee appointed by the Mayor, Honolulu attempts, by policy, to limit its bonded debt to 5 percent of the market value of net real-property taxable valuations.

Prior studies have concluded that property-tax rates in Hawaii are comparatively low with respect to the remainder of the United States, and the City and County financing of transit may require increasing the real-property tax rates.

Under the present revenue structure, the future balances in the State Highway Fund appear insufficient to meet the Capital Improvements Program in the Interstate and regular Federal-Aid highway programs. Past legislatures have recognized this fact and have made direct appropriations, which in effect replenished the State Highway Fund and thus provided matching funds for the Federal-Aid highway programs.

CONCLUSIONS

The results of this Study show that both highway improvements and improved rapid-transit system will be required by 1985; that rapid-transit can attract large numbers of passengers and that an improved rapid-transit system can influence the requirements for highway capacity. The Study staff therefore recommends that a rapid-transit system be adopted in all long-range transportation plans for Oahu but that, in the meantime, a short-range interim program be initiated for the purpose of improving and expanding the present bus system to prepare for integration into the express and feeder systems when the fixed facility is available.

Mass transit on Oahu should be financed, constructed, and operated by existing governments. The Fourth State Legislature enacted enabling legislation that became law on June 13, 1967, permitting the City and County of Honolulu to move forward with confidence to establish by phase development a balanced mass-transportation system for Oahu. The City and County of Honolulu therefore now assumes principal responsibility for mass transit because its geographic limits encompass the transit-service area, because transit is so closely related to other functions and services for which Honolulu is responsible, and because Honolulu is financially and organizationally well equipped for the task.

The Study shows the need for high-capacity roadways in the east-west direction of Central Honolulu, even with an improved integrated mass transit system. The Study staff believes that providing *full* capacity roadways for a high level of service in 1985 would not meet with general public acceptance. A balance would have to be established among level of service, land uses, community values, and costs. The Study staff believes that a decision to provide a strong network of major and collector street improvements would be acceptable.

A long-range transportation plan, based on the results of the present Study and continuing the collection of data and refining of the information, would provide more precise answers. The increments of action on the plan should be related to stages of economic growth and urban development, which can vary under the influence of many factors over time, so that all the projections and forecasts are subject to continuing reassessment.