CITY COUNCIL
CITY AND COUNTY OF HONOLULU

AN ASSESSMENT OF TWO MASS TRANSIT ALTERNATIVES FOR HONOLULU

Prepared for:

Mrs. Marilyn Bornhorst, Chairman

April, 1977

ARTHUR YOUNG & COMPANY

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FOREWORD

This document was prepared under contract to the City Council. Its objective is to portray the expected results of 1) constructing the proposed Rapid Transit System which is to consist of a 14-mile "fixed guideway" segment and a fleet of supporting or "feeder" buses or 2) continuing to rely on buses that use the existing highways and streets in a conventional manner as objectively as possible.

The reader should know from the start that the two alternatives, as defined for this study, have greatly different capacities to transport people. The 14-mile fixed guideway alternative would be able to meet demand for transit to 1995 and beyond. An expanded bus system would not even be able to meet the 1985 demand, primarily because existing streets will limit the practical maximum size of the bus fleet and, hence, the capacity of the system. The different capacities of the alternatives are reflected in many of the different impacts we have identified for the two systems. Despite their different capacities, these transit alternatives pose two reasonable policy choices for the City which have not been analyzed thus far - that is, essentially a choice between a major new investment and a continuation of the current approach to providing public transportation.

In line with Council's original objective, we have attempted to portray the expected results in such a fashion as to make them as meaningful as possible to the individual citizen. To minimize the complexity of the report we have included much of the technical data in appendices and summarized the anticipated impacts in the main body of the attached report. We have also prepared a more popularized summary of this titled, "Mass Transit for Honolulu? A 1995 Balance Sheet for Two Alternatives."

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We wish to emphasize that this report is concerned with identifying the probable impacts or effects of the two alternatives and not the "benefits," as the definition of benefits is relative and subjective and is dependent on an individual's societal values.

We recognize that the question of whether or not Honolulu needs a Rapid Transit System is a highly charged emotional and political issue. In this climate, no document can provide definitive answers to the abundance of issues that exist. Any statement about the comparable impacts of various alternatives is likely to draw both criticism and praise from various segments of the community.

In line with Council's objective, we have strived to make our analysis objective and impartial based upon the available information, not in the hope of making final and conclusive statements about the alternatives, but rather to provide a new forum or focal point for continued community discussion of this important issue. Consistent with this objective, we have compiled the various comments we received on an earlier draft of this study from members of our Advisory Committee and others. These comments are in Appendix D.

Finally, there are several points or issues that the reader should keep in mind when reviewing this report. First, all data regarding the 14-mile Fixed Guideway alternative, including design, routing and ridership of the system, are taken from the City's PEEP II study. While the City is still proceeding according to the recommendations in PEEP II, the proposal remains preliminary in nature and subject to change. Any changes in the design of the system, particularly in the areas of routing and demand forecasts, would necessarily affect the impacts identified in this study.

A second caution is in order with respect to operating and maintenance "deficits" of the two systems and how these are interpreted by the reader. Neither alternative will generate sufficient revenues to cover its operating costs and thus will

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operate with "deficits." Since these amounts have been predicted, we have used them for comparative purposes. However, to use deficits alone as a major yardstick to weigh the alternatives rests on the assumption that a transportation system should pay its own way. In the view of many, public mass transportation should be considered a public service, much as education, and police or fire protection. In this context, operating deficits have no meaning.

The fact is that public transit will pay part of its way through fare revenues. Thus, it may be useful to weigh, as a question of public policy, the likely deficit that a transit alternative will incur against the need for government to provide a certain level of transportation service.

Finally, we wish to thank those individuals who participated in the study's Advisory Committee for their time and many helpful suggestions. It should be clearly recognized, however, that the analyses and findings herein are those of the Arthur Young & Company team and not those of the Advisory Committee or City Council.

Arthur Young & Company

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I. INTRODUCTION

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2. Background of This Analysis
3. Scope and Objectives of This Analysis
4. Analytical Approach and Assumptions
5. Description of The Alternatives
6. Organization of This Report

I. INTRODUCTION

1. A BRIEF HISTORY OF MASS TRANSIT IN HONOLULU

As early as 1963, the City and County of Honolulu recognized that rapid urbanization was creating a need for an integrated transportation system which would be more efficient than total dependence upon the automobile. Planning to meet this need was actually started when the Oahu Transportation Study (OTS) was undertaken that same year. Subsequent studies have been made up to the present time.

The initial study, OTS, was funded jointly by Federal, State and City agencies and closely examined future patterns of growth in population, employment, and land use. Projections made during the course of the study established the need for improved transit capability by the 1980s to meet increasing pressures of congestion, pollution, and general mobility. The study concluded that alternatives to expanded highway construction must be found and recommended that the long-term development of a "rapid transit system," augmented by expansion of the then existing bus systems, be made. The study suggested that the rapid transit system be routed through the urban core from Pearl City to Hawaii Kai, with an expanded bus system serving the whole island.

The development of a short-range, interim plan for improving the existing bus systems was also recommended by the Oahu Transportation Study. The City of Honolulu conducted further study of the bus systems in 1971 and concluded that various privately-owned lines should be integrated under City ownership. This was done and the present bus system, "The Bus," came into existence.

Subsequent preliminary engineering and evaluation studies, such as PEEP I and PEEP II, used regional travel and modal split models confirmed the OTS findings and thus provided additional

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support to development of a rapid transit system. Extensive analysis and evaluation of system design alternatives yielded quantities of data on service, needs, partronage, modal preferences, and cost for comparison purposes. The result of PEEP II indicated that a rapid transit system consisting of a fixed guideway component and a fleet of "feeder" or supporting buses was the optimum method for meeting Honolulu's requirements, considering all cost and user-related factors.

The major recommendation of the 1971-1972 PEEP I study was to construct a 22-mile rapid transit system to provide a means of moving people through the Pearl City-Hawaii Kai core. In early 1973, as a supplement to this study, the State and City jointly funded a second study, which evaluated a modified personalized rapid transit system and a system of busways as alternatives to the previously recommended fixed guideway system. When that study concluded that either of these alternatives would be more expensive than the fixed guideway system, the State and City agreed to proceed with the PEEP II study.

The primary objective of PEEP II was to develop a preliminary engineering design for the rapid transit system, in preparation for system implementation. In reality, PEEP II was a continuation of the prior studies which defined the basic system concept.

Work conducted by PEEP II included:

- Reevaluation of the rapid transit route and station locations
- Establishment of detailed route alignments and station locations
- Preliminary design analysis of system facilities and equipment

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- Preparation of detailed preliminary engineering plans and drawings
- Development of physical design criteria
- Preparation of physical and performance criteria for transit vehicles and supporting operating systems
- Development of detailed patronage estimates
- Establishment of rights-of-way for defining property acquisitions
- Preparation of final design, construction and implementation schedules
- Preparation of detailed cost estimates for construction and procurement of system facilities, including right-of-way and relocation costs and annual operating and maintenance costs
- Financial analysis
- A management study of the implementing organization
- A relocation planning study
- Preparation of General Plan amendment documents
- Preparation of a Draft Environmental Impact Statement

2. BACKGROUND OF THIS ANALYSIS

The data resulting from the prior studies (OTS, PEEP I and PEEP II) were sufficient in technical scope and depth to support general endorsement of the concept of a rapid transit system by the City Council and the State legislature for preliminary Federal grant application purposes. Some concern, though, was shown by local community leaders and the City Council regarding the more indirect social and economic impacts of the rapid transit undertaking. Since the project would be the largest of Hawaii's public works endeavors to date, it was felt that all possible information comparing the relative social and economic impact of the rapid transit system and a conventional bus system should

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be brought to the attention of interested parties and considered before making a decision whether to retain the conventional bus system or to construct the rapid transit system.

With help from concerned community groups, the City Council, in conjunction with the Department of Transportation Services, defined the scope of work and products to be delivered by such an analysis. The scope of work emphasized the development of cost and impact data that would be well-understood by many components of the community such as labor, business, government, and individual residents. The information contained in this report is designed to provide the various sectors of the community with estimates of the economic and social impacts of the two basic transit system alternatives available to the community.

3. SCOPE AND OBJECTIVES OF THIS ANALYSIS

This analysis was initiated to explain the potential economic and social results or impacts of two transit system alternatives (e.g., the proposed rapid transit system consisting of a 14-mile fixed guideway and a supporting bus fleet and an expanded bus system that would use the existing roadway system) on individual citizens and the community-at-large. The analysis was to build upon the extensive prior work to identify and describe, in terms meaningful to the layman, the comparative advantages and disadvantages of the two alternatives.

The results of this analysis were to describe illustratively the anticipated impacts or effects of implementing the alternatives on various community groups. This approach was taken as a direct result of a desire by City Council to develop a document that would 1) summarize data on the prior analyses regarding the probable effects of the alternatives, 2) expand that data to

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reflect the probable impacts on other important segments of the community, and 3) present all of the data in as meaningful a fashion as possible. Thus, this analysis was not to be a conventional "cost benefit" analysis in which the result is a single cost/benefit ratio that, in theory, reflects the relative desirability of each alternative. Rather, the result was to be a document that would provide a basis for understanding, on a personal basis, the effects of constructing the rapid transit system or retaining the conventional bus system as Oahu's mass transit system. Thus, this study was intended to provide an understanding to a wide range of citizens.

To provide a framework for the ayalysis, several major segments of the community were selected as key interest groups that have major concerns and for which specific impacts are anticipated. The selected groups included: business, labor, individual residents and their families, and the State and County governments. In addition, other anticipated community-wide impacts related to the environment, residential housing growth and location, and land use were to be addressed.

4. ANALYTICAL APPROACH AND ASSUMPTIONS

This evaluation's unique requirement to compare various transit proposals in a nontechnical fashion, while incorporating both quantifiable and nonquantifiable data, required the development of an equally unique analytical approach. This section describes that approach, discusses the underlying assumptions, and describes the methods of analysis used.

(1) Approach

After reviewing similar studies performed for other transit systems around the country, it was determined that a traditional method of analysis, using the cost/benefit ratio approach common to engineering and financial analysis, was not satisfactory for this socio-economic impact study. Use of the cost/benefit ratio approach

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requires the quantification of all future costs and benefits in dollar terms and restricts the analysis to only those areas of impact which lend themselves to quantification and assignment of a dollar value. This inherent limitation precludes equivalent treatment of many subjective aspects of the impacts from transit systems on life styles and the future quality of life. Information on these impacts can be even more meaningful to the local resident in deciding his or her individual preferences, even though arbitrary dollar values cannot be assigned.

In addition, under the cost/benefit ratio approach, a single dollar value is assigned to each transit impact. This, therefore, assumes that all sectors of the community share common views as to the real costs and benefits of each anticipated impact. This necessary assumption becomes a disqualifying factor for the cost/benefit ratio approach due to the diverse nature of local community values and the overriding requirement to present study findings in terms that are meaningful to the average citizen, as well as to informed decision-makers.

The approach chosen and utilized in this study focuses on analyzing and presenting potential impacts of the two basic transit proposals within the perception of the individual resident's transportation requirements, life style, economic background and to the extent practical, social condition. Individual residents are represented in the study as groups each having individuals with common interests, life styles and requirements. In some cases, representative resident locations were also identified during the analysis of certain impacts to make the presentation of travel data more vivid and meaningful to the various resident groups.

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Of necessity, this presentation of findings does not attempt to make independent value judgments regarding the potential cost or benefit of any individual impact. Rather each impact is analyzed and portrayed objectively as it may actually be realized in the future by each citizen and each decision-maker. Information about the potential future impacts enables the reader to assign values to each impact within the context of his or her individual social and economic situation based upon a description of real life situation and cost. In other words, Honolulu residents who must eventually live and work within the resulting transportation environment, and bear the costs created by either proposal, have meaningful information which enables them to become their own informed evaluators.

(2) Assumptions

In order to perform the analysis, certain assumptions regarding the future were necessary. These assumptions attempted to define the parameters within which community decisions regarding such things as housing and employment decisions would be made by individuals in the future. The assumptions for this study are essential to a full understanding of the findings and are presented as follows:

- Expanded Street and Highway Facilities

  Every indication is that major expansions of the street and highway facilities serving urban Honolulu are not possible by virtue of the limited space available in the corridor linking Pearl Harbor and Hawaii Kai. Therefore, this consideration has been incorporated into the study by assuming that existing street and highway capacities will remain constant through the study period of 1995.

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- Peak Period Traffic Congestion

Observations of critical highway and street screenlines in the urban Honolulu corridor indicate that maximum automobile congestion volumes have already been attained in the peak period and that the addition of new traffic in the future will only have the effect of lengthening the period of peak congestion (i.e. those morning and afternoon periods when traffic volumes are highest). Therefore, it is assumed that in the future, total automobile travel times will not lengthen for those traveling during the current peak period but rather residents choosing to use automobiles for future home/work commuting and desiring to avoid peak traffic will be forced to begin their daily commute trips at increasingly earlier times in order to arrive at work by the start of the regular business day.

- Staggered Work Hours

For study purposes it was assumed that the community as a whole would retain the current work schedule of normal start and stop times without major modifications in the future. This assumption precludes the option of significantly staggering work hours--a frequently proposed solution to current traffic congestion problems. It was felt for this analysis that traditional work and travel habits would prevail in the future and that other options would be rejected by individuals and businesses before major changes could be economically and potentially implemented.

- Land Use

Based upon our review of land use and land use planning in other jurisdictions, it is assumed that future changes in land use will be based upon local zoning decisions and will not be primarily a function of the transportation facilities available. It is recognized that the lack of efficient transportation can create pressures for changes in land use in order to keep total travel times at a "socially acceptable" level, but in the final analysis the construction of residential and industrial facilities will be in accordance with the zoning decisions made under the overall guidance of master plans developed and accepted after consideration of all social and economic factors.

- Conventional Bus Capacities and Speeds

The original study specifications called for an analysis of a conventional bus system using existing city streets as the transit alternative to be compared to the rapid transit system consisting of high-speed vehicles operating on a grade-separated fixed guideway supported by a fleet of "feeder buses." Therefore, it

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is assumed that no modifications will be made to current street and highway traffic systems in the urban area which would significantly reduce existing capacity to accommodate automobile traffic for the benefit of transit vehicles. This assumption is consistent with current city planning but it imposes an inherent limitation on the volume and speed, and hence total passenger carrying capacity, of future bus systems as a result of the physical constraints to unlimited expansion dictated by the roadway size and traffic movement. It is recognized, though beyond the scope of this study, other alternatives may be considered which, among others include dedicating existing automobile traffic lanes to bus use or providing exclusive grade-separated busways.

Other assumptions of lesser technical importance have been made and are identified as appropriate throughout the report.

(3) Methodologies Employed

In performing this study under the approach already described, traditional methodologies of data collection and analysis were utilized to develop and present the findings. These methodologies are as follows:

. Data Collection

- Acceptance of existing data

  To reduce study costs, existing transit data was used extensively. This data was reviewed and accepted for use in study analysis if nothing came to our attention that indicated it was invalid.

- Surveys and Interviews

  Limited surveys were conducted through direct interview among various sectors of the community on a sampling basis. Due to budgetary and time constraints, the surveys were not sufficiently extensive to be statistically valid. Information derived from these surveys of community representatives is periodically cited as being indicative of the individual concerns or opinions which were observed.

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- Forecasts, Projections and Estimates

All forecasts and projections of future population growth, transit ridership, capital and operating costs, and guideway travel times are those of the City and County of Honolulu as published in the PEEP II studies and reports prepared by the City's engineering consultant, Daniel Mann Johnson and Mendenhall. We have accepted these forecasts and projections for this study, as we have other data provided by City and State officials, unless something came to our attention to indicate that the data was invalid.

- Data Analysis

  - Bus Travel Times

    Inasmuch as a comprehensive analysis of bus travel times between major locations throughout the urban corridor did not exist, travel times using existing bus facilities were derived from current bus schedules. To more adequately portray total travel times, additional time was added consistently to each scheduled time enroute to compensate for total actual travel times which include access, waiting, transfer and normal traffic delay times.

- Rapid Transit (Fixed Guideway/Feeder Bus) Costs

The rapid transit capital and operating costs used in the study were extracted directly from the engineering documents provided by the City. It was observed, though, that assumptions regarding future cost inflation escalators did not apply to the same years for capital and operating base costs. This difference in methodology was overcome by discounting all costs as appropriate to present price levels. Consequently, all financial data depicted, unless otherwise indicated, is shown in current 1976 dollar terms for ease of comprehension. To the extent absolute dollar outlays must be calculated for future financing or other purposes, recalculation will be required using assumed inflation rates and the known period of construction and operation.

- Definition of Costs and Benefits

Inasmuch as common reference to the "costs and benefits" of the alternative proposals is often made relative to the findings in studies of this type, this terminology is only figuratively used throughout the

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report because definitions of benefits are relative and subjective. Consequently, no attempt has been made in either our analysis or presentation of findings to define independently an impact as a real cost or benefit for any sector of the community. Rather differential social and economic impacts have been identified, analyzed and depicted by alternative for subsequent evaluation by individual residents and decision-makers.

Recommendations and Conclusions

Inasmuch as the purpose of this study was to collect, analyze and present information for decision making purposes, conclusions as to the probable outcome of each transit decision are provided. Because of the subjective nature of the cost or value placed on each future impact, no attempt has been made to provide the City with a recommended course of action relative to implementation of either transit proposal.

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5. DESCRIPTION OF THE ALTERNATIVES

Two transit alternatives have been identified for comparative evaluation in this study. The first, the "rapid transit alternative," is the proposal now under consideration by the City and consists of a 14-mile fixed guideway for high-speed, electrically powered transit vehicles and a supporting system of feeder and express buses. This alternative is described in detail in the PEEP II Final Report (PEEP II, Doc. #17B).* The second alternative, the "conventional bus," is a moderate expansion of the City's present bus operation using existing highways and streets. There are major differences between these two alternatives with respect to their structures and facilities and their size and capacity. Both alternatives are briefly described below and their major differences noted.

(1) Basic Facilities and Structures

The proposed rapid transit system consists of 14 miles of a dual tracked guideway running from Kahala Mall to Halawa, 16 stations, and a number of regular buses operated as express and local buses to "feed in" passengers from outlying areas to the nearest station on the guideway route. Thus the feeder buses would act as extensions of the system at both ends (Kalaha Mall and Halawa) and also provide mauka/makai service between the 16 proposed stations which are to be located as follows:

- Halawa
- Pearl Harbor
- Airport
- Keehi Lagoon
- Kalihi
- Iwilei
- Fort Street
- Civic Center
- Ward Avenue
- Ala Moana
- Waikiki
- Date Street
- University
- Sixth Avenue
- Koko Head Avenue
- Kahala Mall

* References to PEEP study documents are given in this format. The specific reference is document number 17B from the PEEP II study. All PEEP II reference documents are cited in Appendix C.

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The fixed guideway structure will largely be elevated (over approximately 2/3 of the route). In areas of lower population density, mostly ewa of the airport and a short stretch in Kaimuki, the guideway will be at ground level. Portions in the Central Business District (CBD) between the Iwilei and Ala Moana stations will be underground.

The proposed guideway vehicles are rubber-tired vehicles with 36 seats and a "crush capacity" of 110 people. They will be under the computerized control of a centralized automatic Train Control System with a provision for override by an on-board train operator. This system will automatically provide train separation through centralized train surveillance and control which monitors vehicle speed and spacing. Another control system will regulate speed and vehicle stopping to provide smooth stopping at preselected points and to relieve the train operators for other duties aboard the vehicles as the need arises. Individual fare collection is planned to be handled by an automated fare collecting system utilizing magnetically encoded fare cards.

Both transit alternatives involve the operation of a large fleet of buses. The buses transfer passengers to vehicles on the 14-mile guideway structure in the rapid transit alternative. Under the conventional bus alternative, the bus fleet of some 450 vehicles constitutes the entire transit system. Both alternatives would build upon the current bus fleet, which means that each alternative would have a somewhat modernized fleet of standard buses having about 50 seats.

(2) <u>System Size, Capacity and Routing</u>

The two alternatives evaluated here have drastically different capacities to move passengers. As later chapters explain, the types of impacts of the two systems and the magnitude of the impacts in many cases relate directly to this difference in capacity. Table I. 1 compares the size and capacity and routing of the two systems in 1985 and 1995.

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TABLE I. 1

TRANSIT ALTERNATIVES BEING EVALUATED:
COMPARISON OF SIZE, PATRONAGE & ROUTING OF SYSTEMS -
1985 and 1995

	Rapid Transit		Conventional Bus	
	1985	1995	1985	1995
Number of Vehicles				
Guideway Transit Vehicles	176	264	-0-	-0-
All Buses*	363	580	450	450
Express Buses	202	349		
Local or Shuttle Buses	161	231		
Capacity of System				
(Average daily person trips)	320,100	473,300	214,300	214,300
Fixed Guideway**	206,600	306,900		
Express Bus	84,800	141,000		
Local or Shuttle Bus	260,700	386,600		
Number of Routes				
Express Bus		18		7
Local or Shuttle Bus		55		31

* Includes 10% spares
** Trip breakdown totals to more than whole system because of transfers

For purposes of this analysis, the conventional bus system was defined as a bus system that uses existing roadways. Thus the capacity of downtown streets during peak periods becomes a constraint on the size of the conventional bus fleet. The selection of a fleet of 450 buses was not an attempt to identify the optimum fleet size; rather it is a reasonable example of an effort to provide a level of service through the use of conventional buses without major changes to the roadway system.

With respect to a bus fleet of about 450 buses, the City has concluded in its PEEP II analysis that,

> "If greater numbers of buses were to be operated, it would tie up two lanes of the street (rather than just the curb lane) and thus reduce the available roadway capacity remaining for automobiles. This condition would not permit the maximum utilization of existing roadway capacity..."
> (PEEP II, Doc. #41, Chapter VII)

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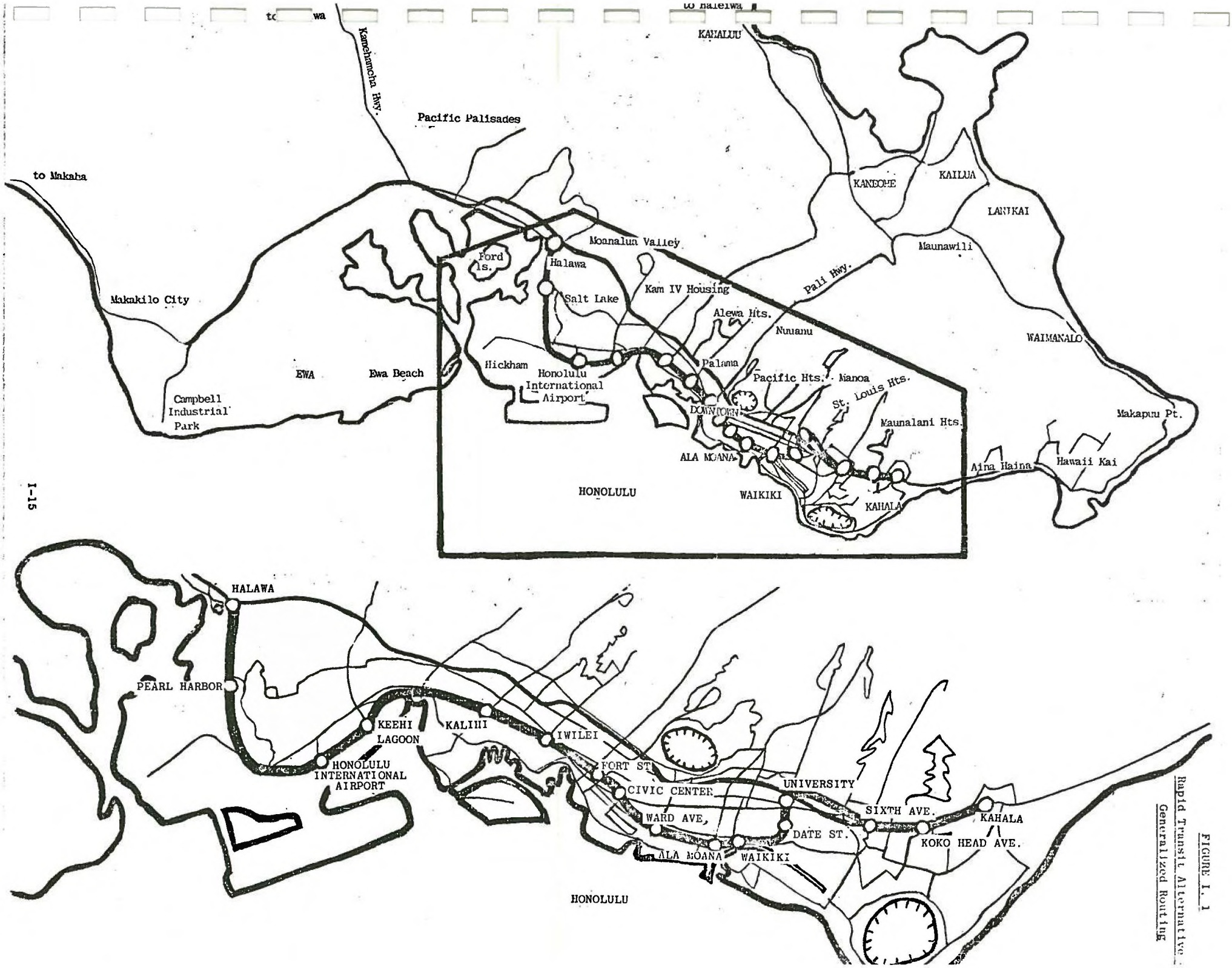

FIGURE I. 1
Rapid Transit Alternative: Generalized Routing

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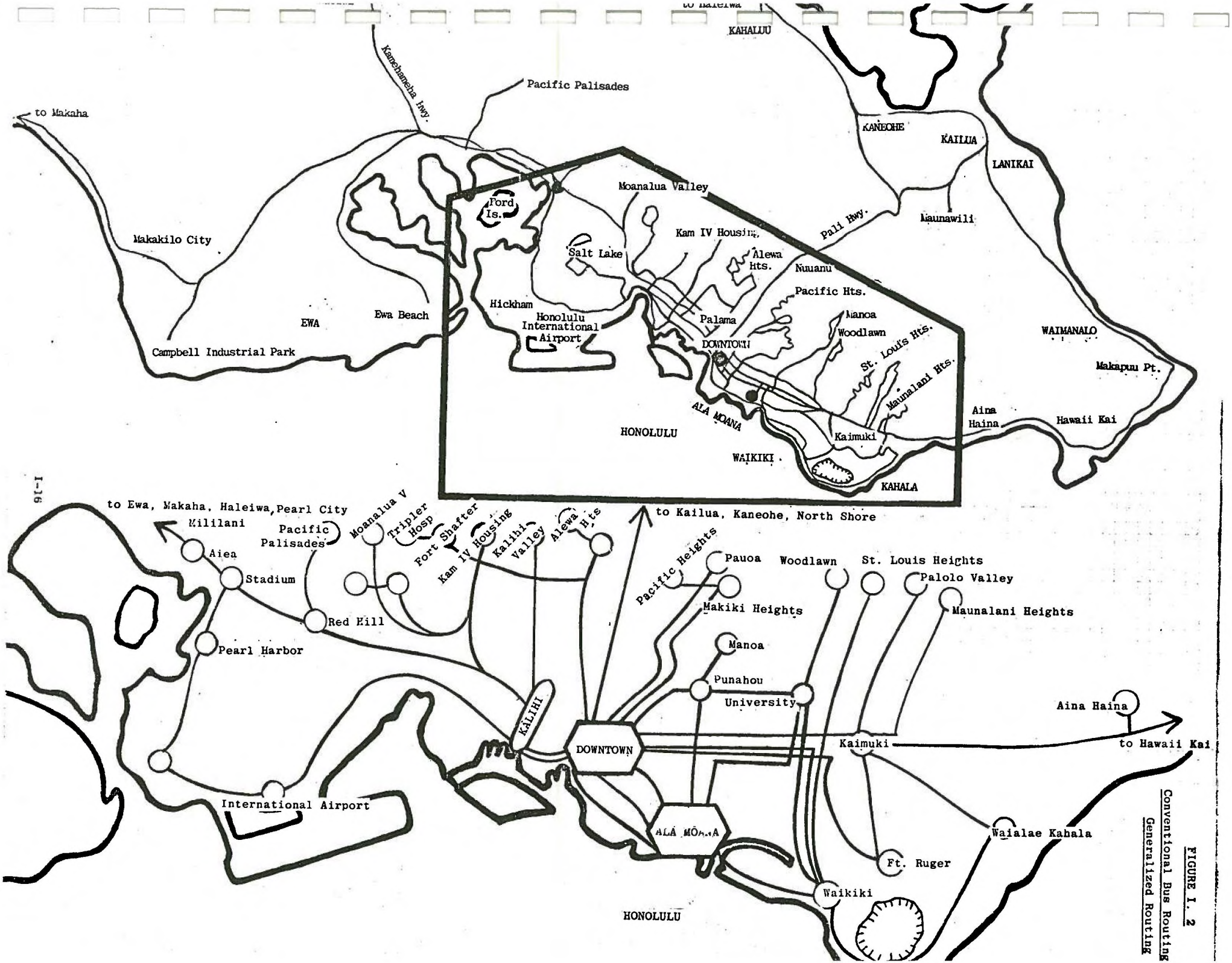

FIGURE I. 2
Conventional Bus Routing
Generalized Routing

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We have assumed that the fleet of 450 buses operating at or near congested levels in many locations before 1985 would not be able to attract appreciably greater numbers of passengers even though the demand for transit would continue to grow through 1995.

In order for buses to be used to meet future demands, i.e. provide a level of service roughly comparable to the rapid transit system, a new passage for buses through the CBD must be made available. One approach to providing this is by building a grade-separated exclusive busway through the CBD. The City has examined a busway alternative having a 7-mile exclusive, grade-separated right-of-way for buses from Kehei Lagoon to the University. About 930 buses would operate on the busway, the freeways beyond the end points, and on feeder routes. PEEP II evaluated this option unfavorably in comparison with the fixed guideway rapid transit. In comparing this alternative with the 14 mile fixed guideway with its electrically powered vehicles. however, PEEP II concluded that the busway alternative had inherent disadvantages in providing quality service, minimizing community disruptions, and reducing environmental impacts. It also has higher operating and maintenance costs per passenger than the fixed guideway. (PEEP II, Doc. #41 Chapter VII).

The general routing of the alternative transit systems is displayed in Figures I. 1 and I. 2. In constructing the conventional bus alternative, we have assumed the new buses acquired would be added to current bus routes. However, it is reasonable to expect that some of the new buses would be put on new routes to service newly developed areas.

In contrast, the rapid transit system has the ability to be expanded to meet future demands. Its ability to be expanded in total relates principally to the ability of the fixed guideway portion <u>to handle increased passenger volumes through the CBD</u>. Thus, the rapid transit system is designed to overcome the critical constraint that faces any, and all, bus systems.

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The number of transit vehicles and buses in the rapid transit alternative can be expanded as needed to keep pace with the projected increases in passengers. Thus, by 1995, there would be 580 express buses and feeder buses supporting a fleet of 264 transit vehicles on the fixed guideway.

6. ORGANIZATION OF THIS REPORT

This initial chapter has described the historical evolution of mass transit and transit planning in Honolulu. It has also described the specific objectives and scope of this study and the two alternatives considered, along with the rationale for their selection. It also summarized the methods used in the analysis and the major assumptions and limitations of the analysis.

Chapter II summarizes the findings of the analysis and presents our conclusions regarding the various impacts.

Chapter III focuses on the anticipated impacts of the two alternatives on individual Oahu residents. Consistent with the study's objectives, the results of our analysis are presented in terms of individuals and/or households. Mobility impacts are explored first, followed by quantified time savings and effects on the cost of local transportation.

Chapter IV deals with anticipated impact on business and labor. Overall economic and job impacts are presented, as are the results of a survey of downtown businesses. A description of anticipated business relocations and the disruption from the construction of the rapid transit alternative are briefly discussed. The chapter concludes with a discussion of the limited impact anticipated for the Oahu tourist industry.

Chapter V presents anticipated impacts of a broader natrue on the community as a whole. Covered in this chapter are: 1) land use implications, 2) land value changes, 3) resident displacements, 4) safety implications, 5) general environmental impacts, and 6) implications on parking requirements in the CBD.

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Chapter VI focuses on public sector impacts including: 1) construction and operating costs, 2) effects on tax revenues, 3) public lands or existing roadways to be used for transit rights-of-way, 4) accessibility to public facilities, and 5) parking requirements.

PEEP II documents cited in the text are referenced with a document number that ties to a listing of all PEEP II documents in Appendix C. Other footnotes are numbered and appear at the end of the report.

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II. SUMMARY

1. Impact on Residents
2. Impact on Business and Labor
3. Impact on the General Community
4. Government Impacts

II. SUMMARY

This chapter summarizes the differential impacts of the two transit alternatives which are examined in depth in Chapters III through VI. The intent here is to sumarize the findings in general statements with a minimum of quantification. This is done to provide the reader with a comparative review of the transit impacts and a general indication of the analyses contained in the respective chapters.

1. IMPACT ON RESIDENTS

(1) In nearly all cases the rapid transit alternative would result in time-savings over similar trips made on the conventional bus system. The rapid transit time-savings for peak period trips examined in this study generally ranged from 20% to 60% of conventional bus times.

(2) Time-savings with the rapid transit system would accrue to three groups of commuters: those diverted to rapid transit from their cars, former bus riders who continue on transit, and motorists who continue to commute by car but on less congested roads.

(3) Rapid transit would have a significantly greater capacity than the conventional bus to move people. The limited capacity of existing downtown streets will constrain the conventional bus alternative to a fleet of 450 vehicles. The rapid transit's fixed guideway structure is an additional high speed path through downtown; thus, relatively few buses would come into the downtown area. As a result, the rapid transit system could be expanded to meet travel demand through 1995, whereas the conventional bus cannot expand and would not meet the demand beyond the early 1980s. The conventional bus alternative would be able to move a maximum of

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214,300 persons per day in 1985 and thereafter. The rapid transit system could accommodate the projected demand (320,100 by 1985 and 473,300 in 1995). The rapid transit system has a capacity that is more than twice that of the conventional bus system.

(4) Rapid transit offers an overall higher level of mobility for Oahu residents. Its relative ability to meet the projected demand for travel in comparison to the bus is the most obvious impact on mobility. Accumulated time-savings, particularly for persons and families who regularly make longer trips, will also be significant. In addition, some households of commuters diverted to transit will have the former commuter auto available for daytime use. This may greatly increase the mobility of one-car households.

(5) Present households having an individual who commutes by car to work or other activities will save considerably in their total annual expenditures for transportation by switching to public transportation under the rapid transit alternative. A two-car household would save about $450 a year by switching to transit. Giving up the commuting auto altogether would mean a significant annual savings of about $1,800. Similar opportunities to use the bus are limited under the conventional bus alternative because that system lacks capacity to meet the need thus forcing people to continue to use their cars. Once the bus system reaches capacity, individuals will be forced to use their cars in peak periods, thus incurring the higher costs associated with this mode of transportation.

2. IMPACT ON BUSINESS AND LABOR

(1) Either transit alternative would bring new federal funds to Hawaii, thereby increasing the overall level of economic activity. The rapid transit option, however, with its much greater capital cost, would generate about $1.4 billion in new direct and indirect expenditures and about 12,000 man-years of employment in Hawaii. This compares with only $64 million in new expenditures with the conventional bus and only some 150 man-years of employment locally.

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(2) Construction employment on the fixed guideway structures and stations would range between 700 and 1,600 jobs in the four most intensive years of building. These potential jobs represent between 11% and 25% of the current unemployment in the local construction industry.

(3) Although more efficient, the rapid transit operation would employ a moderately larger number of persons (1,528) than would the conventional bus (1,202), but would also be transporting substantially more passengers.

(4) The rapid transit would probably result in greater reliance on the CBD as the principal business center for Honolulu than would be the case under the conventional bus. This is due to the rapid transit's ability to handle the peak period demand for getting commuters into and out of the downtown area. Selected building owners and developers and large employers in downtown, when interviewed, generally agreed the rapid transit would cause renewed expansion of the CBD.

(4) Rapid transit would cause the relocation of about 155 business establishments, primarily from present locations in the CBD and Kakaako/Ala Moana areas. These businesses tend to be small, tied closely to their present location, and on short-term leases. Over two-thirds expect to relocate rather than liquidate if the rapid transit system is built. Other small businesses along the fixed guideway route would be adversely affected temporarily, and some permanently, as pedestrian flows change during construction. The bus alternative would not require the relocation of any businesses.

(5) Neither the bus nor the rapid transit alternative, in its present proposed length and alignment, is expected to have any appreciable impact on the tourism industry.

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3. IMPACT ON THE GENERAL COMMUNITY

(1) As a moderate expansion of the existing bus system, the conventional bus proposal offers no special opportunities for achieving land use objectives beyond the opportunities currently available. Rapid transit, however, offers a major catalyst for channeling future growth according to regional land use plans if those plans and the transit system routing are consistent. Rapid transit would stimulate new development toward allowable (increased) densities around stations and create incentives for zoning changes to further increase densities in these areas. At a regional level, the rapid transit system would do more to maintain the downtown as the financial and civic center of Oahu. It would also facilitate achievement of the recent Draft General Plan proposals for long-range population levels in the Ewa, Central Oahu and Wahiawa areas, as well as the Aina Haina-Hawaii Kai area. However, it should be recognized that transportaton projects do not directly cause land use changes. Finalization of the General Plan and subsequent policy decisions by the City and the state will be the most important factors in determining eventual land use impacts under either alternative.

(2) Rapid transit would affect land values in three ways that the conventional bus system would not. First, some private land, which currently generates tax revenues, would be taken for construction, while some developable air rights over station facilities would be created. Second, land near the stations will increase in value more rapidly due to its greater accessibility. Third, land on the development fringes, remote from the facility, may increase in value more slowly than would be the case without rapid transit. It should be recognized that land value changes due to rapid transit may only be a redistribution of values rather than an absolute islandwide increase or decrease.

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(3) Some residential relocation would be required under rapid transit. A total of 162 units would be involved, primarily low-rise apartments in the McCully-Moiliili area. No residential relocation is required under the bus alternative.

(4) Transit vehicles and buses historically are safer than cars. Fewer deaths and personal injuries and less property damage due to traffic accidents can be expected with rapid transit, which would remove some cars from the road, than with the conventional bus.

(5) Rapid transit would be quieter than the conventional bus along the fixed guideway route, since a rubber-tired, electrically-powered transit vehicle generates substantially less noise than a conventional bus. Along the feeder and express bus routes, the rapid transit alternative may be somewhat noisier than the conventional bus alternative during the peak period because a higher level of service is planned.

(6) The rapid transit alternative would go further than the bus alternative in helping arrest the general trend toward worsening air quality in the urban area. This is due primarily to the fact that more drivers would be diverted from their cars to the fixed guideway-feeder bus system.

(7) Fewer new parking facilities in the CBD would be required under the rapid transit alternative. By 1995, 4,200 new stalls would be required with rapid transit in contrast to about 9,500 under the greater auto usage associated with the conventional bus. The relative demand for parking facilities under each alternative is primarily a question of land use rather than one of economics. Analysis shows that parking stalls are profitable, whether they are built and operated by the private or the public sector.

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4. GOVERNMENT IMPACTS

(1) The capital cost of the rapid transit would be much higher than the bus alternative due to the construction of guideway structures and stations. If construction were to begin in 1979, the cost of the 20% local share to each current Oahu household in present day dollars would be $24 per year for 20 years. Conventional bus transit would require only new vehicles and would cost about $1 per household per year.

(2) Rapid transit would provide a higher level of service and, therefore, would have higher annual operation and maintenance costs ($33.6 million in 1985) than the conventional bus ($31.0 million in 1985). But rapid transit would be less expensive on a per passenger basis (34.6¢/passenger as compared with 47.7¢/passenger). As ridership increases on rapid transit the operating cost per passenger would decrease.

(3) Paying for the capital cost and the subsidized portion of the operating costs of both alternatives over a 20-year period can be illustrated in terms of the potential impact on property taxes. Without considering finance charges, the conventional bus would cost $1.57 per $1,000 assessed valuation in 1985 and thereafter. Rapid transit would cost $2.30 per $1,000 in 1985 and $2.68 in 1995.

(4) Increased tax revenues would be generated from the higher land values caused by rapid transit. These higher tax revenues from development around stations, the potential leasing of air rights over stations, general appreciation of lands near stations, and including revenue losses due to land taken for construction may amount to about $2.5 million annually. However, a similar level of potential tax revenues may be foregone on lands more remote from the rapid transit line that appreciate more slowly as a result of rapid transit.

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(5) About 36 acres of publicly (primarily state) owned land would be used for the rapid transit. This land is valued at about $16 million and may be used as part of the 20% local share of the total project cost if so desired by the state.

(6) There would be differing impacts on the existing roadways. Under the conventional bus alternative, certain key intersections in downtown would reach congested levels before 1985. Downtown bus lanes, which are part of this proposal, would be at capacity with a fleet of 450 buses, and more buses could not be added to divert motorists without making major investments in roadway improvements. Increased travel after 1985 with the conventional bus alternative generally means a lengthening of the peak traffic period at congested traffic levels. The rapid transit system would be able to meet growing demand for transit, but its current alignment will convert some traffic lanes from existing roadways. The most notable among the conversions will be: 2 lanes on H-1 from Aloha Stadium to the future Elliott Street crossover near the airport and 2 lanes on H-1 from Kaimuki to the Kahala viaduct. Also, Hotel Street will be converted to a pedestrian mall; whereas under the bus alternative it will be a bus mall.

(7) Since travel times would generally be shorter on the rapid transit, residents would have slightly improved accessibility to numerous public facilities. This is likely to result in somewhat greater use of these facilities.

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III. IMPACT ON RESIDENTS

1. Travel Time and Service Differentials
2. Impact on Individual Mobility
3. Savings in Household Expenditures for Transportation

III. IMPACT ON RESIDENTS

This chapter examines the differences between the probable impacts of the rapid transit and the bus on individual residents. The types of impacts considered here are those which would affect typical individuals, families, or groups of persons with special needs, such as the elderly or youth. Those impacts which affect the community as a whole, such as changes in air and noise pollution levels, are examined the Chapter V.

Section 1 discusses time savings and service differentials between the alternative systems. Possible effects on individual mobility are suggested in Section 2. Section 3 analyzes the possibility for changes in personal expenditures for transportation under the transit alternatives.

1. TRAVEL TIME AND SERVICE DIFFERENTIALS

Travel times under the rapid transit alternative would be shorter than under the conventional bus system. These potential savings in travel time can be most readily appreciated if time saved can be related to the reasons for specific trips which individuals would routinely make. Alternatively, the total travel time savings to the community can also be determined by analyzing predictions of travel behavior in some future year with rapid transit and without rapid transit. In addition, the rapid transit system offers some distinct advantages over the bus with respect to the frequency, accessibility and speed of the service that would be available to riders to meet daily travel needs. The following paragraphs discuss these time related differences.

(1) Comparative Travel Times for Specific Trips

In nearly all cases the rapid transit alternative would provide travelers with time savings for similar trips made on the conventional bus system. Table III.1 shows comparable travel times for peak hour trips from six residential locations to selected popular destinations. Time savings on the

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TABLE III.I

COMPARATIVE TRAVEL TIMES FOR SELECTED TRIPS VIA
RAPID TRANSIT AND THE CONVENTIONAL BUS*
(Minutes)

TO \ FROM	MILILANI		HALAWA		LILIHA		MANOA		KAHALA		HAWAII KAI	
	RT	BUS	RT	BUS	RT	BUS	RT	BUS	RT	BUS	RT	BUS
UH Manoa	73	100	34	62	26	42	N/A		29	35(EB)	36	46(EB
% savings	27%		45%		38%				17%		22%	
Keehi Lagoon Park	54	68	17	25	20	55	28	65	44	79	51	78
% savings	21%		32%		64%		57%		44%		35%	
McCully Rec. Center	64	93	28	61	18	36	12	26	28	64	35	65
% savings	31%		54%		50%		54%		56%		46%	
Makua-Alii Senior Center	66	89	28	44	19	36	17	27	32	45	40	70
% savings	26%		36%		47%		37%		29%		43%	
Queen's Medical Center	65	77	28	41	19	24	21	36	37	47	45	58(EB
% savings	16%		32%		21%		42%		21%		22%	
Kaiser Hospital	64	83	35	55	26	38	20	33	36	55	43	65
% savings	23%		36%		32%		39%		35%		34%	
St. Francis Hospital	71	85	34	50	N/A		33	44	49	65	56	75
% savings	16%		32%				25%		25%		25%	
Ala Moana Center	64	83	26	51	26	36	25	32	32	54	38	65
% savings	23%		49%		28%		22%		41%		42%	
Kahala Mall	87	106	50	72	41	42	29	35	N/A		39	40
% savings	18%		31%		2%		17%				3%	
Aloha Stadium	47	52	N/A		26	66	34	66	50	89	57	97
% savings	10%				61%		48%		44%		41%	
State Library	62	77	25	42	16	24	18	36	34	43	42	57.5
% savings	19%		40%		33%		50%		21%		27%	
Airport	54	68	17	25	18	40	28	65	44	79	51	78
% savings	21%		32%		55%		57%		44%		35%	
Pearl Harbor/Hickam	60	57	23	24	33	68	40	77	56	89	64	95
% savings	(5%)		4%		51%		48%		37%		33%	
CBD - Civic Center	58	75	20	31	11	23	17	36	32	43	40	51
% savings	17%		35%		52%		53%		26%		22%	

EB = Express Bus

* Travel times for rapid transit trips are from DTS projections supporting patronage and revenue estimates. The travel times for the bus are based on current peak hour schedules. To the scheduled running times from point to point were added: (1) assumed walk times from a centroid to the nearest bus stop; (2) a wait time assumed to be one-half of the headway time; and (3) five minutes to reflect the lag between scheduled times and actual running times during the peak period. The estimates are necessarily rough since the current schedule is too fast, walk times would vary from person to person, and bus services on a certain route may vary throughout the day. Seeming disparities between travel times for similar distances may partly reflect transfers and associated waiting time as well as variations of service.

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rapid transit are also shown as a percentage of current bus travel times because the benefits of a 50% reduction in daily commute time may be perceived as almost equal for those traveling 20 minutes or 60 minutes per day. The minutes that would be saved by making a specific trip by transit rather than by bus is shown as a percentage of the total time required to make the trip by bus. Thus, a 100% savings for a specific trip means transit takes half as long as the bus. Generally, rapid transit time savings for trips shown in the table range from 20% to 60% of conventional bus time.

(2) Aggregate Time Savings to Commuters

The estimated time savings shown in Table III.1 are those that will be available with the rapid transit to individuals who elect to make those specific trips. In addition, a large number of peak-period commuters will be directly affected in their home-to-work trips.

Traditional analysis methodology values these time savings at a rate which theorically reflects the "value" of this time to the average citizen. Prior work in the transportation field estimated such a value, which is equal to $4.57 per hour at the current price level. (PEEP II, Doc. #41). This estimated value of time connected with work-related travel can be applied to expected time savings for three types of commuters under the rapid transit alternative: those commuters who are diverted to rapid transit from their cars; former bus riders who make the transition to the faster transit system; and current motorists who continue to use their cars on highways that would be more crowded and, hence, slower without rapid transit. Time savings to each group, as estimated by the City's consultant in cost-benefit analysis of the rapid transit, is shown in Table III.2.

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TABLE III.2

Peak Hour Time Savings for Individuals Under Rapid Transit

Category of Individual	Time Savings Daily Hours	Time Savings Annual Hours	Estimated Annual "Value"
Commuters diverted to the Rapid Transit from their cars	1,796	449,000	$ 2,052,000
Former bus riders	13,225	3,306,000	15,108,000
Motorists electing to continue to use their cars	24,713	6,178,000	28,233,000
	39,734	9,933,000	$45,393,000

(3) Level of Service

The rapid transit alternative offers several distinct advantages over the conventional bus in the level of service that would be available to users. Level of service refers to such characteristics as the system's capacity, comfort, and frequency and reliability of service. First, and most importantly, rapid transit offers a far greater capacity to move passengers. The system is designed to expand to meet the expected demand for public transportation through 1995, which would be about 473,300 trips per day. The all bus alternative, in contrast, would not be able to carry appreciably more than about 214,300 trips per day, which represents a level of demand that should be reached before 1985. After that time, the increasing demand for public transportation would continue to be absorbed by automobiles with associated congestion and lengthening of the peak period.

The greater capacity of rapid transit will be due to the increased speed of the guideway transit vehicles permitting more round trips for peak hour passengers and to the

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large number of feeder and express buses in the transit system. In 1995 there would be 231 feeder and shuttle buses on local routes and 349 high speed express buses combined with the high capacity transit vehicles on the 14 mile guideway structure. In contrast, the conventional bus alternative would have a total of only about 450 buses, which is the maximum size fleet that downtown streets can handle without major capital improvements.

Second, the rapid transit offers greater reliability and frequency of service. The fixed guideway portion of the system would operate on its own structure and right-of-way with regular headway times. There would be no traffic interference or other disturbances which normally disrupt schedules in the present bus system. The majority of feeder buses would operate away from the highly congested areas thereby permitting higher speeds and greater schedule reliability.

Third, rapid transit offers a more convenient and pleasant form of transportation than the bus system. Transit stations will be covered and well lighted. Passengers on the guideway portion of the transit system will find the air-conditioned vehicles smoother and quieter than buses and without sudden starts and stops.

Finally, information on system routing and scheduling will be more readily available to riders than is the case with the bus system. The present bus system provides this information by phone or by printed route maps and schedules. In contrast, each station in the rapid transit system is designed to have a staffed information center. To get to any destination an individual would need to know only how to get to the nearest feeder or express bus.

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2. IMPACT ON INDIVIDUAL MOBILITY

Very little is known about how moderate improvements in accessibility through better transportation facilities improves individuals' mobility. Limited conclusions about how rapid transit has affected mobility in other cities are summarized below along with some general suggestions as to possible impacts in Honolulu.

(1) Conclusions from Other Areas

The mobility impacts of rapid transit systems have not been studied in detail for any existing system, although claims of increased mobility generally have been made in evaluating systems prior to the decision to build. The only documentation of mobility changes deals with the BART system. One additional observation involves Washington's Metro. There off-peak ridership is far higher than projected and appears to be due, principally, to trips made by employees in government offices and firms in the Connecticut Avenue area making longer trips for lunch and incidental personal business than pre-Metro, or making such trips where they were not made before.

A number of preliminary observations can be made for BART. First, mobility in the Bay Area has increased as shown by a rapid upsurge in total travel in the area. In effect, congestion on the major highways and bridges is now the same as it was two years ago, but BART is carrying nearly 40,000 passengers per day on its Trans-Bay route, of whom only about 12,000 have been diverted from the bus. Thus, there has been an increase of about 28,000 person trips per day since BART began "full" operation in April 1974.

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Second, 6% of transbay tripmakers, surveyed in October 1974, indicated that they had not made their current trip prior to the opening of BART. (It should be noted that congestion at that time had dropped markedly from earlier levels, but has since climbed. Thus, the percentage of "new" trips being made now may be substantially higher than 6%.) Of the 6%, 4.5% were in automobiles and only 1.5% on BART. Thus, BART improved auto availability and mobility for a significant number of people.

BART has not done much, directly or indirectly, for the poor and disadvantaged in terms of increasing mobility. BART travelers are predominantly male, younger than the average Bay Area resident, better educated, have higher incomes, and are predominantly white. The profile of automobile users is almost identical. This may be a direct result of the design of BART, which tends to serve the white, upper-middle class suburbs of the Bay Area and which may discriminate against poor users by its comparatively high out-of-pocket costs.

In summary, total travel has increased since the beginning of the operation of BART, but without any increase in congestion or any new highway construction. Perhaps because of the design, location and price of the system, the mobility improvements appear to have accrued principally to younger, white, male, college-educated, middle to high income residents. A significant mobility improvement has been obtained by releasing communter automobiles for daytime use by other members of the family.

(2) Possible Mobility Impacts in Honolulu

Consideration of local mobility impacts must necessarily be handled in a very speculative manner. Findings from experience in other cities are helpful, but they are certainly

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not definitive for Hawaii's situation because each urban area has its own peculiar conditions that greatly effect individuals' travel behavior. The most fundamental impact on mobility that is directly attributable to rapid transit is the system's ability to meet residents' expected demand for public transportation through 1995. This relates directly to the capaciaty of the system in comparison to the conventional bus as described earlier.

We may begin to consider other mobility impacts of rapid transit by asking three related questions. First, what would be the causes of greater mobility with a rapid transit system? Second, who are the recipients of greater mobility, and particularly, who receives the more significant increases in mobility? And third, for what purpose would these individuals use their greater mobility? Available information does not support complete answers to these questions, but some major distinctions can be made.

. Travel Time and Automobile Usage

Two major causes of greater mobility can be directly attributed to development of the rapid transit system. First, and most apparent, there will be time-savings to those persons who use rapid transit. Predictions of aggregate savings to commuters were discussed in Section (1) above. Table II. 3 shows how travel time-savings would accumulate for several hypothetical families living in different areas and making typical commuting trips to various destinations. The second major cause of greater mobility is less evident than time-savings and relates to the increased availability of the automobile for trips other than daily commuting. As motorists are diverted to the rapid transit for commuting trips, the cars they formerly used will be available to other members of their families for transportation during the day. A certain percentage of these cars will be given up by the owners. (For example, a commuting motorist using a family's second auto who switches to rapid transit may decide to become a one-car family.) However, those former commuting autos that are not given up would increase the mobility of other family members.

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TABLE III.3

ILLUSTRATIVE TIME SAVINGS WITH RAPID TRANSIT
FOR SEVERAL HYPOTHETICAL FAMILIES

Family Location and Description	Trip Purpose	Destination	Time Savings (Minutes) Each Round Trip	No. Round Trips/Year	Annual Time Savings
Mililani					
Husband	Work	CBD	34	210	7,140
Wife	Part-time work	Kaiser Hospital	38	105	3,990
Son (age 19):	College	UH Manoa	54	110	5,940
	Entertainment events:	Blaisdell Center	34	5	170
		Waikiki	38	5	190
Daughter (age 14)	Special recreation events	Kapaolono Field	46	5	230
		Total Annual Time Savings for Family			17,660 (about 25 days)*
Liliha					
Husband	Work	Pearl Harbor	70	210	14,700
Wife	Work	Waikiki	18	210	3,780
	Shopping	Ala Moana	20	25	500
Son (age 18):	Part-time college	Leeward C. C.	68	55	3,740
	Part-time work	Kakaako	16	105	1,680
Daughter (age 20)	College	UH Manoa	32	110	3,520
Grandmother	Social recreation events	Mauka Alii Senior Cntr.	34	105	3,570
		Total Annual Time Savings for Family			31,490 (about 44 days)
Manoa					
Husband	Work	Airport	74	210	15,540
Wife	Work	Kahala	12	210	2,520
		Total Annual Time Savings for Family			18,060 (about 25 days)
Hawaii Kai					
Husband	Work	Civic Center	22	210	4,620
Wife	Part-time work	Ala Moana	54	105	5,670
Daughter	High school	St. Louis High	48	160	7,680
		Total Annual Time Savings for Family			17,970 (about 25 days)

* Conversion based on 12-hour days

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The number of cars that would become available in this way through diverted commuters can be roughly approximated. The City's consultant estimated that an additional 27,600 peak hour commuting motorists would be diverted to the rapid transit by 1995 if the system were built (PEEP II, Doc. #41). Assuming an average of 1.4 persons per vehicle, this means a total of about 20,000 automobiles would be freed up from peak hour use. Most of these cars would be retained by their owners. Changes in commuting behavior are not likely to bring dramatic changes in auto ownership since people own cars for many reasons besides commuting. Car ownership is most likely to decrease in affluent households, where additional cars may not be needed, and in poorer families where the maintenance of a single car is really beyond the means of the family. A model of auto ownership developed for Washington, D.C. and applied in Los Angeles and San Francisco was applied to a number of specific trips from specific locations in Honolulu to estimate auto ownership changes. 1/. Results suggest that in 1995 there would be about 3,500 fewer cars owned in Honolulu if the rapid transit were built than if it were not built. This means that about 16,500 of the cars diverted from commuter trips would be available to provide greater mobility to residents.

Benefits of Mobility For Residents

Identifying the recipients of greater mobility and how significant these improvements are to them is especially speculative. Table III. 4 provides a useful framework for making some initial distinctions. It suggests making two types of distinctions, first between those who are more mobile because of time-savings on transit and those who are more mobile because of better access to transportation, and second, between mobility increases which are nominal and those which are significant. As the table shows, the most significant increases in mobility would probably accrue to a moderate number of commuters regularly receiving large travel time-savings and to a moderate to small number of single-car commuter families who are diverted to rapid transit, thus making a car available to the household for daytime use.

More specific determination of what persons would be affected by considerable increases in mobility is problematic. Clearly commuters would be involved, but other groups such as students, senior citizens, youth, and the unemployed, among others, would benefit as well. The

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TABLE III.4

FRAMEWORK FOR CONSIDERING RECIPIENTS OF IMPROVED MOBILITY UNDER RAPID TRANSIT

Cause of Greater Mobility	Degree of Increase in Mobility: Nominal	Degree of Increase in Mobility: Considerable
Time Savings in Transit	Large number of commuters and other transit users receiving frequent small travel time savings	Moderate number of transit commuters who regularly receive large travel time savings
Better Access to Transportation	Moderate number of multi-car commuter families diverted to transit	Moderate-to-small number of single-car commuter families diverted to transit

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discussion below illustrates some possible mobility impacts for groups such as these in connection with a tentative exploration of the third question raised above, that is, to what uses individuals might put their greater mobility. The intention here is to be illustrative and suggestive rather than exhaustive and predictive.

The rapid transit may facilitate access to and participation in public recreation facilities and programs by Oahu's younger persons. Major recreational facilities, such as gymnasiums, tennis courts, pools, and some athletic fields are clustered in larger regional parks, which are a considerable distance from some neighborhoods. Figure III. 1 shows the location of parks and recreational facilities in Honolulu. The rapid transit would provide faster and more convenient transportation to these sites than is now possible on the bus, as shown by comparable travel times in Table II. 5. A Liliha youngster using rapid transit, for example, would save over half an hour in his travel to Kihei Lagoon Park. For young people the expansion of individual mobility through increased speed or reduced reliance on the family car can permit them to take active advantage of all public facilities provided for them without regard to resident location thereby enhancing the value of these investments.

A substantial portion of Oahu's senior citizens now use the bus system as their major or sole means of transportation. They pay no bus fares (about 47,000 free passes are now issued, although this includes some handicapped persons), and many of the places they frequent, such as shopping centers and senior citizen centers, are located on bus routes. Interviews with selected staff members of several senior citizen programs and centers suggest that "...those seniors who routinely request auto rides from friends and relatives are, for the most part, able-bodied and within easy walking distance of a bus stop." Their reasons for preferring auto transportation include the discomfort and waiting time associated with buses. To the extent that the rapid transit would provide faster rides, less confusion with routes, comfortable reliable schedules, and more convenient access, the system may encourage greater senior citizen participation in more activities and to do so with less dependency on others for transportation. As an example of time-savings

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TABLE III.5

COMPARATIVE TRAVEL TIMES TO MAJOR
RECREATION CENTERS VIA RAPID TRANSIT AND THE CONVENTIONAL BUS
(Minutes)

To/From	Mililani		Liliha		Manoa		Hawaii Kai	
	Rt.	Bus	Rt.	Bus	Rt.	Bus	Rt.	Bus
Ala Moana Park	64	83	26	36	25	32	38	65
Kihei Lagoon	54	68	20	55	28	65	51	78
Kapaolono Field (Kaimuki)	72	95	26	69	14	39	31	55
McCully Rec. Center	64	93	18	36	12	26	35	65(EB)
Kanewai Field	71	100	25	42	N/A		36	46(EB)

N/A Not applicable because the two places are so close that transit or bus would not be used.

N/D No material difference in times between transit and the bus.

(EB) Express bus time.

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that can be expected, a senior citizen from Manoa taking the rapid transit to the State Library would save 18 minutes over the same trip made on the bus. For informational purposes, Figure III. 2 shows the location of major senior citizen centers in Honolulu, and Table III. 6 shows comparable travel times to these centers under the rapid transit and the conventional bus.

Travel time-savings may be as significant to students attending the University of Hawaii system as to persons commuting daily to work. Facilities in the UH system are located from Pearl City to Diamond Head in urban Honolulu as Figure III. 3 shows. Each campus has its special emphases in the academic and technical education programs that it offers, but the greatest concentration of public investment is on the Manoa campus. Travel time to school is already an important factor in a student's selection of a campus. A recent survey on the Manoa campus found that the proximity of the home to the campus was a major consideration in enrollment for 65% of the respondents. 2/. It is reasonable to assume, therefore, that shorter travel times on the rapid transit would encourage some prospective students to consider a greater number of options in choosing a campus and a program for enrollment. Table III. 7 shows comparable travel times to four UH system campuses under the rapid transit and the conventional bus. As an example of travel time-savings, a student living in the Mililani area can expect to save about half an hour in his or her commute time to the Manoa campus on rapid transit.

The rapid transit system may be of some special use to Oahu's unemployed residents, at least to the extent that the unavailability of adequate transportation is a possible factor in a particular individual's inability to secure work. The transit system would have its greatest capacity and would be most efficient along its 14-mile guideway structure. This length spans nearly all of Honolulu's primary employment centers. And, as Table III. 8 shows, travel times on the rapid transit from residential areas to major employment centers compare very favorably with those on the conventional bus. As an example, an unemployed person in Liliha using rapid transit would save about half an hour in travel time to job possibilities in the Pearl Harbor/Hickam area. The availability of inexpensive transportation can be a significant factor in eliminating a common reason for not taking available part- or full-time employment. The ability to get to and from work quickly can act as a significant incentive to take work at locations which may have been heretofore realistically inaccessible from many remote residential areas.

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FIGURE III. 2 - Senior Citizen Centers

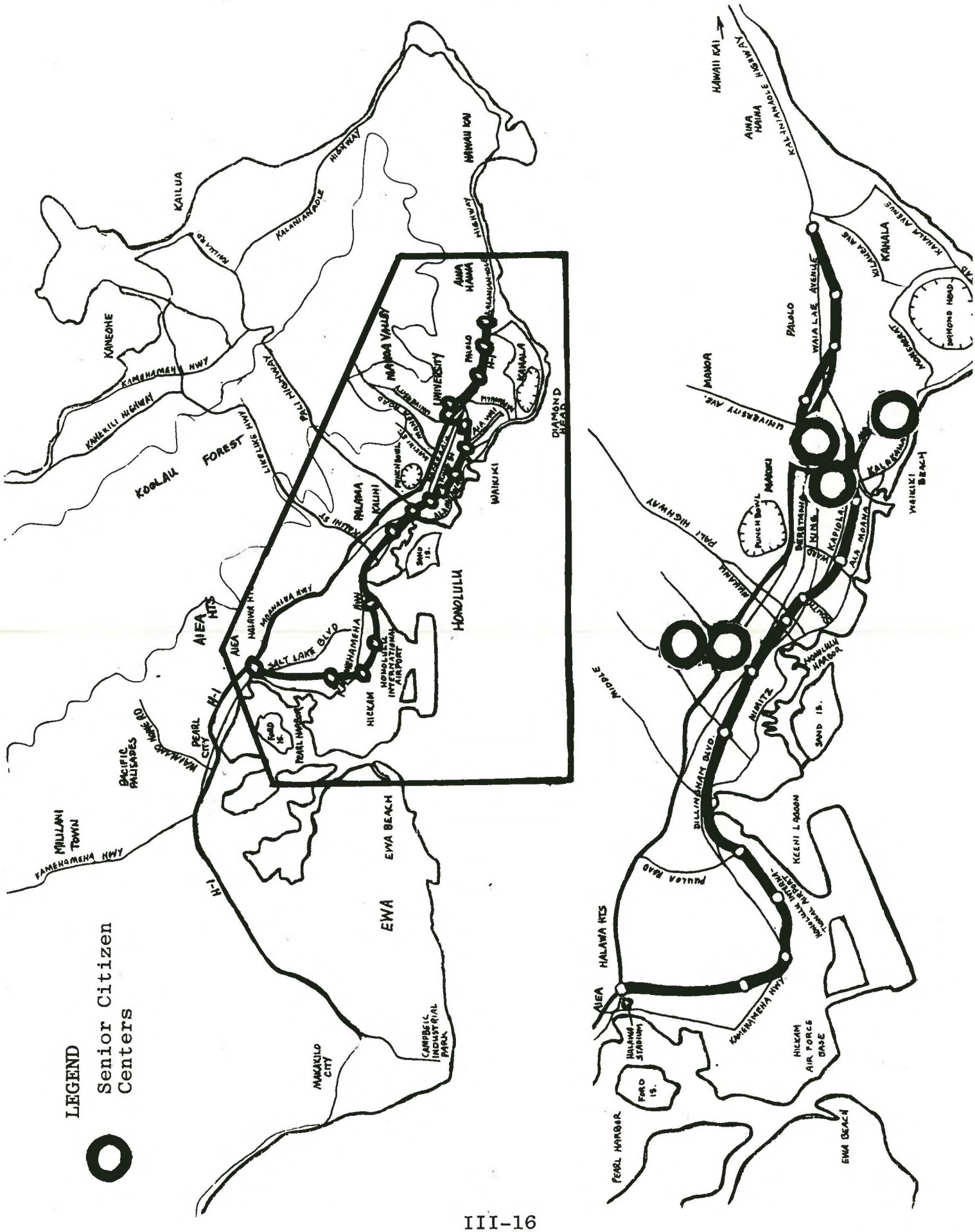

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TABLE III.6

COMPARATIVE TRAVEL TIMES TO SENIOR
CITIZEN CENTERS VIA RAPID TRANSIT AND THE CONVENTIONAL BUS
(Minutes)

To/From	Mililani		Liliha		Manoa		Hawaii Kai	
	Rt.	Bus	Rt.	Bus	Rt.	Bus	Rt.	Bus
Waikiki Community Center	74	93	27	36	15	32	42	65 (EB)
Moiliili Community Center	65	95	19	58	N/A	N/A	35	51
Makua Alii Senior Center	66	89	19	36	17	27	40	70
Beretania Neighborhood Community Center	58	72	11	25	20	40	43	68

N/A Not applicable because the two places are so close that transit or bus would not be used.

N/D No material difference in times between transit and the bus.

(EB) Express bus time.

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FIGURE III.3 - University of Hawaii Facilities

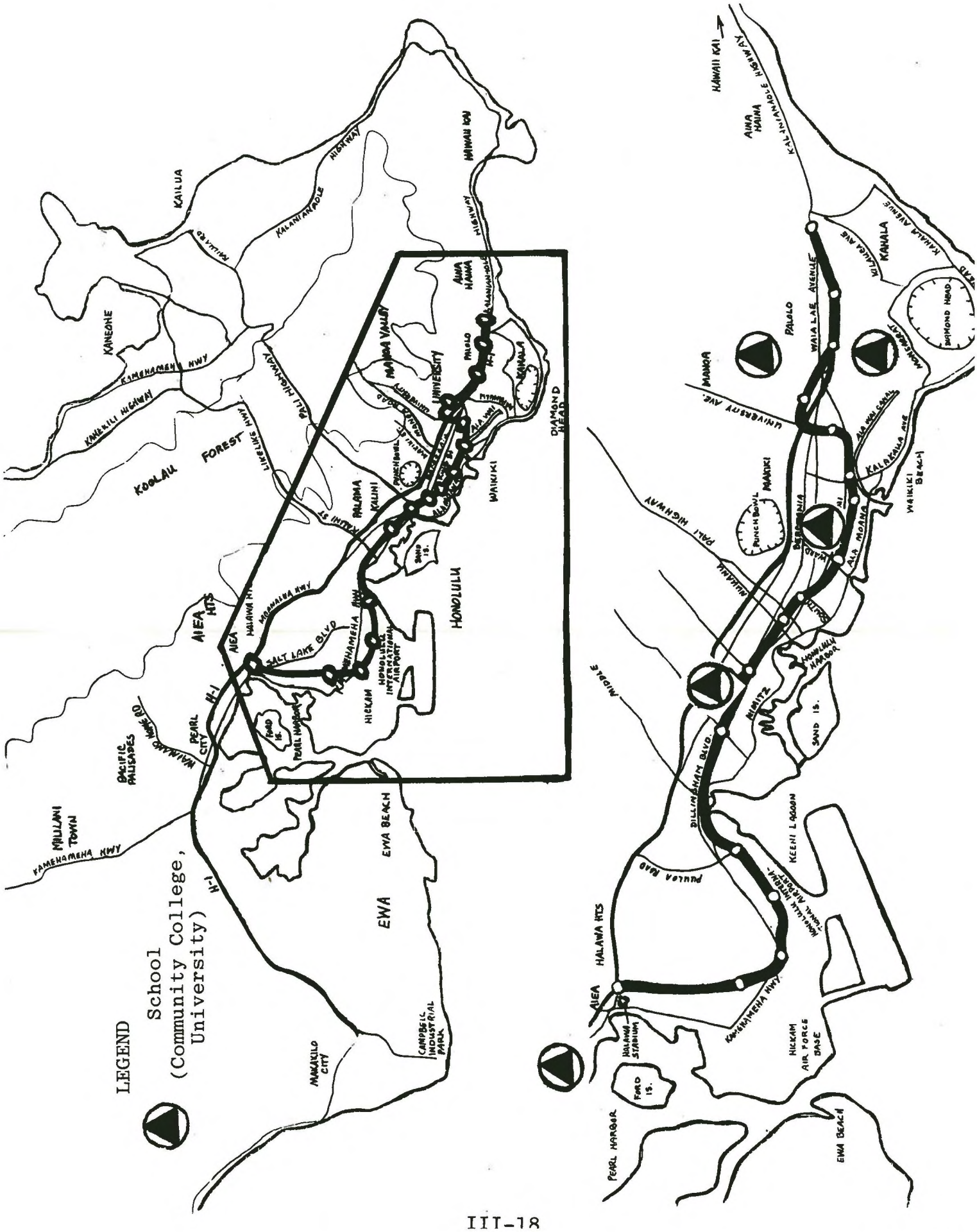

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TABLE III.7

COMPARATIVE TRAVEL TIMES TO U.H. SYSTEM VIA RAPID TRANSIT AND CONVENTIONAL BUS

(Minutes)

FROM / TO	Mililani		Liliha		Manoa		Hawaii Kai	
	RT	Bus	RT	Bus	RT	Bus	RT	Bus
UH Manoa	73	100	26	42	N/A		36	46(EB)
Kapiolani CC (Ft. Ruger site)	88	118	41	65	N/D		47	60
Honolulu CC	63	85	N/A		25	56	48	61
Leeward CC	38	52	41	78	49	84	72	112

N/A Not applicable because the two places are so close that transit or bus would not be used.

N/D No material difference in times between transit and the bus.

(EB) Express bus time.

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TABLE III.8

COMPARATIVE TRAVEL TIMES TO MAJOR EMPLOYMENT CENTERS
VIA RAPID TRANSIT AND CONVENTIONAL BUS
(Minutes)

FROM / TO	Mililani		Liliha		Manoa		Hawaii Kai	
	RT	Bus	RT	Bus	RT	Bus	RT	Bus
Ala Moana/ Waikiki	74	93	26	36	15	32	42	65(EB)
Liliha/Iwilei	63	85	N/A		25	56	48	61(EB)
Kakaako	65	78	16	24	18	30	45	58(EB)
CBD	58	75(EB)	11	23	17	36	40	51
Pearl Harbor/ Hickham	60	57	33	68	40	77	64	95
Airport	54	68	18	40	28	65	51	78

N/A Not applicable because the two places are so close that transit or bus would not be used.

N/D No material difference in times between transit and the bus.

(EB) Express bus time.

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3. SAVINGS IN HOUSEHOLD EXPENDITURES FOR TRANSPORTATION

The rapid transit system would reduce automobile operating costs for those who divert their trips from the automobile to the transit. Savings will be greatest for those households who divert to transit and give up a car altogether, but those who divert to transit and keep their car for other purposes will also experience savings.

Table III.9 shows estimates of the current annual cost of a standard size automobile in Honolulu and distinguishes among those costs which are attributable to basic ownership, basic operation, and commuting travel. The total annual cost, including commuting costs, is about $2,030. Commuting costs contribute about $640, or 32% of the total.

Table III.10 compares total transportation expenditures for an auto-commuter household under the conventional bus system with expenditures for the same household diverted to public transportation under the rapid transit alternative. This example assumes a two car household having one commuter who uses a car. Annual transportation costs to that household under the conventional bus would be $3,501. In contrast, total expenditures would be about $3,039 under the rapid transit alternative if the household keeps both cars and limits their use to basic operation. Expenditures would be significantly reduced further to about $1,760 per year if the second car were given up completely.

This analysis is based on current prices of gasoline. Future prices of gasoline will certainly be higher, but the expected increase is unpredictable. Any increase in price will, of course, increase the savings to those households diverted to transit.

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TABLE III. 9

ANNUAL COST OF AN AUTOMOBILE*
(Standard Size, e.g. Chevelle)

Basic Ownership:	
Depreciation (over 10 years)	$ 380
Insurance	167
Registration	25
Financing (optional)	177
	747
Basic Operation:	
Fuel & Oil (6,300 mi/yr)	277
Maintenance	265
Occasional Parking	100
	642
Subtotal Basic Ownership and Operation	1,389
Added Commuting Costs:	
Fuel & Oil (3,700 mi/yr)	167
Maintenance	155
Parking	295
Insurance	25
	642
Total with Commuting Cost	$2,031

* Total annual travel of 10,000 miles @ 15 miles/gallon and maintenance @ 4.2¢/mile are based on 1976 U.S. DOT, FHA publication "Cost of Owning and Operating an Automobile - 1976." The portion of total mileage assigned to commuting is based on 8.1 mile average trip length in peak period ("Planning for Oahu", Dept. of General Planning) X 230 working days, which equals about 3,700 miles/year, or 37% of total travel. Basic parking assumes 50 days/year @ $2.00/day. Commuter parking assumes 230 days @ $1.50/day, less half the occasional parking which could be foregone.

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TABLE III. 10

COMPARATIVE TRANSPORTATION COSTS TO COMMUTER HOUSEHOLDS
(Two-car household with one auto commuter diverted to rapid transit)

	Conventional Bus	Rapid Transit
20 year annual net capital cost/household*	$ 1	$ 24
Annual operating subsidy cost/household**	80	122
Annual auto costs/household	3,420	2,778
Annual commuter transit cost (25¢/ride)	-0-	115
Total Annual Cost	$3,501	$3,039
Potential Annual Savings from Rapid Transit/household	$462	

Note: If one car were given up by the household diverted to rapid transit, then there would be additional savings of $1,389 and total annual expenditures could be greatly reduced to $1,650.

* Annual net capital cost/household is based on 20% local share and 213,500 households in 1976. Possible financing costs are not considered. (See Chapter VI.)

** Annual operating subsidy in 1995 is assumed to be the same percentage of total O&M costs as is currently subsidized in the City's bus system.

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IV. IMPACT ON BUSINESS AND LABOR

1. Overall Economic Impacts
2. Perceived Business Impacts in the CBD
3. Relocation of Business
4. Construction Disruption
5. Impact on the Tourism Industry

IV. IMPACT ON BUSINESS AND LABOR

This chapter deals with the anticipated impacts of the two basic alternatives on business and labor. For our purposes, business and labor are defined rather broadly. Business includes all types of private sector enterprises, and labor is treated principally in terms of the number and type of jobs that are anticipated to result from the two alternatives.

The initial section deals with the overall economic impact anticipated to result from the capital development associated with the two alternatives. This impact is discussed in terms of the overall economy of the State, as well as the number of jobs to be created in the various sectors. The initial section also describes the number of types and jobs that are expected to result from continued operation of the rapid transit system as well as the conventional bus system. The second section contains the results of a survey of businesses' perceptions of the impact of the rapid transit alternative on attracting employees to the central business district and the need and cost of employee parking.

The third section identifies the number and type of businesses anticipated to be displaced under both alternatives. The fourth section discusses the possible impact on business from construction of the rapid transit system. The impact of the two alternatives on Oahu tourism industry is addressed in the final section.

1. OVERALL ECONOMIC IMPACTS

(1) Increased Economic Activity

Increased economic activity will result from expenditures during the construction phase of the rapid transit system. This analysis identifies the differentail economic impacts associated with the rapid transit construction and attempts to report these impacts in measures that a typical

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resident can easily relate to his or her current economic situation. Several characteristics, which are briefly noted below, underlie the economic impacts discussed in this section.

- The economy will benefit from both direct and induced expenditures associated with repid transit construction. Direct expenditures are made for labor and materials for construction of the transit facilities. These expenditures are considered first round impacts. Dollars spent as direct expenditures for labor and materials continue to circulate in the local economy and create additional income and sales. This additional activity is induced expenditures and is considered second and third round impact. The Department of Planning and Economic Development's (DPEP) multiplier of 2.53 is used in this analysis to reflect the total level of expenditures that can be expected in the Hawaii economy for every dollar of direct project expenditure. 3/

- Only the 80% Federal share of the rapid transit construction cost is considered as a base for calculating the local economic impact of the project. We have assumed that the 20% of the cost to be funded locally would be spent regardless of whether or not the transit system is built, and therefore, it would not contribute to any differential impact. Some persons may argue that not all of the 20% local share would be spent in any event, in which case our assumption may result in a slightly conservative estimate of economic impact.

- Construction expenditures will take place over a seven-year period. To determine the actual expenditure of Federal dollars in Hawaii during each year of construction, it has been assumed that the project would start in 1978, and expenditures during each of the seven years of the construction period have been escalated at a rate of 8% annually to account for inflation.

Table IV. 1, below, shows the estimated expenditure of Federal funds on the rapid transit system assuming that land aquisition and detailed design are initiated in 1978. The table also shows the total direct and induced expenditures in Hawaii's economy that would result from the 80% Federal share. Table IV. 2 shows similar data for the bus bystem.

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It includes expenditures for new buses and associated equipment and facilities. The impact over time of the spending related to the rapid transit alternative is shown in Figure IV. 1. Neither Tables IV. 1, IV. 2 nor Figure IV. 1 reflects the time lag that will occur before full impact of the expenditures is felt.

TABLE IV. 1

OVERALL ECONOMIC IMPACT OF THE RAPID TRANSIT SYSTEM ALTERNATIVE
(Millions)

	1978	1979	1980	1981	1982	1983	1984	Total
Federal share	$ 2.99	$36.07	$122.87	$130.38	$142.33	$ 77.92	$ 33.45	$ 545.98
Total impact on Hawaii's economy	$ 7.57	$91.27	$310.70	$329.85	$360.06	$197.26	$ 84.63	$1,381.34

Source: DMJM estimates of development costs adjusted at 8% per year to the time shown.

As can clearly be seen by comparing Table IV. 1 and IV. 2, the bus alternative is a much lower capital cost approach and thus will result in less stimualtion to the local economy. Table IV. 3 shows the estimated direct project spending for selected categories on local labor and materials of the two alternatives. This further highlights the capital intensity of the rapid transit alternative.

TABLE IV. 2

OVERALL ECONOMIC IMPACT OF THE BUS ALTERNATIVE*
(Millions)

	1976	1977	1978	1979	1980	Total
Federal share	$11.05	$1.15	$ 4.44	$ 4.44	$ 4.44	$25.52
Total impact on Hawaii's economy	$27.96	$2.91	$11.23	$11.23	$11.23	$64.56

* In this case, the DPEP multiplier probably overstates the total impact because a significant proportion of these expenditures are for vehicles purchased from the mainland.

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ANNUAL IMPACT OF PROJECT SPENDING
(FEDERAL SHARE ONLY) - RAPID TRANSIT ALTERNATIVE

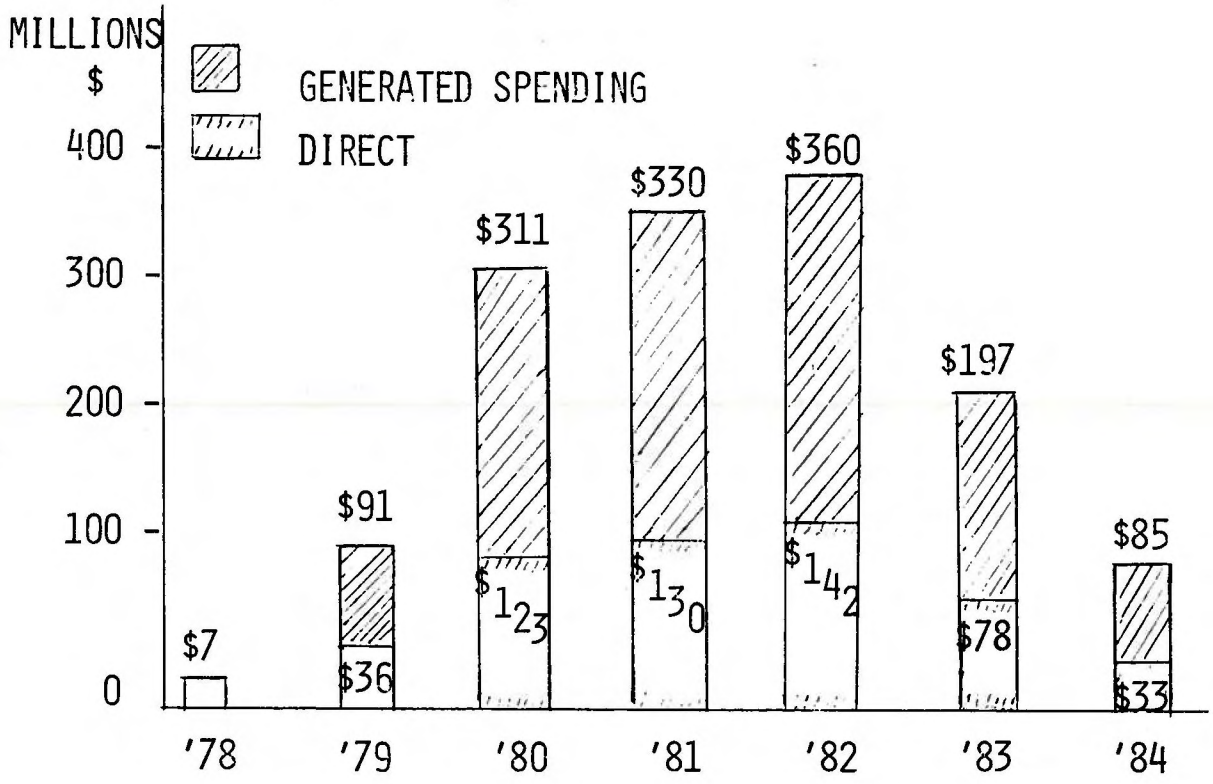

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TABLE IV. 3

MAJOR CATEGORIES OF LOCAL CONSTRUCTION SPENDING
(Millions)

Rapid Transit	Materials	Labor
Guideway Structures	$44.0	$70.8
Stations	18.8	41.1
Electric Power System	1.6	12.3
Maintenance Facilities	3.9	7.6
Transit Vehicles	4.6	8.5
Bus		
Yard and Shop	$ 2.5	$ 2.3
Street Furniture	.1	.1
Special Support Devices	-	.1
Parking Lots and Miscellaneous	.8	.5

(2) The Effects of Development on the Demand for Labor

It is obvious that the higher capital cost rapid transit system will generate more construction jobs than the bus alternative, even after adjusting for the fact that significant components, such as the vehicles, will generally be made on the mainland. Table IV. 4 shows the estimated salaries and wages resulting from both alternatives. Figure IV. 2 shows the same data over time.

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TABLE IV. 4

TOTAL WAGES TO BE PAID DURING THE CONSTRUCTION PERIOD
(Millions)

	Rapid Transit	Bus
Direct Project Wages (includes project administration)	$212	$3.0
Project-Related Indirect Wages	36	.5
Other Project Induced Wages	89	.6
Total	$337	$4.1

By estimating the average payroll cost of an employee, the estimated labor costs can be translated into a projection of the number of full time jobs that would be required, including direct, indirect, and induced jobs. Table IV. 5 shows these estimates for the rapid transit alternative. Figures IV. 3 and IV. 4 depict graphically the types of jobs expected and how they will become available over time. Over 12,000 man years of employment would be generated during the 7 year construction period. Total annual employment generated by the three most intensive years of construction expenditures would range from 2,300 to 3,500 jobs. In contrast, construction of new yards, shops and street furniture associated with the bus alternative would generate only about 150 man years of construction work in 1976 and 1977. Table IV. 6 shows the anticipated mix of skilled, unskilled and administrative jobs needed for construction of transit stations and guideway structures, two of the major components of the rapid transit system.

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FIGURE IV. 2

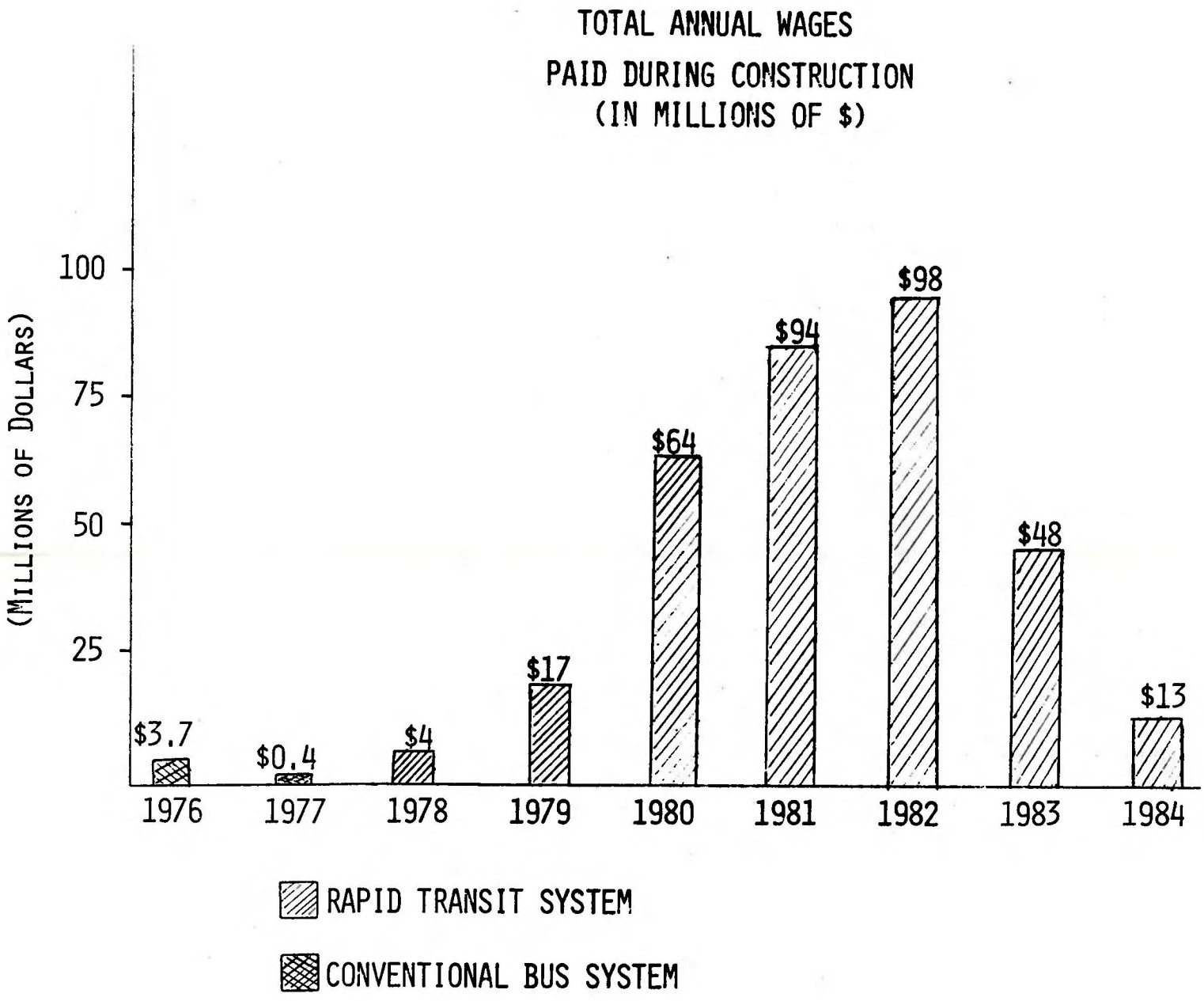

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TABLE IV. 5

ESTIMATED EMPLOYMENT RESULTING FROM CONSTRUCTION OF THE RAPID TRANSIT (IN EQUIVALENT MAN YEARS OF EMPLOYMENT)

Source	1978	1979	1980	1981	1982	1983	1984	Total
Direct Jobs								
Construction	-	30	770	1,450	1,570	730	110	4,660
Project Adm.	80	290	400	350	290	140	90	1,640
Right-of-Way	-	40	60	-	-	-	-	100
Vehicle Assembly & Testing	-	-	40	50	60	70	70	290
Total	80	360	1,270	1,850	1,920	940	270	6,690
Indirect Jobs	10	60	220	330	350	170	50	1,190
Induced Jobs	50	210	800	1,170	1,230	600	170	4,230
Total Project-Related Jobs	140	630	2,290	3,350	3,500	1,710	490	12,110

TABLE IV. 6

TYPICAL JOB MIXES FOR DIRECT CONSTRUCTION EMPLOYMENT - RAPID TRANSIT (TOTAL MAN YEARS REQUIRED)

Guideway Structures	Man Years	Estimated %
Skilled Workers	1,500	59%
Semi/Unskilled Workers	900	35%
Administrative Workers	160	6%
Stations		
Skilled Workers	920	66%
Semi/Unskilled Workers	390	28%
Administrative Workers	80	6%
Other (Power Plant, Shops, Yards, etc.)	710	
Total Man Years for All Construction Jobs	4,660	

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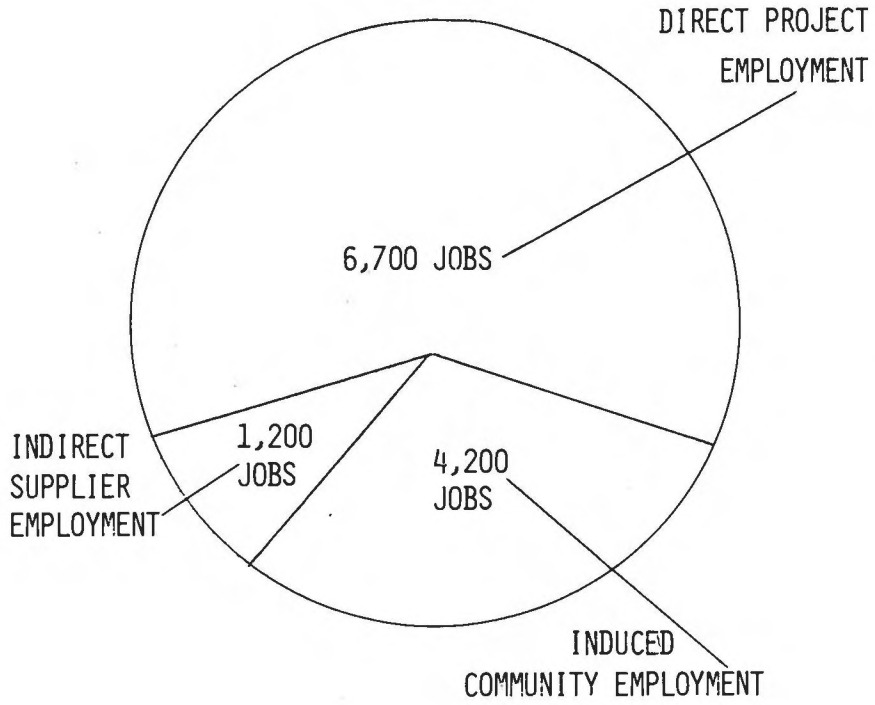
FIGURE IV. 3

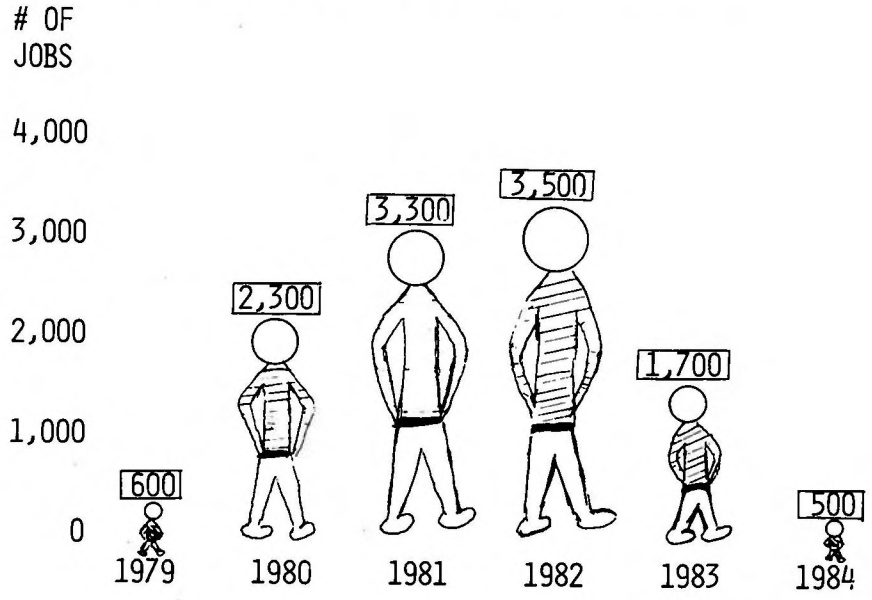
CONSTRUCTION CREATED EMPLOYMENT - RAPID TRANSIT
(MAN-YEARS)



TOTAL = 12,100 MAN-YEARS OF WORK
1978-1984

FIGURE IV. 4

ANNUAL DISTRIBUTION OF ALL
PROJECT CREATED EMPLOYMENT - RAPID TRANSIT



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Because of its large size the rapid transit system would have a significant impact on Oahu construction employment for several years. As Table IV. 7 shows, direct project construction wages would equal or exceed $25 million annually from 1980 to 1982. Based on actual construction wages in recent years, the project's annual construction wages may peak at 8% of total construction wages paid on Oahu in 1982. This is a substantial portion of construction employment. In an industry which is particularly susceptible to peaks and valleys in activity from year to year, this level of expenditure poses both special opportunities and special risks for managing the economy. It can be used in conjunction with other capital expenditures to support steady growth in the industry during the project period. Alternatively, if project expenditures are added to already brisk construction activity in the early 1980s, a tight labor market could bring higher construction bids and, more importantly, the risk of a more serious slowdown as project expenditures decline rapidly in 1983 and 1984.

TABLE IV. 7

ESTIMATE OF RAPID TRANSIT DIRECT CONSTRUCTION WAGES
AS PERCENT OF ALL OAHU CONSTRUCTION WAGES
(Millions)

Year	Wages*	Estimated % of all Oahu Construction Wages
1979	1	0.2%
1980	25	4.0
1981	47	7.0
1982	51	8.0
1983	24	3.0
1984	4	0.5

* Source: State Data Book Oahu construction wages estimated at 85% of contract construction wages for the entire State.

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Construction of the rapid transit system would provide more jobs in an industry that is high in unemployment. But as a single construction project, it cannot solve the current unemployment problems of the industry. There were about 6,300 unemployed persons in the construction industry on Oahu as of September 1975. This figure represents about 26% of the construction labor force. If the project were started in 1978, then a sizeable number of construction jobs would be generated by 1980. Table IV. 5 shows that direct construction jobs on the system would range from about 700 to about 1,600 annually during the 4 year period, 1980 through 1983. This is from 11% to 25% of the September 1975 unemployment in the industry.

(3) Operational Effects on the Demand for Labor

The number and types of operating jobs required under each alternative have been estimated and are shown below in Table IV. 8.

The difference in 1985 employment for bus versus rapid transit operations is principally due to the fact that the projected bus ridership would be approximately 65 million whereas the rapid transit ridership would be 102 million passengers per year. Thus a substantially higher level of service to the community is provided by the rapid transit system. The employment figures in Table IV. 8 compare with a 1975 employment of 906 by MTL, the City's bus operator.

TABLE IV. 8

1985 RAPID TRANSIT AND BUS OPERATIONS EMPLOYMENT (JOBS)

Type	Bus	Rapid Transit
Transit Train Operators	0	96*
Bus Operators	836**	755**
Support Personnel	366**	677*
Total Employment	1,202	1,528

Sources: * DMJM estimates; ** Arthur Young & Co. estimates

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2. PERCEIVED BUSINESS IMPACTS IN THE CENTRAL BUSINESS DISTRICT

One possible outcome of the rapid transit alternative is greater reliance on the CBD as the principal business center for Honolulu than would be possible under the bus alternative. The CBD is not likely to experience a decline under either alternative, but some difference in its rate of growth may be expected. Better access to the CBD under the rapid transit alternative will encourage the area's continued growth. The rapid transit system express buses offer a greater capacity for bringing commuters in from the suburbs during peak period, and the system offers a much greater capacity for moving passengers through the central Honolulu and CBD areas on the guideway structures.

In attempting to learn how the proposed rapid transit system might affect businesses and business development in Honolulu, we interviewed selected building owners, developers, and employers in the CBD. Several interesting trends emerged in the responses.

A majority of building owners and developers surveyed felt the transit system would cause renewed expansion of the downtown business district, but they did not think that it would lead to an increase in the cost of doing business in Honolulu. Nearly all of the building owners and developers responding perceived a general negative relationship between increasing traffic congestion and the rate of expansion of business and commerce. But they expect the continued expansion of business and commerce in the CBD even if traffic congestion worsened in the area. Several developers of major commercial complexes believed that a rapid transit system would stimulate growth and development of business and commerce around the fixed guideway stations as well as in the CBD.

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Two-thirds of the building owners and developers said that they would still offer the same (current) proportion of parking spaces in the future, whether or not the fixed guideway system were built. However, half indicated that they thought parking would be somewhat less important with the fixed guideway system in operation. All agreed that the provision of parking in a downtown building is important to its "rentability." Those interviewed also felt that even if the existence of a rapid transit system allowed them to provide less parking in future buildings, rents for office and commercial space would nevertheless be unchanged because parking generally contributes equally to profitability along with space rentals.

Selected senior personnel executives from businesses in the CBD were interviewed to determine perceptions about how the rapid transit might influence problems of attracting employees to the CBD and any additional costs that may be incurred as a result of a CBD, rather than a suburban, location.

The employers interviewed who offered an opinion were evenly divided on whether or not the system would make it easier to attract new employees to the CBD. The majority, however, had no opinion. Some comments were volunteered about employees' preferences for convenient parking or accessibility to transit stations. However, none of the employers indicated that parking and/or transportation problems affected their ability to hire and keep employees in today's job market. Employers seemed to feel that workers will go where the jobs are whether or not it is quick and easy to get there.

One large downtown employer, who has satellite offices scattered around the island, indicated that employees in satellite offices generally live nearby and do not want to have the transportation problems associated with working downtown. However, a recent employee survey of his main downtown office showed a marked

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preference among those employees for working in the CBD. Another major employer had the same impression--in spite of congestion, people want to work in the CBD.

Nearly all of the employers interviewed now provide at least some parking for their employees. In most cases these spaces are located within their own building. All of the employers said they had some employees who used public parking spaces outside of their buildings. When asked to project to the future, all indicated that they do not expect a change in their firm's expense policy for parking if the rapid transit system were built. Further, they indicated that they would continue to provide as many parking stalls for their employees as they do at present. This attitude appears to stem largely from two factors: 1) the employers believe that many of the employees for whom they provide parking need their cars in the business to reach places that will not be served by the proposed rapid transit system, and 2) the expense involved is relatively small.

Seventy-five percent of the employers felt that the rapid transit system would have no real impact on their business. None of them has plans to relocate away from the CBD and none believes that the presence of a rapid transit system would change that. An employer with small, satellite offices said that site selection for future offices "might" be made with fixed guideway stations in mind.

The employers all agreed that the rapid transit system would enhance the growth of business in the CBD. In other areas, specifically the cost of doing business and the impact on unemployment, the perceptions of those interviewed were evenly divided.

One caution should be noted regarding the results of these interviews. It has been well recognized in situations of this type (particularly market research work) that an individual's description

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of his or her future behavior and the actual behavior often varys significantly. A number of factors contribute to this including the interviewee's attempt to "please" the interviewer with the "right" answer, the fact that the future situation being discussed is not concrete in the mind of the interviewee, and, perhaps most importantly, the interviewee is not required to carry out the future action he or she thinks will happen.

3. RELOCATION OF BUSINESS

This section addresses the probable business relocations that will occur under the two alternatives. For the rapid transit alternative, the number and types of businesses that would be displaced have been identified based upon the assumption that the route identified in PEEP II would be used. This identification is based on a detailed survey conducted in Spring, 1975. (PEEP II, Doc. #29). Because of the nature of the all bus alternative, no business relocations are anticipated. The following tables display various characteristics of the businesses anticipated to be relocated. In general, those to be displaced by the rapid transit have the following characteristics:

- They are small neighborhood businesses as evidenced by their:
  - ownership
    - .. over three-fourths are owned by four or fewer persons
    - .. almost 40% are sole proprietorships
    - .. almost one-fourth with four or fewer owners have at least one owner who is elderly
  - size and financial characteristics
    - .. for over three-fourths of the businesses, the affected locations are their only place of business

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.. over half have less than five employees at the affected location; about three-fourths have less than ten employees

.. only 8% had net earnings in excess of $250,000 per year while half earned less than $50,000; the estimated median net annual earnings are $28,000

.. over half provide between 80% to 100% of their owners' gross personal incomes

- business space characteristics

.. the median floor area is 1,500 square feet

.. the median monthly cost is 34¢ per square foot

- location

.. over half have been at the affected location for ten years or more

.. over half are on month-to-month leases

.. 87% consider their location important for their customers or clients

.. about half think that closeness to the owners' residences is an important feature of their locations

The number and location of businesses to be relocated and the expected results of the relocation are shown in Tables III. 9 and III. 10.

TABLE IV. 9

NUMBER OF BUSINESS ESTABLISHMENTS
TO BE RELOCATED BY AREA

Area	Rapid Transit
Kalihi-Palama	23
Central Business District	60
Kakaako/Ala Moana	51
McCully/Moiliili	3
Kaimuki/Kahala	18
	155

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TABLE IV. 10

EXPECTED RESULTS OF BUSINESS DISPLACEMENT

	Rapid Transit
Would Relocate	114
Would Liquidate	25
Undecided	17
	156*

* Survey included one business in corridor beyond Kahala Mall.

4. CONSTRUCTION DISRUPTON

It is a stated policy of the City and County of Honolulu to minimize the disruption resulting from construction of the proposed rapid transit system. Nevertheless, it is anticipated that there will be some inconvenience and disruption caused by the construction. Overall, past experience elsewhere indicates that at the community-wide level disruption of established business patterns does not result in a net loss to business; nor does it reduce the total level of expenditures. Rather, existing patterns are shifted as people react to the inaccessibility and/or inconvenience of continuing their established behavior patterns. Depending on the nature of the clientele, some groups, such as the elderly, may avoid an active construction area entirely.

While the total level of economic activity is not anticipated to change, individual establishments will be affected by shifts in established expenditure patterns. The timing, magnitude, and duration of these expenditure shifts is not predictable because such items as temporary traffic re-routings have not yet been identified.

In the CBD where major underground construction is planned, bus traffic will be re-routed from Hotel Street to King and Beretania Streets. It is anticipated that by the time construction starts,

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Hotel Street will be an exclusive bus mall and automobile traffic will already have been removed. The re-routing of buses, however, will have immediate impact on retail establishments along Hotel Street that sell significant amounts of convenience items and, therefore, are highly dependent upon walk-in traffic. Presently, that walk-in traffic largely results from the proximity of bus stops and the mauka/makai pedestrian traffic.

The basic approach anticipared for construction of the underground sections in the CBD is the technique known as "cut and cover." With this approach, the underground sections are dug as large ditches, as opposed to tunneling under the surface, and covered, section by section. Current plans call for cross-street traffic, on Bishop, Richards and Bethel for example, to be facilitated during the construction phase by use of temporary covers across the "cut and cover" sections. This is the same approach that was used in BART's construction and is currently being used in Washington, D.C.

This construction approach is likely to somewhat restrict the freedom of pedestrian movement across Hotel Street and thus affect walk-ins to the retail businesses on the adjacent Fort Street and Union Street Malls. The extent of this reduction is not predictable, but undoubtedly will be experienced during the actual construction. Construction dirt and noise will also contribute to making the area generally less attractive to pedestrian traffic. The net result of disruption will be to cause shift in the pedestrian traffic and change in the normal spending patterns generated by that traffic. Spending will most likely be shifted to other areas in the CBD.

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Elsewhere along the route, the impact on businesses will vary depending upon the specific construction approach taken. In many areas, such as the Kaimuki section which is anticipated to be built in the median of the H-1 Freeway, there will be no such impact. Actual construction elsewhere could result in the temporary isolation of individual retail or service establishments from their normal pedestrian flows. To the extent that this occurs, individual businesses may have a significant profitability problem for the duration of actual construction and for a period afterwards. It may take time for normal pedestrian flows to reestablish themselves. If the alternative patterns established during construction are considered more convenient, the original pedestrian patterns and business revenues of the affected establishments may not reestablish themselves. The extent of this phenomenon will, of course, depend on the specific engineering of pedestrian walkways and associated facilities.

The economic impact on individual businesses is not predictable but various data show that Hawaii's small businesses are generally not very profitable and earn only about 5% on revenues. The impact upon individual businesses will, of course, depend on the owner's ability to reduce cost in concert with any reduction in revenues. To the extent that the business is unable to reduce variable costs, profitability will become seriously impared quickly. Analysis of the specific financial information of a selected sample of small businesses indicates a fairly high level (generally about 50% of expenses) of fixed costs. A reduction in revenues ranging from 7% to 20% would begin to impact the profitibility of most businesses in the sample.

The ability of an individual business to survive a period of decreased profitability is a function of a number of factors, including the adequacy of capitalization, prior profitability,

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and income tax status. However, it is well recognized that many of Honolulu's small businesses are under capitalized. This implies that their ability to withstand even a relatively short period of unprofitability is limited and therefore it can be expected that some small business will undoubtedly fail as a result of the disruption from construction of the rapid transit system.

5. IMPACT ON THE TOURISM INDUSTRY

The potential impact of the rapid transit alternative on Oahu's tourism industry must be considered, especially since tourism is now the State's largest industry and, according to many authorities, the only one having significant potential for growth. Analysis of tourism trends and interviews with selected persons associated with the industry suggests that the rapid transit, in the proposed length and alignment, would have a nominal impact on the most important aspects of the tourism industry.

Several aspects of tourist behavior are helpful when considering changes the rapid transit might bring. The typical visitor stays in a Waikiki hotel and remains in the State about 10 days. He or she has arranged for personal travel and accommodations in Hawaii rather than coming with a group tour. The typical visitor spends about $42 per day, of which 29% is for lodging; 29% for food and beverage; 11% for clothing; 14% for inter-island travel, entertainment, and miscellaneous; and 9% for gifts and souveniers. Only 8% is spent for ground transportation and sight-seeing tours. 4/

A large percentage of visitors (37%) comes with a group tour, and their general activities are largely pre-programed. A group tour visitor spends slightly more while here--about $53 per day.

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There is very little information available about where tourists go on Oahu and how many of them use public transportation to get around. A 1970 survey of bus users found that only 2.5% of all riders were tourists, but persons familiar with bus operations admit this percentage has increased considerably. MTL staff have general impressions of most popular bus destinations for tourists. Their experience suggests the following destination priorities:

Priority	Destination	Bus Route No.
1	Ala Moana Shopping Center	5, 8, 57
2	Arizona Memorial	50, 51, 52
3	Polynesian Cultural Center	52
4	Paradise Park	5
5	Sea Life Park	57
6	North Shore/Kuilima	52

Potential impacts of the rapid transit system on several aspects of tourism are discussed below.

The rapid transit system would not greatly encourage the development of hotel rooms in new locations outside Waikiki because few additional developments are under consideration near the proposed alignment. The Department of General Planning has identified potential sites for 18,000 to 30,000 new hotel rooms in off-Waikiki location. 5/. Only about 3,000 of these under consideration in the Ala Moana-Kakaako vicinity would be serviced by the system. Development of two other sites, West Beach (3,000-10,000 units) and Queens Beach (3,000-10,000 units) might be encouraged if the system were eventually extended to Ewa or Hawaii Kai, respectively. It should be noted that the Department of General Planning's listing of potential sites does not reflect the City's current policy regarding tourism growth.

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The rapid transit system would probably not stimulate potential new visitor sites on Oahu. Several persons close to the industry interviewed could suggest no such potential new sites. One person did suggest that the guideway would itself become an attraction. As such, it would become known as an inexpensive Hawaii attraction, much as the around-the-island City bus is now known to many mainland visitors.

The impact on the relative attractiveness of current visitor sites in urban Honolulu is difficult to estimate, but several factors suggest it will not be great. First, the choices of the large numbers of tourists who visit these sites on group tours or on chartered day tours, would not be materially changed. Second, tourists are probably less sensitive than workers to slight changes in travel times. Thus, visitors who now ride the bus to in-town sites probably would not shift their choice among sites due to a few minutes time savings offered by rapid transit. The Arizona Memorial, which is 78 minutes from Waikiki but still a popular City bus ride for tourists, may be a notable exception. The guideway will terminate in the vicinity of the Memorial, only 35 minutes from Waikiki. If the guideway itself becomes an attraction for tourists, then the quicker ride to the Memorial combined with the "end of the line ride" would increase the attraction of that site.

Changes in transit expenditures due to the rapid transit system would probably be slight, but two types of impact are worth considering. First is a minor shifting in the types of tourist expenditures from that described in the profile above might result if the rapid transit system causes more excursions from Waikiki to other locations. Second, a slight decrease in expenditures might result if the system attracts tourists from more expensive chartered excursion tours. A similar decrease would result if tourists spent a greater percentage of their time on excursions and less time shopping. However, nothing suggests that either of these trends would develop to any appreciable degree.

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V. IMPACT ON THE GENERAL COMMUNITY

1. Land Use Impacts
2. Land Value Changes
3. Residential Relocation
4. Safety
5. General Environmental Impacts
6. Parking Requirements in the CBD

V. IMPACT ON THE GENERAL COMMUNITY *

This chapter discusses the anticipated impacts of the two transit alternatives on the general community. Unlike the residential impacts examined in Chapter II which can be identified with certain types of individuals or households, the general community impacts discussed here must be attributed, for the most part, to the community as a whole. Therefore, the impact measures tend to be summarized in aggregated terms.

The first two sections deal with land use and land value impacts, respectively. A particular effort has been made in both these sections to assemble relevant observations from other cities' experiences with transit systems, in addition to presenting available local information. The discussion about expected displacement of residents in the third section is based on a recent survey of affected units conducted for PEEP II. The fourth section examines the relative impacts on transportation safety, considering the loss of life, personal injury, and property damage that can be expected under each of the two alternatives.

Several aspects of environmental impacts are analyzed in section 5. Aggragate impacts on noise and air pollution are estimated, and a subjective analysis of aesthetic considerations is offered. Finally, the long-run requirements for parking facilities in the central business district are compared under the two alternatives.

1. LAND USE IMPACTS

Transportation investments and policies alone do not cause land-use changes. However, they may frequently be used as a powerful catalyst in the formation of land-use development patterns. The fact that transportation investments do not cause land-use changes is one of the reasons why recent rapid transit investments have had widely diversified effects on land use. The use of zoning and other land-use controls in conjunction with the rapid transit construction may channel development patterns as desired. Some examples will serve to demonstrate this.

* Differential impact analysis presented in some sections of this chapter were conducted by Dr. Peter R. Stopher, Director of Research, the Transportation Center, Northwestern University.

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(1) Experiences in Other Cities

In Toronto, the initial four and one-half mile Yonge Street subway was utilized as a means to concentrate the expansion of business and commerce in downtown Toronto. The subway is credited with triggering $10 billion of downtown expansion, which would probably have taken place as diversified development throughout the metropolitan area if the subway had not been built. The subsequent construction of the University extension and the Bloor-Danforth line, an east-west line of 14.25 miles in length, has continued the growth of downtown Tornoto. Development in that area has averaged 2 to 3 million square feet of new office space per year since the opening of the Yonge Street subway. Since then, ninety percent of all office construction in Toronto has occurred in the planning districts through which the subway passes. It is important to note, for purposes of comparison with Honolulu, that the Toronto subways are entirely within the domain of the regional Toronto government, which is also the regional planning body and overall land-use control agency for the area. Controls against extensive business development outside of the downtown area have been rigidly enforced by this agency. There has also been considerable growth of high rise apartment buildings along the Toronto subway lines. Areas surrounding many of the transit stations that were predominantly single family residential areas have been replaced by high density apartment complexes, some heavily mixed with commercial and recreational uses.

The "Speedline" from Lindenwold, New Jersey to Philadelphia is a 14.5 mile high-speed rapid transit line providing service into the business districts of Camden, N. J. and Philadelphia, Pa. Since the line only opened in 1969, it is still too early to clearly identify the effects of this transit line on land use patterns. Preliminary findings, however, indicate that the line has had some effects in encouraging development of the Philadelphia CBD and has also encouraged suburban

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business development, particularly in Haddonfield and Cherry Hill. In addition, the decline of the Camden CBD shows signs of accelerating. Indeed, many of the businesses (about 70%) that have located in Haddonfield and Cherry Hill suburbs have relocated from the Camden CBD. Thus, the Speedline has had the effect of both strengthening the Philadelphia CBD and encouraging suburbanization of business in New Jersey. It should be noted in this case, that there is no single authority with the power to control land use in all of the jurisdictions adjacent to Speedline and that no attempts have been made by the various governmental units to coordinate development policies. The fact that the affected area covers two states further compounds the situation.

BART has not been in operation long enough to reveal any clear trends in development patterns. However, since construction began on BART, $1 billion of commercial construction, stimulated by BART, has been completed in downtown San Francisco. Further development is continuing at a rate greater than that seen in San Francisco since the rebuilding after the 1906 earthquake. Similarly, a $165 million city center redevelopment project has been launched by Oakland as a result of BART. The precise extent of BART's effects in generating both of these developments is difficult to substantiate, but it does appear to be consistent with effects in Toronto and New Jersey. Outside of central San Francisco and Oakland, there has been little successful commercial development along BART and no obvious changes in residential development patterns so far. It might be concluded, however, that pressures for increasing urban sprawl have been lessened by the presence of BART.

A study based on intensive interviews with realtors, bankers, developers and other participants in the land development process who were familiar with the BART project focused on the way in which development and redevelopment

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decisions are affected by BART. Most of those interviewed said that those decisions in which they themselves have been involved BART has not had much influence on market activity. There was an agreement that on a regional scale BART is redistributing activities. Residential densities in Central Contra Costa and Southern Alameda Counties and office construction in San Francisco are increasing. Systemmatic acquisition of land near BART stations is not occurring. In general, the responses suggest that the way in which BART may influence individual development decisions is obscure. 6/

Again, in the Bay Area as in the Lindenwold case, there is no single regional authority for controlling land use. Coordinated land development policies have not been formulated by the individual municipalities.

(2) Conclusions for Honolulu

The above cases show that specific transportation investments do not directly cause specific land use changes. A major transportation facility together with related public investments, private sector decisions, and public policy decisions will obviously influence land use patterns. The cases suggest that a transit system under a unified political and planning jurisdiction (such as is the case in Honolulu) offers greater opportunities for channelling land use impacts. On the other hand, multiple political and planning jurisdictions offer a greater probability of competition for land use impacts and less opportunity for channelling regional impacts.

As a moderate expansion of the existing bus system, the future bus system would offer no special opportunities for achieving land use plans beyond those opportunities that are apparent in current land development trends in Honolulu. The rapid transit system, in comparison, offers a major catalyst for channelling future growth according to regional land use plans, if the land use plans and transit system routing are

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consistent. Honolulu's experience in this respect may be more like that of Toronto than the other cities discussed in the cases above. As in Toronto, the entire transit system would be in a single political jurisdiction. And, while the State and the City and County both have land use planning functions, each exercises its authority over the entire island rather than over adjacent and potentially competitive subregions.

It is useful to consider two categories of land use impacts when examining the possible effects of the rapid transit system. These are:

- Local impacts, which deal with the clustering or density of new growth in subregions. As new growth comes to all parts of the City, how will the density or configuration of that growth change?

- Islandwide impacts, which deal with the distribution of new growth; that is, changes in the rate of growth in different regions of the island.

The most obvious local impact of the rapid transit would be a concentrating of new growth in those areas near the transit line which have a capacity for growth under the existing land use, zoning, and general plan designations. Development of these parcels of land would require no new policy decisions by the City. PEEP I and II examined parcels of land within one quarter mile of the transit stations to determine the potential for this type of growth.

In summary, there is a capacity for an additional 240 single family units on about six acres around the proposed Kahala station. Around the University, Date Street, Waikiki, Ala Moana, and Ward Street stations there is a capacity for about 2,000 single and muti-family residences on 13 acres. These station areas also have the potential for eight acres of high density office space and an acre of industrial area. The Iwilei station vicinity can accommodate 1.5 acreas in multi-family uses, 0.7 acres of commercial office space, and 0.6 acres of industrial space. (PEEP II, Doc. #44)

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These uses can be expected in the short run future under the rapid transit alternative. Under the conventional bus alternative these parcels would not be developed, or, if developed, they would be spread over a longer period of time or would lose some of their density to other parcels with development potential located farther from the transit stations.

There is much greater potential for increased densities along the transit through new zoning and general plan decisions by the City Council. Using zoning and general planning as tools to move new growth in neighborhoods closer to the transit line may be especially attractive to the City as a means of reducing the annual operating deficit of the rapid transit. Current projections of operating deficits are based on ridership resulting from future growth according to the land use projections in the 1964 Oahu General Plan. Any general plan changes which move future growth closer to the system could reasonably be expected to increase ridership and thereby reduce the operating deficit. The recent proposal to the City Council by Mr. William Mau to create a special design district around the site of the proposed Waikiki transit station may be a typical example of the opportunities to increase densities along the transit line. Under the initial proposal the Waikiki station site would include a 25 story office building, a 31 story apartment building, a 20 story hotel tower, and a parking structure and commercial shopping mall.

While much higher densities along the line would be consistent with the Toronto experience and minimize system costs, this prospect is not predetermined since any significant density increases along the line require deliberate policy decisions by the City. The conventional bus alternative, which will incur a significant deficit by 1980, would not offer a similar opportunity, largely because it lacks sufficient capacity.

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The regional land use impacts, that is, how future population and commercial growth is distributed to different parts of the island, will also be a function of both the transit system and public policy decisions regarding land use districts, the general plan, development plans, and zoning. Ideally, the transit system would be designed to support a plan for locating future residential, commercial, industrial and other growth. Honolulu is now in the unusual position of recasting the general plan which the rapid transit system was designed to support. A review of the October 1976 Oahu General Plan Draft Report suggests that its major population and employment growth parameters are roughly consistent with assumptions used in the PEEP II analysis. The Draft General Plan assumes a slightly higher population (1,039,000 in the year 2000 versus 990,000 assumed under PEEP II) and shows a slightly greater portion of growth going to the Pearl City-Central Honolulu area and to the Ewa area. Policy statements in the plan suggest the possibility of a larger employment base in Ewa than was projected in PEEP II.

Since finalization of the general plan and subsequent public policy decisions will largely determine eventual land use impacts of rapid transit, it may be most useful to consider what land use options might be foregone under each of the two alternatives.

The opportunity to maintain and improve downtown Honolulu as the financial and civic center of Oahu and the major retail and office center, in accordance with the Draft General Plan, may not exist under the bus alternative. The bus system would not have the capacity to move enough people on demand into the CBD to maintain the CBD as envisioned in the Draft General Plan. Options under the bus alternative may be limited to greater diffusion of these

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activities throughout the Honolulu-Waipahu corridor, or perhaps the growth of satellite centers accessible by car in locations such as Pearl Ridge and Kahala. The rapid transit system, with its much greater capacity for moving people along its 14-mile guideway corridor, would not foreclose this option.

The limited transportation capacity in the bus alternative may also foreclose the possibility of distributing population and employment activities as proposed in the Draft General Plan. The plan proposes to locate about 44% of the new Oahu population in Ewa, the Urban Fringe areas of central Oahu, Wahiawa, and Aina Koa-Hawaii Kai. Even though a Secondary Urban Center with a new employment base is proposed for Ewa, the bulk of new employment is proposed for Waipahu-Kahala, the Primary Urban Center. Table V. 1 displays these population targets. If the conventional bus alternative can only handle transportation demand through 1980, then long run development options may be limited to concentrating much larger portions of the future population in the Primary Urban Center nearer future employment, or dispersing a much larger portion of future employment to the Urban Fringes; that is, allowing employers to relocate closer to sources of labor.

TABLE V. 1

Population Proposal
New General Plan: October 6, 1976 Draft

Area	Population 1975	Population 2000	Increase	% of Total Increase
Kahala-Waipahu (Primary Urban Area)	422,000	561,000	139,000	41%
Ewa (Secondary Urban Center) and Central Oahu & Wahiawa (Fringe)	91,000	215,000	124,000	37%
Aina Koa-Hawaii Kai (Fringe)	39,000	62,000	23,000	7%
Other Fringe & Rural Areas	152,000	201,000	49,000	15%
Total	704,000	1,039,000	335,000	100%

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A simple analysis was conducted to illustrate the relative ability of the two transit alternatives to support the population distribution proposed in the General Plan by providing capacity to transport suburban residents to the Primary Urban Center. Two screenlines, one in Pearl City and one in Aina Haina, were chosen through which suburban residents commuting to the Primary Urban Center would have to pass. This involves H-1 Freeway, Kam Highway and Moanalua Road in the Pearl City area and Kalanianaole Highway in Aina Haina. Both transit alternatives feature buses crossing the screenline - feeder buses bound for the Halawa and Kahala terminals in the rapid transit alternative and town-bound buses under the conventional bus alternative. For each alternative, the remaining capacity for person-trips through the screenlines was calculated based on future road laneage and use, the number of buses, and present volumes. The remaining capacity for person-trips was translated into the total population that could be added beyond the screenline using assumptions about commuting behavior and the number of persons per dwelling unit. Appendix A provides details of the analysis. The analysis is intended to illustrate relative capacities, not to predict future travel behavior. Different assumptions about travel behavior would, of course, change the figures in Table V. 2, but both alternatives would be similarly affected.

*For this analysis the western screenline has been placed in the Pearl City Area because this is near the western extreme of the Primary Urban Center identified in the Draft General Plan. Motorists bound for downtown encounter the greatest capacity constraint in the Red Hill and Shafter Flats areas. The area designated as the Primary Urban Center extends all the way to Pearl City, however, and not all commuters in 1995 will be passing through areas that are the present bottlenecks.

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TABLE V. 2

COMPARISON OF RAPID TRANSIT SYSTEM AND BUS ALTERNATIVE AS A CONSTRAINT ON GENERAL PLAN POPULATION TARGETS:

EWA, CENTRAL OAHU, WAHIAWA

	General Plan Proposes to Add:	Transport Capacity Will Allow:		Number Not Accommodated:	
		Bdrm. Community in Ewa	Urban Center in Ewa	Bdrm. Community in Ewa	Urban(1) Center in Ewa
RT	124,000	82,000	124,000	42,000	-0-
Bus	124,000	73,000	110,000	51,000	14,000

AINA HAINA - HAWAII KAI

	General Plan Proposes to Add:	Transport Capacity Will Allow:	Number Not Accommodated:
RT	23,000	35,000	-0-
Bus	23,000	9,000	14,000

(1) Assuming that 1/3 of the peak period trips by new population are diverted to Secondary Urban Center in Ewa.

In conclusion, the analysis shows that the all-bus alternative would be a greater constraint on achieving population growth targets to the east and west of the Primary Urban Centers. The rapid transit system, which would have a greater number of express buses serving the Hawaii Kai area, would support planned population growth in the Aina Haina-Hawaii Kai area, while the conventional bus alternative would leave approximately 14,000 persons unaccommodated. Figures in the table also show that the rapid transit system would

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also support planned population targets in Ewa, Central Oahu and Wahiawa provided that Ewa develops as a Secondary Urban Center rather than as a typical suburban bedroom community. For this analysis, it was assumed that new jobs and other activities in the Secondary Urban Center could attract one-third of the peak hour trips to Honolulu that would otherwise be made by the new population in that area. With a Secondary Urban Center in Ewa, the bus alternative would fail to accommodate 14,000 of the proposed new population while all of these persons could be supported by the rapid transit system.

2. LAND VALUE CHANGES

Any major change in transportation facilities will influence land values in the areas affected by the facilities. Three primary types of changes are likely to take place. First, private land acquired for the construction of the facility is removed from the tax rolls and from the stock of land available for development or redevelopment. A possible offset exception to this is the use of air rights for development over the facility. Second, the land adjacent to the new facility may change in value. Land that becomes more accessible will generally increase in value. Land that suffers a relative reduction in accessibility will generally decline in value or will increase in value more slowly. Third, land in the development fringes of the urban area, remote from the facility, may decline in value or increase more slowly because of the improved development potentials elsewhere, for example in the vicinity of the new transportation facility.

Any changes in land values due to transportation facilities on Oahu must necessarily be considered a redistribution of values rather than a net increase or decrease in islandwide values. Evidence suggests that net regional land values do not change with the building of a transportation facility.

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For purposes of weighing relative impacts, the conventional bus alternative can be considered to have no future impact on land values. This is primarily because the bus alternative proposes only a very modest increase in transportation capacity over the existing system.

(1) Experiences in Other Cities

Studies were undertaken in Toronto in 1959 and 1962 of the effect of the Yonge Street subway on land values. It was determined that land values had increased by 38% from 1952 to 1962, compared with a city-wide average of 25%. While not all of this land-value increase can necessarily be attributed to the subway, it appears that a substantial portion of it probably can be considered to have resulted from the facility. This land-value increase along the 4.5 mile line is estimated to have generated more than $5 million per year in property taxes.

Two specific instances of land-value increases in Toronto are illustrative. A piece of vacant land opposite the Eglington Terminal was purchased for $8,000 in 1948 by the Toronto Transit Commission for the construction of the subway. It was sold as surplus in 1952 for $100,000. Another piece of vacant land was purchased in the same area by a developer for $22,000 in the same year. Still vacant in 1957, it was resold for $257,000.

Finally, it has been estimated that land adjacent to the 14.25-mile Bloor-Danforth line in Toronto was worth $250 million in 1963. In 1966, after the line began operation, the same land was valued at over $500 million, which is a doubling in value. There is, however, no documentation from the Toronto system on land-value changes in areas remote from the subway system or on the costs of land acquired for construction.

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BART has been in "full" operation for too short a time to determine the extent of value changes. However, an early study indicated that residential properties in the vicinity of the Glen Park Station have increased in value by about 8% more per year than properties in the entire Outer Mission District. There is also some evidence of increased values in the areas just beyond the Concord Terminal of the line.

Quantitative information on land-value impacts of the Lindenwold line in Philadelphia is largely unavailable. Early studies indicate that the line has apparently resulted in increased values of land both along the line and beyond the suburban terminus. The extent of these land-value increases in not fully documented, but it is suggested that they are about equal to the travel cost and travel time savings to the user per year. In other words, the added value on a house with one worker, who saves 10 minutes per day and 20¢ per day because of the Lindenwold line, would be $850 per year, assuming that his time is worth $5 per hour. It has also been noted that at least a portion of the impact of the Lindenwold corridor on land values is a transfer of property values from nearby unserved corridor.

(2) Conclusions About Honolulu

The first change in land values is due to the acquisition of land for the construction of the rapid transit system. The market value of the land and improvements identified in PEEP II for acquisition is $35.6 million, excluding property that is already in the public sector and which does not yield property taxes. Based upon the 1973 land value of the City of Honolulu, this represents less than 0.4% of the land value of the urban area. The tax yeild of this land in 1976 is estimated at about $356,000.* Table V. 3, followig page V- displays this and other land-value information.

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* Assumes 1976 Oahu effective tax rate of $16.66/$1,000 assessed valuation and assessed value at 60% of market value.

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The lease of air rights for development over some of the rapid transit stations is a potential source of public revenue, although its realization would require both the investment in the system and a public policy decision to develop these spaces. PEEP II estimated that 10.8 acres worth $9 million at six stations (Kalihi, Iwilei, Ward Avenue, Waikiki, Date Street, and Kahala) could be developed in this way (PEEP II, Doc. #44). Developing slightly more than half of this acreage would involve $5 million in land at market value and would generate from $350,000 to $500,000 in annual lease rentals.

The second change results from increased land values in the vicinity of the facility. Smith, Barney and Co., Inc. estimated for PEEP II that the 1973 market value of land within one-quarter mile of the transit stations on the 14-mile fixed-guideway system was between $550 million and $680 million. This represents a conservative estimate of mate of the land that would be affected by the rapid transit system. Using these land-value figures, however, and based upon experiences in Toronto, it may be estimated that all of the land proximate to the rapid transit stations may double in value to about $1.2 billion by 1983, if the system is operating by then. Assuming a city-wide increase of 5% per annum in property values (a higher rate than occurred in Toronto or Lindenwold during their land-value study periods) through the same period, this land would increase in value to about $850 million without the rapid transit system. Thus, the system would have resulted in increased value on the order of $350 million during this period.

The value increment may range widely by 1995 depending on whether the higher annual land-value increases are maintained over the period, or whether the initial $350 million increment represents a one-time value increase. There is no documentation on transit induced land value changes over a

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comparably long period of time. So it is not clear whether the $350 million increment would be a one-time value increase or whether the land near the stations would continue to appreciate at a higher rate. In the former case, the initial land-value increment would be worth $630 million in 1995, assuming a 5% annual value increase. However, if the differential annual rate of increase were maintained, the added value near the stations would be worth $2.5 billion in 1995.

The estimates above reflect expected added values to all land around the stations, which would include increments to existing properties as well as higher values for development of vacant lands or redevelopment of underutilized lands. PEEP II estimated the added value that could be expected from just new development and redevelopment (PEEP II, Doc. #44). Based on a parcel-by-parcel examination of existing use, zoning and general plan designation of lands around the stations, PEEP II projected an $8 million increment in assessed value of these lands, which reflects a $13 million increase in market value. This would generate about $130,000 in annual tax revenues. This increase from new development and redevelopment would, of course, have to be considered a part of the overall value increase expected on lands around the stations.

Evidence from Toronto and Philadelphia suggests that property beyond the termini of the line and property that has direct bus service to transit stations can also be expected to increase in value. Thus, areas such as Aina Haina, Niu, Hawaii Kai, Pearl City, Aiea, and Pearl Ridge, among others, may all experience significant value increases because of their proximity to the ends of the rapid transit line. The areas along the line that would be affected might be twice or three times the amount of land within walking distance of the stations. No reasonable basis exists, however, for estimating what the magnitude of the increase in these areas might be.

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In summary, the land-value changes outlined here are highly speculative in nature. Their accuracy depends not only on the general land-value changes that occur throughout the Honolulu area during the period, but also on the extent to which the findings of other cities are applicable to Honolulu. However, it seems reasonable to conclude that land-value increases would be at least $630 million in 1995 and could be as high as $2.5 billion for all lands within one quarter mile of the stations. If current property-tax rates are maintained, this added value will generate between $6.3 million and $25 million property taxes for the City of Honolulu in 1995. In addition, the leasing of air rights for development above transit stations affords the potential of keeping valuable land in uses that could generate up to an additional half million in annual revenues.

Finally, it should be emphasized again that value increases near the line and the stations will probably result in lower value increases than would normally occur on land on the periphery of the urban area, including vacant land that might be developed if the rapid transit system were not built. Thus, the land value increases discussed here may be simply a redistribution of land values from the periphery of the area to the transit corridor. The net effect of the rapid transit on aggragate island land values and public tax revenues may be little or nothing.

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TABLE V. 3

LAND VALUE IMPACTS

SUMMARY

Source of Estimate	Area Involved	Type of Impact	Market Value of Land	Net Impact on Value	Net Impacts on Annual Taxes or Revenues*
PEEP II	Take of Private Lands/ Improvements for Right-of-Way (22.14 acres)	Removal from tax	$35.6 million (1976)	(35.6 million) lost	($356,000) taxes
PEEP II	Air Rights at 6 stations (10.8 acres)	Lease of develop-able air rights	$9 million (1976)	5 million developable	$350-500,000 annual revenues (1976)
AY	All land within ¼ mile of sta-tions (700 acres)	Higher Annual Increase In Value	$550 - 680 million (1973)	$350 million by 1983 $630 million - 2.5 billion by 1995	$3.5 million taxes by 1983 $6.3 million - 25 million taxes by 1995
PEEP II	Only developable or redeveloopable land within ¼ mile of stations (30.1 acres)	Higher uses of selected parcels	Not documented	$13 million by 1985	$130,000 by 1985
AY	Property near end of line or on feeder bus routes	Higher annual increases in value	Not quantified	Not quantified	Not quantified

*Tax impact assumes tax rate of $16.66/1,000 assessed valuation (the 1976 average effective rate for all Oahu land) and assessed value at 60% of market value.

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3. RESIDENTIAL RELOCATION

This section deals with the current alignment of the relocation of residences that would be required under the rapid transit alternative. Information presented here is drawn from a detailed study of relocation impacts conducted in Spring 1975 for PEEP II (PEEP II, Doc. #29). Since the bus alternative would involve no new construction or rights-of-way acquisition, no relocation is anticipated under that system. Table V. 4 summarizes characteristics of the units that will be affected. In general, the units that would be removed have the following characteristics:

- A total of 162 units would be removed. Of these, 139 are in the McCully-Moiliili area.
- In the McCully-Moiliili area the majority (78%) of the units to be removed are in low-rise apartments of four stories or under.
- The units tend to be small. About two-thirds have three rooms or less. Few of the units occupied by three or more people have more than 800 square feet.
- Six units are in need of major repairs, but none is dilapidated or beyond repair. Only nine units are substandard, lacking basic facilities.
- 89% of the units are rented and the median rent is $148.
- All owner-occupied units are reportedly worth more than $70,000.
- A typical unit that will be affected is a standard renter-occupied, low-rise apartment with no more than two bedrooms, renting for less than $200 per month, having complete kitchen and plumbing facilities and in sound condition.

Information on the characteristics of the residents to be affected is based on interviews in 140 households. Included are some interviews in 5 units surveyed in the Aina Haina to Hawaii Kai area that would not be affected under the 14-mile fixed guideway proposal. The residents to be removed have the following characteristics:

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- Over half of the households to be relocated are families having two or more related persons. Over 40% are single individual households, all of which are in multi-family units. The average number of persons per household is 2.1.

- Over half of all households have lived in their units for two years or less.

- About half of the households pay more than 25% of their income for rent and one-third pay more than 35%.

- There are two typical kinds of households to be displaced:

  - A small (2-3 person), non-elderly family, whose income is under $1,200 per month and whose head is a married and employed male of Japanese or Caucasian ethnicity.

  - A non-elderly, single male or female who is employed full or part time with a monthly income of less than $500.

TABLE V. 4

Location and Type of Residences to be Removed by Guideway

TYPE OF UNIT		LOCATION		
	Total Units	Kalihi-Palama	McCully-Moiliili	Kapahulu-Kahala
Single family	12	-	11	1
Duplex	20	-	20	-
Low-rise apartment	108	-	108	-
Sleeping room (hotel)	22	22	-	-
Total	162	22	139	1

4. SAFETY

Rapid transit vehicles and buses historically show lower rates of accidental death and injury to passengers than do automobiles. The bus alternative would divert some motorists from their cars.

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There would be additional prevention of deaths, injuries and property damage to the extent that additional persons could be attracted to transit vehicles and buses under the rapid transit alternative.

The bus alternative is estimated to result in 14,143,530 vehicle miles of automobile travel and 58,180 vehicle miles of bus travel in Honolulu per day in 1995. Using recent (1971) national accident rate figures, this suggests that there will be 0.64 deaths, 29 injuries and 164.7 property damage accidents per day due to automobiles. 7/ For buses, national accident figures only give the number of deaths per 100 million vehicle miles. Since the rate for buses was one-quarter of that for autos in 1971, it can be assumed that the rates for injury accidents and property-damage accidents will also be one-quarter of the highway figures. This results in an infinitesimal chance of a death per year on buses and only 9 injuries and 51 property-damage accidents per year.

If the rapid transit were in operation in 1995, it would have 64,230 vehicle miles of travel each day and the feeder buses would have 94,260 vehicle miles per day. Auto travel will be reduced to 12,553,670 vehicle miles per day. Reported deaths per 100 million vehicle miles of rapid transit travel are half the figures for auto, so half the figures for the auto injury and property-damage accidents are assumed. Using these figures, the total number of deaths resulting from the automobile, the rapid transit, and the buses will be just over 210 per year, with 9,542 injuries and 54,105 property-damage accidents during the year. The details of these accidents are shown in Table V. 5.

Thus, the construction of the rapid transit would save about 24 lives per year, 1,052 injuries and 6,061 property-damage accidents in 1995. In a recent study by the National Highway Traffic

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Safety Administration of the United States Department of Transportation, the societal costs of accidents were estimated to be $200,000 for a fatality, $7,200 for an injury, and $300 for property damage only. These costs are based only on the actual economic costs of the accident itself, plus some attempt to include

TABLE V. 5

Annual Vehicle Accidents in 1995 in Honolulu

Accident Type	With Rapid Transit				Without Rapid Transit		
	Combined	Rapid Transit	Bus	Auto	Both Bus and Auto	Bus	Auto
Deaths	210.1	.4	.3	209.4	233.8	.2	233.6
Injuries	9,542.1	20.0	14.7	9,507.4	10,594.0	9.0	10,585.0
Property Damage	54,105.4	113.4	83.2	53,908.8	60,166.7	51.2	60,115.5

costs to society at large resulting from losses to the working force, insurance payments, and similar costs. They are not an attempt to value a human life nor to include the costs of the misery and mental pain associated with deaths and injuries. Using these figures, however, the savings to society of the installation of the rapid transit versus the bus alternative are shown in 1976 dollars the total accident savings would be over $19.2 million.

TABLE V. 6

Societal Value of Accident Savings Accruing from the Installation of a Rapid Transit System in Honolulu for 1995

Accident Type	Amount of Societal Saving
Deaths	$ 6,435,000
Injuries	10,304,000
Property Damage	2,473,000
Total	$19,212,000

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5. GENERAL ENVIRONMENTAL IMPACTS

Noise and air pollution are two impacts of transportation that are readily perceptible to the general population. In addition, opportunities for enhancing the aesthetic aspects of the urban environment should also be considered when the relative impacts of the rapid transit and the bus alternative are compared. Comparisons are made for each of these areas in separate subsections below.

(1) Noise Impacts

A rubber tired, electrically powered transit vehicle generates substantially less noise than a conventional bus or automobile. Unlike air pollution, the actual noise impact of any vehicle is dependent upon a large number of local conditions. For example, a tunneled guideway or highway will offer the lowest noise impacts from any vehicle, while placing the guideway or highway on an aerial structure with no sound absorptive barriers will generally offer the highest noise impacts.

The noise impact of a vehicle is also dependent upon the existing sound levels to which it is added. Noise is measured in decibels. An increase of 10 decibels (dB) indicates a subjective doubling of the noise level. An increase of 3 dB is about the smallest sound difference that the human ear can detect. Noise is usually measured on an A-weighted scale to indicate how humans react to noise. The weighting process simply gives more weight to the pitches that the human ear responds to most readily and less weight to those that are at the extremes of our hearing ability. Measurements on this scale are designated dBA. Some illustrations of typical noise levels are given in Table V. 7.

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TABLE V. 7

Some Typical Noise Levels

Noise Source	Noise Level (dBA)
1976 Automobile at 25-30 mph at 50 feet	73
Ringing Alarm Clock at 2 feet	80
Vacuum Cleaner at 10 feet	69
Room in a House in the Country at Night	32

As an illustration of the way in which sounds add up, a 1976 automobile traveling at 25-30 mph on an arterial street will produce 70-75 dBA at 50 feet from the center of the roadway. (This would be about the distance to the front of a building facing the street.) If there were 250 vehicles per hour on the street (a very lightly traveled street), the noise level would increase by a few dBA. The subjective noise level increases arithmetically as the number of cars grows logarithmically. So that increasing the volume of cars to 3,000 vehicles per hour raises the noise level only by several dBA. So, adding another vehicle to this street is unlikely to increase the perception of noise from it. Figure V. 1 shows the general nature of the relationship of the number of vehicles to the noise we hear.

Figure V. 1

Relationship between Number of Vehicles and Noise

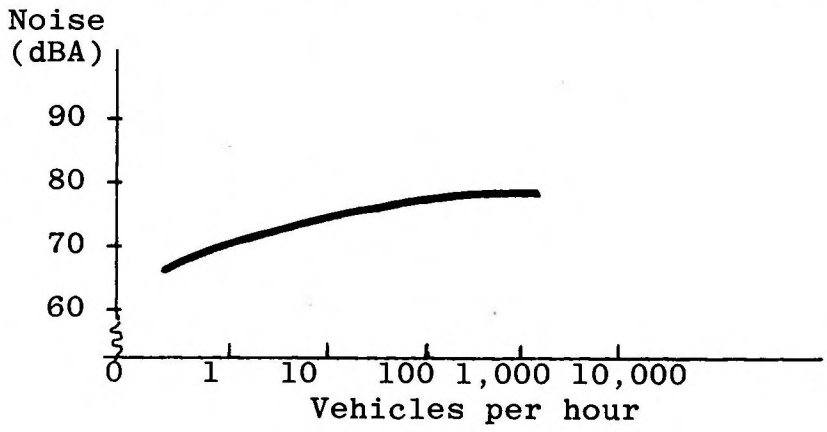

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Table V. 8 lists the noise levels for various types of vehicles as shown in the draft environmental impact statement (EIS) for the rapid transit done under PEEP I. 8/. All of the noise levels are measured at 50 feet from the vehicle and are the maximum levels that would occur in normal operation. All of the noise levels assume that there are no other traffic noises audible and that background noise level is very low (e.g. 30-35 dBA).

TABLE V. 8

Comparative Noise Levels of Cars, Buses and Fixed-Guideway Vehicles

Noise Source	Noise Level at 50 feet (dBA)
Modern Diesel Bus at 35 mph	83-88
Possible 1978 Diesel Bus at 35 mph	75-80
1976 Automobile at 25-30 mph	70-75
3,000 Automobiles at 25-30 mph	75-84
Rubber Tired Rapid Transit, 2 cars	61-68
Rubber Tired Rapid Transit, 5 cars	64-71
Rubber Tired Rapid Transit, 10 cars	65-72

It is clear from the above table that the rapid transit vehicles are quieter than autos and substantially quieter than buses. More importantly, if rapid transit trains are added to existing automobile traffic, for example in the median of the freeway, the trains will have the effect of adding less than one dBA to existing noise levels. That is, they will be imperceptible. On the other hand, the much noisier buses would add about 10-11 dBA to the existing noise levels, resulting in a perceived doubling of the noise level.

Mean noise levels along the proposed fixed guideway route now vary from 53 to 68 dBA in the day and from 47 to 61 dBA at night. (These measurements are from the baseline survey in the draft EIS and reflect noise at the building

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set back line. They mask the effects of peak period traffic by averaging over large portions of the day.) As Table V. 9 shows, the mean level of noise at these points with the rapid transit system would be about 55 to 70 dBA in the day and 53 to 63 at night. If conventional buses are used along the route, the noise levels would be higher, on the order of 60-74 dBA in the day and 58-70 dBA at night.

TABLE V. 9

Mean Noise Levels Along Guideway Route
(in dBA)

	Current	Rapid Transit	Bus Alternative
Day	53-68	55-70	60-74
Night	47-61	53-63	58-70

Since the rapid transit system will have more buses than the bus alternative, (576 in feeder and express lines versus 450 in the entire bus alternative system in 1995), the noise level along feeder bus routes and express bus routes to the guideway terminals may be higher at times, especially during peak traffic periods. Some of the unmet demand for transportation under the bus alternative system will generate additional cars on the road. But adding cars to an existing traffic stream would not be as noisy as having more buses on the road even after considering the larger carrying capacity of the buses. However, comparable estimates of noise levels on feeder and express bus routes cannot be reasonably made because the baseline noise survey completed for the draft EIS took measurements only along the proposed fixed guideway route.

(2) Air Pollution

The implementation of a rapid transit system in Honolulu would reduce the levels of air pollution in the urban area in two principal ways. First, some auto drivers would be

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attracted out of their cars and onto the combined fixed guideway-feeder bus system. On this system, transit vehicles produce lower emissions per passenger mile than cars, and also reduce the periods of congestion during which cars generate far higher levels of pollutants than at other times. Second, the pollutants from the rapid transit system would be generated only at several coastal points in the urban area (e.g. at the several power stations) and would not disperse pollutants throughout the urban area. Moreover, under normal tradewind conditions these pollutants would be readily dispersed over the ocean.

Table V. 10 shows the pollutants emitted for each vehicle-mile of travel by bus, auto, and rapid transit vehicles. Several observations are in order.

TABLE V. 10

Emissions Per Vehicle-Mile

Pollutant	Travel Means		
	Bus	Auto (25 mph)	Rapid Transit Vehicle
Carbon Monoxide	.045 lbs	.022 lbs	-
Hydrocarbons	.007 lbs	.002 lbs	-
Nitrogen Oxides	.074 lbs	.002 lbs	.016 lbs
Particulates	.003 lbs	.0002 lbs	.010 lbs
Sulfur Dioxide	.005 lbs	.0004 lbs	.018 lbs
Total	.134 lbs	.027 lbs	.044 lbs

Five cars produce the same total pollution as one bus, although almost all of the car pollution is highly poisonous carbon monoxide, while half of the bus pollution is the relatively less noxious nitrogen oxides. Similarly, two cars

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produce more pollutants than one rapid transit vehicle, and the latter produces negligible amounts of carbon monoxide. Finally, production of carbon monoxide and hydrocarbons is a function of auto speed, but pollutants from the other two vehicles are unaffected by speed. At speeds below 25 mph, auto pollutants rise very rapidly.

Daily pollutants are shown in Table V. 11 for all vehicles using PEEP II vehicle mileage figures for each mode in 1995 and assuming: auto speeds of 15 mph in the peak and 23 mph in the off-peak; that 20% of daily auto travel occurs in the peak period with the rapid transit and 30% with the bus alternative. Reliable figures for commercial vehicles are not available and no estimates of pollutants from them are included. Shortening the length of the peak would cause a greater relative reduction of pollutants under the rapid transit alternative.

TABLE V. 11

Total Daily Emissions for Honolulu in 1995

Travel Means	Total Daily Pollutants (in tons)	
	With Bus Only	With Rapid Transit
Bus Alternative	3.9	6.3
Rapid Transit	-	1.4
Auto	222.2	190.1
Total	226.1 tons	197.8 tons

Use of the rapid transit for passenger movement would generate daily pollutant levels 28.3 tons lower than the bus alternative, which would be a 12.5% reduction. In the urban area, the reduction would be slightly higher -- 29.7 tons -- because the pollutants from the rapid transit vehicles would not be generated in the urban area. Thus, although the rapid transit system cannot solve air quality problems, it would clearly have positive effects relative to the bus in arresting the general trend of worsening air quality in the urban area.

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(3) Enhancement of the Aesthetic Environment

An incidental impact of rapid transit construction may be the enhancement of various elements of the visual or aesthetic aspects of the urban environment. In certain cases, this enhancement may result from the use of the transit construction to acquire property that may be demolished and replaced with improved buildings and landscaping. Alternatively, it may result as an unplanned incidental impact as construction work is completed and the area relandscaped and made good.

The principal examples of environmental enhancement of this type are to be found on the BART system and along the Transit Expressway experimental line in Pittsburgh. In both cases, one environmental benefit has been the creation of "linear parks" along elevated sections of the guideway. These linear parks consist of landscaped areas of slightly greater width than the right-of-way, with landscaped plantings, walks, fountains, pools, benches, children's play areas, etc. extending beneath the guideway. One such park was built beneath the BART right-of-way in El Cerrito and has been praised widely by the local residents, planners and environmentalists. A similar park was created beneath a section of the Transit Expressway in Pittsburgh.

A second environmental advantage has accrued where construction has required the acquisition of dilapidated buildings that are subsequently replaced with higher-quality buildings and appropriate landscaping. In some instances, opportunities may be taken to create park areas within a downtown area or within a residential neighborhood. A number of examples of such enhancement are evident in the BART system, and several are anticipated for the Washington Metro and for MARTA in Atlanta.

In general, such environmental enhancement is obtainable by a deliberate decision to use the opportunity of the rapid transit system construction to provide such opportunities. In Honolulu, instances of this type of enhancement are shown in the artist's rendering for the Civic Center Station, for example (PEEP II, Doc. #20A).

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6. PARKING REQUIREMENTS IN THE CENTRAL BUSINESS DISTRICT

As the Central Business District (CBD) continues to attract more jobs and more retail spending, the need for parking facilities for both short- and long-term parking will increase. The amount of additional parking space required in the future will depend, in part, on the capacity available in the rapid transit system to divert motorists who would otherwise need parking stalls.

The rapid transit system would have a much greater capacity to move people than would the bus alternative. Thus, it would require smaller increases to the current inventory of parking stalls in the CBD to accommodate future growth than would the bus alternative. Estimates of future needs under each alternative can be made by updating the most recent projections of CBD parking requirements to reflect the 14-mile rapid transit and the bus alternatives.

The 1973 "Downtown Honolulu Comprehensive Parking Study" focused on the area bounded by Richards, Queen Emma, Vineyard, River Streets and the waterfront. 9/. It made alternative estimates of future needs under a 23-mile fixed guideway versus an expansion of the existing bus system to 376 vehicles. Employment in the CBD was assumed to grow from about 33,000 in 1975 to 43,000 in 1985 and 53,000 in 1995, a projection which is still valid. Using PEEP I data, the study assumed a total ridership on the 23-mile fixed guideway system that was about equal to that projected for the 14-mile sytem under PEEP II. Projections in the 1973 study will be adjusted slightly here, however, to reflect a lower use of transit under the all bus alternative, based upon the recommendation of Department of Transportation Services staff.

The 1975 parking inventory in the CBD is estimated at about 11,200 stalls. This includes 6,600 long-term stalls, typically used by employees, and 4,600 short-term stalls. The short-term

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stalls are intended for shoppers and others needing parking only for a few hours, although the present shortage of all-day parking means many of these are now used by employees.

The rapid transit system will minimize the current deficiency in long-term parking space in the CBD in the future. With 43,000 jobs in the CBD in 1985, adjusted by a factor of 85% to reflect walkers and absentee employees, and assuming that with a rapid transit system 41% of all employees will still drive at 1.7 persons per vehicle, then 3,800 additional long-term parking stalls will be needed in 1985. Table V. 12 shows comparitive parking needs. If 61% of employees remain in their cars under the all bus alternative, as DTS staff suggests, then an additional 6,500 stalls would be needed beyond the present inventory. An additional 4,200 would be needed in 1995 with the rapid transit system, but a considerably greater number, 9,500, would be required under the bus alternative. In addition, the needs projected under the bus alternative for 1995 may be somewhat optimistically low, since it assumes that the 1980 fleet of 450 vehicles will be able to accommodate a fixed percentage of the growing work force through 1995.

TABLE V. 12

Comparison of CBD Parking Needs Under
14-Mile Rapid Transit System and Bus Alternative

		1975 Inventory	Rapid Transit		Bus Alternative	
			Need	(+)Surplus/ (-)Deficiency	Need	(+)Surplus/ (-)Deficiency
1985	Short-term	4,600	3,600	+1,000	3,800	+800
	Long-term	6,600	10,400	-3,800	13,100	-6,500
1995	Long-term	6,600	10,800	-4,200	16,100	-9,500

The 1973 parking plan found that a significant increase in downtown activities that generate short-term parking requirements is not likely. Projecting these needs through 1985, the plan found that the current inventory should be sufficient to meet the demand under the rapid transit alternative.

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VI. GOVERNMENT IMPACTS

1. The Financial Impact on the Public Sector
2. Nonfinancial Impacts in the Public Sector

VI. GOVERNMENT IMPACTS

This chapter focuses on the two alternatives from the viewpoint of state and local government. As is the case with other impacts, there are two basic categories -- financial and nonfinancial. The financial impacts, which are addressed first, include: 1) one-time development costs, e.g. right-of-way, design and construction costs; 2) on-going operation and maintenance costs; 3) total annual costs of the two alternatives; 4) loss of future property tax revenues due to taxable land being used; and 5) use of government land currently in other uses. It should be stressed that public sector costs, particularly for operations and maintenance, are not the total costs to the public since a significant portion of the total costs of both alternatives is incurred by those who chose or are forced to use other modes of transportation, namely their cars. This is particularly true for the bus alternative which provides a lower level of service and thus, shifts significant costs to individuals who have no alternative except to use a car.

The second major section address the nonfinancial impacts on the public sector. Included here are: 1) the anticipated impacts on alternative transportation modes, e.g. the highway system; 2) access to public facilities; and 3) parking requirements.

1. THE FINANCIAL IMPACT ON THE PUBLIC SECTOR

One of the more visible, and hence controversial, aspects of the alternatives is the dollar cost to be borne by the public sector. This section focuses on the cost estimates.

(1) Right-of-Way and Construction Costs

Estimates of the initial or one-time development costs of the 14-mile rapid transit system have been developed by the City's engineering consultant. It should be noted that

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the cost estimate contains a provision for price escalation from the time of the original estimate (late 1974 - early 1975) to the time construction was assumed to occur in the 1976-1982 time period.

For our purposes, we have converted the estimate into the amount that would be required to fund the entire project now; i.e., in 1976. That is, this is the amount that, if collected from the citizens today and deposited in a bank at an interest rate of 5-5/8%, would provide the amount required during the construction period, assuming that construction would start in 1979. Appendix B contains further details regarding the estimated costs. Table VI. 1 below summarizes the cost in terms of present day dollars per household.

TABLE VI. 1

COST PER HOUSEHOLD OF RAPID TRANSIT SYSTEM DEVELOPMENT
(At 1976 Price Level)

	One Time Cost	Annual Cost Amortized Over 20 Years (No Interest)
20% portion to be paid by local government	$ 477	$ 24
Total system cost	2,386	119

Because of anticipated increases in price levels (e.g. inflation) between now and when actual construction is anticipated, the cost of the local share when it must be paid in future (inflated) dollars is expected to approximately $640 per household.

The bus alternative is, of course, a low investment cost alternative. The total investment required is estimated at $31.9 million represented largely by the purchase of new buses. In fact, these are essentially the same costs that will be incurred under either alternative as the rapid transit alternative incorporates a fleet of 363 buses in 1985 to "feed" passengers to the fixed guideway portion of the system.

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(2) On-going Operating and Maintenance Costs

Estimates of the cost of the operating and maintaining both systems have been developed. These estimated, along with pertinent costs, in total and on a per passenger basis, are presented in Table VI. 2 below:

TABLE VI. 2

ESTIMATED OPERATING AND MAINTENANCE COST
(In 1976 Dollars)

	Bus*	Rapid Transit	
	Constant - 1980-95	1985	1995
Total Operations and Maintenance	$31,007,000	$33,556,000	$47,300,000
Cost per Passenger	47.7¢	34.6¢	33.1¢
Total Passengers (million)	65	97	143

Note: As a point of reference, MTL served 51.3 million passengers in 1976 at a cost of 36.7¢ per passenger.
* Based on DTS data, 11/18/76 letter to City Council.

Since the costs in Table V.2 are presented in current (and constant) dollars, the increase in cost of the rapid transit alternative is due to the fact that the system can be expanded to meet future demands. This cannot be done with buses alone, unless major capital improvements such as elevated busways are built to provide a means to move the buses through the CBD. As indicated previously, the city's engineering consultant evaluated busways as a comparable service level alternative to a rapid transit system and concluded that a rapid transit system was a better way to meet a demand for travel at a level above 110-125 million trips per year. (PEEP II, Doc. #41, particularly Chapter VIII).

The cost per trip under either alternative is, of course, a function of both the total cost and the number of trips.

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Ignoring for the moment variations in operating and maintenance (O&M) costs that might result from small changes in the number of trips, the sensitivity of the cost per trip to the number of projected passengers can be estimated. These calculations indicate that if the 1985 ridership is 28% below the projection (e.g. 70 million), then the cost per trip for the rapid transit system would equal that of the bus alternative. Only if the ridership falls below 70 million in 1985 would the estimated cost per trip of the rapid transit exceed that of the bus. For 1995, it would take a reduction of more than 31% (fewer than 99 million) passengers per year) before the cost per trip would exceed 47.7 cents. The net impact of O&M costs is, of course, felt after adjustment for the amount of revenue generated.

Transit revenues are a direct reflection of the fares charged which, in turn, are a reflection of the public policy regarding transit service. For purposes of this presentation, we will assume that the current MTL fare structure of 25¢ for regular fare, 10¢ for students, and free rides to senior citizens will be maintained. It should be recognized that either a change in the fare structure or actual development of ridership different from that projected could change revenues, and thus the net operating cost, significantly. The ridership, however, is projected to increase faster than population growth and to result in a higher percentage of full-fare passengers over time. Thus, at current price levels, the average fare is expected to increase from 17.6¢ per passenger currently to an amount equal to 22¢ in 1995. Based on the assumptions of the city's consultant, the resulting revenues and the estimated net operating cost of the alternatives are shown in Table VI. 3.

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TABLE VI. 3

ESTIMATED NET COST OF TRANSIT ALTERNATIVES
(In 1976 Price Levels and Fare Structure)
(Millions)

	MTL 1976 Actual*	Bus (Constant 1980-95)	Rapid Transit 1985	Rapid Transit 1995
Revenues	$ 8.97	$ 12.12	$ 20.70	$ 31.51
Operating and Maintenance Expense	(19.83)	(31.00)	(33.56)	(47.30)
Net Operating Cost (Loss)	$ 10.86	$ 18.88	$ 12.86	$ 15.79

*For comparison purposes only.

(3) Total Annual Costs

The net operating cost of the selected alternatives will, of course, be the total amount that must be raised from non-operating sources. Under the current tax structure, the principal source of other revenue available to the City and County is the property tax. Table VI. 4, following, summarizes the annual impact of both alternatives and presents the net amount estimated to be required from sources other than the existing transit fare structure.

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TABLE VI. 4

ESTIMATED TOTAL FUNDING REQUIREMENT

	MTL 1976 Actual*	Bus (Constant 1980-95)	Rapid Transit 1985	Rapid Transit 1995
Net operating loss (millions)	$10.86	$18.88	$12.86	$15.79
Oahu households	213,500	241,800 Est.	241,800 Est.	280,000 Est.
Operating loss per household (dollars)	$50.87	$78.08	$53.18	$56.39
Amortization of 20% local share - 20 years**	N.A.	1.35	21.06	18.19
Total cost per Household	$50.87	$79.43	$74.24	$75.58

* For comparison purposes only.

** The 20-year amortization period is arbitrary and was selected because both the City and the State use 20-year bonds as their principal debt financing mechanism. It can be argued that the amortization period should correspond with the anticipated physical life of the various components which is estimated at slightly over 30 years. A 30-year amortization period would reduce the annual total per household costs by about 10%.

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It should be noted, however, that neither the estimate of O&M nor the capital costs reflect any interest costs that may result from debt financing of the 20% local share of the development cost of the rapid transit alternative. The decision regarding the funding mechanism to be used has not been made at this time and hence there is no basis for identifying what financing costs, if any, may ultimately be incurred. However, as an example, financing the 20% local share over 20 years at 5-5/8% would add $16.50 to the annual cost per household in 1985 and $12.60 in 1995. Table V.5 shows the impact of the estimated total funding requirement on the Oahu real property tax.

TABLE VI.5

REAL PROPERTY TAX IMPACT PER $1,000
(1976 price levels)

	Bus (1980-95)	Rapid Transit 1985	Rapid Transit 1995
Annual Requirement including 20-year amortization of development costs - no interest on capital cost	$2.45	$2.30	$2.68
- 5-5/8% interest on capital cost	$2.48	$2.75	$3.13

The assessed evaluation base used to calculate Table V.5 does not reflect estimates of any real, as opposed to inflationary, growth in the base. To the extent that real growth occurs, the actual 1985 and 1995 rates are conservative as the actual rates would be lower reflecting the increased evaluation base. It is interesting to note that the amounts required are less than what would be generated by increasing the general excise tax one-half percent.

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(4) Impact on Property Tax Revenues

City and County property tax revenues are expected to be changed by the rapid transit alternative for two reasons. The first, and most predictable, reason is the loss of taxable property resulting from the acquisition of private land for the system right-of-way. This is estimated to remove some $35.6 million in land and improvements from the property tax rolls. Such removal represents an annual revenue loss of approximately $356,000 at the current 60% evaluation percentage and an average tax rate of $16.66 per thousand.

The second and more speculative impact arises from experiences elsewhere which indicate that property close to transit stations will gain in value due to increased accessibility resulting from the nearby station. The most obvious example is a small retail establishment which suddenly enjoys a rise in sales resulting from the increased level of pedestrian traffic due to a new, nearby transit station. (The increased profit potential would, in theory, be reflected in the value of the underlying real property and eventually in the property taxes paid, although on a city-wide basis property values and taxes may be largely redistributed with little or no net increase in revenues.)

Several other potential revenue impacts were discussed in Chapter V. Their potential impact on city and county revenues is summarized here. It should be noted, however, that net tax revenues may not change since the rapid transit may just redistribute land values on an island-wide basis.

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TABLE VI. 6

RAPID TRANSIT PROPERTY TAX IMPACTS
(1976 Price Level)

Property Tax Revenue Impacts	Annual Impact
Potential gain from increased development around stations	$ 130,000
Loss from the land used	(356,000)
Potential leasing of air rights at 6 stations	400,000
Potential joint development around stations	Not Quantified
Potential value increase in land around station	2,386,000
Net potential increase	$2,560,000

(5) Use of Government Land

The right-of-way for the rapid transit system selected by the PEEP-II study required some 35.5 acres of land currently owned by various public entities (principally the State). In addition, the alignment makes extensive use of the median of existing highways and in some locations proposes to use lanes now used by cars. This right-of-way was assumed to be available at no cost to the project.

The 35.5 acres of public land to be purchased for the rapid transit project was appraised in 1975 at $16 million. Of that amount, approximately $750,000 is for University of Hawaii property and the balance for state property.

It is generally acknowledged that should the State so choose, the value of state land acquired for the rapid transit system could be counted as part of the 20% "local" share of the total cost. If the State only provided the land, it would provide 16% of the total local share.

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2. NONFINANCIAL IMPACTS IN THE PUBLIC SECTOR

This section outlines some of the major nonfinancial impacts expected in, or principally related to, the public sector.

(1) Use of Existing Roadways

Both alternatives will impact the existing roadway system due to the increased number of buses in operation and, in the case of the rapid transit, the conversion of existing lanes to transit right-of-way.

The conventional bus alternative represents an increase of 100 buses over the 1976 fleet. Approximately 80 of the additional buses are expected to be used on routes leading into the CBD with the remaining 20 serving country routes. For comparison, the anticipated number of feeder buses supporting the rapid transit system are shown in Table VI. 7.

TABLE VI. 7

BUS REQUIREMENTS

Rapid Transit	1985	1990	1995
Express buses	202*	275*	349
Local buses	161	196	231
Total	363	471	580
Conventional bus	450	450	450

* Source: Arthur Young estimate

This table again points out the need to keep in mind the major constraint on expansion of the bus system -- namely the inability of the CBD to accomodate significantly more buses during peak periods. The apparent contradiction in Table VI. 7 (e.g. that the rapid transit alternative has more buses after the late 1980's than does the conventional bus) is not, in reality, a contradiction because of that constraint. The

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fixed guideway portion of the total rapid transit system will be capable of delivering significantly more people to their destinations. Thus, the larger bus fleet, with the feeder buses, will be operating outside of the congested CBD area and will be collecting people who will transfer to the fixed guideway in order to complete their trip to or through the CBD.

Significiantly increasing the number of buses in the conventional bus system would not increase the level of service because the bus could neither get to nor through the CBD in "reasonable" travel times. Thus, ridership would not be expected to materially increase because of the extended travel times. The specific congestion impacts of the local and express buses associated with the rapid transit system have not been identified, although the routes are known.

One other roadway impact will arise from the conversion of some traffic lanes to transit right-of-way under the rapid transit alternative. The current (PEEP-II) alignment uses two lanes in the median of the current H-1 freeway from the Halawa Station (Aloha Stadium) to the Elliott Street freeway crossover near the airport. From the H-1 freeway it goes to the Airport Station mauka of the airport and follows Aolele Street through the northern edge of Keehi Lagoon Park. In Kalihi it uses the median of Dillingham Boulevard. The underground portion begins at the Diamond Head end of the Dole Cannery on Dillingham Boulevard and follows Hotel Street through Chinatown and the CBD. Present plans call for Hotel Street to become a pedestrian mall.

is crossed at Waimano Street. The aerial configuration is continued east on Kona Street until it is east of Kalakaua where it moves mauka at McCully to follow the median of Kapiolani Boulevard. At University Avenue the route turns

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up University, where it continues to follow the median, moves past the freeway and continues easterly through the University and along Waialae Road. The only laneage taken in this area would include the left turn lanes from Kapiolani Boulevard to Wiliwili, Paani, Hoawa, Isenberg and Hausten Streets and the left turn lane from University Avenue to Date Street.

It again enters onto the H-1 freeway for all of the St. Louis Heights and Kaimuki areas. Two of the current eight and ten lanes through this section of H-1 are used as are two of six lanes across the Kahala Mall viaduct. The planned Kahala Mall station will also cause a shortening of the left turn lanes on Waialae Avenue under the Kahala station.

One critical impact will be the reducted number of H-1 lanes across the Kahala Mall viaduct. Currently (March 1976) the one-way peak traffic volume in that area is approximately 3,600 vehicles per hour, 10/. The current six-lane section has a one-way maximum capacity of 6,000 vehicles per hour at "level of service" E which is defined as having an "unstable traffic flow", 11/. The existing roadway is capable of providing service near level B, which is stable traffic flowing at approximately 55 mph.

A loss of two lanes at that point (one lane in each direction) would reduce the capacity of the roadway to a maximum of 4,000 vehicles per hour and cause a deterioration in the level of service to D (approaching an unstable flow) or E (an unstable flow).

(2) Access to Public Facilities

The general public will have greater accessibility to public facilities to the extent that the rapid transit would save travel time in comparison to the bus. Table VI. 8 shows expected travel time savings at the peak period from selected

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residential areas to major public facilities. Although time savings with rapid transit on some specific trips are small, these savings would recur and would marginally affect the accessibility and probably the use of public facilities.

TABLE VI. 8

RAPID TRANSIT TRAVEL TIME SAVINGS
FROM SELECTED AREAS TO
MAJOR PUBLIC FACILITIES
(in minutes)

	Mililani Town	Manoa	Hawaii Kai
Aloha Stadium	5	32	39.5
Blaisdell Memorial Center	13	12	12.5
University of Hawaii	27		8.5
Civic Center	12	19	10.5

(3) Parking Requirements

The two alternatives differ significantly in the number of people they are capable of moving to the CBD. As a result, under the conventional bus alternative there will be a significantly greater use of cars to meet that need and hence a greater need for parking facilities in the CBD. Even with the rapid transit system, it is estimated that approximately 2,800 and 4,200 additional parking spaces in the CBD will be required in 1985 and 1995, respectively, to accommodate the number of cars. Under the bus alternative, it is estimated that the parking requirements would be approximately 103% and 126% greater as shown in Table VI. 9, below. Estimated cost of constructing those parking places at a current price of $5,000 per stall are also included in Table VI. 9.

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TABLE VI. 9

ESTIMATED ADDITIONAL PARKING REQUIREMENTS

	1985		1995	
	Nos. Spaces	Est. Cost (Millions)	Nos. Spaces	Est. Cost (Millions)
Bus System	5,700	$28.5	9,500	$47.5
Rapid Transit	2,800	14.1	4,200	21.0
Net Additional Under Bus Alternative	2,900	$14.5	5,300	$26.5

While the majority of the needed facilities may be provided by private enterprise, it has been claimed elsewhere that there is an impact on the public at large as the facilities require a capital investment that is "wasteful" and could (or should) be put to "better" use. As a result, the "savings" of these investments due to a transit system is generally claimed as a public benefit. Further examination, however, points out the fallacy of this approach, at least as it relates to Honolulu.

First, if set at government's "breakeven" price, the cost of providing these facilities is a pass through to the ultimate user with the government acting only as the developer/operator. This cost is addressed in the chapter dealing with Resident Impacts. It is the residents in this case who directly bear the cost.

Second, on an historical basis the City's off-street parking operation has enjoyed significant operating surpluses. In 1975, for example, a surplus of $186,000 was generated from 2,525 stalls. At a capital cost of $5,000 per stall, the current rates would have to be increased approximately 22% to $490 per stall per year or $41 per month to maintain the fund balance. This, however, is still at the lower edge of the rates currently being charged in the CBD. Rates for

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prime locations are being quoted as high as $70 per month, plus the 4% general excise tax.

Thus, clearly from the viewpoint of general government, the impact on parking requirements is not one of cost but of land use. The need for parking, and its requirement in zoning statutes, limits the business density in the CBD but imposes no cost on government. In fact, current experience indicates that a reduced parking requirement can be equated with reduced governmental profit opportunities.

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APPENDICES

A. Documentation of Analysis of Impact of Transportation Capacity on Draft General Plan Population Policy

B. Rapid Transit Development Costs

C. Honolulu Rapid Transit Program Documents

D. Comments Received on Draft Report from City Council Advisory Committee Members and Others

APPENDIX A

DOCUMENTATION OF ANALYSIS OF IMPACT OF TRANSPORTATION CAPACITY ON DRAFT GENERAL PLAN POPULATION POLICY

APPENDIX A

DOCUMENTATION OF ANALYSIS OF IMPACT OF TRANSPORTATION CAPACITY ON DRAFT GENERAL PLAN POPULATION POLICY

The purpose of this appendix is to illustrate the relative ability of the rapid transit and bus alternatives to support future development in the Ewa and Central Oahu areas and East Honolulu as proposed in the Draft General Plan. (The analysis is summarized in Section 1 of Chapter IV: Land Use Impacts). Admittedly, many factors will influence how closely population growth in these areas follows that proposed in the General Plan. The location of new jobs and the actual rate of population growth may be the most significant factors. But since many future residents in Ewa, Central Oahu and East Honolulu will continue to work in the Primary Urban Center (Waipahu-Aina Haina), the capacity of the transportation system to move commuters to and from town may also be a factor in determining how many persons move to these areas. The rapid transit system and the bus would have greatly different capacities to move people. This analysis, therefore, answers the following questions: To what extent would the ability of each transportation alternative to move persons into the Primary Urban Center limit the number of persons who could be added to the Ewa and Central Oahu area and the East Honolulu area?

This analysis produces estimates of the number of people that can be added to Ewa and Central Oahu and East Honolulu under each alternative. The methodology required making assumptions about household characteristics, commuting behavior, lane capacities, and other factors. While reasonable assumptions have been made based on present information, these assumptions may be a poor predictor of actual future behavior. However, each assumption has been applied to both transit alternatives in order to isolate differences arising from their ability to move people. If a particular assumption is low or high the resultant number of new people assigned to the different areas may change, but the relative performance of each alternative would remain the same.

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Population targets for different parts of the island were taken from the October 6, 1976 Draft Report of the New General Plan. The proposed distribution of residential population shown on page 33 of the plan has been reformated in Table A.1 below to show population targets for the areas being studied here.

TABLE A.1

POPULATION PROPOSAL
NEW GENERAL PLAN: OCTOBER 6, 1976 DRAFT REPORT

Area	1975	2000	Increase
Kahala - Waipahu (Primary Urban Area)	422,000	561,000	139,000
Ewa (Secondary Urban Area)	91,000	215,000	124,000
Central Oahu and Wahiawa (Fringe)			
Aina Koa - Hawaii Kai (Fringe)	39,000	62,000	23,000
Other Fringe and Rural Areas	152,000	201,000	49,000
Total	704,000	1,039,000	335,000

1. GENERAL METHODOLOGY

Two screen lines, one near the east and west ends of the Primary Urban Center shown in the General Plan, were selected through which town-bound commuters would have to pass. The remaining capacity for person trips through these lines was

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calculated under conditions that would exist under each alternative. The remaining capacity for trips was then translated into additional population that would be possible in residential areas beyond the screen lines.

The east screen line crosses Kalanianaole Highway at East Hind Drive in Aina Haina as shown in Figure A.1. The west screen line crosses three major roads in the Pearl City area: H-1 freeway at Kaonohi Bridge; Moanalua Road at Kaonohi Bridge; and Kam Highway at Kalauao Bridge. It can be reasonably argued that the bottleneck for Leeward traffic bound for the CBD would occur much closer to town, for example, in the Shafter flats area of H-1 freeway. The purpose of this analysis, however, is to look at access to the whole Primary Urban Center, which will stretch from Kahala to Waipahu in the year 2000 according to the Draft General Plan. Consideration of the Primary Urban Center as a whole is made in this analysis since much of the new employment in the Primary Urban Center may develop in areas to the west of downtown in the future.

2. CALCULATING REMAINING CAPACITY FOR PERSON TRIPS

The remaining capacity for town-bound trips through each screen line was calculated as follows:

Remaining Capacity for person trips = (Eventual # lanes
X vehicles/lane/hour
X # hours in peak period
X # persons/vehicle)
- (Current vehicles in peak period
X # persons/vehicle)

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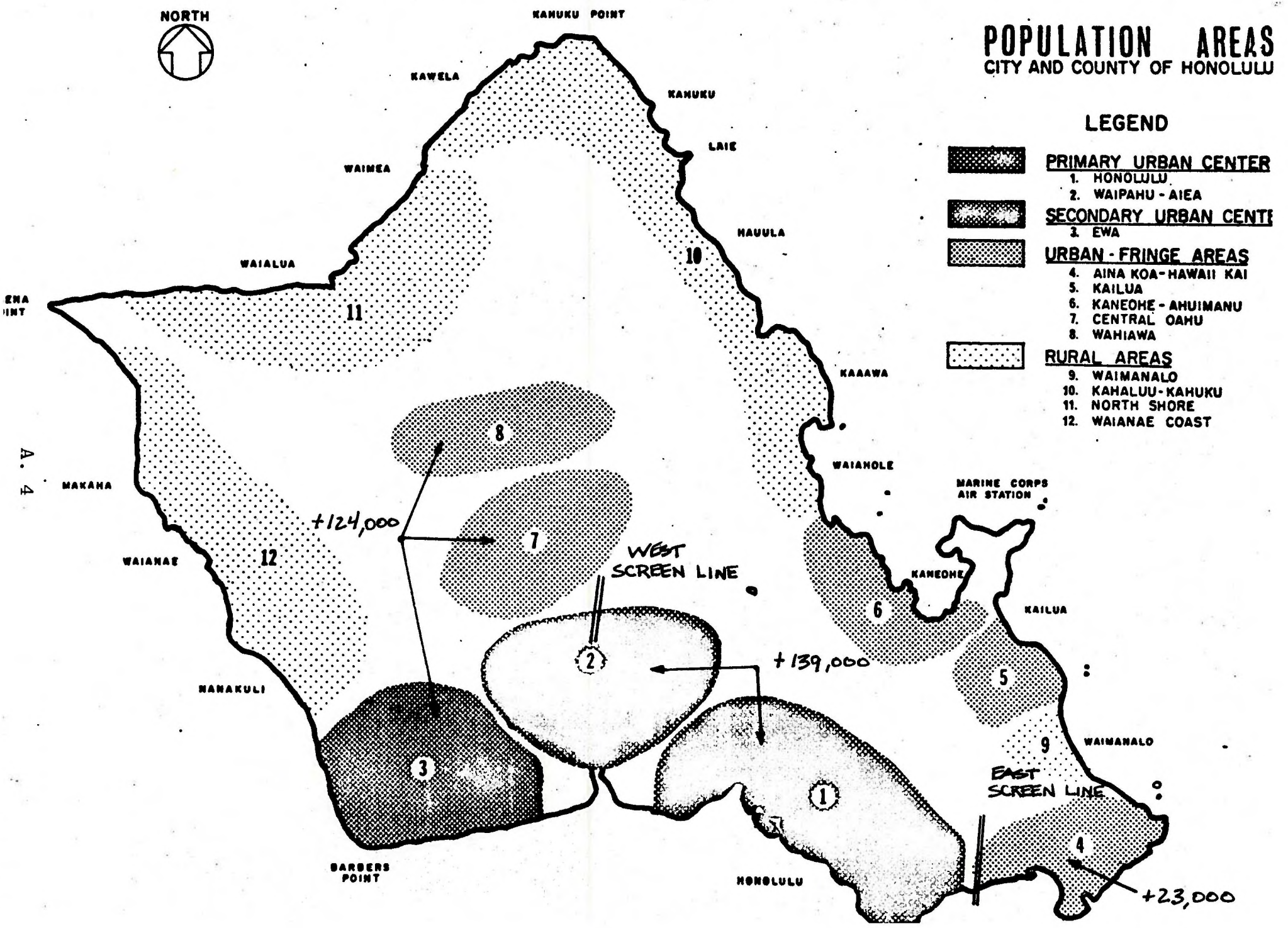
FIG. A.1 SCREENLINES & DRAFT GENERAL PLAN POPULATION INCREMENTS



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(1) Eventual Number of Lanes and Their Use

There is no planned addition of laneage to the four roads at the screen lines. The number and use of lanes on each road for the two alternatives is shown in Table A.2. Moanalua and Kam Highway lanes are the same in both alternatives.

One of the four lanes on H-1 under rapid transit is an express bus lane carrying passengers to the Halawa station. Both alternatives have two-car lanes on Kalanianaole Highway. One additional lane will be borrowed from the non-peak direction as is the current situation. This extra lane will remain a bus/carpool lane under the bus alternative, but will be an exclusive express bus lane bound for the Kahala station under rapid transit.

TABLE A.2

INBOUND ROAD LANEAGE AND USE AT SCREEN LINES, 1995:

RAPID TRANSIT AND CONVENTIONAL BUS

	Rapid Transit	Bus Alternative
H-1	2 Car 1 Express Bus	3 Car
Moanalua Road	2 Car	2 Car
Kam Highway	3 Car	3 Car
Kalanianaole Highway	2 Car 1 Express Bus	2 Car 1 Bus/Car pool

(2) Vehicles Per Lane Per Hour and Number of Hours in Peak Period

For purposes of this analysis, the peak period, which is now over one hour in length, has been extended to two hours. This reflects the trend towards slightly staggered work hours. Assumptions about the vehicle capacity of in-bound lanes are reflected

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in Table A.3. This table shows capacities of some lanes in various uses so that total capacity of each road can be accumulated for each alternative according to the descriptions in Table A.2.

Assumptions about the vehicle capacity of lanes on a particular road may vary considerably and depend in large part on the level of service that is desired. In projecting the capacities reflected in Table A.3 the following guidelines were used. The basic vehicle capacity/lane/hour was taken from a September 1976 DOT memorandum which studied the maximum number of vehicles that might be permitted on Oahu based on the capacity of the major corridors. The vehicle capacity/lane/hour suggested at sites near the screen lines was: Kalanianaole Highway, 1,200; H-1, 1,800; Moanalua Road, 1,000; and Kam Highway, 1,200. Under the bus alternative, the capacity of the bus/car pool lane on Kalanianaole Highway was lowered to 600 vehicles/land/hour for this study to give those drivers an attractive speed advantage over non-car pool drivers in the other two lanes.

The bus volumes shown in Table A. 3 are drawn from Table A. 4, which shows the number of in-bound buses per hour passing each screen line under each alternative. The rapid transit bus volumes are taken from PEEP II (PEEP II, Doc. #16). The bus volumes are based on current routing of buses increased by 39% to reflect expansion of the fleet to 450 buses.

(3) Number of Persons Per Vehicle

1.4 passengers/car and 3.25 passenger/car pool are assumed for 1995 calculations based on 1976 counts by Alan Vorhees and Associates. Buses are assumed to carry 60 persons per vehicle, 50 seated and 10 standees.

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TABLE A.3

CALCULATION OF TOTAL LANEAGE CAPACITY UNDER ALTERNATE LANE USES

	Transit Alt.	Road	Lane Use	# of Lanes	Vehicles/ Lane/ 2 Hrs.[1]	Total Vehicles	Persons/ Vehicle	Total Persons
1.	Both	Kal.	Cars	2	2,400	4,800	1.4 [3]	6,700
2.	RT	Kal.	Exp. Bus	1	404	404	60	24,200
3.	Bus	Kal.	Bus/ Car Pool	1	39 Bus 1,200 Car[2]	39 1,200	60 3.25[3]	2,300 3,900
4.	RT	H-1	Car	3	3,600	10,800	1.4 [3]	15,100
5.	RT	H-1	Exp. Bus	1	159	159	60	9,500
6.	Bus	H-1	Car	4	3,600	14,400	1.4 [3]	20,200
7.	Both	Moanalua	Car	2	2,000	4,000	1.4	5,600
8.	Both	Kam	Car	3	2,400	7,200	1.4	10,000
9.	Bus	H-1, Kam, Moanalua	Bus in Mixed Traffic	-0-	-	39	60	2,300

(1) DOT capacity estimates, 9/76.

(2) Assumes 600 cars/lane/hour in bus/car pool lane to ensure speed advantage over other lanes carrying 1,200/lane/hour.

(3) Alan Vorhees and Associates, 9/29/76 count.

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TABLE A.4

IN-BOUND BUSES AS SCREEN LINES: 1995

	Rapid Transit(1)			Bus(2)		
	Local	Express	Total	Local	Express	Total
East Screen Line	28	174	202	29	16.7	19.6
West Screen Line	16.5	62.8	79.3	12.5	7	19.7

(1) PEEP II, Doc. #16

(2) Based on present bus scheduling increased by 39% to reflect expansion of fleet to 450 buses.

(4) Current Vehicles and Persons in Peak Period

Table A.5 shows recent vehicle counts for each road and estimates the total number of person trips. Bus counts are estimated from current bus schedules. The number of passengers per car are based on recent counts by Alan Vorhees & Associates. Estimates of bus ridership are based on MTL staff estimates.

3. CALCULATION OF ADDITIONAL POPULATION POSSIBLE

The remaining capacity for person trips at the screen lines was translated into additional population outside the primary urban center as follows:

Additional Population Possible = Remaining Capacity for Person Trips
÷ # peak period trips in peak direction/dwelling unit
X # persons/dwelling unit.

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Each dwelling unit is assumed to generate .75 person trips in the peak direction during the peak period. This is based on 1974 DTS survey data in the Hawaii Kai area which found .45 auto trips/dwelling unit in the peak direction at 1.65 persons per car. This figure represents the trips generated from a bedroom type community or suburb. The Draft General Plan calls for developing a Secondary Urban Center in Ewa, which would attract some peak period trips and decrease the volume to Honolulu through the west screen line. Therefore, an alternate assumption has been made for Ewa, Central Oahu and Wahiawa area in which each dwelling unit generates only .50 person trips in the peak direction during the peak period. This reflects a diversion to Ewa of one-third the peak flow that would be generated by new population in the area.

Finally, an average of 3.3 persons/dwelling unit is assumed based on 1975 estimates of Oahu population and housing units.

TABLE A.5

CURRENT IN-BOUND VEHICLE VOLUMES FOR
2-HOUR AM PEAK: 6-8 AM

	Road	Vehicle Type	# of Vehicles	Persons/ Vehicle (1)	Total Persons	Date of Vehicle Count
1.	Kalanianaole Hwy.	Cars	4,285	1.39	5,983	9/76, Vorhees
2.	Kalanianaole Hwy.	Car Pool	1,178	3.25	3,834	9/76, Vorhees
3.	Kalanianaole Hwy.	Local Bus	2	45	90	
4.	Kalanianaole Hwy.	Exp. Bus	16	60	960	
5.	H-1	Cars	4,915	1.4	6,900	7/75, DOT
6.	Moanalua Hwy.	Cars	3,236	1.4	4,500	
7.	Kam Hwy.	Cars	6,652	1.4	9,300	3/75, DOT
8.	H-1, Kam Hwy., Moanalua Hwy.	Local Buses	9	60	540	
9.	H-1, Kam Hwy., Moanalua Hwy.	Exp. Bus	5	60	300	

(1) Cars: actual or assumed based on 9/76 count by Alan Vorhees & Assoc.
Buses: MTL staff estimates of occupancy.

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TABLE A.6

REMAINING CAPACITY FOR PEAK PERIOD PERSON TRIPS THROUGH SCREEN LINES INTO PRIMARY URBAN CENTER: 2-HOUR PEAK IN 1995

	1995 Total Capacity		Current 2-Hour Volume	Remaining Capacity	
	RT	Bus		RT	Bus
West Screen Line	(1) 40,200	(2) 38,100	(5) 21,500	18,700	16,600
East Screen Line	(3) 30,900	(4) 12,900	(6) 10,800	20,100	2,100

(1) From Table 3: Sum of "Total Person" count from lines 4, 5, 7, 8

(2) From Table 3: Sum of "Total Person" count from lines 6, 7, 8, 9

(3) From Table 3: Sum of "Total Person" count from lines 1, 2

(4) From Table 3: Sum of "Total Person" count from lines 1, 3

(5) From Table 5: Sum of "Total Person" count from lines 5, 6, 7, 8, 9

(6) From Table 5: Sum of "Total Person" count from lines 1, 2, 3, 4

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TABLE A.7

COMPARISON OF RAPID TRANSIT SYSTEM AND BUS ALTERNATIVE AS A CONSTRAINT ON ACHIEVING GENERAL PLAN POPULATION TARGETS:

EWA, CENTRAL OAHU, WAHIAWA

	General Plan Proposes to Add:	Transport Capacity Will Allow:		Number Not Accommodated:	
		Bdrm. Community in Ewa	Urban Center in Ewa	Bdrm. Community in Ewa	Urban Center in Ewa
RT	124,000	82,000	124,000	42,000	-0-
Bus	124,000	73,000	110,000	51,000	14,000

AINA HAINA - HAWAII KAI

	General Plan Proposes to Add:	Transport Capacity Will Allow:	Number Not Accommodated:
RT	23,000	88,000	-0-
Bus	23,000	9,000	14,000

Table A.6 shows the remaining capacity for work trips in 1995 at the east and west screen lines under both the rapid transit and bus alternatives. In Table A.7 this remaining capacity has been converted into additional population using the factors described above. Table A.7 shows the additional population possible under each transit alternative in comparison with the number targeted in the Draft General Plan.

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APPENDIX B

RAPID TRANSIT DEVELOPMENT COSTS

APPENDIX B

RAPID TRANSIT DEVELOPMENT COSTS

This appendix presents a reconciliation of the capital costs used in Chapter V with those presented in other PEEP documents. The basic capital cost estimate used in this analysis is the City's estimate of $582.6 million for development of the 14-mile fixed guideway system. That estimate as presented is shown in Table B.1 (PEEP-II, Doc. #17B).

TABLE B.1

CAPITAL COST ESTIMATES FOR THE 14-MILE FIXED GUIDEWAY SYSTEM
($ Million)

Guideway and Stations	$178.23
Power and Control	39.97
Yard and Shop	13.55
Vehicles	57.75
Subtotal Direct Construction	289.50
Contingency - 10%	28.95
Administration and Engineering Expense - 13%	41.40
Total Construction	359.85
Right-of-Way and Relocation	51.02
Contingency - 10%	5.10
Administration - 3%	1.69
Total Right-of-Way	57.81
Total Construction and Right-of-Way	417.66
State Excise Tax	14.39
TOTAL PROJECT (1975 Price Levels)	432.05
Escalation (1976-1984)	150.53
TOTAL PROJECT (Escalated Dollars)	$582.58

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The escalation shown in Table B.1 is based on annual rates of 10% for right-of-way and 8% for all other items and the time from the preparation of those estimates in 1975 until actual expenditures were anticipated based on an assumed project schedule. The project schedule, however, assumed that work would begin in January 1976.

For our purposes, the total estimated cost in Table B.1 was escalated two additional years at 8% annually, thus, reflecting an assumed two year delay in project initiation. This escalated cost, $681.4 million, was used to develop an estimated cash flow schedule for the years 1978-84 based on the PEEP-II cash flow schedule. (PEEP-II, Doc. #17B).

The present value of the 1978-84 cash requirements was determined by using the appropriate factors reflecting the time between 1976 and the time and amounts reflected in the cash flow projection at an interest rate of 5-5/8%. That rate was selected to maintain consistency with prior work and is also in line with discount rates normally used in evaluating public projects. The result is a present value of the estimated total construction cost of $509.4 million or $101.9 million for the total 20% local share. A present value amount is that amount if compounded annually at the specified interest rate, in this case 5-5/8%, will yield the actual amount needed in the future. Thus $509.4 million invested now at 5-5/8% would be sufficient to meet the future cash flow which totals $681.4 million during the 1978-84 period. Based on 213,500, an estimate of households on Oahu in 1976, this is equal to investing $477 per household in 1976 for the local share. The annual cost over 20 years to borrow $477 today at 5-5/8% interest is $40.33.

AR00052831

APPENDIX C

HONOLULU RAPID TRANSIT PROGRAM DOCUMENTS

APPENDIX C

HONOLULU RAPID TRANSIT PROGRAM DOCUMENTS

The following reports have been produced during the Honolulu Rapid Transit Program, Preliminary Engineering & Evaluation Program Phase II, PEEP II. They are listed below according to the Reference File Numbers assigned by the Department of Transportation Services.

AR00052833

PEEP II DOCUMENTS

DTS Reference File No.	Title
1A	"Feasibility Study of The H-1 Freeway System for Fixed Guideway System," Technical Report, Daniel, Mann, Johnson, & Mendenhall, March 1974.
2A	"Feasibility Study of the Lunalilo Freeway Route for Fixed Guideway System," Technical Report, Daniel, Mann, Johnson, & Mendenhall, March 1974.
4A	"Study of Alternative Alignments in The Dillingham Boulevard Corridor," Technical Report, Daniel, Mann, Johnson, & mendenhall, April 1974.
5A	"Study of Alternative Routes in the Moiliili/ University Area," Technical Report, Daniel, Mann, Johnson, & Mendenhall, May 1974.
6A	"Provisions for the Elderly and Handicapped for The Fixed Guideway System," Technical Report, Daniel, Mann, Johnson, & Mendenhall, May 1974.
10	"Landscape Criteria for Honolulu Rapid Transit System", Iwamoto and Associates, October 1974.
11	"Rapid Transit Preliminary Engineering Evaluation Program - Car Storage & Maintenance Yard - Honolulu, Oahu, Hawaii - Soil Reconnaissance Report," Walter Lum Associates, Inc., October 1974.
12	"Preliminary Subsurface Investigation Proposed Honolulu Rapid Transit System, Underground System," Dames and Moore, September 1974.
15	"A Study of Rubber-Tired Transit Technology," Technical Report Applied Technology Laboratory, Daniel, Mann, Johnson, & Mendenhall, December 1974.
16	"Patronage and Revenue Estimates," Technical Report, Alan M. Voorhees & Associates, Inc., November 1974.
17B	"Honolulu Rapid Transit System, Preliminary Engineering and Evaluation Program, Phase II, Final Report," Daniel, Mann, Johnson, & Mendenhall, November 1976.
20A	"Manual of Recommended Policies for The Construction and Operations of The Rapid Transit System," Technical Memorandum, Daniel, Mann, Johnson, & Mendenhall, March 1975.
21	"Study of Fixed Guideway Operational Concepts," Technical Report, Daniel, Mann, Johnson, & Mendenhall, July 1974.

DTS Reference File No.	Title
22A	"Benefit-Cost Analysis," Technical Memorandum, Environment Capital Manager, Inc., March 1975.
23A	"Preliminary Investigation of Structures Adjacent to Underground Segment," Technical Memorandum, Daniel, Mann, Johnson, & Mendenhall, January 1975.
24	"Manual of Recommended Policies for The Construction and Operation of The Rapid Transit System," Technical Memorandum, Daniel, Mann, Johnson, & Mendenhall, March 1975.
25A	"Short-Range Bus Plan for Oahu (FY 1976-1981 incl.)," Technical Report, City and County of Honolulu, Department of Transportation Services, December 1975.
27	"Technical Document, Design Criteria and General Specifications, Honolulu Rapid Transit Project - Volume I through IV," Daniel, Mann, Johnson, & Mendenhall, 1975.
28	"Honolulu Rapid Transit System, SUMMARY REPORT, Preliminary Engineering and Evaluation Program, Phase II," City and County of Honolulu, Department of Transportation Services, June 1975.
29	"Honolulu Rapid Transit System, Relocation Plan," Survey & Marketing Services, Inc., June 1975.
36A	"Report on Management Plan," Gottfried Consultants, Inc., September 1975.
37	"Bus Shelters and Information Centers," Clarence Lee Design Inc., June 1975.
38A	"Financing the Honolulu Rapid Transit Program," Smith, Barney and Co., July 1975.
40	"Honolulu Rapid Transit System, General Plan Amendment Application," Draft, Donald Wolbrink & Associates, Inc., June 1975.
41	"Analysis of Transit Alternatives," Daniel, Mann, Johnson, & Mendenhall, April 1976.
42	"Additional Technical Information for Alternatives Analysis," Honolulu Rapid Transit Program, Department of Transportation Services, April 1976.

DTS Reference File No.	Title
44	"Summary Report, Preliminary Value Capture Analysis," Honolulu Rapid Transit Program, Department of Transportation Services, July 1976.
45	"Evaluation of Supplementary Waterborne System, Alan M. Voorhees, & Associates, Inc., July 1976.
46	"Environmental Impact Analysis," and Technical Appendices, U.S. Department of Transportation, Urban Mass Transportation Administration and City and County of Honolulu, Department of Transportation Services, February 1976.

APPENDIX D

COMMENTS RECEIVED ON DRAFT REPORT FROM CITY COUNCIL ADVISORY COMMITTEE MEMBERS AND OTHERS

APPENDIX D

COMMENTS RECEIVED ON DRAFT REPORT FROM CITY COUNCIL ADVISORY COMMITTEE MEMBERS AND OTHERS

Index of Comments Received

INDEX NO.	ORGANIZATION
1.	League of Women Voters of Honolulu
2.	Akinaka & Associates, Ltd.
3.	Downtown Improvement Association
4.	Oahu Metroplitan Planning Organization
5.	Robert Pittman
6.	3M Community Council
7.	City Department of Transportation Services
8.	Daniel, Mann, Johnson & Mendenhall of Hawaii
9.	Oahu Development Conference

RECEIVED

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OFFICE OF COUNCIL SERVICES
CITY COUNCIL
HONOLULU, HAWAII

February 17, 1977

The Honorable Marilyn Bornhorst
Chairman of the City Council
Honolulu Hale
Honolulu, Hawaii

Dear Mrs. Bornhorst:

The League of Women Voters appreciates this opportunity to comment on the draft of the Arthur Young Report. Since the consultants used material from previous studies, we realize that we may be commenting in some instances, not on the Arthur Young analysis, but on the content of the other studies. Nevertheless, here are some of the questions we feel the report raises.

Two major reasons are given in the report to support the need for a fixed guideway. Neither is completely convincing. The first reason is population increase. Projected figures are cited. Yet, these figures are controversial. If population does not grow as projected, will there be a need for a major capital expenditure?

The second reason stated for a guideway is inability of a bus system to handle more people--the constraint being the physical capacity downtown. However, no data is included to support this constraint. Could different routing patterns ease the congestion?

Perhaps the biggest weakness in the report is that it has not brought out clearly what the impact of a fixed guideway, or lack of one, would be on the community. Nor has it visualized the effect on the individual of the two methods of transportation. It has not answered the question, how would the guideway, compared with the bus system, affect a typical commuter from Manoa? From Kailua? An auto driver from Hawaii Kai?

Parking, except in the down town area, is not discussed in the report. This is a seeming contradiction as a destination area would have less need for parking than the terminals. What would the parking facilities be at the various stops?

Pollution and energy are other subjects which receive little attention. Yet, these are important long range aspects for the community to consider when making transportation decisions.

The economic stimulation federal money will bring to the Island is tempting. The advantages are desirable, but would there be accompanying problems? For example, if more workers were brought in from the Mainland, would our long range unemployment problems be exacerbated?

LEAGUE OF WOMEN VOTERS OF HONOLULU 1232 WAIMANU ST. / HONOLULU, HI. 96814

AR00052839

Mrs. Bornhorst February 17, 1977

If you have any questions on what we have written, please feel free to call us.

Very truly yours,

LEAGUE OF WOMEN VOTERS OF HONOLULU

Dorothy Lum

Dorothy Lum, Co-Chairman
Transportation Committee

LEAGUE OF WOMEN VOTERS OF HONOLULU 1232 WAIMANU ST. / HONOLULU, HI. 96814

AR00052840

AKINAKA & ASSOCIATES, LTD.
CONSULTING ENGINEERS
Civil and Structural Engineering • Land Surveying

ROOM 201, AKINAKA BLDG. • 1339 NORTH SCHOOL STREET, HONOLULU, HAWAII 96817 • TELEPHONE 845-329

ARTHUR Y. AKINAKA
RONALD T. YAMA
ROBERT Y. AKINAKA

February 9, 1976

RECEIVED
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CITY COUNCIL
HONOLULU, HAWAII

Mrs. Marilyn Bornhorst, Councilwoman
Chairperson, City Council's Advisory Committee
for the Transportation Cost/benefit Analysis
City and County of Honolulu
City Hall
Honolulu, Hawaii 96813

Dear Honorable Mrs. Bornhorst:

I herewith offer the following comments pursuant to your invitation for constructive criticisms of the Arthur Young & Company's draft.

It is my belief that my participation on your committee has its value in responding to the consultant's draft primarily from the perspective of a resident. While I had hoped by now to report on expressions from our Kalihi-Palama neighborhood organizations, I learn that the data in the draft is not ready for release. Therefore, my comments are made as an individual having the benefit of access to the draft and coupled with a fair knowledge of the concerns of the peoples of our particular locality. My comments should not be interpreted to encompass the neighborhood people's views on mass transit since I believe thus far by far the greater majority are not sufficiently informed to be able to react. Their favorable reaction thru adequate communication should be strived for but I sense that consensus is not that easily obtainable.

Modes of communication, if response is sought before decision making, have to take into consideration the variegated ethnic as well as socio-economic composition of our neighborhoods. Such modes of communication, in my opinion, attained a highest level of efficiency in the Model Cities program. Presently, community organizations and recently organized Neighborhood Boards can assist in this effort, e.g. distributing flyers for study or having speakers for their evening meetings.

It is believed that ways and means of public financing for the local share of the capital costs and proposals for paying the O & M costs and as these relate to household budgeting would be basic information that the resident has to have.

In order to assure a viable system, ridership estimates I believe should be checked through responses from residents. I wonder whether the number of automobile drivers would decrease as per forecasts, if any, or this is to be effectuated by constraints and regulations.

Very truly yours,

Arthur Y. Akinaka

Arthur Y. Akinaka
Consulting Engineer

AR00052841

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OFFICE OF COUNCIL SERVICES
CITY COUNCIL
HONOLULU, HAWAII

DOWNTOWN IMPROVEMENT ASSOCIATION 1000 BISHOP STREET/SUITE ... HONOLULU, HAWAII 96813 PHONE 531-2081

February 8, 1977

Mrs. Mabel Chung
Council Services Office
City Hall
Honolulu, Hawaii 96813

Dear Mabel:

Subject: Arthur Young Cost-Benefit Analysis

I'm writing this to place on the record my oral comments at our recent meeting on this matter. These comments follow:

(1) If the study is to serve any useful purpose, I believe it must reflect the expert advice of the consultant on which alternative the council should adopt.

(2) Most of all, I believe the consultant should prepare a succinct summary of not more than six pages which outlines the salient points of his conclusions and recommendations. The rationale for this is that many busy executives will never read beyond this point unless their interest is stimulated. This summary would therefore furnish the reader all he needs to know, unless he wishes to examine the supporting data.

(3) I concur with the suggestions made that the dollar savings to the average man made possible by Rapid Transit should be emphasized in the report.

Sincerely,

Clarence E. Beck
Executive Director

AR00052842

DOWNTOWN IMPROVEMENT ASSOCIATION 1000 BISHOP STREET/SUITE 602 HONOLULU, HAWAII 96813 PHONE 531-2081

February 1, 1976

DIA REACTION TO THE DELEUW, CATHER PARKING STUDY OF 1973

DIA has had long-standing objections to the DeLeuw, Cather Parking Study of 1973. These objections were publicly stated to the Council, to the consultants and to the Department of Transportation Services at the time. Summarized they are as follows:

1. The consultant utilized the wrong work population for the downtown area. They used a figure of 22,700 rather than the correct datum of 29,850 utilized in the Rapid Transit Study.

2. The study further assumes that no future, short-term demand increase will occur in Downtown, since such needs can be taken care of by an expanded bus system. This rationale ignores the fact that a number of new buildings have come into inventory in Downtown since 1972 and DIA has knowledge of several projects in the advanced state of planning which will create new short-term parking demand in Downtown. A good example is the new Federal Building of 550,000 square feet which will be occupied on the periphery of Downtown within the next 60 days. Because of a failure of federal plans to include off-street parking sufficient to meet the needs of this building as laid down in the Comprehensive Zoning Code, this will create an increased demand on all parking facilities in Downtown and the vicinity of the structure.

3. The DeLeuw, Cather study assumed car occupancy higher than that reported by the State Department of Transportation in an actual survey in 1971 and 1972 (1.7 in the study versus 1.5 in actual practice).

4. The study gave no credence to demand generated outside of the Downtown area but contiguous to the boundary.

AR00052843

5. Match-up of availability and demand: Apparently DeLeuw, Cather utilized a surplus parking stall anywhere in the Downtown area to satisfy a demand, no matter what the distance, despite their assumption that a parker will walk 800 feet for short-term parking. DIA believes from study of other expert opinion on parking that a short-term parker will not walk farther than a 600-foot radius (the approximate length of two football fields) for short-term parking. Utilizing this as a criterion, we come up with a net deficiency of 940 short-term and 2,597 long-term parking stalls within a 600-foot radius of the center of the intersection of the Fort Street Mall and Hotel Street Summary.

In summary, DIA felt that the only saving grace for the DeLeuw, Cather study was that it did establish that a minimum shortage of some 3,800 stalls will exist in Downtown in 1995 *. Other than this, we have serious questions as to the professional merit of the DeLeuw, Cather study submitted in 1973. To our knowledge, this study has never been adopted by the City Council or the Department of Transportation Services nor have its findings ever been acted upon to rectify the shortage in Downtown.

Clare Beck
Executive Director

* with a functioning Rapid Transit System

AR00052844

OMPO

Oahu
Metropolitan
Planning
Organization

Suite 1174
Pacific Trade Center
190 S. King Street
Honolulu, Hawaii 96813
(808) 523-4178
(808) 548-2638

Executive Committee

DENNIS O'CONNOR
Chairperson

BENJAMIN J. CAYETANO
Vice Chairperson

MARILYN R. BORNHORST
Member

KEKOA D. KAAPU
Member

Senate Members

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CLARENCE Y. AKIZAKI

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WILBERT S. HOLCK

GEORGE KOGA

FRANK N.C. LOO

TORAKI MATSUMOTO

RUDY PACARRO

Executive Director

ROY A. PARKER

February 18, 1977

RECEIVED
FEB 18 4 13 PM '77
CITY COUNCIL
HONOLULU, HAWAII

MEMORANDUM

TO: Marilyn Bornhorst, Chairman
Advisory Committee on Transportation

FROM: Roy A. Parker, Executive Director RAParker

RE: Arthur Young Study

This report in no way compares equals.

A 450 bus system is not comparable to a fixed guideway/ feeder bus system. At least as a very minimum, we should compare our costs on a per person basis but then we would still have to add in additional costs to increase the capacity of other sectors of the transportation system so that we are comparing systems that move comparable numbers of people.

In other words, we should be comparing a fixed guideway/ feeder bus system with a 450 bus/expanded highway, parking facility system.

RAP:fk

xc: Mabie

AR00052845

2/15/77

Please forgive the handwriting but we are in the process of moving and the typewriter is packed.

As to the report on the rapid transit, I could not find any major faults in the report except for the failure to include the handicapped. This has been a fault of the Young study from the start. Just why I never been able to learn. Perhaps it is because I not been able to attend many of the sessions: "out of sight, out of mind."

As you know I fully support rapid transit and I am continuously trying to sell the idea to my friends, both able and disabled.

There is one caution the City Council should keep foremost when considering, planning or studying a rapid transit system and that is "Remember the METRO."

Warmest aloha.

signed/Bob

(Robert C. Pittman)

AR00052846

TO: Arthur Young and Company Feb. 15, 1977

FROM: Chester Koga

SUBJECT: Comments from the 3-M Community Council on the Transportation Cost-Benefit Analysis

Enclosed please find the comments relating to the Transportation Cost-Benefit Analysis from the 3-M Community Council. The comments that I have attached are from my reading the report with the Planning Committee of the 3-M Council reviewing the draft of my comments. The Planning Committee will also send their own comments.

We appreciate the opportunity to make comments on a projects which will have long lasting impact on our community as well as all of Honolulu.

The approach that we have taken was on some of our current understanding of the state of our community and particularly how understandable the analysis was. Comments are both general and specific to particular sections.

The intent and spirit of our comments are towards producing the best analysis of the problems/impacts for the purpose of making the 'right'decisions.

AR00052847

COMMENTS ON THE TRANSPORTATION COST-BENEFIT ANSLYSIS

General Comments:

1. Client Identification: It was our understanding that this analysis was to directed to our decision makers, namely, the City Council and the State Legislature. The analysis falls short of its objectives to provide for a helpful decision making tool which outlines the costs and benefits of different courses of action.

2. If the objectives of the analysis was to provide for general public understanding of the impact of a rapid transit system or a conventional bus system, here again the analysis provides a limited analysis of the impact to the general public.

3. There appears to be some ommissions in the analysis in that there are little mention of the impacts on the RT or all bus system with regard to the following areas:

   a. It is almost a given that future fuel costs will be higher and the effects of this fuel cost not really addressed.

   b. The state through the Dept. of Transportation and other policy making bodies are currently looking at ways to limiting the number of cars on the roads. Companies are also suggesting ways of adjusting work schedules. These considerations havenot been given thought in the analysis as to future impacts.

Specific Comments By Sections:

Sec. I, p. 11. Recommendations and Conclusions.
If an impact to a group, idividual, or government is identified, then it would be incumbent on the tanlysis to outline the probable impacts if certain courses of actions are taken.

Sec. II. p. 1-3. Travel Times.
It is unclear whether or not the travel times and percent time savings reflect the travel time from the point of the trip origination, ie. where one gets on the RT to destination; or travel time from home to travel on a feeder bus/auto to travel on RT to travel on feeder bus to desitination. Relative travel times and time saved could be affected by how the travel times are calculated.

Sec. II. p. 10. Automobile Usage.
The assumption that the affluent would be diverted from auto usage is erroneous. One could safely assume that the affluent do not take advantage of the RT system currently, and in the future with a RT system it would not change their auto usage patterns. The effect of diversion from the auto as a result of RT would be marginal at best, the more limiting factor for auto usage will be the higher cost of operating and purchasing a new car.

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Sec. II. p. 9. Table II. 3.
This is a similar comment made in reference to Sec. II. p. 1-3. relating to travel times. Families in all communities mentioned would necessarily have to take a feeder bus to the transit line.

Sec. II. p. 12. Resident Mobility
The notion that the RT system may facilitate access to recreational facilities not a good example. It appears that the City plans for more neighborhood recreational facilities rather than cross town or regional facilities. The example would be more applicable to access to 'events' where one may want to travel cross town. The use of the term younger may need to be qualified, as one could safely assume that the travel patterns of lower elementary aged kids will continue to be taken by the parents.

Sec. II. pl 14. Table 11.5.
Reference to Kanewai Field is misleading with the notation (UH) attached to it. Kanewai Field is a City facility which is located towards St. Louis, and not part of the UH.

Sec. II. p. 12. Resident Mobility
"Easy walking distance of a bus stop" -- this is definitely a subjective opinion. What may be easy walking distance may be extremely difficult for others, as the elderly is often characterized as having decreased ambulatory ability with advanced age.

Sec. II. p. 15. Resident Mobility
Travel time to work appears not to be a "significant" incentive to use the RT system. Travel times would certainly be a consideration in seeking employment but generally the job is the more significant influencing factor.

Sec. III, p. 20. Construction Disruption
The impact on the small business should be expanded as the impact is treated lightly. The fact that a small business may fail should be of importance to decision making. Further, the McCully-Moiliili area is primarily made up of small businesses, and the loss of a business is of particular concern to us.

Sec. IV, p.1. Land Use Impacts
The impact of the RT system is understated in this section. The pressures associated with a transportation system may be inevetible. Although there may be no land use designation changes, there will be definitly be changes in the patterns of usage of land adjacent to transit stops. One of the changes would be to cause higher densities around the transit stops.

Sec. IV. p. 4. Land Use Impacts
(2) Conclusions for Honolulu. The conclusions are for Toronto, San Francisco, and Lindonwold, but the conclusions would have to be streched to apply to Honolulu.

AR00052849

Sec. IV, p. 5. Conclusions for Honolulu
The local impact is something that the 3-M areas is most concerned about as residents in the areas already feel that the area is over-developed and that the social impacts for future development would be a definite unwelcomed change. The community is well aware of the potential for growth under current soing, and is looking towards ways not to have the 3-M areas developed to its 'full' potential.

Sec. IV. p. 12. Land Value Changes
It appears improbable that land values would decrease, rather, it would be more correct to say that land values would increase at a slower rate.

Paragraph 2. What eveidence?

Sec. IV, p. 15. How was 5% increase arrived at?

Sec. IV. p. 19. Residential Relocation
Relocation is definitely not 'probable', it the RT system as planned is implemented, then it is definite that relocation will take place. When one is dealing with relocation one cannot look at the residents as a typical body, each resident has his/her own needs, and characteristics. Further, it appears more emphasis is placed on the units rather than the people who live in them are addressed.

Sec. IV. p. 20+. Safety
The use of information from the National Highway Traffic Safety Adiministration is valuable for comparison purposes, but traffic deaths attributed to autos in Honolulu was only 97 in 1976. It may be grossly overstated to say that a RT system may save 24 lives per year.
Even though historically, RT vehicles have lower rate of accidental deaths, it should be noted that potentially more people could die in one accident of an RT vehicle. As an example: with wervice at capacity, 350 people could be killed in one accident-- three time that are killed currently by auto accidents.

Section IV. p. 23+. Noise Impacts
It is difficult to understand how the addition of the RT System would have an insignificnat impact on the level of noise. The fact that it would create a negligible increase on the dbA scale, it will certainly have impact on the social well-being on the residents close to the transit lines. Just taking into account the physical irritability and not considering the social consequences is an unjustice to thoses who would be directly affected.

Sec-. IV, p. 26+ Air Pollution
p. 27. It would be presumptions to assume that there will be a decrease in autos on the road. The number of autos are geometrically related to population. Air pollution is an additive item and its would be more appropriate to treat the entire scheme with a colum showing the total amount of pollutants as a result of cars, bus, and the RT system. As previously

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noted in the report, there will be an increase in the number of buses as part of the feeder system, and if one bus creates as much pollutants as five cars, the total impact needs to be considered. The effects of the increase in energy output to operating the RT system should not be treated lightly and the operations of the RT system is contigent on being able to produce the energy to operate this system. The entire system should be looked at in terms of a non-degradation of the air quality.

Sec. IV, p. 29+ Aesthetic Environment.

The aesthetic environment is definitely not 'incidental'. The impact of an Rt stystem on the aesthetics of our community should be looked upon as an important part of the overall impacts. Much of Oahu's and Hawaii's beauty is with the fact that it is often a visually attractive place to live. Having to travel and view an RT system along th skyline would not be especially appealing.

AR00052851

2535 So. King Street
Honolulu, HI 96826
February 21, 1977

RECEIVED
FEB 25 2 34 PM '77
CITY COUNCIL
HONOLULU, HAWAII

The Honorable Marilyn Bornhorst
Chairperson, City Council
City & County of Honolulu
Honolulu Hale
Honolulu, HI 96813

Dear Marilyn:

The 3M Community Council Planning Committee appreciates the opportunity to comment on the draft "Assessment of Two Mass Transit Alternatives for Honolulu". We are deeply concerned about the impacts of proposed transit systems as they will greatly determine the future of our community.

What follows is a summary of concerns raised during discussion of the study. As a decision-making tool, the study seems to be inadequate because the analysis is not fully developed nor does it result in recommendations. Moreover, the study does not contain any summary of their findings or any analysis of the potential impact of the various government policy decisions that could be made on the project to promote its operation. The study provides a limited analysis of the impact to the general public, i.e. the cost-benefit is not easily understandable and clear.

As examples of the above,

the study does not address the effects of future energy costs and the impact of other transportation policy alternatives such as staggered work hours and car pooling;

the land use impacts to include land value are dealt with lightly, especially when they apply to the 3M area. The physical changes in land use due to a fixed guideway and its stations should be subject to more comprehensive and detailed study;

xc: A. Young, Mayor

AR00052852

the impact on small businesses during the construction phase is not treated thoroughly enough. In an area characterized by small businesses, 3M would be greatly affected by the disruption caused by construction on such a large scale;

the need for relocation of residents where a great portion of those affected are in the 3M area is not fully addressed;

the question of aesthetic impact on the environment deserves a more deliberate consideration as part of the overall impact.

We feel, therefore, that the assessment does not provide adequate information and analysis that clearly indicates whether or not the benefits of Rapid Transit are equal to the costs entailed.

Sincerely,

Carl T. Takamura
3M Planning Committee

AR00052853

DEPARTMENT OF TRANSPORTATION SERVICES
CITY AND COUNTY OF HONOLULU
HONOLULU MUNICIPAL BUILDING
650 SOUTH KING STREET
HONOLULU, HAWAII 96813

FRANK F. FASI
MAYOR

KAZU HAYASHIDA
DIRECTOR

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1977 FEB 24 AM 11 46
CITY CLERK
HONOLULU, HAWAII

February 23, 1977

Honorable Marilyn Bornhorst, Chairman,
and Members of the City Council
City and County of Honolulu
Honolulu, Hawaii 96813

Gentlemen:

We have reviewed the draft report, "An Assessment of Two Mass Transit Alternatives for Honolulu", prepared by Arthur Young and Company for the City Council in January, 1977, and we have the following comments.

The consultant is making comparisons of a fixed-guideway rapid transit/bus system with 539 vehicles (176 rapid transit vehicles and 363 buses) carrying 97 million passengers in 1985 to an all-bus system with 450 coaches carrying 65 million passengers in 1985 with no consideration for the facilities required to take care of the additional 32 million people that would be carried by the rapid transit/bus system. Comparisons should be made off from the same base. An excellent example of this omission is at the bottom of Page V-2 where it is stated:

> "The bus alternative is, of course, a low investment cost alternative. The total investment required is estimated at $31.9 million represented largely by the purchase of new buses."

The cost of widening existing streets, constructing additional freeway lanes through the central core and providing additional parking that would be required under the 450-bus alternative would obviously make it the <u>high</u> investment alternative rather than the <u>low</u> investment alternative as stated.

Those additional 32 million riders would have to find alternative means of travel if the rapid transit system is not constructed. The cost of operating the additional automobiles to accommodate those 32 million trips plus the cost to maintain the additional highways required without rapid transit should be included in the bus alternative operations and maintenance cost.

The addition of these additional capital and O&M costs to the costs generated for the 450-bus alternative would put both alternatives on an equal footing. It would also make a considerable difference in the comparisons given in the report.

XC: Arthur Young, Mabel

D7-1

There is another alternative to consider. The recently developed rapid transit alternatives analysis presents a maximized bus system based on the premise of no major construction. This system would entail 640 buses that would carry 84 million passengers in 1985. The 1985 operations and maintenance cost of this system would be approximately $16,000,000 more than that of the fixed-guideway/bus system. The impact on automobile traffic would be considerable; in order to operate 640 buses efficiently, it would be necessary to reserve exclusive lanes for buses on most of the major streets through the urban core. The alternative to accommodate auto traffic would require widening of these major streets. The patronage of this system would still be some 13 million people short of that of the fixed-guideway/bus system.

Additional comments on individual parts of the report are as follows:

Foreword Par. 2

"We wish to . . . identify the probable impacts or effects of the two alternatives and not the 'benefits,' as the definition of benefits is relative and subjective."

The above is in conflict with the statement on page 1-4, line 7:

"The scope of work emphasized the development of cost and benefit that would be well understood by many components of the community such as . . ."

Page I-8

Assumptions related to "Peak-Period Traffic Congestion" and "Staggered Work Hours" appear to be in conflict. If a person leaves earlier for work with the same starting hour, he will "waste" time or probably ask for an earlier work shift. This means that although his travel time is the same, the total time away from home is longer.

Pp. I-12 to I-15

Under "Description of the Alternatives"

1. The transit alternatives should be discussed in terms of projected total transportation mobility needs, i.e., public mass transit versus private vehicular travel. Based on the total need, a good transit system will allow freer private movement and vice versa a poor transit system will cause a great degree of traffic congestion.

2. Under Table I.1 the figures under "Capacity of System" are estimated patrons and not reflective of capacity, i.e., under a given condition, a specific transit system will attract a certain number of patrons.

AR00052855

Page I-13	The number of fixed-guideway vehicles in Table I.1 is 176 in 1985 and 264 in 1995.
Page I-15	Where are Figures I.1 and I.2 mentioned in the third paragraph?
Pp. II-1 & II-3	Last sentence re perceived benefits . . . What does it mean?
Pp. II-6 & II-7	Regarding BART's experience -- the discussion has no bearing and does not contribute to Honolulu's proposed system.
Page II-21	Figures at the bottom of the page: $13,150 and $1,760 do not match the Table.
Page IV-10	The second sentence in the second paragraph is inconsistent with the last paragraph of Page IV-17.
Pp. IV-15 to IV-17	Regarding land value changes by using Toronto's experience . . . Is Honolulu comparable to Toronto regarding existing high land cost before rapid transit is implemented? Also, it is stated that "land-value changes outlined . . . are highly speculative in nature." If this is so, why not omit or place it in the appendix?
Page V-2	How about amortizing the per household cost shown in Table V.1 and in the last sentence prior to that Table?

We have reviewed the comments submitted to you directly by DMJM and ODC, and we concur with them.

Thank you for giving us the opportunity of reviewing the Arthur Young report.

Respectfully,

HHB/HT:ek

KAZU HAYASHIDA
Director

CONCUR:

RICHARD K. SHARPLESS
Managing Director

AR00052856

DMJM

DANIEL, MANN, JOHNSON, & MENDENHALL
OF HAWAII

9 February 1977

PHILLIP J. DANIEL, 1912-1972
ARTHUR E. MANN
S. KENNETH JOHNSON, 1912-1974
IRVAN F. MENDENHALL
T. K. KUTAY
DAVID R. MILLER
SVEN B. SVENDSEN
ALBERT A. DORMAN
STANLEY M. SMITH

Mrs. Marilyn Bornhorst
Chairman, City Council
City and County of Honolulu
City Hall
Honolulu, Hawaii 96813

Dear Mrs. Bornhorst:

Enclosed is a copy of my comments on the Arthur Young report on Transit Alternatives. If there are questions relative to any of the comments, please let me know.

Thank you for the opportunity of reviewing the draft report since we are all interested in presenting to the public an accurate and objective report on this very important program.

Sincerely,

DANIEL, MANN, JOHNSON, & MENDENHALL

Shu Magota
Project Manager

SM/hk
Enclosure
cc: Mrs. Mabel Chung

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CITY COUNCIL
HONOLULU, HAWAII

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210 WARD AVENUE · HONOLULU, HAWAII 96814 · TELEPHONE 538-6747 CABLE: DIMJIM HAWAII

AR00052857

Comments on the Draft Report (1-12-77) on Transit Alternatives
by Arthur Young & Co.

Pg. I-6: It states that in the benefit/cost ratio approach, a single dollar value is assigned to each transit impact and therefore assumes that all sectors of the community share consumer views as to real costs of benefits. It then goes on to state that this becomes a "disqualifying factor" of the benefit/cost ratio approach due to the "diverse nature of local community values".

In the next paragraph the following statement is made: "Individual residents are represented in the study as groups having common interest, life style and requirements".

These appear to be conflicting statements!

Pg. I-7: 1st paragraph. "Peak Period Traffic Congestion", second sentence. One can assume that peak period will certainly get longer in the future but at the same time, it is not unreasonable to assume that certain motorists will continue to travel during the height of the peak period and hence add to the greater congestion. Also, congestion should be measured not only in intensity but also duration.

Pg. I-10: 1st paragraph, last sentence. What does "negative assurance" mean? If this means that all data supplied and used are not good, then why use them since the entire report is based on them!

Pg. II-6: Last paragraph. BART is carrying over 120,000 per day. If the 40,000 figure is for only the trans-bay tube crossing, it should be so stated!

Pg. II-10: 1st paragraph. The "27,600 commuting motorists diverted to rapid transit" is during peak hours and should be so stated since the daily commuting motorists diverted number over 60,000!

Pg. II-21: 3rd paragraph. The figure $13,150 must be a typo error!

Pg. III-5: Table III-4. The figure "39" should be "89".

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Pg. III-6: Table III-5. The number of induced jobs appear low. What is basis for this number and what average wage rate was assumed?

Pg. III-18: Last paragraph. "And the extent of inconvenience caused by removing pedestrian walkway across Hotel St." We would not disagree with the inconvenience factor but pedestrian walkways will not be removed!

Pg. IV-10: 1st paragraph. "The pressure for converting agriculture land to urban uses might be attributed to the conventional bus alternative to the extent that it would encourage greater centralization of future development." This is an entirely erroneous statement since with conventional buses, access to the urban core is constrained and, therefore, this will force greater de-centralization of activities to outlying areas!

Pg. IV-11: Table IV-2 and Appendix A. This analysis is mis-applied since the critical screenline is in the urban core on either side of the downtown area and not out in Pearl City area. We recognize the constraint on Kal. Hwy. to Hawaii Kai but to Ewa, the number of buses used in the analysis reflects only those needed to serve the Ewa area in 1995 under the original General Plan policy which indicated a population distribution of 100,000 less than that reflected under the new General Plan. Under the new General Plan basis, one could provide additional buses as necessary to meet demand.

Pg. IV-17: Last paragraph, last 2 sentences. This conflicts with summary statement on pg. VI-6, item (4). If net effect of transit on land value may be little or nothing, then the $2.5 million given in pg. VI-6 is wrong or should be qualified. Also, see pg. V-9, Table V-6.

Pg. V-3: Table V-2. The O & M costs given in 1976 dollars for the rapid transit system in 1985 and 1995 has been derived by adjusting the 1975 dollar estimate to 1976 dollar estimate by using 8% inflation. The 1975 dollar estimate for the bus system is $28.71 million or $31.0 in 1976 dollar, which then gives the cost per passenger of 47.7¢.

Pg. V-5: Table V-3. For the bus system, the revenues should be $12.12 million, the O & M cost $31.0 million, and therefore the deficit is $18.88 million.

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Pg. V-6: Table V-4. Again by correcting the figures for the bus system the operating loss per household should be $78.08 and the total cost per household is $79.43.

Pg. V-6: Table V-4 and Pg. V-7, Table V-5. There is a glaring omission on these tables since there is no mention that under the bus system, additional transportation capacity is needed which would add substantially to the cost per household. Since highway facilities are not normally financed through property tax, a foot note should be added to this effect.

Pg V-11: 3rd paragraph. "In Kalihi it used the median of Dillingham Blvd., which would be widened to replace the space used." Not so! Basically, the existing right-of-way and the roadway will remain the same.

Pg. V-12: 2nd paragraph. "The planned Kahala Mall station will also reduce Waialae Avenue under the Kahala station from six to four lanes." The two inside lanes will only be partially used and not for the entire length between Hunakai and Kilauea Streets. Since these are left-turn lanes, it merely means shortening the left turn pockets!

Pg. VI-5: After item (7), suggest adding another item. Should be added to indicate that without rapid transit, additional investment would be required for new streets and highways and furthermore, a new highway could create some serious social and environmental problems.

Pg VI-6: Item (2). The cost per passenger for the bus system is 47.7¢ and not 39.5¢.

Item (3). Potential impact on property tax - Bus cost must include other costs such as new highways, although it most likely will not be on property tax. An additional and very important point missing in the entire cost analysis is that the current fare of 25¢ is less then break-even and, therefore, the more riders attracted, the greater the deficit. But the whole objective of investing in a modern transit system is to attract more riders. This is why one cannot use the operating deficit as a yardstick for comparison but must <u>use cost per passenger or benefit/cost ratio measures</u>.

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Appendix A. Table A-3, item 2. Vehicle/Lane/2 hrs. should be 404, the Total Vehicles 404, and the Total Persons 24,200.

This entire analysis is redundant since if more capacity is needed, one has the option to extend the fixed guideway system to Hawaii Kai or Ewa. Furthermore, the constraint is in the urban core and not near Pearl City!

AR00052861

OAHU DEVELOPMENT CONFERENCE
[illegible] MERCHANT STREET · HONOLULU, HAWAII [illegible]

MEMO TO: Mrs. Marilyn Bornhorst, Chairman
Honolulu City Council

FROM: Aaron Levine, Member
City Council Advisory Committee

January 31, 1977

SUBJECT: Arthur Young report on Transit Alternatives
(1-12-77 draft)

FOREWORD

In the Foreword, the report states that the definition of benefits is "relative and subjective". Therefore the report is not concerned with the benefits of the transit alternates. This is an incredible statement since every other city developing or considering transit systems has carefully documented the benefits so that decision-makers have some basis for their decisions.

On page I-4, the report states that the "scope of work emphasized the development of cost and benefit data that would be well understood...". That was the purpose of this entire project, so why discount it in the foreword?

INTRODUCTION
Brief history of mass transit in Honolulu

A minor point at the outset of the report: On line one of section 1, the OTS was started in 1964, not 1966. Technically, it was not the "projections made during the course of the study that established the need for improved transit capability by the 1980s." It was the result of the development of a series of new models dealing with land use, the economy, population, traffic, etc. which produced the results.

Why is it necessary to list in this project the work conducted by PEEP II? (on page I-2) All through the report there is extraneous material like this or redundancy that tends to obscure the main points of the analysis.

Scope & Objectives

On page I-5 the report states that this analysis was not to result in a single cost/benefit ratio. That may be true, except that the basis for the simple number exemplified by a cost/benefit ratio is usually spelled out so that everyone can understand the components producing the number.

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Analytical approach and assumptions

On page I-7 the report states that "this presentation of findings does not attempt to make independent value judgements regarding the potential cost or benefit of any individual impact." Why not? The consultant was retained to examine the problem and disclose the results of his concentrated thought on the subject and the experience which the consultant was paid to furnish.

On page I-8 the report states and repeats later that the result of future growth and congestion will be merely a lengthening of the peak traffic period. There is little indication of the increased costs associated with that congested condition, in terms of longer motor idling periods, more driving to find terminal parking points, increased accidents caused by a thickening of traffic volumes, etc. Although some of these are touched upon in separate places in the report, there is minor attention devoted to them.

Methodology

On page I-9 there is mention of "limited surveys" being conducted. Needless to say, the statistical reliability of the surveys should be established before conclusions of such importance to the community are reached.

Page I-10 has a reference to "negative" assurance applied to all other data provided by City and State officials. That's an intriguing phrase. What does it mean?

Description of the alternatives

Page I-13 (Table 1.1) indicates that express buses would be a component of the rapid transit system, but not of the conventional bus system. That is the major factor affecting the operating costs of the former system and should be spelled out.

Although page I-15 tells about the limited capacity of buses, it makes the point in an obscure way. And the conclusion on busways is handled in one sentence by referring to PEEP II. With so much verbiage in this report, perhaps the conclusion should be restated in summary form here instead of referring the reader to still another report of several years back.

Organization of the report

Instead of placing the Summary Findings and Conclusions of the analysis in Chapter VI, it should be placed at the beginning of the report.

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Impact on residents
Travel time

Of far greater importance to the reader are the actual costs associated with the alternatives. I suggest this section on travel time be at the end of this chapter, not at the beginning.

Some of the travel times in Table II.1 are suspiciously high. For example, from Kahala Mall to Manoa campus of the University, which is only 3 stations away, the table calls for 29 minutes. It then adds 3 minutes to Ala Moana Center which is 3 more stations distant. The first number seems too large, particularly in view of the latter number.

Aggregate time savings to commuters

I do not question the $4.57 per hour value assigned to waiting time. However, would the Bureau of Labor Statistics data provide a better basis for computation, using the various wage rates for white collar, blue collar, etc. and then averaging them on the population breakdown of Honolulu?

Level of service

The important fact that "increasing demand for public transportation would continue to be absorbed by automobiles..." is mentioned occasionally in the report, but is never stated as a fundamental point and converted to dollar amounts for those who would not receive public transportation service.

In discussing service, the report totally overlooks speed of travel as the major factor it has proven to be in many transportation studies.

Impact on individual mobility
Conclusions from other areas

Why use BART as the first system and most frequently mentioned "other" system for comparative purposes? It is operating far below its design capacity because of limited hours, an unusually large number of cars inoperative, and very rigid safety standards beneath the Bay. Its configuration and suburban type of orientation make it almost totally different than the Honolulu proposal.

The report discloses no knowledge that an official five-year BART Impact Study is underway by HUD, DOT and Metropolitan Transportation Commission. It has not only found that an additional bridge would be needed if BART did not exist, but it also found that many people are still using their automobiles because BART does not offer evening return service or full weekend service. Obviously, an automobile is needed. Incidentally, the Impact Study also found that 24% of the riders on BART are minorities, - the same percentage of minorities in the Bay Area.

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If other areas are selected, what about using Lindenwold? Insofar as configuration is concerned, it is more analagous to the Honolulu proposal. Also of interest is the fact that 40% of the Lindenwold riders were former motorists and that number is increasing. That system did not overrun its original cost estimates and was paying 100% of its operating and maintenance costs out of its fare box until recently.

Travel time and automobile usage

The report states "...a total of 20,000 automobiles would be freed up. Most of these cars would be retained by their owners". That is an interesting conclusion without the basis stated for it. Perhaps a different conclusion might be significant to this analysis.

Benefits of mobility for residents

On page II-15 considerable space is devoted to the savings in time for senior citizens and students getting to the library or the University. Although this is of interest in the total picture, it is not nearly as important as the last 8 lines on that page noting the importance of transportation to employment. That is a major point that deserves major attention, not only for accessibility in terms of time but for the cost of having a vehicle in order to keep a job when reliable public transportation does not exist. For the hourly wage worker and the moonlight job holder, promptness can be a critical factor in holding a job.

Instead of so many tables and charts devoted to senior citizens and students, the residence of employees and their associated places of employment and travel distances would be of interest.

Savings in household expenditures for transportation

I suppose it is an unfortunate typo on page II-21, and the $13,150 should be $3,039 as stated two pages later. But the really serious point overlooked is that twice as many people would be able to experience that saving by 1995 if rapid transit were operating. Can't that be expressed in some clear way? It is probably one of the most important parts of the entire analysis, yet this section is overly short and receives so little attention in a long report on the general subject. BART receives so much more space!

Impact on business and labor
Overall economic impacts

Why use only the 80% Federal share of the rapid transit construction cost as the base for calculating the local economic impact of the project? Assuming that the 20% local cost would be spent anyway is only one conclusion that can be drawn. Another is that those

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funds would go for a far less labor intensive project of a totally different character thereby decreasing the construction industry employment opportunities.

Tables III.1 and 2 dealing with overall economic impact are confusing in their presentation. They should be made comparable in format, years and clarity. They could also be adjusted for local versus mainland purchases which would affect the results.

On page III-7, there is reference to 1974 dollars. Why not current dollars or 1980 dollars? Using an old base simply complicates the issue further.

On page III-8 there is reference in the first paragraph to 700 to 1600 direct construction jobs on the transit system. How does that reconcile with the 2300 to 3500 jobs mentioned on page III-5?

Operational effects on the demand for labor

Isn't there a better way of expressing the labor requirements of the two systems? Actually the rapid transit system would use less employees per thousand riders, but that is not clear in the text.

Perceived business impacts in the CBD

The report mentions that "selected" building owners, etc. were interviewed and that several interesting "trends" emerged in the responses.

Needless to say, the scope of knowledge, personal experience, and sometimes totally unrelated factors influence the replies. There should be great caution exercised in selective inquiries of this type.

Construction disruption

Page III-20 describes the negative impact of the transit construction but does not seem to give equal importance to the new business locations and opportunities that will result.

Impact on the tourism industry (section 5; not 6)

In the section discussing possible new resort areas on Oahu on page III-21, there could be consideration of the possible future extension of the rapid transit line to West Beach, thereby linking it with Waikiki. Imagine the possibilities for evening travel for tourists. And the possibilities of the labor force reaching either West Beach or Waikiki any hour of the day by rapid transit. On the following page there are several negative statements that are contestable.

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First, tourists might very well use an attractive transit system unlike any other in beauty, reliability and directness, rather than line up for the overcrowded unpredictable bus. And the statement that they might spend less on shopping and more time travelling shows lack of understanding of travel behavior.

Impact on the general community
Experience in other cities

The sweeping statement that development would probably have occurred throughout the metropolitan Toronto area is contrary to the facts of the case. The transit line helped spark the renaissance of the Toronto area in planning as well as in transportation. Fred Gardner, the Chairman of Metropolitan Toronto, championed the cause for growth and cooperation with the city and suburbs. Those of us who knew him and consulted with him saw how he and Matthew Lawson, Toronto's planning director at the time, changed that city from a provincial center into the dynamic business capital it has become. It would not have happened "anyway"!

The reference to Camden, New Jersey and the Lindenwold line is totally inaccurate. That city's decline started in 1950 and accelerated by the 60s, before the Lindenwold line was built or even proposed.

Conclusions for Honolulu

On page IV-6 there is discussion of a $13 million operating deficit by 1985 and $13 million by 1995. It should be made clear that those figures are based on a 25¢ fare and a particular modal split. What if the ridership is 20% less or higher, and the fare increased?

Presenting isolated figures this way attaches reliability to them which they do not really possess.

On page IV-10 it states that the conventional bus alternative would encourage greater centralization of future development. Shouldn't it be just the opposite?

Table IV-2 is difficult to understand. I know what it is attempting to convey, but it is not doing it.

Land value changes

The point is made here and elsewhere that there would simply be a redistribution of values if the islandwide rapid transit system is built. This is not necessarily true. Transportation can generate new land uses and new resulting values that might not otherwise be conceived. Two dramatic ones that I am fully familiar with for the past twenty years are Place Ville Marie in Montreal and Penn Center in Philadelphia. They completely refute that sweeping generalization.

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Experience in other cities

Once again BART is used with the statement that it has been in "full" operation. Due to its limited operation, BART is carrying as many people in one day as it was designed to carry in one hour!

The report's conclusions about Lindenwold are so luke-warm that I wasn't certain it was the system I know. And instead of stressing time saved, what about the travel costs saved? That is particularly important on a line that has diverted so many motorists to transit.

Conclusions about Honolulu

This section overlooks the value capture and joint development possibilities that even UMTA is stressing. This section concludes on page IV-17 with the prize throwaway line of the year. It assumes that everything in a community will happen anyway. If not in one section, then in another. Experience throughout the U.S. proves how untrue that statement is.

Residential relocation

In noting the characteristics of the properties that would be affected by the rapid transit alignment, it should be noted that those in McCully-Moiliili (139 of the total 162) are in a high-rise, high-density area where there is daily pressure to realize the full zoning potential. From the taxation standpoint and market standpoint, they are jeopardized. Incidentally, that private development would not be accompanied by a relocation assistance program, as rapid transit would be.

Safety

Although the dreadful cost figures are cited for accidents and deaths by various transportation modes, can't the costs between bus and rapid transit be better expressed on a comparative basis?

General environmental impacts
Air pollution

Is one to conclude from Table IV.10 on page IV-27 that the rapid transit vehicle really emits 63% more pounds of pollutants per vehicle-mile than an automobile?

Parking requirements in the CBD

Shouldn't this section review the economic impact of the varying parking requirements? For example, the cost of the parking facilities, the removal of land from higher uses and the consequent tax impact, etc.

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Government impacts

The last sentence of the first paragraph on page V-1 is very important. It should be stressed under Personal Benefits as well. It appears buried far back in the report and therefore not considered to be important.

The financial impact on the public sector

Table V.1 on page V-2 presents the "cost of rapid transit system development per household".

That simple figure can be totally misused. It is only one facet of the total cost picture. It is like stating that the average household has 6.6 ears. That may be true, but there's a lot more information that must accompany that figure.

The ongoing operating and maintenance costs

On page V-4 there is reference again to the 25¢ fare. Why should that fare be used? The ride would be of a different quality. Service reliability would be far superior.

Every other American major city, with the exception of Atlanta, is now charging more than Honolulu. Even DMJM and Smith, Barney computed the cost at 35¢ and 50¢ fare structures. It would be reasonable to use them, particularly in Table V-3 on the following page.

Impact on property tax revenues

On page V-8 the report repeats its incorrect allegation that rapid transit "may just redistribute land values on an islandwide basis". It shows lack of knowledge of the generative effects of dynamic transportation improvements.

Non-financial impacts in the public sector

Throughout this section it is stated that lanes of the H-1 Freeway will be removed for rapid transit structure. It should have been pointed out to the consultant that there are alternatives that have not been fully decided upon. For example, the use of either bank of the freeway would result in little change of lanes. The point is that the alternatives are discounted and the worst picture is presented by the consultant.

Summary
Impact on the general community

Although rapid transit would employ more people, it should be spelled out that 1528 employees would be transporting 100 million plus passengers, in contrast to 1202 transporting X million riders.

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The section painting a happier relocation picture for the bus system alternatives should also mention the continuing threat of building intensification in the McCully Moiliili area so that it does not leave the impression that nothing will happen if the bus alternative is selected.

What is meant by the reference on page VI-5 to "low-use" apartments? It's not what it sounds like, I hope!

Government impacts

The figures quoted on page VI-6 could be misleading since the rapid transit system is worth more in its reliability, service, etc. The figures quoted tell only part of the story.

On the following page, there is the following statement: "Increased travel after 1985 with the conventional bus alternative generally means a lengthening of the peak traffic period at congested traffic levels." That doesn't sound too bad, only because it is stating a portion of the total condition. That is my feeling about the entire report.

AR00052870

FOOTNOTES

This list documents footnotes numbered in the text. See Appendix C for PEEP II documents referenced in the text.

1. "Disaggragate Behavioral Model of Automobile Ownership," S. R. Lerman and M. E. Ben-Akiva, Transportation Research Record, No. 569, 1916, pp 34-50.

2. University of Hawaii, Survey Research Office, Student Evaluation Questionnaire, 1974.

3. "Inter-Industry Study of the Hawaiian Economy," Dept. of Planning and Economic Development, 1972, pp 24-25.

4. "1974 Visitor Expenditure Study," Hawaii Visitors Bureau, July 1975.

5. "Interim Report on the Future of the Oahu Economy," Dept. of General Planning, City and County of Honolulu, July 1976, p 7.

6. "A Review of Some Anticipated and Observed Impacts of the Bay Area Rapid Transit System," Peat, Marwick, Mitchell & Co., 1974.

7. "Safety in Urban Mass Transportation," Report No. UMTA RI-06-0005-75-1, Battelle's Columbus Laboratories, for Urban Mass Transportation Administration, Washington, D. C., April 1975.

8. "Draft Environmental Impact Statement, Volume I," Honolulu Rapid Transit PEEP I Program, Dept. of Transportation, UMTA, for City and County of Honolulu, 1972.

9. "Downtown Honolulu Comprehensive Parking Study," De Leuw, Cather & Co., 1973.

10. Letter to Honorable Jack Larsen from E. Alvey Wright, Director, Dept. of Transportation, October 7, 1976.

11. Highway Capacity Manual, 1965, Highway Research Board, Special Report 87, Chapter 9.